The Secretary of Energy
Washington, DC 20585

Secretarial Determination of the Adequacy of the Nuclear Waste Fund Fee

Based on the attached *U.S. Department of Energy Nuclear Waste Fund Fee Adequacy Report*, I determine that neither insufficient nor excess revenues are being collected in order to recover the costs incurred by the Federal Government that are specified in the Nuclear Waste Policy Act of 1982, as amended. Accordingly, I do not propose an adjustment to the Nuclear Waste Fund Fee at this time.

Steven Chu

JAN 16 2013

Steven Chu

Date

Attachment

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U.S. Department of Energy
Nuclear Waste Fund
Fee Adequacy Assessment Report

January 2013

U.S. Department of Energy
Washington, D.C.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND DEFINITIONS

2012$	Constant year-2012 dollars (dollars with purchasing power equal to the dollar's purchasing power in 2012)
BRC	Blue Ribbon Commission on America's Nuclear Future
CPI	Consumer Price Index
DOE or The Department	U.S. Department of Energy
EIA	Energy Information Administration
EPRI	Electric Power Research Institute
FY	Fiscal Year
GDP	Gross Domestic Product
GI	IHS Global Insight
HLW	High-Level Radioactive Waste
kWh	Kilowatt-hour
MTHM	Metric Tons of Heavy Metal
NRC	U.S. Nuclear Regulatory Commission
Waste Fund	Nuclear Waste Fund
NWPA or the Act	Nuclear Waste Policy Act of 1982, as amended
OMB	Office of Management and Budget
SNF	Spent Nuclear Fuel
TIPS	Treasury Inflation-Protected Securities
TSLCC	Total System Life Cycle Cost
TWh	Terawatt hour
ZCB	Zero Coupon Bond

EXECUTIVE SUMMARY

The purpose of this *U.S. Department of Energy Nuclear Waste Fund Fee Adequacy Assessment Report* (Assessment) is to present an analysis of the adequacy of the fee being paid by nuclear power utilities for the permanent disposal of their spent nuclear fuel (SNF) and high-level radioactive waste (HLW) by the federal government. In accordance with the Nuclear Waste Policy Act of 1982, as amended (NWPA), the costs for disposal of commercial SNF are to be funded by fees sufficient to offset expenditures for nuclear waste disposal activities. The NWPA established the initial fee at one mill ($0.001) per kilowatt-hour (kWh) levied on electricity generated and sold. Section 302(a)(4) of the NWPA requires the U.S. Secretary of Energy (Secretary) to annually review the fee to evaluate whether its collection will provide sufficient revenues to offset the commercial utilities' share of the total life cycle costs of the federal government's disposal activities. In the event the Secretary determines that either insufficient or excess revenues are being collected to recover the costs incurred by the federal government, the Secretary is required to propose an adjustment to the fee to ensure full cost recovery. To date, the Secretary has never proposed an adjustment to the fee.

This Assessment follows the approach employed by the U.S. Department of Energy (DOE or Department) from 1983 to 2009 of conducting a detailed evaluation of the projected costs of the plan for safe management and disposal of SNF and HLW and comparing those costs to the projected revenues from the fee. To evaluate the adequacy of the one mill per kWh fee, 42 scenarios were created and tested based on the assumed disposal system described in Part 2.1 below, three cost estimates (base case, high, and low), two defense share percentages (0% and 20%), and seven economic forecasts. The results of this Assessment demonstrate that there is currently no compelling evidence that either insufficient or excess revenues are being collected to ensure the recovery of costs by the federal government.[1] As shown in Figure 1, approximately 38 percent of scenarios developed for this Assessment result in a negative ending Nuclear Waste Fund balance, while the remaining scenarios result in a positive balance. Figure 1 also indicates that the results of the scenarios exhibit significant variation, ranging from a negative ending balance of $2.0 trillion to a positive ending balance of $4.9 trillion. The magnitude of this variation primarily reflects uncertainty surrounding the long-term economic outlook, but also reflects uncertainty regarding the disposal system cost. The Department anticipates that cost uncertainty will lessen as siting questions are resolved pursuant to the Strategy described below.

To help clarify a workable path to meet the Department's commitment to manage and dispose of the nation's SNF and HLW, the Secretary, at the President's direction, established the Blue Ribbon Commission on America's Nuclear Future (BRC). In January 2012, the BRC issued its final report. After reviewing that report, in January 2013 the Administration issued its Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste (Strategy).[2] The Strategy describes the Administration's plan for developing a pilot interim

[1] As discussed in Part 1.2 below, the Department's long-standing policy is that a fee adjustment should be proposed only when there is "compelling" evidence in support of a change.

[2] DOE, Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste (Jan. 2013), *available at* http://energy.gov/downloads/strategy-management-and-disposal-used-nuclear-fuel-and-high-level-radioactive-waste. As explained in the Strategy, the term "used nuclear fuel" is intended to be synonymous with the term "spent nuclear fuel." Strategy at 1 n.1.

storage facility; a larger, full-scale interim storage facility; and a geologic repository to safely manage and dispose of SNF and HLW. The Strategy, along with disposal system cost estimates including a modified version of the Total System Life Cycle Cost estimate developed in 2008, provides the basis for the system and cost assumptions used in this Assessment.

This Assessment is based on (1) disposal system configuration and availability dates set out in the Strategy;[3] (2) projected costs of disposal activities; (3) projected revenues from the Nuclear Waste Fund; and (4) projected economic conditions over the total life cycle of disposal activities.

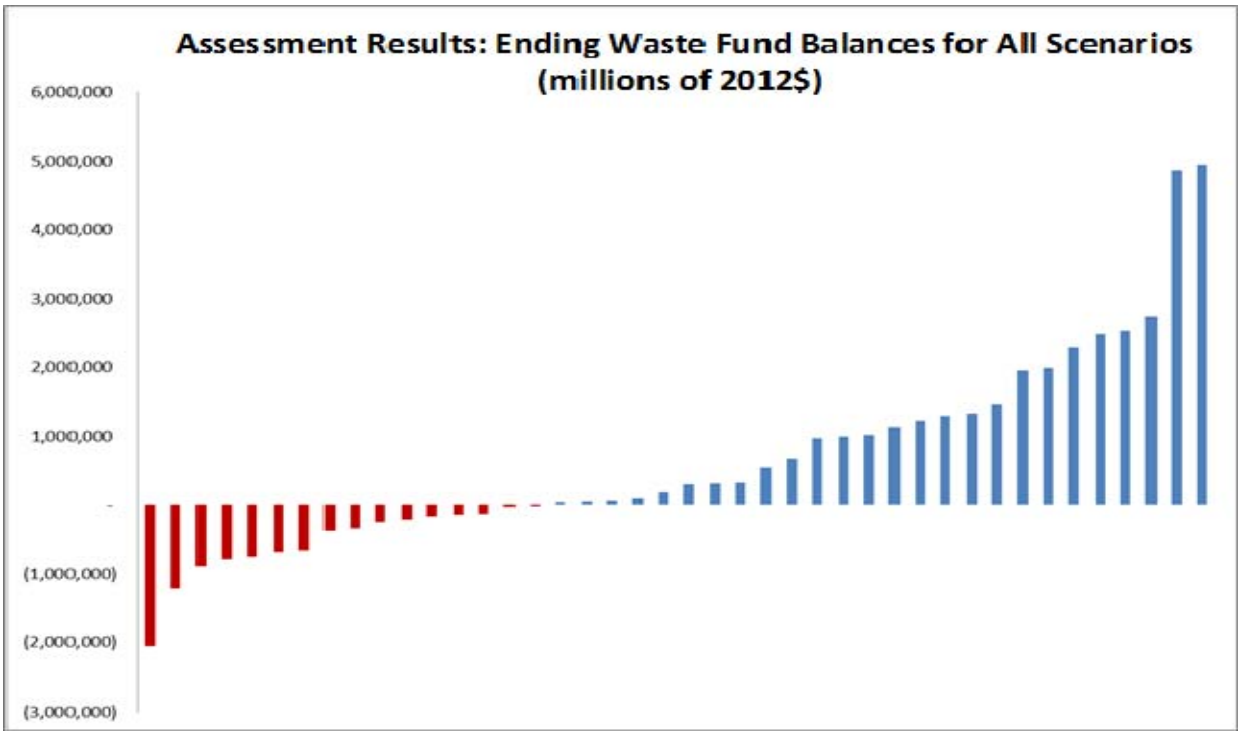

Figure 1: Assessment Results: Ending Waste Fund Balances for All Scenarios (millions of 2012$)

The results of the Assessment do not demonstrate that either insufficient or excess revenues are being collected to ensure full cost recovery. The Department will continue to prepare annual fee adequacy assessments. If, based on future annual assessments, the Secretary concludes that either insufficient or excessive revenues are being collected, the Department will promptly propose an adjustment to the fee, as required by the NWPA.

[3] Strategy at 2.

1 INTRODUCTION

The purpose of this *U.S. Department of Energy Nuclear Waste Fund Fee Adequacy Assessment Report* (Assessment) is to present an analysis of the adequacy of the fee being paid by nuclear power utilities for the permanent disposal of their SNF and HLW by the United States government.

This Assessment consists of six sections: Section 1 provides historical context and a comparison to previous fee adequacy assessments; Section 2 describes the system, cost, income, and economic factors analyzed; Section 3 describes the methodologies used in this analysis; Section 4 presents the results of the fee adequacy evaluation; Section 5 provides an analysis of the fee adequacy results; and Section 6 presents the conclusion.

1.1 The Framework Established by the NWPA and the Standard Contracts

Section 111(b)(4) of the NWPA states that one of the purposes of the Act is "to establish a Nuclear Waste Fund, composed of payments made by the generators and owners of [high-level radioactive] waste and spent fuel, that will ensure that the costs of carrying out activities relating to the disposal of such waste and spent fuel will be borne by the persons responsible for generating such waste and spent fuel." The legislative history of the NWPA confirms that Congress intended those who benefit from electricity supplied through nuclear power to pay for the disposal of SNF and HLW created during the generation of that electricity.[4]

Section 302(a)(1) of the NWPA authorizes the Secretary of Energy to enter into contracts with generators or owners of SNF and HLW. Section 302(a)(2) of the NWPA establishes a fee of 1 mill (1/10-cent) per kilowatt-hour of electricity generated and sold on or after the date 90 days after enactment of the NWPA, which must be paid by nuclear utilities with standard contracts and deposited in the Nuclear Waste Fund (Waste Fund). Section 302(a)(5) requires that these contracts contain a provision under which the Secretary agrees to dispose of SNF and HLW in return for payment of the fees established by Section 302. Thus, payment of the fee is the consideration for the Secretary's contractual obligations related to the disposal of commercial SNF and HLW.

Section 302(a)(4) of the NWPA requires the Secretary to review the amount of the fee annually to "evaluate whether collection of the fee will provide sufficient revenues to offset the costs as defined in subsection (d)" of Section 302. Subsection (d) defines such costs in terms of expenditures from the Waste Fund "for purposes of radioactive waste disposal activities under

[4] *Commonwealth Edison Co. v. U.S. Dep't of Energy*, 877 F.2d 1042, 1047 (D.C. Cir. 1989) ("Congress, in passing the Nuclear Waste Policy Act, expressed its intention that 'the costs of such disposal should be the responsibility of the generators and owners of such waste and spent fuel.'") (citing NWPA, sec. 111(a)(4)); Congressional Record – Senate at S. 15655 (December 20, 1982) ("The bill includes several new or modified concepts from the bill passed by the Senate in the last Congress. One of the most noteworthy of those is the proposal for an assured full-cost recovery by the Federal Government from nuclear power-supplied ratepayers for the nuclear waste programs included in the bill. By establishing a 1 mill-per-kilowatt-hour users fee on nuclear generated electricity, this bill for the first time would provide a direct financial linkage between the beneficiaries of nuclear power and the cost for interim management and ultimate disposal for nuclear wastes.").

Titles I and II" of the NWPA. Section 302(a)(4) further provides that, if the Secretary "determines that either insufficient or excess revenues are being collected," the Secretary "shall propose an adjustment to the fee to [e]nsure full cost recovery." The NWPA gives Congress 90 days in which it could potentially enact legislation overruling the Secretary's proposal before the adjustment takes effect. Because any adjustment must be prospective,[5] the Secretary can collect from standard contract holders only the fee that is in effect at the time electricity is generated and sold. Even if the Secretary later determines that the amount of the fee assessed for electricity generated and sold in the past was incorrect, the Secretary cannot retroactively adjust the amount of the fee collected for that electricity.

The fee can be altered under the NWPA only through the adjustment provision of Section 302(a)(4). Since the enactment of the NWPA in January 1983, the Secretary has never proposed a fee adjustment. As a result, the current fee remains at the 1 mill per kilowatt-hour level established by Congress in the NWPA.

The NWPA does not prescribe a methodology for how the Secretary must implement the fee adequacy review provision of Section 302(a)(4). Rather, the NWPA gives the Secretary discretion in carrying out the fee adequacy assessment. In doing so, Congress recognized the Secretary's expertise with respect to nuclear waste disposal and cost issues, and thus in determining the manner of conducting the review and whether the fee should be altered.[6] As a baseline, however, Congress in the NWPA affirmatively set the annual fee amount at "1.0 mil per kilowatt-hour,"[7] unless and until "the Secretary determines that either insufficient or excess revenues are being collected" pursuant to section 302(a)(4).

The fee currently results in the deposit of approximately $750 million of receipts annually into the Waste Fund. In addition to those receipts, the Waste Fund's value is now growing by approximately $1.5 billion per year, as a result of accrued interest and the increasing book value of the Zero Coupon Bonds. The current value of the Waste Fund is approximately $28.2 billion.

1.2 Past Fee Adequacy Assessments

From 1983 to 2009, the Department followed the same overall approach to fee adequacy assessments. Under that approach, the Department evaluated the projected costs of the federal government's planned disposal activities and compared those costs to projected fee revenues. Fee adequacy was assessed by estimating the likely future balance of the Waste Fund at the end of the federal government's planned disposal activities while adjusting for variables such as the allocation of costs between civilian and defense waste, inflation, and interest rates. The

[5] *See* NWPA, sec. 302(a)(4); Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste, 10 C.F.R. § 961.11, Article VIII.A.4 ("Any adjustment to the 1M/KWH fee under paragraph A.1. of this Article VIII shall be prospective.").

[6] *See National Ass'n of Regulatory Utility Com'rs v. U.S. Dep't of Energy*, 680 F.3d 819, 824 (D.C. Cir. 2012) ("There is certainly some discretion given to the Secretary in the *manner* in which he calculates costs … ."); *Alabama Power Co. v. U.S. Dep't of Energy*, 307 F.3d 1300, 1307 (11th Cir. 2002) (finding that Congress entrusted the Secretary "full discretion to alter the fee" following his fee review if Congress did not itself timely act to modify it); *General Elec. Uranium Mgt. Corp. v. Dep't of Energy*, 764 F.2d 896, 905 (D.C. Cir. 1985) (applying Chevron deference to DOE interpretation of NWPA provision after finding that "DOE is indubitably entrusted with the administration of the Waste Act").

[7] NWPA, sec. 302(a)(2).

Secretary's fee adequacy assessments have reflected the evolving nature of planned disposal activities, including changes in the direction of the program and changes in expectations concerning what activities would be undertaken in the future, what costs would be incurred, and what future market conditions would be.[8] None of these annual assessments so far have led to a determination by the Secretary that "either insufficient or excess revenues are being collected," warranting an adjustment of the statutorily prescribed fee in order to ensure full cost recovery. Consequently, the fee level has remained unchanged since its establishment in the NWPA.

From 1983 to 1987, the Department made reasonable assumptions about key disposal activities that were under development without assuming that a repository would be constructed at a particular site. For example, the 1983 assessment assumed that two repositories would be constructed in either bedded salt or tuff even though the number of repositories and type of geologic media were unsettled at the time.[9] In 1984, the Secretary determined that, "[s]ince substantial uncertainty surrounds both program cost and revenue projections at this time, it is prudent to delay a decision to adjust the fee structure until the program is more clearly defined."[10] Similarly, in both the 1986 and 1987 assessments, DOE concluded that:

> Many of the cost and revenue forecasts analyzed … show margins of revenues over costs. … However, these margins are within the uncertainty bounds of the electric generation and program cost estimates, so a fee reduction is not warranted at this time. Fee revisions may be recommended within a few years, when more accurate program cost estimates will be developed as the program matures from its present conceptual design phase to the engineering design phase … [11]

[8] For example, in the 1987 assessment, the number of cases (involving different host rock and locations among two repositories) was reduced from 10 to five, as a result of the President's decision in May 1986 to approve only three candidate sites for characterization. In 1989, the number of cases was reduced to one, as a result of the Nuclear Waste Policy Amendments Act's designation of Yucca Mountain as the only site to be characterized for the first repository. Program changes in other years were similarly reflected in fee adequacy assessments for those years. Notably, all fee adequacy assessments since 1995 have assumed that the NWPA's 70,000 Metric Tons of Heavy Metal (MTHM) emplacement limit would be repealed by Congress so that only one repository would be constructed to receive all the SNF produced by existing reactors. *See* Bechtel SAIC Company, LLC, History of Total System Life Cycle Cost and Fee Adequacy Assessments for the Civilian Radioactive Waste Management System, MIS-CRW-SE-000007 REV 00, at 10-11, 12-13, and 14-33 (Sep. 2008).

[9] DOE, Report on Financing the Disposal of Commercial Spent Nuclear Fuel and Processed High-Level Radioactive Waste, DOE/S-0020, at 1 (June 1983) ("1983 Assessment") ("The reference case program discussed in this report presupposes the construction of two geologic repositories which would be ready to accept emplacement of either spent fuel or reprocessing waste in 1998 and 2002. … Two candidate geologic media were considered as hosts for the two nuclear waste repositories (bedded salt and tuff).").

[10] DOE, Memorandum to the Secretary, "Submittal of Annual Fee Adequacy Evaluation Report for the Office of Civilian Radioactive Waste Management Program," HQZ.870307.8942, at 2 (July 16, 1984).

[11] DOE, Nuclear Waste Fund Fee Adequacy: An Assessment, DOE/RW-0020, at 1-2 (March 1986) ("1986 Assessment"); DOE, Nuclear Waste Fund Fee Adequacy: An Assessment, HQS.880517.227, at 2 (June 1987) ("1987 Assessment").

Since 1983, the Secretary has consistently decided against fee adjustments even though assessments in certain years indicated more positive than negative balances and in other years more negative than positive balances.[12]

The Secretary's past decisions concerning fee adequacy reflect a long-standing Department policy that, given the high degree of uncertainty in economic and other variables over the total life cycle of the disposal activities,[13] and the inability retroactively to adjust the fee for electricity generated and sold in prior years, an adjustment to the fee set by Congress should not be proposed lightly. As the D.C. Circuit recently recognized, "[s]ince at least 1990, the Department's policy has been 'to conduct a thorough analysis annually and to recommend a change in the fee when there is a compelling case for the change.'"[14] Accordingly, no fee adjustment was proposed in 2008, when just under two-thirds of scenarios analyzed resulted in Waste Fund balances of as high as positive $794 billion and the remaining one-third resulted in balances as low as negative $275 billion (in 2007 dollars).[15] Similarly, no fee adjustment was proposed in 1990, when just under two-thirds of the scenarios analyzed resulted in Waste Fund balances that were as low as negative $36 billion and the remaining one-third resulted in balances that were as high as positive $111 billion (in 1988 dollars).[16] Compelling evidence supporting a change to the fee "would likely come from more than a single year's analysis."[17] Accordingly, no fee adjustment was proposed in 2009, when over 90 percent of the scenarios analyzed resulted in positive balances that were as high as positive $433 billion and the remaining scenarios resulted in balances that were as low as negative $89 billion.[18] The results of the scenario analysis conducted a year earlier in 2008, as noted above, differed significantly and therefore there was no multi-year trend sufficient to support a fee adjustment proposal.

[12] *See, e.g.*, 1986 Assessment at 10, Table 3 (positive balance in 55 of 64 scenarios); DOE, Nuclear Waste Fund Fee Adequacy: An Assessment, DOE/RW-0291P, at 14 (November 1990) ("1990 Assessment") (negative balance in 20 of 32 scenarios).

[13] The Eleventh Circuit has recognized, for example, that the Secretary's exercise of discretion in assessing the fee involves "nebulous calculations that must be made in order to assess the costs of waste storage that will be incurred in the distant future." *Alabama Power*, 307 F.3d at 1309.

[14] *National Ass'n of Regulatory Utility Com'rs*, 680 F.3d at 822 (D.C. Cir. 2012) (quoting 1990 Assessment at 5). In fact, the origins of this policy can be traced as far back as 1986. *See* 1986 Assessment at 2 ("Future program cost increases ... could be recovered by indexing the fee ... Indexing is merely an alternative to larger, less frequent fee adjustments, so this analysis does not provide a compelling case for initiating indexing in 1986, especially since it will not be clear then whether additional new nuclear plants will be ordered in the future."); 1987 Assessment at 2 ("This analysis does not provide a compelling case for recommending that indexing be initiated at this time."); DOE, Fiscal Year 2007 Civilian Radioactive Waste Management Fee Adequacy Assessment Report, DOE/RW-0593, at 12 (July 2008) ("2008 Assessment") ("It is understood that any adjustment to the fee would require compelling evidence that such an adjustment is necessary to ensure future full cost recovery."); Civilian Radioactive Waste Management 2008 Fee Adequacy Assessment Letter Report, at 10 (January 2009) ("2009 Assessment") (same).

[15] 2008 Assessment at 15.

[16] 1990 Assessment at 14.

[17] 2008 Assessment at 12; 2009 Assessment at 10.

[18] 2009 Assessment at i.

1.3 Termination of the Yucca Mountain Project

The Secretary of Energy has determined that a geologic repository at Yucca Mountain, Nevada, is not a workable option for the permanent disposal of SNF and HLW.[19] In March 2010, the Department filed a motion with the Nuclear Regulatory Commission (NRC) to withdraw the license application for Yucca Mountain.[20] An NRC Board denied that motion on June 29, 2010,[21] but the next day the Commission invited briefing as to whether it should review and reverse or affirm that determination.[22] On September 9, 2011, the NRC issued a Memorandum and Order stating that "the Commission finds itself evenly divided on whether to take the affirmative action of overturning or upholding the Board's decision," and directing the Board to "by the close of [FY 2011], complete all necessary and appropriate case management activities, including disposal of all matters currently pending before it and comprehensively documenting the full history of the adjudicatory proceeding."[23] On September 30, 2011, the Board suspended the Yucca license application proceeding.[24]

As explained above, Section 302(a)(1) of the NWPA provides that DOE's disposal contracts with generators or owners of SNF or HLW must contain a provision that requires the payment of a fee. Section 302(a)(5) provides that payment of the fee is the consideration for the Secretary's obligation under the contract to take and dispose of SNF and HLW. Nothing in the NWPA, or in the contracts entered into pursuant to Section 302 (standard contracts),[25] ties either of these obligations to progress on the Yucca Mountain repository or to use of the Yucca Mountain repository for the disposal of SNF or HLW. Consistent with the statute, the standard contracts provide that "DOE shall accept title to all SNF and/or HLW, of domestic origin, generated by the civilian nuclear power reactor(s) specified in appendix A, provide subsequent transportation for such material to the DOE facility, and dispose of such material in accordance with the terms of this contract" without specifying a particular disposal site or method.[26] Both the statutory and contractual language are clear that the obligations to collect and to pay the waste fee are ongoing and tied to DOE's obligation to take and dispose of SNF and HLW, not to the Yucca Mountain project.

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[19] *See, e.g.*, DOE's Reply to the Responses to the Motion to Withdraw, *In re U.S. Dep't of Energy (High-Level Waste Repository)*, Docket No. 63-001, ASLBP No. 09-892-HLW-CAB04 (United States Nuclear Regulatory Commission) (May 27, 2010), at 28-33.

[20] DOE's Motion to Withdraw, *In re U.S. Dep't of Energy (High-Level Waste Repository)*, Docket No. 63-001, ASLBP No. 09-892-HLW-CAB04 (United States Nuclear Regulatory Commission) (March 3, 2010) ("Motion to Withdraw").

[21] Order of Atomic Safety and Licensing Board, *In re U.S. Dep't of Energy (High-Level Waste Repository)*, Docket No. 63-001, ASLBP No. 09-892-HLWCAB04 (United States Nuclear Regulatory Commission) (June 29, 2010).

[22] Order, *In re U.S. Dep't of Energy (High-Level Waste Repository)*, Docket No. 63-001, ASLBP No. 09-892-HLW-CAB04 (United States Nuclear Regulatory Commission) (June 30, 2010).

[23] Order, *In re U.S. Dep't of Energy (High-Level Waste Repository)*, Docket No. 63-001, ASLBP No. 09-892-HLW-CAB04 (United States Nuclear Regulatory Commission) (September 9, 2011), at 1-2.

[24] Memorandum and Order of Atomic Safety and Licensing Board (Suspending Adjudicatory Proceeding), *In re U.S. Dep't of Energy (High-Level Waste Repository)*, Docket No. 63-001, ASLBP No. 09-892-HLW-CAB04 (United States Nuclear Regulatory Commission) (September 30, 2011).

[25] 10 C.F.R. § 961.11 (text of the standard contract).

[26] *Id.*, Art. IV.B.1.

Under the statutory and contractual scheme, payment of the fees continues to provide the consideration for DOE's performance of its obligations to dispose of SNF and HLW.[27] DOE, moreover, has stated clearly that termination of the Yucca Mountain project does not affect its commitment to fulfill its contractual obligations to take and dispose of HLW and SNF.[28] The nuclear waste generators or owners are already receiving contractual damages for the government's delay in meeting that obligation. The United States has paid approximately $2.6 billion in final judgments and settlement payments to standard contract holders for DOE's partial breach of the standard contract, and additional damages claims against the federal government continue to accrue under the contract as long as that delay continues. Additionally, the Administration established a Blue Ribbon Commission to provide recommendations on a new path forward, as discussed further below, and the Administration requested appropriations from the Nuclear Waste Fund to begin pursuing that new path.[29] Accordingly, the termination of the Yucca Mountain project does not provide a basis to stop the collection and payment of the consideration under the standard contract for acceptance and disposal of SNF and HLW.

Courts have confirmed that the obligation to dispose of SNF and HLW is independent of the status of the Yucca Mountain repository, or any other repository. As explained by the D.C. Circuit in *Indiana Michigan*:

> DOE's duty … to dispose of the SNF is conditioned on the payment of fees by the owner … *Nowhere, however, does the statute indicate that the obligation … is somehow tied to the commencement of repository operations* … The only limitation placed on the Secretary's duties … is that that duty is "in return for the payment of fees established by this section."[30]

Similarly, courts have made it clear that the waste fee is intended to defray the costs of a wide set of activities relating to permanent disposal. In *State of Nev. ex rel. Loux*, the court concluded that the NWPA requires the Waste Fund to cover the costs of a broad array of activities that relate to the ultimate disposal of waste, including pre-site characterization activities conducted by a state in which a repository may potentially be sited.[31] In *Alabama Power*, which was

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[27] NWPA, sec. 302(a)(5) ("Contracts entered into under this section shall provide that … (B) in return for the payment of fees … the Secretary … will dispose of the [HLW] or [SNF] … .").

[28] *See, e.g.*, DOE, FY 2012 Congressional Budget Request at 139, *available at* http://www.cfo.doe.gov/budget/12budget/Content/Volume7.pdf ("The Administration remains committed to fulfilling its obligations under the Nuclear Waste Policy Act."); Motion to Withdraw at 1 ("DOE reaffirms its obligation to take possession and dispose of the nation's spent nuclear fuel and high-level nuclear waste … .").

[29] *See* DOE, FY 2013 Cong. Budget Request, at 287, *available at* http://www.cfo.doe.gov/budget/13budget/content/volume3.pdf ("[I]n FY 2013 the Department is requesting the appropriation of $10 million from the Nuclear Waste Fund to support BRC recommended activities, consistent with the Nuclear Waste Policy Act.").

[30] *Indiana Michigan Power Co. v. Dep't of Energy*, 88 F.3d 1272, 1276 (D. C. Cir. 1996) (quoting NWPA, sec. 302(a)(5)(B)) (emphasis added).

[31] *State of Nev. ex rel. Loux v. Herrington*, 777 F.2d 529, 532 (9th Cir. 1985). The issue in that case was whether Nevada was entitled to access the Waste Fund to pay for its pre-site characterization monitoring and testing activities at Yucca Mountain. Despite the fact that the NWPA – in sections 116(c)(1)(A) and 117(c)(8) – expressly

decided after the Joint Resolution of Congress approving the Yucca Mountain site (i.e., the Yucca Mountain Development Act) became law, the court did not limit Section 302(d) to activities associated with Yucca Mountain. Instead, the court noted that Section 302(d) permits expenditures for activities that "entail some sort of advancement or step toward permanent disposal, or else an incidental cost of maintaining a repository."[32] These cases are consistent with Congress's intent that the Waste Fund be used to pay the costs of the activities relating to permanent disposal, including storage and transportation activities,[33] rather than only the costs of a particular repository.[34] Thus, the need to collect a fee to recover such disposal costs is independent of the status of Yucca Mountain.

1.4 Strategy for a New Disposal System

As noted above, although the Secretary has determined that a geologic repository at Yucca Mountain is not a workable option, the Secretary has repeatedly affirmed the Department's commitment to meeting its obligation to manage and dispose of the nation's SNF and HLW. To help clarify a workable path to meet this commitment, the Secretary, at the President's direction, established the Blue Ribbon Commission on America's Nuclear Future (BRC).[35] The BRC was directed by its charter to consider, among other things, "[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed," "fuel cycle technologies and R&D programs," and "[o]ptions for permanent disposal of used fuel and/or high-level nuclear waste, including deep geological disposal."[36] Congress appropriated funds for the BRC to consider "alternatives" for disposal of SNF and HLW.[37] The BRC issued its final report in January 2012.[38]

After thoroughly reviewing the BRC's final report, the Administration issued its Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste (Strategy). The Strategy describes the Administration's plan for developing a pilot interim storage facility; a larger, full-scale interim storage facility; and a geologic repository to safely manage and dispose

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authorizes funding of only *post*-site characterization monitoring and testing activities, the court liberally construed other NWPA provisions as also authorizing funding of *pre*-site characterization monitoring and testing activities. *Id*. at 532-35. The court indicated that a liberal construction of the NWPA's funding provisions is necessary to effectuate the statutory purpose of ensuring that generators and owners of HLW and SNF bear the full costs of the disposal of their HLW and SNF. *Id*. at 532. *See also Indiana Michigan*, 88 F.3d at 1275 (indicating that Congress intended Section 302(d) of the NWPA, which governs Waste Fund expenditures, to be interpreted more liberally than other sections of the NWPA).

[32] *Alabama Power*, 307 F.3d at 1313.

[33] *See* NWPA, sec. 302(d)(1) and (4).

[34] *See* S. Rep. No. 100-517 at 1-2 (1988) ("The Nuclear Waste Policy Act of 1982 (NWPA) establishes a national policy and *program for safely storing, transporting, and disposing of spent nuclear fuel and high-level radioactive waste*. … The NWPA also establishes a nuclear waste fund, to be composed of payments made by generators of spent fuel and high-level waste, from which the costs of *the program* are paid.") (emphases added).

[35] DOE, Secretary Chu Announces Blue Ribbon Commission on America's Nuclear Future (Jan. 29, 2010), *available at* http://energy.gov/articles/secretary-chu-announces-blue-ribbon-commission-americas-nuclear-future.

[36] Charter, Blue Ribbon Commission on America's Nuclear Future (filed March 1, 2010), *available at* http://energy.gov/articles/blue-ribbon-commission-americas-nuclear-future-charter.

[37] Energy and Water Development and Related Agencies Appropriations Act, 2010 Pub. L. No. 111-85, 123 Stat. 2845, 2864-65 (Oct. 2009).

[38] Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy (January 2012).

of SNF and HLW.[39] The Administration intends to work with Congress to enact legislation to implement the Strategy.

1.5 The Vacated 2010 Fee Determination

On November 1, 2010, the Secretary issued a Determination of the Adequacy of the Nuclear Waste Fund Fee (2010 Determination).[40] The 2010 Determination concluded that "there is no reasonable basis at this time to conclude that either excess or insufficient funds are being collected" and that the Secretary "thus will not propose an adjustment to the fee to Congress."[41] Unlike previous fee adequacy assessments, the 2010 Determination did not evaluate the projected costs and revenues of the federal government's planned disposal activities. It did, however, cite the 2009 Assessment which showed that the fee was adequate for Yucca Mountain – the closest proxy to the yet-to-be-selected disposal alternative – to support its conclusion.[42] On December 16, 2011, the Secretary issued another fee adequacy determination, which reached the same conclusion as the 2010 Determination for substantially the same reasons.[43]

On June 1, 2012, the U.S. Court of Appeals for the District of Columbia Circuit ruled that the Secretary "failed to perform a valid evaluation, as he is obliged to do under the [NWPA]."[44] As a result, the Court vacated the 2010 Determination and remanded for the Secretary to conduct a valid fee adequacy evaluation by January 18, 2013.

1.6 This Assessment

This current Assessment follows the Department's approach from 1983 to 2009 of conducting a detailed evaluation of the projected costs of the plan for safe management and disposal of SNF and HLW and comparing them to projected revenues. The Assessment is consistent with the Department's practice from 1983 to 2009 in both methodology and rigor. It estimates the projected costs of the planned civilian nuclear waste disposal system, and compares those costs to projected fee revenues and Waste Fund earnings. It then evaluates the adequacy of the fee by projecting the future balance of the Waste Fund at the end of the civilian nuclear waste disposal system's life cycle while adjusting for variables such as inflation, interest rates, and the allocation of costs between civilian and defense waste. This approach is consistent with the NWPA requirement that the fee fully offset the total life cycle cost of civilian nuclear waste disposal activities, not merely fund current or short-term activities.

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[39] As noted in the Strategy, "[a] consent-based siting process could result in more than one storage facility and/or repository, depending on the outcome of discussions with host communities; … As a starting place, this Strategy is focused on just one of each facility." Strategy at 2. As stated below, the Department remains committed to reviewing the fee annually. If the federal government decides to pursue a disposal system that includes more than one storage or repository facility, the impact of such a system will be reflected in fee adequacy assessments conducted after such a decision is made.

[40] DOE, Secretarial Determination of the Adequacy of the Nuclear Waste Fund Fee (November 1, 2010), *available at* http://energy.gov/sites/prod/files/gcprod/documents/Secretarial_Determination_WasteFee.pdf.

[41] *Id*. at 1.

[42] *Id*. at 7.

[43] DOE, Secretarial Determination of the Adequacy of the Nuclear Waste Fund Fee (December 16, 2011), *available at* http://energy.gov/sites/prod/files/2011%20Secretarial%20Fee%20Adequacy%20Determination.PDF.

[44] *National Ass'n of Regulatory Utility Com'rs*, 680 F.3d at 820.

2 SYSTEM, COST, INCOME, AND ECONOMIC ASSUMPTIONS USED FOR THIS ASSESSMENT

Consistent with previous fee adequacy assessments, this Assessment developed assumptions based on the best available information concerning (1) the disposal system configuration and availability dates; (2) costs; (3) projected revenues; and (4) economic forecasts.[45]

2.1 Disposal System Configuration and Availability Dates

As indicated above, the Strategy describes the Administration's plan to develop a disposal system consisting of one pilot storage facility, one full-scale storage facility, and one geologic repository. This Assessment assumes a disposal system that is consistent with the Strategy. The advisability of developing separate facilities for defense and commercial waste is an issue that is left open by the Strategy for further analysis and consideration. This Assessment deals with this uncertainty by varying the defense share of disposal costs.

The disposal system configuration considered in this Assessment includes one geologic repository. A geologic repository is assumed to take 34 years to open (12 years to site, followed by 16 years for site characterization and licensing, followed by six years of construction). The system configuration also assumes one pilot consolidated storage facility and one full-scale consolidated storage facility. The pilot storage facility is assumed to take seven years to open (two years to site the facility followed by five years to license and construct). The full-scale storage facility is assumed to take eight years to open (three years to site the facility followed by five years to license and construct). These assumptions are consistent with the milestones contained in the Strategy as well as with the Department's previous estimates and experience.[46]

[45] This Assessment also assumes that legislation necessary to implementing a disposal system will be enacted in 2014 and that sufficient annual appropriations will be provided by Congress. Similar assumptions have been made in past assessments. For example, past assessments have assumed that Congress would pass legislation authorizing the permanent withdrawal of land necessary to support a repository at the Yucca Mountain site. In addition, as discussed in footnote 8 above, all fee adequacy assessments since 1995 have assumed that the NWPA's 70,000 MTHM emplacement limit would be repealed by Congress so that only one repository would be constructed to receive all the SNF produced by existing reactors.

[46] *See* Strategy at 2 and 7; DOE, Report to Congress on the Demonstration of the Interim Storage of Spent Nuclear Fuel from Decommissioned Nuclear Power Reactor Sites, DOE/RW-0596, at iii (December 2008) (estimating that an interim storage facility could be developed in six years). The Department opened the nation's first deep geologic repository for the disposal of transuranic radioactive waste (the Waste Isolation Pilot Plant) in 1999, which was 20 years after it was authorized by Congress and 25 years after exploratory work at the site began. *See* DOE, WIPP Chronology (Feb. 2007), *available at* http://www.wipp.energy.gov/fctshts/Chronology.pdf.

Table 1 provides a summary of the disposal system considered in this Assessment.

Table 1: Summary of the Disposal System

Element	Description
Waste Quantity	141,423 MTHM
Geologic Repository	One Repository
Transportation Mode	Mostly Rail
Storage	One Pilot Facility and One Consolidated Storage Facility
Authorizing Legislation Passed	2014
Pilot Storage Facility Opens	2021
Full-Scale Storage Facility Opens	2025
Repository Opens	2048
End of Emplacement	2099
End of Monitoring	2149
Closure	2157

2.2 Costs

Three cost estimates are considered for the assumed disposal system, consisting of a lower bound, base case, and upper bound estimate. In addition, for reasons explained in Part 2.2.5 below, two defense shares of 0% and 20% are considered.

Each cost estimate covers four major categories of costs: storage costs, repository costs, transportation costs, and remaining program costs. The base case amount of storage costs are derived from DOE's analysis of a recent study by the Electric Power Research Institute (EPRI) that estimated the cost of a generic, away-from-reactor interim storage facility (EPRI Study).[47] Base case amounts for repository, transportation, and remaining program costs are derived from the 2008 Total System Life Cycle Cost estimate (TSLCC) used for the 2009 Assessment with the modifications described below to remove costs that are specific to the Yucca Mountain site and reflect lessons learned.[48]

Actual costs will vary considerably based upon unsettled factors such as geology and geography. To address this variability, a consortium of DOE's national laboratories conducted a study that provided a rough cost comparison of nuclear waste repositories across various types of geologic media.[49] That study analyzed a subset of repository costs contained in the TSLCC and concluded that those costs would increase by approximately 80% if the repository were sited in the most expensive geologic medium (crystalline rock) and would decrease by approximately

[47] *See* Cost Estimate for an Away-From-Reactor Generic Interim Storage Facility (GISF) for Spent Nuclear Fuel. EPRI, Palo Alto, CA: 2009, 1018722.
[48] Except as explained in this Assessment, no further modifications were made to the TSLCC estimates that comprise the components of the disposal system.
[49] *See* Appendix B.

50% if the repository were sited in the least expensive geologic medium (bedded salt). Therefore, based on this study, a cost range with an upper bound of 80% above base case and a lower bound of 50% below base case is applied to all base case costs. The consent-based approach to facility siting set forth in the Strategy makes it impossible to assign meaningful probabilities to any geologic medium and, by extension, any cost estimate (i.e., lower bound, base case, or upper bound). Although the cost range was derived from a study of a subset of repository costs, the same cost range is applied to all base case costs considered in this Assessment (i.e. storage, repository, transportation, and remaining program costs) in order to reasonably bound the anticipated cost variability that exists with those components.[50]

A summary of estimated base case storage, repository, transportation, and remaining program costs is provided below.[51] All cost estimates used in this Assessment are escalated to 2012$ using the implicit price deflator for U.S. gross domestic product (GDP) calculated by the Bureau of Economic Analysis in the Department of Commerce.

2.2.1 Storage Costs

As noted above, estimates of consolidated storage costs relied on in this Assessment are derived from DOE's analysis of the EPRI Study. In particular, this Assessment relies on the Department's analysis of the EPRI Study's estimate of the cost of a storage facility capable of accepting 3,000 metric tons of SNF per year with a total capacity of 60,000 metric tons. The EPRI Study's estimates were reported in 2009 dollars and have been converted to 2012$ according to the implicit price deflator for U.S. GDP calculated by the Bureau of Economic Analysis in the Department of Commerce. Only costs directly attributable to the storage of civilian SNF are included in these estimates.

Siting Costs: $19 million

This category of costs includes all activities in the pre-license application phase of a project, such as project management, stakeholder involvement, site characterization, preliminary design, safety analyses, and license application preparation. While the EPRI Study estimated that this pre-application phase should take 18 months, DOE increased that time frame to 24 months in this Assessment to better reflect and accommodate the consent-based approach to facility siting set forth in the Strategy.

[50] Past assessments have consistently recognized the large uncertainty concerning potential costs and other factors. *See*, *e.g.*,1983 Assessment at 3 ("The cost estimates developed for the program were based on the best available data. The history of past major projects of this magnitude has demonstrated, however, that the potential for unanticipated cost increases is very high. Indeed, historical analyses suggest that the actual costs of technology intensive programs often exceed initial estimates by a large amount. It should also be noted that considerable uncertainty is associated with the plan to implement a nuclear waste disposal program spanning five decades."); DOE, Nuclear Waste Fund Fee Adequacy: An Assessment, DOE/RW-0509, at 1 (December 1998) ("1998 Assessment") ("This recommendation is based on examination and analysis of the revenue forecasts and estimated costs for the Program's current approach to a waste management system, and on consideration of the uncertainties associated with economic assumptions, program revenues, program scope, and cost estimates."). Similarly, this Assessment may not capture all of the uncertainties concerning unanticipated cost increases and other factors that are difficult to quantify.

[51] A detailed breakdown of all base case costs is attached as Appendix C.

Design, Engineering, Licensing and Startup Costs: $52 million

This class of costs includes the extension of some of the preliminary efforts in the siting phase while adding licensing fees as well as detailed design development and startup costs.

Total Storage Infrastructure Costs: $53 million

Infrastructure costs include the transportation infrastructure specific to the site but not the rolling stock, which are included in the transportation costs. Also included in these costs are the up-front construction costs needed for the first year of operation. These up-front costs include excavation, grading, fencing, and security costs.

Fuel Storage Facility: $111 million per 60,000 metric tons

These are the costs to build the concrete storage pads as SNF is moved to the facility. These costs are based on prior industry experience with such pads and are assumed to scale with the amount of fuel being moved to the site.

General Administrative Costs: $12 million per year

The administrative costs cover the operational phase of the facility and are assessed annually. They include security, engineering, and maintenance labor costs, general administrative expenses, and licensing fees.

Storage Overpack Costs: $0.03 million per metric ton

The consolidated storage facility is assumed to use sealed canisters of SNF that are placed into concrete overpacks for safe and secure medium-term storage prior to removal to a permanent repository.

Loading Operations Costs: $7 million per year

Years in which either loading or unloading operations are being conducted will require additional labor costs. This estimate is the average of the separate estimates included for loading and unloading operations. This cost is the marginal labor above and beyond the base workforce costs included as part of the general administrative expenses.

Decommissioning Costs: $358 million

These are the integrated costs to be borne after SNF has been removed from the site. They are spread evenly over a ten-year time period.

2.2.2 Repository Costs

To derive a cost estimate for a generic repository, rather than one located at Yucca Mountain, the TSLCC cost estimate was reviewed and costs that were deemed specific to the Yucca Mountain site were removed from the estimate. For purposes of this Assessment, DOE determined that the remaining components of the design were of a generic nature and representative of any geologic repository to be considered in the future. The modified TSLCC costs were then converted to 2012$ using the implicit price deflator for U.S. gross domestic product calculated by the Bureau of Economic Analysis in the Department of Commerce.

The cost estimate developed from components of the TSLCC is an appropriate base from which to estimate the likely costs of a generic geologic repository. The TSLCC is the most comprehensive cost estimate of a U.S. SNF repository that is available. A geologic repository at any site will require the same type of basic facilities costed out in the TSLCC. These include waste receipt and handling facilities, onsite rail facilities for the receipt and handling of rail transport equipment, waste package preparation facilities, underground emplacement facilities, administration and technical support facilities, and security and monitoring facilities. Tunneling will also be required. In order to move SNF from the utility site to a repository, the Department will require transportation infrastructure, described below, as well as a transportation operations center and cask decontamination and maintenance facility at the repository site. While the geologic medium and the location will affect the specific design of a repository and these facilities, the detailed cost estimates prepared for the Yucca Mountain repository are the best available estimates for these types of facilities, equipment, and operations.

To develop the generic repository cost estimate used in this Assessment, the Department removed from the TSLCC the cost of the nearly 300-mile-long rail line from the main line tracks to the repository location at Yucca Mountain because these costs were deemed to be unique to the Yucca site. For the same reason, the costs for titanium drip shields to protect the waste packages once the emplacement in the repository was complete were removed from the estimate.

The generic repository cost estimate envisions a multi-phase project that involves the evaluation of multiple potential sites, characterization and licensing of a site, engineering and construction, emplacement operations, monitoring of the loaded repository, and eventual closure. These activities are modeled to occur in series, although it is likely that some aspects of each stage would take place in parallel with activities in adjacent stages.

Pre-selection Site Evaluation: $3,260 million

The pre-selection costs for a repository are estimated based upon the historical costs incurred by the Department for evaluating potential repository sites before Congress limited the Department's site-specific activities to Yucca Mountain. This estimate includes all of the expenses associated with evaluating various geologic formations. The costs associated with evaluating Yucca Mountain through 1988 are also included, after which point costs are shifted to the specific site characterization effort calculated below. Additionally, the technical support and analytical studies conducted in this time period are included. Consistent with the consent-based approach to siting set forth in the Strategy, pre-selection site evaluation is assumed to be an eleven-year phase with costs escalating during the first three years and holding steady after that.

Site Characterization and Licensing: $8,514 million

This is the total cost to perform the scientific analyses that will be the basis of the licensing effort as well as the cost of the licensing activities themselves. This estimate includes historical costs at the Yucca Mountain site from 1989 through 2007 and the TSLCC projections for site characterization activities, technical support and analytic activities, safety analyses and assessments, and license application activities. Consistent with the consent-based approach to siting outlined in the Strategy, these costs are evenly distributed across the assumed sixteen-year phase.

Repository Engineering, Procurement, and Construction: $7,819 million for a 3,000 metric tons of uranium per year facility

These costs reflect the investment that will need to be made before a repository can begin to dispose of SNF at a maximum operating rate of 3,000 metric tons per year. The estimate includes historical costs at the Yucca Mountain site from 1989 through 2007 and the TSLCC projections. These costs include infrastructure investments, balance of plant, waste package design, aging facilities, nuclear handling facilities, site improvements, and integration activities through the point of full operating capacity. Also included in this estimate are subsurface costs borne prior to initial operations. Eighty percent of the engineering, procurement, and construction costs are incurred in the six years prior to initial operation of the facility with the remaining twenty percent tapered over the five-year ramp up period as operations commence.

Waste Packages: $0.11 million per metric ton of heavy metal

The cost of waste packages is estimated by taking the entire forecast for these expenses in the TSLCC and dividing it by the total amount of SNF that is to be disposed of in the repository.

Subsurface Facilities: $0.06 million per metric ton of heavy metal

The ongoing subsurface expenses were modeled based upon the associated costs from the TSLCC from the beginning of repository operations as well as any contracting fees and contingencies being incurred at full operation. This estimate was scaled on a per-ton basis.

Emplacement Costs: $0.11 million per metric ton of heavy metal

The emplacement costs are the remaining expenses associated with operating and loading the repository during the acceptance phase. These costs are estimated from the TSLCC forecasts for emplacement operations, performance confirmation, operations management, and safeguards and security during the loading period.

Monitoring Costs: $56 million per year

This estimate is determined by the annual average of all the costs expected during the monitoring phase of the TSLCC. Expenses associated with drip shields were excluded from this estimate. Monitoring costs are incurred after all of the SNF has been emplaced in the repository and are assumed to run for fifty years after which point the closure stage will begin. In any scenario in which minimal emplacement operations are taking place, preliminary monitoring costs are assessed at the same rate.

Closure Costs: $145 million per year

The closure costs are the annual average for all of the activities estimated to take place during the final phase. This ten-year process includes closure activities, management, security, and contingencies.

2.2.3 Transportation Costs

The transportation cost estimates are based upon the TSLCC estimates prepared for the Yucca Mountain system. SNF is loaded in canisters at the reactor site, and each canister is then placed

into a transportation overpack cask. The transportation cask is then shipped to the storage or repository site via the existing rail network. As noted above, the costs associated with building the nearly 300-mile-long rail line in Nevada were excluded from this estimate as they were deemed to be directly associated with the specific location of the Yucca Mountain repository site. For simplicity, unlike in the TSLCC, only one type of canister is modeled, and its cost is an average of the canister costs included in the TSLCC. The TSLCC costs were calculated in 2008 dollars and converted to 2012$ using the implicit price deflator for U.S. gross domestic product calculated by the Bureau of Economic Analysis in the Department of Commerce. Only costs directly attributable to the transport of civilian SNF are included in this estimate.

Transportation Investment Total Cost: $1,544 million

This is the total amount that will need to be spent before full-scale transportation can begin. It includes the costs associated with acquiring the transportation cask fleet, the miscellaneous handling equipment required to load and handle the transportation casks, the fleet of rail cars required to transport the casks, and the escort cars required to provide security for the shipments. This amount also includes the cost to establish a transportation operations center and a cask maintenance facility. These costs ramp up in advance of the system operating at 3,000 metric tons per year over eleven years.

Canister Cost: $0.81 million per canister

The life cycle cost of canisters is based upon the TSLCC forecasts of $4.2 billion for 4,952 boiling water reactor canisters and $5.4 billion for 7,739 pressurized water reactor canisters. The total costs for these canisters were added together and divided by the total number of canisters to arrive at an average cost which was then converted to 2012$. These canisters need to be acquired two years prior to anticipated usage.

Transportation Cask Cost: $5.44 million per cask system

Cost estimates for transportation casks were based on the TSLCC's comprehensive estimates of all of the costs for commercial SNF fuel casks and canisters, including the associated transport equipment and impact limiters required for safe transport. It was anticipated that a fleet of 108 casks would be required to move the spent nuclear fuel at a rate of 3,000 metric tons of uranium per year. The estimated cost is $5.44 million per cask system, which includes the cask as well as associated transport equipment and impact limiters.

Annual Transportation and Operations Support Cost: $101 million per year

Once the transportation investment is complete and the system is operational, this cost is applied annually as long as the transportation system is in use. This cost is estimated by taking the average annual outlay for a broad range of activities necessary to operate the transportation system. This cost includes the annual cost of: all system support activities, cask maintenance, and rail car expenses including capital replacement, integration and support activities, and transportation operations.

Shipment Cost: $0.012 million per metric ton

The TSLCC included specific costs for shipments of material to the Yucca Mountain repository site. For purposes of this Assessment, these costs are modeled by taking the annual cost of those shipments and dividing them by the mass of civilian SNF being shipped in that year to yield a cost per metric ton of shipment. The average of those shipment costs is just under $12,000 per metric ton.

2.2.4 Remaining Program Costs

This category includes all remaining costs for managing the entire disposal system that are not captured in the storage, repository, or transportation cost categories. Remaining program costs are divided into three sub-categories corresponding to the three phases of work on the repository: construction, operations, and monitoring. For all of the phases, the costs were based upon the balance-of-program costs from the TSLCC. This class of costs includes program direction, quality assurance programs, systems engineering and integration, safeguards and security, support to the NRC and the Nuclear Waste Technical Review Board, as well as institutional expenses such as payments in lieu of taxes and assistance to localities.

Construction Phase: $244 million

The management costs during the construction phase were estimated by averaging the annual balance of program costs from the TSLCC over the time period from 2008 through 2020 when the repository was expected to begin operation. Management costs during the construction phase are assumed to phase in linearly over the time period during which pre-selection site evaluation for the repository is underway.

Operations Phase: $114 million

The management costs during the operations phase were estimated by averaging the annual balance of program costs from the TSLCC over the time period from 2021 through 2069 when the loading operations were expected to be completed.

Monitoring Phase: $27 million

The management costs during the monitoring phase were estimated by averaging the annual balance of program costs from the TSLCC over the time period from 2070 through 2129, during which monitoring and closure activities were expected to be performed.

2.2.5 Civilian and Defense Share of Costs

Three of the four major categories of costs (repository costs, transportation costs, and remaining program costs) will be affected by whether civilian and defense waste is commingled in a single disposal system. In 1985, pursuant to Section 8 of the NWPA, President Reagan directed DOE to make arrangements to use the civilian disposal system for the disposal of defense waste. The NWPA requires that civilian and defense waste generators pay the disposal costs of their respective waste.[52]

[52] NWPA, §§ 8(b)(2), 111(b)(4).

The Strategy leaves open the question of whether the 1985 decision on commingling should be reexamined.[53] Therefore, the share of repository, transportation, and remaining program costs that will be paid out of the Nuclear Waste Fund (for civilian waste disposal) and the share of such costs that will be paid out of the Defense Nuclear Waste Disposal appropriation (for defense waste disposal) are uncertain.

To reasonably bound the uncertainty regarding the defense share, this Assessment analyzes two scenarios: a 0% defense share as the lower bound and a 20% defense share as the upper bound. The 0% defense share scenario accounts for the possibility that civilian and defense waste are not commingled. The 20% defense share scenario accounts for the possibility that commingling does occur and approximately matches the defense share utilized in the two most recent fee adequacy assessments.[54] The possibility that the defense share will exceed 20% under the current cost allocation regulation is unlikely given that the amount of defense waste to be accepted for disposal is relatively constant when compared to the amount of commercial SNF to be accepted for disposal, which increases with the extension of the operating life of the existing fleet of nuclear power plants and the addition of new nuclear power plants.

The 0% defense share scenario includes the full amount of repository, transportation, and remaining program costs necessary for a generic repository (except for costs directly attributable to managing defense waste) being paid for from the Nuclear Waste Fund. The 20% defense share scenario includes only 80% of commingled repository, transportation, and remaining program costs necessary for a generic repository coming from the Nuclear Waste Fund, since the remaining 20% would be paid for by defense waste generators.

2.3 Projected Revenues

Projected revenues consist of fees paid by commercial generators of SNF and HLW and income from the portion of those fees invested. The civilian fee is assessed on the amount of electricity generated and sold by nuclear utilities. Therefore, in order to calculate future fee revenues, the amount of future nuclear electricity generation must be forecasted. The amount of generation must also be adjusted to reflect the amount of electricity projected to be "sold." Civilian fee payments are deposited in the Waste Fund, a separate account in the U.S. Treasury. The portion of the amount collected annually that is not appropriated to meet current waste management costs is invested to meet long-term needs. Revenues from the Waste Fund's investments must cover the cost of future disposal activities for over 75 years following the end of nuclear power generation, when the fee is no longer collected from utilities.[55]

Nuclear Generation Forecast

The nuclear electricity generation forecast generated for this Assessment closely tracks the assumptions used in the Reference Case of the *Annual Energy Outlook 2012* produced by DOE's

[53] Strategy at 8.
[54] *See* 2008 Assessment at 12 ("the defense share of total Program cost is 19.6 percent for 2007); 2009 Assessment at 6 (estimating the defense share at 21.2 percent for 2008). These defense shares were calculated using the existing methodology for allocating costs between civilian and defense waste that was developed by public rulemaking. *See* 52 FR 31508 (August 20, 1987).
[55] *See* Appendix A.

Energy Information Administration (EIA).[56] The Reference Case projects the future contribution of nuclear energy in the United States. Past fee adequacy assessments have also relied on EIA projections for such estimates.[57] The forecast generated for this Assessment differs from the EIA forecast in a few ways, notably that the EIA projections extend only through 2035 whereas the projections for the disposal systems analyzed in this Assessment extend across the full life cycle of current and forecasted new reactors. Recent fee assessments did not include forecasted new reactors or future generation from current reactors attributable to license renewals that had not yet been granted by the NRC.

The nuclear generation forecast begins with the current fleet of 104 reactors and their capacities as reported by the EIA. All current reactors are assumed to receive a single life extension and retire after sixty years of operation. The forecast includes 513 megawatts of unit-specific "uprates" to add capacity at certain reactors through 2015. An "uprate" is a change to a nuclear unit that allows for increased electrical generation from the unit. This change can be either a physical modification to the plant or nuclear fuel, or a regulatory change that allows for greater electrical output by relaxing limits on the unit's operation. Additional capacity resulting from a unit-specific uprate is assumed to cease when that unit reaches the end of its sixty-year operational lifetime.

EIA also forecasts 6,500 megawatts in "generic" uprates. This is additional capacity that is expected to be added to current units, but not attributed to a specific reactor. The EIA model allocates these generic uprates to a subset of reactors located in one of twenty-one regions into which it divides the U.S. nuclear fleet. These EIA regions are used in the SNF forecast to estimate retirements as well. As reactors are retired, any generic uprates allocated to the region are retired proportionally.

EIA also includes two classes of new reactors that are expected to enter into service. The first are specific units that are currently under development in the U.S. Although these are not named by EIA, they align with expectations for Watts Bar 2, Bellefonte, Vogtle 3 and 4, and Summer 2 and 3. The EIA implied assumptions have been updated to reflect current expectations in this estimate. Specifically, the assumed start date for Watts Bar 2 has been moved back to 2016 in accordance with recent schedule revisions. All of these units are assumed to operate for sixty years.

The second class of new builds forecasted by EIA is "unplanned additions." These are new reactors that are expected to be built but that are not associated with any specific project. EIA projects 1,759 megawatts to enter service between 2030 and 2035. Like existing reactors, these are assumed to have a service life of sixty years.

The EIA forecast limits its analysis to the year 2035. As the EIA forecast stops in 2035, no additional new builds are assumed after that time.

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[56] *See* U.S. Energy Information Administration, Annual Energy Outlook 2012, DOE/EIA-0383 (June 2012), *available at* http://www.eia.gov/forecasts/aeo/pdf/0383(2012).pdf.
[57] *See, e.g.*, 2008 Assessment at 7; 1990 Assessment at 8.

Fee Revenue Forecast

As with all previous fee assessments, for purposes of developing the fee revenue forecast, this Assessment assumes that the amount of the fee remains at 1 mill per kWh. That fee is assessed on the electricity that is generated and sold from the nuclear reactor. The EIA projections discussed above provide the expected gross electrical generation from the anticipated fleet of nuclear reactors. This gross electrical generation must be adjusted to reflect the fact that some of this nuclear electrical generation will never be sold to a consumer. Some will be used at the nuclear generation facility to cover electrical loads for operating components at the facility (also known as station loads); some will be lost when the electricity is transported over the electrical transmission and distribution system to the ultimate consumer (also known as transmission and distribution losses); and some will be lost to system theft and other uses (other losses).

The Department reviews annually data submitted to the Federal Energy Regulatory Commission to determine what percentage of the gross nuclear electrical generation is lost before it is sold to the ultimate consumer. This review results in the development of the National Average Adjustment Factor. This factor is applied to the gross nuclear electric generation from each nuclear unit to determine the portion of the nuclear electric generation on which the nuclear waste disposal fee must be paid. While unique circumstances may affect the amount of nuclear electricity that is lost on each utility's system before it is sold to the consumer, these additional losses vary greatly from utility to utility and generally are small when compared to the National Average Adjustment Factor adjustment.

The Department last assessed the National Average Adjustment Factor in May of 2012. At that time, the National Average Adjustment Factor was determined to be 0.955. Accordingly, the gross electrical generation contained in the EIA forecast and used in this Assessment is multiplied by 0.955 to obtain the anticipated revenue stream associated with this forecast of nuclear generation.

As noted above, the fee paid by nuclear utilities is deposited in the Nuclear Waste Fund; the portion not appropriated to meet current waste management costs is invested to meet long-term needs. Nuclear Waste Fund investments generate revenue through both interest payments and bond maturities. Investment income projections are derived from the current portfolio and the investment of surplus cash flows in future years.[58] The current portfolio contains U.S. Treasury securities with maturities through 2040. For purposes of this analysis, starting in FY 2013, surplus cash flows (revenues from all sources minus costs) are assumed to be invested in 30-year Treasury bonds.[59]

[58] *See* Appendix D.

[59] For the past several years, per the recommendations of its investment advisor, the Department has been investing Waste Fund funds in securities with 10-year maturities due to the very small difference in yields between 10-year and 30-year securities. It is anticipated that the Department will be advised to begin investing in 30-year securities when the yield between the 10-year and the 30-year increases to historical levels. Due to the uncertainty of when the Department will switch investment strategies, all excess cash flows are assumed to be invested in 30-year bonds for this fee adequacy assessment.

2.4 Economic Forecasts

Interest and inflation rates affect long-term income projections and are another component in assessing the adequacy of the fee. This analysis uses seven interest and inflation rate forecasts from five separate sources. Three forecasts are from IHS Global Insight (GI), one is from the EIA, and one is based on data from the Office of Management and Budget (OMB). The remaining two forecasts are developed using 1) current market data from Taylor Investments and 2) long-term historical averages from Ibbotson Associates.

Interest and inflation rate forecasts were extended beyond the forecast period to cover the years until disposal activities are projected to end (FY 2157). The method used to extend each forecast is described below.

2.4.1 IHS Global Insight

IHS Global Insight (GI) is a leading econometric forecasting firm that maintains one of the world's largest repositories of global economic, financial, and industry data. Global Insight's models of national economies and industry sectors are widely used for economic forecasting, development planning, and policy simulation. The GI data include interest and inflation rates based on economic forecasts for 30 years from 2012-2042, and the average of those years is used to extend the data for years beyond 2042.

The GI general equilibrium model assumes that the various forces driving the economy exhibit minor variations. Their model assumes that the economy approaches a balanced-growth path during the forecast period with no external shocks which would accelerate or decelerate economic growth. Demographic factors, such as population growth and labor productivity, are primary economic drivers in the GI model. Additional drivers include the government's fiscal and economic policy, energy prices, growth patterns of international trading partners, and demand mix. This assessment uses GI's three primary forecasts, Trend, Optimistic, and Pessimistic, which are defined as follows:

- The **Trend forecast** is GI's baseline forecast. This forecast assumes that the economy will suffer no major mishaps between now and 2042.[60] The economy grows smoothly, in the sense that actual output follows potential output relatively closely. This forecast is best described as depicting the mean of all possible paths that the economy could follow in the absence of major disruptions.

- The **Optimistic forecast** is the forecast in which economic growth proceeds more rapidly than the baseline, and there is less inflation. In this forecast, population, labor force, and capital stock growth, as well as exogenous technological changes, occur more quickly than in the Trend forecast. Potential output climbs more rapidly, and because output is primarily supply-determined in the long-run, real GDP grows 0.3 percentage points more quickly per year.

[60] GI defines "mishaps" as follows: "Such disruptions include large oil price shocks, untoward swings in macroeconomic policy, natural disasters, a financial meltdown, or a sudden collapse of the Eurozone."

- The **Pessimistic forecast** assumes that economic growth proceeds more slowly than in the baseline forecast and that productivity growth is weaker. In this forecast, population, labor force, and capital stock growth, together with exogenous technological changes, occur less rapidly than in the Trend forecast. Real GDP climbs 0.4 percentage points more slowly per year.

The terms Optimistic and Pessimistic used by GI refer to the level of economic growth in general; they do not necessarily describe conditions as they would affect the state of the Waste Fund balance. The three forecasts from GI range from 2012 through 2042, and the average rates for their respective 30-year periods are used from the last year of forecast through 2157.

2.4.2 U.S. Department of Energy, Energy Information Administration

The Energy Information Administration (EIA) of the U.S. Department of Energy provides official energy statistics for the U.S. government. The EIA publishes data in its *Annual Energy Outlook 2012*, which provides an additional perspective on predicted interest and inflation rates through 2035. The EIA utilizes the National Energy Modeling System for its forecasts, which include assumptions of moderate projected economic growth. This forecast methodology is intended to reflect the interaction between economic conditions and energy supply and demand. The averages of the forecasted rates are used to extend data from 2035 through the completion of all disposal activities.

2.4.3 Ibbotson Associates

Ibbotson Associates provides historical data for stocks, bonds, bills, and inflation in its publication, *Ibbotson SBBI 2012 Valuation Yearbook.* The Ibbotson report is of value in this assessment because it incorporates a range of economic conditions, including periods of historically high and low rates. The averages of interest and inflation rates for the 40 years from 1971-2011 produced a single value for each rate. Those values were used as the forecasted rates within this Assessment from 2012 through 2157.

2.4.4 Office of Management and Budget

The Office of Management and Budget (OMB) within the Executive Office of the President assists in the preparation of the federal budget and supervises executive branch agencies. In addition to formulating the President's spending plans, OMB evaluates the effectiveness of agency financial management and agency programs, policies, and procedures; assesses competing funding demands among agencies; and sets funding priorities. OMB also provides guidance to analyze new government investments through Circular No. A-94, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs." Annual updates provide the discount rates to be used in evaluating new federal investments whose benefits and costs are distributed over time.

The OMB data set used for the fee adequacy assessment contains the recommended 30-year nominal and real interest rates for 2012 from OMB Circular No. A-94, Appendix C. These data were revised in December 2011.

OMB's published 30-year discount rates for 2012 and OMB's fiscal year (FY) 2012 Budget provide forecasts of 90-day Treasury bill rates and inflation rates for 2012-2021. Per the

recommendation from OMB Circular No. 94, the rates of the last available year were used for forecasting beyond that year. The OMB 2012 30-year discount rate was used from 2012 through 2157, and the FY 2021 Budget 90-day Treasury bill and inflation rates were used from 2021 through 2157.

2.4.5 Market Yield Rates (Taylor Advisors)

Market yield data reflect the consensus current interest rates demanded by investors. Nominal rates incorporate expectations of future inflation rates. Real yields are determined from the Treasury Inflation Protected Security (TIPS) yield curve. The inflation rates for each year through 2041 reflect expected inflation for that year and are calculated by subtracting the real yield curve from the nominal rate. Interest rates are the returns required by investors for investments between one and 30 years. The forecasted interest rate for 2041 was extended through the end of the life cycle. Market rates provide a reflection on the current economic environment and are not a forecast of future 30-year interest rates required by the market (such as GI and EIA rates). When used to discount cash flows from the Waste Fund bond portfolio, market rates will result in an approximation of the current market value of the Waste Fund. Taylor Advisors provided the market data for nominal and real interest rates through 2041 in addition to near term 90-day Treasury bill rates.

Table 2 shows the extended interest and inflation rates from the sources used.

Table 2: Summary of Inflation and Real Interest Rates

Forecast	Description	Forecast/ Historical Period	Inflation Rate	Real Interest Rate	90-Day Treasury Bill Rate
Global Insight 2012 Trend	Fiscal Year Averages (Base Case)	2012-2042	1.98%	3.11%	3.32%
Global Insight 2012 Optimistic	Fiscal Year Averages (High Economic Growth Case)	2012-2042	1.61%	2.90%	3.01%
Global Insight 2012 Pessimistic	Fiscal Year Averages (Low Economic Growth Case)	2012-2042	3.52%	3.73%	5.58%
Office of Management and Budget	Inflation and 90-Day T-Bill Interest Rate Forecast from President's Budget; Current 30 Year Bond Discount Rate	2012 to 2021 (inflation), 2012 (interest)	2.10%	1.67%	4.10%
DOE Energy Information Administration (EIA)	Fiscal year averages for 2012-2035; Average of the data from 2012-2035 used for years beyond 2035	2012-2035	2.12%	2.66%	3.54%
Ibbotson Historical	Historical fiscal year average used for years 2012 and beyond	1971-2011	4.37%	2.73%	5.44%
Taylor Advisors Market Yield Rates	Market yield fiscal year averages for 2012-2042; 2042 values used for subsequent years	2012-2041	2.871%	0.51%	0.117%

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3 METHODOLOGY

As stated above, the methodology employed by this Assessment is consistent with the Department's practice from 1983 to 2009. As of August 2012, the balance in the Waste Fund totaled approximately $28.2 billion (2012$). Based on the nuclear electricity generation forecast generated for this Assessment, future fee income from utilities is projected to total $27.1 billion ($20.5 billion in 2012$); this amount includes not only the ongoing fee that is the subject of this Assessment, but also one-time fees that are owed by several utilities to the Department for disposal of waste from electricity generated and sold prior to 1983.[61] In accordance with the provisions of the standard contract, each of these utilities must pay its one-time fees, plus accumulated interest, prior to the acceptance of SNF at the utility site. For purposes of this Assessment, payments of outstanding one-time fees were assumed to occur in the year the Department would begin waste acceptance from that utility.

About 16 percent of the Waste Fund's investments are in conventional Treasury securities ("Notes") whose interest payments and maturity dates were specified when each security was purchased. About 8 percent of the Waste Fund's investments are in Treasury Inflation-Protected Securities (TIPS) whose return does not include an expected inflation component. Instead, interest is calculated at the "real" rate and the principal values of TIPS securities are adjusted semiannually by the Treasury to pay investors for actual inflation. The remainder of the Waste Fund's investment (76 percent) is in Zero Coupon Bonds (ZCBs). ZCBs do not pay interest but are purchased at a deep discount, with profit accumulating at maturity when the bond is redeemed for its full face value. A listing of the Waste Fund's investment holdings as of July 2012 is provided in Appendix F. The FY 2012 Interest and Inflation Rate Report, a companion document detailing the projections of inflation and short- and long-term interest rates, as well as the sources and methodologies used in the fee adequacy model, is provided in Appendix G.

To evaluate the adequacy of the one mill per kWh fee, 42 scenarios were created and tested based on the assumed disposal system described in Part 2.1 above,[62] three cost estimates (base case, high, and low), two defense share percentages (0% and 20%), and seven economic forecasts. For each scenario, the model begins with the current Waste Fund portfolio of Treasury Notes, TIPS, and ZCBs (see Appendix D for a detailed explanation of how each type of security is modeled), adds fee and investment income expected during the year, and subtracts spending expected during the year to arrive at a year-end balance. This process is repeated for each year until the completion of disposal activities to arrive at a projected final Waste Fund balance for that scenario.

By analyzing the Waste Fund balances using a range of costs, two defense share percentages and seven economic forecasts, the Department evaluated whether the fee would likely be adequate to conduct all disposal activities in accordance with currently available assumptions.

[61] *See* NWPA, sec. 302(a)(3).

[62] As explained in Part 2.1 above, the assumed disposal system consists of a pilot storage facility that opens in 2021, a full-scale storage facility that opens in 2025, and a geologic repository that opens in 2048.

The scenario methodology is intended to examine potential outcomes under a broad range of possible circumstances, accounting for a range of costs (including the percentage of costs covered by the defense share) and economic forecasts.

The projected Waste Fund balances should be seen as indications of the adequacy of the current fee level under a variety of scenarios, rather than as predictions of the actual Waste Fund balance at the completion of all disposal activities.

4 FEE ADEQUACY ASSESSMENT RESULTS

A summary of results of this year's Assessment is graphed in Figure 2 and shown numerically in Table 3. The graphical results are organized from the lowest ending Nuclear Waste Fund balance to the highest for convenience only and their relative position does not indicate any greater or lesser probability of occurrence. Of the 42 scenarios analyzed, 16 result in a negative Nuclear Waste Fund balance at the end of the program and 26 result in a positive balance. The magnitude of the results spans a range of nearly $7 trillion – from an ending Nuclear Waste Fund balance of negative $2.0 trillion to positive $4.9 trillion.[63] The lowest balance of negative $2.0 trillion occurs in the scenario that assumes upper-bound costs, a 0% defense share, and the Global Insight 2012 Pessimistic economic forecast. The highest balance of positive $4.9 trillion assumes lower-bound costs, a 0% defense share, and the Global Insight 2012 Pessimistic economic forecast.

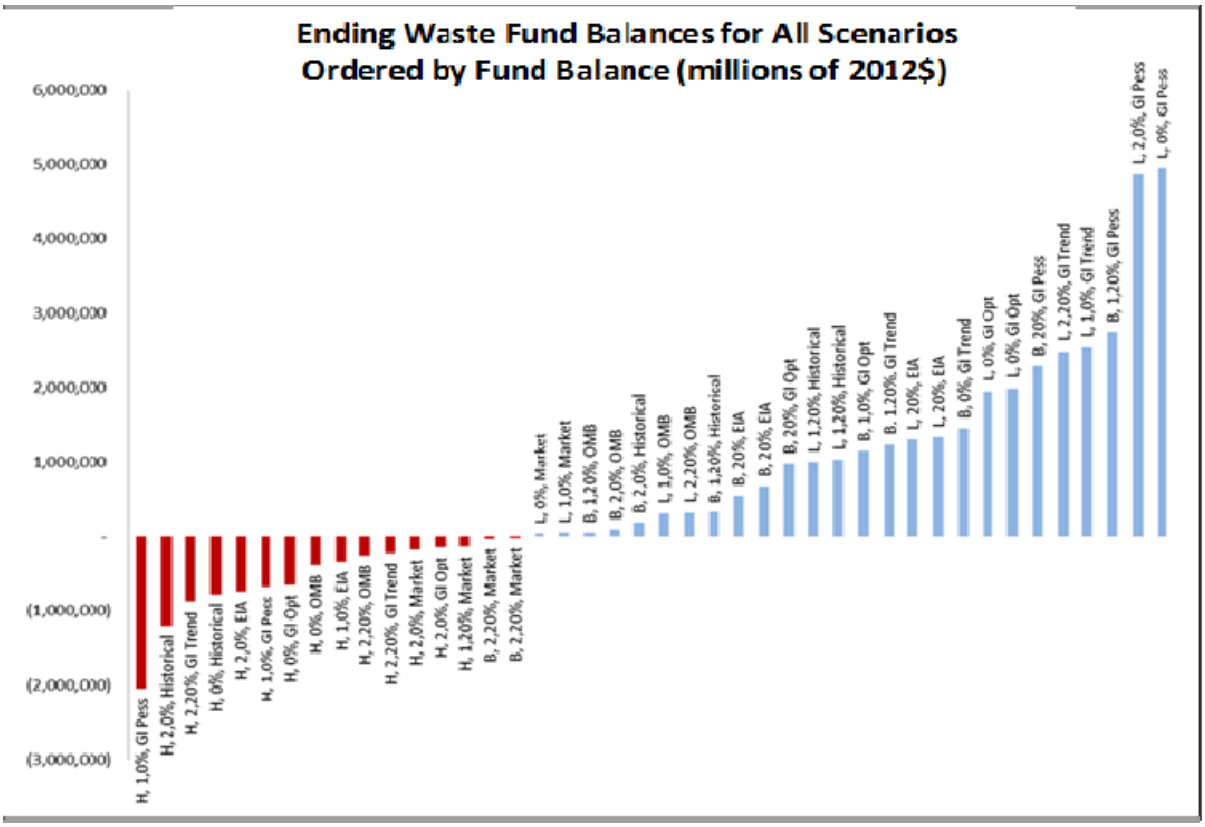

Figure 2: Ending Waste Fund Balances for All Scenarios, Ordered by Fund Balance (millions of 2012$)

[63] The substantial increase in the magnitude of this range, compared to the approximately $500 billion range shown in the 2009 Assessment (discussed in Part 1.2 above), is due in large part to differences in long-term economic forecasts and the length of the period in which those differences are compounded. The 2009 Assessment assumed that the total life cycle of disposal activities would last 120 years (until 2129), compared to 144 years (until 2157) in this year's Assessment. Over such long time periods, even small differences in inflation and interest rates can produce enormous differences in the ending balance of the Waste Fund.

Table 3: Summary of All Scenarios

Disposal System Scenarios				
	Cost Scenarios	Defense Share Scenarios	Economic Scenario	Fund Balance in millions (in 2162)
1	High	0%	Global Insight Optimistic	$ (649,027)
2	High	0%	Global Insight Trend	$ (876,640)
3	High	0%	Global Insight Pessimistic	$ (2,048,380)
4	High	0%	Historical	$ (1,201,472)
5	High	0%	EIA Forecast	$ (739,078)
6	High	0%	OMB Forecast	$ (384,456)
7	High	0%	Market Yield Rates	$ (175,138)
8	High	20%	Global Insight Optimistic	$ (145,047)
9	High	20%	Global Insight Trend	$ (220,707)
10	High	20%	Global Insight Pessimistic	$ (672,654)
11	High	20%	Historical	$ (778,424)
12	High	20%	EIA Forecast	$ (341,239)
13	High	20%	OMB Forecast	$ (253,994)
14	High	20%	Market Yield Rates	$ (135,619)
15	Baseline	0%	Global Insight Optimistic	$ 982,572
16	Baseline	0%	Global Insight Trend	$ 1,236,511
17	Baseline	0%	Global Insight Pessimistic	$ 2,293,519
18	Baseline	0%	Historical	$ 191,325
19	Baseline	0%	EIA Forecast	$ 551,496
20	Baseline	0%	OMB Forecast	$ 54,690
21	Baseline	0%	Market Yield Rates	$ (36,115)
22	Baseline	20%	Global Insight Optimistic	$ 1,143,498
23	Baseline	20%	Global Insight Trend	$ 1,449,044
24	Baseline	20%	Global Insight Pessimistic	$ 2,743,582
25	Baseline	20%	Historical	$ 324,431
26	Baseline	20%	EIA Forecast	$ 676,564
27	Baseline	20%	OMB Forecast	$ 93,827
28	Baseline	20%	Market Yield Rates	$ (24,346)
29	Low	0%	Global Insight Optimistic	$ 1,987,599
30	Low	0%	Global Insight Trend	$ 2,536,905
31	Low	0%	Global Insight Pessimistic	$ 4,946,443
32	Low	0%	Historical	$ 1,029,840
33	Low	0%	EIA Forecast	$ 1,337,734
34	Low	0%	OMB Forecast	$ 319,503
35	Low	0%	Market Yield Rates	$ 47,606
36	Low	20%	Global Insight Optimistic	$ 1,947,519
37	Low	20%	Global Insight Trend	$ 2,489,359
38	Low	20%	Global Insight Pessimistic	$ 4,865,921
39	Low	20%	Historical	$ 995,242
40	Low	20%	EIA Forecast	$ 1,305,554
41	Low	20%	OMB Forecast	$ 305,677
42	Low	20%	Market Yield Rates	$ 42,390

While the current statutory scheme contemplates one interim storage facility and one geologic repository, it does not contemplate a pilot interim storage facility. Appendix E shows a summary of results assuming that a pilot interim storage facility is never authorized by statute but otherwise assuming a disposal system identical to the one considered in this Assessment. As shown in Appendix E, such results are not materially different from the results of this Assessment.

Impact of Economic Forecasts

Figure 3 and Tables 4A-4G show the same results as Figure 2 and Table 3, respectively, except that the results are organized by the seven economic forecasts that were assumed for this Assessment. Figure 3 demonstrates that the magnitude of the variation in ending Waste Fund balances is largely driven by the different economic forecasts.

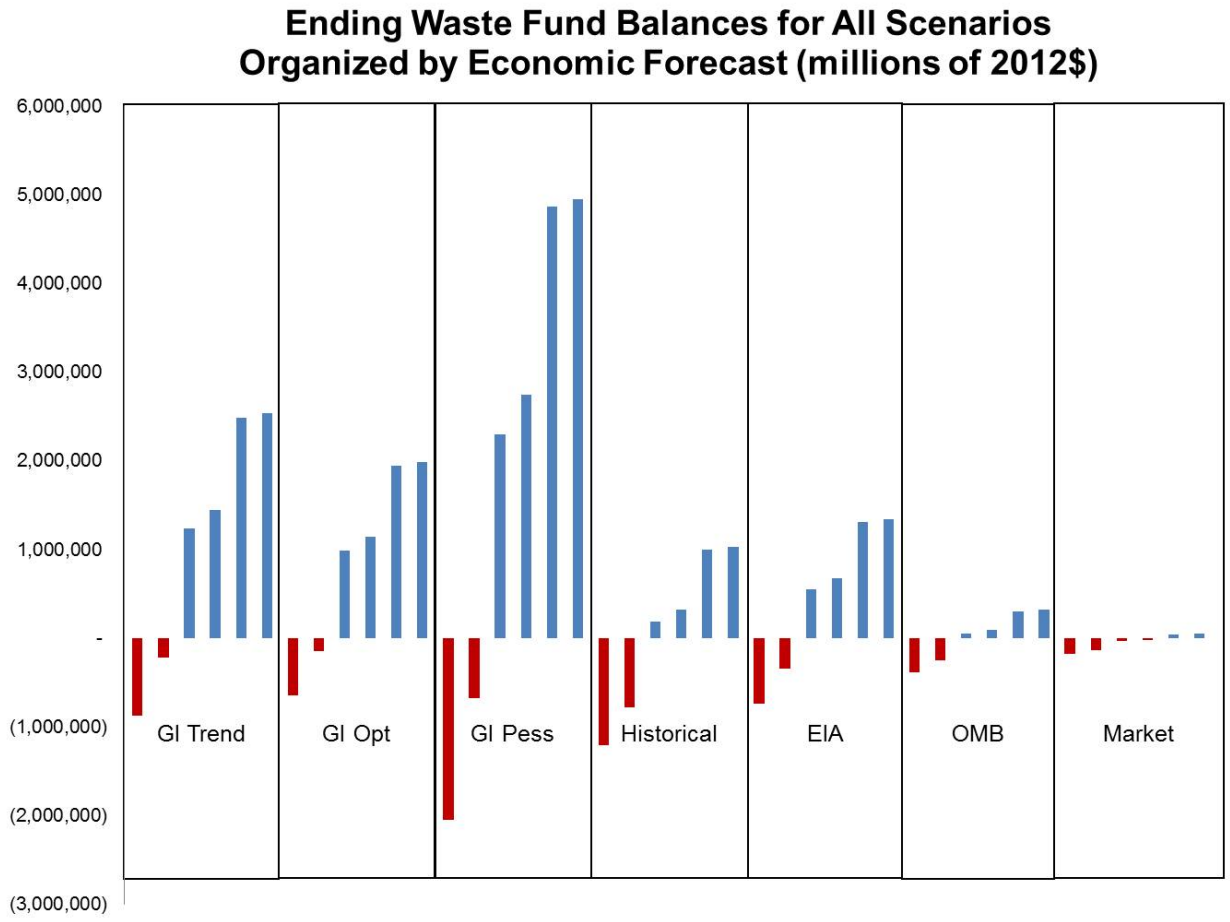

Figure 3: Ending Waste Fund Balances for All Scenarios, Organized by Economic Forecast (millions of 2012$)

Table 4A: Global Insight Trend Forecast

Disposal System, Global Insight		
Cost	Defense Share	Fund Balance
High	0%	$ (649,027)
High	20%	$ (145,047)
Baseline	0%	$ 982,572
Baseline	20%	$ 1,143,498
Low	0%	$ 1,987,599
Low	20%	$ 1,947,519

Table 4B: Global Insight Optimistic Forecast

Disposal System, Global Insight		
Cost	Defense Share	Fund Balance
High	0%	$ (649,027)
High	20%	$ (145,047)
Baseline	0%	$ 982,572
Baseline	20%	$ 1,143,498
Low	0%	$ 1,987,599
Low	20%	$ 1,947,519

Table 4C: Global Insight Pessimistic Forecast

Disposal System, Global Insight		
Cost	Defense Share	Fund Balance
High	0%	$ (2,048,380)
High	20%	$ (672,654)
Baseline	0%	$ 2,293,519
Baseline	20%	$ 2,743,582
Low	0%	$ 4,946,443
Low	20%	$ 4,865,921

Table 4D: OMB Forecast

Disposal System, OMB Forecast		
Cost	Defense Share	Fund Balance
High	0%	$ (384,456)
High	20%	$ (253,994)
Baseline	0%	$ 54,690
Baseline	20%	$ 93,827
Low	0%	$ 319,503
Low	20%	$ 305,677

Table 4E: EIA Forecast

Disposal System, EIA Forecast		
Cost	Defense Share	Fund Balance
High	0%	$ (739,078)
High	20%	$ (341,239)
Baseline	0%	$ 551,496
Baseline	20%	$ 676,564
Low	0%	$ 1,337,734
Low	20%	$ 1,305,554

Table 4F: Historical

Disposal System, Historical		
Cost	Defense Share	Fund Balance
High	0%	$ (1,201,472)
High	20%	$ (778,424)
Baseline	0%	$ 191,325
Baseline	20%	$ 324,431
Low	0%	$ 1,029,840
Low	20%	$ 995,242

Table 4G: Market Yield Rates Forecast

Disposal System, Market Yield Rates		
Cost	Defense Share	Fund Balance
High	0%	$ (175,138)
High	20%	$ (135,619)
Baseline	0%	$ (36,115)
Baseline	20%	$ (24,346)
Low	0%	$ 47,606
Low	20%	$ 42,390

The range of results for scenarios assuming the Global Insight 2012 Pessimistic forecast is the largest – from negative $2.0 trillion to positive $4.9 trillion. By contrast, the range is the smallest for scenarios assuming the Market Yield Rates forecast – from negative $175 billion to positive $48 billion. The data in Table 5 (ordered by decreasing average real interest rate) show the impact of real interest and inflation rates on the range of results for each economic forecast. Higher real interest rates tend to increase the ending fund balances for low cost scenarios, while decreasing the fund balance for high cost scenarios. Higher inflation rates tend to decrease

ending fund balances for comparable real interest rates. With the exception of the Market Yield Rates (with significantly lower real interest rates), economic forecasts impact primarily the magnitude, both positive and negative, of the ending fund balances. They do not significantly impact the number of scenarios with positive ending balances, with four of the six scenarios ending with a positive balance.

Table 5: Impact of Economic Forecasts

Economic Forecast	Average Inflation	Average Real Interest	Maximum Ending Fund Balance (trillion 2012$)	Minimum Ending Fund Balance (trillion 2012$)	# of Scenarios with Positive NWF Ending Balance
Global Insight Pessimistic	3.52%	3.73%	$4.95	($2.05)	4 of 6
Global Insight Trend	1.98%	3.11%	$2.54	($0.88)	4 of 6
Global Insight Optimistic	1.61%	2.90%	$1.99	($0.65)	4 of 6
Ibbotson Historical	4.37%	2.73%	$1.03	($1.20)	4 of 6
DOE Energy Information Administration	2.12%	2.66%	$1.34	($0.74)	4 of 6
Office of Management and Budget	2.10%	1.67%	$0.32	($0.38)	4 of 6
Taylor Advisors Market Yield Rates	2.87%	0.51%	$0.05	($0.18)	2 of 6

5 FEE ADEQUACY ANALYSIS

The results of this year's Assessment do not provide compelling evidence that either insufficient or excess revenues are being collected to recover the full costs that will be incurred by the federal government in meeting its disposal obligation.[64] As Figure 2 shows, continuation of the fee at its current level may result in a Waste Fund balance at the projected end of the disposal program of as low as negative $2.0 trillion or as high as positive $4.9 trillion. Within this range, Figure 2 indicates that approximately 38% of the scenarios result in negative balances whereas approximately 62% result in positive balances. It is, however, not currently possible to assign meaningful probabilities to any of the scenarios. Thus, a simple numerical preponderance of scenarios showing positive or negative balances is not dispositive.

Figure 3 further demonstrates the absence of compelling evidence to support an adjustment of the fee at this time. As shown in Figure 3, the large variation in projected ending fee balances is driven in significant measure by uncertainty as to which long-term economic forecast will materialize. The number of scenarios resulting in a negative balance varies from one-third of the scenarios (under the EIA, OMB, historical, and all three GI forecasts) to two-thirds of the scenarios (under the Market Yield Rates forecast). Under the Global Insight 2012 Pessimistic forecast, the ending Waste Fund balance could be as low as negative $2.0 trillion or as high as positive $4.9 trillion. Under the Market Yield Rates forecast, the range of results is far narrower, albeit still considerable – from negative $175 billion to positive $48 billion. Thus, economic factors will likely play a significant role in how the required full cost recovery is achieved over the long term. It is not currently possible to assign a meaningful probability to any economic forecast and therefore not possible to estimate the likelihood of whether there will be excess or insufficient collections at the current fee amount. At the same time, there is no demonstrable evidence that the current fee amount needs to change.

The Department's ultimate goal in determining whether to propose an adjustment of the fee is to ensure "full cost recovery,"[65] consistent with the NWPA's purpose of making nuclear utilities,

[64] Some nuclear utilities have called for a suspension of the fee (i.e., a downward adjustment of the fee to zero). The Secretary's determination that no fee adjustment should be proposed necessarily entails a determination that collection of the fee should not be suspended. A fee suspension in the absence of a conclusion that the current fee is excessive would increase the likelihood that the fee would need to be higher than 1 mill in future years to ensure full cost recovery. Utilities that generate SNF during the time the fee was zero would forever avoid paying the disposal costs for that SNF, with the costs shifted to future generators. Such cost-shifting would be inconsistent with the NWPA, by which Congress undertook to make utilities bear the full cost of disposal for the SNF they generate. *See, e.g., Consolidated Edison Co. of New York, Inc. v. U.S. Dep't of Energy*, 870 F.2d 694, 698 (D.C. Cir. 1989) (recognizing that Congress intended to avoid "unfairly burdening future ratepayers."); NWPA, sec. 111 ("Findings and Purposes … (a) FINDINGS–The Congress finds that … (4) … the costs of [HLW and SNF] disposal should be the responsibility of the generators and owners of such waste and spent fuel … (b) PURPOSES–The purposes of this subtitle are … (4) to establish a Nuclear Waste Fund … that will ensure that the costs of carrying out activities relating to the disposal of such waste and spent fuel will be borne by the persons responsible for generating such waste and spent fuel."). In addition, deferring these costs to the future would concentrate them more heavily on particular generators by increasing the proportion of costs that would still need to be collected at a time when the number of nuclear power generators is projected to decline. The nuclear electricity generation forecast used for this Assessment, which is based on the EIA's Reference Case of the Annual Energy Outlook 2012, projects a substantial decline in the number of nuclear power generators beginning in the 2030s. *See* Appendix A below.

[65] NWPA, sec. 302(a)(4).

rather than taxpayers, bear the costs of disposal for the nuclear waste that these utilities generate. The Department's aim is thus to avoid both over- and under-collection while remaining cognizant that any fee adjustment can only be prospective (as explained in Part 1.1 above) and that, if the fee collected from utilities in the past turns out to be insufficient to cover disposal costs, those costs will be shifted to future generators or taxpayers. As explained in Part 3 above, the ending balances projected in this Assessment should be seen as indications of the relative adequacy of the current fee level under a variety of scenarios, rather than as predictions of the actual Waste Fund balance at the completion of all disposal activities. The Department remains committed to reviewing the fee annually, with the objective of ensuring full cost recovery while achieving an actual ending balance of the Waste Fund that is as close to zero as possible. As noted above, prior assessments have indicated that evidence supporting a change to the fee would likely come from more than a single year's analysis. As sources of uncertainty are removed, future fee assessments may be more likely to find compelling evidence that the Secretary should propose an adjustment of the fee.

6 CONCLUSION

Congress in the NWPA affirmatively set the annual fee amount at "1.0 mil per kilowatt-hour," unless and until the Secretary, based on his expertise and exercising his discretion,[66] "determines that either insufficient or excess revenues are being collected" pursuant to section 302(a)(4). The results of the Assessment do not demonstrate that either insufficient or excess revenues are being collected to ensure full cost recovery.

[66] *See* Part 1.1 above.

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APPENDIX A: NUCLEAR GENERATION, WASTE FUND FEES RECEIVED, AND SYSTEM ANNUAL COSTS

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Table A-1: Nuclear Generation, WASTE FUND Fees Received,[67] and System Annual Costs

Year	Nuclear Generation (TWh)	Fees Received (Millions of 2012$)	Disposal System Annual Costs (Millions of 2012$)					
			No Defense Share			20% Defense Share		
			System Low	System Base case	System High	System Low	System Base case	System High
2012	801	$765	$0	$0	$0	$0	$0	$0
2013	801	$752	$0	$0	$0	$0	$0	$0
2014	804	$741	$16	$33	$59	$13	$26	$47
2015	804	$729	$63	$145	$276	$66	$131	$237
2016	826	$735	$110	$258	$495	$119	$237	$427
2017	848	$739	$159	$376	$724	$174	$347	$625
2018	860	$736	$206	$488	$941	$226	$453	$815
2019	874	$733	$265	$608	$1,156	$274	$548	$986
2020	878	$722	$300	$677	$1,281	$302	$604	$1,087
2021	882	$711	$382	$840	$1,574	$367	$734	$1,321
2022	886	$701	$407	$890	$1,665	$387	$774	$1,393
2023	892	$692	$479	$1,035	$1,924	$445	$889	$1,601
2024	898	$683	$519	$1,116	$2,071	$477	$955	$1,718
2025	904	$675	$428	$933	$1,741	$404	$808	$1,455
2026	910	$666	$510	$1,141	$2,149	$504	$1,008	$1,815
2027	910	$654	$541	$1,202	$2,259	$529	$1,057	$1,903
2028	910	$641	$529	$1,178	$2,216	$519	$1,038	$1,869
2029	910	$629	$542	$1,203	$2,261	$529	$1,058	$1,905
2030	911	$617	$512	$1,143	$2,153	$505	$1,010	$1,818
2031	889	$590	$512	$1,143	$2,153	$505	$1,010	$1,818
2032	874	$569	$487	$1,094	$2,066	$486	$971	$1,748
2033	862	$550	$487	$1,094	$2,066	$486	$971	$1,748
2034	827	$518	$487	$1,094	$2,066	$486	$971	$1,748
2035	758	$465	$487	$1,094	$2,066	$486	$971	$1,748
2036	663	$398	$487	$1,094	$2,066	$486	$971	$1,748
2037	648	$381	$487	$1,094	$2,066	$486	$971	$1,748
2038	589	$340	$487	$1,094	$2,066	$486	$971	$1,748
2039	566	$319	$487	$1,094	$2,066	$486	$971	$1,748
2040	542	$300	$487	$1,094	$2,066	$486	$971	$1,748
2041	542	$294	$487	$1,094	$2,066	$486	$971	$1,748
2042	515	$273	$629	$1,493	$2,875	$691	$1,383	$2,489
2043	489	$254	$629	$1,493	$2,875	$691	$1,383	$2,489
2044	442	$225	$629	$1,493	$2,875	$691	$1,383	$2,489
2045	407	$204	$629	$1,493	$2,875	$691	$1,383	$2,489

[67] Waste Fund Fees Received de-escalated from Year of Expenditure $ to 2012$ using Global Insight Trend Inflation rates.

Year	Nuclear Generation (TWh)	Fees Received (Millions of 2012$)	Disposal System Annual Costs (Millions of 2012$)					
			No Defense Share			20% Defense Share		
			System Low	System Base case	System High	System Low	System Base case	System High
2046	329	$161	$629	$1,493	$2,875	$691	$1,383	$2,489
2047	271	$130	$637	$1,509	$2,904	$698	$1,396	$2,512
2048	185	$87	$506	$1,189	$2,280	$546	$1,091	$1,964
2049	137	$63	$501	$1,179	$2,265	$543	$1,086	$1,954
2050	126	$57	$495	$1,170	$2,250	$540	$1,080	$1,944
2051	108	$48	$465	$1,112	$2,148	$518	$1,036	$1,864
2052	87	$38	$456	$1,096	$2,121	$512	$1,024	$1,844
2053	87	$37	$456	$1,096	$2,121	$512	$1,024	$1,844
2054	87	$37	$456	$1,096	$2,121	$512	$1,024	$1,844
2055	77	$32	$456	$1,096	$2,121	$512	$1,024	$1,844
2056	77	$31	$456	$1,096	$2,121	$512	$1,024	$1,844
2057	67	$27	$456	$1,096	$2,121	$512	$1,024	$1,844
2058	67	$26	$456	$1,096	$2,121	$512	$1,024	$1,844
2059	67	$26	$456	$1,096	$2,121	$512	$1,024	$1,844
2060	67	$25	$454	$1,093	$2,114	$511	$1,022	$1,839
2061	67	$25	$453	$1,091	$2,111	$510	$1,020	$1,836
2062	67	$24	$453	$1,091	$2,111	$510	$1,020	$1,836
2063	67	$24	$453	$1,091	$2,111	$510	$1,020	$1,836
2064	67	$23	$453	$1,091	$2,111	$510	$1,020	$1,836
2065	67	$23	$453	$1,091	$2,111	$510	$1,020	$1,836
2066	67	$22	$453	$1,091	$2,111	$510	$1,020	$1,836
2067	67	$22	$453	$1,091	$2,111	$510	$1,020	$1,836
2068	67	$21	$381	$947	$1,852	$452	$905	$1,629
2069	67	$21	$369	$921	$1,806	$442	$884	$1,592
2070	67	$21	$376	$935	$1,831	$448	$895	$1,612
2071	67	$20	$376	$935	$1,831	$448	$895	$1,612
2072	67	$20	$376	$935	$1,831	$448	$895	$1,612
2073	67	$19	$376	$935	$1,831	$448	$895	$1,612
2074	67	$19	$376	$935	$1,831	$448	$895	$1,612
2075	67	$19	$374	$933	$1,826	$447	$893	$1,608
2076	50	$14	$373	$930	$1,821	$446	$891	$1,604
2077	32	$9	$372	$929	$1,819	$445	$890	$1,602
2078	24	$6	$371	$927	$1,816	$444	$889	$1,600
2079	14	$4	$371	$927	$1,816	$444	$889	$1,600
2080	14	$3	$380	$943	$1,846	$451	$902	$1,624
2081	14	$3	$380	$943	$1,846	$451	$902	$1,624

Year	Nuclear Generation (TWh)	Fees Received (Millions of 2012$)	Disposal System Annual Costs (Millions of 2012$)					
			No Defense Share			20% Defense Share		
			System Low	System Base case	System High	System Low	System Base case	System High
2082	14	$3	$380	$943	$1,846	$451	$902	$1,624
2083	14	$3	$380	$943	$1,846	$451	$902	$1,624
2084	14	$3	$380	$943	$1,846	$451	$902	$1,624
2085	14	$3	$380	$943	$1,846	$451	$902	$1,624
2086	14	$3	$380	$943	$1,846	$451	$902	$1,624
2087	14	$3	$380	$943	$1,846	$451	$902	$1,624
2088	14	$3	$380	$943	$1,846	$451	$902	$1,624
2089	14	$3	$380	$943	$1,846	$451	$902	$1,624
2090	14	$3	$362	$908	$1,781	$437	$873	$1,572
2091	13	$3	$362	$907	$1,781	$437	$873	$1,572
2092	12	$2	$362	$907	$1,780	$437	$873	$1,572
2093	10	$2	$361	$907	$1,780	$436	$873	$1,571
2094	8	$1	$361	$906	$1,779	$436	$872	$1,570
2095	4	$1	$361	$906	$1,777	$436	$872	$1,569
2096			$361	$906	$1,777	$436	$872	$1,569
2097			$108	$243	$458	$107	$215	$387
2098			$49	$109	$204	$48	$95	$171
2099			$49	$109	$204	$48	$95	$171
2100			$49	$109	$204	$48	$95	$171
2101			$49	$109	$204	$48	$95	$171
2102			$49	$109	$204	$48	$95	$171
2103			$49	$109	$204	$48	$95	$171
2104			$49	$109	$204	$48	$95	$171
2105			$49	$109	$204	$48	$95	$171
2106			$49	$109	$204	$48	$95	$171
2107			$49	$109	$204	$48	$95	$171
2108			$31	$73	$140	$33	$67	$120
2109			$31	$73	$140	$33	$67	$120
2110			$31	$73	$140	$33	$67	$120
2111			$31	$73	$140	$33	$67	$120
2112			$31	$73	$140	$33	$67	$120
2113			$31	$73	$140	$33	$67	$120
2114			$31	$73	$140	$33	$67	$120
2115			$31	$73	$140	$33	$67	$120
2116			$31	$73	$140	$33	$67	$120
2117			$31	$73	$140	$33	$67	$120

Year	Nuclear Generation (TWh)	Fees Received (Millions of 2012$)	Disposal System Annual Costs (Millions of 2012$)					
			No Defense Share			20% Defense Share		
			System Low	System Base case	System High	System Low	System Base case	System High
2118			$31	$73	$140	$33	$67	$120
2119			$31	$73	$140	$33	$67	$120
2120			$31	$73	$140	$33	$67	$120
2121			$31	$73	$140	$33	$67	$120
2122			$31	$73	$140	$33	$67	$120
2123			$31	$73	$140	$33	$67	$120
2124			$31	$73	$140	$33	$67	$120
2125			$31	$73	$140	$33	$67	$120
2126			$31	$73	$140	$33	$67	$120
2127			$31	$73	$140	$33	$67	$120
2128			$31	$73	$140	$33	$67	$120
2129			$31	$73	$140	$33	$67	$120
2130			$31	$73	$140	$33	$67	$120
2131			$31	$73	$140	$33	$67	$120
2132			$31	$73	$140	$33	$67	$120
2133			$31	$73	$140	$33	$67	$120
2134			$31	$73	$140	$33	$67	$120
2135			$31	$73	$140	$33	$67	$120
2136			$31	$73	$140	$33	$67	$120
2137			$31	$73	$140	$33	$67	$120
2138			$31	$73	$140	$33	$67	$120
2139			$31	$73	$140	$33	$67	$120
2140			$31	$73	$140	$33	$67	$120
2141			$31	$73	$140	$33	$67	$120
2142			$31	$73	$140	$33	$67	$120
2143			$31	$73	$140	$33	$67	$120
2144			$31	$73	$140	$33	$67	$120
2145			$31	$73	$140	$33	$67	$120
2146			$31	$73	$140	$33	$67	$120
2147			$31	$73	$140	$33	$67	$120
2148			$46	$118	$234	$58	$116	$209
2149			$46	$118	$234	$58	$116	$209
2150			$46	$118	$234	$58	$116	$209
2151			$46	$118	$234	$58	$116	$209
2152			$46	$118	$234	$58	$116	$209
2153			$46	$118	$234	$58	$116	$209

Year	Nuclear Generation (TWh)	Fees Received (Millions of 2012$)	Disposal System Annual Costs (Millions of 2012$)					
			No Defense Share			20% Defense Share		
			System Low	System Base case	System High	System Low	System Base case	System High
2154			$46	$118	$234	$58	$116	$209
2155			$46	$118	$234	$58	$116	$209
2156			$46	$118	$234	$58	$116	$209
2157			$46	$118	$234	$58	$116	$209
Totals	**29,293**	**$20,225**	**$37,511**	**$88,883**	**$171,077**	**$41,097**	**$82,194**	**$147,949**

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APPENDIX B: BACK END FUEL CYCLE COST COMPARISON

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Back End Fuel Cycle Cost Comparison

Fuel Cycle Research & Development

Prepared for
U.S. Department of Energy
Nuclear Fuel Storage and Transportation Planning Project
Joe T. Carter
Savannah River National Laboratory
December 21, 2012
FCRD-UFD-2013-000063, Rev 1

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SUMMARY

The Blue Ribbon Commission on America's Nuclear Future (BRC) "Report to the Secretary of Energy" [BRC-2012] outlined a series of recommended actions to "establish a truly integrated national nuclear waste system" for the back end of the nuclear fuel cycle. Their recommendations include consideration of consolidated interim storage while recognizing the need for ultimate geologic disposal of the used nuclear fuel (UNF).

Currently nuclear fuel discharged from commercial power reactors is transferred to pool storage (for time periods ranging from 5 to 60 years) to allow decay heat to dissipate. Due to a lack of pool storage capacity at most reactor locations, the industry has also implemented numerous dry storage systems to off load the cooler fuel while awaiting a final disposition solution. These dry storage systems typically contain 24 to 68 assemblies (depending upon dry storage container design and fuel type). Thermal analyses completed by the Used Fuel Disposition Campaign (UFDC) indicate that waste package sizes for the geologic media under consideration by the UFDC and comparable international repository concepts are significantly smaller than the canisters being used for on-site dry storage by the nuclear utilities. Therefore, at some point along the UNF disposition pathway there may be a need to re-package fuel assemblies already loaded into the types of dry storage canisters currently in use unless the feasibility of direct disposal of these large canisters can be demonstrated and implemented for site specific geologic media.

The UFDC recently completed [Hardin 2012] an alternative study for the geologic disposal of UNF, developing five alternative geologic disposal concepts and developed rough order of magnitude estimates for these concepts. The *Back End Fuel Cycle Cost Comparison* provides a life cycle cost (LCC) comparison for these alternatives to the disposal concept previously estimated for the Yucca Mountain Project's (YMP) total system life cycle cost (TSLCC). This comparison does not consider all cost elements considered in the YMP TSLCC, such as national transportation. Rather, this report compares specific cost elements related to construction and operation of a deep geologic repository. Only those repository-related cost elements that were estimated by the UFDC are compared to the YMP TSLCC as well.

Overall the alternative repository concepts range from about half the cost of the YM repository (established by the LCC for either a bedded salt repository or an open mode shale repository) to about 80% higher than the YM repository (established by the high cost for the shale enclosed repository). This factor is for the direct repository costs only. Transportation, consolidated storage and used fuel packaging/re-packaging costs as required for an integrated back end solution are not included.

Revision History

Revision 1 corrected typographical errors in Table 2-4 and 4-1.

CONTENTS

FIGURES

TABLES

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ACRONYMS

BRC	Blue Ribbon Commission
BWR	Boiling Water Reactor
CSF	Consolidated Storage Facility
DOE	Department of Energy
DPC	Dual Purpose Canister
GW	Giga-watt
GW/d	Giga-watt days
HLW	High Level Waste
LCC	Life Cycle Cost
LWR	Light Water Reactor
MTHM	Metric Ton Heavy Metal
NRC	Nuclear Regulatory Commission
NWPA	Nuclear Waste Policy Act
OCRWM	Office of Civilian Radioactive Waste Management
PWR	Pressurized Water Reactor
R&D	Research and Development
ROM	Rough Order-of-Magnitude
SNF	Spent Nuclear Fuel
TAD	Transport-aging-disposal
TSLCC	Total System Life Cycle Cost
U.S.	United States
UFD	Used Fuel Disposition
UFDC	Used Fuel Disposition Campaign
UNF	Used Nuclear Fuel
WBS	Work Breakdown Structure
YM	Yucca Mountain
YMP	Yucca Mountain Project

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NUCLEAR FUELS STORAGE AND TRANSPORTATION PLANNING PROJECTS
BACK END FUEL CYCLE COST COMPARISON

1. INTRODUCTION

The Blue Ribbon Commission on America's Nuclear Future (BRC) "Report to the Secretary of Energy" [BRC-2012] outlined a series of recommended actions to "establish a truly integrated national nuclear waste system" for the back end of the nuclear fuel cycle. Their recommendations include consideration of consolidated interim storage while recognizing the need for ultimate geologic disposal of the used nuclear fuel (UNF).

Currently nuclear fuel discharged from commercial power reactors is transferred to pool storage (for time periods ranging from 5 to 60 years) to allow decay heat to dissipate. Due to a lack of pool storage capacity at most reactor locations, the industry has also implemented numerous dry storage systems to off load the cooler fuel while awaiting a final disposition solution. These dry storage systems typically contain 24 to 68 assemblies (depending upon dry storage container design and fuel type). Thermal analyses completed by the Used Fuel Disposition Campaign (UFDC) indicate that waste package sizes for the geologic media under consideration by the UFDC and comparable international repository concepts are significantly smaller than the canisters being used for on-site dry storage by the nuclear utilities. Therefore, at some point along the UNF disposition pathway there may be a need to re-package fuel assemblies already loaded into the types of dry storage canisters currently in use unless the feasibility of direct disposal of these large canisters can be demonstrated and implemented for a site specific geologic media.

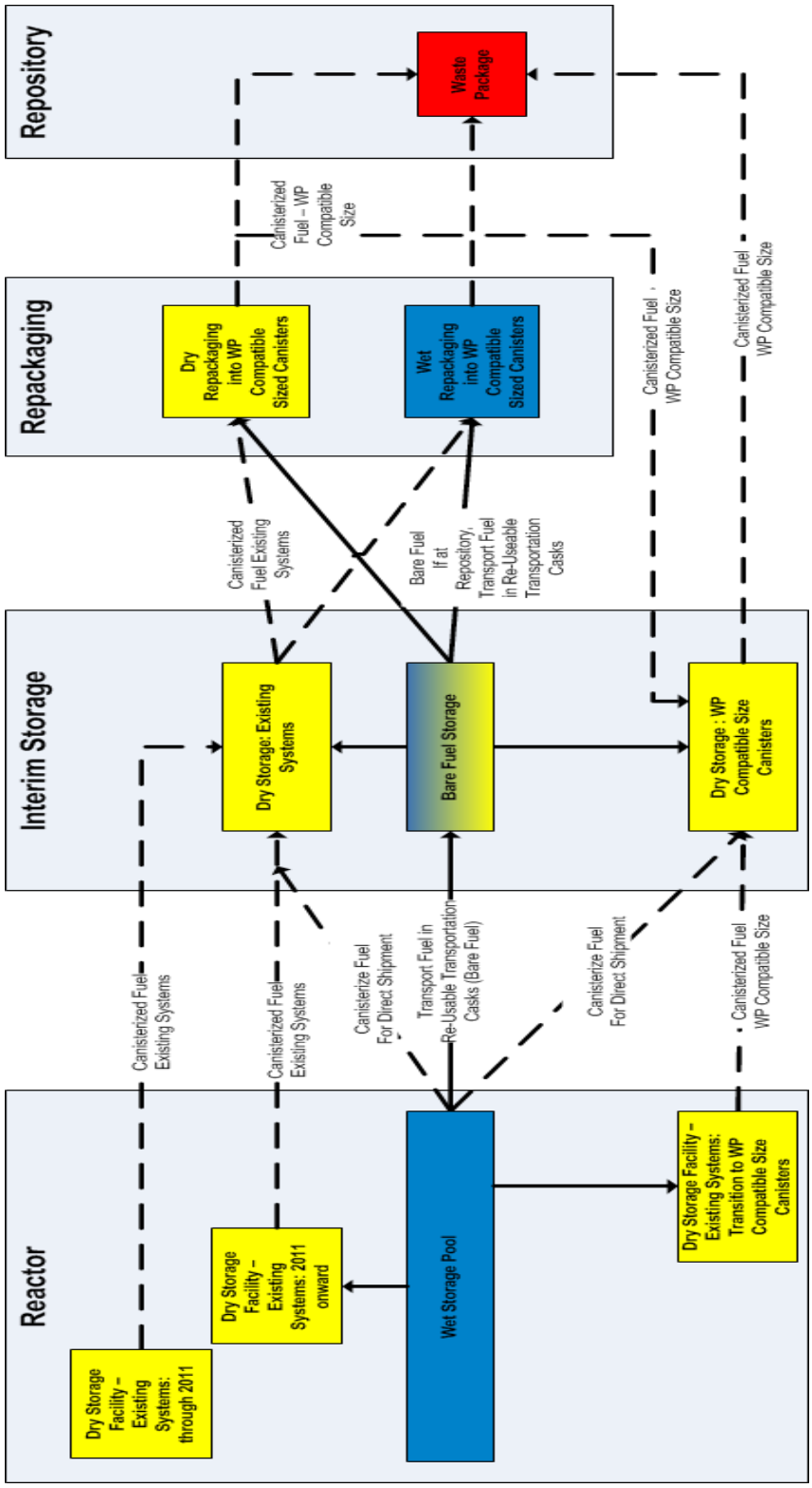
A high-level diagram for alternative UNF disposition pathways is shown in Figure 1-1. The figure indicates multiple disposition pathways through four typical phases for at reactor storage, UNF storage at a consolidated storage facility (CSF) and UNF packaging/re-packaging prior to ultimate disposal.

The UFDC recently completed [Hardin et al., et al., 2012] an alternative study for the geologic disposal of UNF, developing five alternative geologic disposal concepts. The purpose of the *Back end Fuel Cycle Cost Analysis* is to provide a life cycle cost (LCC) comparison for these alternatives to the disposal concept previously estimated for the Yucca Mountain Project's (YMP) total system life cycle cost (TSLCC). Consolidated storage, UNF packaging/re-packaging and transportation costs are not yet included in the comparison. Section 2 provides a summary of the alternative geologic disposal alternatives and their initial rough order-of-magnitude (ROM) costs estimates. Section 3 describes the TSLCC components and identifies adjustments required to allow for an "apples to apples" comparison with the alternatives since these initial estimates did not include all system attributes required for a completely integrated back end solution. Section 4 summarizes the LCC comparison.

2. ALTERNATIVE REPOSITORY STUDY

The recently completed [Hardin et al., et al., 2012] UFD study for alternative repositories developed five alternative concepts in two broad categories of waste package emplacement modes: "open" where extended ventilation can remove heat for many years following waste emplacement underground; and "enclosed" modes for clay/shale and salt media. For the enclosed modes, waste packages are emplaced in direct or close contact with natural or engineered materials which may have temperature limits that constrain thermal loading. All disposal concepts developed internationally and in this report fit into one of these two categories. Enclosed modes include backfilled alcoves, vertical and horizontal borehole accessed via tunnels or drifts. In-drift emplacement can be open or enclosed depending on whether buffer and/or backfill are installed around waste packages at emplacement. Emplacement drifts may be kept open for ventilation, then backfilled or isolated by seals prior to closure.

Figure 1-1 Alternative Used Nuclear Fuel Disposition Pathway



2.1 Reference Disposal Concepts

Geologic settings selected for use in reference disposal concepts are: crystalline rock (including granite), clay/shale, bedded salt, massive soft shale, other sedimentary rock (e.g., alluvium) with favorable characteristics, and unsaturated hard rock (e.g., crystalline rock or volcanic tuff). Bedded salt, rather than domal salt, is used for the salt reference case as it is more likely able to accommodate a large capacity repository. These selections include types of host media being investigated internationally (e.g., crystalline, clay/ shale, and salt—geologic conditions vary).

The reference mined disposal concepts developed in the UFDC alternative study are [Hardin et al., 2012]:

1. **Crystalline (enclosed)** - Vertical borehole emplacement is used with a copper waste package (e.g., Swedish KBS-3 concept) with a clay buffer installed at emplacement. Access drifts are backfilled with low-permeability clay-based backfill at closure.
2. **Generic Salt Repository (enclosed)** – A repository in bedded salt in which carbon steel waste packages are placed on the floor in drifts or alcoves, and immediately covered (backfilled) with run-of-mine salt.
3. **Clay/Shale (enclosed)** – Spent nuclear fuel (SNF) or high level waste (HLW) is emplaced in blind, steel-lined horizontal borings constructed from access drifts. SNF is emplaced in carbon steel packages with a clay buffer. HLW glass is emplaced in stainless steel pour canisters, within a steel liner.
4. **Shale Unbackfilled (open)** – A repository in a thick shale formation constructed so that ventilation is maintained for at least 50 to 100 years after waste emplacement. Emplacement drifts are not backfilled at closure but all other openings are backfilled to provide waste isolation.
5. **Sedimentary Backfilled (open)** – Constructed in sedimentary rock so that ventilation is maintained for at least 50 to 100 years after waste emplacement. All waste emplacement and other openings are backfilled with low-permeability clay-based backfill prior to repository closure.

2.2 Thermal Analysis

The UFDC study of deep geologic repository alternatives also evaluated the impacts of thermal constraints on SNF loading strategies [Hardin et al., 2012]. An important result of this work with respect to comparisons to the Yucca Mountain Project design concept is that the enclosed concepts would need to use packages are significantly smaller than the transport-aging-disposal (TAD) containers developed previously (DOE 2008b) and much smaller than the dry-storage containers currently being loaded by United States (U.S.) nuclear utilities. Open mode design concepts can utilize larger packages (approximately the size of the TAD containers). In addition, relatively long durations of decay storage prior to emplacement, and ventilation for the open modes, would also be needed to meet thermal constraints.

The thermal analyses for the enclosed and open modes are summarized below. More details can be found in the UFDC repository alternative study [Hardin et al., 2012].

2.2.1 Thermal Analysis - Enclosed Modes

Clay-based buffers are part of the Crystalline (enclosed) concept for SNF and HLW, and the Clay/Shale (enclosed) concept for SNF. Various temperature limits for buffers containing swelling clay have been proposed, for example, the Swedish program has used a peak temperature of 100°C. The UFDC reference design concepts adopted this target maximum buffer temperature is 100°C, and the same target of 100°C is used for clay or shale host media that contain similar minerals.

Thermal results are presented for waste package sizes given as capacity for pressurized water reactor (PWR) assemblies, but boiling water reactors (BWR) assemblies can also be disposed in quantities that are larger per package because the assemblies have smaller cross-sections and lower thermal output per assembly.

Thermal results for Crystalline (enclosed) and Clay/Shale (enclosed) concepts are similar because of the use of clay-based buffers, and the similarity of clay or shale host media to clay buffers. The following results are obtained:

- Existing light water reactor (LWR) SNF with average burnup (40 GW-d/MT) could be emplaced in 4-PWR waste packages (or equivalent), after 50 to 75 years of surface decay storage.
- High-burnup (60 GW-d/MT) LWR SNF could be emplaced in 4-PWR waste packages (or equivalent), after approximately 100 years of surface decay storage.

Larger waste packages could be used but would require significantly increased decay storage to meet target temperatures.

For salt a target value of 200°C for the peak salt temperature is used although higher temperatures may be possible. LWR SNF could be emplaced in 4-PWR waste packages (or equivalent) after approximately 10 years of decay storage, regardless of burnup (up to 60 GW-d/MT). Also, 12-PWR packages could be emplaced after approximately 50 years. The later was selected as the reference case for a bedded salt repository concept.

2.2.2 Thermal Analysis - Open Modes

This study identified three open emplacement mode concepts for disposal of 21-PWR packages, with ventilation requirements ranging from 50 years (Hard Rock Unsaturated concept) to 250 years (Sedimentary Backfilled open mode). Thermal analysis is presented for the Shale Unbackfilled and Sedimentary Backfilled open concepts. The 21-PWR package size was selected for these modes, for comparison to the transport, aging and disposal (TAD) canister-based system studied previously.

Even with 250 years of forced ventilation, peak temperatures exceed 100°C for 21-PWR size (and larger) packages. The entire repository horizon heats up over hundreds of years, and heat generated by the intermediate half-life actinide content of the waste (after decay of short-lived fission products) can sustain buffer or rock-wall temperatures above 100°C after closure. However, thermal analysis show that the open emplacement concepts can be adjusted to manage these temperatures through selection of host media, drift spacing, etc. Doubling the drift spacing has an effect on peak temperature that is similar to doubling the ventilation time, so waste package spacing (repository footprint) is a key parameter for open concepts. For 21-PWR or larger waste packages, host rock thermal conductivity of at least 3 to 4 W/m-K is needed to limit near-field host rock (and buffer/backfill) temperatures to 100°C even after 300 years of combined decay storage and repository ventilation. Such values are found in certain media (e.g., salt, some types of crystalline rock) but are significantly higher than other media considered.

A combination of parameters was selected to optimize a strategy for disposing of 21-PWR size packages containing SNF with 40 GW-d/MT burnup, while limiting ventilation duration to 100 years. The results show that with drift spacing set to 60 m, the host rock temperature at a distance of 3 m into the wall could be kept below 100°C even after only 50 years ventilation (and 50 years decay storage), for 21-PWR packages containing SNF with 40 GW-d/MT burnup. The design test case is a reasonable solution that was used for cost estimation, subject to confirmation of the performance consequences of over-heating the near-field host rock.

2.3 Cost Estimation

An evaluation of cost factors for the disposal concepts is provided to show how design features and thermal management strategies for each concept affect relative costs. Each disposal concept is described in sufficient detail in the UFDC repository alternative study [Hardin et al., 2012] to support cost estimation, including construction sequence, shafts, ramps, underground openings, ground support, invert features, and the types of equipment to be used for waste transport and emplacement underground.

The study assumed a total SNF emplacement of 140,000 MT at an annual emplacement rate of 3,000 MT per year, which would require approximately 47 years for disposal of the total inventory. The 140,000 MT capacity is based on operating the existing 104 commercial U.S. nuclear reactors for 60 years each.

The operating concept assumed in the UFDC repository alternative study involves the repository receiving SNF in sealed stainless steel canisters that are in the configuration needed for disposal, and are not re-opened. No bare fuel handling was included; the study assumed that SNF will be received from central storage or a repackaging facility, in sealed stainless steel canisters. The study assumed that such packaging or repackaging would be performed elsewhere (i.e., at a centralized fuel storage facility) and the repository would receive canisters ready for disposal. Surface facilities were assumed to be needed to package these canisters into disposal overpacks that are specific to each disposal concept. It was assumed that disposal overpacks would be fabricated and inspected off site, and transported to the repository, and are included in the cost estimates. Overpacks were assumed to be of carbon steel or copper, with welded closures. Limited lag storage capacity was assumed to be provided to buffer throughput.

Descriptions of the repository layout, emplacement mode, and waste packaging were developed for each of the five concepts considered. Concepts were developed considering thermal management (among other factors) using typical heat transfer characteristics for each generic geologic setting.

Major aspects of the concept description are summarized in Tables 2-1 and 2-2. Table 2-1 summarizes the waste package configuration, total and annual numbers of waste packages for disposal, and the materials of construction.

Repository layouts were developed as modular panels for each concept, which is important because the scale or volume of excavation is one of the principal differences among alternatives (Table 2-2). These modular panels were then repeated as necessary to accommodate the total SNF inventory of 140,000 MT.

Shafts connect the surface and underground facilities to provide men-and-materials access, ventilation, waste rock removal, and waste transfer. Waste package transport is by shaft hoist system for two concepts, and by ramp for the other three. The numbers of ventilation intake and exhaust shafts vary according to whether ventilation is used to remove heat (open modes), or merely to maintain drifts available for human access after emplacement (crystalline and shale enclosed modes), or only for construction and emplacement operations (salt).

Table 2-1 Summary of Waste Package Numbers for Alternative Disposal Concepts

	Package Capacity (PWR/BWR)	140,000 MT Repository		Disposal Overpack
		Total Waste Packages	Annual Waste Packages	Material
Crystalline (enclosed)	4/9	82,583	1,757	Copper
Generic Salt Repository (enclosed)	12/24	28,792	616	Carbon Steel
Clay/Shale (enclosed)	4/9	82,583	1,757	Carbon Steel
Shale Unbackfilled (open)	21/44	16,157	344	Carbon Steel
Sedimentary Backfilled (open)	21/44	16,157	344	Carbon Steel

Table 2-2 Summary of Mined Opening Length and Volume for Alternative Disposal Concepts

	Access Drift		Disposal Drifts/ Borings		Service Drift		Repository Total	
	Length (m)	Volume (m^3)	Length (m)	Volume (m^3)	Length (m)	Volume (m^3)	Length (m)	Volume (m^3)
Crystalline (enclosed)	8.3E5	2.7E7	8.3E5	1.8E6	2.3E5	7.7E6	1.9E6	3.7E7
Generic Salt Repository (enclosed)	3.1E5	1.7E7	3.5E5	4.4E6	1.3E5	7.2E6	7.9E5	2.9E7
Clay/Shale (enclosed)	3.9E5	9.2E6	8.3E5	4.6E6	3.7E5	8.7E6	1.6E6	2.3E7
Shale Unbackfilled (open)	7.7E4	2.2E6	1.4E5	2.3E6	9.3E4	2.2E6	3.1E5	6.7E6
Sedimentary Backfilled (open)	8.5E4	2.0E6	2.2E5	3.5E6	5.8E4	1.4E6	3.6E5	6.9E6

2.4 Rough Order-of-Magnitude Life Cycle Cost Estimates

The cost for permanent disposal of 140,000 MT of commercial SNF ranges from approximately $24 B to $81 B in 2012 dollars (Table 2-3), including the range of low to high contingency. The lowest cost estimates are for the Generic Salt Repository and the Shale Unbackfilled concepts, and the highest are for the Clay/Shale and Crystalline concepts. This range reflects the different strategies for relying on engineered and natural barriers (i.e., natural barriers cost less). A geologic setting in relatively poor quality shale (e.g., indurated, with fracture permeability) is better suited technically to the Clay/Shale

(enclosed) reference concept which uses short (40 m) horizontal emplacement borings, small waste packages, and multiple engineered barriers (buffer, plugs, and seals). By contrast, the Shale Unbackfilled concept is intended for a higher quality, relatively unfractured, low-permeability host rock. It can accept larger waste packages and does not require backfill in emplacement drifts (although backfilling remains an option until repository closure).

It is important to note that the cost estimates in this report are for repositories with relatively simple surface facilities that handle only canistered commercial SNF that arrives already in waste package-size containers. The costs associated with fabricating SNF canisters of the correct size for waste disposal, including internal structures and materials for heat transfer, criticality control, etc., the cost of consolidated storage, and the costs associated with repackaging the ever-growing inventory of SNF that is stored in sealed, dual-purpose canisters (DPCs) are not included. Facilities, equipment, and personnel required to support these additional necessary operations will increase the costs all of the repository concepts analyzed. The waste package assumed in the reference report is constructed from solid copper for the crystalline repository and carbon steel for all other concepts. Prior repository studies have assumed more durable materials of construction for the waste packages and drip shields to demonstrate compliance with performance standards. Table 2-4 provides an expanded range for the high cost in which the carbon steel waste packages are upgraded to stainless steel.

Table 2-3 Summary of Costs for Design, Construction, Start-up, Operations, Closure and Monitoring for a 140,000 MT SNF Repository

Costs in $Millions	Crystalline (enclosed)		Generic Salt Repository (enclosed)		Clay/Shale (enclosed)		Shale Unbackfilled (open)		Sedimentary Backfilled (open)	
Element	**Low Range**	**High Range**	**Low Range**	**High Range**	**Low Range**	**High Range**	**Low Range**	**High Range**	**Low Range**	**High Range**
Facility Design, Construction, Startup	3,754	5,495	3,896	5,595	6,872	10,064	3,303	4,711	5,410	7,599
Operations & Maintenance	17,545	22,475	7,947	10,259	26,884	34,525	9,702	12,408	9,614	12,264
Closure	9,563	13,704	832	1,363	5,556	8,334	1,622	2,515	2,263	3,558
Waste Packages	17,489	21,647	3,998	4,950	7,542	9,337	2,882	3,569	2,882	3,569
Regulatory & Licensing	424	441	368	379	414	429	417	421	668	679
Monitoring	10,685	14,571	4,580	6,246	9,021	12,302	3,395	4,629	3,775	5,148
Performance Confirmation	411	561	567	773	758	1,034	423	576	798	1,088
Program Integration	1,575	2,142	2,136	2,907	2,914	3,965	3,732	5,084	6,878	9,370
Total	**$61,450**	**$81,040**	**$24,330**	**$32,480**	**$59,970**	**$79,990**	**$25,480**	**$33,920**	**$32,290**	**$43,280**

Table 2-4Expanded Range for Design, Construction, Start-up, Operations, Closure and Monitoring for a 140,000 MT SNF Repository

Costs in $Millions	Crystalline (enclosed)		Generic Salt Repository (enclosed)		Clay/Shale (enclosed)		Shale Unbackfilled (open)		Sedimentary Backfilled (open)	
Element	**Low Range**	**High Range**	**Low Range**	**High Range**	**Low Range**	**High Range**	**Low Range**	**High Range**	**Low Range**	**High Range**
Facility Design, Construction, Startup	3,754	5,495	3,896	5,595	6,872	10,064	3,303	4,711	5,410	7,599
Operations & Maintenance	17,545	22,475	7,947	10,259	26,884	34,525	9,702	12,408	9,614	12,264
Closure	9,563	13,704	832	1,363	5,556	8,334	1,622	2,515	2,263	3,558
Waste Packages	17,489	21,647	3,998	11,872	7,542	21,967	2,882	8,388	2,882	8,388
Regulatory & Licensing	424	441	368	379	414	429	417	421	668	679
Monitoring	10,685	14,571	4,580	6,246	9,021	12,302	3,395	4,629	3,775	5,148
Performance Confirmation	411	561	567	773	758	1,034	423	576	798	1,088
Program Integration	1,575	2,142	2,136	2,907	2,914	3,965	3,732	5,084	6,878	9,370
Total	**$61,450**	**$81,040**	**$24,330**	**$39,400**	**$59,970**	**$92,620**	**$25,480**	**$38,740**	**$32,290**	**$48,100**

3. YUCCA MOUNTAIN TOTAL SYSTEM LIFE CYCLE COST

The *Analysis of the Total System Life Cycle Cost (TSLCC) of the Civilian Radioactive Waste Management Program* [DOE, 2008] presents the Office of Civilian Radioactive Waste Management's (OCRWM) May 2007 total system cost estimate for the disposal of the Nation's spent nuclear fuel (SNF) and high-level radioactive waste (HLW). The TSLCC was further updated in 2008 to support the latest Nuclear Waste Fund Fee Adequacy Report and provided to the author via an excel workbook file. These working papers [Booz Allen Hamilton 2009] are used as a basis for comparison to the current studies.

The TSLCC spans the period of 1983 to the assumed closure date of 2133, and totals nearly $97 billion in constant 2008 dollars, as reflected in Table 3-1. Assumptions used for the development of the 2008 TSLCC estimate were a snapshot in time, and program plans will continue to evolve. The schedules identified in this report are assumed for cost estimating purposes and reflect the previously assumed start of operations date of 2017.

The TSLCC estimate is based on the acceptance, transport and permanent disposal in the Yucca Mountain Repository of all currently projected civilian and defense wastes, estimated at that time to be 122,100 Metric Tons Heavy Metal (MTHM) of SNF and HLW. The estimated total of civilian SNF is 109,300 MTHM, based on data that includes discharge projections from the 47 reactor license extensions granted by the Nuclear Regulatory Commission (NRC) as of January 2007. Any discharge from potential new reactors was not assumed. As more utilities receive reactor license extensions and additional reactors are built, the discharge projections will increase therefore, the UFD Repository study in Section 2 extended all the currently operating reactors to 60 years of operations. The TSLCC also include the full inventory of approximately 12,800 MTHM of government-owned SNF and HLW.

Table 3-1 indicates the four major work breakdown structure (WBS) elements of the TSLCC. Historical costs ($14.5B) are those incurred between 1983 and 2008. This category includes the early programmatic costs for site selection, site characterization and most of the licensing costs. The total future costs ($82.5B) include most of the repository construction, operation and maintenance, and closure costs ($52.5 B). Transportation ($20.3B) includes the capital acquisitions, operations and maintenance costs required for the national transportation systems and the costs associated with the proposed Nevada rail line and transportation. The Balance of Program ($9.7B) WBS elements includes those associated with quality assurance, program management, community outreach and support required by other state and federal agencies.

3.1 Adjustments to the Yucca Mountain Total System Life Cycle Cost for Comparison

As discussed above the estimate bases for the UFD repository study and the YM TSLCC are not identical. The UFD study did not include all of the system components that would be required for a totally integrated back end fuel cycle. To allow comparison of the YM repository to the alternative repository concepts two types of adjustments are made: items in the YM TSLCC that are not required in the implementation of the alternative repository concepts are eliminated and items that are likely required for any repository implementation but not included in the UFD repository estimates are removed for comparison. Table 3-2 summarizes these adjustments. The adjustments also include $14.5B in historical costs. Some program elements in the historical costs such as site selection, site characterization and licensing are required program elements for any repository that were not estimated in the UFD repository studies. The amount of the historical costs that will be required is unclear since it is assumed that future repository programs can be more efficient at these activities.

Table 3-1 Yucca Mountain Repository Total System Life Cycle Cost

millions of 2008$	2008 TSLCC
TOTAL FUTURE COST (FY 2008 - FY 2133)	**$ 82,495**
Yucca Mountain Project	**$ 52,473**
EPC Total	15,962
OPEX Packages	12,368
Emplacement Operations	8,049
Monitoring	1,086
Closure	975
Drip Shields	7,774
Operations Management (RIMS)	1,452
Performance Confirmation	2,779
Post IOC Safeguards & Security	2,029
Transportation	**$ 20,279**
National Transportation	11,347
Nevada Infrastructure	2,605
System Support	3,308
Operations Execution	3,019
Balance of Program	**$ 9,743**
Quality Assurance	670
Systems Engineering & Integration	248
Program Management	3,783
Safeguards & Security	1,165
Benefits, PETT, Outreach and Institutional (i.e., Set-Asides)	2,794
Other Agencies (Non-OCRWM)	1,084
Historical Costs (FY 1983 - FY 2007)	**$ 14,462**
TOTAL PROJECT COST (FY 1983 - FY 2133)	**$ 96,957**

Table 3-2 Adjustments to the TSLCC for Comparison of Repository Only Attributes

Items in TSLCC Not Required in Alternative Repository Implementation		
TADS [Total of 28 each (35 - 7 in EPC)]	$	15
Remaining Aging Overpacks [Total of 1,121 Each, 1,321 - 200 in EPC)]	$	309
Drip Shields	$	7,774
sub total	**$**	**8,099**
Items Required for Repository Implementation Not Included in the UFD Repository Estimates		
Transportation	$	20,279
Benefits, PETT, Outreach and Institutional (i.e., Set-Asides)	$	2,794
sub total	**$**	**23,073**
Historical Costs (FY 1983 - FY 2007)	**$**	**14,462**
Total Delta	**$**	**45,634**

4. REPOSITORY COST COMPARISON

The direct repository costs in the UFD study is compared to an adjusted YM TSLCC values of $51.3B ($97.0 B less $45.6B). A relative cost scaling factor for each of the alternative repository concepts is presented in Table 4-1.

Overall the alternative repository concepts range from about half the cost of the YM repository (established by the lost cost for either a bedded salt repository or an open mode shale repository) to about 80% higher than the YM repository (established by the high cost for the shale enclosed repository).

These factors are for the direct repository costs only. Transportation, consolidated storage and used fuel packaging/re-packaging costs as required for an integrated SNF management system architecture are not included.

5. REFERENCES

"Analysis of the Total System Life Cycle Cost (TSLCC) of the Civilian Radioactive Waste Management Program", DOE/RW 0591, June 2008.

Booz Allen Hamilton "Tab-11- FY2008 Integrated TSLCC Estimate_rev2e-Final.xls", Feb., 2, 2009.

Hardin, E., Hadgu, T., Clayton, D., Howard, R., Greenberg, H., Blink, J., Sharma, M., Sutton, M., Carter, J., Dupont, M., and Rodwell, P., "Repository reference Disposal Concepts and Thermal Load Management Analysis", FCRD-UFD-2012-00219 Rev 2, November, 2012.

Blue Ribbon Commission on America's Nuclear Future, "Report to the Secretary of Energy", January 2012

Table 4-1 Alternative Repository Concept Comparison

Costs in $Millions	Crystalline (enclosed)		Generic Salt Repository (enclosed)		Clay/Shale (enclosed)		Shale Unbackfilled (open)		Sedimentary Backfilled (open)	
Element	**Low Range**	**High Range**	**Low Range**	**High Range**	**Low Range**	**High Range**	**Low Range**	**High Range**	**Low Range**	**High Range**
Total	$61,450	$81,040	$24,330	$39,400	$59,970	$92,620	$25,480	$38,740	$32,290	$48,100
Scaling Factor*	1.20	1.56	0.47	.77	1.17	1.80	050	0.75	0.63	0.94
* Scaled to the adjusted YM TSLCC of $51.3B										

APPENDIX C: DETAILED BREAKDOWN OF BASE CASE COSTS

Year	Total Costs	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
High Case Total Costs	**$ 184,940**	**$ -**	**$ -**	**$ 60**	**$ 300**	**$ 530**	**$ 780**	**$ 1,020**	**$ 1,230**	**$ 1,360**	**$ 1,650**	**$ 1,740**	**$ 2,000**
Base Case Total Costs	**$ 102,740**	**$ -**	**$ -**	**$ 30**	**$ 160**	**$ 300**	**$ 430**	**$ 570**	**$ 680**	**$ 750**	**$ 920**	**$ 970**	**$ 1,110**
Low Case Total Costs	**$ 51,370**	**$ -**	**$ -**	**$ 20**	**$ 80**	**$ 150**	**$ 220**	**$ 280**	**$ 340**	**$ 380**	**$ 460**	**$ 480**	**$ 560**
Base Case Breakdown													
Count		1	2	3	4	5	6	7	8	9	10	11	12
New Entity Year		0	0	1	2	3	4	5	6	7	8	9	10
Total Costs	**$ 102,740**	**$ -**	**$ -**	**$ 30**	**$ 160**	**$ 300**	**$ 430**	**$ 570**	**$ 680**	**$ 750**	**$ 920**	**$ 970**	**$ 1,110**
Defense Share	$ (20,550)	$ -	$ -	$ (10)	$ (30)	$ (60)	$ (90)	$ (110)	$ (140)	$ (150)	$ (180)	$ (190)	$ (220)
Total Costs Net of Defense	**$ 82,190**	**$ -**	**$ -**	**$ 30**	**$ 130**	**$ 240**	**$ 350**	**$ 450**	**$ 550**	**$ 600**	**$ 730**	**$ 770**	**$ 890**
Current and Future Nuclear Capacity (MW)		101,475	101,475	101,877	101,955	104,756	107,456	109,056	110,816	111,316	111,816	112,316	113,066
Current and Future Nuclear Generation (TWh)		801	801	804	804	826	848	860	874	878	882	886	892
Nuclear Share		20%	20%	20%	20%	20%	21%	21%	21%	21%	21%	21%	21%
Current and Expected Used Fuel Generation (MT/yr)		2,022	2,022	2,030	2,031	2,087	2,141	2,173	2,208	2,218	2,228	2,238	2,253
Forecasted Used Fuel Generation (MT/yr)		-	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel Discharged (MT)		69,472	71,493	73,523	75,554	77,641	79,782	81,955	84,162	86,380	88,608	90,845	93,098
Total Used Fuel at Reactor Sites (MT)		69,472	71,493	73,523	75,554	77,641	79,782	81,955	84,162	86,380	88,275	89,845	91,098
Adding Used Fuel at Reactor Sites (MT/yr)			2,022	2,030	2,031	2,087	2,141	2,173	2,208	2,218	2,228	2,238	2,253
Removing Used Fuel from Reactor Sites (MT/yr)			-	-	-	-	-	-	-	-	333	667	1,000
Total Consolidated Storage Capacity		-	-	-	-	-	-	-	-	-	*333*	*1,000*	*2,000*
Total Max Acceptance Rate Into Storage		-	-	-	-	-	-	-	-	-	*333*	*667*	*1,000*
Total Used Fuel in Storage			-	-	-	-	-	-	-	-	333	1,000	2,000
Moving Used Fuel Into Storage			-	-	-	-	-	-	-	-	333	667	1,000
Removing Used Fuel From Storage		-	-	-	-	-	-	-	-	-	-	-	-
Total Repository Capacity		-	-	-	-	-	-	-	-	-	-	-	-
Total Max Acceptance Rate Into Repository		-	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Repository			-	-	-	-	-	-	-	-	-	-	-
Moving Used Fuel into Repository			-	-	-	-	-	-	-	-	-	-	-

Year	Total Costs	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Management	**$ 13,810**	**$ -**	**$ -**	**$ -**	**$ 20**	**$ 40**	**$ 70**	**$ 90**	**$ 110**	**$ 130**	**$ 160**	**$ 180**	**$ 200**
Program Management Costs	$ 13,810	$ -	$ -	$ -	$ 20	$ 40	$ 70	$ 90	$ 110	$ 130	$ 160	$ 180	$ 200
Transportation	**$ 21,030**	**$ -**	**$ -**	**$ 20**	**$ 50**	**$ 70**	**$ 90**	**$ 120**	**$ 190**	**$ 230**	**$ 380**	**$ 380**	**$ 490**
Canisters		-	-	-	-	-	-	-	*25*	*49*	*74*	*74*	*119*
Needed Transportation Cask Fleet Size		-	-	-	-	-	-	-	-	-	*5*	*10*	*15*
Purchasing Transportation Casks		-	-	-	-	-	-	-	*5*	*5*	*5*	-	*9*
Transportation Investment Year		0	0	1	2	3	4	5	6	7	8	9	10
Transportation Startup Costs	$ 1,540	$ -	$ -	$ 20	$ 50	$ 70	$ 90	$ 120	$ 140	$ 160	$ 190	$ 210	$ 230
Canister Cost	$ 8,480	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20	$ 40	$ 60	$ 60	$ 100
Transportation Cask Cost	$ 490	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 30	$ 30	$ 30	$ -	$ 50
Shipment Cost	$ 2,730	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10	$ 10
Operations and Support Cost	$ 7,800	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 100	$ 100	$ 100
Transportation Subtotal	$ 21,030	$ -	$ -	$ 20	$ 50	$ 70	$ 90	$ 120	$ 190	$ 230	$ 380	$ 380	$ 490
Defense Share Credit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Consolidated Storage	**$ 5,500**	**$ -**	**$ -**	**$ 10**	**$ 10**	**$ 10**	**$ 20**	**$ 20**	**$ 40**	**$ 50**	**$ 40**	**$ 70**	**$ 80**
Stage 1	**$ 1,650**	**$ -**	**$ -**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 40**	**$ 40**	**$ 30**	**$ 40**	**$ 50**
Siting Project Year		*0*	*0*	*1*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year		*0*	*0*	*0*	*0*	*1*	*2*	*3*	*4*	*5*	*0*	*0*	*0*
Construction Project Year		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*2*	*0*	*0*	*0*
Operating Year		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*2*	*3*
Decommissioning Year		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ 20	$ -	$ -	$ 10	$ 10	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ 50	$ -	$ -	$ -	$ -	$ 10	$ 10	$ 10	$ 10	$ 10	$ -	$ -	$ -
Infrastructure	$ 50	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 30	$ 30	$ -	$ -	$ -
Decommissioning	$ 360	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ 20	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ 730	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10	$ 10	$ 10
Loading Labor Cost	$ 150	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10	$ 10	$ 10
Storage Overpack Costs	$ 280	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10	$ 20	$ 30
Storage Acceptance Rate (MT/yr)		-	-	-	-	-	-	-	-	-	333	667	1,000
Storage Capacity (MT)			-	-	-	-	-	-	-	-	333	1,000	2,000
Used Fuel at Storage Facility			-	-	-	-	-	-	-	-	333	1,000	2,000
Loading Storage Facility		-	-	-	-	-	-	-	-	-	333	667	1,000
Unloading Storage Facility		-	-	-	-	-	-	-	-	-	-	-	-

Year	Total Costs	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Stage 2	**$ 3,850**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 30**	**$ 30**
Siting Project Year		*0*	*0*	*0*	*0*	*0*	*1*	*2*	*3*	*0*	*0*	*0*	*0*
Design Year		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*2*	*3*	*4*
Construction Project Year		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*2*
Operating Year		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ 20	$ -	$ -	$ -	$ -	$ -	$ 10	$ 10	$ 10	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ 50	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10	$ 10	$ 10	$ 10
Infrastructure	$ 50	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20	$ 20
Decommissioning	$ 360	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ 180	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ 910	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ 380	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ 1,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)		-	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)			-	-	-	-	-	-	-	-	-	-	-
Used Fuel at Storage Facility			-	-	-	-	-	-	-	-	-	-	-
Loading Storage Facility		-	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility		-	-	-	-	-	-	-	-	-	-	-	-
Repository	**$ 62,400**	**$ -**	**$ -**	**$ -**	**$ 90**	**$ 170**	**$ 260**	**$ 340**	**$ 340**	**$ 340**	**$ 340**	**$ 340**	**$ 340**
Stage 1	**$ 62,400**	**$ -**	**$ -**	**$ -**	**$ 90**	**$ 170**	**$ 260**	**$ 340**	**$ 340**	**$ 340**	**$ 340**	**$ 340**	**$ 340**
Preselection Year		*0*	*0*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Site Characterization Year		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Year		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Delay Year		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operation Year		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Monitor Year		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Closure Year		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Capital Costs													
Preselection Site Evaluation	$ 3,260	$ -	$ -	$ -	$ 90	$ 170	$ 260	$ 340	$ 340	$ 340	$ 340	$ 340	$ 340
Site Characterization and Licensing Cost	$ 8,510	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repository Engineering, Procurement, Construction Cost	$ 7,820	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating Costs													
Waste Package Cost	$ 15,280	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emplacement Operation Costs	$ 15,290	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subsurface Costs	$ 8,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Costs	$ 2,780	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure Costs	$ 1,450	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Max Storage Acceptance Rate (MT/yr)		-	-	-	-	-	-	-	-	-	-	-	-
Loading Repository (MT/yr)		-	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)		-	-	-	-	-	-	-	-	-	-	-	-
Used Fuel in Repository		-	-	-	-	-	-	-	-	-	-	-	-
Repository Stage 1 Subtotal	$ 62,400	$ -	$ -	$ -	$ 90	$ 170	$ 260	$ 340	$ 340	$ 340	$ 340	$ 340	$ 340
Defense Share Removed	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
High Case Total Costs	**$ 2,150**	**$ 1,820**	**$ 2,270**	**$ 2,380**	**$ 2,340**	**$ 2,380**	**$ 2,270**	**$ 2,270**	**$ 2,190**	**$ 2,190**	**$ 2,190**	**$ 2,190**	**$ 2,190**
Base Case Total Costs	**$ 1,190**	**$ 1,010**	**$ 1,260**	**$ 1,320**	**$ 1,300**	**$ 1,320**	**$ 1,260**	**$ 1,260**	**$ 1,210**	**$ 1,210**	**$ 1,210**	**$ 1,210**	**$ 1,210**
Low Case Total Costs	**$ 600**	**$ 510**	**$ 630**	**$ 660**	**$ 650**	**$ 660**	**$ 630**	**$ 630**	**$ 610**	**$ 610**	**$ 610**	**$ 610**	**$ 610**
Base Case Breakdown													
Count	13	14	15	16	17	18	19	20	21	22	23	24	25
New Entity Year	11	12	13	14	15	16	17	18	19	20	21	22	23
Total Costs	**$ 1,190**	**$ 1,010**	**$ 1,260**	**$ 1,320**	**$ 1,300**	**$ 1,320**	**$ 1,260**	**$ 1,260**	**$ 1,210**	**$ 1,210**	**$ 1,210**	**$ 1,210**	**$ 1,210**
Defense Share	$ (240)	$ (200)	$ (250)	$ (260)	$ (260)	$ (260)	$ (250)	$ (250)	$ (240)	$ (240)	$ (240)	$ (240)	$ (240)
Total Costs Net of Defense	**$ 950**	**$ 810**	**$ 1,010**	**$ 1,060**	**$ 1,040**	**$ 1,060**	**$ 1,010**	**$ 1,010**	**$ 970**	**$ 970**	**$ 970**	**$ 970**	**$ 970**
Current and Future Nuclear Capacity (MW)	113,816	114,566	115,316	115,316	115,316	115,316	115,460	112,651	110,760	109,295	104,863	96,044	84,059
Current and Future Nuclear Generation (TWh)	898	904	910	910	910	910	911	889	874	862	827	758	663
Nuclear Share	21%	21%	21%	20%	20%	20%	20%	19%	19%	18%	17%	16%	14%
Current and Expected Used Fuel Generation (MT/yr)	2,268	2,282	2,297	2,297	2,297	2,297	2,300	2,244	2,207	2,177	2,089	1,913	1,675
Forecasted Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel Discharged (MT)	95,366	97,648	99,945	102,243	104,540	106,838	109,138	111,382	113,589	115,766	117,855	119,769	121,444
Total Used Fuel at Reactor Sites (MT)	92,366	93,048	93,145	92,643	91,540	89,838	88,138	86,382	85,589	84,766	83,855	82,769	81,444
Adding Used Fuel at Reactor Sites (MT/yr)	2,268	2,282	2,297	2,297	2,297	2,297	2,300	2,244	2,207	2,177	2,089	1,913	1,675
Removing Used Fuel from Reactor Sites (MT/yr)	1,000	1,600	2,200	2,800	3,400	4,000	4,000	4,000	3,000	3,000	3,000	3,000	3,000
Total Consolidated Storage Capacity	*3,000*	*4,600*	*6,800*	*9,600*	*13,000*	*17,000*	*21,000*	*25,000*	*28,000*	*31,000*	*34,000*	*37,000*	*40,000*
Total Max Acceptance Rate Into Storage	*1,000*	*1,600*	*2,200*	*2,800*	*3,400*	*4,000*	*4,000*	*4,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*
Total Used Fuel in Storage	3,000	4,600	6,800	9,600	13,000	17,000	21,000	25,000	28,000	31,000	34,000	37,000	40,000
Moving Used Fuel Into Storage	1,000	1,600	2,200	2,800	3,400	4,000	4,000	4,000	3,000	3,000	3,000	3,000	3,000
Removing Used Fuel From Storage	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Repository Capacity	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Max Acceptance Rate Into Repository	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Repository	-	-	-	-	-	-	-	-	-	-	-	-	-
Moving Used Fuel into Repository	-	-	-	-	-	-	-	-	-	-	-	-	-

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Management	**$ 220**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**
Program Management Costs	$ 220	$ 240	$ 240	$ 240	$ 240	$ 240	$ 240	$ 240	$ 240	$ 240	$ 240	$ 240	$ 240
Transportation	**$ 550**	**$ 340**	**$ 380**	**$ 420**	**$ 380**	**$ 390**	**$ 330**	**$ 330**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**
Canisters	*163*	*207*	*252*	*296*	*296*	*296*	*222*	*222*	*222*	*222*	*222*	*222*	*222*
Needed Transportation Cask Fleet Size	*15*	*24*	*33*	*42*	*51*	*60*	*60*	*60*	*45*	*45*	*45*	*45*	*45*
Purchasing Transportation Casks	*9*	*9*	*9*	*9*	-	-	-	-	-	-	-	-	-
Transportation Investment Year	11	0	0	0	0	0	0	0	0	0	0	0	0
Transportation Startup Costs	$ 260	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Canister Cost	$ 130	$ 170	$ 200	$ 240	$ 240	$ 240	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180
Transportation Cask Cost	$ 50	$ 50	$ 50	$ 50	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Shipment Cost	$ 10	$ 20	$ 30	$ 30	$ 40	$ 50	$ 50	$ 50	$ 40	$ 40	$ 40	$ 40	$ 40
Operations and Support Cost	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Transportation Subtotal	$ 550	$ 340	$ 380	$ 420	$ 380	$ 390	$ 330	$ 330	$ 320	$ 320	$ 320	$ 320	$ 320
Defense Share Credit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Consolidated Storage	**$ 80**	**$ 90**	**$ 100**	**$ 120**	**$ 140**	**$ 160**	**$ 160**	**$ 160**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**
Stage 1	**$ 50**	**$ 50**	**$ 50**	**$ 50**	**$ 50**	**$ 50**	**$ 50**	**$ 50**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Loading Labor Cost	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	-	-	-	-	-
Storage Capacity (MT)	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	10,000	10,000	10,000	10,000	10,000
Used Fuel at Storage Facility	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	10,000	10,000	10,000	10,000	10,000
Loading Storage Facility	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-	-	-

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Stage 2	**$ 30**	**$ 40**	**$ 50**	**$ 70**	**$ 90**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*5*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*3*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ 10	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ 20	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
General administrative costs	$ -	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Loading Labor Cost	$ -	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Storage Overpack Costs	$ -	$ 20	$ 30	$ 50	$ 70	$ 80	$ 80	$ 80	$ 80	$ 80	$ 80	$ 80	$ 80
Storage Acceptance Rate (MT/yr)	-	600	1,200	1,800	2,400	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Storage Capacity (MT)	-	600	1,800	3,600	6,000	9,000	12,000	15,000	18,000	21,000	24,000	27,000	30,000
Used Fuel at Storage Facility	-	600	1,800	3,600	6,000	9,000	12,000	15,000	18,000	21,000	24,000	27,000	30,000
Loading Storage Facility	-	600	1,200	1,800	2,400	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-	-	-
Repository	**$ 340**	**$ 340**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**
Stage 1	**$ 340**	**$ 340**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**
Preselection Year	*10*	*11*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Site Characterization Year	*0*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
Construction Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Delay Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operation Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Monitor Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Closure Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Capital Costs													
Preselection Site Evaluation	$ 340	$ 340	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Characterization and Licensing Cost	$ -	$ -	$ 530	$ 530	$ 530	$ 530	$ 530	$ 530	$ 530	$ 530	$ 530	$ 530	$ 530
Repository Engineering, Procurement, Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating Costs													
Waste Package Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emplacement Operation Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subsurface Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Max Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-	-	-
Loading Repository (MT/yr)	-	-	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	-	-	-	-	-	-	-	-	-	-	-	-	-
Used Fuel in Repository	-	-	-	-	-	-	-	-	-	-	-	-	-
Repository Stage 1 Subtotal	$ 340	$ 340	$ 530	$ 530	$ 530	$ 530	$ 530	$ 530	$ 530	$ 530	$ 530	$ 530	$ 530
Defense Share Removed	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Year	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
High Case Total Costs	**$ 2,190**	**$ 2,190**	**$ 2,190**	**$ 2,190**	**$ 2,190**	**$ 3,110**	**$ 3,110**	**$ 3,110**	**$ 3,110**	**$ 3,110**	**$ 3,140**	**$ 2,460**	**$ 2,440**
Base Case Total Costs	**$ 1,210**	**$ 1,210**	**$ 1,210**	**$ 1,210**	**$ 1,210**	**$ 1,730**	**$ 1,730**	**$ 1,730**	**$ 1,730**	**$ 1,730**	**$ 1,740**	**$ 1,360**	**$ 1,360**
Low Case Total Costs	**$ 610**	**$ 610**	**$ 610**	**$ 610**	**$ 610**	**$ 860**	**$ 860**	**$ 860**	**$ 860**	**$ 860**	**$ 870**	**$ 680**	**$ 680**
Base Case Breakdown													
Count	26	27	28	29	30	31	32	33	34	35	36	37	38
New Entity Year	24	25	26	27	28	29	30	31	32	33	34	35	36
Total Costs	**$ 1,210**	**$ 1,210**	**$ 1,210**	**$ 1,210**	**$ 1,210**	**$ 1,730**	**$ 1,730**	**$ 1,730**	**$ 1,730**	**$ 1,730**	**$ 1,740**	**$ 1,360**	**$ 1,360**
Defense Share	$ (240)	$ (240)	$ (240)	$ (240)	$ (240)	$ (350)	$ (350)	$ (350)	$ (350)	$ (350)	$ (350)	$ (270)	$ (270)
Total Costs Net of Defense	**$ 970**	**$ 970**	**$ 970**	**$ 970**	**$ 970**	**$ 1,380**	**$ 1,380**	**$ 1,380**	**$ 1,380**	**$ 1,380**	**$ 1,400**	**$ 1,090**	**$ 1,090**
Current and Future Nuclear Capacity (MW)	82,103	74,673	71,724	68,760	68,760	65,252	61,930	56,010	51,626	41,712	34,362	23,467	17,374
Current and Future Nuclear Generation (TWh)	648	589	566	542	542	515	489	442	407	329	271	185	137
Nuclear Share	13%	12%	12%	11%	11%	10%	10%	9%	8%	6%	5%	4%	3%
Current and Expected Used Fuel Generation (MT/yr)	1,636	1,488	1,429	1,370	1,370	1,300	1,234	1,116	1,029	831	685	468	346
Forecasted Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel Discharged (MT)	123,079	124,567	125,996	127,366	128,736	130,036	131,270	132,385	133,414	134,245	134,930	135,397	135,743
Total Used Fuel at Reactor Sites (MT)	80,079	78,567	76,996	75,366	73,736	72,036	70,270	68,385	66,414	64,245	61,930	59,397	56,743
Adding Used Fuel at Reactor Sites (MT/yr)	1,636	1,488	1,429	1,370	1,370	1,300	1,234	1,116	1,029	831	685	468	346
Removing Used Fuel from Reactor Sites (MT/yr)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Total Consolidated Storage Capacity	*43,000*	*46,000*	*49,000*	*52,000*	*55,000*	*58,000*	*61,000*	*64,000*	*67,000*	*70,000*	*73,000*	*76,000*	*79,000*
Total Max Acceptance Rate Into Storage	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*
Total Used Fuel in Storage	43,000	46,000	49,000	52,000	55,000	58,000	61,000	64,000	67,000	70,000	73,000	75,400	77,200
Moving Used Fuel Into Storage	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	2,400	1,800
Removing Used Fuel From Storage	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Repository Capacity	-	-	-	-	-	-	-	-	-	-	-	*150,000*	*150,000*
Total Max Acceptance Rate Into Repository	-	-	-	-	-	-	-	-	-	-	-	*600*	*1,200*
Total Used Fuel in Repository	-	-	-	-	-	-	-	-	-	-	-	600	1,800
Moving Used Fuel into Repository	-	-	-	-	-	-	-	-	-	-	-	600	1,200

Year	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Management	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 240**	**$ 110**	**$ 110**
Program Management Costs	$ 240	$ 240	$ 240	$ 240	$ 240	$ 240	$ 240	$ 240	$ 240	$ 240	$ 240	$ 110	$ 110
Transportation	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 330**	**$ 370**	**$ 370**
Canisters	*222*	*222*	*222*	*222*	*222*	*222*	*222*	*222*	*222*	*222*	*222*	*222*	*222*
Needed Transportation Cask Fleet Size	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*54*	*63*
Purchasing Transportation Casks	-	-	-	-	-	-	-	-	-	-	*3*	*9*	*9*
Transportation Investment Year	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation Startup Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Canister Cost	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180
Transportation Cask Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20	$ 50	$ 50
Shipment Cost	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40
Operations and Support Cost	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Transportation Subtotal	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 330	$ 370	$ 370
Defense Share Credit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Consolidated Storage	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 100**	**$ 90**
Stage 1	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Used Fuel at Storage Facility	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-	-	-

Year	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Stage 2	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 90**	**$ 70**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
General administrative costs	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Loading Labor Cost	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Storage Overpack Costs	$ 80	$ 80	$ 80	$ 80	$ 80	$ 80	$ 80	$ 80	$ 80	$ 80	$ 80	$ 70	$ 50
Storage Acceptance Rate (MT/yr)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Storage Capacity (MT)	33,000	36,000	39,000	42,000	45,000	48,000	51,000	54,000	57,000	60,000	63,000	66,000	69,000
Used Fuel at Storage Facility	33,000	36,000	39,000	42,000	45,000	48,000	51,000	54,000	57,000	60,000	63,000	65,400	67,200
Loading Storage Facility	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	2,400	1,800
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-	-	-
Repository	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 1,050**	**$ 1,050**	**$ 1,050**	**$ 1,050**	**$ 1,050**	**$ 1,050**	**$ 780**	**$ 790**
Stage 1	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 530**	**$ 1,050**	**$ 1,050**	**$ 1,050**	**$ 1,050**	**$ 1,050**	**$ 1,050**	**$ 780**	**$ 790**
Preselection Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Site Characterization Year	*12*	*13*	*14*	*15*	*16*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Year	*0*	*0*	*0*	*0*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*0*	*0*
Delay Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operation Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*2*
Monitor Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Closure Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Capital Costs													
Preselection Site Evaluation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Characterization and Licensing Cost	$ 530	$ 530	$ 530	$ 530	$ 530	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repository Engineering, Procurement, Construction Cost	$ -	$ -	$ -	$ -	$ -	$ 1,050	$ 1,050	$ 1,050	$ 1,050	$ 1,050	$ 1,050	$ 620	$ 460
Operating Costs													
Waste Package Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 60	$ 130
Emplacement Operation Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 60	$ 130
Subsurface Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 30	$ 70
Monitoring Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Max Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-	600	1,200
Loading Repository (MT/yr)	-	-	-	-	-	-	-	-	-	-	-	600	1,200
Storage Capacity (MT)	-	-	-	-	-	-	-	-	-	-	-	150,000	150,000
Used Fuel in Repository	-	-	-	-	-	-	-	-	-	-	-	600	1,800
Repository Stage 1 Subtotal	$ 530	$ 530	$ 530	$ 530	$ 530	$ 1,050	$ 1,050	$ 1,050	$ 1,050	$ 1,050	$ 1,050	$ 780	$ 790
Defense Share Removed	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Year	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059
High Case Total Costs	**$ 2,430**	**$ 2,330**	**$ 2,310**	**$ 2,310**	**$ 2,310**	**$ 2,310**	**$ 2,310**	**$ 2,310**	**$ 2,310**	**$ 2,310**
Base Case Total Costs	**$ 1,350**	**$ 1,290**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**
Low Case Total Costs	**$ 680**	**$ 650**	**$ 640**	**$ 640**	**$ 640**	**$ 640**	**$ 640**	**$ 640**	**$ 640**	**$ 640**
Base Case Breakdown										
Count	39	40	41	42	43	44	45	46	47	48
New Entity Year	37	38	39	40	41	42	43	44	45	46
Total Costs	**$ 1,350**	**$ 1,290**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**
Defense Share	$ (270)	$ (260)	$ (260)	$ (260)	$ (260)	$ (260)	$ (260)	$ (260)	$ (260)	$ (260)
Total Costs Net of Defense	**$ 1,080**	**$ 1,040**	**$ 1,020**	**$ 1,020**	**$ 1,020**	**$ 1,020**	**$ 1,020**	**$ 1,020**	**$ 1,020**	**$ 1,020**
Current and Future Nuclear Capacity (MW)	16,029	13,631	11,047	11,047	11,047	9,790	9,790	8,541	8,541	8,541
Current and Future Nuclear Generation (TWh)	126	108	87	87	87	77	77	67	67	67
Nuclear Share	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%
Current and Expected Used Fuel Generation (MT/yr)	319	272	220	220	220	195	195	170	170	170
Forecasted Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-
Total Used Fuel Discharged (MT)	136,063	136,334	136,554	136,774	136,994	137,189	137,384	137,555	137,725	137,895
Total Used Fuel at Reactor Sites (MT)	54,063	51,334	48,554	45,774	42,994	40,189	37,384	34,555	31,725	28,895
Adding Used Fuel at Reactor Sites (MT/yr)	319	272	220	220	220	195	195	170	170	170
Removing Used Fuel from Reactor Sites (MT/yr)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Total Consolidated Storage Capacity	*82,000*	*85,000*	*88,000*	*91,000*	*94,000*	*97,000*	*100,000*	*103,000*	*106,000*	*109,000*
Total Max Acceptance Rate Into Storage	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*
Total Used Fuel in Storage	78,400	79,000	79,000	79,000	79,000	79,000	79,000	79,000	79,000	79,000
Moving Used Fuel Into Storage	1,200	600	-	-	-	-	-	-	-	-
Removing Used Fuel From Storage	-	-	-	-	-	-	-	-	-	-
Total Repository Capacity	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*
Total Max Acceptance Rate Into Repository	*1,800*	*2,400*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*
Total Used Fuel in Repository	3,600	6,000	9,000	12,000	15,000	18,000	21,000	24,000	27,000	30,000
Moving Used Fuel into Repository	1,800	2,400	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000

Year	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059
Management	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**
Program Management Costs	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110
Transportation	**$ 370**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**
Canisters	*222*	*222*	*222*	*222*	*222*	*222*	*222*	*222*	*222*	*222*
Needed Transportation Cask Fleet Size	*72*	*81*	*90*	*90*	*90*	*90*	*90*	*90*	*90*	*90*
Purchasing Transportation Casks	*9*	-	-	-	-	-	-	-	-	-
Transportation Investment Year	0	0	0	0	0	0	0	0	0	0
Transportation Startup Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Canister Cost	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180
Transportation Cask Cost	$ 50	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Shipment Cost	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40
Operations and Support Cost	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Transportation Subtotal	$ 370	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320
Defense Share Credit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Consolidated Storage	**$ 70**	**$ 50**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**
Stage 1	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*30*	*31*	*32*	*33*	*34*	*35*	*36*	*37*	*38*	*39*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Used Fuel at Storage Facility	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-

Year	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059
Stage 2	**$ 60**	**$ 40**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*26*	*27*	*28*	*29*	*30*	*31*	*32*	*33*	*34*	*35*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
General administrative costs	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Loading Labor Cost	$ 10	$ 10	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ 30	$ 20	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Storage Capacity (MT)	72,000	75,000	78,000	81,000	84,000	87,000	90,000	93,000	96,000	99,000
Used Fuel at Storage Facility	68,400	69,000	69,000	69,000	69,000	69,000	69,000	69,000	69,000	69,000
Loading Storage Facility	1,200	600	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-
Repository	**$ 800**	**$ 810**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**
Stage 1	**$ 800**	**$ 810**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**
Preselection Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Site Characterization Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Delay Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operation Year	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Monitor Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Closure Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Capital Costs										
Preselection Site Evaluation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Characterization and Licensing Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repository Engineering, Procurement, Construction Cost	$ 310	$ 150	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating Costs										
Waste Package Cost	$ 190	$ 260	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320
Emplacement Operation Costs	$ 190	$ 260	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320
Subsurface Costs	$ 100	$ 140	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170
Monitoring Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Max Storage Acceptance Rate (MT/yr)	1,800	2,400	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Loading Repository (MT/yr)	1,800	2,400	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Storage Capacity (MT)	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Used Fuel in Repository	3,600	6,000	9,000	12,000	15,000	18,000	21,000	24,000	27,000	30,000
Repository Stage 1 Subtotal	$ 800	$ 810	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820
Defense Share Removed	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Year	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
High Case Total Costs	**$ 2,300**	**$ 2,300**	**$ 2,300**	**$ 2,300**	**$ 2,300**	**$ 2,300**	**$ 2,300**	**$ 2,300**	**$ 2,040**	**$ 1,990**	**$ 2,010**
Base Case Total Costs	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,130**	**$ 1,110**	**$ 1,120**
Low Case Total Costs	**$ 640**	**$ 640**	**$ 640**	**$ 640**	**$ 640**	**$ 640**	**$ 640**	**$ 640**	**$ 570**	**$ 550**	**$ 560**
Base Case Breakdown											
Count	49	50	51	52	53	54	55	56	57	58	59
New Entity Year	47	48	49	50	51	52	53	54	55	56	57
Total Costs	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,280**	**$ 1,130**	**$ 1,110**	**$ 1,120**
Defense Share	$ (260)	$ (260)	$ (260)	$ (260)	$ (260)	$ (260)	$ (260)	$ (260)	$ (230)	$ (220)	$ (220)
Total Costs Net of Defense	**$ 1,020**	**$ 1,020**	**$ 1,020**	**$ 1,020**	**$ 1,020**	**$ 1,020**	**$ 1,020**	**$ 1,020**	**$ 900**	**$ 880**	**$ 900**
Current and Future Nuclear Capacity (MW)	8,541	8,541	8,541	8,541	8,541	8,541	8,541	8,541	8,541	8,541	8,541
Current and Future Nuclear Generation (TWh)	67	67	67	67	67	67	67	67	67	67	67
Nuclear Share	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Current and Expected Used Fuel Generation (MT/yr)	170	170	170	170	170	170	170	170	170	170	170
Forecasted Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel Discharged (MT)	138,065	138,235	138,405	138,576	138,746	138,916	139,086	139,256	139,426	139,597	139,767
Total Used Fuel at Reactor Sites (MT)	26,065	23,235	20,405	17,576	14,746	11,916	9,086	6,256	3,426	597	170
Adding Used Fuel at Reactor Sites (MT/yr)	170	170	170	170	170	170	170	170	170	170	170
Removing Used Fuel from Reactor Sites (MT/yr)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	597
Total Consolidated Storage Capacity	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*
Total Max Acceptance Rate Into Storage	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*
Total Used Fuel in Storage	79,000	79,000	79,000	79,000	79,000	79,000	79,000	79,000	79,000	79,000	76,597
Moving Used Fuel Into Storage	-	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel From Storage	-	-	-	-	-	-	-	-	-	-	2,403
Total Repository Capacity	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*
Total Max Acceptance Rate Into Repository	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*
Total Used Fuel in Repository	33,000	36,000	39,000	42,000	45,000	48,000	51,000	54,000	57,000	60,000	63,000
Moving Used Fuel into Repository	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000

Year	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
Management	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**
Program Management Costs	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110
Transportation	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 320**	**$ 170**	**$ 150**	**$ 150**
Canisters	*222*	*222*	*222*	*222*	*222*	*222*	*222*	*222*	*44*	*13*	*13*
Needed Transportation Cask Fleet Size	*90*	*90*	*90*	*90*	*90*	*90*	*90*	*90*	*90*	*90*	*90*
Purchasing Transportation Casks	-	-	-	-	-	-	-	-	-	-	-
Transportation Investment Year	0	0	0	0	0	0	0	0	0	0	0
Transportation Startup Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Canister Cost	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 40	$ 10	$ 10
Transportation Cask Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Shipment Cost	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40
Operations and Support Cost	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Transportation Subtotal	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 170	$ 150	$ 150
Defense Share Credit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Consolidated Storage	**$ 30**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 40**
Stage 1	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 20**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*40*	*41*	*42*	*43*	*44*	*45*	*46*	*47*	*48*	*49*	*50*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Used Fuel at Storage Facility	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	9,000
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	1,000

Year	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
Stage 2	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 10**	**$ 20**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*36*	*37*	*38*	*39*	*40*	*41*	*42*	*43*	*44*	*45*	*46*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Storage Capacity (MT)	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Used Fuel at Storage Facility	69,000	69,000	69,000	69,000	69,000	69,000	69,000	69,000	69,000	69,000	67,597
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	1,403
Repository	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**
Stage 1	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**
Preselection Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Site Characterization Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Delay Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operation Year	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*
Monitor Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Closure Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Capital Costs											
Preselection Site Evaluation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Characterization and Licensing Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repository Engineering, Procurement, Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating Costs											
Waste Package Cost	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320
Emplacement Operation Costs	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320
Subsurface Costs	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170
Monitoring Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Max Storage Acceptance Rate (MT/yr)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Loading Repository (MT/yr)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Storage Capacity (MT)	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Used Fuel in Repository	33,000	36,000	39,000	42,000	45,000	48,000	51,000	54,000	57,000	60,000	63,000
Repository Stage 1 Subtotal	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820
Defense Share Removed	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Year	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081
High Case Total Costs	**$ 2,010**	**$ 2,010**	**$ 2,010**	**$ 2,010**	**$ 2,010**	**$ 2,010**	**$ 2,000**	**$ 2,000**	**$ 2,000**	**$ 2,030**	**$ 2,030**
Base Case Total Costs	**$ 1,120**	**$ 1,120**	**$ 1,120**	**$ 1,120**	**$ 1,120**	**$ 1,110**	**$ 1,110**	**$ 1,110**	**$ 1,110**	**$ 1,130**	**$ 1,130**
Low Case Total Costs	**$ 560**	**$ 560**	**$ 560**	**$ 560**	**$ 560**	**$ 560**	**$ 560**	**$ 560**	**$ 560**	**$ 560**	**$ 560**
Base Case Breakdown											
Count	60	61	62	63	64	65	66	67	68	69	70
New Entity Year	58	59	60	61	62	63	64	65	66	67	68
Total Costs	**$ 1,120**	**$ 1,120**	**$ 1,120**	**$ 1,120**	**$ 1,120**	**$ 1,110**	**$ 1,110**	**$ 1,110**	**$ 1,110**	**$ 1,130**	**$ 1,130**
Defense Share	$ (220)	$ (220)	$ (220)	$ (220)	$ (220)	$ (220)	$ (220)	$ (220)	$ (220)	$ (230)	$ (230)
Total Costs Net of Defense	**$ 900**	**$ 900**	**$ 900**	**$ 900**	**$ 890**	**$ 890**	**$ 890**	**$ 890**	**$ 890**	**$ 900**	**$ 900**
Current and Future Nuclear Capacity (MW)	8,541	8,541	8,541	8,541	8,541	6,319	4,119	3,019	1,759	1,759	1,759
Current and Future Nuclear Generation (TWh)	67	67	67	67	67	50	32	24	14	14	14
Nuclear Share	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%
Current and Expected Used Fuel Generation (MT/yr)	170	170	170	170	170	126	82	60	35	35	35
Forecasted Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel Discharged (MT)	139,937	140,107	140,277	140,447	140,618	140,744	140,826	140,886	140,921	140,956	140,991
Total Used Fuel at Reactor Sites (MT)	170	170	170	170	170	126	82	60	35	35	35
Adding Used Fuel at Reactor Sites (MT/yr)	170	170	170	170	170	126	82	60	35	35	35
Removing Used Fuel from Reactor Sites (MT/yr)	170	170	170	170	170	170	126	82	60	35	35
Total Consolidated Storage Capacity	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*
Total Max Acceptance Rate Into Storage	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Storage	73,767	70,937	68,107	65,277	62,447	59,618	56,744	53,826	50,886	47,921	44,956
Moving Used Fuel Into Storage	-	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel From Storage	2,830	2,830	2,830	2,830	2,830	2,830	2,874	2,918	2,940	2,965	2,965
Total Repository Capacity	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*
Total Max Acceptance Rate Into Repository	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*
Total Used Fuel in Repository	66,000	69,000	72,000	75,000	78,000	81,000	84,000	87,000	90,000	93,000	96,000
Moving Used Fuel into Repository	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000

Year	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081
Management	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**
Program Management Costs	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110
Transportation	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**
Canisters	*13*	*13*	*13*	*13*	*9*	*6*	*4*	*3*	*3*	*3*	*3*
Needed Transportation Cask Fleet Size	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*
Purchasing Transportation Casks	-	-	-	-	-	-	-	-	-	-	-
Transportation Investment Year	0	0	0	0	0	0	0	0	0	0	0
Transportation Startup Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Canister Cost	$ 10	$ 10	$ 10	$ 10	$ 10	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Cask Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Shipment Cost	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40
Operations and Support Cost	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Transportation Subtotal	$ 150	$ 150	$ 150	$ 150	$ 150	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140
Defense Share Credit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Consolidated Storage	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 60**	**$ 60**
Stage 1	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 40**	**$ 40**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*51*	*52*	*53*	*54*	*55*	*56*	*57*	*58*	*59*	*0*	*0*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*2*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 40	$ 40
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ -	$ -
Loading Labor Cost	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Used Fuel at Storage Facility	8,000	7,000	6,000	5,000	4,000	3,000	2,000	1,000	-	-	-
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	-	-

Year	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081
Stage 2	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*47*	*48*	*49*	*50*	*51*	*52*	*53*	*54*	*55*	*56*	*57*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Loading Labor Cost	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Used Fuel at Storage Facility	65,767	63,937	62,107	60,277	58,447	56,618	54,744	52,826	50,886	47,921	44,956
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	1,830	1,830	1,830	1,830	1,830	1,830	1,874	1,918	1,940	2,965	2,965
Repository	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**
Stage 1	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**
Preselection Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Site Characterization Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Delay Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operation Year	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	*32*	*33*	*34*
Monitor Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Closure Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Capital Costs											
Preselection Site Evaluation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Characterization and Licensing Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repository Engineering, Procurement, Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating Costs											
Waste Package Cost	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320
Emplacement Operation Costs	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320
Subsurface Costs	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170
Monitoring Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Max Storage Acceptance Rate (MT/yr)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Loading Repository (MT/yr)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Storage Capacity (MT)	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Used Fuel in Repository	66,000	69,000	72,000	75,000	78,000	81,000	84,000	87,000	90,000	93,000	96,000
Repository Stage 1 Subtotal	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820
Defense Share Removed	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Year	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092
High Case Total Costs	**$ 2,030**	**$ 2,030**	**$ 2,030**	**$ 2,030**	**$ 2,030**	**$ 2,030**	**$ 2,030**	**$ 2,030**	**$ 1,970**	**$ 1,960**	**$ 1,960**
Base Case Total Costs	**$ 1,130**	**$ 1,130**	**$ 1,130**	**$ 1,130**	**$ 1,130**	**$ 1,130**	**$ 1,130**	**$ 1,130**	**$ 1,090**	**$ 1,090**	**$ 1,090**
Low Case Total Costs	**$ 560**	**$ 560**	**$ 560**	**$ 560**	**$ 560**	**$ 560**	**$ 560**	**$ 560**	**$ 550**	**$ 550**	**$ 550**
Base Case Breakdown											
Count	71	72	73	74	75	76	77	78	79	80	81
New Entity Year	69	70	71	72	73	74	75	76	77	78	79
Total Costs	**$ 1,130**	**$ 1,130**	**$ 1,130**	**$ 1,130**	**$ 1,130**	**$ 1,130**	**$ 1,130**	**$ 1,130**	**$ 1,090**	**$ 1,090**	**$ 1,090**
Defense Share	$ (230)	$ (230)	$ (230)	$ (230)	$ (230)	$ (230)	$ (230)	$ (230)	$ (220)	$ (220)	$ (220)
Total Costs Net of Defense	**$ 900**	**$ 900**	**$ 900**	**$ 900**	**$ 900**	**$ 900**	**$ 900**	**$ 900**	**$ 870**	**$ 870**	**$ 870**
Current and Future Nuclear Capacity (MW)	1,759	1,759	1,759	1,759	1,759	1,759	1,759	1,759	1,759	1,615	1,472
Current and Future Nuclear Generation (TWh)	14	14	14	14	14	14	14	14	14	13	12
Nuclear Share	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Current and Expected Used Fuel Generation (MT/yr)	35	35	35	35	35	35	35	35	35	32	29
Forecasted Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel Discharged (MT)	141,026	141,061	141,096	141,131	141,166	141,201	141,236	141,271	141,306	141,339	141,368
Total Used Fuel at Reactor Sites (MT)	35	35	35	35	35	35	35	35	35	32	29
Adding Used Fuel at Reactor Sites (MT/yr)	35	35	35	35	35	35	35	35	35	32	29
Removing Used Fuel from Reactor Sites (MT/yr)	35	35	35	35	35	35	35	35	35	35	32
Total Consolidated Storage Capacity	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*
Total Max Acceptance Rate Into Storage	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Storage	41,991	39,026	36,061	33,096	30,131	27,166	24,201	21,236	18,271	15,306	12,339
Moving Used Fuel Into Storage	-	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel From Storage	2,965	2,965	2,965	2,965	2,965	2,965	2,965	2,965	2,965	2,965	2,968
Total Repository Capacity	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*
Total Max Acceptance Rate Into Repository	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*
Total Used Fuel in Repository	99,000	102,000	105,000	108,000	111,000	114,000	117,000	120,000	123,000	126,000	129,000
Moving Used Fuel into Repository	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000

Year	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092
Management	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 110**
Program Management Costs	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110	$ 110
Transportation	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**
Canisters	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*2*	*2*	*2*
Needed Transportation Cask Fleet Size	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*
Purchasing Transportation Casks	-	-	-	-	-	-	-	-	-	-	-
Transportation Investment Year	0	0	0	0	0	0	0	0	0	0	0
Transportation Startup Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Canister Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Cask Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Shipment Cost	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40
Operations and Support Cost	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Transportation Subtotal	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140
Defense Share Credit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Consolidated Storage	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 20**	**$ 20**	**$ 20**
Stage 1	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ -**	**$ -**	**$ -**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Used Fuel at Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-

Year	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092
Stage 2	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*58*	*59*	*60*	*61*	*62*	*63*	*64*	*65*	*66*	*67*	*68*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Loading Labor Cost	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Used Fuel at Storage Facility	41,991	39,026	36,061	33,096	30,131	27,166	24,201	21,236	18,271	15,306	12,339
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	2,965	2,965	2,965	2,965	2,965	2,965	2,965	2,965	2,965	2,965	2,968
Repository	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**
Stage 1	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 820**
Preselection Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Site Characterization Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Delay Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operation Year	*35*	*36*	*37*	*38*	*39*	*40*	*41*	*42*	*43*	*44*	*45*
Monitor Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Closure Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Capital Costs											
Preselection Site Evaluation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Characterization and Licensing Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repository Engineering, Procurement, Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating Costs											
Waste Package Cost	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320
Emplacement Operation Costs	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320	$ 320
Subsurface Costs	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170	$ 170
Monitoring Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Max Storage Acceptance Rate (MT/yr)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Loading Repository (MT/yr)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Storage Capacity (MT)	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Used Fuel in Repository	99,000	102,000	105,000	108,000	111,000	114,000	117,000	120,000	123,000	126,000	129,000
Repository Stage 1 Subtotal	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820	$ 820
Defense Share Removed	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Year	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103
High Case Total Costs	**$ 1,960**	**$ 1,960**	**$ 1,960**	**$ 1,960**	**$ 480**	**$ 210**	**$ 210**	**$ 210**	**$ 210**	**$ 210**	**$ 210**
Base Case Total Costs	**$ 1,090**	**$ 1,090**	**$ 1,090**	**$ 1,090**	**$ 270**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**
Low Case Total Costs	**$ 550**	**$ 550**	**$ 540**	**$ 540**	**$ 130**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**
Base Case Breakdown											
Count	82	83	84	85	86	87	88	89	90	91	92
New Entity Year	80	81	82	83	84	85	86	87	88	89	90
Total Costs	**$ 1,090**	**$ 1,090**	**$ 1,090**	**$ 1,090**	**$ 270**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**
Defense Share	$ (220)	$ (220)	$ (220)	$ (220)	$ (50)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)
Total Costs Net of Defense	**$ 870**	**$ 870**	**$ 870**	**$ 870**	**$ 210**	**$ 100**	**$ 100**	**$ 100**	**$ 100**	**$ 100**	**$ 100**
Current and Future Nuclear Capacity (MW)	1,306	969	499	-	-	-	-	-	-	-	-
Current and Future Nuclear Generation (TWh)	10	8	4	-	-	-	-	-	-	-	-
Nuclear Share	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Current and Expected Used Fuel Generation (MT/yr)	26	19	10	-	-	-	-	-	-	-	-
Forecasted Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel Discharged (MT)	141,394	141,413	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Total Used Fuel at Reactor Sites (MT)	26	19	10	-	-	-	-	-	-	-	-
Adding Used Fuel at Reactor Sites (MT/yr)	26	19	10	-	-	-	-	-	-	-	-
Removing Used Fuel from Reactor Sites (MT/yr)	29	26	19	10	-	-	-	-	-	-	-
Total Consolidated Storage Capacity	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*
Total Max Acceptance Rate Into Storage	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Storage	9,368	6,394	3,413	423	-	-	-	-	-	-	-
Moving Used Fuel Into Storage	-	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel From Storage	2,971	2,974	2,981	2,990	423	-	-	-	-	-	-
Total Repository Capacity	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*
Total Max Acceptance Rate Into Repository	*3,000*	*3,000*	*3,000*	*3,000*	*3,000*	-	-	-	-	-	-
Total Used Fuel in Repository	132,000	135,000	138,000	141,000	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Moving Used Fuel into Repository	3,000	3,000	3,000	3,000	423	-	-	-	-	-	-

Year	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103
Management	**$ 110**	**$ 110**	**$ 110**	**$ 110**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**
Program Management Costs	$ 110	$ 110	$ 110	$ 110	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30
Transportation	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 110**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Canisters	*1*	*1*	-	-	-	-	-	-	-	-	-
Needed Transportation Cask Fleet Size	*45*	*45*	*45*	*45*	*45*	-	-	-	-	-	-
Purchasing Transportation Casks	-	-	-	-	-	-	-	-	-	-	-
Transportation Investment Year	0	0	0	0	0	0	0	0	0	0	0
Transportation Startup Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Canister Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Cask Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Shipment Cost	$ 40	$ 40	$ 40	$ 40	$ 10	$ -	$ -	$ -	$ -	$ -	$ -
Operations and Support Cost	$ 100	$ 100	$ 100	$ 100	$ 100	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Subtotal	$ 140	$ 140	$ 140	$ 140	$ 110	$ -	$ -	$ -	$ -	$ -	$ -
Defense Share Credit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Consolidated Storage	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**
Stage 1	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Used Fuel at Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-

Year	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103
Stage 2	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 20**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*69*	*70*	*71*	*72*	*73*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*1*	*2*	*3*	*4*	*5*	*6*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ 10	$ 10	$ 10	$ 10	$ 10	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ 10	$ 10	$ 10	$ 10	$ 10	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Used Fuel at Storage Facility	9,368	6,394	3,413	423	0	0	0	0	0	0	0
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	2,971	2,974	2,981	2,990	423	-	-	-	-	-	-
Repository	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 120**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**
Stage 1	**$ 820**	**$ 820**	**$ 820**	**$ 820**	**$ 120**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**
Preselection Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Site Characterization Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Delay Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operation Year	*46*	*47*	*48*	*49*	*50*	*0*	*0*	*0*	*0*	*0*	*0*
Monitor Year	*0*	*0*	*0*	*0*	*0*	*1*	*2*	*3*	*4*	*5*	*6*
Closure Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Capital Costs											
Preselection Site Evaluation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Characterization and Licensing Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repository Engineering, Procurement, Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating Costs											
Waste Package Cost	$ 320	$ 320	$ 320	$ 320	$ 50	$ -	$ -	$ -	$ -	$ -	$ -
Emplacement Operation Costs	$ 320	$ 320	$ 320	$ 320	$ 50	$ -	$ -	$ -	$ -	$ -	$ -
Subsurface Costs	$ 170	$ 170	$ 170	$ 170	$ 20	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Costs	$ -	$ -	$ -	$ -	$ -	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Closure Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Max Storage Acceptance Rate (MT/yr)	3,000	3,000	3,000	3,000	3,000	-	-	-	-	-	-
Loading Repository (MT/yr)	3,000	3,000	3,000	3,000	423	-	-	-	-	-	-
Storage Capacity (MT)	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Used Fuel in Repository	132,000	135,000	138,000	141,000	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Repository Stage 1 Subtotal	$ 820	$ 820	$ 820	$ 820	$ 120	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Defense Share Removed	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Year	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114
High Case Total Costs	**$ 210**	**$ 210**	**$ 210**	**$ 210**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**
Base Case Total Costs	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**
Low Case Total Costs	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**
Base Case Breakdown											
Count	93	94	95	96	97	98	99	100	101	102	103
New Entity Year	91	92	93	94	95	96	97	98	99	100	101
Total Costs	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**
Defense Share	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)
Total Costs Net of Defense	**$ 100**	**$ 100**	**$ 100**	**$ 100**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**
Current and Future Nuclear Capacity (MW)	-	-	-	-	-	-	-	-	-	-	-
Current and Future Nuclear Generation (TWh)	-	-	-	-	-	-	-	-	-	-	-
Nuclear Share	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Current and Expected Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Forecasted Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel Discharged (MT)	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Total Used Fuel at Reactor Sites (MT)	-	-	-	-	-	-	-	-	-	-	-
Adding Used Fuel at Reactor Sites (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel from Reactor Sites (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Total Consolidated Storage Capacity	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*
Total Max Acceptance Rate Into Storage	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Storage	-	-	-	-	-	-	-	-	-	-	-
Moving Used Fuel Into Storage	-	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel From Storage	-	-	-	-	-	-	-	-	-	-	-
Total Repository Capacity	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*
Total Max Acceptance Rate Into Repository	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Repository	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Moving Used Fuel into Repository	-	-	-	-	-	-	-	-	-	-	-

Year	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114
Management	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**
Program Management Costs	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30
Transportation	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Canisters	-	-	-	-	-	-	-	-	-	-	-
Needed Transportation Cask Fleet Size	-	-	-	-	-	-	-	-	-	-	-
Purchasing Transportation Casks	-	-	-	-	-	-	-	-	-	-	-
Transportation Investment Year	0	0	0	0	0	0	0	0	0	0	0
Transportation Startup Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Canister Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Cask Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Shipment Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operations and Support Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Subtotal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Defense Share Credit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Consolidated Storage	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Stage 1	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Used Fuel at Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-

Year	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114
Stage 2	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year	*7*	*8*	*9*	*10*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ 40	$ 40	$ 40	$ 40	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Used Fuel at Storage Facility	0	0	0	0	0	0	0	0	0	0	0
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Repository	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**
Stage 1	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**
Preselection Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Site Characterization Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Delay Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operation Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Monitor Year	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*
Closure Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Capital Costs											
Preselection Site Evaluation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Characterization and Licensing Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repository Engineering, Procurement, Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating Costs											
Waste Package Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emplacement Operation Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subsurface Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Costs	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Closure Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Max Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Loading Repository (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Used Fuel in Repository	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Repository Stage 1 Subtotal	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Defense Share Removed	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Year	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125
High Case Total Costs	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**
Base Case Total Costs	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**
Low Case Total Costs	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**
Base Case Breakdown											
Count	104	105	106	107	108	109	110	111	112	113	114
New Entity Year	102	103	104	105	106	107	108	109	110	111	112
Total Costs	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**
Defense Share	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)
Total Costs Net of Defense	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**
Current and Future Nuclear Capacity (MW)	-	-	-	-	-	-	-	-	-	-	-
Current and Future Nuclear Generation (TWh)	-	-	-	-	-	-	-	-	-	-	-
Nuclear Share	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Current and Expected Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Forecasted Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel Discharged (MT)	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Total Used Fuel at Reactor Sites (MT)	-	-	-	-	-	-	-	-	-	-	-
Adding Used Fuel at Reactor Sites (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel from Reactor Sites (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Total Consolidated Storage Capacity	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*
Total Max Acceptance Rate Into Storage	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Storage	-	-	-	-	-	-	-	-	-	-	-
Moving Used Fuel Into Storage	-	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel From Storage	-	-	-	-	-	-	-	-	-	-	-
Total Repository Capacity	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*
Total Max Acceptance Rate Into Repository	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Repository	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Moving Used Fuel into Repository	-	-	-	-	-	-	-	-	-	-	-

Year	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125
Management	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**
Program Management Costs	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30
Transportation	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Canisters	-	-	-	-	-	-	-	-	-	-	-
Needed Transportation Cask Fleet Size	-	-	-	-	-	-	-	-	-	-	-
Purchasing Transportation Casks	-	-	-	-	-	-	-	-	-	-	-
Transportation Investment Year	0	0	0	0	0	0	0	0	0	0	0
Transportation Startup Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Canister Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Cask Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Shipment Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operations and Support Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Subtotal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Defense Share Credit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Consolidated Storage	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Stage 1	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Used Fuel at Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-

Year	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125
Stage 2	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Used Fuel at Storage Facility	0	0	0	0	0	0	0	0	0	0	0
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Repository	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**
Stage 1	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**
Preselection Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Site Characterization Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Delay Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operation Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Monitor Year	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*
Closure Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Capital Costs											
Preselection Site Evaluation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Characterization and Licensing Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repository Engineering, Procurement, Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating Costs											
Waste Package Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emplacement Operation Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subsurface Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Costs	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Closure Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Max Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Loading Repository (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Used Fuel in Repository	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Repository Stage 1 Subtotal	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Defense Share Removed	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Year	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136
High Case Total Costs	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**
Base Case Total Costs	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**
Low Case Total Costs	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**
Base Case Breakdown											
Count	115	116	117	118	119	120	121	122	123	124	125
New Entity Year	113	114	115	116	117	118	119	120	121	122	123
Total Costs	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**
Defense Share	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)
Total Costs Net of Defense	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**
Current and Future Nuclear Capacity (MW)	-	-	-	-	-	-	-	-	-	-	-
Current and Future Nuclear Generation (TWh)	-	-	-	-	-	-	-	-	-	-	-
Nuclear Share	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Current and Expected Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Forecasted Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel Discharged (MT)	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Total Used Fuel at Reactor Sites (MT)	-	-	-	-	-	-	-	-	-	-	-
Adding Used Fuel at Reactor Sites (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel from Reactor Sites (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Total Consolidated Storage Capacity	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*
Total Max Acceptance Rate Into Storage	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Storage	-	-	-	-	-	-	-	-	-	-	-
Moving Used Fuel Into Storage	-	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel From Storage	-	-	-	-	-	-	-	-	-	-	-
Total Repository Capacity	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*
Total Max Acceptance Rate Into Repository	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Repository	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Moving Used Fuel into Repository	-	-	-	-	-	-	-	-	-	-	-

Year	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136
Management	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**
Program Management Costs	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30
Transportation	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Canisters	-	-	-	-	-	-	-	-	-	-	-
Needed Transportation Cask Fleet Size	-	-	-	-	-	-	-	-	-	-	-
Purchasing Transportation Casks	-	-	-	-	-	-	-	-	-	-	-
Transportation Investment Year	0	0	0	0	0	0	0	0	0	0	0
Transportation Startup Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Canister Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Cask Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Shipment Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operations and Support Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Subtotal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Defense Share Credit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Consolidated Storage	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Stage 1	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Used Fuel at Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-

Year	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136
Stage 2	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Used Fuel at Storage Facility	0	0	0	0	0	0	0	0	0	0	0
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Repository	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**
Stage 1	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**
Preselection Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Site Characterization Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Delay Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operation Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Monitor Year	*29*	*30*	*31*	*32*	*33*	*34*	*35*	*36*	*37*	*38*	*39*
Closure Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Capital Costs											
Preselection Site Evaluation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Characterization and Licensing Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repository Engineering, Procurement, Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating Costs											
Waste Package Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emplacement Operation Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subsurface Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Costs	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Closure Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Max Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Loading Repository (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Used Fuel in Repository	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Repository Stage 1 Subtotal	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Defense Share Removed	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Year	**2137**	**2138**	**2139**	**2140**	**2141**	**2142**	**2143**	**2144**	**2145**	**2146**	**2147**
High Case Total Costs	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**	**$ 150**
Base Case Total Costs	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**
Low Case Total Costs	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**	**$ 40**
Base Case Breakdown											
Count	126	127	128	129	130	131	132	133	134	135	136
New Entity Year	124	125	126	127	128	129	130	131	132	133	134
Total Costs	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**	**$ 80**
Defense Share	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)	$ (20)
Total Costs Net of Defense	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**
Current and Future Nuclear Capacity (MW)	-	-	-	-	-	-	-	-	-	-	-
Current and Future Nuclear Generation (TWh)	-	-	-	-	-	-	-	-	-	-	-
Nuclear Share	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Current and Expected Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Forecasted Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel Discharged (MT)	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Total Used Fuel at Reactor Sites (MT)	-	-	-	-	-	-	-	-	-	-	-
Adding Used Fuel at Reactor Sites (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel from Reactor Sites (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Total Consolidated Storage Capacity	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*
Total Max Acceptance Rate Into Storage	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Storage	-	-	-	-	-	-	-	-	-	-	-
Moving Used Fuel Into Storage	-	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel From Storage	-	-	-	-	-	-	-	-	-	-	-
Total Repository Capacity	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*
Total Max Acceptance Rate Into Repository	-	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Repository	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Moving Used Fuel into Repository	-	-	-	-	-	-	-	-	-	-	-

Year	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147
Management	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**	**$ 30**
Program Management Costs	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30
Transportation	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Canisters	-	-	-	-	-	-	-	-	-	-	-
Needed Transportation Cask Fleet Size	-	-	-	-	-	-	-	-	-	-	-
Purchasing Transportation Casks	-	-	-	-	-	-	-	-	-	-	-
Transportation Investment Year	0	0	0	0	0	0	0	0	0	0	0
Transportation Startup Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Canister Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Cask Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Shipment Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operations and Support Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Subtotal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Defense Share Credit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Consolidated Storage	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Stage 1	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Used Fuel at Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-

Year	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147
Stage 2	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Used Fuel at Storage Facility	0	0	0	0	0	0	0	0	0	0	0
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-	-
Repository	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**
Stage 1	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**	**$ 60**
Preselection Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Site Characterization Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Delay Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operation Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Monitor Year	*40*	*41*	*42*	*43*	*44*	*45*	*46*	*47*	*48*	*49*	*50*
Closure Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Capital Costs											
Preselection Site Evaluation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Characterization and Licensing Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repository Engineering, Procurement, Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating Costs											
Waste Package Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emplacement Operation Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subsurface Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Costs	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Closure Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Max Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Loading Repository (MT/yr)	-	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Used Fuel in Repository	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Repository Stage 1 Subtotal	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Defense Share Removed	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Year	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157
High Case Total Costs	**$ 260**	**$ 260**	**$ 260**	**$ 260**	**$ 260**	**$ 260**	**$ 260**	**$ 260**	**$ 260**	**$ 260**
Base Case Total Costs	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**
Low Case Total Costs	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**	**$ 70**
Base Case Breakdown										
Count	137	138	139	140	141	142	143	144	145	146
New Entity Year	135	136	137	138	139	140	141	142	143	144
Total Costs	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**
Defense Share	$ (30)	$ (30)	$ (30)	$ (30)	$ (30)	$ (30)	$ (30)	$ (30)	$ (30)	$ (30)
Total Costs Net of Defense	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**	**$ 120**
Current and Future Nuclear Capacity (MW)	-	-	-	-	-	-	-	-	-	-
Current and Future Nuclear Generation (TWh)	-	-	-	-	-	-	-	-	-	-
Nuclear Share	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Current and Expected Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-
Forecasted Used Fuel Generation (MT/yr)	-	-	-	-	-	-	-	-	-	-
Total Used Fuel Discharged (MT)	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Total Used Fuel at Reactor Sites (MT)	-	-	-	-	-	-	-	-	-	-
Adding Used Fuel at Reactor Sites (MT/yr)	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel from Reactor Sites (MT/yr)	-	-	-	-	-	-	-	-	-	-
Total Consolidated Storage Capacity	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*	*110,000*
Total Max Acceptance Rate Into Storage	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Storage	-	-	-	-	-	-	-	-	-	-
Moving Used Fuel Into Storage	-	-	-	-	-	-	-	-	-	-
Removing Used Fuel From Storage	-	-	-	-	-	-	-	-	-	-
Total Repository Capacity	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*	*150,000*
Total Max Acceptance Rate Into Repository	-	-	-	-	-	-	-	-	-	-
Total Used Fuel in Repository	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Moving Used Fuel into Repository	-	-	-	-	-	-	-	-	-	-

Year	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157
Management	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Program Management Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transportation	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Canisters	-	-	-	-	-	-	-	-	-	-
Needed Transportation Cask Fleet Size	-	-	-	-	-	-	-	-	-	-
Purchasing Transportation Casks	-	-	-	-	-	-	-	-	-	-
Transportation Investment Year	0	0	0	0	0	0	0	0	0	0
Transportation Startup Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Canister Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Cask Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Shipment Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operations and Support Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transportation Subtotal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Defense Share Credit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Consolidated Storage	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Stage 1	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Used Fuel at Storage Facility	-	-	-	-	-	-	-	-	-	-
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-

Year	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157
Stage 2	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Siting Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Design Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Project Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operating Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Decommissioning Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Siting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design, Engineering, Licensing & Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Infrastructure	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Decommissioning	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fuel Storage Facility	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General administrative costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Loading Labor Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Overpack Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Used Fuel at Storage Facility	0	0	0	0	0	0	0	0	0	0
Loading Storage Facility	-	-	-	-	-	-	-	-	-	-
Unloading Storage Facility	-	-	-	-	-	-	-	-	-	-
Repository	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**
Stage 1	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**	**$ 140**
Preselection Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Site Characterization Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Construction Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Delay Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Operation Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Monitor Year	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Closure Year	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Capital Costs										
Preselection Site Evaluation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Characterization and Licensing Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repository Engineering, Procurement, Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating Costs										
Waste Package Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Emplacement Operation Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subsurface Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure Costs	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140
Max Storage Acceptance Rate (MT/yr)	-	-	-	-	-	-	-	-	-	-
Loading Repository (MT/yr)	-	-	-	-	-	-	-	-	-	-
Storage Capacity (MT)	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Used Fuel in Repository	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423	141,423
Repository Stage 1 Subtotal	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140	$ 140
Defense Share Removed	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

APPENDIX D: FEE ADEQUACY MODELING OF NUCLEAR WASTE FUND INVESTMENTS

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TABLE D-1: FEE ADEQUACY MODELING OF NUCLEAR WASTE FUND INVESTMENTS

Current Waste Fund Instruments	Description	Modeling Approach
Notes	A fixed rate bond with a principal (face) value repaid at maturity, and with a constant interest amount (coupon) payable at fixed intervals (semiannual or annual).	▸ Each individual note's specific interest payments are modeled ▸ When the instrument matures, the proceeds are used to pay current year costs and then reinvested in 30 year bonds
Treasury Inflation-Protected Securities (TIPS)	An inflation linked bond in which the principal amount and the interest payments are indexed to inflation. The interest rate is normally lower than for fixed rate bonds with a comparable maturity. However, as the principal amount grows, the payments increase with inflation.	▸ Initial inflation adjustment to principal is based on the Treasury's reference CPI and Index ratio applicable to the individual security ▸ After 2012, principal adjustments are based off of the inflation rate corresponding to the interest/inflation forecast scenario being run ▸ Interest payments are based on individual bond's actual coupon rate, times the inflation adjusted principal
Zero Coupon Bonds (ZCB)	A bond bought at a price lower than its face value, with the face value repaid at the time of maturity. It does not make periodic interest payments, or have so-called "coupons," hence the term zero-coupon bond. When the bond reaches maturity, its investor receives its par (or face) value.	▸ ZCBs are modeled as a cash flow in the year in which the individual security matures ▸ For fund balance purposes, ZCBs accrue interest at the individual security rate (although this revenue is not paid until the bond reaches maturity)
Overnights	Funds lent for one business day, which is the shortest period for which a loan can be made.	▸ Overnights are treated as cash in 2012, and are reinvested in 30 year bonds in 2012

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APPENDIX E: NO-PILOT DISPOSAL SYSTEM SCENARIOS

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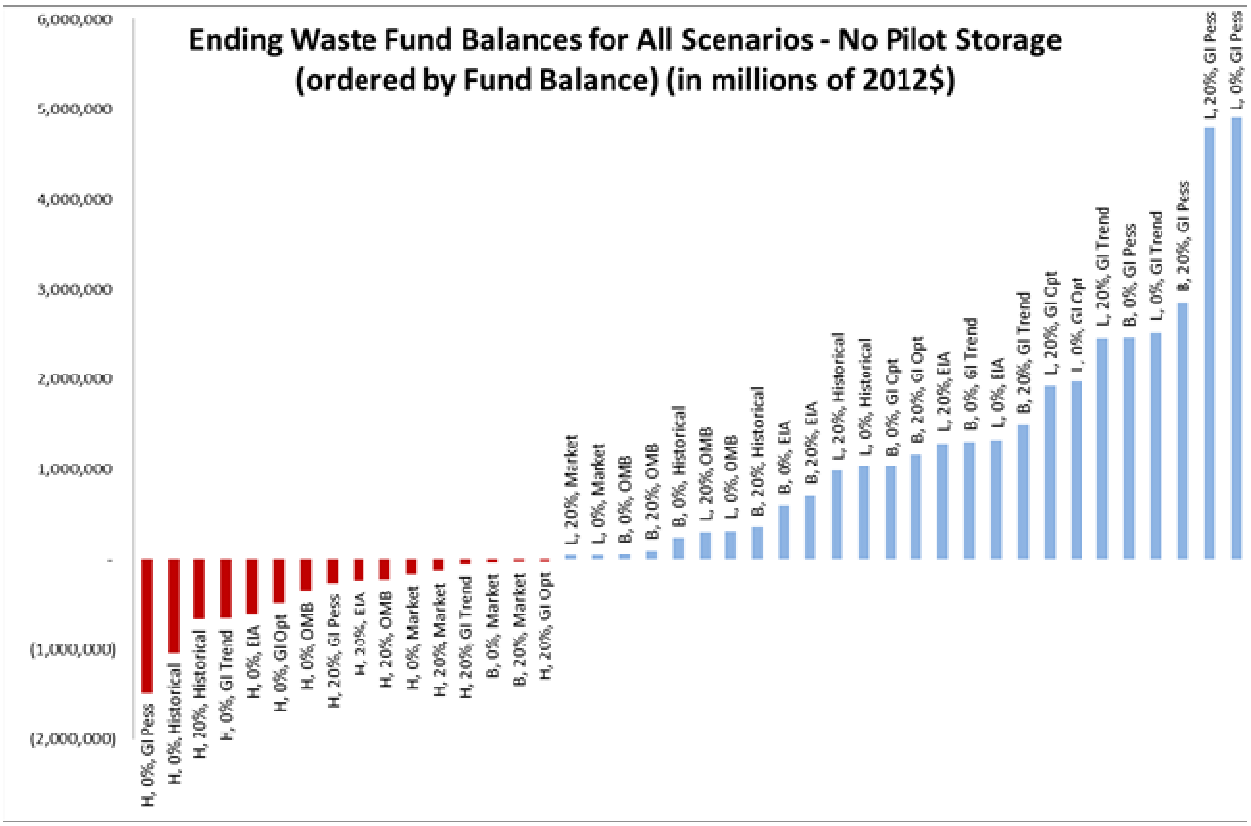

Figure E-1: Ending Waste Fund Balances for All Scenarios – No Pilot Storage (ordered by Fund Balance)
(millions of 2012$)

Table E-1: Summary of All Scenarios – No Pilot Storage

	Cost Scenarios	Defense Share Scenarios	Economic Scenario	Fund Balance in millions (in 2157)
1	High	0%	Global Insight Optimistic	$ (475,362)
2	High	0%	Global Insight Trend	$ (639,267)
3	High	0%	Global Insight Pessimistic	$(1,479,473)
4	High	0%	Historical	$(1,042,693)
5	High	0%	EIA Forecast	$ (598,054)
6	High	0%	OMB Forecast	$ (346,420)
7	High	0%	Market Yield Rates	$ (166,584)
8	High	20%	Global Insight Optimistic	$ (19,049)
9	High	20%	Global Insight Trend	$ (45,716)
10	High	20%	Global Insight Pessimistic	$ (263,432)
11	High	20%	Historical	$ (654,220)
12	High	20%	EIA Forecast	$ (237,142)
13	High	20%	OMB Forecast	$ (225,177)
14	High	20%	Market Yield Rates	$ (128,497)
15	Baseline	0%	Global Insight Optimistic	$ 1,038,626
16	Baseline	0%	Global Insight Trend	$ 1,313,947
17	Baseline	0%	Global Insight Pessimistic	$ 2,469,024
18	Baseline	0%	Historical	$ 253,420
19	Baseline	0%	EIA Forecast	$ 600,757
20	Baseline	0%	OMB Forecast	$ 70,755
21	Baseline	0%	Market Yield Rates	$ (31,514)
22	Baseline	20%	Global Insight Optimistic	$ 1,178,629
23	Baseline	20%	Global Insight Trend	$ 1,497,621
24	Baseline	20%	Global Insight Pessimistic	$ 2,852,163
25	Baseline	20%	Historical	$ 369,781
26	Baseline	20%	EIA Forecast	$ 710,050
27	Baseline	20%	OMB Forecast	$ 105,885
28	Baseline	20%	Market Yield Rates	$ (20,708)
29	Low	0%	Global Insight Optimistic	$ 1,974,754
30	Low	0%	Global Insight Trend	$ 2,519,528
31	Low	0%	Global Insight Pessimistic	$ 4,900,720
32	Low	0%	Historical	$ 1,036,963
33	Low	0%	EIA Forecast	$ 1,335,627
34	Low	0%	OMB Forecast	$ 322,927
35	Low	0%	Market Yield Rates	$ 49,572
36	Low	20%	Global Insight Optimistic	$ 1,927,532
37	Low	20%	Global Insight Trend	$ 2,462,087
38	Low	20%	Global Insight Pessimistic	$ 4,797,519
39	Low	20%	Historical	$ 996,615
40	Low	20%	EIA Forecast	$ 1,297,946
41	Low	20%	OMB Forecast	$ 307,622
42	Low	20%	Market Yield Rates	$ 43,954

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APPENDIX F: NUCLEAR WASTE FUND INVESTMENT HOLDINGS

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Department of Energy

Consolidated Accounting & Investment System

Investment Portfolio Report

Nuclear Waste Fund

Sorted By: Investment Type, Maturity Date, Investment ID (w/ Yield Rate)

Report Date : 7/2012

Invest Date	Invest ID	Adjusted Remaining Face Amount	Book Value	Market Value (ZCB)/ # of CDs	Unamortized Discount Balance	Unamortized Premium Balance	Prepaid Interest	Six Month Interest Collection	Int/Inv Rate	Yield Rate	Interest Collection Dates	Maturity Date	Call Date
Notes													
08/16/2010	N20100816A	742,533,000.00	762,705,740.88		0.00	20,172,740.88	0.00	11,602,078.13	0.03125	0.007758152	03/31 & 09/30	09/30/2013	
12/01/2010	N20101201A	31,824,000.00	32,252,663.31		0.00	428,663.31	0.00	278,460.00	0.01750	0.008428005	01/31 & 07/31	01/31/2014	
02/16/2010	N20100216A	352,001,000.00	355,491,305.31		0.00	3,490,305.31	0.00	4,620,013.13	0.02625	0.021153630	01/31 & 07/31	07/31/2014	
11/02/1998	N19981102A	78,518,000.00	89,710,155.88		0.00	11,192,155.88	0.00	4,416,637.50	0.11250	0.051846940	02/15 & 08/15	02/15/2015	
11/16/1998	N19981116A	43,266,000.00	49,357,835.53		0.00	6,091,835.53	0.00	2,433,712.50	0.11250	0.052529098	02/15 & 08/15	02/15/2015	
11/01/2001	N20011101A	83,974,000.00	97,179,614.57		0.00	13,205,614.57	0.00	4,723,537.50	0.11250	0.046139910	02/15 & 08/15	02/15/2015	
02/15/2002	N20020215A	69,906,000.00	79,607,007.68		0.00	9,701,007.68	0.00	3,932,212.50	0.11250	0.053324272	02/15 & 08/15	02/15/2015	
11/03/2010	N20101103A	225,328,000.00	226,244,922.40		0.00	916,922.40	0.00	1,408,300.00	0.01250	0.011187365	03/31 & 09/30	09/30/2015	
05/02/2002	N20020502A	40,800,000.00	45,587,897.68		0.00	4,787,897.68	0.00	1,887,000.00	0.09250	0.055515083	02/15 & 08/15	02/15/2016	
03/01/1996	N19960301C	18,000,000.00	18,426,351.20		0.00	426,351.20	0.00	652,500.00	0.07250	0.065340315	05/15 & 11/15	05/15/2016	
09/01/2011	N20110901A	43,024,000.00	43,167,351.01		0.00	143,351.01	0.00	215,120.00	0.01000	0.009166431	02/29 & 08/31	08/31/2016	
04/03/1996	N19960403A	172,500,000.00	176,850,400.08		0.00	4,350,400.08	0.00	6,468,750.00	0.07500	0.068118963	05/15 & 11/15	11/15/2016	
02/04/2011	N20110204A	138,913,000.00	140,668,069.94		0.00	1,755,069.94	0.00	2,083,695.00	0.03000	0.027049347	02/28 & 08/31	02/28/2017	
02/15/2011	N20110215A	93,315,000.00	94,386,827.15		0.00	1,071,827.15	0.00	1,399,725.00	0.03000	0.027315740	02/28 & 08/31	02/28/2017	
03/01/2011	N20110301A	33,137,000.00	33,805,125.04		0.00	668,125.04	0.00	497,055.00	0.03000	0.025311309	02/28 & 08/31	02/28/2017	
03/01/1996	N19960301B	53,100,000.00	58,320,927.09		0.00	5,220,927.09	0.00	2,356,312.50	0.08875	0.065522409	02/15 & 08/15	08/15/2017	
05/03/2011	N20110503A	167,327,000.00	186,012,038.15		0.00	18,685,038.15	0.00	3,974,016.25	0.04750	0.023847080	02/15 & 08/15	08/15/2017	
05/15/2002	N20020515B	23,549,000.00	27,360,385.80		0.00	3,811,385.80	0.00	1,044,986.88	0.08875	0.058596131	02/15 & 08/15	02/15/2019	
08/03/2011	N20110803A	248,544,000.00	259,244,632.86		0.00	10,700,632.86	0.00	3,883,500.00	0.03125	0.025744523	05/15 & 11/15	05/15/2021	
08/15/2011	N20110815A	865,190,000.00	928,584,116.77		0.00	63,394,116.77	0.00	13,518,593.75	0.03125	0.022033371	05/15 & 11/15	05/15/2021	
11/01/2011	N20111101A	171,730,000.00	188,236,308.20		0.00	16,506,308.20	0.00	2,683,281.25	0.03125	0.019306034	05/15 & 11/15	05/15/2021	
11/15/2011	N20111115A	27,145,000.00	29,802,947.47		0.00	2,657,947.47	0.00	424,140.63	0.03125	0.019094047	05/15 & 11/15	05/15/2021	
02/01/2012	N20120201A	144,147,000.00	148,369,693.00		0.00	4,222,693.00	0.00	1,531,561.88	0.02125	0.017728013	02/15 & 08/15	08/15/2021	
02/15/2012	N20120215A	308,339,000.00	315,657,114.12		0.00	7,318,114.12	0.00	3,276,101.88	0.02125	0.018387837	02/15 & 08/15	08/15/2021	
11/30/2011	N20111130A	40,256,000.00	39,984,330.93		271,669.07	0.00	0.00	402,560.00	0.02000	0.020802797	05/15 & 11/15	11/15/2021	
03/01/2012	N20120301A	40,174,000.00	39,974,768.94		199,231.06	0.00	33,110.44	401,740.00	0.02000	0.020575264	02/15 & 08/15	02/15/2022	
04/02/2012	N20120402A	21,277,000.00	20,954,625.26		322,374.74	0.00	54,946.10	212,770.00	0.02000	0.021767650	02/15 & 08/15	02/15/2022	

Department of Energy

Consolidated Accounting & Investment System

Investment Portfolio Report

Nuclear Waste Fund

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04/16/2012	N20120416A	20,848,000.00	20,927,221.99		0.00	79,221.99	69,875.16	208,480.00	0.02000	0.019561354	02/15 & 08/15	02/15/2022	
05/01/2012	N20120501A	138,770,000.00	139,405,198.21		0.00	635,198.21	579,479.12	1,387,700.00	0.02000	0.019471848	02/15 & 08/15	02/15/2022	
05/15/2012	N20120515A	28,208,000.00	28,847,130.64		0.00	639,130.64	139,490.11	282,080.00	0.02000	0.017411575	02/15 & 08/15	02/15/2022	
Notes Totals :		4,465,843,000.00	4,677,122,707.09		793,274.87	212,272,981.96	876,900.93	82,206,621.28					
Overnights													
07/31/2012	D20120731A	192,160,000.00	192,160,000.00		0.00	0.00	0.00	0.00	0.00050	0.000499968	08/01/2012	08/01/2012	
Overnights Totals :		192,160,000.00	192,160,000.00		0.00	0.00	0.00	0.00					
TIPS													
11/03/2004	T20041103A	63,400,480.00	65,079,158.50		0.00	1,678,678.50	0.00	617,500.00	0.02375	0.020794345	01/15 & 07/15	01/15/2025	
02/01/2005	T20050201A	29,261,760.00	30,432,466.79		0.00	1,170,706.79	0.00	285,000.00	0.02375	0.019324170	01/15 & 07/15	01/15/2025	
08/01/2005	T20050801A	353,579,600.00	363,441,723.07		0.00	9,862,123.07	0.00	3,443,750.00	0.02375	0.020639371	01/15 & 07/15	01/15/2025	
02/04/2009	T20090204A	105,830,032.00	103,452,699.54		2,377,332.46	0.00	0.00	1,030,750.00	0.02375	0.026343996	01/15 & 07/15	01/15/2025	
02/04/2009	T20090204B	111,161,280.00	104,439,155.32		6,722,124.68	0.00	0.00	960,000.00	0.02000	0.026209765	01/15 & 07/15	01/15/2026	
11/10/2008	T20081110A	82,734,711.51	71,485,321.43		11,249,390.08	0.00	0.00	659,898.75	0.01750	0.029597272	01/15 & 07/15	01/15/2028	
11/03/2004	T20041103B	120,780,750.00	140,439,993.94		0.00	19,659,243.94	0.00	1,540,625.00	0.03625	0.019130376	04/15 & 10/15	04/15/2028	
02/01/2005	T20050201B	53,996,100.00	64,035,441.47		0.00	10,039,341.47	0.00	688,750.00	0.03625	0.017009805	04/15 & 10/15	04/15/2028	
08/02/2005	T20050802A	355,805,880.00	416,849,054.61		0.00	61,043,174.61	0.00	4,538,500.00	0.03625	0.018317207	04/15 & 10/15	04/15/2028	
11/03/2004	T20041103C	150,985,080.00	181,257,560.08		0.00	30,272,480.08	0.00	2,092,500.00	0.03875	0.019075983	04/15 & 10/15	04/15/2029	
02/01/2005	T20050201C	55,920,400.00	68,581,641.94		0.00	12,661,241.94	0.00	775,000.00	0.03875	0.016918541	04/15 & 10/15	04/15/2029	
08/02/2005	T20050802B	356,492,550.00	431,903,503.75		0.00	75,410,953.75	0.00	4,940,625.00	0.03875	0.018148395	04/15 & 10/15	04/15/2029	
11/04/2004	T20041104A	46,612,080.00	55,058,361.36		0.00	8,446,281.36	0.00	607,500.00	0.03375	0.019370021	04/15 & 10/15	04/15/2032	
11/15/2004	T20041115A	42,080,350.00	49,250,734.17		0.00	7,170,384.17	0.00	548,437.50	0.03375	0.020130786	04/15 & 10/15	04/15/2032	
02/16/2005	T20050216A	90,634,600.00	111,196,241.24		0.00	20,561,641.24	0.00	1,181,250.00	0.03375	0.016266672	04/15 & 10/15	04/15/2032	
08/02/2005	T20050802C	187,743,100.00	223,068,699.42		0.00	35,325,599.42	0.00	2,446,875.00	0.03375	0.018885837	04/15 & 10/15	04/15/2032	
TIPS Totals :		2,207,018,753.51	2,479,971,756.63		20,348,847.22	293,301,850.34	0.00	26,356,961.25					

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ZCBs													
11/17/1997	Z19971117A	180,000,000.00	179,575,384.23	179,997,701.40	424,615.77	0.00	0.00	0.00	0.06235	0.062358236		08/15/2012	
08/01/2002	Z20020801A	340,000,000.00	335,230,933.70	339,965,401.60	4,769,066.30	0.00	0.00	0.00	0.04964	0.049647302		11/15/2012	
05/15/1998	Z19980515A	120,000,000.00	114,454,553.48	120,000,000.00	5,545,446.52	0.00	0.00	0.00	0.06950	0.060950000		05/15/2013	
12/11/1997	Z19971211A	300,000,000.00	281,722,550.31	299,457,207.00	18,277,449.69	0.00	0.00	0.00	0.06145	0.061456944		08/15/2013	
04/02/1998	Z19980402A	610,000,000.00	556,839,323.44	607,955,023.80	53,160,676.56	0.00	0.00	0.00	0.06015	0.060155374		02/15/2014	
07/23/1998	Z19980723A	135,000,000.00	121,847,717.86	134,440,599.15	13,152,282.14	0.00	0.00	0.00	0.05815	0.058156249		05/15/2014	
05/01/2002	Z20020501A	170,000,000.00	153,740,526.06	169,295,569.30	16,259,473.94	0.00	0.00	0.00	0.05000	0.057022427		05/15/2014	
09/04/2002	Z20020904A	620,000,000.00	556,352,173.42	616,179,535.20	63,647,826.58	0.00	0.00	0.00	0.04790	0.047905611		11/15/2014	
06/25/1998	Z19980625A	600,000,000.00	511,514,738.17	594,619,944.00	88,485,261.83	0.00	0.00	0.00	0.05805	0.058054296		05/15/2015	
11/05/2002	Z20021105A	480,000,000.00	406,735,079.33	473,978,164.80	73,264,920.67	0.00	0.00	0.00	0.05101	0.051011293		11/15/2015	
02/16/1999	Z19990216A	576,000,000.00	470,661,828.05	567,324,794.88	105,338,171.95	0.00	0.00	0.00	0.05790	0.057900134		02/15/2016	
08/03/1998	Z19980803A	265,000,000.00	209,825,174.23	259,485,869.40	55,174,825.77	0.00	0.00	0.00	0.05865	0.058651488		08/15/2016	
08/17/1998	Z19980817A	275,000,000.00	218,686,179.12	269,277,789.00	56,313,820.88	0.00	0.00	0.00	0.05755	0.057550245		08/15/2016	
09/05/2002	Z20020905A	645,000,000.00	521,369,120.48	629,922,641.25	123,630,879.52	0.00	0.00	0.00	0.05024	0.050245278		11/15/2016	
04/01/1999	Z19990401A	915,000,000.00	665,566,066.41	879,652,314.75	249,433,933.59	0.00	0.00	0.00	0.06110	0.061104634		11/15/2017	
06/01/1999	Z19990601A	275,000,000.00	191,938,758.15	262,604,958.00	83,061,241.85	0.00	0.00	0.00	0.06310	0.063102183		05/15/2018	
11/04/2002	Z20021104A	1,125,000,000.00	802,149,998.28	1,065,808,417.50	322,850,001.72	0.00	0.00	0.00	0.05452	0.054521313		11/15/2018	
01/15/1998	Z19980115A	940,000,000.00	623,426,677.42	875,750,990.60	316,573,322.58	0.00	0.00	0.00	0.05920	0.059202861		08/15/2019	
02/01/1999	Z19990201A	300,000,000.00	197,108,581.32	275,642,685.00	102,891,418.68	0.00	0.00	0.00	0.05650	0.056501344		02/15/2020	
07/01/1999	Z19990701A	570,000,000.00	342,702,369.41	517,014,019.80	227,297,630.59	0.00	0.00	0.00	0.06430	0.064304594		08/15/2020	
05/17/2000	Z20000517A	940,000,000.00	548,906,721.27	839,587,526.80	391,093,278.73	0.00	0.00	0.00	0.06400	0.064006169		02/15/2021	
05/18/2000	Z20000518A	75,000,000.00	43,542,829.90	66,988,366.50	31,457,170.10	0.00	0.00	0.00	0.06470	0.064706304		02/15/2021	
11/01/2000	Z20001101A	430,000,000.00	247,373,044.63	375,499,598.40	182,626,955.37	0.00	0.00	0.00	0.06042	0.060421537		11/15/2021	
11/15/2000	Z20001115A	500,000,000.00	287,595,199.30	436,627,440.00	212,404,800.70	0.00	0.00	0.00	0.06044	0.060440000		11/15/2021	
08/02/2002	Z20020802A	363,000,000.00	213,180,241.19	316,991,521.44	149,819,758.81	0.00	0.00	0.00	0.05813	0.058135358		11/15/2021	
08/01/2000	Z20000801A	400,000,000.00	218,024,957.00	338,456,976.00	181,975,043.00	0.00	0.00	0.00	0.05986	0.059864900		11/15/2022	
08/15/2000	Z20000815A	620,000,000.00	339,528,987.75	524,608,312.80	280,471,012.25	0.00	0.00	0.00	0.05939	0.059394953		11/15/2022	

Department of Energy

Consolidated Accounting & Investment System

Investment Portfolio Report

Nuclear Waste Fund

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Report Date : 7/2012

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09/02/2003	Z20030902A	73,000,000.00	39,911,935.12	61,197,365.11	33,088,064.88	0.00	0.00	0.00	0.05812	0.058121901		02/15/2023	
11/03/1997	Z19971103A	400,000,000.00	201,040,924.11	329,743,396.00	198,959,075.89	0.00	0.00	0.00	0.06330	0.063304767		08/15/2023	
08/15/2003	Z20030815A	101,000,000.00	53,186,722.22	83,260,207.49	47,813,277.78	0.00	0.00	0.00	0.05895	0.058950000		08/15/2023	
10/16/1997	Z19971016A	610,000,000.00	292,239,662.91	489,161,415.60	317,760,337.09	0.00	0.00	0.00	0.06480	0.064804438		02/15/2024	
12/11/1997	Z19971211B	500,000,000.00	241,979,859.45	393,740,345.00	258,020,140.55	0.00	0.00	0.00	0.06120	0.061204048		08/15/2024	
02/15/2001	Z20010215A	855,000,000.00	414,582,284.82	667,560,761.10	440,417,715.18	0.00	0.00	0.00	0.05857	0.058570000		02/15/2025	
05/01/2001	Z20010501A	450,000,000.00	206,575,581.86	345,169,044.00	243,424,418.14	0.00	0.00	0.00	0.06010	0.060614579		08/15/2025	
05/15/2001	Z20010515A	95,000,000.00	42,877,147.39	72,869,020.40	52,122,852.61	0.00	0.00	0.00	0.06195	0.061954942		08/15/2025	
08/18/2003	Z20030818A	120,000,000.00	56,018,071.44	92,045,078.40	63,981,928.56	0.00	0.00	0.00	0.05929	0.059290317		08/15/2025	
02/01/2001	Z20010201A	490,000,000.00	229,490,031.96	369,019,093.10	260,509,968.04	0.00	0.00	0.00	0.05682	0.056821142		02/15/2026	
05/15/2001	Z20010515B	655,000,000.00	278,659,882.10	484,830,973.80	376,340,117.90	0.00	0.00	0.00	0.06181	0.061814725		08/15/2026	
05/03/2004	Z20040503A	639,000,000.00	289,526,914.30	472,987,774.44	349,473,085.70	0.00	0.00	0.00	0.05719	0.057194486		08/15/2026	
08/02/2002	Z20020802B	740,000,000.00	326,316,710.42	542,439,232.60	413,683,289.58	0.00	0.00	0.00	0.05813	0.058134255		11/15/2026	
08/15/2002	Z20020815A	450,000,000.00	207,228,728.25	329,861,695.50	242,771,271.75	0.00	0.00	0.00	0.05501	0.055013899		11/15/2026	
05/17/2004	Z20040517A	161,000,000.00	67,472,749.90	114,957,722.32	93,527,250.10	0.00	0.00	0.00	0.05867	0.058674627		08/15/2027	
05/19/2004	Z20040519A	328,000,000.00	136,738,888.01	234,199,583.36	191,261,111.99	0.00	0.00	0.00	0.05903	0.059034681		08/15/2027	
02/13/2003	Z20030213A	81,000,000.00	36,284,958.78	57,321,948.78	44,715,041.22	0.00	0.00	0.00	0.05322	0.053223575		11/15/2027	
02/19/2003	Z20030219A	1,495,000,000.00	669,803,706.92	1,057,979,178.10	825,196,293.08	0.00	0.00	0.00	0.05321	0.053213565		11/15/2027	
02/02/2004	Z20040202A	513,000,000.00	214,171,599.68	352,302,190.83	298,828,400.32	0.00	0.00	0.00	0.05435	0.054353655		11/15/2028	
09/22/2004	Z20040922A	143,000,000.00	62,473,466.54	98,205,094.13	80,526,533.46	0.00	0.00	0.00	0.05149	0.051492856		11/15/2028	
02/02/2006	Z20060202A	563,000,000.00	258,092,810.07	377,504,144.98	304,907,189.93	0.00	0.00	0.00	0.04772	0.047720817		02/15/2029	
02/16/2006	Z20060216A	265,000,000.00	121,876,998.79	180,617,004.00	143,123,001.21	0.00	0.00	0.00	4.75200	0.047520067		02/15/2029	
04/30/2004	Z20040430A	1,134,000,000.00	431,337,954.64	742,391,073.90	702,662,045.36	0.00	0.00	0.00	0.05670	0.056701199		11/15/2029	
02/17/2004	Z20040217A	364,000,000.00	143,876,250.30	236,474,598.36	220,123,749.70	0.00	0.00	0.00	0.05363	0.053630149		02/15/2030	
08/02/2004	Z20040802A	542,000,000.00	207,357,119.42	352,113,275.58	334,642,880.58	0.00	0.00	0.00	0.05540	0.055541009		02/15/2030	
08/16/2004	Z20040816A	380,000,000.00	148,415,812.49	246,869,086.20	231,584,187.51	0.00	0.00	0.00	0.05433	0.054330078		02/15/2030	
09/01/2005	Z20050901B	1,515,000,000.00	707,850,620.28	984,228,067.35	807,149,379.72	0.00	0.00	0.00	0.04386	0.043860820		02/15/2030	
03/06/2006	Z20060306A	87,000,000.00	37,785,702.57	56,520,027.63	49,214,297.43	0.00	0.00	0.00	0.04812	0.048121128		02/15/2030	

Department of Energy

Consolidated Accounting & Investment System

Investment Portfolio Report

Nuclear Waste Fund

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11/03/2003	Z20031103A	669,000,000.00	252,833,369.59	430,797,050.82	416,166,630.41	0.00	0.00	0.00	0.05318	0.053183180		02/15/2031	
11/17/2003	Z20031117A	150,000,000.00	58,130,662.11	96,591,267.00	91,869,337.89	0.00	0.00	0.00	0.05179	0.051793075		02/15/2031	
05/02/2005	Z20050502A	495,000,000.00	216,605,947.83	318,751,181.10	278,394,052.17	0.00	0.00	0.00	0.04508	0.045082396		02/15/2031	
05/16/2005	Z20050516A	132,000,000.00	57,813,903.67	85,000,314.96	74,186,096.33	0.00	0.00	0.00	0.04503	0.045032460		02/15/2031	
08/15/2005	Z20050815A	253,000,000.00	112,413,848.00	162,917,270.34	140,586,152.00	0.00	0.00	0.00	0.04424	0.044240000		02/15/2031	
09/01/2005	Z20050901A	1,625,000,000.00	739,516,043.82	1,046,405,392.50	885,483,956.18	0.00	0.00	0.00	0.04292	0.042920754		02/15/2031	
10/04/2005	Z20051004A	56,000,000.00	24,178,566.36	36,060,739.68	31,821,433.64	0.00	0.00	0.00	0.04582	0.045822040		02/15/2031	
11/02/2005	Z20051102A	489,000,000.00	205,579,679.78	314,887,530.42	283,420,320.22	0.00	0.00	0.00	0.04729	0.047292706		02/15/2031	
05/03/2006	Z20060503A	781,000,000.00	283,446,659.59	475,082,581.16	497,553,340.41	0.00	0.00	0.00	5.25500	0.052553267		02/15/2032	
08/03/2006	Z20060803A	519,000,000.00	188,103,338.85	305,415,566.70	330,896,661.15	0.00	0.00	0.00	5.00300	0.050030735		02/15/2033	
08/16/2006	Z20060816A	221,000,000.00	80,388,459.67	130,051,715.30	140,611,540.33	0.00	0.00	0.00	4.98500	0.049850063		02/15/2033	
11/02/2006	Z20061102A	609,000,000.00	223,093,785.56	346,582,241.04	385,906,214.44	0.00	0.00	0.00	0.04717	0.047172495		02/15/2034	
02/05/2007	Z20070205A	584,000,000.00	197,653,708.45	321,259,252.64	386,346,291.55	0.00	0.00	0.00	0.04865	0.048650546		02/15/2035	
02/15/2007	Z20070215A	340,000,000.00	117,530,897.33	187,034,496.40	222,469,102.67	0.00	0.00	0.00	0.04769	0.047690000		02/15/2035	
05/02/2007	Z20070502A	789,000,000.00	256,783,289.63	431,205,069.00	532,216,710.37	0.00	0.00	0.00	0.04826	0.048262460		02/15/2036	
08/02/2007	Z20070802A	581,000,000.00	177,802,837.90	307,241,933.32	403,197,162.10	0.00	0.00	0.00	0.04884	0.048840678		02/15/2037	
05/02/2008	Z20080502A	716,000,000.00	230,860,153.23	378,632,055.52	485,139,846.77	0.00	0.00	0.00	4.66600	0.046662305		02/15/2037	
11/01/2007	Z20071101A	634,000,000.00	201,795,592.83	332,529,297.44	432,204,407.17	0.00	0.00	0.00	4.67200	0.046720654		05/15/2037	
02/04/2008	Z20080204A	765,000,000.00	253,968,667.52	401,238,032.40	511,031,332.48	0.00	0.00	0.00	0.04498	0.044982131		05/15/2037	
02/15/2008	Z20080215A	257,000,000.00	79,975,310.04	134,794,999.12	177,024,689.96	0.00	0.00	0.00	4.76500	0.047652426		05/15/2037	
08/04/2008	Z20080804A	482,000,000.00	150,013,710.73	245,989,360.34	331,986,289.27	0.00	0.00	0.00	0.04623	0.046230518		02/15/2038	
08/19/2008	Z20080819A	242,000,000.00	77,377,357.86	123,505,031.54	164,622,642.14	0.00	0.00	0.00	0.04515	0.045150182		02/15/2038	
11/07/2008	Z20081107A	346,000,000.00	121,979,918.17	175,288,402.48	224,020,081.83	0.00	0.00	0.00	0.04084	0.040840296		05/15/2038	
05/13/2009	Z20090513A	663,000,000.00	222,478,985.57	326,903,049.72	440,521,014.43	0.00	0.00	0.00	0.04157	0.041571812		02/15/2039	
08/03/2009	Z20090803A	562,000,000.00	171,096,687.47	275,117,534.76	390,903,312.53	0.00	0.00	0.00	0.00489	0.044892076		05/15/2039	
08/25/2009	Z20090825A	272,000,000.00	85,074,197.25	133,152,970.56	186,925,802.75	0.00	0.00	0.00	0.00438	0.043862000		05/15/2039	
11/04/2009	Z20091104A	799,000,000.00	239,481,073.60	388,125,100.42	559,518,926.40	0.00	0.00	0.00	0.04506	0.045062099		08/15/2039	
02/01/2010	Z20100201A	533,000,000.00	146,150,381.23	256,289,883.98	386,849,618.77	0.00	0.00	0.00	0.04798	0.047982367		11/15/2039	

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05/03/2010	Z20100503A	844,000,000.00	228,020,413.16	402,901,638.84	615,979,586.84	0.00	0.00	0.00	0.00480	0.048092369		02/15/2040	
08/03/2010	Z20100803A	683,000,000.00	206,734,600.08	322,621,757.06	476,265,399.92	0.00	0.00	0.00	0.04347	0.043471947		05/15/2040	
ZCBs Totals :		42,609,000,000.00	21,089,654,855.53	30,755,074,482.99	21,519,345,144.47	0.00	0.00	0.00					
Grand Totals:		49,473,821,753.51	28,438,909,319.25	30,755,074,482.99	21,540,487,266.56	505,574,832.30	876,900.93	108,563,582.53					

APPENDIX G: INTEREST AND INFLATION RATE REPORT

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U.S. DEPARTMENT OF ENERGY

NUCLEAR WASTE FUND (NWF)

INTEREST AND INFLATION RATE REPORT

FINAL REPORT

Prepared for

U.S. Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585

Prepared by

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955 L'Enfant Plaza North, SW
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January 2013

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TABLE OF CONTENTS

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1. EXECUTIVE SUMMARY

This report details the projections of inflation, short and long-term interest rates, as well as their sources and methodologies used in the fee adequacy model. Interest and inflation rates serve separate purposes to assess the adequacy of the Nuclear Waste Fund (NWF) fee. Interest rates are used to estimate the NWF's future revenues from investments.

To characterize the uncertainty inherent in projecting long-range economic conditions, seven sets of interest and inflation rate projections were assembled. These projections include economic data from:

Table 1: Data Sources	
1. IHS Global Insight (GI) (includes three data sets)	A leading international econometric forecasting firm that provides **Trend, Optimistic,** and **Pessimistic** projections that, together, are intended to bracket 90 percent of the possible paths that the U.S. economy might take over the next 30 years, assuming no external shocks.
2. Ibbotson Associates	An investment consulting firm that provides historical information on inflation and interest rates.
3. Energy Information Administration (EIA)	A Department of Energy organization that provides economic forecasts influenced by energy supply and demand projections. The EIA utilized the National Energy Modeling System (NEMS) for their projections, and included moderate projected economic growth and an extended economic recovery period.
4. Office of Management and Budget (OMB)	An Executive Branch agency that provides limited projections of interest and inflation rates for use in valuing long-term investments in Federal programs. The OMB forecasts are produced by applying their expectations of economic recovery and short term cyclical developments.
5. Market Yield	The Department of Energy's Nuclear Waste Fund investment consultant, Taylor Advisors, Inc., has provided interest and inflation rates based on current market data.

Averages from historical or forecast data are extended to produce complete data sets sufficient for analyses of life cycle costs and revenues. This report provides projections through 2157 for 90-day Treasury Bills (i.e., Treasury Bills), inflation rates, and 30-year Treasury bonds (i.e., Treasury Bonds) interest rates.

Section 2 of this report discusses the specific interest and inflation rates used and elaborates on their applicability to the fee adequacy assessment. Section 3 presents the various data sources and forecasting methodologies. In addition, the appendices include the actual interest and inflation rates by year for each data source.

2. OVERVIEW OF INTEREST AND INFLATION RATES

These economic conditions are reflected in readily obtainable economic data to include interest and inflation rates. Three projections are required to assess fee adequacy: short term nominal interest rates, long-term nominal interest rates, and inflation rates.[69] These measures are described in this section.

2.1 INTEREST RATES

Future interest rate values are essential for estimating future income from investments in Treasury securities in the NWF. Nominal short-term interest rates (i.e., 90-day Treasury bill data), Nominal long-term interest rates (i.e., 30-year Treasury bond data), and long-term (i.e. 30-year) real interest rate data are described below and presented in Appendices A, B and C, respectively.

2.1.1 INTEREST MEASURES

- **Nominal 90-Day Treasury Bill Rate** (Appendix A)

  The 90-day Treasury Bill nominal rate is the annual interest rate earned on money loaned to the U.S. Treasury for three months. Short-term (i.e., 90-day Treasury Bill) rates are used in the Fee Adequacy Assessment to calculate interest accrued on outstanding one-time fees owed by civilian waste owners for nuclear power generated and sold before 1983.

- **Nominal 30-Year Treasury Bond Rate** (Appendix B)

  Long-term nominal interest rates determine the returns on investment. The Treasury Bond rate is the annual interest rate received on money loaned to the U.S. Treasury over longer periods. Currently, the existing NWF portfolio of investments extends out to 2040. The issuance of 30-Year Treasury Bonds allows the NWF to invest in longer-term bonds, thus increasing the average maturity of the investments. The 30-year rates are used in the Fee Adequacy Assessment to calculate the growth of the cash flow and any outstanding debt that may have accrued over the 150 year period. For most data series, the 30-year Treasury Bond rate was used. However, there is an exception for the EIA data, for which the 10-year Treasury note rate has been used as a proxy due to the availability of data.

- **Real Treasury Bond Rates** (Appendix C)

  According to OMB Circular No. A-94, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs," real interest rates are defined as the return that is in excess of inflation.[70] Real interest rates show only the compensation investors receive for the use of the funds. They are used in the Fee Adequacy Assessment to analyze the delta

[69] In addition, real interest rates are derived and applied within the Fee Adequacy Assessment

between the growth rate in investments (per the nominal interest rate) and the growth rate in cost (per the inflation rate).

2.2 INFLATION RATES

Inflation rates measure how fast prices for goods and services rise over time or how much less one unit of currency buys today compared to one unit of currency at a given time in the past. The inflation rate is used to escalate costs over the nuclear waste disposition life cycle. The inflation rate also is used to adjust the final (i.e., end of life cycle) balance in the Nuclear Waste Fund to constant 2012 dollars for comparative purposes.

2.2.1 INFLATION MEASURES

All data sets except for Taylor Advisors use the Consumer Price Index for all Urban Consumers (CPI-U) as a measure of inflation. Taylor Advisors has instead provided the implied inflation expectations derived from market data.

- **Consumer Price Index**

  The CPI-U represents changes in the final cost of a broad array of goods and services used by urban consumers. The CPI-U index uses a fixed basket of goods from a specific base year, meaning that the quantities of goods and services consumed in this basket remain the same from year to year while the prices of goods and services change. The CPI-U index assumes that consumers do not change their purchasing behavior during inflationary periods or when new goods are introduced.

2.3 APPLICATION

Calculations in the Fee Adequacy Assessment are carried out in year-of-expenditure dollars (YOE$). Nominal interest and inflation rates were used to grow the investments and expected disposal-related costs, respectively, to the YOE$ at the end of the nuclear waste disposition life cycle. Then, the fund balance values were discounted for inflation to show values in 2012 dollars (i.e., Constant$ or Current$). Accordingly, it was necessary to grow the numbers to YOE$ by using the compounding inflation and interest rates. These data points were then discounted back to Constant$ by dividing the total fund balance at the end of the life cycle of each cost scenario by the compounded inflation for that year.

[70] Real interest rates are calculated using the **Fisher Equation: Real Interest Rate = [(1+Nominal Interest Rate)/(1+Nominal Inflation Rate)] - 1**

Table 2 below describes the equations that were used in the assessment of the fee.

Table 2: Equations		
Compounding	$FV = PV(1+i)^n$	FV = Future value of cash flow n = Number of years i = Interest or inflation rate *PV*= Current value in YOE$
Year of Expenditure: YOE$	$YOE\$ = x(I_c)$	x = Constant or current dollar amount I_c = Compound inflation rate for that year
Discounting	$PV = \frac{FV}{(1+i)^n}$	FV = future value of cash flow i = Interest or inflation rate n = number of years

Constant$ reflect the cost of the goods and services purchased over the life of activities as though they were purchased using dollars whose value or purchasing power does not change over time. Constant$ are designated by the year in which the costs have been estimated (in this case, 2012).

YOE$ reflect the dollar amount that goods and services are expected to cost in the years that they are purchased. Calculations of YOE$ in future years (i.e., beyond 2012 in this case) are an adjustment of the Constant$ according to an inflation factor. The YOE$ represent the actual dollars that would need to be spent from the NWF or appropriated in the specific year of the life cycle for which the calculations have been made.

Discounting is the process of determining the present value of a payment or a stream of payments that is to be received in the future. Given the time value of money, a dollar is worth more today than it would be worth tomorrow given its capacity to earn interest. Discounting is the method used to figure out how much these future payments are worth today. The model sums up undiscounted cash flow streams first to arrive at a NWF balance in YOE$, and discounts that total value by the inflation rate to show the balance in Constant 2012$.

3. PROJECTIONS AND METHODOLOGY

The data sets in this report are based on data acquired from IHS Global Insight,[71] the EIA,[72] Ibbotson Associates, the Office of Management and Budget,[73] and Taylor Advisors. These sources were selected to characterize the uncertainty inherent in projecting long-range economic conditions (i.e., a sensitivity analysis). Each projection methodology was adapted as appropriate for the source. A brief description of each data source is provided in Table 3 below, followed by a more complete discussion in subsequent sections of this report.

Table 3: Data Sources and Corresponding Projections

Data Source	Economic Scenarios
Global Insight	"Trend," "Optimistic," and "Pessimistic" inflation and interest rate forecasts for 30 years.
Ibbotson Associates	Historical inflation and interest rate data from the past 40 years.
Energy Information Administration	Interest and inflation projections influenced by energy supply and demand forecasts for 24 years.
Office of Management and Budget	Ten-year forecast of inflation rates and 30-day Treasury rates used in the OMB Fiscal Year Budget and a single 30-year interest rate.
Market Yield	Taylor Advisors, Inc., provided a 30 year rate and inflation rate projections until 2041. The 3 month rate that was provided is a single value.

3.1 IHS GLOBAL INSIGHT

IHS Global Insight (GI) is a leading econometric forecasting firm that maintains one of the world's largest repositories of global economic, financial and industry data. Global Insight's models of national economies and industry sectors are widely used for economic forecasting, development planning, and policy simulation. The GI data include interest and inflation rates based on economic forecasts for 30 years from 2012-2042, and the average of those years is used to extend the data for years beyond 2042. GI provides three primary forecasts, including the Trend, Optimistic, and Pessimistic. These are explained in more detail below.

The GI general equilibrium model assumes that the various forces driving the economy exhibit minor variations. Their model assumes that the economy approaches a balanced-growth path during the forecast period with no external shocks which would accelerate or decelerate economic growth. Demographic factors, such as population growth and labor productivity, are primary economic drivers in the GI model. Additional drivers include the government's fiscal

[71] IHS Global Insight Report: The U.S. Economy, The 30-Year Focus, First-Quarter 2012, Waltham, MA, 2012.
[72] U. S. Department of Energy, Energy Information Administration, 2012 Annual Energy Outlook.
[73] Office of Management and Budget, FY 2012 Budget of the United States Government. Analytical Perspectives. Table 27-4 Summary of Economic Assumptions, Washington, D.C., 2012.

and economic policy, energy prices, growth patterns of international trading partners, and demand mix. GI defines its three forecasts (Trend, Optimistic, and Pessimistic) as follows:

- The **Trend projection** is Global Insight's baseline scenario. This scenario assumes that the economy will suffer no major mishaps between now and 2042. The economy grows smoothly, in the sense that actual output follows potential output relatively closely. This projection is best described as depicting the mean of all possible paths that the economy could follow in the absence of major disruptions.[74]

- The **Optimistic projection** is the scenario in which economic growth proceeds more rapidly than the baseline, and there is less inflation. In this projection, population, labor force, and capital stock growth, as well as exogenous technological changes, occur more quickly than in the Trend projection. Potential output climbs more rapidly, and because output is primarily supply-determined in the long-run, real GDP grows 0.3 percentage points more quickly per year.[75]

- The **Pessimistic projection** assumes that economic growth proceeds more slowly than in the baseline forecast and that productivity growth is weaker. In this projection, population, labor force, and capital stock growth, together with exogenous technological changes, occur less rapidly than in the Trend projection. Real GDP climbs 0.4 percentage points more slowly per year.[76]

The terms Optimistic and Pessimistic as used by GI refer to the level of economic growth in general; they do not necessarily describe conditions as they would affect the state of the NWF balance. The three sets of projections from GI range from 2012 through 2042, and the average rates for their respective 30 year periods are used from the last year of projection through 2157. Global Insight's projected average rates are shown in Table 4 below. The 30-year GI real interest rates are calculated using the Fisher equation, with the 30-year nominal interest rate and the inflation rate provided by GI (refer to footnote 2 for Fisher equation).

Table 4: Global Insight Average Forecasted Rates

	Trend	Optimistic	Pessimistic
90-day Treasury Bill	3.32%	3.01%	5.58%
Nominal 30-year Treasury Bond	5.15%	4.56%	7.38%
Real 30-year Interest Rate	3.11%	2.90%	3.73%
Inflation Rate (Core CPI-U)	1.98%	1.61%	3.52%

3.2 U.S. DEPARTMENT OF ENERGY, ENERGY INFORMATION ADMINISTRATION (EIA)

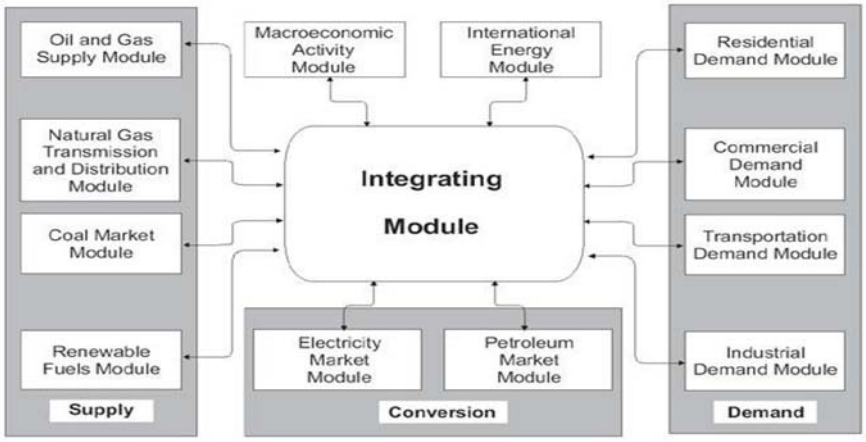
[74] IHS Global Insight Report: The U.S. Economy, The 30-Year Focus, First-Quarter 2012, Waltham, MA, 2012. pg. 2-3.
[75] Ibid.
[76] Ibid.

The Energy Information Administration of the U.S. Department of Energy provides official energy statistics for the U.S. Government. The EIA data have been included in this report because (1) EIA's National Energy Modeling System (NEMS) projects nuclear energy production and, therefore, fee income, which is used in the NWF Fee Adequacy Assessment, and (2) these data provide an additional perspective on interest and inflation rates. In addition, the interest and inflation rates (along with other macroeconomic variables) in NEMS both affect and are affected by conditions in energy markets across multiple sectors (e.g., electricity, oil and gas, et. al.). The projections of these energy statistics are published in the EIA's *Annual Energy Outlook* (AEO) 2012.

The EIA has developed NEMS to represent domestic energy markets by explicitly modeling the economic decision making involved in the production, conversion, and consumption of energy products. Figure 2 below provides an overview of NEMS. Macroeconomic variables are both inputs and outputs in NEMS through the Macroeconomic Activity Module. The Macroeconomic Activity Module links NEMS to the rest of the economy, providing projections of economic driver variables for use by the supply, demand and conversion modules of NEMS. The Macroeconomic Activity Module is used to present alternative macroeconomic growth cases to provide a range of uncertainty about the growth potential of the economy and the likely consequences for the energy sector.

For inputs, NEMS relies partially on GI economic forecasts. NEMS also provides inputs to the Fee Adequacy Assessment in the form of projections of fee income from nuclear utilities that are based on electricity generation forecasts within the model. Further, macroeconomic factors are outputs of this model after being processed and integrated in an energy supply and demand context. The output economic factors – as measured by the Federal Funds rates and nominal 10-year T-Note rates (instead of 30-Year Treasury Bond rates as used in the other data sets) – are presented in this report.

Figure 2 - National Energy Modeling System Overview[77]



NEMS includes three economic projections: the reference, the high, and the low economic cases. Only the reference case is included here. The EIA provides a forecast through 2035, and the average values from this forecast are used to project interest and inflation rates from 2035 through 2157. The EIA reference case averages are included in Table 5 below.

Table 5: EIA Forecasted Average Rates	
90-day Treasury Bill	3.54%
Nominal 10-year T-note (proxy for 30 year Treasury bond)	4.83%
Real 10-year Interest Rate (proxy for 30 year real rate)	2.66%
Inflation Rate (CPI-U)	2.12%

3.3 IBBOTSON ASSOCIATES

Ibbotson Associates provides historical data for stocks, bonds, bills, and inflation in its publication, *Ibbotson SBBI 2012 Valuation Yearbook.*[78] The Ibbotson report is valuable because it incorporates a range of economic conditions including periods of historically high and low rates. The averages of interest and inflation rates for the 40 years from 1971-2011 are used as the projection within the Fee Adequacy Assessment for all years after 2011.

The 30-year bond yield rates were used to calculate fee adequacy. Bond yield is used instead of "total returns" because bond yield refers to the prospect of a bond's performance. The bond yield is expressed annually as a percentage based on the investment's costs or its face value. This income from the coupon payments is taken in the context of a certain time period and then annualized, with the assumption that the interest or dividends will continue to be received at the same rate.

[77] U. S. Department of Energy, Energy Information Administration, The National Energy Modeling System: An Overview.
[78] Ibbotson Associates, Ibbotson SBBI 2012 Valuation Yearbook, Market Results for Stocks, Bonds, Bills, and Inflation, 1926-2011, Chicago, IL, 2012

The averages of interest and inflation rates for the 40 years from 1971-2011 produced a single value for each rate. That value was used as the forecast within the Fee Adequacy Assessment from 2012 through 2157. Table 6 below provides the average of the historical rates.

Table 6: Ibbotson Average Historical Rates	
90-day Treasury Bill	5.44%
Nominal 30-year Treasury Bond	7.22%
Real 30-year Interest Rate	2.73%
Inflation Rate	4.37%

3.4 OFFICE OF MANAGEMENT AND BUDGET

The Office of Management and Budget (OMB) within the Executive Office of the President assists in the preparation of the Federal budget and supervises Executive Branch agencies. In addition to formulating the President's spending plans, OMB evaluates the effectiveness of agency financial management and agency programs, policies and procedures; assesses competing funding demands among agencies; and sets funding priorities. OMB also provides guidance to analyze new Government investments through Circular No. A-94, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs."[79] Annual updates provide the discount rates to be used in evaluating new Federal investments whose benefits and costs are distributed over time.

The OMB data set used in this report contains the recommended 30-year nominal and real interest rates for 2012 from OMB Circular No. A-94, Appendix C. These data were revised in December 2011. OMB's published 30-year discount rates for 2012 and OMB's fiscal year (FY) 2012 Budget provides projections of 90-day Treasury bill rates and inflation rates for 2012-2021. Per recommendation from Circular No. 94 "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Program" the rates of the last available year were used for forecasting beyond that year. The OMB 2012 30-year discount rate was used from 2012 through 2157, and the FY 2021 Budget 90-day Treasury Bill and inflation rates were used from 2021 through 2157. Table 7 below provides the OMB forecasted data.

Table 7: OMB 2012 Rates	
90-day Treasury Bill	4.10%
Nominal 30-year Treasury Bond	3.80%
Real 30-year Interest Rate	1.67%
Inflation Rate	2.10%

3.5 TAYLOR ADVISORS, INC.

[79] Office of Management and Budget, Circular No. A-94, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs". 2012 Discount Rates for OMB Circular No. A-94, Washington, D.C., 2012.

Market yield curves and associated implied inflation rates have also been added to this year's report. Market data reflect current interest rates demanded by investors. Nominal rates incorporate expectations of future inflation rates. Real yields are determined from the Treasury Inflation Protected Security (TIPS) yield curve. The inflation rates for each year through 2041 reflect expected inflation for that year and are calculated by subtracting the real yield curve from the nominal. Interest rates are the returns required by investors for investments between one and 30 years. The 30-year rate (2041) was extended through the end of the life cycle. Market rates provide a reflection on the current economic environment and are not a projection of future 30-year interest rates required by the market (such as GI and EIA rates). When used to discount cash flows from the NWF bond portfolio, market rates will result in an approximation of the current market value of the NWF. Taylor Advisors provided the market data for nominal and real interest rates through 2041 in addition to near term 90-day Treasury Bill rates.

The nominal 30 year interest rate and the inflation rate were provided by Taylor Advisors through 2041. The 90 day or 3 month rate was provided as a single value for the full time period.

Table 8: Market Yield 2012 Rates	
90-day Treasury Bill	0.117%
Nominal 30-year Treasury Bond	3.398%
Real 30-year Interest Rate	0.51%
Inflation Rate	2.871%

3.6 COMPARISON OF DATA SOURCES

A comparison of data sources is included in Table 9 below. As presented in the table, the averages of the data sets 2012 GI Trend, 2012 GI Optimistic, EIA Reference, and the OMB scenarios for the most part project rates lower than the historical 40 year average from Ibbotson. The GI Pessimistic scenario creates the highest real interest rate due to a 30 year bond rate similar to the historical average with a long term average inflation expectation of 3.52%.

The data show that Ibbotson's historical averages and EIA's projection of long term real interest rate of 2.66% provide the lowest of the forecasts. In contrast, GI's Pessimistic projection and Ibbotson's historical average rate of inflation of 3.52% and 4.27%, respectively, provides the highest inflation rate projection. GI's Pessimistic projection of 90-day Treasury Bill and long term nominal interest rate are the highest of the seven projections.

Table 9: Comparison of Data Sources and Averages over Period						
Data Source	**Years Averaged**	**90-Day Treasury Bill**	**Nominal Long Term Interest Rate[1]**	**Real Long Term Interest Rate[1]**	**Inflation**	**Forecast Period and Post Forecast Average**
Global Insight Trend	2012-2042	3.32%	5.15%	3.11%	1.98%	• Fiscal Year Averages for 2012-2042; Average of the Data from 2012-2042 used for years beyond 2042
Global Insight Optimistic	2012-2042	3.01%	4.56%	2.90%	1.61%	
Global Insight Pessimistic	2012-2042	5.58%	7.38%	3.73%	3.52%	
EIA Reference	2012-2035	3.54%	4.83%	2.66%	2.12%	• Fiscal year averages for 2012-2035; Average of the data from 2012-2035 used for years beyond 2035
Ibbotson-Historical Rates	1971-2011	5.44%	7.22%	2.73%	4.37%	• Historical fiscal year average for 1971-2011 data used for years 2012 and beyond.
OMB	2012-2021	4.10%	3.80%	1.67%	2.10%	• 2012-2021 Inflation and 90-day Treasury Bills obtained from OMB FY 2012 Budget; 2021 data used for 2022 and beyond • 2012 30-year nominal rates obtained from OMB Circular A-94; 2012 data used for years 2013 and beyond
Market Yield	2012-2041	0.117%	3.40%	0.51%	2.871%	• 2012-2041 Inflation and 30 year rates obtained from Taylor Advisors. Year 2041 data used for 2042 and beyond. • Constant value provided by Taylor used for 90 day rate for all years.

[1] 10-year T-Note rate data used as a proxy for 30-year Treasury Bond rates for EIA.

APPENDICES

APPENDIX A: 90-DAY TREASURY BILL DATA

The 90-day Treasury Bill data are used in the Fee Adequacy Assessment to calculate interest accruals on outstanding one-time fees owed by civilian waste owners for nuclear power generated and sold before 1983.

Table A-1 highlights data provided from the five (5) sources of data presented in this report as well as the methodology for creating the data sets. Table A-2 presents 90-day Treasury bill data sets created for this report.[80] The blue highlighted data include data obtained from the initial sources; data in black represent averages based upon forecast or historical data provided.

Table A-1: Data and Methodology for Creating the Datasets for 90-Day Treasury Bill Data

Source	Years for Data	Method for Averaging Data and Adjusting to Fiscal Year Terms
Global Insight (includes 3 data sets)	2012-2042	Data from years 2012-2042 were averaged and used as the forecasted rate for years beyond 2042. Then, the data were adjusted to fiscal year terms by adding 25% of previous year's rate to 75% of the current year's rate.
Ibbotson-Historical Market	1971-2011	Data from years 1971-2011 were averaged and used as the forecasted rate for years from 2012 onward. Then, the data were adjusted to fiscal year terms by adding 25% of previous year's rate to 75% of the current year's rate.
EIA	2012-2035	Data from years 2012-2035 were averaged and used as the forecasted rate for years beyond 2035. Then, the data were adjusted to fiscal year terms by adding 25% of previous year's rate to 75% of the current year's rate.
OMB	2012-2021	Data were provided for years 2012-2021, and the 2021 value was used for years 2022 and beyond. Then the data was adjusted to fiscal year terms by adding 25% of previous year's rate to 75% of the current year's rate.
Taylor Advisors	2012	Single data value provided by Taylor Advisors was used for the entirety of the period. Since it was a constant, no adjustment was needed.

[80] Data was provided on a calendar year basis

TABLE A-2: 90-DAY TREASURY BILL DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2012	0.09%	1.00	0.12%	1.00	0.06%	1.00	5.44%	1.00	-0.02%	1.00	0.60%	1.00	0.117%	1.00
2013	0.09%	1.00	0.21%	1.00	0.05%	1.00	5.44%	1.05	-0.01%	1.00	2.20%	1.02	0.117%	1.00
2014	0.24%	1.00	1.68%	1.02	0.23%	1.00	5.44%	1.11	1.30%	1.01	3.60%	1.06	0.117%	1.00
2015	1.81%	1.02	3.53%	1.05	1.98%	1.02	5.44%	1.17	3.17%	1.05	4.00%	1.10	0.117%	1.00
2016	3.50%	1.06	3.61%	1.09	3.99%	1.06	5.44%	1.24	3.76%	1.08	4.10%	1.15	0.117%	1.00
2017	3.74%	1.10	3.25%	1.13	4.48%	1.11	5.44%	1.30	3.79%	1.13	4.10%	1.19	0.117%	1.01
2018	3.74%	1.14	3.25%	1.17	4.91%	1.17	5.44%	1.37	3.78%	1.17	4.10%	1.24	0.117%	1.01
2019	3.74%	1.18	3.24%	1.20	5.22%	1.23	5.44%	1.45	3.80%	1.21	4.10%	1.29	0.117%	1.01
2020	3.74%	1.22	3.24%	1.24	5.47%	1.29	5.44%	1.53	3.83%	1.26	4.10%	1.35	0.117%	1.01
2021	3.74%	1.27	3.24%	1.28	5.77%	1.37	5.44%	1.61	3.73%	1.31	4.10%	1.40	0.117%	1.01
2022	3.74%	1.32	3.23%	1.32	6.07%	1.45	5.44%	1.70	3.77%	1.36	4.10%	1.46	0.117%	1.01
2023	3.74%	1.37	3.23%	1.37	6.25%	1.54	5.44%	1.79	3.91%	1.41	4.10%	1.52	0.117%	1.01
2024	3.74%	1.42	3.23%	1.41	6.48%	1.64	5.44%	1.89	3.99%	1.46	4.10%	1.58	0.117%	1.01
2025	3.74%	1.47	3.23%	1.46	6.48%	1.75	5.44%	1.99	4.04%	1.52	4.10%	1.65	0.117%	1.02
2026	3.74%	1.53	3.23%	1.50	6.59%	1.86	5.44%	2.10	4.11%	1.59	4.10%	1.71	0.117%	1.02
2027	3.74%	1.58	3.23%	1.55	6.71%	1.99	5.44%	2.21	4.22%	1.65	4.10%	1.78	0.117%	1.02
2028	3.74%	1.64	3.24%	1.60	6.71%	2.12	5.44%	2.33	4.30%	1.72	4.10%	1.86	0.117%	1.02
2029	3.74%	1.70	3.24%	1.65	6.71%	2.26	5.44%	2.46	4.32%	1.80	4.10%	1.93	0.117%	1.02
2030	3.74%	1.77	3.24%	1.71	6.71%	2.42	5.44%	2.59	4.28%	1.88	4.10%	2.01	0.117%	1.02
2031	3.74%	1.83	3.24%	1.76	6.71%	2.58	5.44%	2.74	4.34%	1.96	4.10%	2.09	0.117%	1.02
2032	3.74%	1.90	3.24%	1.82	6.70%	2.75	5.44%	2.88	4.35%	2.04	4.10%	2.18	0.117%	1.02
2033	3.74%	1.97	3.24%	1.88	6.70%	2.94	5.44%	3.04	4.05%	2.12	4.10%	2.27	0.117%	1.02
2034	3.74%	2.05	3.24%	1.94	6.70%	3.13	5.44%	3.21	4.08%	2.21	4.10%	2.36	0.117%	1.03
2035	3.74%	2.12	3.24%	2.00	6.76%	3.34	5.44%	3.38	4.08%	2.30	4.10%	2.46	0.117%	1.03
2036	3.74%	2.20	3.23%	2.07	6.94%	3.58	5.44%	3.57	3.54%	2.38	4.10%	2.56	0.117%	1.03
2037	3.74%	2.29	3.23%	2.13	6.94%	3.82	5.44%	3.76	3.54%	2.47	4.10%	2.67	0.117%	1.03

TABLE A-2: 90-DAY TREASURY BILL DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2038	3.74%	2.37	3.24%	2.20	6.94%	4.09	5.44%	3.96	3.54%	2.55	4.10%	2.77	0.117%	1.03
2039	3.74%	2.46	3.24%	2.27	6.94%	4.37	5.44%	4.18	3.54%	2.64	4.10%	2.89	0.117%	1.03
2040	3.74%	2.55	3.24%	2.35	6.93%	4.68	5.44%	4.41	3.54%	2.74	4.10%	3.01	0.117%	1.03
2041	3.74%	2.65	3.24%	2.42	6.93%	5.00	5.44%	4.65	3.54%	2.84	4.10%	3.13	0.117%	1.03
2042	3.74%	2.75	3.24%	2.50	6.93%	5.35	5.44%	4.90	3.54%	2.94	4.10%	3.26	0.117%	1.04
2043	3.32%	2.84	3.01%	2.58	5.58%	5.65	5.44%	5.17	3.54%	3.04	4.10%	3.39	0.117%	1.04
2044	3.32%	2.93	3.01%	2.65	5.58%	5.96	5.44%	5.45	3.54%	3.15	4.10%	3.53	0.117%	1.04
2045	3.32%	3.03	3.01%	2.73	5.58%	6.29	5.44%	5.74	3.54%	3.26	4.10%	3.68	0.117%	1.04
2046	3.32%	3.13	3.01%	2.82	5.58%	6.64	5.44%	6.06	3.54%	3.37	4.10%	3.83	0.117%	1.04
2047	3.32%	3.24	3.01%	2.90	5.58%	7.01	5.44%	6.39	3.54%	3.49	4.10%	3.98	0.117%	1.04
2048	3.32%	3.34	3.01%	2.99	5.58%	7.41	5.44%	6.73	3.54%	3.62	4.10%	4.15	0.117%	1.04
2049	3.32%	3.45	3.01%	3.08	5.58%	7.82	5.44%	7.10	3.54%	3.75	4.10%	4.32	0.117%	1.04
2050	3.32%	3.57	3.01%	3.17	5.58%	8.26	5.44%	7.49	3.54%	3.88	4.10%	4.49	0.117%	1.05
2051	3.32%	3.69	3.01%	3.27	5.58%	8.72	5.44%	7.89	3.54%	4.02	4.10%	4.68	0.117%	1.05
2052	3.32%	3.81	3.01%	3.36	5.58%	9.20	5.44%	8.32	3.54%	4.16	4.10%	4.87	0.117%	1.05
2053	3.32%	3.94	3.01%	3.47	5.58%	9.72	5.44%	8.77	3.54%	4.30	4.10%	5.07	0.117%	1.05
2054	3.32%	4.07	3.01%	3.57	5.58%	10.26	5.44%	9.25	3.54%	4.46	4.10%	5.28	0.117%	1.05
2055	3.32%	4.20	3.01%	3.68	5.58%	10.83	5.44%	9.76	3.54%	4.61	4.10%	5.49	0.117%	1.05
2056	3.32%	4.34	3.01%	3.79	5.58%	11.43	5.44%	10.29	3.54%	4.78	4.10%	5.72	0.117%	1.05
2057	3.32%	4.49	3.01%	3.90	5.58%	12.07	5.44%	10.85	3.54%	4.95	4.10%	5.95	0.117%	1.05
2058	3.32%	4.64	3.01%	4.02	5.58%	12.75	5.44%	11.44	3.54%	5.12	4.10%	6.20	0.117%	1.06
2059	3.32%	4.79	3.01%	4.14	5.58%	13.46	5.44%	12.06	3.54%	5.30	4.10%	6.45	0.117%	1.06
2060	3.32%	4.95	3.01%	4.27	5.58%	14.21	5.44%	12.71	3.54%	5.49	4.10%	6.72	0.117%	1.06
2061	3.32%	5.11	3.01%	4.39	5.58%	15.00	5.44%	13.40	3.54%	5.69	4.10%	6.99	0.117%	1.06
2062	3.32%	5.28	3.01%	4.53	5.58%	15.84	5.44%	14.13	3.54%	5.89	4.10%	7.28	0.117%	1.06
2063	3.32%	5.46	3.01%	4.66	5.58%	16.72	5.44%	14.90	3.54%	6.10	4.10%	7.58	0.117%	1.06

TABLE A-2: 90-DAY TREASURY BILL DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2064	3.32%	5.64	3.01%	4.80	5.58%	17.66	5.44%	15.71	3.54%	6.31	4.10%	7.89	0.117%	1.06
2065	3.32%	5.83	3.01%	4.95	5.58%	18.64	5.44%	16.57	3.54%	6.54	4.10%	8.21	0.117%	1.06
2066	3.32%	6.02	3.01%	5.10	5.58%	19.68	5.44%	17.47	3.54%	6.77	4.10%	8.55	0.117%	1.07
2067	3.32%	6.22	3.01%	5.25	5.58%	20.78	5.44%	18.42	3.54%	7.01	4.10%	8.90	0.117%	1.07
2068	3.32%	6.43	3.01%	5.41	5.58%	21.94	5.44%	19.42	3.54%	7.25	4.10%	9.26	0.117%	1.07
2069	3.32%	6.64	3.01%	5.57	5.58%	23.16	5.44%	20.48	3.54%	7.51	4.10%	9.64	0.117%	1.07
2070	3.32%	6.86	3.01%	5.74	5.58%	24.46	5.44%	21.59	3.54%	7.78	4.10%	10.04	0.117%	1.07
2071	3.32%	7.09	3.01%	5.91	5.58%	25.82	5.44%	22.77	3.54%	8.05	4.10%	10.45	0.117%	1.07
2072	3.32%	7.32	3.01%	6.09	5.58%	27.26	5.44%	24.01	3.54%	8.34	4.10%	10.88	0.117%	1.07
2073	3.32%	7.57	3.01%	6.27	5.58%	28.78	5.44%	25.31	3.54%	8.63	4.10%	11.32	0.117%	1.07
2074	3.32%	7.82	3.01%	6.46	5.58%	30.39	5.44%	26.69	3.54%	8.94	4.10%	11.79	0.117%	1.08
2075	3.32%	8.08	3.01%	6.65	5.58%	32.08	5.44%	28.14	3.54%	9.25	4.10%	12.27	0.117%	1.08
2076	3.32%	8.35	3.01%	6.86	5.58%	33.87	5.44%	29.67	3.54%	9.58	4.10%	12.77	0.117%	1.08
2077	3.32%	8.63	3.01%	7.06	5.58%	35.76	5.44%	31.29	3.54%	9.92	4.10%	13.30	0.117%	1.08
2078	3.32%	8.91	3.01%	7.27	5.58%	37.76	5.44%	32.99	3.54%	10.27	4.10%	13.84	0.117%	1.08
2079	3.32%	9.21	3.01%	7.49	5.58%	39.87	5.44%	34.78	3.54%	10.64	4.10%	14.41	0.117%	1.08
2080	3.32%	9.51	3.01%	7.72	5.58%	42.09	5.44%	36.67	3.54%	11.01	4.10%	15.00	0.117%	1.08
2081	3.32%	9.83	3.01%	7.95	5.58%	44.44	5.44%	38.67	3.54%	11.40	4.10%	15.62	0.117%	1.08
2082	3.32%	10.16	3.01%	8.19	5.58%	46.92	5.44%	40.77	3.54%	11.81	4.10%	16.26	0.117%	1.09
2083	3.32%	10.49	3.01%	8.44	5.58%	49.54	5.44%	42.99	3.54%	12.22	4.10%	16.92	0.117%	1.09
2084	3.32%	10.84	3.01%	8.69	5.58%	52.30	5.44%	45.33	3.54%	12.66	4.10%	17.62	0.117%	1.09
2085	3.32%	11.20	3.01%	8.95	5.58%	55.22	5.44%	47.80	3.54%	13.11	4.10%	18.34	0.117%	1.09
2086	3.32%	11.58	3.01%	9.22	5.58%	58.30	5.44%	50.40	3.54%	13.57	4.10%	19.09	0.117%	1.09
2087	3.32%	11.96	3.01%	9.50	5.58%	61.56	5.44%	53.14	3.54%	14.05	4.10%	19.87	0.117%	1.09
2088	3.32%	12.36	3.01%	9.78	5.58%	64.99	5.44%	56.03	3.54%	14.55	4.10%	20.69	0.117%	1.09
2089	3.32%	12.77	3.01%	10.08	5.58%	68.62	5.44%	59.08	3.54%	15.06	4.10%	21.54	0.117%	1.09

TABLE A-2: 90-DAY TREASURY BILL DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2090	3.32%	13.19	3.01%	10.38	5.58%	72.45	5.44%	62.29	3.54%	15.60	4.10%	22.42	0.117%	1.10
2091	3.32%	13.63	3.01%	10.69	5.58%	76.49	5.44%	65.68	3.54%	16.15	4.10%	23.34	0.117%	1.10
2092	3.32%	14.08	3.01%	11.02	5.58%	80.76	5.44%	69.25	3.54%	16.72	4.10%	24.30	0.117%	1.10
2093	3.32%	14.55	3.01%	11.35	5.58%	85.26	5.44%	73.02	3.54%	17.31	4.10%	25.29	0.117%	1.10
2094	3.32%	15.03	3.01%	11.69	5.58%	90.02	5.44%	76.99	3.54%	17.92	4.10%	26.33	0.117%	1.10
2095	3.32%	15.53	3.01%	12.04	5.58%	95.05	5.44%	81.18	3.54%	18.56	4.10%	27.41	0.117%	1.10
2096	3.32%	16.05	3.01%	12.40	5.58%	100.35	5.44%	85.60	3.54%	19.22	4.10%	28.53	0.117%	1.10
2097	3.32%	16.58	3.01%	12.78	5.58%	105.95	5.44%	90.25	3.54%	19.90	4.10%	29.70	0.117%	1.10
2098	3.32%	17.13	3.01%	13.16	5.58%	111.86	5.44%	95.16	3.54%	20.60	4.10%	30.92	0.117%	1.11
2099	3.32%	17.70	3.01%	13.56	5.58%	118.10	5.44%	100.34	3.54%	21.33	4.10%	32.19	0.117%	1.11
2100	3.32%	18.29	3.01%	13.97	5.58%	124.69	5.44%	105.80	3.54%	22.09	4.10%	33.51	0.117%	1.11
2101	3.32%	18.90	3.01%	14.39	5.58%	131.65	5.44%	111.55	3.54%	22.87	4.10%	34.88	0.117%	1.11
2102	3.32%	19.53	3.01%	14.82	5.58%	139.00	5.44%	117.62	3.54%	23.68	4.10%	36.31	0.117%	1.11
2103	3.32%	20.18	3.01%	15.26	5.58%	146.75	5.44%	124.02	3.54%	24.51	4.10%	37.80	0.117%	1.11
2104	3.32%	20.85	3.01%	15.72	5.58%	154.94	5.44%	130.77	3.54%	25.38	4.10%	39.35	0.117%	1.11
2105	3.32%	21.54	3.01%	16.20	5.58%	163.59	5.44%	137.88	3.54%	26.28	4.10%	40.96	0.117%	1.11
2106	3.32%	22.26	3.01%	16.68	5.58%	172.72	5.44%	145.38	3.54%	27.21	4.10%	42.64	0.117%	1.12
2107	3.32%	23.00	3.01%	17.19	5.58%	182.35	5.44%	153.29	3.54%	28.18	4.10%	44.39	0.117%	1.12
2108	3.32%	23.76	3.01%	17.70	5.58%	192.53	5.44%	161.63	3.54%	29.17	4.10%	46.21	0.117%	1.12
2109	3.32%	24.55	3.01%	18.24	5.58%	203.27	5.44%	170.42	3.54%	30.21	4.10%	48.11	0.117%	1.12
2110	3.32%	25.36	3.01%	18.79	5.58%	214.62	5.44%	179.69	3.54%	31.28	4.10%	50.08	0.117%	1.12
2111	3.32%	26.21	3.01%	19.35	5.58%	226.59	5.44%	189.47	3.54%	32.38	4.10%	52.13	0.117%	1.12
2112	3.32%	27.08	3.01%	19.93	5.58%	239.24	5.44%	199.77	3.54%	33.53	4.10%	54.27	0.117%	1.12
2113	3.32%	27.98	3.01%	20.53	5.58%	252.59	5.44%	210.64	3.54%	34.72	4.10%	56.50	0.117%	1.13
2114	3.32%	28.91	3.01%	21.15	5.58%	266.68	5.44%	222.10	3.54%	35.94	4.10%	58.81	0.117%	1.13
2115	3.32%	29.87	3.01%	21.79	5.58%	281.56	5.44%	234.18	3.54%	37.22	4.10%	61.22	0.117%	1.13

TABLE A-2: 90-DAY TREASURY BILL DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2116	3.32%	30.86	3.01%	22.44	5.58%	297.27	5.44%	246.92	3.54%	38.54	4.10%	63.73	0.117%	1.13
2117	3.32%	31.89	3.01%	23.12	5.58%	313.86	5.44%	260.36	3.54%	39.90	4.10%	66.35	0.117%	1.13
2118	3.32%	32.95	3.01%	23.81	5.58%	331.37	5.44%	274.52	3.54%	41.31	4.10%	69.07	0.117%	1.13
2119	3.32%	34.04	3.01%	24.53	5.58%	349.86	5.44%	289.45	3.54%	42.77	4.10%	71.90	0.117%	1.13
2120	3.32%	35.17	3.01%	25.27	5.58%	369.39	5.44%	305.20	3.54%	44.29	4.10%	74.85	0.117%	1.13
2121	3.32%	36.34	3.01%	26.03	5.58%	390.00	5.44%	321.80	3.54%	45.86	4.10%	77.92	0.117%	1.14
2122	3.32%	37.55	3.01%	26.81	5.58%	411.76	5.44%	339.31	3.54%	47.48	4.10%	81.11	0.117%	1.14
2123	3.32%	38.80	3.01%	27.62	5.58%	434.74	5.44%	357.77	3.54%	49.16	4.10%	84.44	0.117%	1.14
2124	3.32%	40.08	3.01%	28.45	5.58%	459.00	5.44%	377.23	3.54%	50.90	4.10%	87.90	0.117%	1.14
2125	3.32%	41.42	3.01%	29.31	5.58%	484.61	5.44%	397.75	3.54%	52.70	4.10%	91.50	0.117%	1.14
2126	3.32%	42.79	3.01%	30.19	5.58%	511.65	5.44%	419.39	3.54%	54.57	4.10%	95.25	0.117%	1.14
2127	3.32%	44.21	3.01%	31.10	5.58%	540.20	5.44%	442.20	3.54%	56.50	4.10%	99.16	0.117%	1.14
2128	3.32%	45.68	3.01%	32.03	5.58%	570.35	5.44%	466.26	3.54%	58.50	4.10%	103.22	0.117%	1.15
2129	3.32%	47.20	3.01%	33.00	5.58%	602.17	5.44%	491.62	3.54%	60.57	4.10%	107.46	0.117%	1.15
2130	3.32%	48.77	3.01%	33.99	5.58%	635.77	5.44%	518.37	3.54%	62.72	4.10%	111.86	0.117%	1.15
2131	3.32%	50.39	3.01%	35.01	5.58%	671.25	5.44%	546.57	3.54%	64.94	4.10%	116.45	0.117%	1.15
2132	3.32%	52.06	3.01%	36.07	5.58%	708.71	5.44%	576.30	3.54%	67.24	4.10%	121.22	0.117%	1.15
2133	3.32%	53.79	3.01%	37.15	5.58%	748.25	5.44%	607.65	3.54%	69.62	4.10%	126.19	0.117%	1.15
2134	3.32%	55.58	3.01%	38.27	5.58%	790.01	5.44%	640.71	3.54%	72.08	4.10%	131.37	0.117%	1.15
2135	3.32%	57.43	3.01%	39.42	5.58%	834.09	5.44%	675.56	3.54%	74.63	4.10%	136.75	0.117%	1.15
2136	3.32%	59.34	3.01%	40.61	5.58%	880.63	5.44%	712.31	3.54%	77.28	4.10%	142.36	0.117%	1.16
2137	3.32%	61.31	3.01%	41.83	5.58%	929.77	5.44%	751.06	3.54%	80.01	4.10%	148.19	0.117%	1.16
2138	3.32%	63.35	3.01%	43.09	5.58%	981.65	5.44%	791.92	3.54%	82.85	4.10%	154.27	0.117%	1.16
2139	3.32%	65.45	3.01%	44.38	5.58%	1036.43	5.44%	835.00	3.54%	85.78	4.10%	160.60	0.117%	1.16
2140	3.32%	67.62	3.01%	45.72	5.58%	1094.26	5.44%	880.42	3.54%	88.82	4.10%	167.18	0.117%	1.16
2141	3.32%	69.87	3.01%	47.10	5.58%	1155.33	5.44%	928.32	3.54%	91.96	4.10%	174.03	0.117%	1.16

TABLE A-2: 90-DAY TREASURY BILL DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2142	3.32%	72.19	3.01%	48.51	5.58%	1219.79	5.44%	978.82	3.54%	95.22	4.10%	181.17	0.117%	1.16
2143	3.32%	74.59	3.01%	49.97	5.58%	1287.86	5.44%	1032.06	3.54%	98.59	4.10%	188.60	0.117%	1.17
2144	3.32%	77.07	3.01%	51.48	5.58%	1359.72	5.44%	1088.21	3.54%	102.08	4.10%	196.33	0.117%	1.17
2145	3.32%	79.63	3.01%	53.03	5.58%	1435.60	5.44%	1147.41	3.54%	105.69	4.10%	204.38	0.117%	1.17
2146	3.32%	82.28	3.01%	54.62	5.58%	1515.70	5.44%	1209.83	3.54%	109.43	4.10%	212.76	0.117%	1.17
2147	3.32%	85.01	3.01%	56.27	5.58%	1600.28	5.44%	1275.64	3.54%	113.31	4.10%	221.48	0.117%	1.17
2148	3.32%	87.84	3.01%	57.96	5.58%	1689.58	5.44%	1345.04	3.54%	117.32	4.10%	230.56	0.117%	1.17
2149	3.32%	90.75	3.01%	59.70	5.58%	1783.86	5.44%	1418.21	3.54%	121.47	4.10%	240.02	0.117%	1.17
2150	3.32%	93.77	3.01%	61.50	5.58%	1883.40	5.44%	1495.36	3.54%	125.77	4.10%	249.86	0.117%	1.18
2151	3.32%	96.89	3.01%	63.35	5.58%	1988.49	5.44%	1576.70	3.54%	130.23	4.10%	260.10	0.117%	1.18
2152	3.32%	100.10	3.01%	65.26	5.58%	2099.45	5.44%	1662.48	3.54%	134.84	4.10%	270.77	0.117%	1.18
2153	3.32%	103.43	3.01%	67.22	5.58%	2216.61	5.44%	1752.92	3.54%	139.61	4.10%	281.87	0.117%	1.18
2154	3.32%	106.87	3.01%	69.24	5.58%	2340.29	5.44%	1848.27	3.54%	144.55	4.10%	293.42	0.117%	1.18
2155	3.32%	110.42	3.01%	71.33	5.58%	2470.88	5.44%	1948.82	3.54%	149.67	4.10%	305.45	0.117%	1.18
2156	3.32%	114.09	3.01%	73.47	5.58%	2608.76	5.44%	2054.84	3.54%	154.97	4.10%	317.98	0.117%	1.18
2157	3.32%	117.88	3.01%	75.68	5.58%	2754.33	5.44%	2166.62	3.54%	160.46	4.10%	331.01	0.117%	1.18

APPENDIX B: LONG-TERM NOMINAL 30-YEAR TREASURY BOND DATA

The long-term Treasury Bond data approximate annual interest rates received on money loaned to the Treasury for 30 years. The Fee Adequacy Assessment assumes that new investments into the NWF will be invested at the 30-year Treasury Bond rate. These new investments are estimated for the entire nuclear waste disposition life cycle and the 30-year rates are provided until 2157.

Table B-1 highlights data provided from the five (5) sources of data presented in this report, as well as the methodology for creating the datasets, and Table B-2 presents the long-term Treasury Bond data sets. The blue highlighted data include data obtained from the initial sources; data in black represent averages based upon forecast or historical data provided.

Table B-1: Data and Methodology for Creating the Datasets for Long-Term 30-year Nominal Treasury Bond Data

Source	Years for Data	Method for Averaging Data and Adjusting to Fiscal Year Terms
Global Insight (includes 3 data sets)	2012-2042	Data from years 2012-2042 were averaged and used as the forecasted rate for years beyond 2042. Then, the data were adjusted to fiscal year terms by adding 25% of previous year's rate to 75% of the current year's rate.
Ibbotson-Historical Market	1971-2011	Data from years 1971-2011 were averaged and used as the forecasted rate for years from 2012 onward. Then, the data were adjusted to fiscal year terms by adding 25% of previous year's rate to 75% of the current year's rate.
EIA	2012-2035	Data from years 2012-2035 were averaged and used as the forecasted rate for years beyond 2035. Then, the data were adjusted to fiscal year terms by adding 25% of previous year's rate to 75% of the current year's rate.
OMB	2012	OMB provided a forecast of 30-year Treasury Bond data for 2012 in their OMB Circular A-94 Appendix C. The 2012 number was used as the future 30-year Treasury Bond rate for years beyond 2012.
Market Yield	2012-2041	Taylor Advisors provided a forecast of 30 year Treasury Bond rate data from 2012-2041. The 2041 number was used for year 2042 and beyond as per the source's guidance.

TABLE B-2: NOMINAL 30-YEAR TREASURY BOND DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2012	2.85%	1.00	3.03%	1.00	2.93%	1.00	7.22%	1.00	2.28%	1.00	3.80%	1.00	3.307%	1.00
2013	3.22%	1.03	4.35%	1.04	3.95%	1.04	7.22%	1.07	2.76%	1.03	3.80%	1.04	3.412%	1.03
2014	4.05%	1.07	5.29%	1.10	4.99%	1.09	7.22%	1.15	3.63%	1.06	3.80%	1.08	3.509%	1.07
2015	4.58%	1.12	4.98%	1.15	5.91%	1.16	7.22%	1.23	4.67%	1.11	3.80%	1.12	3.599%	1.11
2016	5.27%	1.18	4.75%	1.21	7.00%	1.24	7.22%	1.32	5.01%	1.17	3.80%	1.16	3.672%	1.15
2017	5.38%	1.25	4.74%	1.27	7.33%	1.33	7.22%	1.42	5.02%	1.23	3.80%	1.20	3.733%	1.19
2018	5.38%	1.31	4.71%	1.32	7.52%	1.43	7.22%	1.52	5.02%	1.29	3.80%	1.25	3.773%	1.24
2019	5.38%	1.38	4.69%	1.39	7.53%	1.53	7.22%	1.63	5.05%	1.36	3.80%	1.30	3.798%	1.28
2020	5.38%	1.46	4.69%	1.45	7.59%	1.65	7.22%	1.75	5.10%	1.43	3.80%	1.35	3.812%	1.33
2021	5.38%	1.54	4.69%	1.52	7.74%	1.78	7.22%	1.87	5.02%	1.50	3.80%	1.40	3.811%	1.38
2022	5.38%	1.62	4.67%	1.59	7.77%	1.92	7.22%	2.01	5.00%	1.57	3.80%	1.45	3.795%	1.44
2023	5.38%	1.71	4.65%	1.67	7.79%	2.07	7.22%	2.15	5.04%	1.65	3.80%	1.51	3.822%	1.49
2024	5.38%	1.80	4.63%	1.74	7.81%	2.23	7.22%	2.31	5.05%	1.73	3.80%	1.56	3.845%	1.55
2025	5.38%	1.89	4.61%	1.82	7.82%	2.40	7.22%	2.48	5.06%	1.82	3.80%	1.62	3.863%	1.61
2026	5.38%	2.00	4.59%	1.91	7.84%	2.59	7.22%	2.65	5.10%	1.91	3.80%	1.69	3.876%	1.67
2027	5.38%	2.10	4.58%	1.99	7.85%	2.79	7.22%	2.85	5.18%	2.01	3.80%	1.75	3.885%	1.74
2028	5.38%	2.22	4.57%	2.09	7.87%	3.01	7.22%	3.05	5.24%	2.12	3.80%	1.82	3.889%	1.80
2029	5.38%	2.34	4.56%	2.18	7.88%	3.25	7.22%	3.27	5.28%	2.23	3.80%	1.89	3.888%	1.87
2030	5.38%	2.46	4.55%	2.28	7.89%	3.51	7.22%	3.51	5.26%	2.35	3.80%	1.96	3.882%	1.95
2031	5.38%	2.59	4.55%	2.38	7.90%	3.79	7.22%	3.76	5.36%	2.47	3.80%	2.03	3.870%	2.02
2032	5.38%	2.73	4.54%	2.49	7.92%	4.09	7.22%	4.03	5.40%	2.61	3.80%	2.11	3.853%	2.10
2033	5.38%	2.88	4.53%	2.60	7.92%	4.41	7.22%	4.32	5.10%	2.74	3.80%	2.19	3.830%	2.18
2034	5.38%	3.04	4.52%	2.72	7.94%	4.76	7.22%	4.64	5.14%	2.88	3.80%	2.27	3.800%	2.26
2035	5.38%	3.20	4.50%	2.84	7.95%	5.14	7.22%	4.97	5.18%	3.03	3.80%	2.36	3.765%	2.35
2036	5.38%	3.37	4.49%	2.97	7.96%	5.55	7.22%	5.33	4.83%	3.18	3.80%	2.45	3.723%	2.44
2037	5.38%	3.55	4.48%	3.11	7.97%	5.99	7.22%	5.71	4.83%	3.33	3.80%	2.54	3.674%	2.53

TABLE B-2: NOMINAL 30-YEAR TREASURY BOND DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2038	5.38%	3.74	4.47%	3.24	7.99%	6.47	7.22%	6.13	4.83%	3.49	3.80%	2.64	3.617%	2.62
2039	5.38%	3.94	4.47%	3.39	8.00%	6.98	7.22%	6.57	4.83%	3.66	3.80%	2.74	3.553%	2.71
2040	5.38%	4.16	4.46%	3.54	8.01%	7.54	7.22%	7.04	4.83%	3.84	3.80%	2.84	3.480%	2.80
2041	5.38%	4.38	4.46%	3.70	8.03%	8.15	7.22%	7.55	4.83%	4.02	3.80%	2.95	3.398%	2.90
2042	5.38%	4.62	4.45%	3.86	8.04%	8.80	7.22%	8.10	4.83%	4.22	3.80%	3.06	3.398%	3.00
2043	5.15%	4.85	4.56%	4.04	7.38%	9.45	7.22%	8.68	4.83%	4.42	3.80%	3.18	3.398%	3.10
2044	5.15%	5.10	4.56%	4.22	7.38%	10.15	7.22%	9.31	4.83%	4.63	3.80%	3.30	3.398%	3.21
2045	5.15%	5.37	4.56%	4.42	7.38%	10.90	7.22%	9.98	4.83%	4.86	3.80%	3.42	3.398%	3.31
2046	5.15%	5.64	4.56%	4.62	7.38%	11.70	7.22%	10.70	4.83%	5.09	3.80%	3.55	3.398%	3.43
2047	5.15%	5.93	4.56%	4.83	7.38%	12.57	7.22%	11.47	4.83%	5.34	3.80%	3.69	3.398%	3.54
2048	5.15%	6.24	4.56%	5.05	7.38%	13.49	7.22%	12.30	4.83%	5.60	3.80%	3.83	3.398%	3.66
2049	5.15%	6.56	4.56%	5.28	7.38%	14.49	7.22%	13.19	4.83%	5.87	3.80%	3.97	3.398%	3.79
2050	5.15%	6.90	4.56%	5.52	7.38%	15.56	7.22%	14.14	4.83%	6.15	3.80%	4.13	3.398%	3.92
2051	5.15%	7.26	4.56%	5.77	7.38%	16.70	7.22%	15.16	4.83%	6.45	3.80%	4.28	3.398%	4.05
2052	5.15%	7.63	4.56%	6.03	7.38%	17.94	7.22%	16.26	4.83%	6.76	3.80%	4.45	3.398%	4.19
2053	5.15%	8.02	4.56%	6.31	7.38%	19.26	7.22%	17.43	4.83%	7.09	3.80%	4.61	3.398%	4.33
2054	5.15%	8.44	4.56%	6.59	7.38%	20.68	7.22%	18.69	4.83%	7.43	3.80%	4.79	3.398%	4.48
2055	5.15%	8.87	4.56%	6.89	7.38%	22.20	7.22%	20.04	4.83%	7.79	3.80%	4.97	3.398%	4.63
2056	5.15%	9.33	4.56%	7.21	7.38%	23.84	7.22%	21.48	4.83%	8.16	3.80%	5.16	3.398%	4.79
2057	5.15%	9.81	4.56%	7.54	7.38%	25.60	7.22%	23.04	4.83%	8.56	3.80%	5.36	3.398%	4.95
2058	5.15%	10.31	4.56%	7.88	7.38%	27.49	7.22%	24.70	4.83%	8.97	3.80%	5.56	3.398%	5.12
2059	5.15%	10.85	4.56%	8.24	7.38%	29.52	7.22%	26.48	4.83%	9.40	3.80%	5.77	3.398%	5.29
2060	5.15%	11.41	4.56%	8.62	7.38%	31.69	7.22%	28.39	4.83%	9.86	3.80%	5.99	3.398%	5.47
2061	5.15%	11.99	4.56%	9.01	7.38%	34.03	7.22%	30.44	4.83%	10.34	3.80%	6.22	3.398%	5.66
2062	5.15%	12.61	4.56%	9.42	7.38%	36.54	7.22%	32.64	4.83%	10.83	3.80%	6.45	3.398%	5.85
2063	5.15%	13.26	4.56%	9.85	7.38%	39.24	7.22%	35.00	4.83%	11.36	3.80%	6.70	3.398%	6.05

TABLE B-2: NOMINAL 30-YEAR TREASURY BOND DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2064	5.15%	13.95	4.56%	10.30	7.38%	42.13	7.22%	37.53	4.83%	11.91	3.80%	6.95	3.398%	6.25
2065	5.15%	14.66	4.56%	10.77	7.38%	45.24	7.22%	40.24	4.83%	12.48	3.80%	7.22	3.398%	6.47
2066	5.15%	15.42	4.56%	11.26	7.38%	48.58	7.22%	43.14	4.83%	13.08	3.80%	7.49	3.398%	6.69
2067	5.15%	16.22	4.56%	11.77	7.38%	52.16	7.22%	46.26	4.83%	13.72	3.80%	7.78	3.398%	6.91
2068	5.15%	17.05	4.56%	12.31	7.38%	56.01	7.22%	49.60	4.83%	14.38	3.80%	8.07	3.398%	7.15
2069	5.15%	17.93	4.56%	12.87	7.38%	60.14	7.22%	53.18	4.83%	15.07	3.80%	8.38	3.398%	7.39
2070	5.15%	18.85	4.56%	13.45	7.38%	64.57	7.22%	57.02	4.83%	15.80	3.80%	8.70	3.398%	7.64
2071	5.15%	19.83	4.56%	14.07	7.38%	69.33	7.22%	61.13	4.83%	16.57	3.80%	9.03	3.398%	7.90
2072	5.15%	20.85	4.56%	14.71	7.38%	74.45	7.22%	65.55	4.83%	17.37	3.80%	9.37	3.398%	8.17
2073	5.15%	21.92	4.56%	15.38	7.38%	79.94	7.22%	70.28	4.83%	18.20	3.80%	9.73	3.398%	8.45
2074	5.15%	23.05	4.56%	16.08	7.38%	85.84	7.22%	75.35	4.83%	19.08	3.80%	10.10	3.398%	8.73
2075	5.15%	24.24	4.56%	16.81	7.38%	92.17	7.22%	80.79	4.83%	20.01	3.80%	10.48	3.398%	9.03
2076	5.15%	25.49	4.56%	17.58	7.38%	98.96	7.22%	86.63	4.83%	20.97	3.80%	10.88	3.398%	9.34
2077	5.15%	26.80	4.56%	18.38	7.38%	106.26	7.22%	92.88	4.83%	21.98	3.80%	11.29	3.398%	9.66
2078	5.15%	28.19	4.56%	19.21	7.38%	114.10	7.22%	99.59	4.83%	23.05	3.80%	11.72	3.398%	9.98
2079	5.15%	29.64	4.56%	20.09	7.38%	122.52	7.22%	106.78	4.83%	24.16	3.80%	12.17	3.398%	10.32
2080	5.15%	31.17	4.56%	21.01	7.38%	131.55	7.22%	114.49	4.83%	25.33	3.80%	12.63	3.398%	10.67
2081	5.15%	32.77	4.56%	21.96	7.38%	141.26	7.22%	122.75	4.83%	26.55	3.80%	13.11	3.398%	11.04
2082	5.15%	34.46	4.56%	22.96	7.38%	151.68	7.22%	131.62	4.83%	27.83	3.80%	13.61	3.398%	11.41
2083	5.15%	36.24	4.56%	24.01	7.38%	162.86	7.22%	141.12	4.83%	29.18	3.80%	14.13	3.398%	11.80
2084	5.15%	38.11	4.56%	25.11	7.38%	174.88	7.22%	151.31	4.83%	30.59	3.80%	14.66	3.398%	12.20
2085	5.15%	40.07	4.56%	26.25	7.38%	187.78	7.22%	162.23	4.83%	32.06	3.80%	15.22	3.398%	12.61
2086	5.15%	42.14	4.56%	27.45	7.38%	201.62	7.22%	173.94	4.83%	33.61	3.80%	15.80	3.398%	13.04
2087	5.15%	44.31	4.56%	28.70	7.38%	216.50	7.22%	186.50	4.83%	35.24	3.80%	16.40	3.398%	13.49
2088	5.15%	46.59	4.56%	30.00	7.38%	232.46	7.22%	199.97	4.83%	36.94	3.80%	17.02	3.398%	13.95
2089	5.15%	48.99	4.56%	31.37	7.38%	249.61	7.22%	214.41	4.83%	38.72	3.80%	17.67	3.398%	14.42

TABLE B-2: NOMINAL 30-YEAR TREASURY BOND DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2090	5.15%	51.52	4.56%	32.80	7.38%	268.02	7.22%	229.89	4.83%	40.59	3.80%	18.34	3.398%	14.91
2091	5.15%	54.17	4.56%	34.30	7.38%	287.79	7.22%	246.48	4.83%	42.56	3.80%	19.04	3.398%	15.42
2092	5.15%	56.97	4.56%	35.86	7.38%	309.02	7.22%	264.28	4.83%	44.61	3.80%	19.76	3.398%	15.94
2093	5.15%	59.90	4.56%	37.49	7.38%	331.81	7.22%	283.36	4.83%	46.77	3.80%	20.51	3.398%	16.48
2094	5.15%	62.99	4.56%	39.20	7.38%	356.28	7.22%	303.82	4.83%	49.02	3.80%	21.29	3.398%	17.04
2095	5.15%	66.24	4.56%	40.99	7.38%	382.56	7.22%	325.76	4.83%	51.39	3.80%	22.10	3.398%	17.62
2096	5.15%	69.65	4.56%	42.86	7.38%	410.78	7.22%	349.27	4.83%	53.88	3.80%	22.94	3.398%	18.22
2097	5.15%	73.24	4.56%	44.81	7.38%	441.08	7.22%	374.49	4.83%	56.48	3.80%	23.81	3.398%	18.84
2098	5.15%	77.02	4.56%	46.85	7.38%	473.61	7.22%	401.53	4.83%	59.21	3.80%	24.72	3.398%	19.48
2099	5.15%	80.99	4.56%	48.99	7.38%	508.54	7.22%	430.52	4.83%	62.07	3.80%	25.65	3.398%	20.14
2100	5.15%	85.16	4.56%	51.22	7.38%	546.05	7.22%	461.61	4.83%	65.06	3.80%	26.63	3.398%	20.82
2101	5.15%	89.55	4.56%	53.55	7.38%	586.33	7.22%	494.93	4.83%	68.21	3.80%	27.64	3.398%	21.53
2102	5.15%	94.17	4.56%	55.99	7.38%	629.57	7.22%	530.67	4.83%	71.50	3.80%	28.69	3.398%	22.26
2103	5.15%	99.02	4.56%	58.54	7.38%	676.01	7.22%	568.98	4.83%	74.96	3.80%	29.78	3.398%	23.02
2104	5.15%	104.13	4.56%	61.21	7.38%	725.87	7.22%	610.06	4.83%	78.58	3.80%	30.91	3.398%	23.80
2105	5.15%	109.49	4.56%	64.00	7.38%	779.41	7.22%	654.11	4.83%	82.37	3.80%	32.09	3.398%	24.61
2106	5.15%	115.14	4.56%	66.92	7.38%	836.89	7.22%	701.33	4.83%	86.35	3.80%	33.31	3.398%	25.45
2107	5.15%	121.07	4.56%	69.97	7.38%	898.62	7.22%	751.97	4.83%	90.52	3.80%	34.57	3.398%	26.31
2108	5.15%	127.31	4.56%	73.16	7.38%	964.90	7.22%	806.26	4.83%	94.90	3.80%	35.89	3.398%	27.21
2109	5.15%	133.88	4.56%	76.49	7.38%	1036.07	7.22%	864.48	4.83%	99.48	3.80%	37.25	3.398%	28.13
2110	5.15%	140.78	4.56%	79.98	7.38%	1112.49	7.22%	926.89	4.83%	104.28	3.80%	38.67	3.398%	29.09
2111	5.15%	148.03	4.56%	83.62	7.38%	1194.54	7.22%	993.81	4.83%	109.32	3.80%	40.14	3.398%	30.08
2112	5.15%	155.66	4.56%	87.43	7.38%	1282.65	7.22%	1065.57	4.83%	114.60	3.80%	41.66	3.398%	31.10
2113	5.15%	163.69	4.56%	91.41	7.38%	1377.26	7.22%	1142.50	4.83%	120.14	3.80%	43.24	3.398%	32.16
2114	5.15%	172.12	4.56%	95.58	7.38%	1478.84	7.22%	1224.99	4.83%	125.94	3.80%	44.89	3.398%	33.25
2115	5.15%	181.00	4.56%	99.94	7.38%	1587.92	7.22%	1313.43	4.83%	132.03	3.80%	46.59	3.398%	34.38

TABLE B-2: NOMINAL 30-YEAR TREASURY BOND DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2116	5.15%	190.33	4.56%	104.49	7.38%	1705.04	7.22%	1408.26	4.83%	138.40	3.80%	48.36	3.398%	35.55
2117	5.15%	200.14	4.56%	109.25	7.38%	1830.80	7.22%	1509.94	4.83%	145.09	3.80%	50.20	3.398%	36.75
2118	5.15%	210.45	4.56%	114.23	7.38%	1965.83	7.22%	1618.96	4.83%	152.10	3.80%	52.11	3.398%	38.00
2119	5.15%	221.30	4.56%	119.44	7.38%	2110.83	7.22%	1735.84	4.83%	159.44	3.80%	54.09	3.398%	39.30
2120	5.15%	232.71	4.56%	124.88	7.38%	2266.52	7.22%	1861.17	4.83%	167.15	3.80%	56.15	3.398%	40.63
2121	5.15%	244.70	4.56%	130.57	7.38%	2433.69	7.22%	1995.55	4.83%	175.22	3.80%	58.28	3.398%	42.01
2122	5.15%	257.32	4.56%	136.52	7.38%	2613.20	7.22%	2139.63	4.83%	183.68	3.80%	60.49	3.398%	43.44
2123	5.15%	270.58	4.56%	142.74	7.38%	2805.94	7.22%	2294.11	4.83%	192.56	3.80%	62.79	3.398%	44.92
2124	5.15%	284.53	4.56%	149.25	7.38%	3012.90	7.22%	2459.74	4.83%	201.86	3.80%	65.18	3.398%	46.44
2125	5.15%	299.19	4.56%	156.05	7.38%	3235.12	7.22%	2637.34	4.83%	211.61	3.80%	67.66	3.398%	48.02
2126	5.15%	314.61	4.56%	163.16	7.38%	3473.74	7.22%	2827.75	4.83%	221.83	3.80%	70.23	3.398%	49.65
2127	5.15%	330.83	4.56%	170.59	7.38%	3729.95	7.22%	3031.92	4.83%	232.55	3.80%	72.89	3.398%	51.34
2128	5.15%	347.88	4.56%	178.37	7.38%	4005.07	7.22%	3250.82	4.83%	243.78	3.80%	75.66	3.398%	53.08
2129	5.15%	365.82	4.56%	186.50	7.38%	4300.47	7.22%	3485.53	4.83%	255.56	3.80%	78.54	3.398%	54.89
2130	5.15%	384.67	4.56%	195.00	7.38%	4617.66	7.22%	3737.19	4.83%	267.90	3.80%	81.52	3.398%	56.75
2131	5.15%	404.50	4.56%	203.88	7.38%	4958.25	7.22%	4007.01	4.83%	280.84	3.80%	84.62	3.398%	58.68
2132	5.15%	425.35	4.56%	213.17	7.38%	5323.96	7.22%	4296.32	4.83%	294.41	3.80%	87.84	3.398%	60.68
2133	5.15%	447.28	4.56%	222.89	7.38%	5716.65	7.22%	4606.51	4.83%	308.63	3.80%	91.18	3.398%	62.74
2134	5.15%	470.33	4.56%	233.05	7.38%	6138.29	7.22%	4939.10	4.83%	323.54	3.80%	94.64	3.398%	64.87
2135	5.15%	494.57	4.56%	243.67	7.38%	6591.04	7.22%	5295.70	4.83%	339.17	3.80%	98.24	3.398%	67.07
2136	5.15%	520.07	4.56%	254.77	7.38%	7077.18	7.22%	5678.05	4.83%	355.55	3.80%	101.97	3.398%	69.35
2137	5.15%	546.87	4.56%	266.38	7.38%	7599.18	7.22%	6088.01	4.83%	372.73	3.80%	105.84	3.398%	71.71
2138	5.15%	575.06	4.56%	278.52	7.38%	8159.68	7.22%	6527.56	4.83%	390.73	3.80%	109.87	3.398%	74.15
2139	5.15%	604.71	4.56%	291.21	7.38%	8761.52	7.22%	6998.85	4.83%	409.61	3.80%	114.04	3.398%	76.67
2140	5.15%	635.88	4.56%	304.48	7.38%	9407.75	7.22%	7504.17	4.83%	429.39	3.80%	118.38	3.398%	79.27
2141	5.15%	668.65	4.56%	318.36	7.38%	10101.64	7.22%	8045.97	4.83%	450.13	3.80%	122.87	3.398%	81.97

TABLE B-2: NOMINAL 30-YEAR TREASURY BOND DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2142	5.15%	703.12	4.56%	332.87	7.38%	10846.72	7.22%	8626.89	4.83%	471.88	3.80%	127.54	3.398%	84.75
2143	5.15%	739.36	4.56%	348.03	7.38%	11646.74	7.22%	9249.75	4.83%	494.67	3.80%	132.39	3.398%	87.63
2144	5.15%	777.47	4.56%	363.90	7.38%	12505.78	7.22%	9917.59	4.83%	518.57	3.80%	137.42	3.398%	90.61
2145	5.15%	817.55	4.56%	380.48	7.38%	13428.18	7.22%	10633.64	4.83%	543.62	3.80%	142.64	3.398%	93.69
2146	5.15%	859.69	4.56%	397.82	7.38%	14418.61	7.22%	11401.38	4.83%	569.88	3.80%	148.06	3.398%	96.87
2147	5.15%	904.00	4.56%	415.95	7.38%	15482.10	7.22%	12224.56	4.83%	597.40	3.80%	153.69	3.398%	100.16
2148	5.15%	950.60	4.56%	434.90	7.38%	16624.02	7.22%	13107.18	4.83%	626.26	3.80%	159.53	3.398%	103.57
2149	5.15%	999.60	4.56%	454.72	7.38%	17850.17	7.22%	14053.52	4.83%	656.51	3.80%	165.59	3.398%	107.09
2150	5.15%	1051.12	4.56%	475.44	7.38%	19166.76	7.22%	15068.18	4.83%	688.23	3.80%	171.88	3.398%	110.73
2151	5.15%	1105.30	4.56%	497.11	7.38%	20580.46	7.22%	16156.10	4.83%	721.47	3.80%	178.42	3.398%	114.49
2152	5.15%	1162.28	4.56%	519.76	7.38%	22098.43	7.22%	17322.57	4.83%	756.32	3.80%	185.20	3.398%	118.38
2153	5.15%	1222.19	4.56%	543.45	7.38%	23728.36	7.22%	18573.26	4.83%	792.86	3.80%	192.23	3.398%	122.40
2154	5.15%	1285.18	4.56%	568.21	7.38%	25478.51	7.22%	19914.25	4.83%	831.15	3.80%	199.54	3.398%	126.56
2155	5.15%	1351.43	4.56%	594.11	7.38%	27357.75	7.22%	21352.06	4.83%	871.30	3.80%	207.12	3.398%	130.86
2156	5.15%	1421.09	4.56%	621.18	7.38%	29375.60	7.22%	22893.68	4.83%	913.39	3.80%	214.99	3.398%	135.31
2157	5.15%	1494.34	4.56%	649.49	7.38%	31542.28	7.22%	24546.60	4.83%	957.51	3.80%	223.16	3.398%	139.91

APPENDIX C: LONG-TERM REAL INTEREST RATE DATA

Table C-1 highlights the methodology for calculating the real interest rate data for the five (5) sources of data presented in this report, and Table C-2 presents the long-term real interest data sets. The blue highlighted data present data obtained from the initial sources, whereas data in black include calculations based upon forecast or historical data provided.

Table C-1: Methodology for Calculating Real Interest Rate Data

Source	Years for Data	Method for Calculating Real Interest Rate Data
Global Insight (includes 3 data sets)	2012-2042	The 30-year rate is calculated by applying the Fisher equation (see footnote below) to the nominal inflation and nominal interest rate.[81]
Ibbotson-Historical Market	1971-2011	
EIA	2012-2035	
OMB	2012-2021	
Market Yield	2012-2041	

[81] Real interest rates are calculated by the following equation: Real Interest Rate = [(1+Nominal Inflation)/(1+Nominal Interest Rate)] - 1

TABLE C-2: 30-YEAR REAL INTEREST RATE DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2012	0.88%	1.00	1.50%	1.00	0.91%	1.00	2.73%	1.00	0.77%	1.00	2.06%	1.00	0.47%	1.00
2013	1.61%	1.02	3.18%	1.03	2.02%	1.02	2.73%	1.03	1.42%	1.01	1.86%	1.02	0.50%	1.00
2014	2.11%	1.04	3.57%	1.07	2.62%	1.05	2.73%	1.06	1.37%	1.03	1.76%	1.04	0.57%	1.01
2015	2.79%	1.07	3.47%	1.11	3.38%	1.08	2.73%	1.08	2.40%	1.05	1.76%	1.05	0.64%	1.02
2016	3.19%	1.10	3.02%	1.14	3.85%	1.12	2.73%	1.11	2.96%	1.08	1.76%	1.07	0.71%	1.02
2017	3.40%	1.14	3.05%	1.17	4.08%	1.17	2.73%	1.14	2.96%	1.12	1.67%	1.09	0.78%	1.03
2018	3.29%	1.18	2.90%	1.21	3.96%	1.22	2.73%	1.18	2.88%	1.15	1.67%	1.11	0.82%	1.04
2019	3.34%	1.21	2.98%	1.24	3.92%	1.26	2.73%	1.21	2.95%	1.18	1.67%	1.13	0.86%	1.05
2020	3.37%	1.26	2.99%	1.28	3.92%	1.31	2.73%	1.24	3.02%	1.22	1.67%	1.15	0.88%	1.06
2021	3.34%	1.30	3.17%	1.32	3.93%	1.36	2.73%	1.27	3.00%	1.25	1.67%	1.17	0.88%	1.07
2022	3.33%	1.34	3.20%	1.36	3.82%	1.42	2.73%	1.31	3.00%	1.29	1.67%	1.19	0.87%	1.08
2023	3.34%	1.39	3.01%	1.41	3.87%	1.47	2.73%	1.35	2.98%	1.33	1.67%	1.21	0.88%	1.09
2024	3.39%	1.43	3.08%	1.45	4.00%	1.53	2.73%	1.38	2.99%	1.37	1.67%	1.23	0.89%	1.10
2025	3.39%	1.48	3.05%	1.49	3.98%	1.59	2.73%	1.42	2.93%	1.41	1.67%	1.25	0.89%	1.11
2026	3.39%	1.53	3.02%	1.54	3.95%	1.65	2.73%	1.46	2.87%	1.45	1.67%	1.27	0.89%	1.12
2027	3.37%	1.58	2.97%	1.58	3.95%	1.72	2.73%	1.50	2.87%	1.49	1.67%	1.29	0.88%	1.13
2028	3.37%	1.64	3.00%	1.63	3.92%	1.79	2.73%	1.54	2.87%	1.54	1.67%	1.31	0.87%	1.14
2029	3.34%	1.69	2.95%	1.68	3.95%	1.86	2.73%	1.58	2.83%	1.58	1.67%	1.33	0.85%	1.15
2030	3.32%	1.75	2.92%	1.73	3.99%	1.93	2.73%	1.62	2.82%	1.62	1.67%	1.35	0.83%	1.16
2031	3.28%	1.80	2.85%	1.78	4.02%	2.01	2.73%	1.67	2.61%	1.67	1.67%	1.38	0.80%	1.16
2032	3.31%	1.86	2.88%	1.83	4.00%	2.09	2.73%	1.71	2.69%	1.71	1.67%	1.40	0.77%	1.17
2033	3.31%	1.93	2.87%	1.88	3.98%	2.17	2.73%	1.76	3.22%	1.77	1.67%	1.42	0.75%	1.18
2034	3.27%	1.99	2.82%	1.93	3.90%	2.26	2.73%	1.81	2.67%	1.81	1.67%	1.45	0.73%	1.19
2035	3.27%	2.05	2.80%	1.99	3.88%	2.35	2.73%	1.86	2.70%	1.86	1.67%	1.47	0.71%	1.20
2036	3.25%	2.12	2.76%	2.04	3.87%	2.44	2.73%	1.91	2.66%	1.91	1.67%	1.49	0.69%	1.21
2037	3.23%	2.19	2.72%	2.10	3.91%	2.53	2.73%	1.96	2.66%	1.96	1.67%	1.52	0.66%	1.22

TABLE C-2: 30-YEAR REAL INTEREST RATE DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2038	3.21%	2.26	2.70%	2.16	3.94%	2.63	2.73%	2.02	2.66%	2.01	1.67%	1.54	0.63%	1.22
2039	3.20%	2.33	2.68%	2.21	3.97%	2.74	2.73%	2.07	2.66%	2.07	1.67%	1.57	0.59%	1.23
2040	3.20%	2.41	2.65%	2.27	4.00%	2.85	2.73%	2.13	2.66%	2.12	1.67%	1.60	0.55%	1.24
2041	3.19%	2.48	2.63%	2.33	4.00%	2.96	2.73%	2.19	2.66%	2.18	1.67%	1.62	0.51%	1.24
2042	3.18%	2.56	2.62%	2.39	4.05%	3.08	2.73%	2.24	2.66%	2.24	1.67%	1.65	0.51%	1.25
2043	3.11%	2.64	2.90%	2.46	3.73%	3.19	2.73%	2.31	2.66%	2.30	1.67%	1.68	0.51%	1.26
2044	3.11%	2.72	2.90%	2.53	3.73%	3.31	2.73%	2.37	2.66%	2.36	1.67%	1.70	0.51%	1.26
2045	3.11%	2.81	2.90%	2.61	3.73%	3.44	2.73%	2.43	2.66%	2.42	1.67%	1.73	0.51%	1.27
2046	3.11%	2.90	2.90%	2.68	3.73%	3.56	2.73%	2.50	2.66%	2.48	1.67%	1.76	0.51%	1.28
2047	3.11%	2.99	2.90%	2.76	3.73%	3.70	2.73%	2.57	2.66%	2.55	1.67%	1.79	0.51%	1.28
2048	3.11%	3.08	2.90%	2.84	3.73%	3.84	2.73%	2.64	2.66%	2.62	1.67%	1.82	0.51%	1.29
2049	3.11%	3.17	2.90%	2.92	3.73%	3.98	2.73%	2.71	2.66%	2.69	1.67%	1.85	0.51%	1.30
2050	3.11%	3.27	2.90%	3.01	3.73%	4.13	2.73%	2.79	2.66%	2.76	1.67%	1.88	0.51%	1.30
2051	3.11%	3.37	2.90%	3.10	3.73%	4.28	2.73%	2.86	2.66%	2.83	1.67%	1.91	0.51%	1.31
2052	3.11%	3.48	2.90%	3.19	3.73%	4.44	2.73%	2.94	2.66%	2.91	1.67%	1.95	0.51%	1.32
2053	3.11%	3.59	2.90%	3.28	3.73%	4.61	2.73%	3.02	2.66%	2.98	1.67%	1.98	0.51%	1.32
2054	3.11%	3.70	2.90%	3.37	3.73%	4.78	2.73%	3.10	2.66%	3.06	1.67%	2.01	0.51%	1.33
2055	3.11%	3.81	2.90%	3.47	3.73%	4.96	2.73%	3.19	2.66%	3.15	1.67%	2.04	0.51%	1.34
2056	3.11%	3.93	2.90%	3.57	3.73%	5.14	2.73%	3.27	2.66%	3.23	1.67%	2.08	0.51%	1.34
2057	3.11%	4.06	2.90%	3.68	3.73%	5.33	2.73%	3.36	2.66%	3.31	1.67%	2.11	0.51%	1.35
2058	3.11%	4.18	2.90%	3.78	3.73%	5.53	2.73%	3.46	2.66%	3.40	1.67%	2.15	0.51%	1.36
2059	3.11%	4.31	2.90%	3.89	3.73%	5.74	2.73%	3.55	2.66%	3.49	1.67%	2.18	0.51%	1.36
2060	3.11%	4.45	2.90%	4.01	3.73%	5.95	2.73%	3.65	2.66%	3.59	1.67%	2.22	0.51%	1.37
2061	3.11%	4.58	2.90%	4.12	3.73%	6.17	2.73%	3.75	2.66%	3.68	1.67%	2.26	0.51%	1.38
2062	3.11%	4.73	2.90%	4.24	3.73%	6.40	2.73%	3.85	2.66%	3.78	1.67%	2.29	0.51%	1.38
2063	3.11%	4.87	2.90%	4.36	3.73%	6.64	2.73%	3.95	2.66%	3.88	1.67%	2.33	0.51%	1.39

TABLE C-2: 30-YEAR REAL INTEREST RATE DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2064	3.11%	5.03	2.90%	4.49	3.73%	6.89	2.73%	4.06	2.66%	3.98	1.67%	2.37	0.51%	1.40
2065	3.11%	5.18	2.90%	4.62	3.73%	7.15	2.73%	4.17	2.66%	4.09	1.67%	2.41	0.51%	1.41
2066	3.11%	5.34	2.90%	4.76	3.73%	7.41	2.73%	4.29	2.66%	4.20	1.67%	2.45	0.51%	1.41
2067	3.11%	5.51	2.90%	4.89	3.73%	7.69	2.73%	4.40	2.66%	4.31	1.67%	2.49	0.51%	1.42
2068	3.11%	5.68	2.90%	5.04	3.73%	7.98	2.73%	4.52	2.66%	4.42	1.67%	2.53	0.51%	1.43
2069	3.11%	5.86	2.90%	5.18	3.73%	8.27	2.73%	4.65	2.66%	4.54	1.67%	2.58	0.51%	1.44
2070	3.11%	6.04	2.90%	5.33	3.73%	8.58	2.73%	4.78	2.66%	4.66	1.67%	2.62	0.51%	1.44
2071	3.11%	6.23	2.90%	5.49	3.73%	8.90	2.73%	4.91	2.66%	4.79	1.67%	2.66	0.51%	1.45
2072	3.11%	6.42	2.90%	5.65	3.73%	9.23	2.73%	5.04	2.66%	4.91	1.67%	2.71	0.51%	1.46
2073	3.11%	6.62	2.90%	5.81	3.73%	9.58	2.73%	5.18	2.66%	5.04	1.67%	2.75	0.51%	1.46
2074	3.11%	6.83	2.90%	5.98	3.73%	9.94	2.73%	5.32	2.66%	5.18	1.67%	2.80	0.51%	1.47
2075	3.11%	7.04	2.90%	6.15	3.73%	10.31	2.73%	5.46	2.66%	5.32	1.67%	2.84	0.51%	1.48
2076	3.11%	7.26	2.90%	6.33	3.73%	10.69	2.73%	5.61	2.66%	5.46	1.67%	2.89	0.51%	1.49
2077	3.11%	7.49	2.90%	6.52	3.73%	11.09	2.73%	5.77	2.66%	5.60	1.67%	2.94	0.51%	1.50
2078	3.11%	7.72	2.90%	6.71	3.73%	11.50	2.73%	5.92	2.66%	5.75	1.67%	2.99	0.51%	1.50
2079	3.11%	7.96	2.90%	6.90	3.73%	11.93	2.73%	6.09	2.66%	5.90	1.67%	3.04	0.51%	1.51
2080	3.11%	8.21	2.90%	7.10	3.73%	12.38	2.73%	6.25	2.66%	6.06	1.67%	3.09	0.51%	1.52
2081	3.11%	8.46	2.90%	7.31	3.73%	12.84	2.73%	6.42	2.66%	6.22	1.67%	3.14	0.51%	1.53
2082	3.11%	8.72	2.90%	7.52	3.73%	13.32	2.73%	6.60	2.66%	6.39	1.67%	3.19	0.51%	1.53
2083	3.11%	9.00	2.90%	7.74	3.73%	13.82	2.73%	6.78	2.66%	6.56	1.67%	3.25	0.51%	1.54
2084	3.11%	9.28	2.90%	7.96	3.73%	14.33	2.73%	6.96	2.66%	6.73	1.67%	3.30	0.51%	1.55
2085	3.11%	9.56	2.90%	8.19	3.73%	14.87	2.73%	7.16	2.66%	6.91	1.67%	3.35	0.51%	1.56
2086	3.11%	9.86	2.90%	8.43	3.73%	15.42	2.73%	7.35	2.66%	7.09	1.67%	3.41	0.51%	1.57
2087	3.11%	10.17	2.90%	8.68	3.73%	15.99	2.73%	7.55	2.66%	7.28	1.67%	3.47	0.51%	1.57
2088	3.11%	10.49	2.90%	8.93	3.73%	16.59	2.73%	7.76	2.66%	7.48	1.67%	3.53	0.51%	1.58
2089	3.11%	10.81	2.90%	9.19	3.73%	17.21	2.73%	7.97	2.66%	7.67	1.67%	3.58	0.51%	1.59

TABLE C-2: 30-YEAR REAL INTEREST RATE DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2090	3.11%	11.15	2.90%	9.45	3.73%	17.85	2.73%	8.19	2.66%	7.88	1.67%	3.64	0.51%	1.60
2091	3.11%	11.50	2.90%	9.73	3.73%	18.52	2.73%	8.41	2.66%	8.09	1.67%	3.70	0.51%	1.61
2092	3.11%	11.85	2.90%	10.01	3.73%	19.21	2.73%	8.64	2.66%	8.30	1.67%	3.77	0.51%	1.61
2093	3.11%	12.22	2.90%	10.30	3.73%	19.92	2.73%	8.88	2.66%	8.52	1.67%	3.83	0.51%	1.62
2094	3.11%	12.60	2.90%	10.60	3.73%	20.67	2.73%	9.12	2.66%	8.75	1.67%	3.89	0.51%	1.63
2095	3.11%	12.99	2.90%	10.91	3.73%	21.44	2.73%	9.37	2.66%	8.98	1.67%	3.96	0.51%	1.64
2096	3.11%	13.40	2.90%	11.22	3.73%	22.24	2.73%	9.62	2.66%	9.22	1.67%	4.02	0.51%	1.65
2097	3.11%	13.82	2.90%	11.55	3.73%	23.07	2.73%	9.89	2.66%	9.47	1.67%	4.09	0.51%	1.66
2098	3.11%	14.25	2.90%	11.89	3.73%	23.93	2.73%	10.16	2.66%	9.72	1.67%	4.16	0.51%	1.66
2099	3.11%	14.69	2.90%	12.23	3.73%	24.82	2.73%	10.44	2.66%	9.98	1.67%	4.23	0.51%	1.67
2100	3.11%	15.15	2.90%	12.59	3.73%	25.75	2.73%	10.72	2.66%	10.24	1.67%	4.30	0.51%	1.68
2101	3.11%	15.62	2.90%	12.95	3.73%	26.71	2.73%	11.01	2.66%	10.51	1.67%	4.37	0.51%	1.69
2102	3.11%	16.10	2.90%	13.33	3.73%	27.70	2.73%	11.31	2.66%	10.79	1.67%	4.44	0.51%	1.70
2103	3.11%	16.60	2.90%	13.72	3.73%	28.74	2.73%	11.62	2.66%	11.08	1.67%	4.52	0.51%	1.71
2104	3.11%	17.12	2.90%	14.11	3.73%	29.81	2.73%	11.94	2.66%	11.37	1.67%	4.59	0.51%	1.72
2105	3.11%	17.65	2.90%	14.52	3.73%	30.92	2.73%	12.27	2.66%	11.68	1.67%	4.67	0.51%	1.73
2106	3.11%	18.20	2.90%	14.94	3.73%	32.07	2.73%	12.60	2.66%	11.99	1.67%	4.75	0.51%	1.73
2107	3.11%	18.77	2.90%	15.38	3.73%	33.27	2.73%	12.95	2.66%	12.31	1.67%	4.82	0.51%	1.74
2108	3.11%	19.35	2.90%	15.83	3.73%	34.51	2.73%	13.30	2.66%	12.63	1.67%	4.90	0.51%	1.75
2109	3.11%	19.95	2.90%	16.29	3.73%	35.80	2.73%	13.66	2.66%	12.97	1.67%	4.99	0.51%	1.76
2110	3.11%	20.58	2.90%	16.76	3.73%	37.13	2.73%	14.04	2.66%	13.31	1.67%	5.07	0.51%	1.77
2111	3.11%	21.22	2.90%	17.24	3.73%	38.52	2.73%	14.42	2.66%	13.67	1.67%	5.15	0.51%	1.78
2112	3.11%	21.88	2.90%	17.75	3.73%	39.95	2.73%	14.82	2.66%	14.03	1.67%	5.24	0.51%	1.79
2113	3.11%	22.56	2.90%	18.26	3.73%	41.44	2.73%	15.22	2.66%	14.40	1.67%	5.33	0.51%	1.80
2114	3.11%	23.26	2.90%	18.79	3.73%	42.99	2.73%	15.64	2.66%	14.79	1.67%	5.42	0.51%	1.81
2115	3.11%	23.98	2.90%	19.34	3.73%	44.59	2.73%	16.06	2.66%	15.18	1.67%	5.51	0.51%	1.82

TABLE C-2: 30-YEAR REAL INTEREST RATE DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2116	3.11%	24.73	2.90%	19.90	3.73%	46.25	2.73%	16.50	2.66%	15.58	1.67%	5.60	0.51%	1.83
2117	3.11%	25.50	2.90%	20.48	3.73%	47.98	2.73%	16.95	2.66%	16.00	1.67%	5.69	0.51%	1.83
2118	3.11%	26.29	2.90%	21.07	3.73%	49.77	2.73%	17.42	2.66%	16.42	1.67%	5.79	0.51%	1.84
2119	3.11%	27.11	2.90%	21.68	3.73%	51.62	2.73%	17.89	2.66%	16.86	1.67%	5.88	0.51%	1.85
2120	3.11%	27.95	2.90%	22.31	3.73%	53.55	2.73%	18.38	2.66%	17.31	1.67%	5.98	0.51%	1.86
2121	3.11%	28.82	2.90%	22.96	3.73%	55.55	2.73%	18.88	2.66%	17.77	1.67%	6.08	0.51%	1.87
2122	3.11%	29.72	2.90%	23.63	3.73%	57.62	2.73%	19.40	2.66%	18.24	1.67%	6.18	0.51%	1.88
2123	3.11%	30.64	2.90%	24.31	3.73%	59.77	2.73%	19.93	2.66%	18.72	1.67%	6.28	0.51%	1.89
2124	3.11%	31.60	2.90%	25.02	3.73%	62.00	2.73%	20.47	2.66%	19.22	1.67%	6.39	0.51%	1.90
2125	3.11%	32.58	2.90%	25.75	3.73%	64.31	2.73%	21.03	2.66%	19.73	1.67%	6.49	0.51%	1.91
2126	3.11%	33.59	2.90%	26.49	3.73%	66.71	2.73%	21.61	2.66%	20.26	1.67%	6.60	0.51%	1.92
2127	3.11%	34.64	2.90%	27.26	3.73%	69.20	2.73%	22.20	2.66%	20.80	1.67%	6.71	0.51%	1.93
2128	3.11%	35.72	2.90%	28.05	3.73%	71.78	2.73%	22.80	2.66%	21.35	1.67%	6.82	0.51%	1.94
2129	3.11%	36.83	2.90%	28.87	3.73%	74.45	2.73%	23.43	2.66%	21.92	1.67%	6.94	0.51%	1.95
2130	3.11%	37.97	2.90%	29.71	3.73%	77.23	2.73%	24.07	2.66%	22.50	1.67%	7.05	0.51%	1.96
2131	3.11%	39.16	2.90%	30.57	3.73%	80.11	2.73%	24.73	2.66%	23.10	1.67%	7.17	0.51%	1.97
2132	3.11%	40.37	2.90%	31.46	3.73%	83.10	2.73%	25.40	2.66%	23.71	1.67%	7.29	0.51%	1.98
2133	3.11%	41.63	2.90%	32.37	3.73%	86.20	2.73%	26.10	2.66%	24.34	1.67%	7.41	0.51%	1.99
2134	3.11%	42.93	2.90%	33.31	3.73%	89.41	2.73%	26.81	2.66%	24.99	1.67%	7.53	0.51%	2.00
2135	3.11%	44.26	2.90%	34.28	3.73%	92.75	2.73%	27.54	2.66%	25.65	1.67%	7.66	0.51%	2.01
2136	3.11%	45.64	2.90%	35.27	3.73%	96.21	2.73%	28.29	2.66%	26.33	1.67%	7.79	0.51%	2.02
2137	3.11%	47.06	2.90%	36.30	3.73%	99.79	2.73%	29.07	2.66%	27.03	1.67%	7.92	0.51%	2.03
2138	3.11%	48.52	2.90%	37.35	3.73%	103.52	2.73%	29.86	2.66%	27.75	1.67%	8.05	0.51%	2.04
2139	3.11%	50.03	2.90%	38.44	3.73%	107.38	2.73%	30.68	2.66%	28.49	1.67%	8.18	0.51%	2.05
2140	3.11%	51.59	2.90%	39.55	3.73%	111.38	2.73%	31.51	2.66%	29.25	1.67%	8.32	0.51%	2.06
2141	3.11%	53.19	2.90%	40.70	3.73%	115.54	2.73%	32.38	2.66%	30.02	1.67%	8.46	0.51%	2.07

TABLE C-2: 30-YEAR REAL INTEREST RATE DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2142	3.11%	54.85	2.90%	41.88	3.73%	119.84	2.73%	33.26	2.66%	30.82	1.67%	8.60	0.51%	2.08
2143	3.11%	56.56	2.90%	43.10	3.73%	124.31	2.73%	34.17	2.66%	31.64	1.67%	8.74	0.51%	2.10
2144	3.11%	58.32	2.90%	44.35	3.73%	128.95	2.73%	35.10	2.66%	32.48	1.67%	8.89	0.51%	2.11
2145	3.11%	60.13	2.90%	45.64	3.73%	133.76	2.73%	36.06	2.66%	33.34	1.67%	9.04	0.51%	2.12
2146	3.11%	62.00	2.90%	46.96	3.73%	138.75	2.73%	37.05	2.66%	34.23	1.67%	9.19	0.51%	2.13
2147	3.11%	63.93	2.90%	48.33	3.73%	143.92	2.73%	38.06	2.66%	35.14	1.67%	9.34	0.51%	2.14
2148	3.11%	65.92	2.90%	49.73	3.73%	149.29	2.73%	39.10	2.66%	36.07	1.67%	9.49	0.51%	2.15
2149	3.11%	67.97	2.90%	51.18	3.73%	154.86	2.73%	40.17	2.66%	37.03	1.67%	9.65	0.51%	2.16
2150	3.11%	70.08	2.90%	52.66	3.73%	160.63	2.73%	41.26	2.66%	38.02	1.67%	9.81	0.51%	2.17
2151	3.11%	72.27	2.90%	54.19	3.73%	166.63	2.73%	42.39	2.66%	39.03	1.67%	9.98	0.51%	2.18
2152	3.11%	74.51	2.90%	55.77	3.73%	172.84	2.73%	43.55	2.66%	40.07	1.67%	10.14	0.51%	2.19
2153	3.11%	76.83	2.90%	57.38	3.73%	179.29	2.73%	44.74	2.66%	41.13	1.67%	10.31	0.51%	2.21
2154	3.11%	79.22	2.90%	59.05	3.73%	185.97	2.73%	45.96	2.66%	42.22	1.67%	10.48	0.51%	2.22
2155	3.11%	81.69	2.90%	60.77	3.73%	192.91	2.73%	47.22	2.66%	43.35	1.67%	10.66	0.51%	2.23
2156	3.11%	84.23	2.90%	62.53	3.73%	200.10	2.73%	48.51	2.66%	44.50	1.67%	10.84	0.51%	2.24
2157	3.11%	86.85	2.90%	64.35	3.73%	207.57	2.73%	49.83	2.66%	45.68	1.67%	11.02	0.51%	2.25

APPENDIX D: INFLATION

The inflation rate data are used to inflate the one-time fee and scenario cost values and then deflating Year of Expenditure fund balance values to 2012 dollars and investment income in the Fee Adequacy Assessment.

Table D-1 highlights data provided from the five (5) sources of data presented in this report and the methodology for creating the data sets. Table D-2 presents inflation rate data sets created for this report. The blue highlighted data represent data obtained from the initial sources; data in black include projections based upon data provided.

Table D-1: Data and Methodology for Creating the Datasets for Inflation Rates

Source	Years for Data	Method for Averaging Data and Adjusting to Fiscal Year Terms
Global Insight (includes 3 data sets)	2012-2042	Data from years 2012-2042 were averaged and used as the forecasted rate for years beyond 2042. Then the data were adjusted to fiscal year terms by adding 25% of previous year's rate to 75% of the current year's rate.
Ibbotson-Historical Market	1971-2011	Data from years 1971-2011 were averaged and used as the forecasted rate for years from 2012 onward. Then the data were adjusted to fiscal year terms by adding 25% of previous year's rate to 75% of the current year's rate.
EIA	2012-2035	Data from years 2012-2035 were averaged and used as the forecasted rate for years beyond 2035. Then the data were adjusted to fiscal year terms by adding 25% of previous year's rate to 75% of the current year's rate.
OMB	2012-2021	Data were provided for years 2012-2021, and the 2021 value was used for years 2022 and beyond. Then, the data were adjusted to fiscal year terms by adding 25% of previous year's rate to 75% of the current year's rate.
Market Yield	2012-2041	Taylor Advisors provided a forecast of Inflation rate data from 2012-2041. The 2041 number was used for year 2042 and beyond as per the source's guidance.

TABLE D-2: INFLATION RATE DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2012	1.96%	1.00	1.51%	1.00	2.00%	1.00	4.37%	1.00	1.49%	1.00	1.70%	1.00	2.826%	1.00
2013	1.59%	1.02	1.14%	1.01	1.89%	1.02	4.37%	1.04	1.32%	1.01	1.90%	1.02	2.902%	1.03
2014	1.90%	1.04	1.66%	1.03	2.31%	1.04	4.37%	1.09	2.23%	1.04	2.00%	1.04	2.924%	1.06
2015	1.74%	1.05	1.46%	1.04	2.44%	1.07	4.37%	1.14	2.22%	1.06	2.00%	1.06	2.940%	1.09
2016	2.01%	1.07	1.67%	1.06	3.04%	1.10	4.37%	1.19	1.99%	1.08	2.00%	1.08	2.942%	1.12
2017	1.92%	1.09	1.64%	1.08	3.13%	1.13	4.37%	1.24	2.00%	1.10	2.10%	1.10	2.935%	1.16
2018	2.02%	1.12	1.75%	1.10	3.42%	1.17	4.37%	1.29	2.08%	1.12	2.10%	1.13	2.927%	1.19
2019	1.97%	1.14	1.67%	1.12	3.48%	1.21	4.37%	1.35	2.04%	1.15	2.10%	1.15	2.908%	1.22
2020	1.95%	1.16	1.65%	1.13	3.53%	1.26	4.37%	1.41	2.02%	1.17	2.10%	1.18	2.909%	1.26
2021	1.97%	1.18	1.47%	1.15	3.67%	1.30	4.37%	1.47	1.96%	1.19	2.10%	1.20	2.908%	1.30
2022	1.98%	1.21	1.42%	1.17	3.80%	1.35	4.37%	1.53	1.94%	1.22	2.10%	1.22	2.903%	1.33
2023	1.97%	1.23	1.60%	1.19	3.78%	1.40	4.37%	1.60	2.00%	1.24	2.10%	1.25	2.917%	1.37
2024	1.92%	1.26	1.50%	1.20	3.66%	1.46	4.37%	1.67	2.00%	1.27	2.10%	1.28	2.931%	1.41
2025	1.93%	1.28	1.52%	1.22	3.70%	1.51	4.37%	1.74	2.07%	1.29	2.10%	1.30	2.946%	1.45
2026	1.93%	1.30	1.53%	1.24	3.74%	1.57	4.37%	1.82	2.16%	1.32	2.10%	1.33	2.961%	1.50
2027	1.94%	1.33	1.56%	1.26	3.76%	1.62	4.37%	1.90	2.25%	1.35	2.10%	1.36	2.977%	1.54
2028	1.94%	1.36	1.53%	1.28	3.80%	1.69	4.37%	1.98	2.31%	1.38	2.10%	1.39	2.993%	1.59
2029	1.97%	1.38	1.56%	1.30	3.79%	1.75	4.37%	2.07	2.38%	1.41	2.10%	1.42	3.010%	1.64
2030	1.99%	1.41	1.59%	1.32	3.75%	1.82	4.37%	2.16	2.38%	1.45	2.10%	1.45	3.027%	1.69
2031	2.03%	1.44	1.64%	1.34	3.74%	1.88	4.37%	2.25	2.68%	1.49	2.10%	1.48	3.044%	1.74
2032	2.00%	1.47	1.61%	1.36	3.76%	1.95	4.37%	2.35	2.63%	1.53	2.10%	1.51	3.061%	1.79
2033	2.00%	1.50	1.61%	1.38	3.79%	2.03	4.37%	2.46	1.82%	1.55	2.10%	1.54	3.054%	1.84
2034	2.04%	1.53	1.65%	1.41	3.89%	2.11	4.37%	2.56	2.41%	1.59	2.10%	1.57	3.044%	1.90
2035	2.04%	1.56	1.66%	1.43	3.91%	2.19	4.37%	2.67	2.41%	1.63	2.10%	1.60	3.031%	1.96
2036	2.06%	1.59	1.68%	1.45	3.93%	2.28	4.37%	2.79	2.12%	1.66	2.10%	1.64	3.015%	2.02
2037	2.08%	1.62	1.71%	1.48	3.91%	2.37	4.37%	2.91	2.12%	1.70	2.10%	1.67	2.995%	2.08

TABLE D-2: INFLATION RATE DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2038	2.10%	1.66	1.73%	1.51	3.89%	2.46	4.37%	3.04	2.12%	1.73	2.10%	1.71	2.971%	2.14
2039	2.11%	1.69	1.74%	1.53	3.88%	2.55	4.37%	3.17	2.12%	1.77	2.10%	1.74	2.943%	2.20
2040	2.11%	1.73	1.76%	1.56	3.86%	2.65	4.37%	3.31	2.12%	1.81	2.10%	1.78	2.909%	2.27
2041	2.12%	1.76	1.78%	1.59	3.88%	2.75	4.37%	3.46	2.12%	1.85	2.10%	1.82	2.871%	2.33
2042	2.13%	1.80	1.79%	1.61	3.84%	2.86	4.37%	3.61	2.12%	1.89	2.10%	1.86	2.871%	2.40
2043	1.98%	1.84	1.61%	1.64	3.52%	2.96	4.37%	3.77	2.12%	1.93	2.10%	1.90	2.871%	2.47
2044	1.98%	1.87	1.61%	1.67	3.52%	3.06	4.37%	3.93	2.12%	1.97	2.10%	1.94	2.871%	2.54
2045	1.98%	1.91	1.61%	1.69	3.52%	3.17	4.37%	4.10	2.12%	2.01	2.10%	1.98	2.871%	2.61
2046	1.98%	1.95	1.61%	1.72	3.52%	3.28	4.37%	4.28	2.12%	2.05	2.10%	2.02	2.871%	2.69
2047	1.98%	1.99	1.61%	1.75	3.52%	3.40	4.37%	4.47	2.12%	2.09	2.10%	2.06	2.871%	2.76
2048	1.98%	2.03	1.61%	1.78	3.52%	3.52	4.37%	4.66	2.12%	2.14	2.10%	2.10	2.871%	2.84
2049	1.98%	2.07	1.61%	1.81	3.52%	3.64	4.37%	4.87	2.12%	2.18	2.10%	2.15	2.871%	2.92
2050	1.98%	2.11	1.61%	1.83	3.52%	3.77	4.37%	5.08	2.12%	2.23	2.10%	2.19	2.871%	3.01
2051	1.98%	2.15	1.61%	1.86	3.52%	3.90	4.37%	5.30	2.12%	2.28	2.10%	2.24	2.871%	3.09
2052	1.98%	2.19	1.61%	1.89	3.52%	4.04	4.37%	5.53	2.12%	2.32	2.10%	2.29	2.871%	3.18
2053	1.98%	2.24	1.61%	1.92	3.52%	4.18	4.37%	5.78	2.12%	2.37	2.10%	2.33	2.871%	3.27
2054	1.98%	2.28	1.61%	1.95	3.52%	4.33	4.37%	6.03	2.12%	2.42	2.10%	2.38	2.871%	3.37
2055	1.98%	2.33	1.61%	1.99	3.52%	4.48	4.37%	6.29	2.12%	2.48	2.10%	2.43	2.871%	3.46
2056	1.98%	2.37	1.61%	2.02	3.52%	4.64	4.37%	6.57	2.12%	2.53	2.10%	2.48	2.871%	3.56
2057	1.98%	2.42	1.61%	2.05	3.52%	4.80	4.37%	6.85	2.12%	2.58	2.10%	2.54	2.871%	3.67
2058	1.98%	2.47	1.61%	2.08	3.52%	4.97	4.37%	7.15	2.12%	2.64	2.10%	2.59	2.871%	3.77
2059	1.98%	2.52	1.61%	2.12	3.52%	5.14	4.37%	7.47	2.12%	2.69	2.10%	2.64	2.871%	3.88
2060	1.98%	2.57	1.61%	2.15	3.52%	5.33	4.37%	7.79	2.12%	2.75	2.10%	2.70	2.871%	3.99
2061	1.98%	2.62	1.61%	2.19	3.52%	5.51	4.37%	8.13	2.12%	2.81	2.10%	2.76	2.871%	4.11
2062	1.98%	2.67	1.61%	2.22	3.52%	5.71	4.37%	8.49	2.12%	2.87	2.10%	2.81	2.871%	4.22
2063	1.98%	2.72	1.61%	2.26	3.52%	5.91	4.37%	8.86	2.12%	2.93	2.10%	2.87	2.871%	4.35

TABLE D-2: INFLATION RATE DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2064	1.98%	2.77	1.61%	2.29	3.52%	6.11	4.37%	9.25	2.12%	2.99	2.10%	2.93	2.871%	4.47
2065	1.98%	2.83	1.61%	2.33	3.52%	6.33	4.37%	9.65	2.12%	3.05	2.10%	2.99	2.871%	4.60
2066	1.98%	2.89	1.61%	2.37	3.52%	6.55	4.37%	10.07	2.12%	3.12	2.10%	3.06	2.871%	4.73
2067	1.98%	2.94	1.61%	2.40	3.52%	6.78	4.37%	10.51	2.12%	3.18	2.10%	3.12	2.871%	4.87
2068	1.98%	3.00	1.61%	2.44	3.52%	7.02	4.37%	10.97	2.12%	3.25	2.10%	3.19	2.871%	5.01
2069	1.98%	3.06	1.61%	2.48	3.52%	7.27	4.37%	11.45	2.12%	3.32	2.10%	3.25	2.871%	5.15
2070	1.98%	3.12	1.61%	2.52	3.52%	7.52	4.37%	11.95	2.12%	3.39	2.10%	3.32	2.871%	5.30
2071	1.98%	3.18	1.61%	2.56	3.52%	7.79	4.37%	12.47	2.12%	3.46	2.10%	3.39	2.871%	5.45
2072	1.98%	3.25	1.61%	2.60	3.52%	8.06	4.37%	13.02	2.12%	3.53	2.10%	3.46	2.871%	5.61
2073	1.98%	3.31	1.61%	2.65	3.52%	8.34	4.37%	13.59	2.12%	3.61	2.10%	3.54	2.871%	5.77
2074	1.98%	3.38	1.61%	2.69	3.52%	8.64	4.37%	14.18	2.12%	3.69	2.10%	3.61	2.871%	5.93
2075	1.98%	3.44	1.61%	2.73	3.52%	8.94	4.37%	14.80	2.12%	3.76	2.10%	3.69	2.871%	6.10
2076	1.98%	3.51	1.61%	2.78	3.52%	9.26	4.37%	15.45	2.12%	3.84	2.10%	3.76	2.871%	6.28
2077	1.98%	3.58	1.61%	2.82	3.52%	9.58	4.37%	16.12	2.12%	3.92	2.10%	3.84	2.871%	6.46
2078	1.98%	3.65	1.61%	2.87	3.52%	9.92	4.37%	16.83	2.12%	4.01	2.10%	3.92	2.871%	6.64
2079	1.98%	3.72	1.61%	2.91	3.52%	10.27	4.37%	17.56	2.12%	4.09	2.10%	4.00	2.871%	6.83
2080	1.98%	3.80	1.61%	2.96	3.52%	10.63	4.37%	18.33	2.12%	4.18	2.10%	4.09	2.871%	7.03
2081	1.98%	3.87	1.61%	3.01	3.52%	11.00	4.37%	19.13	2.12%	4.27	2.10%	4.17	2.871%	7.23
2082	1.98%	3.95	1.61%	3.05	3.52%	11.39	4.37%	19.97	2.12%	4.36	2.10%	4.26	2.871%	7.44
2083	1.98%	4.03	1.61%	3.10	3.52%	11.79	4.37%	20.84	2.12%	4.45	2.10%	4.35	2.871%	7.65
2084	1.98%	4.11	1.61%	3.15	3.52%	12.20	4.37%	21.75	2.12%	4.54	2.10%	4.44	2.871%	7.87
2085	1.98%	4.19	1.61%	3.20	3.52%	12.63	4.37%	22.70	2.12%	4.64	2.10%	4.54	2.871%	8.10
2086	1.98%	4.27	1.61%	3.26	3.52%	13.08	4.37%	23.69	2.12%	4.74	2.10%	4.63	2.871%	8.33
2087	1.98%	4.36	1.61%	3.31	3.52%	13.54	4.37%	24.73	2.12%	4.84	2.10%	4.73	2.871%	8.57
2088	1.98%	4.44	1.61%	3.36	3.52%	14.01	4.37%	25.81	2.12%	4.94	2.10%	4.83	2.871%	8.82
2089	1.98%	4.53	1.61%	3.41	3.52%	14.50	4.37%	26.94	2.12%	5.05	2.10%	4.93	2.871%	9.07

TABLE D-2: INFLATION RATE DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2090	1.98%	4.62	1.61%	3.47	3.52%	15.01	4.37%	28.11	2.12%	5.15	2.10%	5.03	2.871%	9.33
2091	1.98%	4.71	1.61%	3.53	3.52%	15.54	4.37%	29.34	2.12%	5.26	2.10%	5.14	2.871%	9.60
2092	1.98%	4.81	1.61%	3.58	3.52%	16.09	4.37%	30.62	2.12%	5.37	2.10%	5.25	2.871%	9.87
2093	1.98%	4.90	1.61%	3.64	3.52%	16.65	4.37%	31.96	2.12%	5.49	2.10%	5.36	2.871%	10.16
2094	1.98%	5.00	1.61%	3.70	3.52%	17.24	4.37%	33.36	2.12%	5.60	2.10%	5.47	2.871%	10.45
2095	1.98%	5.10	1.61%	3.76	3.52%	17.84	4.37%	34.82	2.12%	5.72	2.10%	5.58	2.871%	10.75
2096	1.98%	5.20	1.61%	3.82	3.52%	18.47	4.37%	36.34	2.12%	5.84	2.10%	5.70	2.871%	11.06
2097	1.98%	5.30	1.61%	3.88	3.52%	19.12	4.37%	37.93	2.12%	5.97	2.10%	5.82	2.871%	11.37
2098	1.98%	5.41	1.61%	3.94	3.52%	19.79	4.37%	39.58	2.12%	6.09	2.10%	5.94	2.871%	11.70
2099	1.98%	5.51	1.61%	4.00	3.52%	20.49	4.37%	41.31	2.12%	6.22	2.10%	6.07	2.871%	12.04
2100	1.98%	5.62	1.61%	4.07	3.52%	21.21	4.37%	43.12	2.12%	6.35	2.10%	6.20	2.871%	12.38
2101	1.98%	5.73	1.61%	4.13	3.52%	21.95	4.37%	45.00	2.12%	6.49	2.10%	6.33	2.871%	12.74
2102	1.98%	5.85	1.61%	4.20	3.52%	22.73	4.37%	46.97	2.12%	6.62	2.10%	6.46	2.871%	13.10
2103	1.98%	5.96	1.61%	4.27	3.52%	23.53	4.37%	49.02	2.12%	6.77	2.10%	6.59	2.871%	13.48
2104	1.98%	6.08	1.61%	4.34	3.52%	24.35	4.37%	51.16	2.12%	6.91	2.10%	6.73	2.871%	13.87
2105	1.98%	6.20	1.61%	4.41	3.52%	25.21	4.37%	53.40	2.12%	7.05	2.10%	6.87	2.871%	14.27
2106	1.98%	6.33	1.61%	4.48	3.52%	26.09	4.37%	55.73	2.12%	7.20	2.10%	7.02	2.871%	14.67
2107	1.98%	6.45	1.61%	4.55	3.52%	27.01	4.37%	58.17	2.12%	7.36	2.10%	7.17	2.871%	15.10
2108	1.98%	6.58	1.61%	4.62	3.52%	27.96	4.37%	60.71	2.12%	7.51	2.10%	7.32	2.871%	15.53
2109	1.98%	6.71	1.61%	4.70	3.52%	28.94	4.37%	63.36	2.12%	7.67	2.10%	7.47	2.871%	15.98
2110	1.98%	6.84	1.61%	4.77	3.52%	29.96	4.37%	66.13	2.12%	7.83	2.10%	7.63	2.871%	16.43
2111	1.98%	6.98	1.61%	4.85	3.52%	31.01	4.37%	69.02	2.12%	8.00	2.10%	7.79	2.871%	16.91
2112	1.98%	7.12	1.61%	4.93	3.52%	32.10	4.37%	72.04	2.12%	8.17	2.10%	7.95	2.871%	17.39
2113	1.98%	7.26	1.61%	5.01	3.52%	33.23	4.37%	75.19	2.12%	8.34	2.10%	8.12	2.871%	17.89
2114	1.98%	7.40	1.61%	5.09	3.52%	34.40	4.37%	78.47	2.12%	8.52	2.10%	8.29	2.871%	18.40
2115	1.98%	7.55	1.61%	5.17	3.52%	35.61	4.37%	81.90	2.12%	8.70	2.10%	8.46	2.871%	18.93

TABLE D-2: INFLATION RATE DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2116	1.98%	7.70	1.61%	5.25	3.52%	36.86	4.37%	85.48	2.12%	8.88	2.10%	8.64	2.871%	19.48
2117	1.98%	7.85	1.61%	5.34	3.52%	38.16	4.37%	89.22	2.12%	9.07	2.10%	8.82	2.871%	20.03
2118	1.98%	8.00	1.61%	5.42	3.52%	39.50	4.37%	93.12	2.12%	9.26	2.10%	9.01	2.871%	20.61
2119	1.98%	8.16	1.61%	5.51	3.52%	40.89	4.37%	97.18	2.12%	9.46	2.10%	9.20	2.871%	21.20
2120	1.98%	8.33	1.61%	5.60	3.52%	42.33	4.37%	101.43	2.12%	9.66	2.10%	9.39	2.871%	21.81
2121	1.98%	8.49	1.61%	5.69	3.52%	43.81	4.37%	105.86	2.12%	9.86	2.10%	9.59	2.871%	22.44
2122	1.98%	8.66	1.61%	5.78	3.52%	45.35	4.37%	110.49	2.12%	10.07	2.10%	9.79	2.871%	23.08
2123	1.98%	8.83	1.61%	5.87	3.52%	46.95	4.37%	115.32	2.12%	10.28	2.10%	9.99	2.871%	23.74
2124	1.98%	9.00	1.61%	5.97	3.52%	48.60	4.37%	120.36	2.12%	10.50	2.10%	10.20	2.871%	24.42
2125	1.98%	9.18	1.61%	6.06	3.52%	50.31	4.37%	125.62	2.12%	10.72	2.10%	10.42	2.871%	25.13
2126	1.98%	9.37	1.61%	6.16	3.52%	52.07	4.37%	131.11	2.12%	10.95	2.10%	10.64	2.871%	25.85
2127	1.98%	9.55	1.61%	6.26	3.52%	53.90	4.37%	136.84	2.12%	11.18	2.10%	10.86	2.871%	26.59
2128	1.98%	9.74	1.61%	6.36	3.52%	55.80	4.37%	142.82	2.12%	11.42	2.10%	11.09	2.871%	27.35
2129	1.98%	9.93	1.61%	6.46	3.52%	57.76	4.37%	149.06	2.12%	11.66	2.10%	11.32	2.871%	28.14
2130	1.98%	10.13	1.61%	6.56	3.52%	59.79	4.37%	155.57	2.12%	11.91	2.10%	11.56	2.871%	28.94
2131	1.98%	10.33	1.61%	6.67	3.52%	61.89	4.37%	162.37	2.12%	12.16	2.10%	11.80	2.871%	29.78
2132	1.98%	10.54	1.61%	6.78	3.52%	64.07	4.37%	169.47	2.12%	12.42	2.10%	12.05	2.871%	30.63
2133	1.98%	10.74	1.61%	6.89	3.52%	66.32	4.37%	176.87	2.12%	12.68	2.10%	12.30	2.871%	31.51
2134	1.98%	10.96	1.61%	7.00	3.52%	68.65	4.37%	184.60	2.12%	12.95	2.10%	12.56	2.871%	32.41
2135	1.98%	11.17	1.61%	7.11	3.52%	71.06	4.37%	192.67	2.12%	13.22	2.10%	12.82	2.871%	33.34
2136	1.98%	11.40	1.61%	7.22	3.52%	73.56	4.37%	201.09	2.12%	13.50	2.10%	13.09	2.871%	34.30
2137	1.98%	11.62	1.61%	7.34	3.52%	76.15	4.37%	209.87	2.12%	13.79	2.10%	13.37	2.871%	35.29
2138	1.98%	11.85	1.61%	7.46	3.52%	78.83	4.37%	219.05	2.12%	14.08	2.10%	13.65	2.871%	36.30
2139	1.98%	12.09	1.61%	7.58	3.52%	81.60	4.37%	228.62	2.12%	14.38	2.10%	13.94	2.871%	37.34
2140	1.98%	12.33	1.61%	7.70	3.52%	84.46	4.37%	238.61	2.12%	14.68	2.10%	14.23	2.871%	38.41
2141	1.98%	12.57	1.61%	7.82	3.52%	87.43	4.37%	249.04	2.12%	14.99	2.10%	14.53	2.871%	39.52

TABLE D-2: INFLATION RATE DATA														
Fiscal Year	Global Insight						Ibbotson- Historical		EIA		OMB		Market Yield	
	Trend		Optimistic		Pessimistic									
	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index	Rate	Index
2142	1.98%	12.82	1.61%	7.95	3.52%	90.51	4.37%	259.92	2.12%	15.31	2.10%	14.83	2.871%	40.65
2143	1.98%	13.07	1.61%	8.08	3.52%	93.69	4.37%	271.28	2.12%	15.63	2.10%	15.14	2.871%	41.82
2144	1.98%	13.33	1.61%	8.20	3.52%	96.98	4.37%	283.13	2.12%	15.96	2.10%	15.46	2.871%	43.02
2145	1.98%	13.60	1.61%	8.34	3.52%	100.39	4.37%	295.51	2.12%	16.30	2.10%	15.79	2.871%	44.25
2146	1.98%	13.87	1.61%	8.47	3.52%	103.92	4.37%	308.42	2.12%	16.65	2.10%	16.12	2.871%	45.52
2147	1.98%	14.14	1.61%	8.61	3.52%	107.57	4.37%	321.90	2.12%	17.00	2.10%	16.46	2.871%	46.83
2148	1.98%	14.42	1.61%	8.74	3.52%	111.35	4.37%	335.96	2.12%	17.36	2.10%	16.80	2.871%	48.17
2149	1.98%	14.71	1.61%	8.89	3.52%	115.27	4.37%	350.65	2.12%	17.73	2.10%	17.16	2.871%	49.56
2150	1.98%	15.00	1.61%	9.03	3.52%	119.32	4.37%	365.97	2.12%	18.10	2.10%	17.52	2.871%	50.98
2151	1.98%	15.30	1.61%	9.17	3.52%	123.51	4.37%	381.96	2.12%	18.49	2.10%	17.88	2.871%	52.44
2152	1.98%	15.60	1.61%	9.32	3.52%	127.85	4.37%	398.65	2.12%	18.88	2.10%	18.26	2.871%	53.95
2153	1.98%	15.91	1.61%	9.47	3.52%	132.35	4.37%	416.07	2.12%	19.28	2.10%	18.64	2.871%	55.50
2154	1.98%	16.22	1.61%	9.62	3.52%	137.00	4.37%	434.26	2.12%	19.68	2.10%	19.03	2.871%	57.09
2155	1.98%	16.54	1.61%	9.78	3.52%	141.82	4.37%	453.23	2.12%	20.10	2.10%	19.43	2.871%	58.73
2156	1.98%	16.87	1.61%	9.93	3.52%	146.80	4.37%	473.04	2.12%	20.53	2.10%	19.84	2.871%	60.42
2157	1.98%	17.21	1.61%	10.09	3.52%	151.96	4.37%	493.71	2.12%	20.96	2.10%	20.26	2.871%	62.15

APPENDIX E: IBBOTSON-HISTORICAL TREASURY RATES

The table below presents the historical market interest rates provided by Ibbotson Associates. These historical rates were the original interest rates charged by investors to the U.S. Treasury for 90-day Treasury Bills and 30-year Treasury Bonds.

Table E-1. Historical Annual Data

Year	Inflation Rate	90-Day Treasury Bill Rate	30-year Bond Yield
1971	3.36%	4.39%	5.97%
1972	3.41%	3.84%	5.99%
1973	8.80%	6.93%	7.26%
1974	12.20%	8.00%	7.60%
1975	7.01%	5.80%	8.05%
1976	4.81%	5.08%	7.21%
1977	6.77%	5.12%	8.03%
1978	9.03%	7.18%	8.98%
1979	13.31%	10.38%	10.12%
1980	12.40%	11.24%	11.99%
1981	8.94%	14.71%	13.34%
1982	3.87%	10.54%	10.95%
1983	3.80%	8.80%	11.97%
1984	3.95%	9.85%	11.70%
1985	3.77%	7.72%	9.56%
1986	1.13%	6.16%	7.89%
1987	4.41%	5.47%	9.20%
1988	4.42%	6.35%	9.18%
1989	4.65%	8.37%	8.16%
1990	6.11%	7.81%	8.44%
1991	3.06%	5.60%	7.30%
1992	2.90%	3.51%	7.26%
1993	2.75%	2.90%	6.54%
1994	2.67%	3.90%	7.99%
1995	2.54%	5.60%	6.03%
1996	3.32%	5.21%	6.73%
1997	1.70%	5.26%	6.02%
1998	1.61%	4.86%	5.42%
1999	2.68%	4.68%	6.82%
2000	3.39%	5.89%	5.58%
2001	1.55%	3.83%	5.75%
2002	2.38%	1.65%	4.84%
2003	1.88%	1.02%	5.11%
2004	3.26%	1.20%	4.84%

Year	Inflation Rate	90-Day Treasury Bill Rate	30-year Bond Yield
2005	3.42%	2.98%	4.61%
2006	2.54%	4.80%	4.91%
2007	4.08%	4.66%	4.50%
2008	0.09%	1.60%	3.03%
2009	2.72%	0.10%	4.58%
2010	1.50%	0.12%	4.14%
2011	2.96%	0.04%	2.48%
Average	**4.37%**	**5.44 %**	**7.22%**