Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

SECURITY AND CONTINUITY OF OPERATIONS

August 30, 2013

In reply refer to: NN-1

Charles Johnson
Physicians for Social Responsibility
812 SW Washington St, Ste 1050
Portland, OR 97205

FOIA #BPA-2013-01495-F

Dear Mr. Johnson:

This is a final response to your request for records that you made to the Bonneville Power Administration (BPA), under the Freedom of Information Act, 5 U.S.C. 552.

You have requested the following:
"Energy Northwest's fuel management plans for the Columbia Generating Station submitted to the Bonneville Power Administrator per Contract #14-03-19121, Section 8(a). We are interested in plans submitted from 2007 to present."

Response:
BPA is releasing the responsive documents on the enclosed CD in their entirety.

Pursuant to 10 CFR 1004.8, if you are dissatisfied with this determination, or the adequacy of the search, you may appeal this FOIA response in writing within 30 calendar days of receipt of a final response letter. The appeal should be made to the Director, Office of Hearings and Appeals, HG-1, Department of Energy, 1000 Independence Avenue, SW, Washington, DC 20585-1615. The written appeal, including the envelope, must clearly indicate that a FOIA Appeal is being made.

There are no fees associated with this request.

I appreciate the opportunity to assist you. Please contact Ms. Winn, FOIA Specialist, at 503-230-5273 with any questions about this letter.

Sincerely,

For/s/Paul F. Mautner
Christina J. Munro
Freedom of Information/Privacy Act Officer

Enclosure: CD

Energy Northwest
Columbia Generating Station

FY 2014
Fuel Management Plan

Rev. 0

March 2013

S. M. Praetorius
Program Mgr. Nuclear Fuel Procurement

Section 1

Introduction

The Project Agreement between Energy Northwest and Bonneville Power Administration (BPA) for Columbia Generating Station requires Energy Northwest to submit with each annual budget a Ten-Year Fuel Management Plan.

This Fuel Management Plan for fiscal year (FY) 2014 covers the period from July 1, 2013, through June 30, 2023. This plan includes a cash flow analysis for expenditures and credits for each major component of the fuel cycle by month for the first five (5) years. Also, the contracts for each component of the fuel cycle are discussed. The tables and figures are located at the end of the text.

Section

2

Assumptions

Economic

Table 1 gives the predicted market prices for uranium concentrates (U_3O_8) and conversion and enrichment services. Forward market price data was taken from the *2012 Nuclear Fuel Cycle Supply and Price Report*, provided by Energy Resources International. Over the past year, the spot price for uranium has cycled between lows of $40.75 per lb. U_3O_8 to highs of $52.75 per lb. according to TradeTech, www.uranium.info, historical uranium prices. Spot price is a reflection of very near term inventory supply and demand dynamics. The accident at the Fukushima Daiichi reactors in Japan in March 2011 has caused significant changes in the spot market. Current spot demand is limited as utilities had previously moved to lock up additional forward years' requirements shortly after the price spike in 2007. Over the past year the term price continued its decline from the prior year dropping from $61 per lb. U_3O_8 to $57 per lb. Term price is more closely tied to cost of production and does not exhibit the volatility seen with the spot price but does tend to follow the overall trend of the spot price. In any event, forward price projections predict the price to increase steadily as reactors in Japan are assumed to be returned to service and new mines begin production. The price projections for enrichment services has not seen the significant decline that has been observed in uranium as very little supply is traded in the spot market and suppliers are actively building new enrichment plants. Prices are predicted to begin to decline once the plants are at full capacity. Near term enrichment prices have begun to decline due to surplus capacity being available due to delayed deliveries as a result of the extended reactor shutdowns in Japan and Germany following the accident at Fukushima Daiichi.

Energy Northwest's significant uranium inventory, mid-term uranium contracts and the long-term enrichment contract continue to minimize the near term impact of volatility in the nuclear fuel market prices. The prices from the uranium and enrichment contracts are factored into the cash flow requirements but are not reflected in the prices in Table 1.

Fuel Cycle

Table 2 shows the assumptions for the fuel cycles used in this plan. The planned energy requirements are consistent with the energy requirements supplied by BPA in accordance with the Project Agreement.

SECTION 2 ASSUMPTIONS

Both Final Feedwater Temperature Reduction (FFTR) and Thermal Power Level Coast-Down are planned for cost optimization during the final five to seven weeks of the operating run. During FFTR, the operation of the plant is extended at 100% thermal power level for 8-10 days while the electrical power level gradually decreases by about 1%. During coast-down, the power level is expected to decrease at a rate of 0.5% per day. The Fuel Management Plan assumes 9 days of FFTR and 21 days of coast-down for a total of 30 days of cycle extension for Cycle 22. Future cycles assume a total of 30 days of cycle extension. The planned cycle energy is within the acceptable range provided by BPA for energy requirements for fuel loading in Cycle 22.

The generation factor refers to the amount of energy that is expected to be generated relative to the maximum potential generation from when the generator is synchronized to the grid to when the reactor is shut down for the outage.

The generation factor and outage length are the critical parameters that determine the cycle energy from which the fuel requirements and ultimately the fuel budget is derived.

Section

3

Nuclear Fuel Market

Uranium Market

The uranium market has experienced dramatic fluctuations in price over the past ten years. In January 2003, the price of uranium was $10.20 per lb U_3O_8. The market price peaked in June 2007 at $135 per lb U_3O_8. The spot price currently stands at $43.25 per lb U_3O_8 at the end of December 2012. At the time of the dramatic price increase, utilities moved to place their uncommitted requirements for the next three to six years under contract in an attempt to mitigate supply disruptions and limit their vulnerability to further price increases. As a result, spot supply and demand is very limited leading to market volatility where a 10% change in price from month to month is not uncommon.

A number of investment funds have also entered the market buying uranium, which places additional demand on already short supplies. Although this demand has contributed to the price rise, it also provides a source of liquidity to the market since the investors are solely looking for a return-on-investment. The economic credit crisis in 2008 resulted in the majority of funds starting to liquidate their inventory to raise cash leading to a softening of price. The funds have not been quick to return to the market as the price continues to decline and the accident at Fukushima Daiichi raises additional concerns in their minds about nuclear in general.

The Department of Energy (DOE) has finalized agreements to barter uranium to pay for the cleanup costs at the Portsmouth site for the next four years. DOE issued an Excess Uranium Inventory Management Plan on December 16, 2008 calling for planned annual sales of between 1.5 and 10.3 million pounds U_3O_8 equivalent through the 2017 timeframe. The barter amounts are within this plan.

Price projections indicate a close relationship between the projections and the current term price and show a steady increase in price over the next ten (10) years. The following table lists known factors affecting price:

Push Price Up	Push Price Down
New demand from India	Possible short term over-production
Increased worldwide demand for reactors: • China • Russia • Middle East • United States	Government policies • DOE Excess Uranium Sales
Production problems at mines • Cigar Lake mine flooding • Olympic Dam mine shaft damage	Investor selling • Unknown factor at this time
Low cost uranium mined first • McArthur River • Kazakhstan in situ leach mines	Decreased demand due to reactor shutdowns: • Japan • Germany
Development of uranium mines delayed • Olympic Dam expansion	Delay in new plant construction • United States • Asia
Overall decrease in availability of secondary supplies • US-Russia HEU deal ends in 2013 • Currently secondary supplies provide for 35% of world-wide requirements	
Interest/exchange rates • US dollar is weak against the major producer currencies	

Conversion Services

Spot conversion prices are currently at $10.50 per KgU relative to the term price of $16.75 per KgU as reported by TradeTech. Similar to U_3O_8, the price projections for conversion services indicate a close relationship between the projections and the current term price. Spot price is currently elevated due to the shutdown of CoverDyn's Metropolis, IL facility to install NRC required plant modifications. The plant is projected to be off-line until the summer of 2013. Long-term prices are predicted to remain relatively

stable into the foreseeable future as aged plants are upgraded or replaced.

Enrichment Market

The enrichment market has also seen price increases over the past few years. The spot price in January 2006 was $118 per Separative Work Unit (SWU) and has risen to a high of $165 per SWU in January 2010 with current market price reported by TradeTech at $120 per SWU. Near term enrichment prices have continued to decline due to surplus capacity being available due to delayed deliveries as a result of the extended reactor shutdowns in Japan and Germany following the accident at Fukushima Daiichi. The higher the tails assay, the more uranium feed is required and the less enrichment services. The lower the tails assay, the more enrichment services are required and less uranium feed. At the current prices for uranium and enrichment services, the optimum tails assay has reduced to 0.25% from historical levels of 0.30%. The result is an increase in enrichment demand and reduction in uranium demand. The price increase is also being driven by limited supply to meet the higher demand in the face of rising supply costs. Both the US and European gaseous diffusion plants (GDP) have experienced production cost increases due to an increase in power prices. Electricity costs account for nearly 60% of the enrichment costs at GDP enrichment plants.

Another factor fueling price increases in the near term is the fact that all three Western suppliers are in the process of either replacing their costly gaseous diffusion with centrifuge technology or expanding their existing capacity. Urenco has commenced operations at its new enrichment facility in New Mexico using its proven centrifuge technology. In addition, Urenco has increased the capacity at each of their European plants. AREVA has also commenced operations at their new gaseous centrifuge plant and shutdown the GDP facility at Tricastin in France. AREVA has also announced plans to build a domestic centrifuge plant in Idaho and has received a $2 billion loan guarantee from the DOE, but has put the project on hold pending recovery in demand from Japan. General Electric has received a construction and operating license from the NRC for their laser enrichment facility in North Carolina, but has not made the decision to build a commercial plant. Although the United States Enrichment Corporation (USEC) is also planning to replace their GDP facility in Kentucky with a gaseous centrifuge plant, USEC was denied a DOE loan guarantee for its American Centrifuge Plant in Ohio until the technology could be further proven. USEC has drastically cut expenditures on its new plant while it tries to satisfy the DOE requirements.

Russian access to the US market continues to be restricted due to the Megatons-to-Megawatts program, which will expire in December 2013.

This program down-blended highly enriched uranium from weapons to low enrichments needed for use in nuclear power plants. However, the current Russian suspension agreement has been re-negotiated to allow increasing amounts of material to be supplied into the US market beginning in 2014. The impact of this new supply should help stabilize or lower prices in the long term.

Fuel Fabrication

Currently, three fabricators supply fabricated fuel to the US BWR community: Global Nuclear Fuel (GNF), AREVA and Westinghouse. There have been no major supply disruptions in the fabrication sector, which looks well poised to support any domestic nuclear renaissance. AREVA announced consolidation of its PWR and BWR fabrication facilities and has moved its PWR fuel fabrication from Virginia to Richland, WA.

Section

4

Fuel Management Strategy

Fuel Cycle Designs

During FY2014, Columbia will be in the first half of Cycle 22. This is the third reload of the GE14 fuel design. The current bundle and core design contain a batch size of 240 assemblies with an average enrichment of ~4.07 wt% U^{235}. The Cycle 22 core has energy available to be able to operate at 100% power for 600 days plus an additional 30 days of cycle extension (9 days of FFTR and 21 days of coast-down).

Fuel Procurement Strategy

Energy Northwest has established a fuel procurement strategy to 1) achieve the long-term goal of a secure and consistently low cost fuel supply, and 2) be flexible enough to take advantage of cost saving opportunities as they arise.

Typically Energy Northwest strives to maintain a minimum strategic inventory of one reloads worth of enriched uranium and approximately half a reload of natural uranium.

Fuel Procurement Activities

In FY 2012, Energy Northwest was able to negotiate a Depleted Uranium Enrichment Program (DUEP) with the Department of Energy (DOE), Tennessee Valley Authority (TVA) and United States Enrichment Corporation (USEC) with an estimated cost to Energy Northwest in an amount not to exceed $711 million which includes approximately $20 million in remaining contingency funds. Beginning in June 2012 and lasting 12 months, USEC will enrich approximately 9,075 metric tons uranium (MTU) of 0.44 weight percent U^{235} (wt%) uranium tails supplied by DOE to Energy Northwest into approximately 482 MTU of 4.4 wt% enriched uranium product (EUP). EN will sell uranium an enrichment services contained in the EUP to TVA under a long term contract FY2015-FY2022 for $730 million and retain the balance. The inventory data shown in Tables 3 and 4 only reflects the portion of the DUEP uranium retained by Energy Northwest. The costs of the project will be funded by the issuance of bonds and therefore the values are not reflected in the cash requirements shown in Tables 8 and 9.

Fabrication Services

A fabrication services contract for Columbia Generating Station for the fuel supply for three reloads was awarded to GNF in June 2007. The 2013 refueling outage will be the third reload of GNF's GE14 fuel design.

Energy Northwest is pursuing the licensing and implementation of the operating flexibility program for APRM, RBM Technical Specifications (ARTS) Improvement and Maximum Extended Load Line Limit Analysis (MELLLA) and supply of the Power Range Neutron Monitoring (PRNM) Nuclear Measurement Analysis and Control (NUMAC) system with Option III Stability for the Columbia Generation Station. This project is referred to as "ARTS/MELLLA and PRNM". The project has an approved budget of $23.9 million for Fiscal Years 2009-2015, excluding financing costs. The benefits to the station are reduced fuel cost due to reduced batch size and improved fuel utilization, increased operating flexibility, increased net generation due to reduced recirculation pump speed, reduction in the number of downpowers to reposition control rods, reduction of nuisance alarms in the control room, and improved equipment reliability by replacing obsolete and aging equipment. The project was originally planned to be installed in 2011 refueling outage but has been delayed due to PRNM licensing issues and is now planned to be installed in the 2015 Refueling Outage. As a result, Energy Northwest has extended the existing fabrication services contract one additional cycle to 2015. The project is a Fuel Capital project and is financed using bond proceeds.

Energy Northwest is planning to issue a request for proposal for fabrication services, during Fiscal Year 2014, which will cover the fabrication needs of Columbia beginning with the 2017 refueling outage.

Other Fabrication Costs

A number of costs in addition to vendor fabrication costs for the fuel bundles and analytical services are included as fabrication costs. These costs address the following types of activities:

- Fuel receipt & inspection
- Fuel procurement
- Fuels' staff
- Fuel consultants
- Fuels' work-station and code fees
- Fuels' travel and training

SECTION 4 FUEL MANAGEMENT STRATEGY

Fuel Management Physical Requirements

The assumed cycle energies and fuel designs are used to develop multi-cycle reload material requirement projections. The projected reload material requirements are integrated with the existing inventory levels to project procurement requirements into the future. Tables 3 and 4 summarize those requirements over the next ten years.

Table 3 assumes uranium is purchased as uranium concentrates (U_3O_8). Conversion services must then be purchased to convert the concentrates to uranium hexafluoride (UF_6). Enrichment services are then purchased to convert the natural UF_6 to enriched UF_6. The enriched UF_6 is transferred to the fabrication facility and used to fabricate the necessary quantity of fuel assemblies. Table 4 shows the total material of each form existing as of the end of each fiscal year. Typically, the processing time from concentrates to fabricated fuel assemblies is one year, allowing for the necessary material lead times at each step in the process. Therefore, the majority of the material in Table 4 is considered to be working stock with a lesser portion considered the strategic inventory.

Spent Fuel Storage and Disposal

DOE Spent Fuel Contract

While the courts have now ruled that DOE had a binding obligation to begin acceptance of spent nuclear fuel no later than January 31, 1998, DOE has suspended all work on the license application for the Yucca Mountain underground storage repository. Energy Northwest began legal action due to DOE's failure to meet its obligations for spent fuel and on August 29, 2011, Energy Northwest received $48,702,551 from DOE for expenditures made on the Independent Spent Fuel Storage Installation (ISFSI) prior to September 1, 2006. Energy Northwest will continue further legal action to recover expenditures made on ISFSI starting September 1, 2006. Energy Northwest continues to pay a waste disposal fee as indicated in the category of Disposal.

On-Site Spent Fuel Storage

Columbia Generating Station operates an Independent Spent Fuel Storage Installation (ISFSI) using NRC-approved dry storage casks to supplement wet storage in the fuel pool. The ISFSI, located just north of the Deschutes Building, is capable of being expanded to hold the lifetime spent fuel requirements of Columbia Generating Station. Twenty-seven

(27) storage casks have been loaded to date, moving 1,836 assemblies from the fuel pool to the ISFSI.

The costs for the inner storage canister (called a multi-purpose canister or MPC) and closure welds are treated as fuel and are included in this Fuel Management Plan in the category of Casks. The costs of the overpacks, facility, and common equipment are treated as a plant capital addition. The Fiscal Years 2014-2016 cost of a multi-purpose canister is currently estimated to be $928,911 and welding costs are estimated to be $90,807 per MPC. This equates to a per bundle cost of $14,996. The Fiscal Year 2017 and beyond cost of a multi-purpose canister is currently estimated to be $1,640,504 and welding costs are estimated to be $119,590 per MPC. This equates to a per bundle cost of $25,884. Future costs have been escalated.

Active Contracts

Appendix A contains descriptions of the currently active fuel management contracts for nuclear material and fabrication services.

Section 5

Nuclear Fuel Budgets

Nuclear Fuel Costs

A measure of nuclear fuel cost is the Fuel-in-Process costs, or the costs to fabricate finished fuel assemblies. The estimated costs for the reload batch for Cycle 22 are shown in Table 5. Reload batch costs are amortized over the life of the fuel. Typically, fuel resides in the reactor core for three (3) cycles (equivalent to six years).

Fuel Revenue

There will be cash revenue from Fuels activities in FY2013-FY2022 from sales and reimbursed expenses from TVA under the Depleted Uranium Enrichment Program. The TVA agreement is summarized in Appendix A and the revenue is shown in Table 6.

Nuclear Fuel Cash Flows

The summary of cash requirements for the ARTS/MELLLA and PRNM project for FY 2014 are provided in Table 7. A summary of cash flows by fuel component and fiscal year for the next ten years is given in Table 8. Cash flows for nuclear fuel by month for each component for the next five years are shown in Tables 9 through 13. The cash flows are in today's dollars including the costs associated with the nuclear material (uranium, conversion, enrichment).

Table 1

Projected Market Fuel Prices

Year	Uranium $/lb U3O8	Conversion $/kgU UF6	Enrichment $/SWU
2014	$50.50	$14.00	$124.00
2015	$53.50	$14.00	$124.00
2016	$52.50	$15.50	$128.00
2017	$53.50	$15.50	$130.00
2018	$54.50	$16.00	$131.00
2019	$57.00	$16.00	$133.00
2020	$57.50	$16.00	$130.00
2021	$57.50	$16.00	$129.00
2022	$58.50	$16.00	$128.00
2023	$59.50	$17.00	$130.00

Table 2

Fuel Cycle Assumptions

Fiscal Year	Outage Length (Days)	Cycle	Energy FPD	Generation Factor %
2013	40	22	629	93%
2014				
2015	47	23	646	94%
2016				
2017	40	24	645	94%
2018				
2019	40	25	650	94%
2020				
2021	40	26	650	94%
2022				
2023	40	27	650	94%

Energy FPD = Operating Calendar Days x GF – (Days lost during startup and coastdown)

Table 3

Planned Purchases of Nuclear Material and Fuel Fabrication Requirements

	Purchases			Fabrication		
Fiscal Year	Lbs U_3O_8	KgU UF_6 Conversion	SWU	KgU Enriched UF_6	SWU	# Bundles
2013	4,824,716	1,846,534	26,874	394,005	238,615	240
2014	428,507	164,000	112,500			
2015	154,158	59,000	117,000	427,159	258,694	260
2016		0	0			
2017		0	225,000	433,752	262,687	264
2018		0	132,000			
2019		0	206,800	433,752	262,687	264
2020		0	82,904			
2021		0		433,752	262,687	264
2022		0	287,400			
2023		0		433,752	262,687	264

Table 4

Nuclear Material Totals

Fiscal Year	Natural UF_6 KgU	Enriched Uranium Product	
		UF_6	SWU
2014	897,853	2,612,219	618,730
2015	793,671	2,365,656	465,882
2016	793,671	2,365,656	465,882
2017	682,547	2,076,516	406,745
2018	701,131	2,077,578	526,161
2019	521,348	1,854,388	450,558
2020	405,721	1,982,354	525,558
2021	405,721	1,548,602	262,872
2022	653,477	1,343,621	522,872
2023	1,139,926	423,420	260,185

Table 5

Predicted Reload Batch Costs ($1000)

Component	CGS1-22
# of Assemblies	240
Fuel Cost:	
Uranium	$22,353
Conversion	$2,341
Enrichment	$29,916
Fabrication	$26,604
Sales Tax	$6,100
Fuels' Projects	$0
TOTAL $K	$87,314
Cask Cost:	
TOTAL	$3,599
TOTAL COST:	$90,913

Per Assembly Cost
($)

Fuel Cost	$363,803
Cask Cost	$14,996
Total Cost	$378,799

Table 6

Estimated Revenue From Fuel ($1000)

Fiscal Year	Uranium	Enrichment	Services	Total
2014			100	100
2015		69,960	100	70,060
2016		24,300	100	24,400
2017		24,900	100	25,000
2018	85,000	76,050	100	161,150
2019	147,000	83,420	100	230,520
2020		67,760	100	67,860
2021		85,920	100	86,020
2022		65,880	100	65,980
2023		0	0	0

Table 7

FY2014 Fuel Project Cash Flow [1]
(ARTS/MELLLA+PRNM)

Month	Cash Flow
Jul-13	$18,089
Aug-13	$23,001
Sep-12	$21,956
Oct-13	$24,047
Nov-13	$21,956
Dec-13	$22,234
Jan-14	$20,519
Feb-14	$17,843
Mar-14	$18,735
Apr-14	$19,627
May-14	$25,571
Jun-14	$31,123
Total	$264,700

[1] The costs of this project will be funded by the issuance of bonds.

Table 8

10-Year Cash Flow for Nuclear Fuel ($1,000)

FY	Uranium	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Fuel Cash[1]	Disposal	Gen Tax
2014	$27,317	$1,465	$14,618	$1,763	$2,305		$3,121	$50,589	$7,693	$4,318
2015	$9,828	$527	$15,472	$1,816	$24,780	$7,134	$371	$59,928	$8,725	$5,223
2016				$1,871	$1,597		$9,034	$12,502	$7,798	$4,924
2017			$29,896	$1,927	$26,928	$7,509	$5,948	$72,208	$8,883	$6,106
2018			$17,765	$1,985	$1,692		$8,008	$29,450	$7,950	$5,804
2019			$27,504	$2,044	$28,459	$7,735		$65,742	$8,881	$6,971
2020			$10,777	$2,105	$1,792		$2,828	$17,502	$7,942	$6,629
2021				$2,169	$30,296	$7,883	$2,474	$42,822	$8,846	$7,970
2022			$36,787	$2,234	$1,898		$9,259	$50,178	$7,867	$7,547
2023				$2,301	$32,254	$8,034	$2,859	$45,448	$8,836	$9,070
Total	$37,145	$1,992	$152,819	$20,215	$152,001	$38,295	$43,902	$446,369	$83,421	$64,562

(1) The total fuel cash does NOT include the costs of the ARTS/MELLLA+PRNM project or the Depleted Uranium Enrichment Program. The costs of the both of these projects will be funded by the issuance of bonds.

Table 9

Fiscal Year 2014 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash[1]	Disposal	Gen Tax
Jul-13	27,317	1,465	14,618	147	192			43,739		
Aug-13				147	192			339	1,135	
Sep-13				147	192		1,239	1,578		
Oct-13				147	192		140	479		
Nov-13				147	192			339	2,210	
Dec-13				147	192		924	1,263		
Jan-14				147	192			339		
Feb-14				147	192			339	2,210	
Mar-14				147	192		272	611		
Apr-14				147	192		272	611		
May-14				147	192		272	611	2,138	
Jun-14				147	192			339		4,318
Total	27,317	1,465	14,618	1,764	2,304		3,119	50,587	7,693	4,318

(1) The total fuel cash does NOT include the costs of the ARTS/MELLLA+PRNM project. The costs of the project will be funded by the issuance of bonds.

Table 10

Fiscal Year 2015 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-14	9,828	527	15,472	151	251			26,229		
Aug-14				151	251			402	2,206	
Sep-14				151	251			402		
Oct-14				151	251			402		
Nov-14				151	251			402	2,197	
Dec-14				151	251			402		
Jan-15				151	251		371	774		
Feb-15				151	251			402	2,197	
Mar-15				151	251			402		
Apr-15				151	251			402		
May-15				151	22,273	7,134		29,558	2,125	
Jun-15				151				151		5,223
Total	9,828	527	15,472	1,812	24,783	7,134	371	59,928	8,725	5,223

Table 11

Fiscal Year 2016 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-15				156	133		1,114	1,403		
Aug-15				156	133			289	1,093	
Sep-15				156	133			289		
Oct-15				156	133		1,155	1,444		
Nov-15				156	133			289	2,251	
Dec-15				156	133			289		
Jan-16				156	133			289		
Feb-16				156	133			289	2,251	
Mar-16				156	133		1,800	2,089		
Apr-16				156	133		3,964	4,253		
May-16				156	133		500	789	2,202	
Jun-16				156	133		500	789		4,924
Total				1,872	1,596		9,033	12,501	7,797	4,924

Table 12

Fiscal Year 2017 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-16				161	239			400		
Aug-16				161	239			400	2,246	
Sep-16				161	239		929	1,329		
Oct-16				161	239		100	500		
Nov-16				161	239			400	2,237	
Dec-16				161	239		878	1,278		
Jan-17			29,896	161	239			30,296		
Feb-17				161	239			400	2,237	
Mar-17				161	239		4,042	4,442		
Apr-17				161	239			400		
May-17				161	24,534	7,509		32,203	2,164	
Jun-17				161				161		6,106
Total			29,896	1,932	26,924	7,509	5,949	72,209	8,884	6,106

Table 13

Fiscal Year 2018 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-17				165	141			306		
Aug-17				165	141			306	1,269	
Sep-17				165	141		2,887	3,193		
Oct-17				165	141		140	446		
Nov-17				165	141			306	2,251	
Dec-17				165	141		3,546	3,852		
Jan-18			17,765	165	141			18,071		
Feb-18				165	141			306	2,251	
Mar-18				165	141		359	665		
Apr-18				165	141		359	665		
May-18				165	141		359	665	2,178	
Jun-18				165	141		359	665		5,804
Total			17,765	1,980	1,692		8,009	29,446	7,949	5,804

APPENDIX A ACTIVE FUEL CONTRACTS

Appendix A
Active Nuclear Material Contracts

Contract	Vendor	Scope
324350	Global Nuclear Fuel	Energy Northwest contracted with GNF in June 2007 to supply fuel design, licensing, and fabrication services for three consecutive reloads for Columbia Generating Station. The first reload under this contract was delivered in the spring of 2009. The scope of this contract will meet the needs of Columbia Generating Station for reload fabrication services through 2013. Energy Northwest has extended the existing fabrication services contract one additional reload to 2015.
313337	Urenco	Energy Northwest contracted with Urenco in January 2003 to supply enrichment services for delivery over calendar years 2005 to 2009. The contract was amended (twice) to procure additional SWU. In January 2006, Energy Northwest issued RFP 640137 for SWU to be delivered between calendar years 2010 to 2015. Urenco was awarded the procurement and the contract extended through 2015. The contract has been amended two additional times to move deliveries to meet the needs of both Urenco and Energy Northwest extending the contract through 2018.
330249	Nufcor International Limited	In July 2009, Energy Northwest issued RFP 656708 for natural uranium to be delivered between calendar years 2011 to 2020 to be awarded to multiple suppliers. Nufcor was selected to supply uranium concentrates between calendar years 2012 to 2014. This contract was amended from the supply of uranium concentrates to uranium hexafluoride as part of the FY2012 conversion procurement.
313179	UG USA	Energy Northwest established a no-requirements contract with UG USA in 2003 to supply uranium, conversion and/or enrichment services. Each individual purchase under the contract will require approval of the Energy Northwest management, Executive Board and BPA, as required.
335900	USEC	Energy Northwest established a contract with USEC in May 2012 for the supply of 4.44 million SWU of enrichment services contained in 482 MTU of enriched uranium product produced from the enrichment of 9,075 MTU of depleted uranium supplied to Energy Northwest by DOE. The approved contract value is $706 million.

335903	DOE	Energy Northwest established a contract with DOE in May 2012 for the supply of 9,075 MTU of depleted uranium and the storage of 482 MTU of enriched uranium product. Energy Northwest will pay DOE for actual costs incurred by DOE for the delivery of the depleted uranium and storage of the EUP.
335901	TVA	Energy Northwest established a contract with TVA in May 2012 for the sale of 2.9 million SWU and 1,675 MTU of feed contained in EUP produced by Depleted Uranium Enrichment Program for $730.2 million over TVA fiscal years 2015 to 2022.

Energy Northwest
Columbia Generating Station

FY 2013
Fuel Management Plan

Rev. 0

March 2013

S. M. Praetorius
Program Mgr. Nuclear Fuel Procurement

Section

1

Introduction

The Project Agreement between Energy Northwest and Bonneville Power Administration (BPA) for Columbia Generating Station requires Energy Northwest to submit with each annual budget a Ten-Year Fuel Management Plan.

This Fuel Management Plan for fiscal year (FY) 2013 covers the period from July 1, 2012, through June 30, 2022. This plan includes a cash flow analysis for expenditures and credits for each major component of the fuel cycle by month for the first five (5) years. Also, the contracts for each component of the fuel cycle are discussed. The tables and figures are located at the end of the text.

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Section

2

Assumptions

Economic

Table 1 gives the predicted market prices for uranium concentrates (U_3O_8) and conversion and enrichment services. Forward market price data was taken from the *2011 Nuclear Fuel Cycle Supply and Price Report*, provided by Energy Resources International. Over the past year, the spot price for uranium has cycled between lows of $49.25 per lb. U_3O_8 to highs of $72.25 per lb. according to TradeTech, www.uranium.info, historical uranium prices. Spot price is a reflection of very near term inventory supply and demand dynamics. The accident at the Fukushima Daiichi reactors in Japan in March 2011 has caused significant changes in the spot market. Current spot demand is limited as utilities had previously moved to lock up additional forward years' requirements shortly after the price spike in 2007. Over the past year the term price has decreased from $70 per lb. U_3O_8 to $61 per lb. Term price is more closely tied to cost of production and does not exhibit the volatility seen with the spot price but does tend to follow the overall trend of the spot price. In any event, forward price projections predict the price to increase steadily as new mines begin production. The price projections for enrichment services remain near historical highs as new enrichment plants are being built. Prices are predicted to begin to decline once the plants are at full capacity. Near term enrichment prices have begun to decline due to surplus capacity being available due to delayed deliveries as a result of the extended reactor shutdowns in Japan and Germany following the accident at Fukushima Daiichi.

Energy Northwest's significant uranium inventory, mid-term uranium contracts and the long-term enrichment contract continue to minimize the near term impact of the rapid rise in fuel prices. The prices from the uranium and enrichment contracts are factored into the cash flow requirements but are not reflected in the prices in Table 1.

Fuel Cycle

Table 2 shows the assumptions for the fuel cycles used in this plan. Minor changes may occur in the process of design finalization. The planned energy requirements are consistent with the energy requirements supplied by BPA in accordance with the Project Agreement.

Both Final Feedwater Temperature Reduction (FFTR) and Thermal Power Level Coast-Down are planned for cost optimization during the final five to seven weeks of the operating run. During FFTR, the operation of the plant is extended at 100% thermal power level for 8-10 days while the electrical power level gradually decreases by about 1%. During coast-down, the power level is expected to decrease at a rate of 0.5% per day. The Fuel Management Plan assumes 9 days of FFTR and 21 days of coast-down for a total of 30 days of cycle extension for Cycle 22. Future cycles assume a total of 30 days of cycle extension. The planned cycle energy is within the acceptable range provided by BPA for energy requirements for fuel loading in Cycle 22.

The generation factor refers to the amount of energy that is expected to be generated relative to the maximum potential generation from when the generator is synchronized to the grid to when the reactor is shut down for the outage.

The generation factor and outage length are the critical parameters that determine the cycle energy from which the fuel requirements and ultimately the fuel budget is derived.

Section

3

Nuclear Fuel Market

Uranium Market

The uranium market has experienced dramatic fluctuations in price over the past eight years. In January 2003, the price of uranium was $10.20 per lb U_3O_8. The market price peaked in June 2007 at $135 per lb U_3O_8. The spot price was at a near term high of $72.25 in February 2011 and currently stands at $52.00 per lb U_3O_8 at the end of December 2011. At the time of the dramatic price increase, utilities moved to place their uncommitted requirements for the next three to six years under contract in an attempt to mitigate supply disruptions and limit their vulnerability to further price increases. As a result, spot supply and demand is very limited leading to market volatility where a 10% change in price from month to month is not uncommon.

A number of investment funds have also entered the market buying uranium, which places additional demand on already short supplies. Although this demand has contributed to the price rise, it also provides a source of liquidity to the market since the investors are solely looking for a return-on-investment. The economic credit crisis in 2008 resulted in the majority of funds starting to liquidate their inventory to raise cash leading to a softening of price. The funds have not been quick to return to the market as the price continues to decline and the accident at Fukushima Daiichi raises additional concerns in their minds about nuclear in general.

The Department of Energy (DOE) has finalized agreements to barter uranium to pay for the cleanup costs at the Portsmouth site for the next four years. DOE issued an Excess Uranium Inventory Management Plan on December 16, 2008 calling for planned annual sales of between 1.5 and 10.3 million pounds U_3O_8 equivalent through the 2017 timeframe. The barter amounts are within this plan.

Price projections indicate a close relationship between the projections and the current term price and show a steady increase in price over the next ten (10) years. The following table lists known factors affecting price:

Push Price Up	Push Price Down
New demand from India	Possible short term over-production
Increased worldwide demand for reactors: • China • Russia • Middle East • United States	Government policies • DOE Excess Uranium Sales
Production problems at mines • Cigar Lake mine flooding • Olympic Dam mine shaft damage	Investor selling • Unknown factor at this time
Low cost uranium mined first • McArthur River • Kazakhstan in situ leach mines	Decreased demand due to reactor shutdowns: • Japan • Germany
Development of uranium mines delayed • Olympic Dam expansion	Delay in new plant construction • United States • Asia
Overall decrease in availability of secondary supplies • US-Russia HEU deal ends in 2013 • Currently secondary supplies provide for 35% of world-wide requirements	
Interest/exchange rates • US dollar is weak against the major producer currencies	

Conversion Services

Spot conversion prices are currently at $7.50 per KgU relative to the term price of $16.75 per KgU as reported by TradeTech. Similar to U_3O_8, the price projections for conversion services indicate a close relationship between the projections and the current term price. Long-term prices are predicted to remain relatively stable into the foreseeable future. However, DOE sales activity will continue to suppress spot conversion prices as DOE sales are in the form of UF_6.

The current term price levels do allow for new expansion needed to upgrade or replace aging plants. Cameco has signed a toll-conversion agreement with British Nuclear Fuels plc (BNFL) to acquire uranium conversion services from BNFL's Springfield plant in Lancashire, UK. Comhurex is building another conversion facility to replace its existing plant in France. In addition, ConverDyn has started discussions with a European enrichment company to jointly build a new conversion plant in the UK.

Enrichment Market

The enrichment market has also seen price increases over the past few years. The spot price in January 2006 was $116 per Separative Work Unit (SWU) and has risen to a high of $165 per SWU in January 2010 with current market price reported by TradeTech at $140 per SWU. Near term enrichment prices have begun to decline due to surplus capacity being available due to delayed deliveries as a result of the extended reactor shutdowns in Japan and Germany following the accident at Fukushima Daiichi. The higher the tails assay, the more uranium feed is required and the less enrichment services. The lower the tails assay, the more enrichment services are required and less uranium feed. At the current prices for uranium and enrichment services, the optimum tails assay has reduced to 0.25% from historical levels of 0.30%. The result is an increase in enrichment demand and reduction in uranium demand. The price increase is also being driven by limited supply to meet the higher demand in the face of rising supply costs. Both the US and European gaseous diffusion plants (GDP) have experienced production cost increases due to an increase in power prices. Electricity costs account for nearly 60% of the enrichment costs at GDP enrichment plants.

Another factor fueling price increases in the near term is the fact that all three Western suppliers are in the process of either replacing their costly gaseous diffusion with centrifuge technology or expanding their existing capacity. Urenco has commenced operations at its new enrichment facility in New Mexico using its proven centrifuge technology. In addition, Urenco has increased the capacity at each of their European plants. AREVA has also commenced operations at their new gaseous centrifuge plant to replace their GDP facility at Tricastin in France. AREVA has also announced plans to build a domestic centrifuge plant in Idaho and has received a $2 billion loan guarantee from the DOE. General Electric has submitted a construction and operating license application for their laser enrichment facility in North Carolina, but has not made the decision to build a plant. Although the United States Enrichment Corporation (USEC) is also planning to replace their GDP facility in Kentucky with a gaseous centrifuge plant, USEC was denied a DOE loan guarantee for its American Centrifuge Plant in Ohio until the technology could be further proven.

USEC has drastically cut expenditures on its new plant while it tries to satisfy the DOE requirements.

Russian access to the US market continues to be restricted due to the Megatons-to-Megawatts program, which is set to expire in 2013. This program down-blended highly enriched uranium from weapons to low enrichments needed for use in nuclear power plants. However, the current Russian suspension agreement has been re-negotiated to allow increasing amounts of material to be supplied into the US market beginning in 2014. The impact of this new supply should help stabilize or lower prices in the long term.

Fuel Fabrication

Currently, three fabricators supply fabricated fuel to the US BWR community: Global Nuclear Fuel (GNF), AREVA and Westinghouse. There have been no major supply disruptions in the fabrication sector, which looks well poised to support any domestic nuclear renaissance. AREVA announced consolidation of its PWR and BWR fabrication facilities and has moved its PWR fuel fabrication from Virginia to Richland, WA.

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Section

4

Fuel Management Strategy

Fuel Cycle Designs

During FY2012, Columbia will be in the first half of Cycle 21. This is the second reload of the GE14 fuel design. The current bundle and core design contain a batch size of 244 assemblies with an average enrichment of ~4.08 wt% U^{235}. The Cycle 21 core has energy available to be able to operate at 100% power for 621 days plus an additional 30 days of cycle extension (9 days of FFTR and 21 days of coast-down).

Fuel Procurement Strategy

Energy Northwest has established a fuel procurement strategy to 1) achieve the long-term goal of a secure and consistently low cost fuel supply, and 2) be flexible enough to take advantage of cost saving opportunities as they arise. Energy Northwest signed a number of agreements from 2003-2006 culminating in the Uranium Tails Pilot Proejct. Energy Northwest has been essentially drawing down this inventory since that time. This has allowed Energy Northwest to forego contracting during the price spike in 2007. In addition, Energy Northwest contracted for enrichment services in the beginning of 2006 for supply in 2010-2015 thereby "beating" the price jump in enrichment services. Energy Northwest signed two uranium supply contracts in 2009 for delivery over FY2011-FY2014 for a total of 1,540,000 pounds of U_3O_8, with the rights to purchase additional optional quantities.

Typically Energy Northwest strives to maintain a strategic inventory of one reload's worth of enriched uranium and approximately half a reload of natural uranium. Energy Northwest made a purchase of enriched uranium during Fiscal Year 2011 for strategic inventory due to reduced market prices. Energy Northwest will continue to make uranium and conversion purchases to maintain strategic inventory levels of natural uranium.

Fuel Procurement Activities

In FY 2012, Energy Northwest issued a Request for Proposal (RFP) for the supply of conversion services for Fiscal Years 2012-2014 with the intent to buy when prices are lower than the forecasted term prices and avoid storage fees on U_3O_8. The total quantity of conversion requested under the RFP equates to slightly more than one reload.

Fabrication Services

A fabrication services contract for Columbia Generating Station for the fuel supply for three reloads was awarded to GNF in June 2007. The 2011 refueling outage will be the second reload of GNF's GE14 fuel design. There is the option to begin loading the advanced GNF2 design in subsequent cycles. A detailed evaluation will be done to determine the merits of loading the GNF2 design prior to making a recommendation to management.

Energy Northwest is pursuing the licensing and implementation of the operating flexibility program for APRM, RBM Technical Specifications (ARTS) Improvement and Maximum Extended Load Line Limit Analysis (MELLLA) and supply of the Power Range Neutron Monitoring (PRNM) Nuclear Measurement Analysis and Control (NUMAC) system with Option III Stability for the Columbia Generation Station. This project is referred to as "ARTS/MELLLA and PRNM". The project has an approved budget of $23.3 million for Fiscal Years 2009-2015, excluding financing costs. The benefits to the station are reduced fuel cost due to reduced batch size and improved fuel utilization, increased operating flexibility, increased net generation due to reduced recirculation pump speed, reduction in the number of downpowers to reposition control rods, reduction of nuisance alarms in the control room, and improved equipment reliability by replacing obsolete and aging equipment. The project was originally planned to be installed in 2011 refueling outage but has been delayed due to PRNM licensing issues and is now planned to be installed in the 2015 Refueling Outage. As a result, Energy Northwest has begun discussions with GNF to extend the existing fabrication services contract one additional cycle to 2015. The project is a Fuel Capital project and is financed using bond proceeds.

Other Fabrication Costs

A number of costs in addition to vendor fabrication costs for the fuel bundles and analytical services are included as fabrication costs. These costs address the following types of activities:

- Fuel receipt & inspection
- Fuel procurement
- Fuels' staff
- Fuel consultants
- Fuels' work-station and code fees
- Fuels' travel and training

Fuel Management Physical Requirements

The assumed cycle energies and fuel designs are used to develop multi-cycle reload material requirement projections. The projected reload material requirements are integrated with the existing inventory levels to project procurement requirements into the future. Tables 3 and 4 summarize those requirements over the next ten years.

Table 3 assumes uranium is purchased as uranium concentrates (U_3O_8). Conversion services must then be purchased to convert the concentrates to uranium hexafluoride (UF_6). Enrichment services are then purchased to convert the natural UF_6 to enriched UF_6. The enriched UF_6 is transferred to the fabrication facility and used to fabricate the necessary quantity of fuel assemblies. Table 4 shows the total material of each form existing as of the end of each fiscal year. Typically, the processing time from concentrates to fabricated fuel assemblies is one year, allowing for the necessary material lead times at each step in the process. Therefore, the majority of the material in Table 4 is considered to be working stock with a lesser portion considered the strategic inventory.

Spent Fuel Storage and Disposal

DOE Spent Fuel Contract

While the courts have now ruled that DOE had a binding obligation to begin acceptance of spent nuclear fuel no later than January 31, 1998, DOE has suspended all work on the license application for the Yucca Mountain underground storage repository. Energy Northwest began legal action due to DOE's failure to meet its obligations for spent fuel and on August 29, 2011, Energy Northwest received $48,702,551 from DOE for expenditures made on the Independent Spent Fuel Storage Installation (ISFSI) prior to September 1, 2006. Energy Northwest will continue further legal action to recover expenditures made on ISFSI starting September 1, 2006. Energy Northwest continues to pay a waste disposal fee as indicated in the category of Disposal.

On-Site Spent Fuel Storage

Columbia Generating Station operates an Independent Spent Fuel Storage Installation (ISFSI) using NRC-approved dry storage casks to supplement wet storage in the fuel pool. The ISFSI, located just north of the Deschutes Building, is capable of being expanded to hold the lifetime spent fuel requirements of Columbia Generating Station. Twenty-seven

(27) storage casks have been loaded to date, moving 1,836 assemblies from the fuel pool to the ISFSI.

The costs for the inner storage canister (called a multi-purpose canister or MPC) and closure welds are treated as fuel and are included in this Fuel Management Plan in the category of Casks. The costs of the overpacks, facility, and common equipment are treated as a plant capital addition. The Fiscal Years 2014-2019 cost of a multi-purpose canister is currently estimated to be $928,911 and welding costs are estimated to be $90,807 per MPC. This equates to a per bundle cost of $14,996. The Fiscal Year 2020 and beyond cost of a multi-purpose canister is currently estimated to be $1,640,504 and welding costs are estimated to be $119,590 per MPC. This equates to a per bundle cost of $25,884. Future costs have been escalated.

Active Contracts

Appendix A contains descriptions of the currently active fuel management contracts for nuclear material and fabrication services.

Section

5

Nuclear Fuel Budgets

Nuclear Fuel Costs

A measure of nuclear fuel cost is the Fuel-in-Process costs, or the costs to fabricate finished fuel assemblies. The estimated costs for the reload batch for Cycle 22 are shown in Table 5. Reload batch costs are amortized over the life of the fuel. Typically, fuel resides in the reactor core for three (3) cycles (equivalent to six years).

Fuel Revenue

There is currently no projected cash revenue from Fuels activities in FY2013-FY2022. However, Energy Northwest received a payment of 67,500 KgU of conversion services in December 2011 from the loan of 450,000 KgU of conversion services to ConverDyn. The current spot market value of 67,500 KgU of conversion services would be approximately $506,250.

Nuclear Fuel Cash Flows

The summary of cash requirements for the ARTS/MELLLA and PRNM project for FY 2013 are provided in Table 7. A summary of cash flows by fuel component and fiscal year for the next ten years is given in Table 8. Cash flows for nuclear fuel by month for each component for the next five years are shown in Tables 9 through 13. The cash flows are in today's dollars including the costs associated with the nuclear material (uranium, conversion, enrichment).

Section 6

Tables and Figures

Table 1

Projected Market Fuel Prices

Year	Uranium $/lb U3O8	Conversion $/kgU UF6	Enrichment $/SWU
2013	$50.00	$13.25	$149.00
2014	$51.00	$13.75	$149.00
2015	$52.00	$14.00	$147.00
2016	$53.00	$14.25	$140.00
2017	$54.00	$14.50	$134.00
2018	$55.00	$15.25	$133.00
2019	$56.00	$15.50	$133.00
2020	$57.00	$15.75	$133.00
2021	$58.50	$16.00	$133.00
2022	$60.00	$16.25	$135.00

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Table 2

Fuel Cycle Assumptions

Fiscal Year	Outage Length (Days)	Cycle	Energy FPD	Generation Factor %
2013 2014	40	22	651	94%
2015 2016	47	23	634	94%
2017 2018	40	24	645	94%
2019 2020	40	25	650	94%
2021 2022	40	26	650	94%

Energy FPD = Operating Calendar Days x GF – (Days lost during startup and coastdown)

Table 3

Planned Purchases of Nuclear Material and Fuel Fabrication Requirements

Fiscal Year	Purchases: Lbs U_3O_8	Purchases: KgU UF_6 Conversion	Purchases: SWU	Fabrication: KgU Enriched UF_6	Fabrication: SWU	Fabrication: # Bundles
2013	407,605	156,000	0	408,419	247,556	248
2014	428,507	164,000	137,500			
2015	154,158	59,000	143,000	422,026	255,803	256
2016	300,000	114,817	247,500			
2017	100,000	38,272	132,000	422,026	255,803	256
2018	460,000	176,053	206,800			
2019	460,000	176,053	0	422,026	255,803	256
2020	500,000	191,362	250,000			
2021	500,000	191,362	0	422,026	255,803	256
2022	525,000	200,930	250,000			

Table 4

Nuclear Material Totals

Fiscal Year	Natural UF_6 KgU	Enriched Uranium Product: UF_6	Enriched Uranium Product: SWU
2013	891,189	343,155	215,120
2014	875,883	542,141	340,010
2015	748,405	327,061	214,092
2016	540,472	685,236	438,893
2017	406,611	454,237	302,984
2018	312,988	753,513	490,818
2019	489,041	331,487	235,014
2020	253,848	758,041	485,014
2021	445,210	336,015	229,211
2022	219,586	762,569	479,211

Table 5

Predicted Reload Batch Costs
($1000)

Component	CGS1-21
# of Assemblies	248
Fuel Cost:	
Uranium	$31,095
Conversion	$2,045
Enrichment	$25,943
Fabrication	$27,641
Sales Tax	$6,556
Fuels' Projects	$0
TOTAL	$93,280
Cask Cost:	
TOTAL	$3,719
TOTAL COST:	**$96,999**

Per Assembly Cost
($)

Fuel Cost	$376,131
Cask Cost	$14,996
Total Cost	$391,127

Table 6

Estimated Revenue From Fuel ($1000)

Fiscal Year	Revenue
2013	0
2014	0
2015	0
2016	0
2017	0
2018	0
2019	0
2020	0
2021	0
2022	0

Table 7

FY2013 Fuel Project Cash Flow [1] (ARTS/MELLLA+PRNM)

Month	Cash Flow
Jul-12	$38,500
Aug-12	$50,800
Sep-12	$50,700
Oct-12	$50,700
Nov-12	$50,550
Dec-12	$38,050
Jan-13	$38,050
Feb-13	$29,550
Mar-13	$37,000
Apr-13	$173,700
May-13	$8,700
Jun-13	$8,700
Total	$575,000

[1] The costs of the project will be funded by the issuance of bonds.

Table 8

10-Year Cash Flow for Nuclear Fuel ($1,000)

FY	Uranium	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Fuel Cash[1]	Disposal	Gen Tax
2013	$25,985	$1,393	$0	$1,841	$22,326	$6,556	$2,455	$60,556	$8,879	$4,626
2014	$27,317	$1,465	$17,867	$1,763	$1,535	$0	$3,121	$53,068	$7,880	$4,409
2015	$9,828	$527	$18,910	$1,953	$25,297	$7,825	$371	$64,711	$8,800	$5,269
2016	$15,900	$1,636	$33,309	$1,871	$1,624	$0	$9,034	$63,374	$7,969	$5,050
2017	$5,400	$555	$17,539	$2,072	$27,641	$8,399	$5,948	$67,554	$8,883	$6,106
2018	$25,300	$2,685	$27,831	$1,985	$1,718	$0	$8,008	$67,527	$7,950	$5,804
2019	$25,760	$2,729	$0	$2,198	$29,418	$9,156	$0	$69,261	$8,881	$6,971
2020	$28,500	$3,014	$33,250	$2,105	$1,818	$0	$2,828	$71,515	$7,942	$6,629
2021	$29,250	$3,062	$0	$2,332	$31,315	$9,799	$2,474	$78,232	$8,846	$7,970
2022	$31,500	$3,314	$34,000	$2,198	$1,926	$0	$5,791	$78,729	$7,867	$7,547
Total	$224,740	$20,380	$182,706	$20,318	$144,618	$41,735	$40,030	$674,527	$83,898	$60,381

(1) The total fuel cash does NOT include the costs of the ARTS/MELLLA+PRNM project. The costs of the project will be funded by the issuance of bonds.

Table 9

Fiscal Year 2013 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash[1]	Disposal	Gen Tax
Jul-12	25,985	1,393		153	242			27,773		
Aug-12				153	242			395	2,223	
Sep-12				153	242		620	1,015		
Oct-12				153	242		100	495		
Nov-12				153	242			395	2,243	
Dec-12				153	242			395		
Jan-13				153	242			395		
Feb-13				153	242			395	2,243	
Mar-13				153	242		1,735	2,130		
Apr-13				153	242			395		
May-13				153	19,909	6,556		26,619	2,170	
Jun-13				153				153		4,626
Total	25,985	1,393		1,841	22,326	6,556	2,455	60,556	8,879	4,626

(1) The total fuel cash does NOT include the costs of the ARTS/MELLLA+PRNM project. The costs of the project will be funded by the issuance of bonds.

Table 10

Fiscal Year 2014 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-13	27,317	1,465	17,867	147	128			46,923		
Aug-13				147	128			275	1,263	
Sep-13				147	128		1,239	1,514		
Oct-13				147	128		140	415		
Nov-13				147	128			275	2,230	
Dec-13				147	128		924	1,199		
Jan-14				147	128			275		
Feb-14				147	128			275	2,230	
Mar-14				147	128		272	547		
Apr-14				147	128		272	547		
May-14				147	128		272	547	2,157	
Jun-14				147	128			275		4,409
Total	27,317	1,465	17,867	1,763	1,535		3,121	53,067	7,880	4,409

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Table 11

Fiscal Year 2015 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-14	9,828	527	18,910	163	256			29,684		
Aug-14				163	256			419	2,246	
Sep-14				163	256			419		
Oct-14				163	256			419		
Nov-14				163	256			419	2,278	
Dec-14				163	256			419		
Jan-15				163	256		371	791		
Feb-15				163	256			419	2,278	
Mar-15				163	256			419		
Apr-15				163	256			419		
May-15				163	22,734	7,825		30,722	2,204	
Jun-15				163				163		5,269
Total	9,828	527	18,910	1,953	25,297	7,825	371	64,711	9,006	5,269

Table 12

Fiscal Year 2016 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-15	15,900	1,636		156	135		1,114	18,942		
Aug-15				156	135			291	1,280	
Sep-15				156	135			291		
Oct-15				156	135		1,155	1,446		
Nov-15				156	135			291	2,251	
Dec-15				156	135			291		
Jan-16			33,309	156	135			33,600		
Feb-16				156	135			291	2,251	
Mar-16				156	135		1,800	2,091		
Apr-16				156	135		3,964	4,255		
May-16				156	135		500	791	2,202	
Jun-16				156	135		500	791		5,050
Total	15,900	1,636	33,309	1,871	1,624		9,034	63,373	7,984	5,050

Table 13

Fiscal Year 2017 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-16	5,400	555		173	272			6,399		
Aug-16				173	272			444	2,246	
Sep-16				173	272		929	1,373		
Oct-16				173	272		100	544		
Nov-16				173	272			444	2,237	
Dec-16				173	272		878	1,322		
Jan-17			17,539	173	272			17,983		
Feb-17				173	272			444	2,237	
Mar-17				173	272		4,042	4,486		
Apr-17				173	272			444		
May-17				173	24,924	8,399		33,495	2,163	
Jun-17				173				173		6,106
Total	5,400	555	17,539	2,072	27,641	8,399	5,948	67,554	8,883	6,106

APPENDIX A ACTIVE FUEL CONTRACTS

Appendix A
Active Nuclear Material Contracts

Contract	Vendor	Scope
324350	Global Nuclear Fuel	Energy Northwest contracted with GNF in June 2007 to supply fuel design, licensing, and fabrication services for three consecutive reloads for Columbia Generating Station. The first reload under this contract was delivered in the spring of 2009. The scope of this contract will meet the needs of Columbia Generating Station for reload fabrication services through 2013. This contract is currently under negotiation to extend the supply one additional reload (2015).
313337	Urenco	Energy Northwest contracted with Urenco in January 2003 to supply enrichment services for delivery over calendar years 2005 to 2009. The contract was amended (twice) to procure additional SWU. In January 2006, Energy Northwest issued RFP 640137 for SWU to be delivered between calendar years 2010 to 2015. Urenco was awarded the procurement and the contract extended through 2015. The contract has been amended two additional times to move deliveries to meet the needs of both Urenco and Energy Northwest extending the contract through 2017.
330249	Nufcor International Limited	In July 2009, Energy Northwest issued RFP 656708 for natural uranium to be delivered between calendar years 2011 to 2020 to be awarded to multiple suppliers. Nufcor was selected to supply uranium concentrates between calendar years 2012 to 2014. This contract is to be amended from the supply of uranium concentrates to uranium hexafluoride as part of the FY2012 conversion procurement.
313179	UG USA	Energy Northwest established a no-requirements contract with UG USA in 2003 to supply uranium, conversion and/or enrichment services. Each individual purchase under the contract will require approval of the Energy Northwest management, Executive Board and BPA, as required.
334070	UG USA	Energy Northwest established a contract with UG USA for the storage of uranium concentrates in 2011. The contract provides free storage until April 2012, with storage fees of $0.30 per pound per year thereafter. The maximum amount allowed in storage is 1 million pounds.

Energy Northwest
Columbia Generating Station

FY 2012
Fuel Management Plan

Rev. 0

March 2011

Reactor Fuels Engineering

Section 1

Introduction

The Project Agreement between Energy Northwest and Bonneville Power Administration (BPA) for Columbia Generating Station requires Energy Northwest to submit with each annual budget a Ten-Year Fuel Management Plan.

This Fuel Management Plan for fiscal year (FY) 2012 covers the period from July 1, 2011, through June 30, 2021. This plan includes a cash flow analysis for expenditures and credits for each major component of the fuel cycle by month for the first five (5) years. Also, the contracts for each component of the fuel cycle are discussed. The tables and figures are located at the end of the text.

Section

2

Assumptions

Economic

Table 1 gives the predicted market prices for uranium concentrates (U_3O_8) and conversion and enrichment services. Forward market price data was taken from the 4Q2010 Ux Consulting Market Reports. Over the past year, the spot price for uranium has cycled between lows of $40.50 per lb U_3O_8 to highs of $72.25 per lb. according to TradeTech, www.uranium.info, historical uranium prices. Spot price is a reflection of very near term inventory supply and demand dynamics. Current spot supply and demand are limited as utilities had previously moved to lock up additional forward years' requirements shortly after the price spike in 2007. Over the past year the term price has increased from $60 per lb U_3O_8 to $70 per lb. Term price is more closely tied to cost of production and does not exhibit the volatility seen with the spot price but does tend to follow the overall trend of the spot price. In any event, forward price projections predict the price to increase steadily as new mines begin production. The price projections for enrichment services remain near historical highs as new enrichment plants are being built. Prices are predicted to begin to decline once the plants are at full capacity.

Energy Northwest's significant uranium inventory, mid-term uranium contracts and the long-term enrichment contract continue to minimize the near term impact of the rapid rise in fuel prices. The prices from the uranium and enrichment contracts are factored into the cash flow requirements but are not reflected in the prices in Table 1.

Fuel Cycle

Table 2 shows the assumptions for the fuel cycles used in this plan. Minor changes may occur in the process of design finalization. The planned energy requirements are consistent with the energy requirements supplied by BPA in accordance with the Project Agreement.

Both Final Feedwater Temperature Reduction (FFTR) and Thermal Power Level Coast-down are planned for cost optimization during the final five to seven weeks of the operating run. During FFTR, the operation of the plant is extended at 100% thermal power level for 8-10 days while the electrical power level gradually decreases by about 1%. During coast-down, the power level is expected to decrease at a rate of 0.5% per day. The Fuel Management Plan assumes 9 days of FFTR and 21 days of coast-down

for a total of 30 days of cycle extension for Cycle 21. Future cycles assume a total of 30 days of cycle extension. The cycle energy is within the acceptable range provided by BPA for energy requirements for fuel loading in Cycle 21.

The generation factor refers to the amount of energy that is expected to be generated relative to the maximum potential generation from when the generator is synchronized to the grid to when the reactor is shut down for the outage.

The generation factor and outage length are the critical parameters that determine the cycle energy from which the fuel requirements and ultimately the fuel budget is derived.

Section

3

Nuclear Fuel Market

Uranium Market

The uranium market has experienced dramatic fluctuations in price over the past eight years. In January 2003, the price of uranium was $10.20 per lb U_3O_8. The market price peaked in June 2007 at $135 per lb U_3O_8. The spot price hit a low of $40.50 in February 2010 and currently stands at $72.25 per lb U_3O_8 at the end of January 2011. At the time of the dramatic price increase, utilities moved to place their uncommitted requirements for the next three to six years under contract in an attempt to mitigate supply disruptions and limit their vulnerability to further price increases. As a result, spot supply and demand is very limited leading to market volatility where a 10% change in price from month to month is not uncommon.

A number of investment funds have also entered the market buying uranium, which places additional demand on already short supplies. Although this demand has contributed to the price rise, it also provides a source of liquidity to the market since the investors are solely looking for a return-on-investment. The economic credit crisis in 2008 resulted in some funds liquidating their inventory to raise cash leading to a softening of price.

In recent years, the DOE announced plans to barter uranium to pay for the cleanup costs at the Portsmouth site for the next four years. The market quickly reacted to this unexpected source of supply by exhibiting a price drop into the low $40's. This caused market prices to remain depressed into calendar year 2010 and have recently began to increase. DOE issued an Excess Uranium Inventory Management Plan on December 16, 2008 calling for planned annual sales of between 1.5 and 10.3 million pounds U_3O_8 equivalent through the 2017 timeframe

Price projections indicate a close relationship between the projections and the current term price and show a steady increase in price over the next ten (10) years. The following table lists known factors affecting price:

Push Price Up	Push Price Down
New demand from India	Possible short term over-production
Increased worldwide demand for reactors: • China • Russia • Middle East • United States	Government policies • DOE Excess Uranium Sales
Production problems at mines • Cigar Lake mine flooding • Olympic Dam mine shaft damage	Investor selling • Unknown factor at this time
Low cost uranium mined first • McArthur River • Kazakhstan in situ leach mines	
Development of high cost uranium delayed • Olympic Dam expansion	
Overall decrease in availability of secondary supplies • US-Russia HEU deal ends in 2013 • Drawdown of utility inventories • Currently secondary supplies provide for 35% of world-wide requirements	
Interest/exchange rates • US dollar is weak against the major producer currencies	

Conversion Services

Spot conversion prices are currently at $12.85 per KgU relative to the term price of $15.00 per KgU as reported by TradeTech. Conversion prices are up on reduced supply due to a worker lockout at the ConverDyn facility in Metropolis, Illinois. Similar to U_3O_8, the price projections for conversion services indicate a close relationship between the projections and the current term price. Long-term prices are predicted to remain relatively stable into the foreseeable future. However, increased DOE sales activity will reduce spot conversion prices as DOE sales are in the form of UF_6.

The current price levels do allow for new expansion needed to upgrade or replace aging plants. Cameco has signed a 10 year toll-conversion agreement with British Nuclear Fuels plc (BNFL) to acquire uranium conversion services from BNFL's Springfields plant in Lancashire, UK. Comhurex is building another conversion facility to replace its existing plant in France. In addition, ConverDyn has started discussions with a European enrichment company to jointly build a new conversion plant in the UK.

Enrichment Market

The enrichment market has also seen price increases over the past few years. The spot price in January 2006 was $116 per Separative Work Unit (SWU) and has risen to a high of $165 per SWU in January 2010 with current market price reported by TradeTech at $155 per SWU. This increase is due in part to increasing demand from lower tails assays. Enrichment customers have the option to order enrichment services with a range of tails assays. The higher the tails assay, the more uranium feed is required and the less enrichment services. The lower the tails assay, the more enrichment services are required and less uranium feed. At the current prices for uranium and enrichment services, the optimum tails assay has reduced to 0.25% from historical levels of 0.30%. The result is an increase in enrichment demand and reduction in uranium demand. The price increase is also being driven by limited supply to meet the higher demand in the face of rising supply costs. Both the US and European gaseous diffusion plants (GDP) have experienced production cost increases due to an increase in power prices. Electricity costs account for nearly 60% of the enrichment costs at GDP enrichment plants.

Another factor fueling price increases in the near term is the fact that all three Western suppliers are in the process of either replacing their costly gaseous diffusion with centrifuge technology or expanding their existing capacity. Urenco has commenced operations at its new enrichment facility in New Mexico using its proven centrifuge technology. In addition, Urenco has increased the capacity at each of their European plants. AREVA is also preparing to commence operations at their new gaseous centrifuge plant to replace their GDP facility at Tricastin in France. AREVA has also announced plans to build a domestic centrifuge plant in Idaho and has received a $2 billion loan guarantee from the DOE. General Electric has submitted a construction and operating license application for their laser enrichment facility in North Carolina. Although the United States Enrichment Corporation (USEC) is also planning to replace their GDP facility in Kentucky with a gaseous centrifuge plant, USEC was denied a DOE loan guarantee for its American Centrifuge Plant in Ohio until the technology could be further proven. USEC has drastically cut

expenditures on its new plant while it tries to satisfy the DOE requirements.

Russian access to the US market continues to be restricted due to the Megatons-to-Megawatts program, which is set to expire in 2013. This program down-blended highly enriched uranium from weapons to low enrichments needed for use in nuclear power plants. However, the current Russian suspension agreement has been re-negotiated to allow increasing amounts of material to be supplied into the US market beginning in 2014. The impact of this new supply should help stabilize or lower prices in the long term.

Fuel Fabrication

Currently, three fabricators supply fabricated fuel to the US BWR community: Global Nuclear Fuel (GNF), AREVA and Westinghouse. There have been no major supply disruptions in the fabrication sector, which looks well poised to support any domestic nuclear renaissance. AREVA announced consolidation of its PWR and BWR fabrication facilities and has moved its PWR fuel fabrication from Virginia to Richland, WA.

Section

4

Fuel Management Strategy

Fuel Cycle Designs

During FY2012, Columbia will be in the first half of Cycle 21. This is the second reload of the GE14 fuel design. The current bundle and core design contain a batch size of 244 assemblies with an average enrichment of ~4.08 wt% U^{235}. The Cycle 21 core has energy available to be able to operate at 100% power for 621 days plus an additional 30 days of cycle extension (9 days of FFTR and 21 days of coast-down).

Fuel Procurement Strategy

In 2002, Energy Northwest established a fuel procurement strategy to 1) achieve the long-term goal of a secure and consistently low cost fuel supply, and 2) be flexible enough to take advantage of cost saving opportunities as they arise. Energy Northwest signed a number of agreements from 2003-2006 culminating in the Uranium Tails Pilot Proejct. Energy Northwest has been essentially drawing down inventory since that time. This has allowed Energy Northwest to forego contracting during the price spike in 2007. In addition, Energy Northwest contracted for enrichment services in the beginning of 2006 for supply in 2010-2015 thereby "beating" the price jump in enrichment services. Energy Northwest signed two uranium supply contracts in 2009 for delivery over FY2011-FY2014 for a total of 1,540,000 pounds of U_3O_8, with the rights to purchase additional optional quantities.

Typically Energy Northwest strives to maintain a strategic inventory of one reload's worth of enriched uranium and approximately half a reload of natural uranium. Energy Northwest made a purchase of enriched uranium during Fiscal Year 2011 for strategic inventory due to reduced market prices. Energy Northwest will continue to make uranium and conversion purchases to maintain strategic inventory levels of natural uranium.

Fuel Procurement Activities

In FY 2011, Energy Northwest issued a request for Proposal (RFP) for the supply of Enriched Uranium Products (EUP) for Fiscal Year 2011 with the intent to buy when prices are lower than the forecasted prices in 2017 and beyond. The total quantity of uranium requested under the RFP equates to roughly 0.7 reloads.

There were two offers received. Bids were received from UG USA and United States Enrichment Company (USEC). Awards were made for approximately one half of the total quantity to each of the bidders.

Fabrication Services

A fabrication services contract for Columbia Generating Station for the fuel supply for three reloads was awarded to GNF in June 2007. The 2011 refueling outage will be the second reload of GNF's GE14 fuel design. There is the option to begin loading the advanced GNF2 design in subsequent cycles. A detailed evaluation will be done to determine the merits of loading the GNF2 design prior to making a recommendation to management.

Energy Northwest is pursuing the licensing and implementation of the operating flexibility program for APRM, RBM Technical Specifications (ARTS) Improvement and Maximum Extended Load Line Limit Analysis (MELLLA) and supply of the Power Range Neutron Monitoring (PRNM) Nuclear Measurement Analysis and Control (NUMAC) system with Option III Stability for the Columbia Generation Station. This project is referred to as "ARTS/MELLLA and PRNM". The project has an approved budget of $19.7 million (for Fiscal years 09-11) excluding financing costs. The benefits to the station are reduced fuel cost due to reduced batch size and improved fuel utilization, increased operating flexibility, increased net generation due to reduced recirculation pump speed, reduction in the number of downpowers to reposition control rods, reduction of nuisance alarms in the control room, and improved equipment reliability by replacing obsolete and aging equipment. The project was originally planned to be installed in 2011 refueling outage but has been delayed due to PRNM licensing issues and is now planned to be installed in the 2013 refueling outage. The cost of the project will be included in the Cycle 22 reload batch costs. The project is a Fuel Capital project and is financed using bond proceeds.

Other Fabrication Costs

A number of costs in addition to vendor fabrication costs for the fuel bundles and analytical services are included as fabrication costs. These costs address the following types of activities:

- Fuel receipt & inspection
- Fuel procurement
- Fuels' staff

- Fuel consultants
- Fuels' work-station and code fees
- Fuels' travel and training

Fuel Management Physical Requirements

The assumed cycle energies and fuel designs are used to develop multi-cycle reload material requirement projections. The projected reload material requirements are integrated with the existing inventory levels to project procurement requirements into the future. Tables 3 and 4 summarize those requirements over the next ten years.

Table 3 assumes uranium is purchased as uranium concentrates (U_3O_8). Conversion services must then be purchased to convert the concentrates to uranium hexafluoride (UF_6). Enrichment services are then purchased to convert the natural UF_6 to enriched UF_6. The enriched UF_6 is transferred to the fabrication facility and used to fabricate the necessary quantity of fuel assemblies. Table 4 shows the total material of each form existing as of the end of each fiscal year. Typically, the processing time from concentrates to fabricated fuel assemblies is one year, allowing for the necessary material lead times at each step in the process. Therefore, the majority of the material in Table 4 is considered to be working stock with a lesser portion considered the strategic inventory.

Spent Fuel Storage and Disposal

DOE Spent Fuel Contract

While the courts have now ruled that DOE had a binding obligation to begin acceptance of spent nuclear fuel no later than January 31, 1998, DOE has suspended all work on the license application for the Yucca Mountain underground storage repository. Energy Northwest is continuing to pursue legal action against DOE regarding DOE's failure to begin accepting spent fuel in 1998. Energy Northwest continues to pay a waste disposal fee as indicated in the category of Disposal.

On-Site Spent Fuel Storage

Columbia Generating Station operates an Independent Spent Fuel Storage Installation (ISFSI) using NRC-approved dry storage casks to supplement wet storage in the fuel pool. The ISFSI, located just north of the Deschutes Building, is capable of being expanded to hold the lifetime spent fuel requirements of Columbia Generating Station. Twenty-seven

(27) storage casks have been loaded to date, moving 1,836 assemblies from the fuel pool to the ISFSI.

The costs for the inner storage canister (called a multi-purpose canister) and closure welds are treated as fuel and are included in this Fuel Management Plan in the category of Casks. The costs of the overpacks, facility, and common equipment are treated as a plant capital addition. The Fiscal Years 2014-2019 cost of a multi-purpose canister is currently estimated to be $928,911 and welding costs are estimated to be $90,807 per MPC. This equates to a per bundle cost of $14,996. The Fiscal Year 2020 and beyond cost of a multi-purpose canister is currently estimated to be $1,640,504 and welding costs are estimated to be $119,590 per MPC. This equates to a per bundle cost of $25,884. Future costs have been escalated.

Active Contracts

Appendix A contains descriptions of the currently active fuel management contracts for nuclear material and fabrication services.

Section

5

Nuclear Fuel Budgets

Nuclear Fuel Costs

A measure of nuclear fuel cost is the Fuel-in-Process costs, or the costs to fabricate finished fuel assemblies. The estimated costs for the reload batch for Cycle 21 are shown in Table 5. Reload batch costs are amortized over the life of the fuel. Typically, fuel resides in the reactor core for three (3) cycles (equivalent to six years).

Fuel Revenue

There is currently no projected cash revenue from Fuels activities in FY2012-FY2021. However there is a payment of 67,500 KgU of conversion services in December 2012 from the loan of 450,000 KgU of conversion services to ConverDyn. The current spot market value of 67,500 KgU of conversion services would be approximately $867,000.

Nuclear Fuel Cash Flows

The summary of cash requirements for the ARTS/MELLLA and PRNM project for FY 2012 are provided in Table 7. A summary of cash flows by fuel component and fiscal year for the next ten years is given in Table 8. Cash flows for nuclear fuel by month for each component for the next five years are shown in Tables 9 through 13. The cash flows are in today's dollars including the costs associated with the nuclear material (uranium, conversion, enrichment).

Section

6

Tables and Figures

Table 1

Projected Market Fuel Prices

Year	Uranium $/lb U3O8	Conversion $/kgU UF6	Enrichment $/SWU
2012	$59.33	$16.29	$154.09
2013	$63.15	$16.64	$153.37
2014	$66.50	$16.82	$152.18
2015	$68.85	$16.90	$151.13
2016	$70.55	$16.97	$150.23
2017	$72.00	$16.86	$150.26
2018	$73.35	$16.72	$151.00
2019	$73.15	$16.75	$152.40
2020	$72.65	$16.75	$153.53
2021	$72.65	$16.75	$153.53

Table 2

Fuel Cycle Assumptions

Fiscal Year	Outage Length (Days)	Cycle	Energy FPD	Generation Factor %
2012				
2013	40	22	630	93%
2014				
2015	31	23	646	93%
2016				
2017	29	24	648	93%
2018				
2019	27	25	650	93%
2020				
2021	30	26	647	93%

Energy FPD = Operating Calendar Days x GF – (Days lost during startup and coastdown)

Table 3

Planned Purchases of Nuclear Material and Fuel Fabrication Requirements

	Purchases			Fabrication		
Fiscal Year	Lbs U_3O_8	KgU UF_6 Conversion	SWU	KgU Enriched UF_6	SWU	# Bundles
2012	223,631	0	205,700			
2013	430,000	0	0	428,182	259,534	260
2014	405,000	175,000	137,500			
2015	305,000	300,000	143,000	406,639	244,773	252
2016	292,391	50,000	247,500			
2017	200,000	50,000	132,000	400,185	240,888	248
2018	450,000	200,000	206,800			
2019	450,000	200,000	0	400,185	240,888	248
2020	450,000	200,000	210,000			
2021	450,000	200,000	0	400,185	240,888	248

Table 4

Nuclear Material Totals

Fiscal Year	Lbs U_3O_8	Natural UF_6 KgU	Enriched Uranium Product	
			UF_6	SWU
2012	400,000	585,543	752,912	462,586
2013	653,633	653,043	324,730	203,051
2014	601,384	648,737	523,716	327,941
2015	122,529	762,259	324,023	213,053
2016	284,277	489,509	682,198	437,854
2017	353,635	367,375	473,040	316,861
2018	281,065	297,699	772,316	504,695
2019	208,495	497,699	372,131	263,807
2020	135,925	532,506	537,324	473,807
2021	63,355	319,524	550,121	232,919

Table 5

Predicted Reload Batch Costs
($1000)

Component	CGS1-21
# of Assemblies	244
Fuel Cost:	
Uranium	$24,667
Conversion	$2,122
Enrichment	$21,043
Fabrication	$26,540
Sales Tax	$5,499
Fuels' Projects	$0
TOTAL	$79,872
Cask Cost:	
TOTAL	$3,659
TOTAL COST:	**$83,531**

Per Assembly Cost
($)

Fuel Cost	$327,343
Cask Cost	$14,996
Total Cost	$342,339

Table 6

Estimated Revenue From Fuel ($1000)

Fiscal Year	Revenue
2012	0
2013	0
2014	0
2015	0
2016	0
2017	0
2018	0
2019	0
2020	0

Table 7

FY2012 Fuel Project Cash Flow [1] (ARTS/MELLLA+PRNM)

Month	Cash Flow
Jul-11	$32,949
Aug-11	$38,752
Sep-11	$33,156
Oct-11	$32,779
Nov-11	$44,883
Dec-11	$30,840
Jan-12	$40,692
Feb-12	$36,577
Mar-12	$38,634
Apr-12	$38,634
May-12	$40,692
Jun-12	$38,406
Total	$447,000

[1] The costs of the project will be funded by the issuance of bonds.

Table 8

10-Year Cash Flow for Nuclear Fuel ($1,000)

FY	Uranium	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Fuel Cash[1]	Disposal	Gen Tax
2012	$12,948	$0	$26,221	$1,662	$1,817	$0	$2,850	$45,498	$7,550	$3,582
2013	$27,413	$0	$0	$1,841	$24,763	$7,047	$2,455	$63,518	$8,732	$4,730
2014	$25,819	$2,943	$18,143	$1,763	$1,446	$0	$3,121	$53,235	$7,831	$4,417
2015	$19,444	$5,070	$19,201	$1,953	$25,647	$7,850	$371	$79,535	$8,818	$5,234
2016	$20,628	$849	$33,707	$1,871	$2,050	$0	$9,034	$68,138	$8,078	$5,029
2017	$14,400	$843	$18,359	$2,072	$26,792	$8,446	$5,948	$76,860	$8,752	$5,762
2018	$33,008	$3,344	$29,275	$1,985	$2,050	$0	$8,008	$77,669	$8,095	$5,556
2019	$32,918	$3,349	$0	$2,198	$28,329	$9,384	$0	$76,246	$8,753	$6,336
2020	$32,693	$3,349	$32,241	$2,105	$2,050	$0	$0	$72,438	$8,167	$6,162
2021	$32,693	$3,349	$0	$2,332	$30,042	$10,229	$0	$78,729	$8,752	$7,005
Total	$251,961	$23,095	$177,146	$19,781	$144,986	$42,955	$31,787	$691,866	$83,529	$53,812

(1) The total fuel cash does NOT include the costs of the ARTS/MELLLA+PRNM project. The costs of the project will be funded by the issuance of bonds.

Table 9

Fiscal Year 2012 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash[1]	Disposal	Gen Tax
Jul-11	12,948			139	151			13,238		
Aug-11				139	151			290	959	
Sep-11				139	151			290		
Oct-11				139	151			290		
Nov-11				139	151			290	2,213	
Dec-11			26,221	139	151		496	27,006		
Jan-12				139	151			290		
Feb-12				139	151			290	2,213	
Mar-12				139	151		868	1,157		
Apr-12				139	151			290		
May-12				139	151			290	2,165	
Jun-12				139	151		1,487	1,777		3,582
Total	12,948		26,221	1,662	1,817		2,850	45,498	7,550	3,582

(1) The total fuel cash does NOT include the costs of the ARTS/MELLLA+PRNM project. The costs of the project will be funded by the issuance of bonds.

Table 10

Fiscal Year 2013 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-12	27,413			153	220			27,786		
Aug-12				153	220			374	2,208	
Sep-12				153	220		620	994		
Oct-12				153	220		100	474		
Nov-12				153	220			374	2,199	
Dec-12				153	220			374		
Jan-13				153	220			374		
Feb-13				153	220			374	2,199	
Mar-13				153	220		1,735	2,109		
Apr-13				153	220			374		
May-13				153	22,558	7,047		29,758	2,127	
Jun-13				153				153		4,730
Total	27,413			1,841	24,763	7,047	2,455	63,518	8,732	4,730

Table 11

Fiscal Year 2014 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-13	25,819	2,943	18,143	147	121			47,172		
Aug-13				147	121			267	1,249	
Sep-13				147	121		1,239	1,507		
Oct-13				147	121		140	407		
Nov-13				147	121			267	2,218	
Dec-13				147	121		924	1,192		
Jan-14				147	121			267		
Feb-14				147	121			267	2,218	
Mar-14				147	121		272	540		
Apr-14				147	121		272	540		
May-14				147	121		272	540	2,146	
Jun-14				147	121			267		4,417
Total	25,819	2,943	18,143	1,763	1,446		3,121	53,235	7,831	4,417

Table 12

Fiscal Year 2015 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-14	19,444	5,070	19,201	163	262			44,139		
Aug-14				163	262			425	2,220	
Sep-14				163	262			425		
Oct-14				163	262			425		
Nov-14				163	262			425	2,224	
Dec-14				163	262			425		
Jan-15				163	262		371	796		
Feb-15				163	262			425	2,224	
Mar-15				163	262			425		
Apr-15				163	262			425		
May-15				163	23,029	7,850		31,041	2,151	
Jun-15				163				163		5,234
Total	19,444	5,070	19,201	1,953	25,647	7,850	371	79,535	8,818	5,234

Table 13

Fiscal Year 2016 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-15	20,628	849		156	171		1,114	22,918		
Aug-15				156	171			327	1,472	
Sep-15				156	171			327		
Oct-15				156	171		1,155	1,481		
Nov-15				156	171			327	2,218	
Dec-15				156	171			327		
Jan-16			33,707	156	171			34,034		
Feb-16				156	171			327	2,218	
Mar-16				156	171		1,800	2,127		
Apr-16				156	171		3,964	4,291		
May-16				156	171		500	827	2,170	
Jun-16				156	171		500	827		5,029
Total	20,628	849	33,707	1,871	2,050		9,034	68,138	8,078	5,029

APPENDIX A ACTIVE FUEL CONTRACTS

Appendix A
Active Nuclear Material Contracts

Contract	Vendor	Scope
324350	Global Nuclear Fuel	Energy Northwest contracted with GNF in June 2007 to supply fuel design, licensing, and fabrication services for three consecutive reloads for Columbia Generating Station. The first reload under this contract was delivered in the spring of 2009. The scope of this contract will meet the needs of Columbia Generating Station for reload fabrication services through 2013.
313337	Urenco	Energy Northwest contracted with Urenco in January 2003 to supply enrichment services for delivery over calendar years 2005 to 2009. The contract was amended (twice) to procure additional SWU. In January 2006, Energy Northwest issued RFP 640137 for SWU to be delivered between calendar years 2010 to 2015. Urenco was awarded the procurement and the contract extended through 2015. The contract has been amended two additional times to move deliveries to meet the needs of both Urenco and Energy Northwest extending the contract through 2017.
330163	ConverDyn	Energy Northwest contracted with ConverDyn in December 2009 to lease to ConverDyn conversion services contained in natural uranium hexafluoride for a period of 3 years. The value of the conversion services is secured by a Letter of Credit.
330249	Nufcor International Limited	In July 2009, Energy Northwest issued RFP 656708 for natural uranium to be delivered between calendar years 2011 to 2020 to be awarded to multiple suppliers. Nufcor was selected to supply uranium concentrates between calendar years 2012 to 2014.
313179	UG USA	Energy Northwest established a no-requirements contract with UG USA in 2003 to supply uranium, conversion and/or enrichment services. Each individual purchase under the contract will require approval of the Energy Northwest management, Executive Board and BPA, as required.
330250	ERA	In July 2009, Energy Northwest issued RFP 656708 for natural uranium to be delivered between calendar years 2011 to 2020 to be awarded to multiple suppliers. ERA was selected to supply uranium concentrates in calendar year 2011.

Energy Northwest
Columbia Generating Station

FY 2011
Fuel Management Plan

Rev. 1.1

June 30, 2010

L. L. Ferek
Reactor Fuels Engineering

Section

1

Introduction

The Project Agreement between Energy Northwest and Bonneville Power Administration (BPA) for Columbia Generating Station requires Energy Northwest to submit with each annual budget a Ten-Year Fuel Management Plan.

This Fuel Management Plan for fiscal year (FY) 2011 covers the period from July 1, 2010, through June 30, 2020. This plan includes a cash flow analysis for expenditures and credits for each major component of the fuel cycle by month for the first five (5) years. Also, the contracts for each component of the fuel cycle are discussed. The tables and figures are located at the end of the text.

Revision 1 to this plan updates Table 1, Tables 3 through 6 and Tables 8 through 13 with the following changes:

- Updated Projected Market Prices to utilize the most recent price forecasts provided by Ux Consulting
- Updated FY11 to reflect a spot purchase of nuclear material (uranium, conversion, enrichment)
- Updated FY11-15 to levelize uranium and conversion deliveries
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- Updated FY13 to defer the enrichment delivery to FY18
- Updated FY13 to delete funding for lead fuel assemblies
- Updated FY16-20 to reduce purchases of nuclear material as a result of the spot procurement in FY11 (uranium, conversion, enrichment)
- Updated FY11-20 to reflect the revised cask loading strategy

Section

6

Tables and Figures

Table 1

Projected Market Fuel Prices

Year	Uranium $/lb U3O8	Conversion $/kgU UF6	Enrichment $/SWU
2011	$46.90	$8.79	$155.00
2012	$54.70	$10.12	$154.23
2013	$61.25	$11.77	$152.38
2014	$63.35	$13.14	$149.90
2015	$66.20	$13.94	$147.93
2016	$68.25	$14.39	$146.40
2017	$71.88	$14.77	$146.50
2018	$74.13	$15.09	$147.65
2019	$78.13	$15.44	$148.78
2020	$80.50	$15.54	$150.63

Table 3

Planned Purchases of Nuclear Material and Fuel Fabrication Requirements

Fiscal Year	Purchases Lbs U3O8	Purchases KgU UF6 Conversion	Purchases SWU	Fabrication kgU Enriched UF6	Fabrication SWU	Fabrication # Bundles
2011	706,123 176,369	270.250 76,545	200,000 0	434,815	263,488	264
2012	223,631	85,589	205,700			
2013	414,671	130,000	0	419,150	252,303	260
2014	414,671	130,000	137,500			
2015	414,671	130,000	143,000	406,198	244,507	252
2016	205,000	50,000	247,500			
2017	200,000	50,000	132,000	399,751	240,626	248
2018	400,000	150,000	206,800			
2019	400,000	150,000	0	399,751	240,626	248
2020	133,378	194,750	86,217			

Table 4

Nuclear Material Totals

Fiscal Year	Lbs U3O8	Natural UF6 kgU	Enriched Uranium Product UF6	Enriched Uranium Product SWU
2011	176,369	853,784	433,207	262,462
2012	176,369	671,132	730,891	449,297
2013	75,002	868,632	311,741	196,994
2014	150,002	819,326	510,727	321,884
2015	225,003	762,848	311,475	207,261
2016	299,360	490,098	669,650	432,062
2017	368,718	367,964	460,926	311,330
2018	376,790	248,288	760,202	499,164
2019	384,863	398,288	360,451	258,538
2020	9,388	450,614	502,875	344,755

Table 5

Predicted Reload Batch Costs
($1000)

Component	CGS1-21
# of Assemblies	264
Fuel Cost:	
Uranium	$26,228
Conversion	$2,036
Enrichment	$23,456
Fabrication	$27,531
Sales Tax	$5,904
Fuels' Projects	$19,400
TOTAL	$104,556
Cask Cost:	
TOTAL	$6,999
TOTAL COST:	**$111,555**

Per Assembly Cost
($)

Fuel Cost	$396,046
Cask Cost	$26,512
Total Cost	$422,558

Table 8

10-Year Cash Flow for Nuclear Fuel ($1,000)

FY	Uranium	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Fuel Cash[1]	Disposal	Gen Tax
2011	$39,503	$1,592	$30,600	$1,652	$22,434	$5,904	$915	$102,601	$8,327	$4,328
2012[2]	$12,948	$807	$25,961	$1,576	$2,817	$0	$2,632	$46,742	$7,599	$3,597
2013	$26,435	$1,226	$0	$1,752	$24,822	$6,897	$2,369	$63,501	$8,789	$4,760
2014	$26,435	$1,226	$17,942	$1,672	$1,946	$0	$3,134	$52,356	$8,074	$4,565
2015	$26,435	$1,226	$18,976	$1,859	$25,071	$7,757	$229	$81,553	$8,774	$5,219
2016	$13,991	$720	$32,982	$1,774	$2,050	$0	$6,234	$57,751	$8,098	$5,031
2017	$14,376	$738	$18,320	$1,972	$26,050	$8,223	$3,170	$72,850	$8,752	$5,762
2018	$29,652	$2,264	$29,223	$1,882	$2,050	$0	$3,275	$68,345	$8,071	$5,539
2019	$31,252	$2,316	$0	$2,092	$27,383	$9,220	$0	$72,263	$8,752	$6,336
2020	$10,737	$3,026	$12,987	$1,997	$2,050	$0	$0	$30,797	$8,095	$6,108
Total	$231,766	$15,141	$186,992	$18,228	$136,673	$38,002	$21,958	$648,758	$83,333	$51,245

(1) The total fuel cash does NOT include the costs of the ARTS/MELLLA+PRNM project. The costs of the project will be funded by the issuance of bonds.

(2) A portion of the total uranium, conversion and enrichment purchases for FY2011 may be financed.

Table 8A

Change in Cash Flow (Rev. 1 – Rev. 0) ($1,000)

FY	Uranium	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Fuel Cash[1]	Disposal	Gen Tax
2012[2]	$27,818	$1,554	$30,600	$0	($110)	$1,020	($1,367)	$59,515	$0	$0
2012	$1,658	($985)	$0	$0	($74)	$0	($6,034)	($5,436)	$0	$0
2013	($5,161)	$340	($26,539)	$0	($2,075)	($232)	($4,136)	($37,803)	$0	$0
2014	$617	($571)	$0	$0	($77)	$0	($3,122)	($3,153)	$0	$0
2015	$6,992	($589)	$0	$0	$0	($111)	$229	$6,520	$0	$0
2016	($29,020)	($1,127)	$173	$0	$0	$0	$6,234	($23,739)	$0	$0
2017	($29,744)	($1,159)	$506	$0	$0	($802)	$364	($30,836)	$0	$0
2018	($1,280)	$353	$10,292	$0	$0	$0	($4,921)	$4,444	$0	$0
2019	($660)	$374	($19,066)	$0	$0	($700)	($7,997)	($28,050)	$0	$0
2020	($16,004)	$1,070	($6,204)	$0	$0	$0	($6,284)	($27,422)	$0	$0
Total	($44,785)	($741)	($10,239)	$0	($2,336)	($825)	($27,035)	($85,961)	$0	$0

(1) The total fuel cash does NOT include the costs of the ARTS/MELLLA+PRNM project. The costs of the project will be funded by the issuance of bonds.

(2) A portion of the total uranium, conversion and enrichment purchases for FY2011 may be financed.

Table 9

Fiscal Year 2011 Monthly Cash Flow ($1000)

Date	U	C	E	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-10				138	302			440		
Aug-10				138	302			440	2,220	
Sep-10				138	302			440		
Oct-10				138	302			440		
Nov-10				138	302			440	2,266	
Dec-10	29,450	1,554	30,600	138	302		229	62,273		
Jan-11	10,053			138	302			10,493		
Feb-11		38		138	302			478	2,266	
Mar-11				138	302			440		
Apr-11				138	302			440		
May-11				138	19,414	5,904		25,456	1,576	
Jun-11				138			687	824		4,328
Total	39,503	1,592	30,600	1,652	22,434	5,904	915	102,601	8,327	4,328

(1) The total fuel cash does NOT include the costs of the ARTS/MELLLA+PRNM project. The costs of the project will be funded by the issuance of bonds.

(2) A portion of the total uranium, conversion and enrichment purchases for FY2011 may be financed.

Table 10

Fiscal Year 2012 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-11	12,948	807		131	235			14,121		
Aug-11				131	235			366	965	
Sep-11				131	235			366		
Oct-11				131	235			366		
Nov-11				131	235			366	2,227	
Dec-11			25,961	131	235		458	26,785		
Jan-12				131	235			366		
Feb-12				131	235			366	2,227	
Mar-12				131	235		801	1,167		
Apr-12				131	235			366		
May-12				131	235			366	2,179	
Jun-12				131	235		1,373	1,739		3,597
Total	12,948	807	25,961	1,576	2,817		2,632	46,742	7,599	3,597

Table 11

Fiscal Year 2013 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-12	26,435	1,226		146	270			28,078		
Aug-12				146	270			417	2,223	
Sep-12				146	270		572	989		
Oct-12				146	270			417		
Nov-12				146	270			417	2,213	
Dec-12				146	270		195	611		
Jan-13				146	270			417		
Feb-13				146	270			417	2,213	
Mar-13				146	270		1,602	2,019		
Apr-13				146	270			417		
May-13				146	22,117	6,897		29,160	2,141	
Jun-13				146				146		4,760
Total	26,435	1,226		1,752	24,822	6,897	2,369	63,501	8,789	4,760

Table 12

Fiscal Year 2014 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-13	26,435	1,226	17,942	139	162			45,905		
Aug-13				139	162			302	1,493	
Sep-13				139	162		1,144	1,446		
Oct-13				139	162			302		
Nov-13				139	162			302	2,218	
Dec-13				139	162		1,315	1,617		
Jan-14				139	162			302		
Feb-14				139	162			302	2,218	
Mar-14				139	162		225	526		
Apr-14				139	162		225	526		
May-14				139	162		225	526	2,146	
Jun-14				139	162			302		4,565
Total	26,435	1,226	17,942	1,672	1,946		3,134	52,356	8,074	4,565

Table 13

Fiscal Year 2015 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-14	26,435	1,226	18,976	155	262			47,054		
Aug-14				155	262			417	2,215	
Sep-14				155	262			417		
Oct-14				155	262			417		
Nov-14				155	262			417	2,210	
Dec-14				155	262			417		
Jan-15				155	262		229	646		
Feb-15				155	262			417	2,210	
Mar-15				155	262			417		
Apr-15				155	262			417		
May-15				155	22,453	7,757		30,365	2,138	
Jun-15				155				155		5,219
Total	26,435	1,226	18,976	1,859	25,071	7,757	229	81,553	8,774	5,219

Energy Northwest

Columbia Generating Station

FY 2011
Fuel Management Plan

Rev. 1

June 30, 2010

L. L. Ferek
Reactor Fuels Engineering

Section

1

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- Updated FY11-20 to reflect the revised cask loading strategy
- Updated Appendix A to capture two new contracts

Section

2

Assumptions

Economic

Table 1 gives the predicted market prices for uranium concentrates (U3O8) and conversion and enrichment services. Historical and forecasted prices for uranium, conversion and enrichment are provided in Figures 1-3. Forward market price data was taken from the 3Q2009 Ux Consulting Market Reports. Over the past year, the spot price for uranium has cycled between lows of $41.75 per lb U3O8 to highs of $55 per lb. Spot price is a reflection of very near term inventory supply and demand dynamics. Current spot demand is limited as utilities had previously moved to lock up additional forward years' requirements shortly after the price spike in 2007. Over the past year the term price has decreased from $65 per lb U3O8 to $60 per lb. Term price is more closely tied to cost of production and does not exhibit the volatility seen with the spot price but does tend to follow the overall trend of the spot price. In any event, forward price projections predict the price to recover quickly and increase steadily as new mines begin production. The price projections for enrichment services continue to increase as new enrichment plants are being built. Prices are predicted to stabilize once the plants are at full capacity.

Energy Northwest's significant uranium inventory and the long-term enrichment contract with Urenco continue to minimize the near term impact of the rapid rise in fuel prices. The prices from the long-term enrichment contract are factored into the cash flow requirements but are not reflected in the prices in Table 1.

Fuel Cycle

Table 2 shows the assumptions for the fuel cycles used in this plan. Minor changes may occur in the process of design finalization. The planned energy requirements are consistent with the energy requirements supplied by BPA in accordance with the Project Agreement.

Both Final Feedwater Temperature Reduction (FFTR) and Thermal Power Level Coast-down are planned for cost optimization during the final five to seven weeks of the operating run. During FFTR, the operation of the plant is extended at 100% thermal power level for 8-10 days while the electrical power level gradually decreases by about 1%. During coast-down, the power level is expected to decrease at a rate of 0.5% per day. The Fuel

Management Plan assumes 9 days of FFTR and 21 days of coast-down for a total of 30 days of cycle extension for Cycle 21. Future cycles assume a total of 39 days of cycle extension. The energies specified in Table 2 are within the acceptable range provided by BPA for energy requirements for fuel loading in Cycle 21.

The generation factor refers to the amount of energy that is expected to be generated relative to the maximum potential generation from when the generator is synchronized to the grid to when the reactor is shut down for the outage.

The generation factor and outage length are the critical parameters that determine the cycle energy from which the fuel requirements and ultimately the fuel budget is derived.

Another important assumption is the electrical generator output. A value of 1131 MW is used to reflect a seasonal average value.

Section

3

Nuclear Fuel Market

Uranium Market

The uranium market has experienced a dramatic increase in price over the past seven years. In January 2003, the price of uranium was $10.20 per lb U3O8. The market price peaked in June 2007 at $135 per lb U3O8. Currently, the spot price stands at $40.50 per lb U3O8 at the end of February 2010. At the time of the dramatic price increase, utilities moved to place their uncommitted requirements for the next three years under contract in an attempt to mitigate supply disruptions and limit their vulnerability to further price increases. As a result, spot supply and demand is very limited leading to market volatility where a 10% change in price from month to month is not uncommon.

A number of investment funds have also entered the market buying uranium, which places additional demand on already short supplies. Although this demand has contributed to the price rise, it also provides a source of liquidity to the market since the investors are solely looking for a return-on-investment. The economic credit crisis in 2008 resulted in some funds liquidating their inventory to raise cash leading to a softening of price.

This past year the DOE announced plans to barter uranium to pay for the cleanup costs at the Portsmouth site for the next four years. The market quickly reacted to this unexpected source of supply by exhibiting a price drop into the low $40's. Although the DOE recently revised their plan to only supply uranium in the current DOE fiscal year (ends Sept 2010), market prices remain depressed.

Price projections indicate a close relationship between the projections and the current term price and show a steady increase in price over the next ten (10) years. The following table lists known factors affecting price:

Push Price Up	Push Price Down
New demand from India	Possible short term over-production
Increased worldwide demand for reactors: • China • Russia • Middle East • United States	Government policies • DOE uranium barter (short term 2010 only)

Push Price Up	Push Price Down
Production problems at mines • Cigar Lake mine flooding • Olympic Dam mine shaft damage	Investor selling • Unknown factor at this time
Low cost uranium mined first • McArthur River • Kazakhstan in situ leach mines	
Development of high cost uranium delayed • Olympic Dam expansion	
Overall decrease in availability of secondary supplies • US-Russia HEU deal ends in 2013 • Drawdown of utility inventories • Currently secondary supplies provide for 35% of world-wide requirements	
Interest/exchange rates • US dollar is weak against the major producer currencies	

Conversion Services

Spot conversion prices are currently depressed at $6.25 per kgU relative to the term price. Similar to U3O8, the price projections for conversion services indicate a close relationship between the projections and the current term price. Prices are predicted to remain relatively stable into the foreseeable future.

The current spot price levels do not allow for new expansion needed to upgrade or replace aging plants. Even so, Cameco has signed a 10 year toll-conversion agreement with British Nuclear Fuels plc (BNFL) to acquire uranium conversion services from BNFL's Springfields plant in Lancashire, UK. Comhurex is building another conversion facility to replace its existing plant in France. In addition, ConverDyn has started discussions with a European enrichment company to jointly build a new conversion plant in the UK.

Enrichment Market

The enrichment market has also seen price increases over the past few years. The spot price in January 2006 was $116 per Separative Work Unit (SWU) and has risen to $162 per SWU in February 2010. This increase is due in part to increasing demand from lower tails assays. Enrichment customers have the option to order enrichment services with a range of tails assays. The higher the tails assay, the more uranium feed is required and the less enrichment services. The lower the tails assay, the more enrichment services are required and less uranium feed. At the current prices for uranium and enrichment services, the optimum tails assay has reduced to 0.25% from historical levels of 0.30%. The result is an increase in enrichment demand and reduction in uranium demand. The price increase is also being driven by limited supply to meet the higher demand in the face of rising supply costs. Both the US and European gaseous diffusion plants (GDP) have experienced production cost increases due to an increase in power prices. Electricity costs account for nearly 60% of the enrichment costs at GDP enrichment plants.

Another factor fueling price increases in the near term is the fact that all three Western suppliers are in the process of either replacing their costly gaseous diffusion with centrifuge technology or expanding their existing capacity. Urenco is preparing to commence operations at its new enrichment facility in New Mexico using its proven centrifuge technology. In addition, Urenco has increased the capacity at each of their European plants. AREVA is also preparing to commence operations at their new gaseous centrifuge plant to replace their GDP facility at Tricastin in France. AREVA has also announced plans to build a domestic centrifuge plant in Idaho and is likely to receive a $2 billion loan guarantee from the DOE. General Electric has submitted a construction and operating license application for their laser enrichment facility in North Carolina. Although the United States Enrichment Corporation (USEC) is also planning to replace their GDP facility in Kentucky with a gaseous centrifuge plant, USEC was denied a DOE loan guarantee for its American Centrifuge Plant in Ohio until the technology could be further proven. USEC has drastically cut expenditures on its new plant while it tries to satisfy DOE requirements.

Russian access to the US market continues to be restricted due to the Megatons-to-Megawatts program, which is set to expire in 2013. This program down-blended highly enriched uranium from weapons to low enrichments needed for use in nuclear power plants. However, the current Russian suspension agreement has been re-negotiated to allow increasing amounts of material to be supplied into the US market beginning in 2014. The impact of this new supply should help stabilize or lower prices in the long term.

Fuel Fabrication

Currently, three fabricators supply fabricated fuel to the US BWR community: Global Nuclear Fuel (GNF), AREVA and Westinghouse. There have been no major supply disruptions in the fabrication sector, which looks well poised to support any domestic nuclear renaissance. AREVA announced consolidation of its PWR and BWR fabrication facilities and intends to move is PWR fuel fabrication from Virginia to Richland, WA.

Section

4

Fuel Management Strategy

Fuel Cycle Designs

During FY2010, Columbia will be in the second half of Cycle 20. This is the first reload of the GE14 fuel design. The current bundle and core design contain a batch size of 252 assemblies with an average enrichment of 4.08 wt% U^{235}. The Cycle 20 core has energy available to be able to operate at 100% power for 588 days plus an additional 39 days of cycle extension (9 days of FFTR and 30 days of coast-down).

Fuel Procurement Strategy

In 2002, Energy Northwest established a fuel procurement strategy to 1) achieve the long-term goal of a secure and consistently low cost fuel supply, and 2) be flexible enough to take advantage of cost saving opportunities as they arise. Energy Northwest signed a number of agreements from 2003-2006 culminating in the Uranium Tails Pilot Proejct. Energy Northwest has been essentially drawing down inventory since that time. This has allowed Energy Northwest to forego contracting during the price spike in 2007. In addition, Energy Northwest contracted for enrichment services in the beginning of 2006 for supply in 2010-2015 thereby "beating" the price jump in enrichment services.

Typically Energy Northwest strives to maintain a strategic inventory of one reload's worth of enriched uranium and approximately half a reload of natural uranium. In order to accommodate the need to reduce cash flow requirements in the past few years, Energy Northwest has delayed enrichment purchases under our current contract and plans to use the strategic inventory of enriched uranium in the 2011 reload. Energy Northwest will resume enrichment purchases in FY 2012-2017 to rebuild the strategic inventory and meet reload requirements. Energy Northwest will make uranium and conversion purchases to maintain strategic inventory levels of natural uranium.

Fuel Procurement Activities

In FY 2010, Energy Northwest issued a request for Proposal (RFP) for the supply of natural uranium in the form of concentrates (U3O8) or uranium hexafluoride as either natural UF6 or conversion services for calendar years 2011 to 2020 with the intent to award to multiple vendors for

diversity of supply. The total quantity of uranium requested under the RFP equates to roughly 4.5 reloads.

Approximately 17 offers were received offering a range of quantities, delivery dates, and pricing mechanisms. Bids were received from both primary producers and uranium trading companies. After a thorough bid evaluation by the Source Evaluation Panel (SEP), a recommendation was made to award only one-third of the total quantity to be delivered in the mid-term (2011-2014). The awards were made to a primary producer and a trader.

The long term offers received were much higher than the current spot price making a buy and hold strategy attractive. Work is currently in progress to determine the source of funding to allow Energy Northwest to procure an additional one-third of the original RFP quantity as a spot purchase. The remaining one-third quantity will remain uncommitted to allow us to better gauge the long-term market trend.

Fabrication Services

A fabrication services contract for Columbia Generating Station for the fuel supply for three reloads was awarded to GNF in June 2007. The 2009 refueling outage was the first reload of GNF's GE14 fuel design (for Cycle 20). There is the option to begin loading the advanced GNF2 design in subsequent cycles. A detailed evaluation will be done to determine the merits of loading the GNF2 design prior to making a recommendation to management.

Energy Northwest is pursuing the licensing and implementation of the operating flexibility program for APRM, RBM Technical Specifications (ARTS) Improvement and Maximum Extended Load Line Limit Analysis (MELLLA) and supply of the Power Range Neutron Monitoring (PRNM) Nuclear Measurement Analysis and Control (NUMAC) system with Option III Stability for the Columbia Generation Station. This project is referred to as "ARTS/MELLLA and PRNM". The project has an estimated cost of $19.4 million excluding financing costs. The benefits to the station are reduced fuel cost due to reduced batch size and improved fuel utilization, increased operating flexibility, increased net generation due to reduced recirculation pump speed, reduction in the number of downpowers to reposition control rods, reduction of nuisance alarms in the control room, and improved equipment reliability by replacing obsolete and aging equipment. The project is planned to be installed in the 2011 refueling outage, and the cost of the project has been included in the Cycle 21 reload batch costs. The project is a Fuel Capital project and is financed using bond proceeds.

Other Fabrication Costs

A number of costs in addition to vendor fabrication costs for the fuel bundles and analytical services are included as fabrication costs. These costs address the following types of activities:

- Fuel receipt & inspection
- Fuel procurement
- Fuels' staff
- Legal fees
- Fuel consultants
- Fuels' work-station and code fees
- Fuels' travel and training

Fuel Management Physical Requirements

The assumed cycle energies and fuel designs are used to develop multi-cycle reload material requirement projections. The projected reload material requirements are integrated with the existing inventory levels to project procurement requirements into the future. Tables 3 and 4 summarize those requirements over the next ten years.

Table 3 assumes uranium is purchased as uranium concentrates (U3O8). Conversion services must then be purchased to convert the concentrates to uranium hexafluoride (UF6). Enrichment services are then purchased to convert the natural UF6 to enriched UF6. The enriched UF6 is transferred to the fabrication facility and used to fabricate the necessary quantity of fuel assemblies. Table 4 shows the total material of each form existing as of the end of each fiscal year. Typically, the processing time from concentrates to fabricated fuel assemblies is one year, allowing for the necessary material lead times at each step in the process. Therefore, the majority of the material in Table 4 is considered to be working stock with a lesser portion considered the strategic inventory.

Spent Fuel Storage and Disposal

DOE Spent Fuel Contract

While the courts have now ruled that DOE had a binding obligation to begin acceptance of spent nuclear fuel no later than January 31, 1998, DOE has suspended all work on the license application for the Yucca Mountain underground storage repository. Energy Northwest is continuing to pursue legal action against DOE regarding DOE's failure to begin accepting spent fuel in 1998. Energy Northwest continues to pay a waste disposal fee as indicated in the category of Disposal.

On-Site Spent Fuel Storage

Columbia Generating Station operates an Independent Spent Fuel Storage Installation (ISFSI) using NRC-approved dry storage casks to supplement wet storage in the fuel pool. The ISFSI, located just north of the Deschutes Building, is capable of being expanded to hold the lifetime spent fuel requirements of Columbia Generating Station. Twenty-seven (27) storage casks have been loaded to date, moving 1,836 assemblies from the fuel pool to the ISFSI.

The costs for the inner storage canister (called a multi-purpose canister) and closure welds are treated as fuel and are included in this Fuel Management Plan in the category of Casks. The costs of the overpacks, facility, and common equipment are treated as a plant capital addition. The cost of a multi-purpose canister is currently estimated to be $1,713,775 and welding costs are estimated to be $89,000 per MPC. This equates to a per bundle cost of $26,512. Future costs have been escalated.

Active Contracts

Appendix A contains descriptions of the currently active fuel management contracts for nuclear material and fabrication services.

Section

5

Nuclear Fuel Budgets

Nuclear Fuel Costs

A measure of nuclear fuel cost is the Fuel-in-Process costs, or the costs to fabricate finished fuel assemblies. The estimated costs for the reload batch for Cycle 21 are shown in Table 5. Reload batch costs are amortized over the life of the fuel. Typically, fuel resides in the reactor core for three (3) cycles (equivalent to six years).

Fuel Revenue

As a result of the planned implementation of the ARTS/MELLLA and PRNM project during the 2011 refueling outage, Energy Northwest has declared 75,000 SWU as excess to the needs of Columbia Generating Station and has arranged for the sale. The revenue from the sale will be realized in FY 2011. The revenue is given in Table 6.

Nuclear Fuel Cash Flows

The summary of cash requirements for the ARTS/MELLLA and PRNM project for FY 2011 are provided in Table 7. A summary of cash flows by fuel component and fiscal year for the next ten years is given in Table 8. Cash flows for nuclear fuel by month for each component for the next five years are shown in Tables 9 through 13. The cash flows are in today's dollars including the costs associated with the nuclear material (uranium, conversion, enrichment).

Section

6

Tables and Figures

Table 1

Projected Market Fuel Prices

Year	Uranium $/lb U3O8	Conversion $/kgU UF6	Enrichment $/SWU
2011	$46.90	$8.79	$155.00
2012	$54.70	$10.12	$154.23
2013	$61.25	$11.77	$152.38
2014	$63.35	$13.14	$149.90
2015	$66.20	$13.94	$147.93
2016	$68.25	$14.39	$146.40
2017	$71.88	$14.77	$146.50
2018	$74.13	$15.09	$147.65
2019	$78.13	$15.44	$148.78
2020	$80.50	$15.54	$150.63

Table 2

Fuel Cycle Assumptions

Fiscal Year	Generation GWh	Outage Length (Days)	Cycle	Energy FPD	Generation Factor %
2011	7,419	75	21	649	93%
2012	9,279				
2013	8,437	30	22	639	93%
2014	9,214				
2015	8,428	30	23	647	93%
2016	9,239				
2017	8,402	30	24	647	93%
2018	9,214				
2019	8,402	30	25	647	93%
2020	9,239				

Energy FPD = Operating Calendar Days x GF – (Days lost during startup and coastdown)

Table 3

Planned Purchases of Nuclear Material and Fuel Fabrication Requirements

	Purchases			Fabrication		
Fiscal Year	Lbs U3O8	KgU UF6 Conversion	SWU	kgU Enriched UF6	SWU	# Bundles
2011	706,123 176,369	270.250 76,545	200,000 0	434,815	263,488	264
2012	223,631	85,589	205,700			
2013	414,671	130,000	0	419,150	252,303	260
2014	414,671	130,000	137,500			
2015	414,671	130,000	143,000	406,198	244,507	252
2016	205,000	50,000	247,500			
2017	200,000	50,000	132,000	399,751	240,626	248
2018	400,000	150,000	206,800			
2019	400,000	150,000	0	399,751	240,626	248
2020	133,378	194,750	86,217			

Table 4

Nuclear Material Totals

Fiscal Year	Lbs U3O8	Natural UF6 kgU	Enriched Uranium Product	
			UF6	SWU
2011	176,369	853,784	433,207	262,462
2012	176,369	671,132	730,891	449,297
2013	75,002	868,632	311,741	196,994
2014	150,002	819,326	510,727	321,884
2015	225,003	762,848	311,475	207,261
2016	299,360	490,098	669,650	432,062
2017	368,718	367,964	460,926	311,330
2018	376,790	248,288	760,202	499,164
2019	384,863	398,288	360,451	258,538
2020	9,388	450,614	502,875	344,755

Table 5

Predicted Reload Batch Costs
($1000)

Component	CGS1-21
# of Assemblies	264
Fuel Cost:	
Uranium	$26,228
Conversion	$2,036
Enrichment	$23,456
Fabrication	$27,531
Sales Tax	$5,904
Fuels' Projects	$19,400
TOTAL	$104,556
Cask Cost:	
TOTAL	$6,999
TOTAL COST:	**$111,555**

Per Assembly Cost
($)

Fuel Cost	$396,046
Cask Cost	$26,512
Total Cost	$422,558

Table 6

Estimated Revenue From Fuel ($1000)

Fiscal Year	Revenue
2011	$12,000
2012	0
2013	0
2014	0
2015	0
2016	0
2017	0
2018	0
2019	0
2020	0

Table 7

FY2011 Fuel Project Cash Flow [1] (ARTS/MELLLA+PRNM) ($1000)

Month	Cash Flow
Jul-10	$119
Aug-10	$212
Sep-10	$641
Oct-10	$4,043
Nov-10	($1,181)
Dec-10	$120
Jan-11	$196
Feb-11	$116
Mar-11	$312
Apr-11	$303
May-11	$443
Jun-11	$171
Total	$5,497

[1] The costs of the project will be funded by the issuance of bonds.

Table 8

10-Year Cash Flow for Nuclear Fuel ($1,000)

FY	Uranium	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Fuel Cash[1]	Disposal	Gen Tax
2011	$39,503	$1,592	$30,600	$1,652	$22,434	$5,904	$915	$102,601	$8,327	$4,328
2012[2]	$12,948	$807	$25,961	$1,576	$2,817	$0	$2,632	$46,742	$7,599	$3,597
2013	$26,435	$1,226	$0	$1,752	$24,822	$6,897	$2,369	$63,501	$8,789	$4,760
2014	$26,435	$1,226	$17,942	$1,672	$1,946	$0	$3,134	$52,356	$8,074	$4,565
2015	$26,435	$1,226	$18,976	$1,859	$25,071	$7,757	$229	$81,553	$8,774	$5,219
2016	$13,991	$720	$32,982	$1,774	$2,050	$0	$6,234	$57,751	$8,098	$5,031
2017	$14,376	$738	$18,320	$1,972	$26,050	$8,223	$3,170	$72,850	$8,752	$5,762
2018	$29,652	$2,264	$29,223	$1,882	$2,050	$0	$3,275	$68,345	$8,071	$5,539
2019	$31,252	$2,316	$0	$2,092	$27,383	$9,220	$0	$72,263	$8,752	$6,336
2020	$10,737	$3,026	$12,987	$1,997	$2,050	$0	$0	$30,797	$8,095	$6,108
Total	$231,766	$15,141	$186,992	$18,228	$136,673	$38,002	$21,958	$648,758	$83,333	$51,245

(1) The total fuel cash does NOT include the costs of the ARTS/MELLLA+PRNM project. The costs of the project will be funded by the issuance of bonds.

(2) A portion of the total uranium, conversion and enrichment purchases for FY2011 may be financed.

Table 8A

Change in Cash Flow (Rev. 1 – Rev. 0) ($1,000)

FY	Uranium	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Fuel Cash[1]	Disposal	Gen Tax
2012[2]	$27,818	$1,554	$30,600	$0	($110)	$1,020	($1,367)	$59,515	$0	$0
2012	$1,658	($985)	$0	$0	($74)	$0	($6,034)	($5,436)	$0	$0
2013	($5,161)	$340	($26,539)	$0	($2,075)	($232)	($4,136)	($37,803)	$0	$0
2014	$617	($571)	$0	$0	($77)	$0	($3,122)	($3,153)	$0	$0
2015	$6,992	($589)	$0	$0	$0	($111)	$229	$6,520	$0	$0
2016	($29,020)	($1,127)	$173	$0	$0	$0	$6,234	($23,739)	$0	$0
2017	($29,744)	($1,159)	$506	$0	$0	($802)	$364	($30,836)	$0	$0
2018	($1,280)	$353	$10,292	$0	$0	$0	($4,921)	$4,444	$0	$0
2019	($660)	$374	($19,066)	$0	$0	($700)	($7,997)	($28,050)	$0	$0
2020	($16,004)	$1,070	($6,204)	$0	$0	$0	($6,284)	($27,422)	$0	$0
Total	($44,785)	($741)	($10,239)	$0	($2,336)	($825)	($27,035)	($85,961)	$0	$0

(1) The total fuel cash does NOT include the costs of the ARTS/MELLLA+PRNM project. The costs of the project will be funded by the issuance of bonds.

(2) A portion of the total uranium, conversion and enrichment purchases for FY2011 may be financed.

Table 9

Fiscal Year 2011 Monthly Cash Flow ($1000)

Date	U	C	E	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-10				138	302			440		
Aug-10				138	302			440	2,220	
Sep-10				138	302			440		
Oct-10				138	302			440		
Nov-10				138	302			440	2,266	
Dec-10	29,450	1,554	30,600	138	302		229	62,273		
Jan-11	10,053			138	302			10,493		
Feb-11		38		138	302			478	2,266	
Mar-11				138	302			440		
Apr-11				138	302			440		
May-11				138	19,414	5,904		25,456	1,576	
Jun-11				138			687	824		4,328
Total	39,503	1,592	30,600	1,652	22,434	5,904	915	102,601	8,327	4,328

(1) The total fuel cash does NOT include the costs of the ARTS/MELLLA+PRNM project. The costs of the project will be funded by the issuance of bonds.

(2) A portion of the total uranium, conversion and enrichment purchases for FY2011 may be financed.

Table 10

Fiscal Year 2012 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-11	12,948	807		131	235			14,121		
Aug-11				131	235			366	965	
Sep-11				131	235			366		
Oct-11				131	235			366		
Nov-11				131	235			366	2,227	
Dec-11			25,961	131	235		458	26,785		
Jan-12				131	235			366		
Feb-12				131	235			366	2,227	
Mar-12				131	235		801	1,167		
Apr-12				131	235			366		
May-12				131	235			366	2,179	
Jun-12				131	235		1,373	1,739		3,597
Total	12,948	807	25,961	1,576	2,817		2,632	46,742	7,599	3,597

Table 11

Fiscal Year 2013 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-12	26,435	1,226		146	270			28,078		
Aug-12				146	270			417	2,223	
Sep-12				146	270		572	989		
Oct-12				146	270			417		
Nov-12				146	270			417	2,213	
Dec-12				146	270		195	611		
Jan-13				146	270			417		
Feb-13				146	270			417	2,213	
Mar-13				146	270		1,602	2,019		
Apr-13				146	270			417		
May-13				146	22,117	6,897		29,160	2,141	
Jun-13				146				146		4,760
Total	26,435	1,226		1,752	24,822	6,897	2,369	63,501	8,789	4,760

Table 12

Fiscal Year 2014 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-13	26,435	1,226	17,942	139	162			45,905		
Aug-13				139	162			302	1,493	
Sep-13				139	162		1,144	1,446		
Oct-13				139	162			302		
Nov-13				139	162			302	2,218	
Dec-13				139	162		1,315	1,617		
Jan-14				139	162			302		
Feb-14				139	162			302	2,218	
Mar-14				139	162		225	526		
Apr-14				139	162		225	526		
May-14				139	162		225	526	2,146	
Jun-14				139	162			302		4,565
Total	26,435	1,226	17,942	1,672	1,946		3,134	52,356	8,074	4,565

Table 13

Fiscal Year 2015 Monthly Cash Flow ($1000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Fuel Cash	Disposal	Gen Tax
Jul-14	26,435	1,226	18,976	155	262			47,054		
Aug-14				155	262			417	2,215	
Sep-14				155	262			417		
Oct-14				155	262			417		
Nov-14				155	262			417	2,210	
Dec-14				155	262			417		
Jan-15				155	262		229	646		
Feb-15				155	262			417	2,210	
Mar-15				155	262			417		
Apr-15				155	262			417		
May-15				155	22,453	7,757		30,365	2,138	
Jun-15				155				155		5,219
Total	26,435	1,226	18,976	1,859	25,071	7,757	229	81,553	8,774	5,219

Appendix A
Active Nuclear Material Contracts

Contract	Vendor	Scope
324350	Global Nuclear Fuel	Energy Northwest contracted with GNF in June 2007 to supply fuel design, licensing, and fabrication services for three consecutive reloads for Columbia Generating Station. The first reload under this contract was delivered in the spring of 2009. The scope of this contract will meet the needs of Columbia Generating Station for reload fabrication services through 2013.
313337	Urenco	Energy Northwest contracted with Urenco in January 2003 to supply enrichment services for delivery over calendar years 2005 to 2009. The contract was amended (twice) to procure additional SWU. In January 2006, Energy Northwest issued RFP 640137 for SWU to be delivered between calendar years 2010 to 2015. Urenco was awarded the procurement and the contract extended through 2015. The contract has been amended two additional times to move deliveries to meet the needs of both Urenco and Energy Northwest extending the contract through 2017.
330163	ConverDyn	Energy Northwest contracted with ConverDyn in December 2009 to lease to ConverDyn conversion services contained in natural uranium hexafluoride for a period of 3 years. The value of the conversion services is secured by a Letter of Credit.
330249	Nufcor International Limited	In July 2009, Energy Northwest issued RFP 656708 for natural uranium to be delivered between calendar years 2011 to 2020 to be awarded to multiple suppliers. Nufcor was selected to supply uranium concentrates between calendar years 2012 to 2014.
313179	UG USA	Energy Northwest established a no-requirements contract with UG USA in 2003 to supply uranium, conversion and/or enrichment services. Each individual purchase under the contract will require approval of the Energy Northwest management, Executive Board and BPA, as required.
329477	Exelon	Energy Northwest established a contract with Exelon in 2009 for the sale of enrichment services to Exelon. The enrichment services were declared excess to our needs as a result of the planned implementation of the ARTS/MELLLA and PRNM project.
330250	ERA	In July 2009, Energy Northwest issued RFP 656708 for natural uranium to be delivered between calendar years 2011 to 2020 to be awarded to multiple suppliers. ERA was selected to supply uranium concentrates in calendar year 2011.
330908	AREVA	Energy Northwest contracted with AREVA in May 2010 to lease to AREVA U3O8 for a period of seven (7) months. The value of the U3O8 is secured by a Letter of Credit.

Energy Northwest
Columbia Generating Station

FY 2011
Fuel Management Plan

Rev. 0

March 2010

L. L. Ferek
Reactor Fuels Engineering

Section 1

Introduction

The Project Agreement between Energy Northwest and Bonneville Power Administration (BPA) for Columbia Generating Station requires Energy Northwest to submit with each annual budget a Ten-Year Fuel Management Plan.

This Fuel Management Plan for fiscal year (FY) 2011 covers the period from July 1, 2010, through June 30, 2020. This plan includes a cash flow analysis for expenditures and credits for each major component of the fuel cycle by month for the first five (5) years. Also, the contracts for each component of the fuel cycle are discussed. The tables and figures are located at the end of the text.

Section

2

Assumptions

Economic

Table 1 gives the predicted market prices for uranium concentrates (U3O8) and conversion and enrichment services. Historical and forecasted prices for uranium, conversion and enrichment are provided in Figures 1-3. Forward market price data was taken from the 3Q2009 Ux Consulting Market Reports. Over the past year, the spot price for uranium has cycled between lows of $41.75 per lb U3O8 to highs of $55 per lb. Spot price is a reflection of very near term inventory supply and demand dynamics. Current spot demand is limited as utilities had previously moved to lock up additional forward years' requirements shortly after the price spike in 2007. Over the past year the term price has decreased from $65 per lb U3O8 to $60 per lb. Term price is more closely tied to cost of production and does not exhibit the volatility seen with the spot price but does tend to follow the overall trend of the spot price. In any event, forward price projections predict the price to recover quickly and increase steadily as new mines begin production. The price projections for enrichment services continue to increase as new enrichment plants are being built. Prices are predicted to stabilize once the plants are at full capacity.

Energy Northwest's significant uranium inventory and the long-term enrichment contract with Urenco continue to minimize the near term impact of the rapid rise in fuel prices. The prices from the long-term enrichment contract are factored into the cash flow requirements but are not reflected in the prices in Table 1.

Fuel Cycle

Table 2 shows the assumptions for the fuel cycles used in this plan. Minor changes may occur in the process of design finalization. The planned energy requirements are consistent with the energy requirements supplied by BPA in accordance with the Project Agreement.

Both Final Feedwater Temperature Reduction (FFTR) and Thermal Power Level Coast-down are planned for cost optimization during the final five to seven weeks of the operating run. During FFTR, the operation of the plant is extended at 100% thermal power level for 8-10 days while the electrical power level gradually decreases by about 1%. During coast-down, the power level is expected to decrease at a rate of 0.5% per day. The Fuel

Management Plan assumes 9 days of FFTR and 21 days of coast-down for a total of 30 days of cycle extension for Cycle 21. Future cycles assume a total of 39 days of cycle extension. The energies specified in Table 2 are within the acceptable range provided by BPA for energy requirements for fuel loading in Cycle 21.

The generation factor refers to the amount of energy that is expected to be generated relative to the maximum potential generation from when the generator is synchronized to the grid to when the reactor is shut down for the outage.

The generation factor and outage length are the critical parameters that determine the cycle energy from which the fuel requirements and ultimately the fuel budget is derived.

Another important assumption is the electrical generator output. A value of 1131 MW is used to reflect a seasonal average value.

Section

3

Nuclear Fuel Market

Uranium Market

The uranium market has experienced a dramatic increase in price over the past seven years. In January 2003, the price of uranium was $10.20 per lb U3O8. The market price peaked in June 2007 at $135 per lb U3O8. Currently, the spot price stands at $40.50 per lb U3O8 at the end of February 2010. At the time of the dramatic price increase, utilities moved to place their uncommitted requirements for the next three years under contract in an attempt to mitigate supply disruptions and limit their vulnerability to further price increases. As a result, spot supply and demand is very limited leading to market volatility where a 10% change in price from month to month is not uncommon.

A number of investment funds have also entered the market buying uranium, which places additional demand on already short supplies. Although this demand has contributed to the price rise, it also provides a source of liquidity to the market since the investors are solely looking for a return-on-investment. The economic credit crisis in 2008 resulted in some funds liquidating their inventory to raise cash leading to a softening of price.

This past year the DOE announced plans to barter uranium to pay for the cleanup costs at the Portsmouth site for the next four years. The market quickly reacted to this unexpected source of supply by exhibiting a price drop into the low $40's. Although the DOE recently revised their plan to only supply uranium in the current DOE fiscal year (ends Sept 2010), market prices remain depressed.

Price projections indicate a close relationship between the projections and the current term price and show a steady increase in price over the next ten (10) years. The following table lists known factors affecting price:

Push Price Up	Push Price Down
New demand from India	Possible short term over-production
Increased worldwide demand for reactors: • China • Russia • Middle East • United States	Government policies • DOE uranium barter (short term 2010 only)

Push Price Up	Push Price Down
Production problems at mines • Cigar Lake mine flooding • Olympic Dam mine shaft damage	Investor selling • Unknown factor at this time
Low cost uranium mined first • McArthur River • Kazakhstan in situ leach mines	
Development of high cost uranium delayed • Olympic Dam expansion	
Overall decrease in availability of secondary supplies • US-Russia HEU deal ends in 2013 • Drawdown of utility inventories • Currently secondary supplies provide for 35% of world-wide requirements	
Interest/exchange rates • US dollar is weak against the major producer currencies	

Conversion Services

Spot conversion prices are currently depressed at $6.25 per kgU relative to the term price. Similar to U3O8, the price projections for conversion services indicate a close relationship between the projections and the current term price. Prices are predicted to remain relatively stable into the foreseeable future.

The current spot price levels do not allow for new expansion needed to upgrade or replace aging plants. Even so, Cameco has signed a 10 year toll-conversion agreement with British Nuclear Fuels plc (BNFL) to acquire uranium conversion services from BNFL's Springfields plant in Lancashire, UK. Comhurex is building another conversion facility to replace its existing plant in France. In addition, ConverDyn has started discussions with a European enrichment company to jointly build a new conversion plant in the UK.

Enrichment Market

The enrichment market has also seen price increases over the past few years. The spot price in January 2006 was $116 per Separative Work Unit (SWU) and has risen to $162 per SWU in February 2010. This increase is due in part to increasing demand from lower tails assays. Enrichment customers have the option to order enrichment services with a range of tails assays. The higher the tails assay, the more uranium feed is required and the less enrichment services. The lower the tails assay, the more enrichment services are required and less uranium feed. At the current prices for uranium and enrichment services, the optimum tails assay has reduced to 0.25% from historical levels of 0.30%. The result is an increase in enrichment demand and reduction in uranium demand. The price increase is also being driven by limited supply to meet the higher demand in the face of rising supply costs. Both the US and European gaseous diffusion plants (GDP) have experienced production cost increases due to an increase in power prices. Electricity costs account for nearly 60% of the enrichment costs at GDP enrichment plants.

Another factor fueling price increases in the near term is the fact that all three Western suppliers are in the process of either replacing their costly gaseous diffusion with centrifuge technology or expanding their existing capacity. Urenco is preparing to commence operations at its new enrichment facility in New Mexico using its proven centrifuge technology. In addition, Urenco has increased the capacity at each of their European plants. AREVA is also preparing to commence operations at their new gaseous centrifuge plant to replace their GDP facility at Tricastin in France. AREVA has also announced plans to build a domestic centrifuge plant in Idaho and is likely to receive a $2 billion loan guarantee from the DOE. General Electric has submitted a construction and operating license application for their laser enrichment facility in North Carolina. Although the United States Enrichment Corporation (USEC) is also planning to replace their GDP facility in Kentucky with a gaseous centrifuge plant, USEC was denied a DOE loan guarantee for its American Centrifuge Plant in Ohio until the technology could be further proven. USEC has drastically cut expenditures on its new plant while it tries to satisfy DOE requirements.

Russian access to the US market continues to be restricted due to the Megatons-to-Megawatts program, which is set to expire in 2013. This program down-blended highly enriched uranium from weapons to low enrichments needed for use in nuclear power plants. However, the current Russian suspension agreement has been re-negotiated to allow increasing amounts of material to be supplied into the US market beginning in 2014. The impact of this new supply should help stabilize or lower prices in the long term.

Fuel Fabrication

Currently, three fabricators supply fabricated fuel to the US BWR community: Global Nuclear Fuel (GNF), AREVA and Westinghouse. There have been no major supply disruptions in the fabrication sector, which looks well poised to support any domestic nuclear renaissance. AREVA announced consolidation of its PWR and BWR fabrication facilities and intends to move is PWR fuel fabrication from Virginia to Richland, WA.

Section

4

Fuel Management Strategy

Fuel Cycle Designs

During FY2010, Columbia will be in the second half of Cycle 20. This is the first reload of the GE14 fuel design. The current bundle and core design contain a batch size of 252 assemblies with an average enrichment of 4.08 wt% U^{235}. The Cycle 20 core has energy available to be able to operate at 100% power for 588 days plus an additional 39 days of cycle extension (9 days of FFTR and 30 days of coast-down).

Fuel Procurement Strategy

In 2002, Energy Northwest established a fuel procurement strategy to 1) achieve the long-term goal of a secure and consistently low cost fuel supply, and 2) be flexible enough to take advantage of cost saving opportunities as they arise. Energy Northwest signed a number of agreements from 2003-2006 culminating in the Uranium Tails Pilot Proejct. Energy Northwest has been essentially drawing down inventory since that time. This has allowed Energy Northwest to forego contracting during the price spike in 2007. In addition, Energy Northwest contracted for enrichment services in the beginning of 2006 for supply in 2010-2015 thereby "beating" the price jump in enrichment services.

Typically Energy Northwest strives to maintain a strategic inventory of one reload's worth of enriched uranium and approximately half a reload of natural uranium. In order to accommodate the need to reduce cash flow requirements in the past few years, Energy Northwest has delayed enrichment purchases under our current contract and plans to use the strategic inventory of enriched uranium in the 2011 reload. Energy Northwest will resume enrichment purchases in FY 2012-2017 to rebuild the strategic inventory and meet reload requirements. Energy Northwest will make uranium and conversion purchases to maintain strategic inventory levels of natural uranium.

Fuel Procurement Activities

In FY 2010, Energy Northwest issued a request for Proposal (RFP) for the supply of natural uranium in the form of concentrates (U3O8) or uranium hexafluoride as either natural UF6 or conversion services for calendar years 2011 to 2020 with the intent to award to multiple vendors for

diversity of supply. The total quantity of uranium requested under the RFP equates to roughly 4.5 reloads.

Approximately 17 offers were received offering a range of quantities, delivery dates, and pricing mechanisms. Bids were received from both primary producers and uranium trading companies. After a thorough bid evaluation by the Source Evaluation Panel (SEP), a recommendation was made to award only one-third of the total quantity to be delivered in the mid-term (2011-2014). The awards were made to a primary producer and a trader.

The long term offers received were much higher than the current spot price making a buy and hold strategy attractive. Work is currently in progress to determine the source of funding to allow Energy Northwest to procure an additional one-third of the original RFP quantity as a spot purchase. The remaining one-third quantity will remain uncommitted to allow us to better gauge the long-term market trend.

Fabrication Services

A fabrication services contract for Columbia Generating Station for the fuel supply for three reloads was awarded to GNF in June 2007. The 2009 refueling outage was the first reload of GNF's GE14 fuel design (for Cycle 20). There is the option to begin loading the advanced GNF2 design in subsequent cycles. A detailed evaluation will be done to determine the merits of loading the GNF2 design prior to making a recommendation to management.

Energy Northwest is pursuing the licensing and implementation of the operating flexibility program for APRM, RBM Technical Specifications (ARTS) Improvement and Maximum Extended Load Line Limit Analysis (MELLLA) and supply of the Power Range Neutron Monitoring (PRNM) Nuclear Measurement Analysis and Control (NUMAC) system with Option III for the Columbia Generation Station. This project is referred to as "ARTS/MELLLA and PRNM". The project has an estimated cost of $19.4 million excluding financing costs. The benefits to the station are reduced fuel cost due to reduced batch size and improved fuel utilization, increased operating flexibility, increased net generation due to reduced recirculation pump speed, reduction in the number of downpowers to reposition control rods, reduction of nuisance alarms in the control room, and improved equipment reliability by replacing obsolete and aging equipment. The project is planned to be installed in the 2011 refueling outage, and the cost of the project has been included in the Cycle 21 reload batch costs. The project is a Fuel Capital project and is financed using bond proceeds.

Other Fabrication Costs

A number of costs in addition to vendor fabrication costs for the fuel bundles and analytical services are included as fabrication costs. These costs address the following types of activities:

- Fuel receipt & inspection
- Fuel procurement
- Fuels' staff
- Legal fees
- Fuel consultants
- Fuels' work-station and code fees
- Fuels' travel and training

Fuel Management Physical Requirements

The assumed cycle energies and fuel designs are used to develop multi-cycle reload material requirement projections. The projected reload material requirements are integrated with the existing inventory levels to project procurement requirements into the future. Tables 3 and 4 summarize those requirements over the next ten years.

Table 3 assumes uranium is purchased as uranium concentrates (U3O8). Conversion services must then be purchased to convert the concentrates to uranium hexafluoride (UF6). Enrichment services are then purchased to convert the natural UF6 to enriched UF6. The enriched UF6 is transferred to the fabrication facility and used to fabricate the necessary quantity of fuel assemblies. Table 4 shows the total material of each form existing as of the end of each fiscal year. Typically, the processing time from concentrates to fabricated fuel assemblies is one year, allowing for the necessary material lead times at each step in the process. Therefore, the majority of the material in Table 4 is considered to be working stock with a lesser portion considered the strategic inventory.

Spent Fuel Storage and Disposal

DOE Spent Fuel Contract

While the courts have now ruled that DOE had a binding obligation to begin acceptance of spent nuclear fuel no later than January 31, 1998, DOE has suspended all work on the license application for the Yucca Mountain underground storage repository. Energy Northwest is continuing to pursue legal action against DOE regarding DOE's failure to begin accepting spent fuel in 1998. Energy Northwest continues to pay a waste disposal fee as indicated in the category of Disposal.

On-Site Spent Fuel Storage

Columbia Generating Station operates an Independent Spent Fuel Storage Installation (ISFSI) using NRC-approved dry storage casks to supplement wet storage in the fuel pool. The ISFSI, located just north of the Deschutes Building, is capable of being expanded to hold the lifetime spent fuel requirements of Columbia Generating Station. Twenty-seven (27) storage casks have been loaded to date, moving 1,836 assemblies from the fuel pool to the ISFSI.

The costs for the inner storage canister (called a multi-purpose canister) and closure welds are treated as fuel and are included in this Fuel Management Plan in the category of Casks. The costs of the overpacks, facility, and common equipment are treated as a plant capital addition. The cost of a multi-purpose canister is currently estimated to be $1,713,775 and welding costs are estimated to be $89,000 per MPC. This equates to a per bundle cost of $26,512. Future costs have been escalated.

Active Contracts

Appendix A contains descriptions of the currently active fuel management contracts for nuclear material and fabrication services.

Section

5

Nuclear Fuel Budgets

Nuclear Fuel Costs

A measure of nuclear fuel cost is the Fuel-in-Process costs, or the costs to fabricate finished fuel assemblies. The estimated costs for the reload batch for Cycle 21 are shown in Table 5. Reload batch costs are amortized over the life of the fuel. Typically, fuel resides in the reactor core for three (3) cycles (equivalent to six years).

Fuel Revenue

As a result of the planned implementation of the ARTS/MELLLA and PRNM project during the 2011 refueling outage, Energy Northwest has declared 75,000 SWU as excess to the needs of Columbia Generating Station and has arranged for the sale. The revenue from the sale will be realized in FY 2011. The revenue is given in Table 6.

Nuclear Fuel Cash Flows

The summary of cash requirements for the ARTS/MELLLA and PRNM project for FY 2011 are provided in Table 7. A summary of cash flows by fuel component and fiscal year for the next ten years is given in Table 8. Cash flows for nuclear fuel by month for each component for the next five years are shown in Tables 9 through 13. The cash flows are in today's dollars including the costs associated with the nuclear material (uranium, conversion, enrichment).

Section

6

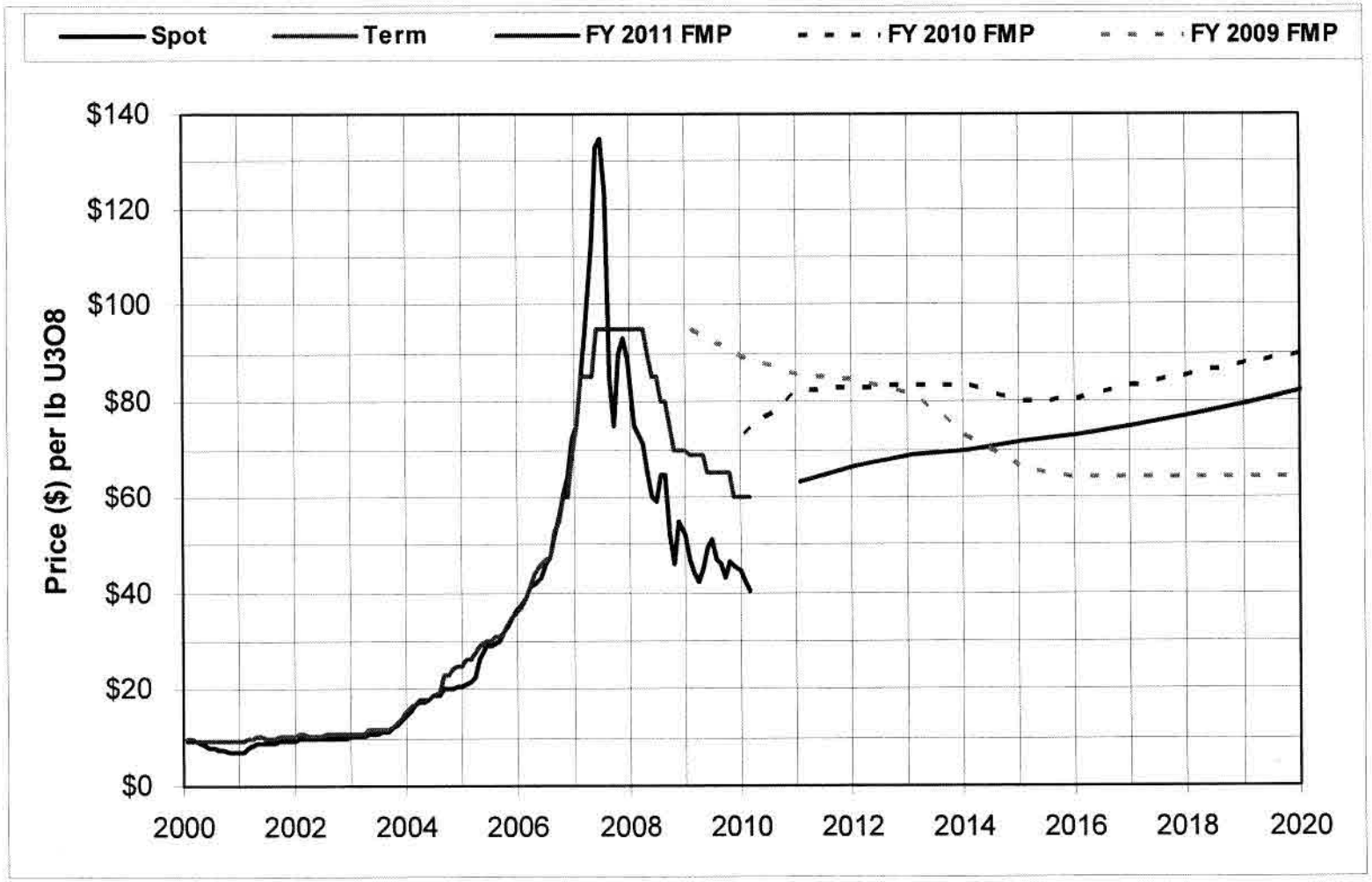
Tables and Figures

Table 1

Projected Market Fuel Prices

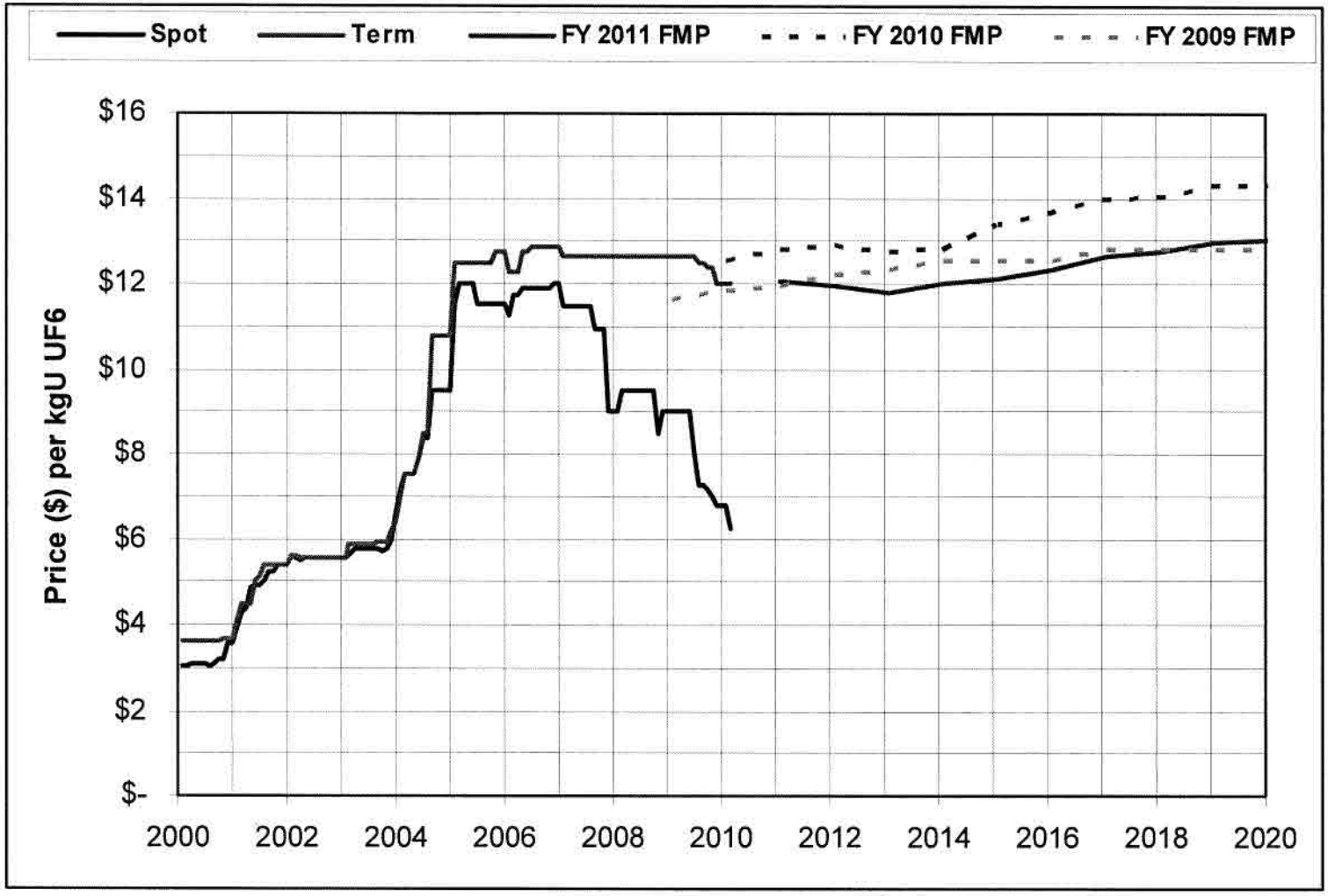
Year	Uranium $/lb U3O8	Conversion $/kgU UF6	Enrichment $/SWU
2011	$63.05	$12.03	$171.70
2012	$66.55	$11.95	$169.98
2013	$68.65	$11.81	$166.28
2014	$69.60	$11.98	$161.43
2015	$71.65	$12.10	$158.10
2016	$72.90	$12.31	$153.98
2017	$74.78	$12.65	$152.43
2018	$77.33	$12.74	$151.45
2019	$79.78	$12.95	$152.53
2020	$82.28	$13.04	$153.53

FIGURE 1
HISTORICAL & PROJECTED PRICES FOR URANIUM CONCENTRATES (U3O8)



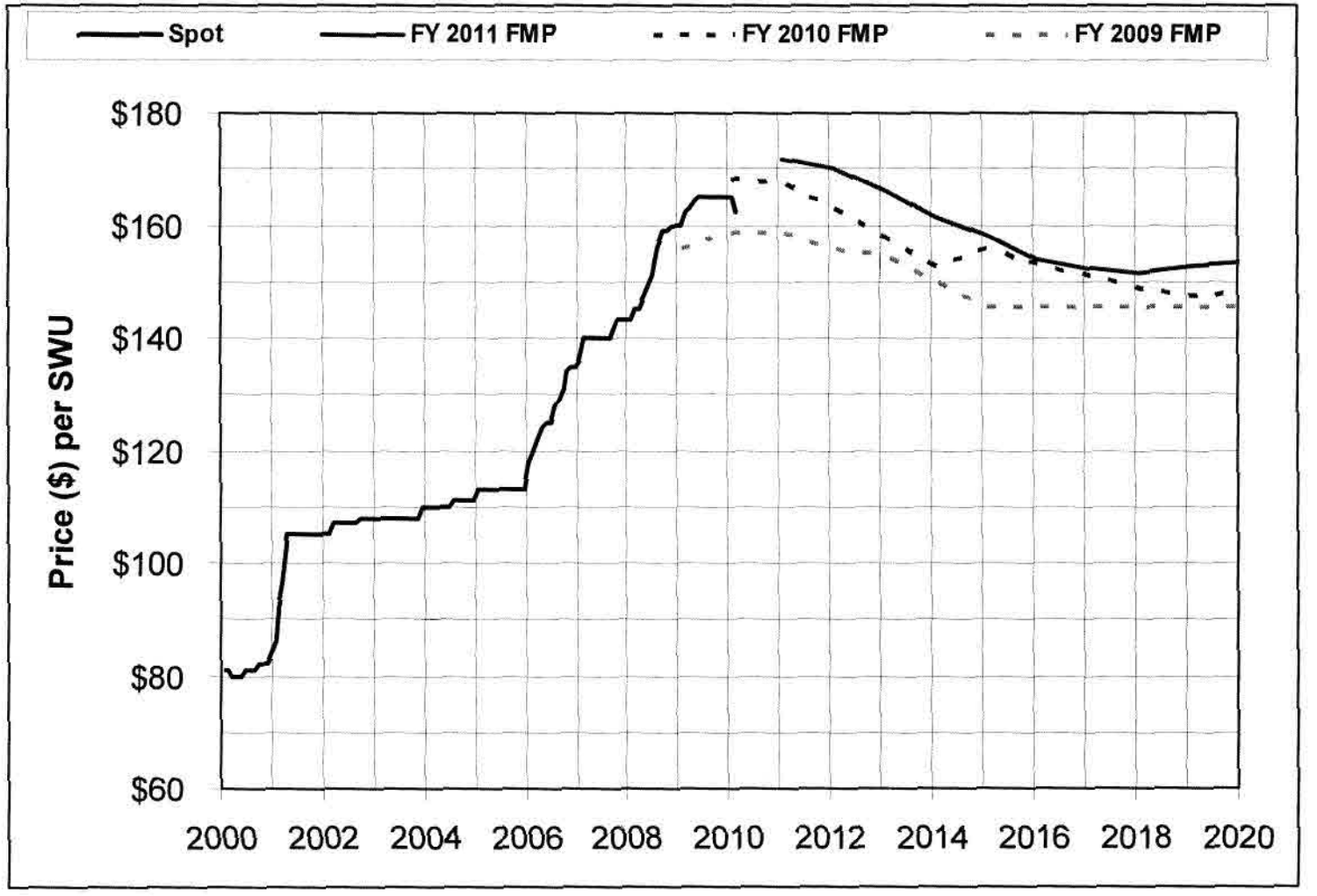
Historical prices provided by Trade Tech www.uranium.info

FIGURE 2
HISTORICAL & PROJECTED PRICES FOR CONVERSION SERVICES



Historical prices provided by Trade Tech www.uranium.info

FIGURE 3
HISTORICAL & PROJECTED PRICES FOR ENRICHMENT SERVICES (SWU)



Historical prices provided by Trade Tech www.uranium.info

Table 2

Fuel Cycle Assumptions

Fiscal Year	Generation GWh	Outage Length (Days)	Cycle	Energy FPD	Generation Factor %
2011	7,419	75	21	649	93%
2012	9,279				
2013	8,437	30	22	639	93%
2014	9,214				
2015	8,428	30	23	647	93%
2016	9,239				
2017	8,402	30	24	647	93%
2018	9,214				
2019	8,402	30	25	647	93%
2020	9,239				

Energy FPD = Operating Calendar Days x GF – (Days lost during startup and coastdown)

Table 3

Planned Purchases of Nuclear Material and Fuel Fabrication Requirements

	Purchases			Fabrication		
Fiscal Year	Lbs U3O8	KgU UF6 Conversion	SWU	kgU Enriched UF6	SWU	# Bundles
2011	205,000	76,545	0	434,815	263,488	264
2012	195,000	150,000	205,700			
2013	505,000	75,000	206,800	419,150	252,303	260
2014	405,000	150,000	137,500			
2015	305,000	150,000	143,000	406,198	244,507	252
2016	590,000	150,000	247,500			
2017	590,000	150,000	132,000	399,751	240,626	248
2018	400,000	155,000	125,000			
2019	400,000	150,000	125,000	399,751	240,626	248
2020	325,000	150,000	125,000			

Table 4

Nuclear Material Totals

Fiscal Year	Lbs U3O8	Natural UF6 kgU	Enriched Uranium Product	
			UF6	SWU
2011	205,000	853,784	133,717	81,165
2012	8,073	735,543	431,401	268,000
2013	140,741	608,367	311,526	203,531
2014	153,814	579,061	510,512	328,421
2015	66,886	542,583	311,260	213,798
2016	264,959	369,833	669,435	438,599
2017	463,031	347,699	460,711	317,867
2018	471,104	334,694	641,608	431,403
2019	479,176	321,689	422,754	304,313
2020	412,249	308,684	603,651	417,849

Table 5

Predicted Reload Batch Costs
($1000)

Component	CGS1-21
# of Assemblies	264
Fuel Cost:	
Uranium	$23,218
Conversion	$1,990
Enrichment	$14,225
Fabrication	$27,641
Sales Tax	$4,884
Fuels' Projects	$19,400
TOTAL	$91,358
Cask Cost:	
TOTAL	$6,999
TOTAL COST:	**$98,357**

Per Assembly Cost
($)

Fuel Cost	$346,057
Cask Cost	$26,512
Total Cost	$372,569

Table 6

Estimated Revenue From Fuel ($1000)

Fiscal Year	Revenue
2011	$12,000
2012	0
2013	0
2014	0
2015	0
2016	0
2017	0
2018	0
2019	0
2020	0

Table 7

FY2011 Fuel Project Cash Flow [1] (ARTS/MELLLA+PRNM) ($1000)

Month	Cash Flow
Jul-10	$0
Aug-10	$70
Sep-10	$626
Oct-10	$3,936
Nov-10	($1,292)
Dec-10	$12
Jan-11	$80
Feb-11	$73
Mar-11	$200
Apr-11	$48
May-11	$148
Jun-11	$1,171
Total	$5,073

[1] The costs of the project will be funded by the issuance of bonds.

Table 8

10-Year Cash Flow for Nuclear Fuel ($1,000)

FY	Uranium	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Fuel Cash[1]	Disposal	Gen Tax
2011	$11,685	$38	$0	$1,652	$22,544	$4,884	$2,282	$43,086	$8,327	$4,328
2012	$11,291	$1,793	$25,961	$1,576	$2,890	$0	$8,666	$52,177	$7,599	$3,597
2013	$31,597	$886	$26,539	$1,752	$26,897	$7,129	$6,505	$101,304	$8,789	$4,760
2014	$25,819	$1,797	$17,942	$1,672	$2,023	$0	$6,256	$55,510	$8,074	$4,565
2015	$19,444	$1,815	$18,976	$1,859	$25,071	$7,869	$0	$75,033	$8,774	$5,219
2016	$43,011	$1,847	$32,809	$1,774	$2,050	$0	$0	$81,490	$8,098	$5,031
2017	$44,120	$1,898	$17,815	$1,972	$26,050	$9,025	$2,806	$103,686	$8,752	$5,762
2018	$30,932	$1,911	$18,931	$1,882	$2,050	$0	$8,195	$63,902	$8,071	$5,539
2019	$31,912	$1,943	$19,066	$2,092	$27,383	$9,920	$7,997	$100,313	$8,752	$6,336
2020	$26,741	$1,956	$19,191	$1,997	$2,050	$0	$6,284	$58,219	$8,095	$6,108
Tot	$276,551	$15,882	$197,231	$18,228	$139,009	$38,827	$48,993	$734,719	$83,333	$51,245

(1) The total fuel cash does NOT include the costs of the ARTS/MELLLA+PRNM project. The costs of the project will be funded by the issuance of bonds.

Table 9

Fiscal Year 2011 Monthly Cash Flow ($1000)

Date	U	C	E	Staff	Fab	Tax	Casks	Disposal	Gen Tax	Cash Flow
Jul-10				138	313					451
Aug-10				138	313			2,220		2,670
Sep-10				138	313					451
Oct-10				138	313					451
Nov-10				138	313			2,266		2,716
Dec-10				138	313		571			1,021
Jan-11	11,685			138	313					12,136
Feb-11		38		138	313			2,266		2,755
Mar-11				138	313					451
Apr-11				138	313					451
May-11				138	19,414	4,884		1,576		26,013
Jun-11				138			1,712		4,328	6,177
Total	11,685	38		1,652	22,544	4,884	2,282	8,327	4,328	55,741

Table 10

Fiscal Year 2012 Monthly Cash Flow ($1000)

Date	U	C	E	Staff	Fab	Tax	Casks	Disposal	Gen Tax	Cash Flow
Jul-11	11,291	1,793		131	241					13,455
Aug-11				131	241		1,167	965		2,505
Sep-11				131	241					372
Oct-11				131	241					372
Nov-11				131	241			2,227		2,600
Dec-11			25,961	131	241					26,334
Jan-12				131	241					372
Feb-12				131	241		3,502	2,227		6,102
Mar-12				131	241		2,497			2,869
Apr-12				131	241		500			872
May-12				131	241		500	2,179		3,051
Jun-12				131	241		500		3,597	4,470
Total	11,291	1,793	25,961	1,576	2,890		8,666	7,599	3,597	63,374

Table 11

Fiscal Year 2013 Monthly Cash Flow ($1000)

Date	U	C	E	Staff	Fab	Tax	Casks	Disposal	Gen Tax	Cash Flow
Jul-12	14,692	886		146	478					16,202
Aug-12				146	478			2,223		2,847
Sep-12				146	478		1,426			2,050
Oct-12	10,522			146	478					11,146
Nov-12				146	478			2,213		2,837
Dec-12			26,539	146	478		993			28,156
Jan-13	6,383			146	478					7,007
Feb-13				146	478			2,213		2,837
Mar-13				146	478		4,086			4,710
Apr-13				146	478					624
May-13				146	22,117	7,129		2,141		31,532
Jun-13				146					4,760	4,906
Total	31,597	886	26,539	1,752	26,897	7,129	6,505	8,789	4,760	114,853

Table 12

Fiscal Year 2014 Monthly Cash Flow ($1000)

Date	U	C	E	Staff	Fab	Tax	Casks	Disposal	Gen Tax	Cash Flow
Jul-13	19,444	1,797	17,942	139	169					39,491
Aug-13				139	169			1,493		1,801
Sep-13				139	169		2,918			3,226
Oct-13				139	169					308
Nov-13				139	169			2,218		2,526
Dec-13				139	169		2,193			2,501
Jan-14	6,375			139	169					6,683
Feb-14				139	169			2,218		2,526
Mar-14				139	169		286			594
Apr-14				139	169		286			594
May-14				139	169		286	2,146		2,740
Jun-14				139	169		286		4,565	5,159
Total	25,819	1,797	17,942	1,672	2,023		6,256	8,074	4,565	68,149

Table 13

Fiscal Year 2015 Monthly Cash Flow ($1000)

Date	U	C	E	Staff	Fab	Tax	Casks	Disposal	Gen Tax	Cash Flow
Jul-14	19,444	1,815	18,976	155	262					40,652
Aug-14				155	262			2,215		2,632
Sep-14				155	262					417
Oct-14				155	262					417
Nov-14				155	262			2,210		2,627
Dec-14				155	262					417
Jan-15				155	262					417
Feb-15				155	262			2,210		2,627
Mar-15				155	262					417
Apr-15				155	262					417
May-15				155	22,453	7,869		2,138		32,615
Jun-15				155					5,219	5,374
Total	19,444	1,815	18,976	1,859	25,071	7,869		8,774	5,219	89,026

APPENDIX A ACTIVE FUEL CONTRACTS

Appendix A
Active Nuclear Material Contracts

Contract	Vendor	Scope
324350	Global Nuclear Fuel	Energy Northwest contracted with GNF in June 2007 to supply fuel design, licensing, and fabrication services for three consecutive reloads for Columbia Generating Station. The first reload under this contract was delivered in the spring of 2009. The scope of this contract will meet the needs of Columbia Generating Station for reload fabrication services through 2013.
313337	Urenco	Energy Northwest contracted with Urenco in January 2003 to supply enrichment services for delivery over calendar years 2005 to 2009. The contract was amended (twice) to procure additional SWU. In January 2006, Energy Northwest issued RFP 640137 for SWU to be delivered between calendar years 2010 to 2015. Urenco was awarded the procurement and the contract extended through 2015. The contract has been amended two additional times to move deliveries to meet the needs of both Urenco and Energy Northwest extending the contract through 2017.
330163	ConverDyn	Energy Northwest contracted with ConverDyn in December 2009 to lease to ConverDyn conversion services contained in natural uranium hexafluoride for a period of 3 years. The value of the conversion services is secured by a Letter of Credit.
330249	Nufcor International Limited	In July 2009, Energy Northwest issued RFP 656708 for natural uranium to be delivered between calendar years 2011 to 2020 to be awarded to multiple suppliers. Nufcor was selected to supply uranium concentrates between calendar years 2012 to 2014.
313179	UG USA	Energy Northwest established a no-requirements contract with UG USA in 2003 to supply uranium, conversion and/or enrichment services. Each individual purchase under the contract will require approval of the Energy Northwest management, Executive Board and BPA, as required.
329477	Exelon	Energy Northwest established a contract with Exelon in 2009 for the sale of enrichment services to Exelon. The enrichment services were declared excess to our needs as a result of the planned implementation of the ARTS/MELLLA and PRNM project.

Energy Northwest
Columbia Generating Station

FY 2010
Fuel Management Plan

Rev. 0

March 9, 2009

L. L. Ferek
Reactor Fuels Engineering

Section 1

Introduction

The Project Agreement between Energy Northwest and Bonneville Power Administration (BPA) for Columbia Generating Station requires Energy Northwest to submit with each Annual Budget a Ten-Year Fuel Management Plan.

This Fuel Plan for FY-2010 covers the period from July 1, 2009, through June 30, 2019. This Fuel Plan includes a cash flow analysis for expenditures and credits for each major component of the fuel cycle by month for the first five (5) years. Also, the contracts for each component of the fuel cycle are discussed. The tables are located in Section 6.

Section

2

Assumptions

Economic

Table 1 gives this year's assumptions for uranium, conversion and enrichment spot market prices. Forward market price data was taken from latest available Ux Consulting Market Reports.

The spot price for uranium has decreased somewhat compared to last year's prices. Prices are currently suppressed due to inventory liquidation as investors and some utilities attempt to raise cash in the wake of the credit crisis and recession. However, forward price projections predict the price to recover and increase steadily as new mines begin production. The price projections for enrichment services continue to increase as new enrichment plants are being built. Prices are predicted to stabilize once the plants are at full capacity.

Energy Northwest's significant uranium inventory and the long-term enrichment contract with Urenco aid in minimizing the near term impact of the rapid rise in fuel prices. The prices from the long-term enrichment contract are factored into the cash flow requirements but are not reflected in the prices in Table 1.

Fuel Cycle

Table 2 shows the assumptions for the fuel cycles used in this plan. Minor changes may occur in the process of design finalization. The planned energy requirements are consistent with the energy requirements supplied by BPA in accordance with the Project Agreement.

Both Final Feedwater Temperature Reduction (FFTR) and Thermal Power Level Coast-down are planned for cost optimization during the final five to seven weeks of the operating run. During FFTR, the operation of the plant is extended at 100% thermal power level for 8-10 days while the electrical power level gradually decreases by about 1%. During coast-down, the power level is expected to decrease at a rate of 0.5% per day. The Fuel Management Plan assumes 9 days of FFTR and 30 days of coast-down for a total of 39 days of cycle extension for all future cycles. The energies specified in Table 2 are within the acceptable range provided by BPA for the FY 2009 Fuel Management Plan.

SECTION 2 ASSUMPTIONS

The generation factor refers to the amount of energy that is expected to be generated relative to the maximum potential generation from when the generator is synchronized to the grid to when the reactor is shut down for the outage.

The generation factor and outage length are the critical parameters that determine the cycle energy from which the fuel requirements and ultimately the fuel budget is derived.

Another important assumption is the electrical generator output. A value of 1131 MW is used to reflect a seasonal average value.

Section

3

Nuclear Fuel Market

Uranium Market

The uranium market has experienced a dramatic increase price over the past six years. In January 2003, the price of uranium was $10.20 per pound. The market price peaked in June 2007 at $135 per pound. Currently, the spot price stands at $55 per pound at end of November 2008. The price increase is being driven by the need for increased primary production to meet demand as quantities available from excess inventories and stockpiles have essentially been committed. The dramatic price increase has moved utilities to sign contracts for their uncommitted requirements for the next three years in an attempt to mitigate supply disruptions and limit their vulnerability to further price increases. Due the limited supply and limited demand, the market is very volatile where a 10% change in price from month to month is not uncommon.

A number of investment funds have also entered the market buying uranium, which places additional demand on already short supplies. Although this has contributed to the price rise, it also provides a source of liquidity to the market since the investors are solely looking for a return-on-investment. As prices continue to rise, the investment funds may become a source of supply instead of, or in addition to, demand. Recently, the economic credit crisis has resulted in some funds liquidating their inventory to raise cash. This has led to a softening of price but is expected to be temporary in nature.

Although price projections show relatively modest increases in price, a number of factors could cause prices to continue to increase. Delays in permitting and construction are causing delays in mine startup especially Cameco's Cigar Lake property. Cigar Lake is currently the largest new mine scheduled to come into production. This has resulted in Cameco reducing scheduled deliveries to customers forcing utilities to draw on inventory. Shortages of sulfuric acid have caused a number of in-situ leach mines to curtail production. Also, the recent decrease in uranium prices has made several new mines not viable and their development is being put on hold. Finally, increased demand is emerging both from the global expansion of nuclear power and the decision to allow India to purchase nuclear material and components.

Conversion Services

Spot conversion prices are predicted to remain relatively stable for the foreseeable future. The current price levels allow for new expansion needed by the market to upgrade or replace aging plants.

Cameco has signed a 10 year toll-conversion agreement with British Nuclear Fuels plc (BNFL) to acquire uranium conversion services from BNFL's Springfields plant in Lancashire, UK. The European converter, Comhurex, has announced plans for building another conversion facility. In addition, Cameco and ConverDyn have both started to expand their North American operations. Cameco's Port Hope facility has recently completed an extended shutdown due to operational problems. However, Cameco is currently experiencing a disruption in the supply of HF and has shutdown the plant yet again.

Enrichment Market

The enrichment market has also seen price increases over the past few years. This increase is due in part to increasing demand from lower tails assays. Enrichment customers have the option to order enrichment services with a range of tails assays. The higher the tails assay the more uranium feed required and the less enrichment services. The lower the tails assay the more enrichment services required and less uranium feed. At the current prices, the optimum tails assay has reduced from 0.30 wt% to 0.25%. The result is an increase in enrichment demand and reduction in uranium demand. The spot price in January 2006 was $116.00 per Separative Work Unit (SWU) and has risen to $160 per SWU in November 2008. The price increase is also being driven by limited supply to meet the higher demand in the face of rising supply costs. Both the US and European gaseous diffusion plants (GDP) have experienced production cost increases due to an increase in power prices. Electricity costs account for nearly 60% of the SWU costs at GDP enrichment plants.

Another factor fueling price increases in the near term is the fact that all three Western suppliers are in the process of either replacing their costly gaseous diffusion with centrifuge technology or expanding their existing capacity. Urenco has broken ground on an enrichment facility in New Mexico using its proven centrifuge technology. In addition, Urenco has increased the capacity at each of their European plants. The United States Enrichment Corporation (USEC) is developing their own centrifuge technology to replace the GDP at Paducah, KY. AREVA's subsidiary Eurodif is nearing completion of a new gaseous centrifuge plant to replace

their GDP facility at Tricastin in France. AREVA has also announced plans to build a domestic centrifuge plant in Idaho. General Electric is evaluating deployment of the SILEX laser enrichment technology, which has been demonstrated at the lab scale.

Russian access to the US market continues to be restricted due to the Megatons-to-Megawatts program, which is set to expire in 2013. However, the current Russian suspension agreement has been re-negotiated to allow increasing amounts of material into the US market beginning in 2010. The impact of this new supply is not well known at this point.

Fuel Fabrication

The fabrication market took a turn for the positive with the announcement that Westinghouse was going to supply Exelon with BWR fuel from its Columbia, South Carolina, plant starting in 2006. The fabrication award was for a total of sixteen reloads at four of Exelon's reactors. The award will keep Westinghouse as a viable competitor in the US BWR fuel fabrication market. In addition, the renewed interest in new plant construction has resulted in significant investment by the GNF, AREVA, and Westinghouse in their fabrication processes and methodologies.

Energy Northwest decided to go out for bids for the supply of fuel fabrication services in 2009, 2011, 2013 (Cycles 20-22). The bid evaluation and negotiation process was completed with an award to GNF for the three reloads. The rapid rise in uranium prices has resulted in a situation where the actual cost of fabrication is minor compared to how efficiently a fuel design utilizes the contained uranium while maintaining operating margins and flexibility. All of the fuel fabricators have been making improvements to the design to improve their uranium efficiency and also provide for more operating margin.

Section

4

Fuel Management Strategy

Fuel Cycle Designs

During FY2010, Columbia will be in the first half of Cycle 20. This is the first reload of GE14 fuel design. The current bundle and core design show batch size of 252 assemblies with an average enrichment of 4.08 wt% U^{235}. The Cycle 20 core has energy available to be able to operate at 100% power for 588 days plus an additional 39 days of cycle extension (9 days of FFTR and 30 days of coast-down).

Fuel Procurement Strategy

Energy Northwest is in a good position in the market. The current enriched uranium inventory in storage at GNF will meet the nuclear material requirements for the 2009 and 2011 reloads. In addition, Energy Northwest has sufficient natural uranium in inventory to supply the feed required for our enrichment contract through FY2013.

The current plan has annual uranium purchases beginning in FY2012 with a small spot purchase in FY2011. These purchases are planned to satisfy the feed requirements of the long-term enrichment contract. New enrichment procurement activities are planned for 2014 with deliveries beginning in 2019. In the long term, Energy Northwest plans to maintain approximately one reload's worth of nuclear material as strategic inventory in the event of supply disruptions.

Fuel Procurement Activities

The primary focus for FY2010 will be on management and optimization of the inventory and preparation of a Request for Proposal for the supply of uranium beginning in FY2012.

Fabrication Services

A fabrication services contract for Columbia Generating Station for the fuel supply for three reloads was awarded to GNF in June 2007. The 2009 refueling outage will be the first reload of GNF's GE14 fuel design (for Cycle 20). There is the option to begin loading the advanced GNF2 design in subsequent cycles. A detailed evaluation will be done to determine the merits of loading the GNF2 design prior to making a recommendation to management.

Energy Northwest is pursuing the licensing and implementation of the operating flexibility program for APRM, RBM Technical Specifications (ARTS) Improvement and Maximum Extended Load Line Limit Analysis (MELLLA) and supply of the Power Range Neutron Monitoring (PRNM) Nuclear Measurement Analysis and Control (NUMAC) system with Option III for the Columbia Generation Station. This project is referred to as "ARTS/MELLLA and PRNM". The project has an estimated cost of $19.4 million excluding financing costs. The benefits to the station are reduced fuel cost due to reduced batch size and improved fuel utilization, increased operating flexibility, increased net generation due to reduced recirculation pump speed, reduction in the number of downpowers to reposition control rods, reduction of nuisance alarms in the control room, and improved equipment reliability by replacing obsolete and aging equipment. The project is planned to be installed in R20 (2011) and the cost of the project has been factored into the Cycle 21 reload batch costs.

Fuel Management Physical Requirements

The assumed cycle energies and fuel designs are used to develop multi-cycle reload material requirement projections. The projected reload material requirements are integrated with the existing inventory levels to project procurement requirements into the future. Tables 3 and 4 summarize those requirements over the next ten years.

Uranium is purchased in natural UF6 form and added to the inventory of natural UF6. When enrichment services are purchased, the necessary quantity of natural UF6 is transferred to the Enricher. Upon delivery of the enriched uranium product, the UF6 and associated enrichment services (SWU) are transferred to the inventory of enriched material. The enriched UF6 is deducted from the inventory when fabricated into fuel assemblies. Table 3 shows purchases of natural uranium and enrichment services and the inventory of natural UF6. Table 4 shows the inventory of enriched uranium and the projected requirements for each reload. The values in Table 4 have been adjusted to 0.3 wt% tails assay.

Spent Fuel Storage and Disposal

DOE Spent Fuel Contract

While courts have now ruled that DOE had a binding obligation to begin acceptance of spent nuclear fuel no later than January 31, 1998, DOE estimates that they will not be accepting fuel at the completed repository until sometime after 2015. Energy Northwest is pursuing legal action

against DOE regarding DOE's failure to begin accepting spent fuel in 1998. Although the litigation is scheduled for the first quarter 2009, an estimated cost of $550,000 is included for FY2010 to cover any ongoing legal costs.

On-Site Spent Fuel Storage

Columbia Generating Station has an Independent Spent Fuel Storage Installation (ISFSI) using NRC-approved dry storage casks to supplement wet storage in the spent fuel pool. The ISFSI, located just north of the Deschutes Building, is capable of being expanded to hold the lifetime spent fuel requirements of Columbia Generating Station. Twenty-seven (27) storage casks have been loaded to date, moving 1,836 assemblies from the spent fuel pool to the ISFSI.

To maintain full core discharge capability, twelve (12) dry spent fuel storage casks must be loaded every three cycles. The cost of an MPC is estimated to be $1,108,649 and welding costs are estimated to be $70,000 per MPC. Future costs have been escalated. The costs for the MPCs and closure welds are treated as a fuel expense and are included in this Fuel Plan in the category of Casks. The costs of the overpacks, facility, and common equipment are treated as a plant capital addition.

Active Contracts

Appendix A contains descriptions of the currently active fuel management contracts for nuclear material and fabrication services.

Section

5

Nuclear Fuel Costs

Nuclear Fuel in Process

A measure of nuclear fuel cost is the Fuel-in-Process costs, or the costs to fabricate finished fuel assemblies.

The estimated costs for the reload batch for Cycle 20 are shown in Table 5.

Fuel Revenue

As a result of the planned implementation of the ARTS/MELLLA and Power Range Neutron Monitor project during R20, Energy Northwest has declared 75,000 SWU as excess to the needs of Columbia Generating Station. The revenue from the sale of this SWU will be realized in FY 2011. The revenue is given in Table 6.

Nuclear Fuel Cash Flows

A summary of cash flows by fuel component and fiscal year for the next ten years is given in Table 7. Cash flows for nuclear fuel by month for each component for the next five years are shown in Tables 8 through 12. The cash flows are in today's dollars including the costs associated with the nuclear material (uranium, conversion, enrichment).

Section 6

Tables

Table 1

Projected Un-Escalated Fuel Prices

Year	Uranium $/lb U3O8	Conversion $/kgU UF6	Enrichment $/SWU
2010	$73.00	$12.52	$168.09
2011	$82.56	$12.81	$167.13
2012	$82.97	$12.91	$163.13
2013	$83.40	$12.76	$157.90
2014	$83.46	$12.78	$152.65
2015	$80.12	$13.40	$155.65
2016	$80.49	$13.64	$153.25
2017	$83.15	$13.96	$151.15
2018	$85.62	$14.03	$148.75
2019	$88.00	$14.27	$147.55

Table 2

Fuel Cycle Assumptions

Fiscal Year	Generation GWhr	Outage Length (Days)	Cycle	Energy FPD	Generation Factor %
2010	9,412				
2011	7,344	78	21	641.53	94%
2012	9,339				
2013	8,493	30	22	653.75	94%
2014	9,313				
2015	8,519	30	23	653.75	94%
2016	9,339				
2017	8,493	30	24	653.75	94%
2018	9,313				
2019	8,493	30	25	653.75	94%

Energy FPD = Operating Calendar Days x GF – (Days lost during startup and coastdown)

Table 3

Natural UF6 Inventory & Planned Purchases

Fiscal Year	Purchase UF6	Purchase SWU	Inventory Nat U
2010	0	0	720,922
2011	15,000	137,500	641,951
2012	145,000	137,500	595,177
2013	145,000	137,500	548,404
2014	145,000	137,500	501,630
2015	150,000	143,000	452,185
2016	225,000	247,500	395,949
2017	225,000	132,000	436,846
2018	250,000	0	686,846
2019	200,000	300,000	468,430

Table 4

Enriched Inventory & Fuel Fabrication Requirements

Fiscal Year	Enriched Inventory UF6	Enriched Inventory SWU	Fuel Fabrication UF6	Fuel Fabrication SWU	Fuel Fabrication # Bundles
2010	678,790	412,933			
2011	347,767	205,770	434,724	263,432	264
2012	560,005	330,161			
2013	344,371	195,272	427,873	259,281	260
2014	556,610	319,663			
2015	342,941	185,795	434,397	263,235	264
2016	683,405	385,338			
2017	452,757	241,520	434,397	263,235	264
2018	452,757	241,520			
2019	481,426	249,685	434,397	263,235	264

Table 5

Reload Batch Costs ($)

Component	CGS1-20
# of Assemblies	252
Fuel Cost:	
Uranium	$19,311,277
Conversion	1,963,261
Enrichment	13,580,511
Fabrication	27,851,940
Sales Tax	4,571,166
SUBTOTAL FUEL	$67,278,156
Cost per Assembly	266,977
Cask Cost:	
SUBTOTAL CASK	$4,367,935
Cost per Assembly	17,333
TOTAL COST:	**$71,646,091**
Cost per Assembly	284,310

Table 6

Estimated Revenue From Fuel ($1000)

Fiscal Year	Revenue
2010	0
2011	$12,000
2012	0
2013	0
2014	0
2015	0
2016	0
2017	0
2018	0
2019	0

Table 7

10-Year Cash Flow for Nuclear Fuel ($1,000)

FY	Uranium (1)	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Fuel Cash	Disposal	Total (2)
2010	$0	$0	$0	$1,177	$2,268	$0	$0	$3,446	$8,104	$11,549
2011	3,236	230	17,215	1,213	23,104	5,283	2,057	52,337	8,223	60,560
2012	31,434	1,871	17,546	1,249	1,676	0	6,631	60,407	7,725	68,132
2013	31,597	1,850	17,886	1,286	23,925	7,241	6,101	89,887	8,847	98,734
2014	31,620	1,853	18,234	1,325	951	0	5,560	59,542	8,158	67,701
2015	31,401	2,010	19,334	1,365	24,964	9,306	0	88,380	8,869	97,249
2016	47,319	3,069	33,667	1,406	951	0	0	86,412	8,185	94,597
2017	48,883	3,141	18,198	1,448	26,879	11,383	3,093	113,026	8,847	121,873
2018	55,928	3,508	0	1,491	951	0	9,405	71,283	8,158	79,441
2019	45,986	2,854	44,265	1,536	28,960	12,742	8,461	144,803	8,847	153,650
Total	$327,405	$20,386	$186,345	$13,496	$134,629	$45,955	$41,307	$769,524	$83,963	$853,486

(1) Uranium cost forecasts are particularly uncertain given the current financial crisis.
(2) The total cash does NOT include the costs of the ARTS/MELLLA+PRNM project. The project costs will be funded by the issuance of bonds.

Table 8

Fiscal Year 2010 Monthly Cash Flow ($1000)

Date	Uranium	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Disposal	Cash Flow
Jul-09				$98	$189				$287
Aug-09				98	189			1,381	1,668
Sep-09				98	189				287
Oct-09				98	189				287
Nov-09				98	189			2,266	2,553
Dec-09				98	189				287
Jan-10				98	189				287
Feb-10				98	189			2,266	2,553
Mar-10				98	189				287
Apr-10				98	189				287
May-10				98	189			2,192	2,479
Jun-10				98	189				287
Total				$1,177	$2,268			$8,104	$11,549

Table 9

Fiscal Year 2011 Monthly Cash Flow ($1000)

Date	Uranium	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Disposal	Cash Flow
Jul-10	$3,236	$230		$101	$200				$3,767
Aug-10				101	200			2,260	2,561
Sep-10				101	200				301
Oct-10				101	200				301
Nov-10				101	200			2,248	2,549
Dec-10			17,215	101	200		503		18,019
Jan-11				101	200				301
Feb-11				101	200			2,248	2,549
Mar-11				101	200				301
Apr-11				101	200				301
May-11				101	21,104	5,283		1,466	27,954
Jun-11				101			1,554		1,655
Total	$3,236	$230	$17,215	$1,213	$23,104	$5,283	$2,057	$8,223	$60,560

Table 10

Fiscal Year 2012 Monthly Cash Flow ($1000)

Date	Uranium	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Disposal	Cash Flow
Jul-11	$31,434	$1,871		$104	$140				$33,549
Aug-11				104	140			1,049	1,292
Sep-11				104	140				244
Oct-11				104	140				244
Nov-11				104	140			2,242	2,486
Dec-11			17,546	104	140		1,131		18,921
Jan-12				104	140				244
Feb-12				104	140			2,242	2,486
Mar-12				104	140		2,008		2,251
Apr-12				104	140				244
May-12				104	140			2,193	2,437
Jun-12				104	140		3,492		3,736
Total	$31,434	$1,871	$17,546	$1,249	$1,676		$6,631	$7,725	$68,132

Table 11

Fiscal Year 2013 Monthly Cash Flow ($1000)

Date	Uranium	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Disposal	Cash Flow
Jul-12	$31,597	$1,850		$107	$178				$33,733
Aug-12				107	178			2,237	2,522
Sep-12				107	178		1,845		2,130
Oct-12				107	178				285
Nov-12				107	178			2,228	2,513
Dec-12			17,886	107	178				18,171
Jan-13				107	178				285
Feb-13				107	178			2,228	2,513
Mar-13				107	178		4,256		4,542
Apr-13				107	178				285
May-13				107	22,144	7,241		2,155	31,646
Jun-13				107					107
Total	$31,597	$1,850	$17,886	$1,286	$23,925	$7,241	$6,101	$8,847	$98,734

Table 12

Fiscal Year 2014 Monthly Cash Flow ($1000)

Date	Uranium	Conversion	Enrichment	Staff	Fabrication	Tax	Casks	Disposal	Cash Flow
Jul-13	$31,620	$1,853		$110	$79				$33,663
Aug-13				110	79			1,506	1,696
Sep-13				110	79		4,234		4,424
Oct-13				110	79				190
Nov-13				110	79			2,242	2,431
Dec-13			18,234	110	79				18,424
Jan-14				110	79				190
Feb-14				110	79			2,242	2,431
Mar-14				110	79		661		851
Apr-14				110	79		664		854
May-14				110	79			2,169	2,358
Jun-14				110	79				190
Total	$31,620	$1,853	$18,234	$1,325	$951		$5,560	$8,158	$67,701

Appendix A
Active Fuel Contracts

CONTRACT C-31700
NUCLEAR FUEL FABRICATION SERVICES
FRAMATOME ANP

SCOPE

Energy Northwest contracted with Framatome ANP in January 2002, to supply fuel design, licensing, and fabrication services for three consecutive reloads for Columbia Generating Station. The last reload under this contract was delivered in the spring of 2007. The contract remains active until all AREVA fuel is discharged from the reactor.

CONTRACT 324350
NUCLEAR FUEL FABRICATION SERVICES
GLOBAL NUCLEAR FUEL

SCOPE

Energy Northwest contracted with GNF in June 2007, to supply fuel design, licensing, and fabrication services for three consecutive reloads for Columbia Generating Station. The first reload under this contract will be delivered in the spring of 2009. The scope of this contract will meet the needs of Columbia Generating Station for reload fabrication services through 2013.

CONTRACT C-31124 (Amended)
ENRICHED URANIUM LOAN
GLOBAL NUCLEAR FUEL

SCOPE

Energy Northwest loaned enriched uranium in the form of UF_6 to Global Nuclear Fuel (GNF) for use as working inventory at their fuel fabrication facility in Wilmington, North Carolina. In exchange Energy Northwest will receive the equivalent amounts of the same product plus loan fees when the EUP is used by GNF.

SECURITY

The Stored EUP will be covered by an irrevocable standby Letter of Credit equal to the market value of the material.

RETURN OF MATERIAL

The Stored EUP will be returned on a schedule commensurate with reactor needs. In the event of a supply disruption, the material or a portion thereof may be recalled with six months notice.

CONTRACT 313337
ENRICHMENT SERVICES
URENCO LTD.

SCOPE

Energy Northwest contracted with Urenco LTD. in January 2003 to supply enrichment services for delivery over calendar years 2005 to 2009. The contract was amended (twice) to procure additional SWU. In January 2006, Energy Northwest issued RFP 640137 for SWU to be delivered between calendar years 2010 to 2015. Urenco was awarded the procurement and the contract extended through 2015.

CONTRACT 313179
URANIUM, CONVERSION AND/OR ENRICHMENT SERVICES
UG USA

SCOPE

Energy Northwest established a no-requirements contract with UG USA in 2003 to supply uranium, conversion and/or enrichment services over calendar years 2003 to 2009. Each individual purchase under the contract will require approval of Energy Northwest Management, Executive Board and Bonneville Power Administration, as required.

Energy Northwest
Columbia Generating Station

FY 2009
Fuel Management Plan

Rev. 2

January 2009

L. L. Ferek
Reactor Fuels Engineering

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Section 1

Introduction

The Project Agreement between Energy Northwest and Bonneville Power Administration (BPA) for Columbia Generating Station requires Energy Northwest to submit with each Annual Budget a Ten-Year Fuel Management Plan.

This Fuel Plan for FY-2009 covers the period from July 1, 2008, through June 30, 2018. This Fuel Plan includes a cash flow analysis for expenditures and credits for each major component of the fuel cycle by month for the first five (5) years. Also, the contracts for each component of the fuel cycle are discussed.

Revision 1 to this Fuel Plan documents the reduction in cash requirements in FY-2009 of $13,942,500. This reduction is due to the contract modification with GNF to provide a portion of the payment for Cycle 20 fuel fabrication in the form of enrichment services (SWU) in lieu of cash.

Revision 2 to this Fuel Plan reflects the accelerated purchase of uranium in FY2009 (rather than FY2011). This revision also documents the latest estimated cash requirements for dry cask storage and fuel fabrication costs. The FY2009 fuel cash budget has been increased by $18 million and the FY2011 fuel cash budget has been reduced by $28 million.

Section

2

Assumptions

Economic

Table 1 gives this year's assumptions for uranium, conversion and enrichment prices. The price estimates are a composite of prices provided by Ux Consulting Company, LLC, and long term contract prices, where available. By comparison, the January 2008 spot market prices are $75.00 per lb for U_3O_8, $11.50 per KgU for conversion services and $143.00 per SWU for enrichment services. The market-fundamental-based models used for these kinds of predictions are unable to cope with the subjective nature of the market and foresee the conditions that ultimately have led to the current trend in market prices.

The price projections for uranium, conversion and enrichment market prices have increased relative to last year's projections. The uranium market projections predict that prices will stabilize in the 2010-2013 time-frame as new mines come into production. The market projections for enrichment continue to show a sharp increase from the 2006 forecast with prices peaking in the 2011-2014 time frame and then decreasing once new enrichment plants are at full capacity. If accurate, these trends would result in significant increases in future Columbia Generating Station fuel costs.

Energy Northwest's significant uranium inventory and the long-term enrichment contract with Urenco aid in minimizing the near term impact of the rapid rise in fuel prices. The prices from the long-term enrichment contract were factored into the price forecasts shown in Table 1. Forward market price data was taken from latest available Ux Consulting Quarterly Market reports.

Costs for the independent spent fuel storage installation are not included in the fuel cost but are reflected as a plant capital project in the Operating and Maintenance budget. However, the costs for the multi-purpose canisters (MPCs) and closure welds, including leak testing, are considered fuel expenses and are included in the report as a separate major cash flow component.

A new fabrication contract with Global Nuclear Fuels – Americas, LLC (GNF) to supply the fuel fabrication services for Cycles 20 through 22 reloads has been award and implemented.

Table 1
Projected Fuel Prices [1]

Projected Fuel Prices			
Year	Uranium $/lb	Conversion $/KgU	Enrichment $/SWU
2009	$55.11	$11.64	$156.00
2010	$88.75	$11.84	$158.50
2011	$85.90	$11.95	$158.50
2012	$84.60	$12.20	$156.00
2013	$81.60	$12.31	$154.50
2014	$72.60	$12.56	$150.00
2015	$66.00	$12.56	$145.50
2016	$64.25	$12.56	$145.50
2017	$64.25	$12.81	$145.50
2018	$64.25	$12.81	$145.50
2019	$64.25	$12.81	$145.50

[1] Prices expressed in current (2008) dollars.

Fuel Cycle

Table 2 shows the assumptions for the fuel cycles used in this plan. Minor changes may occur in the process of design finalization. The planned energy requirements are consistent with the energy requirements supplied by BPA in accordance with the Project Agreement.

Both Final Feedwater Temperature Reduction (FFTR) and Thermal Power Level Coast-down are planned for cost optimization during the final five to seven weeks of the operating run. During FFTR, the operation of the plant is extended at 100% thermal power level for 8-10 days while the electrical power level gradually decreases by about 1%. During coast-down, the power level is expected to decrease at a rate of 0.5% per day. The Fuel Management Plan assumes 9 days of FFTR and 30 days of coast-down for a total of 39 days of cycle extension for all future cycles. The energies specified in Table 2 are within the acceptable range provided by BPA for the FY 2008 Fuel Management Plan.

The generation factor refers to the amount of energy that is expected to be generated relative to the maximum potential generation from when the generator is synchronized to the grid to when the reactor is shut down for the outage.

The generation factor and outage length are the critical parameters that determine the cycle energy from which the fuel requirements and ultimately the fuel budget is derived.

Another important assumption is the electrical generator output. A value of 1131 MW is used to reflect a seasonal average value.

Table 2
Fuel Cycle Assumptions

Fiscal Year	Generation GWhr	Outage Length (Days)	Cycle	Energy FPD	Generation Factor %
2009	8,376	28	20	621	95%
2010	9,412				
2011	7,088	88	21	636	94%
2012	9,339				
2013	8,493	30	22	654	94%
2014	9,313				
2015	8,493	30	23	654	94%
2016	9,339				
2017	8,468	30	24	655	94%
2018	9,313				

Energy FPD = Operating Calendar Days x GF – Days lost during startup – Days lost during coastdown

Section

3

Nuclear Fuel Market

Uranium Market

The uranium market has experience a dramatic increase price. In January 2003 the price of uranium was $10.20 per pound. The market price peaked in June 2007 at $135 per pound. Currently, the price stands at $75.00 per pound at end of January 2008. The price increase is being driven by the need for increased primary production to meet demand as quantities available from excess inventories and stockpiles have essentially been committed. The dramatic price increase has moved utilities to sign contracts for their uncommitted requirements for the next three years in an attempt to mitigate supply disruptions and limit their vulnerability to further price increases. Due the limited supply and limited demand, the market is very volatile where a 10% change in price month to month is not uncommon.

A number of investment funds have also entered the market buying uranium, which places additional demand on already short supplies. Although this has contributed to the price rise, it also provides a source of liquidity to the market since the investors are solely looking for a return-on-investment. As prices continue to rise, the investment funds may become a source of supply instead of or in addition to demand.

The market is projected to continue to increase for the next 3-4 years, with prices stabilizing and starting to decrease once new production comes available. However, a number of things could cause prices to continue to increase. There are two critical items that could have a significant impact on price. The first is how quickly new mines come into production. If the new mines are delayed then prices will rise as near term demand increases. This has recently occurred with Cameco's new Cigar Lake mine, which flooded in October 2006 delaying initial production by an estimated 5 years. Cigar Lake is currently the largest new mine scheduled to come into production. This has resulted in Cameco reducing scheduled deliveries to customers forcing utilities to draw on inventory. The second is the impact of new nuclear plants being ordered both in the US and internationally. New plants result in higher demand as initial cores for those reactors are purchased in the market well in advance of initial startup.

Conversion Services

Spot conversion prices have decreased from a year ago to about $10.00 and are predicted to main stable for the foreseeable future. The current price levels allow for new expansion needed by the market to upgrade or replace aging plants.

Cameco has signed a 10 year toll-conversion agreement with British Nuclear Fuels plc (BNFL) to acquire uranium conversion services from BNFL's Springfields plant in Lancashire, UK. As a result, the price gap between European and North American conversion has been eliminated. The European converter, Comhurex, has announced plans for building another conversion facility. In addition, Cameco and ConverDyn have both started to expand their North American operations.

Enrichment Market

The enrichment market has seen modest price increases over the past few years. However, due to the high uranium prices, the rate of price increases in the enrichment market has begun to increase - with significantly higher prices a very good possibility. Enrichment customers have the option to order enrichment services with a range of tails assays. The higher the tails assay the more uranium feed required and the less enrichment services. The lower the tails assay the more enrichment services required and less uranium feed. At the current prices, the optimum tails assay has reduced from 0.30 wt% to 0.20%. The result is an increase by about 25% in enrichment demand to reduce the uranium feed about 20%. The spot price in January 2006 was $116.00 per Separative Work Unit (SWU) and has risen to $143 per SWU in January 2008. However, price could likely increase to $175 per SWU by January 2009. The price increase is also being driven by limited supply to meet the higher demand in the face of rising supply costs. Both the US and European gaseous diffusion plants (GDP) expect their production costs to increase due to an increase in power prices. Electricity costs account for nearly 60% of the SWU costs at GDP enrichment plants. The average electricity cost for the US GDP has increased 50% and the European GDP it is estimated to have increased 100%.

Another factor fueling price increases in the near term is the fact that all three Western suppliers are in the process of either replacing their costly gaseous diffusion with centrifuge technology or expanding their existing capacity. Urenco has broken ground on an enrichment facility in New Mexico using its proven centrifuge technology. In addition, Urenco has received approval to increase the capacity of their Gronau facility in Germany. The United States Enrichment Corporation (USEC) is developing their own centrifuge technology to replace the GDP at Paducah, KY. AREVA's subsidiary Eurodif has signed an agreement with Urenco to use Urenco's centrifuge technology to replace their GDP facility at Tricastin in France. A new development is that General Electric is looking to deploy the SILEX laser enrichment technology which has been demonstrated at the lab scale.

A new trade agreement signed on February 1, 2008, will give Tenex, the Russian enricher, the ability to starting selling directly into the US market starting in 2011, with quantities gradually increasing up to about 3.0 million SWU by 2020.

Fuel Fabrication

The fabrication market took a turn for the positive with the announcement that Westinghouse was going to supply Exelon with BWR fuel from its Columbia, South Carolina, plant starting in 2006. The fabrication award was for a total of sixteen reloads at four of Exelon's reactors. The award will keep Westinghouse as a viable competitor in the US BWR fuel fabrication market. In addition, the renewed interest in new plant construction has resulted in significant investment by the GNF, AREVA, and Westinghouse in their fabrication processes and methodologies.

Energy Northwest decided to go out for bids for the supply of fuel fabrication services in 2009, 2011, 2013 (Cycles 20-22). The bid evaluation and negotiation process was completed with an award to GNF for the three reloads. The rapid rise in uranium prices has resulted in a situation where the actual cost of fabrication was minor compared to how efficiently a fuel design utilizes the contained uranium while maintaining operating margins and flexibility. All of the fuel fabricators have been making improvements to the design to improve their uranium efficiency and also provide for more operational margin.

Section 4

Fuel Management Strategy

Fuel Cycle Designs

During FY2009, Columbia will be in the second half of Cycle 19, which is the station's fourth twenty-four month cycle. The reload was comprised of 272 assemblies, of the ATRIUM-10 design, with an average enrichment of 4.14 wt% U^{235}. The Cycle 19 core has energy available to be able to operate for the equivalent of 100% power for 642 days, including 39 days of cycle extension from 9 days of FFTR and 30 days of coast-down.

FY2009 will also see the introduction of the GE14 10x10 fuel design beginning in Cycle 20. The GE14 fuel design has 92 fueled locations, 14 of which are 2/3 height and 8 fuel rod locations replaced by two large water rods.

Fuel Procurement Strategy

Energy Northwest is in a remarkable position in the market. The current enriched uranium inventory in storage at GNF will meet the requirements for the 2009, 2011 and 2013 reloads. In addition, the natural uranium in inventory will meet the feed requirements (for our long-term enrichment contract) through 2013.

The current plan contains a spot market uranium purchase in FY2009 to take advantage of the low prices resulting from the economic recession and credit crisis. The conversion services will be purchased in FY2011. Follow-on purchases of UF6 are then scheduled beginning in FY2012. These purchases are planned in the event that the forward prices continue to escalate and early purchases make financial sense. There is no new enrichment procurement needed until after 2016 with deliveries beginning in 2020.

Fuel Procurement Activities

The large inventory of uranium will allow Energy Northwest to stay out of the current market and allow for new mines and enrichment facilities to enter production and help restore prices to more historic levels. The primary focus, for the next few years, will be on management and optimization of the inventory.

Fabrication Services

Currently, Columbia is operating in Cycle 19 with the third reload and final reload of ATRIUM-10 fuel. A fabrication services contract for Columbia Generating Station for three reloads, was awarded to GNF in June 2007. The 2009 refueling outage will be the first reload of GNF's GE14 fuel design. There is the option to begin loading the advanced GNF2 design beginning in 2011. A detailed evaluation will be done to determine the merits of loading the GNF2 design prior to making a recommendation to management for the 2011 reload.

Fuel Management Physical Requirements

The assumed cycle energies and fuel designs are used to develop multi-cycle reload material requirement projections. The projected reload material requirements are integrated with the existing inventory levels to project procurement requirements into the future. Table 4 summarizes those requirements over the next ten years.

Table 3 shows Purchases, Natural Uranium Inventory, Enriched Uranium Inventory and Fuel Fabrication requirements.

Uranium is purchased in natural (not-enriched) form and added to the natural uranium inventory. When enrichment services are purchased, the necessary quantity of natural uranium is transferred to the enriched uranium inventory column along with the associated enrichment services (SWU). The enriched uranium is deducted from the inventory when fabricated into fuel assemblies.

Table 3
Fuel Inventory Projections

	Purchase		Natural Uranium Inventory	Enriched Uranium Inventory		Fuel Fabrication		
FY	UF6	SWU	UF6	UF6	SWU	UF6	SWU	Assemblies
2009	125,000	0	744,377	665,095	404,590	428,768	259,890	252
2010	0	0	744,377	665,095	404,590			
2011	0	137,500	552,603	407,684	269,824	449,185	272,266	264
2012	150,000	137,500	510,829	599,458	407,324			
2013	150,000	137,500	469,056	348,852	276,684	442,380	268,140	260
2014	150,000	137,500	427,282	540,626	414,184			
2015	225,000	261,250	287,912	534,129	405,755	370,867	269,679	256
2016	225,000	261,250	148,541	898,499	667,005			
2017	0	0	148,541	527,633	397,326	370,867	269,679	256
2018	370,867	0	519,408	527,633	397,326			

Spent Fuel Storage and Disposal

DOE Spent Fuel Contract

While courts have now ruled that DOE had a binding obligation to begin acceptance of spent nuclear fuel no later than January 31, 1998, DOE estimates that they will not be accepting fuel at the completed repository until sometime after 2012. Energy Northwest is pursuing legal action against DOE regarding to DOE's failure to begin accepting spent fuel in 1998. An estimated cost of $2.7 million is included for FY2009 to cover the cost of the ongoing legal action.

On-Site Spent Fuel Storage

Columbia Generating Station lost full-core offload capability during the delivery of new fuel in 1999. Without further additions of spent fuel storage capacity, the last refueling possible at Columbia Generating Station would have been in the spring of 2003.

A project to build an Independent Spent Fuel Storage Installation (ISFSI) using NRC approved dry storage casks was approved. The ISFSI, located just north of the Deschutes Building, is capable of being expanded to hold the lifetime spent fuel requirements of Columbia Generating Station. The first twenty-seven (27) storage casks have been loaded moving 1,836 assemblies from the spent fuel pool to the ISFSI. The most recent cask loading campaign was completed in 2008. Twelve (12) casks were loaded with spent fuel during the campaign.

The cost of an MPC is estimated to be $1,108,649 each with welding costs estimated to be $70,000 per MPC. Future costs have been escalated. The costs for the MPCs and closure welds are treated as a fuel expense and are included in this Fuel Plan in the category of Spent Fuel. The costs of the overpacks, facility, and common equipment are treated as a plant capital addition.

Active Contracts

Appendix A contains descriptions of the currently active fuel management contracts. The first contract listed is the Fuel Fabrication Services Contract (C-31700) with Framatome ANP (now AREVA). During FY-2009

Columbia Generating Station will be in the second half of Cycle 19 which is operating with the third and final reload of ATRIUM-10 fuel.

The second contract listed in Appendix A is the Enriched Uranium Loan with Global Nuclear Fuels (GNF) (C-31124). Six lots of material are currently in storage at GNF since GNF no longer has need for the material as working stock. New opportunities are being explored for revenue generation for these materials.

The third contract listed in Appendix A is the long-term uranium enrichment contract with Urenco, Ltd. Urenco will be supplying 775,000 SWU over calendar years 2003 through 2009 and an additional 750,000 SWU from 2010 through 2015.

The fourth contract listed in Appendix A is the new GNF fuel fabrication services contract. This contact covers fuel fabrication and associated services for the 2009, 2011, and 2013 reloads supplying either the GE14 or GNF2 fuel design.

Section

5

Nuclear Fuel Costs

Nuclear Fuel in Process

A measure of nuclear fuel cost is the Fuel-in-Process costs, or the costs to fabricate finished fuel assemblies.

The final costs for the reload batch for Cycle 19 are shown in Table 4.

Table 4

Fabrication Batch Cost

Component	CGS1-19
Uranium	$18,552,888
Conversion	$2,093,231
Enrichment	$18,477,743
Fabrication	$22,804,906
Sales Tax	$3,247,281
TOTAL	$65,176,048
# of Assemblies	272
Cost per Assembly	$239,618
Cask Cost	$15,843
Total Unit Cost	$255,461

Fuel Loan Revenue

There are currently no firm revenue contracts for the loaned strategic inventory. The uranium on loan to AREVA-NC will be paid with conversion services in lieu of cash payments. The enriched uranium inventory at GNF will be evaluated for new loan opportunities since it is no longer required by GNF as working stock.

Nuclear Fuel Cash Flows

A summary of cash flows by fuel component and fiscal year for the next ten years is given in Table 5. Cash flows for nuclear fuel by month for each component for the next five years are shown in Tables 6 through 10. The cash flows are in today's dollars including the costs associated with the nuclear material (uranium, conversion, enrichment).

Table 5
Cash Flow Summary By Fiscal Year
(X$1,000)

Year	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
2009	$18,000	$0	$0	$1,143	$12,310	$4,682	$0	$8,671	$44,806
2010	$0	$0	$0	$1,177	$2,268	$0	$0	$8,270	$11,715
2011	$0	$1,494	$16,862	$1,213	$25,775	$5,169	$2,057	$8,222	$60,792
2012	$33,157	$1,830	$17,060	$1,249	$870	$0	$6,631	$7,481	$68,277
2013	$31,981	$1,847	$17,258	$1,286	$23,545	$7,552	$6,101	$8,847	$98,416
2014	$28,454	$1,884	$17,454	$1,325	$870	$0	$5,560	$8,158	$63,705
2015	$38,801	$2,826	$32,776	$1,365	$25,157	$8,462	$0	$8,847	$118,235
2016	$37,772	$2,826	$33,142	$1,406	$870	$0	$0	$8,183	$84,198
2017	$0	$0	$0	$1,448	$27,227	$9,095	$3,093	$8,825	$49,687
2018	$62,260	$4,751	$0	$1,491	$870	$0	$9,405	$8,156	$86,933
FY09-18	$250,425	$17,457	$134,552	$13,103	$119,761	$34,960	$32,847	$83,659	$686,763

Table 5A

DELTA Cash Flow Summary by Fiscal Year (from Rev. 1)

(X$1,000)

Year	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
2009	$18,000	$0	$0	$0	$0	$0	$0	$0	$18,000
2010	$0	$0	$0	$0	$0	$0	$0	$0	$0
2011	($33,667)	($299)	$0	$0	$4,139	($231)	$2,057	$0	($28,000)
2012	$0	$0	$0	$0	$0	$0	$1,050	$0	$1,050
2013	$0	$0	$0	$0	$292	$334	($66)	$0	$559
2014	$0	$0	$0	$0	$0	$0	$4,309	$0	$4,309
2015	$0	$0	$0	$0	$0	($56)	$0	$0	($56)
2016	$0	$0	$0	$0	$0	$0	$0	$24	$24
2017	$0	$0	$0	$0	$0	($9)	$3,093	($22)	$3,062
2018	$0	$0	$0	$0	$0	$0	$3,825	($2)	$3,822

Table 6
FY-2009 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-08				$95	$603				$699
Aug-08				$95	$603			$2,191	$2,889
Sep-08				$95	$603				$699
Oct-08				$95	$603				$699
Nov-08				$95	$603			$2,184	$2,882
Dec-08				$95	$603				$699
Jan-09				$95	$603				$699
Feb-09				$95	$603			$2,184	$2,882
Mar-09				$95	$603				$699
Apr-09				$95	$603				$699
May-09				$95	$6,277	$4,682		$2,113	$13,166
Jun-09	$ 18,000			$95					$18,095
Total	$ 18,000	$ -	$ -	$1,143	$12,310	$4,682	$ -	$8,671	$44,806

Table 7
FY-2010 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-09	$ -	$ -		$98	$189				$287
Aug-09				$98	$189			$1,547	$1,834
Sep-09				$98	$189				$287
Oct-09				$98	$189				$287
Nov-09				$98	$189			$2,266	$2,553
Dec-09				$98	$189				$287
Jan-10			$ -	$98	$189				$287
Feb-10				$98	$189			$2,266	$2,553
Mar-10				$98	$189				$287
Apr-10				$98	$189				$287
May-10				$98	$189			$2,192	$2,479
Jun-10				$98	$189				$287
Total	$ -	$ -	$ -	$1,177	$2,268	$ -	$ -	$8,270	$11,715

Table 8
FY-2011 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-10	$ -	$1,494		$101	$492				$ 2,087
Aug-10				$101	$492			$2,260	$ 2,853
Sep-10				$101	$492				$ 593
Oct-10				$101	$492				$ 593
Nov-10				$101	$492			$2,248	$ 2,841
Dec-10				$101	$492		$503		$ 1,096
Jan-11			$16,862	$101	$492				$ 17,455
Feb-11				$101	$492			$2,248	$ 2,841
Mar-11				$101	$492				$ 593
Apr-11				$101	$492				$ 593
May-11				$101	$20,854	$5,169		$1,466	$ 27,591
Jun-11				$101			$1,554		$ 1,655
Total	$ -	$1,494	$16,862	$1,213	$ 25,775	$ 5,169	$2,057	$8,222	$ 60,792

Table 9
FY-2012 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-11	$ 33,157	$1,830		$104	$72				$ 35,164
Aug-11				$104	$72			$804	$ 981
Sep-11				$104	$72				$ 177
Oct-11				$104	$72				$ 177
Nov-11				$104	$72			$2,242	$ 2,418
Dec-11				$104	$72		$1,131		$ 1,307
Jan-12			$17,060	$104	$72				$ 17,236
Feb-12				$104	$72			$2,242	$ 2,418
Mar-12				$104	$72		$2,008		$ 2,184
Apr-12				$104	$72				$ 177
May-12				$104	$72			$2,193	$ 2,370
Jun-12				$104	$72		$3,492		$ 3,669
Total	$ 33,157	$1,830	$17,060	$1,249	$ 870	$ -	$6,631	$7,481	$ 68,277

Table 10
FY-2013 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-12	$ 31,981	$1,847		$107	$132				$ 34,067
Aug-12				$107	$132			$2,237	$ 2,476
Sep-12				$107	$132		$1,845		$ 2,084
Oct-12				$107	$132				$ 239
Nov-12				$107	$132			$2,228	$ 2,467
Dec-12				$107	$132				$ 239
Jan-13			$17,258	$107	$132				$ 17,497
Feb-13				$107	$132			$2,228	$ 2,467
Mar-13				$107	$132		$4,256		$ 4,495
Apr-13				$107	$132				$ 239
May-13				$107	$22,225	$7,552		$2,155	$ 32,038
Jun-13				$107					$ 107
Total	$ 31,981	$1,847	$17,258	$1,286	$ 23,545	$ 7,552	$6,101	$8,847	$ 98,416

Appendix A
Active Fuel Contracts

CONTRACT C-31700
NUCLEAR FUEL FABRICATION SERVICES
FRAMATOME ANP

SCOPE

Energy Northwest contracted with Framatome ANP in January 2002, to supply fuel design, licensing, and fabrication services for three consecutive reloads for Columbia Generating Station. The last reload under this contract was delivered in the spring of 2007.

CONTRACT C-31124 (Amended)
ENRICHED URANIUM LOAN
GLOBAL NUCLEAR FUEL

SCOPE

Energy Northwest loaned enriched uranium in the form of UF_6 to Global Nuclear Fuel (GNF) for use as working inventory at their fuel fabrication facility in Wilmington, North Carolina. In exchange Energy Northwest will receive the equivalent amounts of the same product plus loan fees when the EUP is used by GNF.

QUANTITY

Lot #	EUP (kgU)	Assay	Feed (kgU)	SWU	Tails Assay
1	14,469.916	4.40%	162,337.983	80,047.573	0.35%
2	3,790.751	4.00%	34,124.337	20,000.000	0.30%
3a	7,041.262	4.95%	79,664.836	50,000.000	0.30%
3b	9,476.876	4.00%	85,310.842	50,000.000	0.30%
4a	18,593.753	4.00%	170,621.683	100,000.000	0.30%
4b	18,953.753	4.00%	170,621.683	100,000.000	0.30%
5	28,165.047	4.95%	318,659.344	200,000.000	0.30%
6	23,009.664	4.95%	293,189.139	150,000.000	0.35%

SECURITY

The Stored EUP will be covered by an irrevocable standby Letter of Credit equal to the market value of the material.

RETURN OF MATERIAL

The Stored EUP will be returned on a schedule commensurate with reactor needs. In the event of a supply disruption, the material or a portion thereof may be recalled with six months notice.

CONTRACT 313337
ENRICHMENT SERVICES
URENCO LTD.

BASE SCOPE

Energy Northwest contracted with Urenco LTD. in January 2003 to supply 525,000 SWU of enrichment services for delivery over calendar years 2005 to 2009. The contract was amended (twice) to procure an additional 250,000 SWU. In January 2006, Energy Northwest issued RFP 640137 for 750,000 SWU to be delivered between calendar years 2010 – 2015 and the contract extended through 2015. The contract was amended to move the 225,000 SWU for delivery in 2007-2009 to 2014 and 2015.

PRICE

The contract pricing is 25% fixed priced and 75% base escalated by Gross Domestic Product Implicit Price Deflator (GDP-IDP).

SCHEDULES

Delivery Quantity	Delivery Date
125,000 SWU/year	2010-2013
237,500 SWU/year	2014, 2015

FLEXIBILITY

Quantity flexibility is allowed by the contract, ± 10%, on any delivery, with a minimum total quantity specified over the life of the contract.

CONTRACT 313179
URANIUM, CONVERSION AND/OR ENRICHMENT SERVICES
UG USA.

BASE SCOPE

Energy Northwest established a no-requirements contract with UG USA in 2003 to supply uranium, conversion and/or enrichment services over calendar years 2003 to 2009. Each individual purchase under the contract will require approval of Energy Northwest Management, Executive Board and Bonneville Power Administration, as required.

PRICE

The contract price will be determined for each purchase at time of offer.

SCHEDULES

Delivery Quantity	Delivery Date
Determined at time of Offer	Determined at time of Offer

CONTRACT 324350
NUCLEAR FUEL FABRICATION SERVICES
GLOBAL NUCLEAR FUEL

SCOPE

Energy Northwest contracted with GNF in June 2007, to supply fuel design, licensing, and fabrication services for three consecutive reloads for Columbia Generating Station.

SCHEDULES

The first reload under this contract will be delivered in the spring of 2009. The scope of this contract will meet the needs of Columbia Generating Station for reload fabrication services through 2013.

FUEL DESIGNS

The first reload under this contract will be fabricated with the GE14 fuel design. Energy Northwest has the option to load the new advanced GNF2 design in the 2011 and 2013 reloads. Further evaluation is required to support the decisions on if and when to load the GNF2 design.

Energy Northwest
Columbia Generating Station

FY 2009
Fuel Management Plan

Rev. 1

July 2008

L. L. Ferek
Reactor Fuels Engineering

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Section 1

Introduction

The Project Agreement between Energy Northwest and Bonneville Power Administration (BPA) for Columbia Generating Station requires Energy Northwest to submit with each Annual Budget a Ten-Year Fuel Management Plan.

This Fuel Plan for FY-2009 covers the period from July 1, 2008, through June 30, 2018. This Fuel Plan includes a cash flow analysis for expenditures and credits for each major component of the fuel cycle by month for the first five (5) years. Also, the contracts for each component of the fuel cycle are discussed.

Revision 1 to this Fuel Plan documents the reduction in cash requirements in FY-2009 of $13,942,500. This reduction is due to the contract modification with GNF to provide a portion of the payment for Cycle 20 fuel fabrication in the form of enrichment services (SWU) in lieu of cash.

Section

2

Assumptions

Economic

Table 1 gives this year's assumptions for uranium, conversion and enrichment prices. The price estimates are a composite of prices provided by Ux Consulting Company, LLC, and long term contract prices, where available. By comparison, the January 2008 spot market prices are $75.00 per lb for U_3O_8, $11.50 per KgU for conversion services and $143.00 per SWU for enrichment services. The market-fundamental-based models used for these kinds of predictions are unable to cope with the subjective nature of the market and foresee the conditions that ultimately have led to the current trend in market prices.

The price projections for uranium, conversion and enrichment market prices have increased relative to last year's projections. The uranium market projections predict that prices will stabilize in the 2010-2013 time-frame as new mines come into production. The market projections for enrichment continue to show a sharp increase from the 2006 forecast with prices peaking in the 2011-2014 time frame and then decreasing once new enrichment plants are at full capacity. If accurate, these trends would result in significant increases in future Columbia Generating Station fuel costs.

Energy Northwest's significant uranium inventory and the long-term enrichment contract with Urenco aid in minimizing the near term impact of the rapid rise in fuel prices. The prices from the long-term enrichment contract were factored into the price forecasts shown in Table 1. Forward market price data was taken from latest available Ux Consulting Quarterly Market reports.

Costs for the independent spent fuel storage installation are not included in the fuel cost but are reflected as a plant capital project in the Operating and Maintenance budget. However, the costs for the multi-purpose canisters (MPCs) and closure welds, including leak testing, are considered fuel expenses and are included in the report as a separate major cash flow component.

A new fabrication contract with Global Nuclear Fuels – Americas, LLC (GNF) to supply the fuel fabrication services for Cycles 20 through 22 reloads has been award and implemented.

Table 1
Projected Fuel Prices [1]

Projected Fuel Prices			
Year	Uranium $/lb	Conversion $/KgU	Enrichment $/SWU
2009	$95.15	$11.64	$156.00
2010	$88.75	$11.84	$158.50
2011	$85.90	$11.95	$158.50
2012	$84.60	$12.20	$156.00
2013	$81.60	$12.31	$154.50
2014	$72.60	$12.56	$150.00
2015	$66.00	$12.56	$145.50
2016	$64.25	$12.56	$145.50
2017	$64.25	$12.81	$145.50
2018	$64.25	$12.81	$145.50
2019	$64.25	$12.81	$145.50

[1] Prices expressed in current (2008) dollars.

Fuel Cycle

Table 2 shows the assumptions for the fuel cycles used in this plan. Minor changes may occur in the process of design finalization. The planned energy requirements are consistent with the energy requirements supplied by BPA in accordance with the Project Agreement.

Both Final Feedwater Temperature Reduction (FFTR) and Thermal Power Level Coast-down are planned for cost optimization during the final five to seven weeks of the operating run. During FFTR, the operation of the plant is extended at 100% thermal power level for 8-10 days while the electrical power level gradually decreases by about 1%. During coast-down, the power level is expected to decrease at a rate of 0.5% per day. The Fuel Management Plan assumes 9 days of FFTR and 30 days of coast-down for a total of 39 days of cycle extension for all future cycles. The energies specified in Table 2 are within the acceptable range provided by BPA for the FY 2008 Fuel Management Plan.

The generation factor refers to the amount of energy that is expected to be generated relative to the maximum potential generation from when the generator is synchronized to the grid to when the reactor is shut down for the outage.

The generation factor and outage length are the critical parameters that determine the cycle energy from which the fuel requirements and ultimately the fuel budget is derived.

Another important assumption is the electrical generator output. A value of 1131 MW is used to reflect a seasonal average value.

Table 2
Fuel Cycle Assumptions

Fiscal Year	Generation GWhr	Outage Length (Days)	Cycle	Energy FPD	Generation Factor %
2009	8,376	28	20	621	95%
2010	9,412				
2011	7,088	88	21	636	94%
2012	9,339				
2013	8,493	30	22	654	94%
2014	9,313				
2015	8,493	30	23	654	94%
2016	9,339				
2017	8,468	30	24	655	94%
2018	9,313				

Energy FPD = Operating Calendar Days x GF – Days lost during startup – Days lost during coastdown

Section

3

Nuclear Fuel Market

Uranium Market

The uranium market has experience a dramatic increase price. In January 2003 the price of uranium was $10.20 per pound. The market price peaked in June 2007 at $135 per pound. Currently, the price stands at $75.00 per pound at end of January 2008. The price increase is being driven by the need for increased primary production to meet demand as quantities available from excess inventories and stockpiles have essentially been committed. The dramatic price increase has moved utilities to sign contracts for their uncommitted requirements for the next three years in an attempt to mitigate supply disruptions and limit their vulnerability to further price increases. Due the limited supply and limited demand, the market is very volatile where a 10% change in price month to month is not uncommon.

A number of investment funds have also entered the market buying uranium, which places additional demand on already short supplies. Although this has contributed to the price rise, it also provides a source of liquidity to the market since the investors are solely looking for a return-on-investment. As prices continue to rise, the investment funds may become a source of supply instead of or in addition to demand.

The market is projected to continue to increase for the next 3-4 years, with prices stabilizing and starting to decrease once new production comes available. However, a number of things could cause prices to continue to increase. There are two critical items that could have a significant impact on price. The first is how quickly new mines come into production. If the new mines are delayed then prices will rise as near term demand increases. This has recently occurred with Cameco's new Cigar Lake mine, which flooded in October 2006 delaying initial production by an estimated 5 years. Cigar Lake is currently the largest new mine scheduled to come into production. This has resulted in Cameco reducing scheduled deliveries to customers forcing utilities to draw on inventory. The second is the impact of new nuclear plants being ordered both in the US and internationally. New plants result in higher demand as initial cores for those reactors are purchased in the market well in advance of initial startup.

Conversion Services

Spot conversion prices have decreased from a year ago to about $10.00 and are predicted to main stable for the foreseeable future. The current price levels allow for new expansion needed by the market to upgrade or replace aging plants.

Cameco has signed a 10 year toll-conversion agreement with British Nuclear Fuels plc (BNFL) to acquire uranium conversion services from BNFL's Springfields plant in Lancashire, UK. As a result, the price gap between European and North American conversion has been eliminated. The European converter, Comhurex, has announced plans for building another conversion facility. In addition, Cameco and ConverDyn have both started to expand their North American operations.

Enrichment Market

The enrichment market has seen modest price increases over the past few years. However, due to the high uranium prices, the rate of price increases in the enrichment market has begun to increase - with significantly higher prices a very good possibility. Enrichment customers have the option to order enrichment services with a range of tails assays. The higher the tails assay the more uranium feed required and the less enrichment services. The lower the tails assay the more enrichment services required and less uranium feed. At the current prices, the optimum tails assay has reduced from 0.30 wt% to 0.20%. The result is an increase by about 25% in enrichment demand to reduce the uranium feed about 20%. The spot price in January 2006 was $116.00 per Separative Work Unit (SWU) and has risen to $143 per SWU in January 2008. However, price could likely increase to $175 per SWU by January 2009. The price increase is also being driven by limited supply to meet the higher demand in the face of rising supply costs. Both the US and European gaseous diffusion plants (GDP) expect their production costs to increase due to an increase in power prices. Electricity costs account for nearly 60% of the SWU costs at GDP enrichment plants. The average electricity cost for the US GDP has increased 50% and the European GDP it is estimated to have increased 100%.

Another factor fueling price increases in the near term is the fact that all three Western suppliers are in the process of either replacing their costly gaseous diffusion with centrifuge technology or expanding their existing capacity. Urenco has broken ground on an enrichment facility in New Mexico using its proven centrifuge technology. In addition, Urenco has received approval to increase the capacity of their Gronau facility in Germany. The United States Enrichment Corporation (USEC) is developing their own centrifuge technology to replace the GDP at Paducah, KY. AREVA's subsidiary Eurodif has signed an agreement with Urenco to use Urenco's centrifuge technology to replace their GDP facility at Tricastin in France. A new development is that General Electric is looking to deploy the SILEX laser enrichment technology which has been demonstrated at the lab scale.

A new trade agreement signed on February 1, 2008, will give Tenex, the Russian enricher, the ability to starting selling directly into the US market starting in 2011, with quantities gradually increasing up to about 3.0 million SWU by 2020.

Fuel Fabrication

The fabrication market took a turn for the positive with the announcement that Westinghouse was going to supply Exelon with BWR fuel from its Columbia, South Carolina, plant starting in 2006. The fabrication award was for a total of sixteen reloads at four of Exelon's reactors. The award will keep Westinghouse as a viable competitor in the US BWR fuel fabrication market. In addition, the renewed interest in new plant construction has resulted in significant investment by the GNF, AREVA, and Westinghouse in their fabrication processes and methodologies.

Energy Northwest decided to go out for bids for the supply of fuel fabrication services in 2009, 2011, 2013 (Cycles 20-22). The bid evaluation and negotiation process was completed with an award to GNF for the three reloads. The rapid rise in uranium prices has resulted in a situation where the actual cost of fabrication was minor compared to how efficiently a fuel design utilizes the contained uranium while maintaining operating margins and flexibility. All of the fuel fabricators have been making improvements to the design to improve their uranium efficiency and also provide for more operational margin.

Section

4

Fuel Management Strategy

Fuel Cycle Designs

During FY2009, Columbia will be in the second half of Cycle 19, which is the station's fourth twenty-four month cycle. The reload was comprised of 272 assemblies, of the ATRIUM-10 design, with an average enrichment of 4.14 wt% U^{235}. The Cycle 19 core has energy available to be able to operate for the equivalent of 100% power for 642 days, including 39 days of cycle extension from 9 days of FFTR and 30 days of coast-down.

FY2009 will also see the introduction of the GE14 10x10 fuel design beginning in Cycle 20. The GE14 fuel design has 92 fueled locations, 14 of which are 2/3 height and 8 fuel rod locations replaced by two large water rods.

Fuel Procurement Strategy

Energy Northwest is in a remarkable position in the market. The current enriched uranium inventory in storage at GNF will meet the requirements for the 2009, 2011 and 2013 reloads. In addition, there is one reload of natural uranium that will be enriched for the 2015 reload.

The current plan has spot market uranium purchases beginning in FY2011. These purchases are planned in the event that the forward prices continue to escalate and early purchases make financial sense. There is no new enrichment procurement needed until after 2016 with deliveries beginning in 2020.

Fuel Procurement Activities

The large inventory of uranium will allow Energy Northwest to stay out of the current market and allow for new mines and enrichment facilities to enter production and help restore prices to more historic levels. The primary focus, for the next few years, will be on management and optimization of the inventory.

Fabrication Services

Currently, Columbia is operating in Cycle 19 with the third reload and final reload of ATRIUM-10 fuel. A fabrication services contract for Columbia Generating Station for three reloads, was awarded to GNF in June 2007. The 2009 refueling outage will be the first reload of GNF's GE14 fuel design. There is the option to begin loading the advanced GNF2 design beginning in 2011. A detailed evaluation will be done to determine the merits of loading the GNF2 design prior to making a recommendation to management for the 2011 reload.

Fuel Management Physical Requirements

The assumed cycle energies and fuel designs are used to develop multi-cycle reload material requirement projections. The projected reload material requirements are integrated with the existing inventory levels to project procurement requirements into the future. Table 4 summarizes those requirements over the next ten years.

Table 3 shows Purchases, Natural Uranium Inventory, Enriched Uranium Inventory and Fuel Fabrication requirements. Table 4 shows that there are no planned procurements or scheduled deliveries until FY2011.

Uranium is purchase in natural UF6 form and added to the natural UF6 inventory. When enrichment services are purchased the necessary quantity of natural UF6 is transferred to the enriched UF6 inventory column along with the associated enrichment services (SWU). The enriched UF6 is deducted from the inventory when fabricated into fuel assemblies.

Table 3
Fuel Inventory Projections

	Purchase		Natural Uranium Inventory	Enriched Uranium Inventory		Fuel Fabrication		
FY	UF_6	SWU	UF_6	UF_6	SWU	UF_6	SWU	Assemblies
2009	0	0	619,377	639,852	385,655	454,011	278,824	256
2010	0	0	619,377	639,852	385,655			
2011	150,000	137,500	577,603	421,403	279,369	410,223	243,787	256
2012	150,000	137,500	535,829	613,177	416,869			
2013	150,000	137,500	494,056	434,084	284,690	370,867	269,679	256
2014	150,000	137,500	452,282	625,858	422,190			
2015	225,000	261,250	312,912	619,362	413,761	370,867	269,679	256
2016	225,000	261,250	173,541	983,732	675,011			
2017	0	0	173,541	612,865	405,332	370,867	269,679	256
2018	370,867	0	544,408	612,865	405,332			
2019	0	0	544,408	241,998	135,653	370,867	269,679	256
2020	370,867	0	915,275	241,998	135,653			

Spent Fuel Storage and Disposal

DOE Spent Fuel Contract

While courts have now ruled that DOE had a binding obligation to begin acceptance of spent nuclear fuel no later than January 31, 1998, DOE estimates that they will not be accepting fuel at the completed repository until sometime after 2012. Energy Northwest is pursuing legal action against DOE regarding to DOE's failure to begin accepting spent fuel in 1998. An estimated cost of $2.7 million is included for FY2009 to cover the cost of the ongoing legal action.

On-Site Spent Fuel Storage

Columbia Generating Station lost full-core offload capability during the delivery of new fuel in 1999. Without further additions of spent fuel storage capacity, the last refueling possible at Columbia Generating Station would have been in the spring of 2003.

A project to build an Independent Spent Fuel Storage Installation (ISFSI) using NRC approved dry storage casks was approved. The ISFSI, located just north of the Deschutes Building, is capable of being expanded to hold the lifetime spent fuel requirements of Columbia Generating Station. The first fifteen (15) storage casks have been loaded moving 1,020 assemblies from the spent fuel pool to the ISFSI. A cask loading campaign commenced in February 2008. The schedule is for the loading of twelve (12) casks with spent fuel during the campaign.

To maintain full core discharge capability, twelve (12) dry spent fuel storage casks must be loaded every three cycles. Cost of a MPC is estimated to be $811,925 each with welding costs estimated to be $70,000 per MPC. Future costs have not been escalated. The costs for the MPCs and closure welds are treated as a fuel expense and are included in this Fuel Plan in the category of Spent Fuel. The costs of the overpacks, facility, and common equipment are treated as a plant capital addition.

Active Contracts

Appendix A contains descriptions of the currently active fuel management contracts. The first contract listed is the Fuel Fabrication Services Contract (C-31700) with Framatome ANP (now AREVA). During FY-2009

Columbia Generating Station will be in the second half of Cycle 19 which is operating with the third and final reload of ATRIUM-10 fuel.

The second contract listed in Appendix A is the Enriched Uranium Loan with Global Nuclear Fuels (GNF) (C-31124). Six lots of material are currently in storage at GNF since GNF no longer has need for the material as working stock. New opportunities are being explored for revenue generation for these materials.

The third contract listed in Appendix A is the long-term uranium enrichment contract with Urenco, Ltd. Urenco will be supplying 775,000 SWU over calendar years 2003 through 2009 and an additional 750,000 SWU from 2010 through 2015.

The fourth contract listed in Appendix A is the new GNF fuel fabrication services contract. This contact covers fuel fabrication and associated services for the 2009, 2011, and 2013 reloads supplying either the GE14 or GNF2 fuel design.

Section 5

Nuclear Fuel Costs

Nuclear Fuel in Process

A measure of nuclear fuel cost is the Fuel-in-Process costs, or the costs to fabricate finished fuel assemblies.

The final costs for the reload batch for Cycle 19 are shown in Table 4.

Table 4

Fabrication Batch Cost

Component	CGS1-19
Uranium	$18,552,888
Conversion	$2,093,231
Enrichment	$18,477,743
Fabrication	$22,804,906
Sales Tax	$3,247,281
TOTAL	$65,176,048
# of Assemblies	272
Cost per Assembly	$239,618
Cask Cost	$15,843
Total Unit Cost	$255,461

Fuel Loan Revenue

There are currently no firm revenue contracts for the loaned strategic inventory. The uranium on loan to AREVA-NC will be paid with conversion services in lieu of cash payments. The enriched uranium inventory at GNF will be evaluated for new loan opportunities since it is no longer required by GNF as working stock.

Nuclear Fuel Cash Flows

A summary of cash flows by fuel component and fiscal year for the next ten years is given in Table 5. Cash flows for nuclear fuel by month for each component for the next five years are shown in Tables 6 through 10. The cash flows are in today's dollars including the costs associated with the nuclear material (uranium, conversion, enrichment).

Table 5
Cash Flow Summary By Fiscal Year
(X$1,000)

Year	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
2009	$0	$0	$0	$1,143	$12,310	$4,682	$0	$8,671	$26,806
2010	$0	$0	$0	$1,177	$2,268	$0	$0	$8,270	$11,715
2011	$33,667	$1,793	$16,862	$1,213	$21,636	$5,400	$0	$8,222	$88,792
2012	$33,157	$1,830	$17,060	$1,249	$870	$0	$5,581	$7,481	$67,227
2013	$31,981	$1,847	$17,258	$1,286	$23,253	$7,218	$6,167	$8,847	$97,857
2014	$28,454	$1,884	$17,454	$1,325	$870	$0	$1,250	$8,158	$59,395
2015	$38,801	$2,826	$32,776	$1,365	$25,157	$8,518	$0	$8,847	$118,290
2016	$37,772	$2,826	$33,142	$1,406	$870	$0	$0	$8,158	$84,174
2017	$0	$0	$0	$1,448	$27,227	$9,104	$0	$8,847	$46,625
2018	$62,260	$4,751	$0	$1,491	$870	$0	$5,581	$8,158	$83,110
FY09-18	$266,091	$17,756	$134,552	$13,103	$115,330	$34,922	$18,579	$83,659	$683,639

Table 6
FY-2009 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-08	$ -	$ -		$95	$578				$674
Aug-08				$95	$578			$2,191	$2,864
Sep-08				$95	$578				$674
Oct-08				$95	$578				$674
Nov-08				$95	$578			$2,184	$2,857
Dec-08				$95	$578				$674
Jan-09				$95	$578				$3,572
Feb-09				$95	$578			$2,184	$2,857
Mar-09				$95	$578				$674
Apr-09				$95	$578				$674
May-09				$95	$6,526	$4,682		$2,113	$13,416
Jun-09				$95					$95
Total	$ -	$ -	$ -	$1,143	$12,310	$4,682	$ -	$8,671	$26,806

Table 7
FY-2010 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-09	$ -	$ -		$98	$189				$287
Aug-09				$98	$189			$1,547	$1,834
Sep-09				$98	$189				$287
Oct-09				$98	$189				$287
Nov-09				$98	$189			$2,266	$2,553
Dec-09				$98	$189				$287
Jan-10			$ -	$98	$189				$287
Feb-10				$98	$189			$2,266	$2,553
Mar-10				$98	$189				$287
Apr-10				$98	$189				$287
May-10				$98	$189			$2,192	$2,479
Jun-10				$98	$189				$287
Total	$ -	$ -	$ -	$1,177	$2,268	$ -	$ -	$8,270	$11,715

Table 8
FY-2011 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-10	$33,667	$1,793		$101	$132				$ 35,692
Aug-10				$101	$132			$2,260	$ 2,493
Sep-10				$101	$132				$ 233
Oct-10				$101	$132				$ 233
Nov-10				$101	$132			$2,248	$ 2,481
Dec-10				$101	$132				$ 233
Jan-11			$16,862	$101	$132				$ 20,903
Feb-11				$101	$132			$2,248	$ 2,481
Mar-11				$101	$132				$ 233
Apr-11				$101	$132				$ 233
May-11				$101	$20,316	$5,400		$1,466	$ 27,283
Jun-11				$101					$ 101
Total	$33,667	$1,793	$16,862	$1,213	$21,636	$5,400	$ -	$8,222	$ 88,792

Table 9
FY-2012 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-11	$33,157	$1,830		$104	$72		$465		$ 35,629
Aug-11				$104	$72		$465	$804	$ 1,446
Sep-11				$104	$72		$465		$ 642
Oct-11				$104	$72		$465		$ 642
Nov-11				$104	$72		$465	$2,242	$ 2,883
Dec-11				$104	$72		$465		$ 642
Jan-12			$17,060	$104	$72		$465		$ 17,701
Feb-12				$104	$72		$465	$2,242	$ 2,883
Mar-12				$104	$72		$465		$ 642
Apr-12				$104	$72		$465		$ 642
May-12				$104	$72		$465	$2,193	$ 2,835
Jun-12				$104	$72		$465		$ 642
Total	$33,157	$1,830	$17,060	$1,249	$870	$ -	$5,581	$7,481	$ 67,227

Table 10
FY-2013 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-12	$31,981	$1,847		$107	$132		$514		$ 34,581
Aug-12				$107	$132		$514	$2,237	$ 2,990
Sep-12				$107	$132		$514		$ 753
Oct-12				$107	$132		$514		$ 753
Nov-12				$107	$132		$514	$2,228	$ 2,981
Dec-12				$107	$132		$514		$ 753
Jan-13			$17,258	$107	$132		$514		$ 18,011
Feb-13				$107	$132		$514	$2,228	$ 2,981
Mar-13				$107	$132		$514		$ 753
Apr-13				$107	$132		$514		$ 753
May-13				$107	$21,933	$7,218	$514	$2,155	$ 31,927
Jun-13				$107			$514		$ 621
Total	$31,981	$1,847	$17,258	$1,286	$23,253	$7,218	$6,167	$8,847	$ 97,857

Appendix A
Active Fuel Contracts

CONTRACT C-31700
NUCLEAR FUEL FABRICATION SERVICES
FRAMATOME ANP

SCOPE

Energy Northwest contracted with Framatome ANP in January 2002, to supply fuel design, licensing, and fabrication services for three consecutive reloads for Columbia Generating Station. The last reload under this contract was delivered in the spring of 2007.

CONTRACT C-31124 (Amended)
ENRICHED URANIUM LOAN
GLOBAL NUCLEAR FUEL

SCOPE

Energy Northwest loaned enriched uranium in the form of UF_6 to Global Nuclear Fuel (GNF) for use as working inventory at their fuel fabrication facility in Wilmington, North Carolina. In exchange Energy Northwest will receive the equivalent amounts of the same product plus loan fees when the EUP is used by GNF.

QUANTITY

Lot #	EUP (kgU)	Assay	Feed (kgU)	SWU	Tails Assay
1	14,469.916	4.40%	162,337.983	80,047.573	0.35%
2	3,790.751	4.00%	34,124.337	20,000.000	0.30%
3a	7,041.262	4.95%	79,664.836	50,000.000	0.30%
3b	9,476.876	4.00%	85,310.842	50,000.000	0.30%
4a	18,593.753	4.00%	170,621.683	100,000.000	0.30%
4b	18,953.753	4.00%	170,621.683	100,000.000	0.30%
5	28,165.047	4.95%	318,659.344	200,000.000	0.30%
6	23,009.664	4.95%	293,189.139	150,000.000	0.35%

SECURITY

The Stored EUP will be covered by an irrevocable standby Letter of Credit equal to the market value of the material.

RETURN OF MATERIAL

The Stored EUP will be returned on a schedule commensurate with reactor needs. In the event of a supply disruption, the material or a portion thereof may be recalled with six months notice.

CONTRACT 313337
ENRICHMENT SERVICES
URENCO LTD.

BASE SCOPE

Energy Northwest contracted with Urenco LTD. in January 2003 to supply 525,000 SWU of enrichment services for delivery over calendar years 2005 to 2009. The contract was amended (twice) to procure an additional 250,000 SWU. In January 2006, Energy Northwest issued RFP 640137 for 750,000 SWU to be delivered between calendar years 2010 – 2015 and the contract extended through 2015. The contract was amended to move the 225,000 SWU for delivery in 2007-2009 to 2014 and 2015.

PRICE

The contract pricing is 25% fixed priced and 75% base escalated by Gross Domestic Product Implicit Price Deflator (GDP-IDP).

SCHEDULES

Delivery Quantity	Delivery Date
125,000 SWU/year	2010-2013
237,500 SWU/year	2014, 2015

FLEXIBILITY

Quantity flexibility is allowed by the contract, ± 10%, on any delivery, with a minimum total quantity specified over the life of the contract.

CONTRACT 313179
URANIUM, CONVERSION AND/OR ENRICHMENT SERVICES
UG USA.

BASE SCOPE

Energy Northwest established a no-requirements contract with UG USA in 2003 to supply uranium, conversion and/or enrichment services over calendar years 2003 to 2009. Each individual purchase under the contract will require approval of Energy Northwest Management, Executive Board and Bonneville Power Administration, as required.

PRICE

The contract price will be determined for each purchase at time of offer.

SCHEDULES

Delivery Quantity	Delivery Date
Determined at time of Offer	Determined at time of Offer

CONTRACT 324350
NUCLEAR FUEL FABRICATION SERVICES
GLOBAL NUCLEAR FUEL

SCOPE

Energy Northwest contracted with GNF in June 2007, to supply fuel design, licensing, and fabrication services for three consecutive reloads for Columbia Generating Station.

SCHEDULES

The first reload under this contract will be delivered in the spring of 2009. The scope of this contract will meet the needs of Columbia Generating Station for reload fabrication services through 2013.

FUEL DESIGNS

The first reload under this contract will be fabricated with the GE14 fuel design. Energy Northwest has the option to load the new advanced GNF2 design in the 2011 and 2013 reloads. Further evaluation is required to support the decisions on if and when to load the GNF2 design.

Energy Northwest
Columbia Generating Station

FY 2009
Fuel Management Plan

March 2008

Reactor Fuels Engineering

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Section

1

Introduction

The Project Agreement between Energy Northwest and Bonneville Power Administration (BPA) for Columbia Generating Station requires Energy Northwest to submit with each Annual Budget a Ten-Year Fuel Management Plan.

This Fuel Plan for FY-2009 covers the period from July 1, 2008, through June 30, 2018. This Fuel Plan includes a cash flow analysis for expenditures and credits for each major component of the fuel cycle by month for the first five (5) years. Also, the contracts for each component of the fuel cycle are discussed.

Section

2

Assumptions

Economic

Table 1 gives this year's assumptions for uranium, conversion and enrichment prices. The price estimates are a composite of prices provided by Ux Consulting Company, LLC, and long term contract prices, where available. By comparison, the January 2008 spot market prices are $75.00 per lb for U_3O_8, $11.50 per KgU for conversion services and $143.00 per SWU for enrichment services. The market-fundamental-based models used for these kinds of predictions are unable to cope with the subjective nature of the market and foresee the conditions that ultimately have led to the current trend in market prices.

The price projections for uranium, conversion and enrichment market prices have increased relative to last year's projections. The uranium market projections predict that prices will stabilize in the 2010-2013 time-frame as new mines come into production. The market projections for enrichment continue to show a sharp increase from the 2006 forecast with prices peaking in the 2011-2014 time frame and then decreasing once new enrichment plants are at full capacity. If accurate, these trends would result in significant increases in future Columbia Generating Station fuel costs.

Energy Northwest's significant uranium inventory and the long-term enrichment contract with Urenco aid in minimizing the near term impact of the rapid rise in fuel prices. The prices from the long-term enrichment contract were factored into the price forecasts shown in Table 1. Forward market price data was taken from latest available Ux Consulting Quarterly Market reports.

Costs for the independent spent fuel storage installation are not included in the fuel cost but are reflected as a plant capital project in the Operating and Maintenance budget. However, the costs for the multi-purpose canisters (MPCs) and closure welds, including leak testing, are considered fuel expenses and are included in the report as a separate major cash flow component.

A new fabrication contract with Global Nuclear Fuels – Americas, LLC (GNF) to supply the fuel fabrication services for Cycles 20 through 22 reloads has been award and implemented.

Table 1
Projected Fuel Prices [1]

Projected Fuel Prices			
Year	Uranium $/lb	Conversion $/KgU	Enrichment $/SWU
2009	$95.15	$11.64	$156.00
2010	$88.75	$11.84	$158.50
2011	$85.90	$11.95	$158.50
2012	$84.60	$12.20	$156.00
2013	$81.60	$12.31	$154.50
2014	$72.60	$12.56	$150.00
2015	$66.00	$12.56	$145.50
2016	$64.25	$12.56	$145.50
2017	$64.25	$12.81	$145.50
2018	$64.25	$12.81	$145.50
2019	$64.25	$12.81	$145.50

[1] Prices expressed in current (2008) dollars.

Fuel Cycle

Table 2 shows the assumptions for the fuel cycles used in this plan. Minor changes may occur in the process of design finalization. The planned energy requirements are consistent with the energy requirements supplied by BPA in accordance with the Project Agreement.

Both Final Feedwater Temperature Reduction (FFTR) and Thermal Power Level Coast-down are planned for cost optimization during the final five to seven weeks of the operating run. During FFTR, the operation of the plant is extended at 100% thermal power level for 8-10 days while the electrical power level gradually decreases by about 1%. During coast-down, the power level is expected to decrease at a rate of 0.5% per day. The Fuel Management Plan assumes 9 days of FFTR and 30 days of coast-down for a total of 39 days of cycle extension for all future cycles. The energies specified in Table 2 are within the acceptable range provided by BPA for the FY 2008 Fuel Management Plan.

The generation factor refers to the amount of energy that is expected to be generated relative to the maximum potential generation from when the generator is synchronized to the grid to when the reactor is shut down for the outage.

The generation factor and outage length are the critical parameters that determine the cycle energy from which the fuel requirements and ultimately the fuel budget is derived.

Another important assumption is the electrical generator output. A value of 1131 MW is used to reflect a seasonal average value.

Table 2
Fuel Cycle Assumptions

Fiscal Year	Generation GWhr	Outage Length (Days)	Cycle	Energy FPD	Generation Factor %
2009	8,376	28	20	621	95%
2010	9,412				
2011	7,088	88	21	636	94%
2012	9,339				
2013	8,493	30	22	654	94%
2014	9,313				
2015	8,493	30	23	654	94%
2016	9,339				
2017	7,961	30	24	655	94%
2018	9,313				

Energy FPD = Operating Calendar Days x GF – Days lost during startup – Days lost during coastdown

Section

3

Nuclear Fuel Market

Uranium Market

The uranium market has experience a dramatic increase price. In January 2003 the price of uranium was $10.20 per pound. The market price peaked in June 2007 at $135 per pound. Currently, the price stands at $75.00 per pound at end of January 2008. The price increase is being driven by the need for increased primary production to meet demand as quantities available from excess inventories and stockpiles have essentially been committed. The dramatic price increase has moved utilities to sign contracts for their uncommitted requirements for the next three years in an attempt to mitigate supply disruptions and limit their vulnerability to further price increases. Due the limited supply and limited demand, the market is very volatile where a 10% change in price month to month is not uncommon.

A number of investment funds have also entered the market buying uranium, which places additional demand on already short supplies. Although this has contributed to the price rise, it also provides a source of liquidity to the market since the investors are solely looking for a return-on-investment. As prices continue to rise, the investment funds may become a source of supply instead of or in addition to demand.

The market is projected to continue to increase for the next 3-4 years, with prices stabilizing and starting to decrease once new production comes available. However, a number of things could cause prices to continue to increase. There are two critical items that could have a significant impact on price. The first is how quickly new mines come into production. If the new mines are delayed then prices will rise as near term demand increases. This has recently occurred with Cameco's new Cigar Lake mine, which flooded in October 2006 delaying initial production by an estimated 5 years. Cigar Lake is currently the largest new mine scheduled to come into production. This has resulted in Cameco reducing scheduled deliveries to customers forcing utilities to draw on inventory. The second is the impact of new nuclear plants being ordered both in the US and internationally. New plants result in higher demand as initial cores for those reactors are purchased in the market well in advance of initial startup.

Conversion Services

Spot conversion prices have decreased from a year ago to about $10.00 and are predicted to main stable for the foreseeable future. The current price levels allow for new expansion needed by the market to upgrade or replace aging plants.

Cameco has signed a 10 year toll-conversion agreement with British Nuclear Fuels plc (BNFL) to acquire uranium conversion services from BNFL's Springfields plant in Lancashire, UK. As a result, the price gap between European and North American conversion has been eliminated. The European converter, Comhurex, has announced plans for building another conversion facility. In addition, Cameco and ConverDyn have both started to expand their North American operations.

Enrichment Market

The enrichment market has seen modest price increases over the past few years. However, due to the high uranium prices, the rate of price increases in the enrichment market has begun to increase - with significantly higher prices a very good possibility. Enrichment customers have the option to order enrichment services with a range of tails assays. The higher the tails assay the more uranium feed required and the less enrichment services. The lower the tails assay the more enrichment services required and less uranium feed. At the current prices, the optimum tails assay has reduced from 0.30 wt% to 0.20%. The result is an increase by about 25% in enrichment demand to reduce the uranium feed about 20%. The spot price in January 2006 was $116.00 per Separative Work Unit (SWU) and has risen to $143 per SWU in January 2008. However, price could likely increase to $175 per SWU by January 2009. The price increase is also being driven by limited supply to meet the higher demand in the face of rising supply costs. Both the US and European gaseous diffusion plants (GDP) expect their production costs to increase due to an increase in power prices. Electricity costs account for nearly 60% of the SWU costs at GDP enrichment plants. The average electricity cost for the US GDP has increased 50% and the European GDP it is estimated to have increased 100%.

Another factor fueling price increases in the near term is the fact that all three Western suppliers are in the process of either replacing their costly gaseous diffusion with centrifuge technology or expanding their existing capacity. Urenco has broken ground on an enrichment facility in New Mexico using its proven centrifuge technology. In addition, Urenco has received approval to increase the capacity of their Gronau facility in Germany. The United States Enrichment Corporation (USEC) is developing their own centrifuge technology to replace the GDP at Paducah, KY. AREVA's subsidiary Eurodif has signed an agreement with Urenco to use Urenco's centrifuge technology to replace their GDP facility at Tricastin in France. A new development is that General Electric is looking to deploy the SILEX laser enrichment technology which has been demonstrated at the lab scale.

A new trade agreement signed on February 1, 2008, will give Tenex, the Russian enricher, the ability to starting selling directly into the US market starting in 2011, with quantities gradually increasing up to about 3.0 million SWU by 2020.

Fuel Fabrication

The fabrication market took a turn for the positive with the announcement that Westinghouse was going to supply Exelon with BWR fuel from its Columbia, South Carolina, plant starting in 2006. The fabrication award was for a total of sixteen reloads at four of Exelon's reactors. The award will keep Westinghouse as a viable competitor in the US BWR fuel fabrication market. In addition, the renewed interest in new plant construction has resulted in significant investment by the GNF, AREVA, and Westinghouse in their fabrication processes and methodologies.

Energy Northwest decided to go out for bids for the supply of fuel fabrication services in 2009, 2011, 2013 (Cycles 20-22). The bid evaluation and negotiation process was completed with an award to GNF for the three reloads. The rapid rise in uranium prices has resulted in a situation where the actual cost of fabrication was minor compared to how efficiently a fuel design utilizes the contained uranium while maintaining operating margins and flexibility. All of the fuel fabricators have been making improvements to the design to improve their uranium efficiency and also provide for more operational margin.

Section

4

Fuel Management Strategy

Fuel Cycle Designs

During FY2009, Columbia will be in the second half of Cycle 19, which is the station's fourth twenty-four month cycle. The reload was comprised of 272 assemblies, of the ATRIUM-10 design, with an average enrichment of 4.14 wt% U^{235}. The Cycle 19 core has energy available to be able to operate for the equivalent of 100% power for 642 days, including 39 days of cycle extension from 9 days of FFTR and 30 days of coast-down.

FY2009 will also see the introduction of the GE14 10x10 fuel design beginning in Cycle 20. The GE14 fuel design has 92 fueled locations, 14 of which are 2/3 height and 8 fuel rod locations replaced by two large water rods.

Fuel Procurement Strategy

Energy Northwest is in a remarkable position in the market. The current enriched uranium inventory in storage at GNF will meet the requirements for the 2009, 2011 and 2013 reloads. In addition, there is one reload of natural uranium that will be enriched for the 2015 reload.

The current plan has spot market uranium purchases beginning in FY2011. These purchases are planned in the event that the forward prices continue to escalate and early purchases make financial sense. There is no new enrichment procurement needed until after 2016 with deliveries beginning in 2020.

Fuel Procurement Activities

The large inventory of uranium will allow Energy Northwest to stay out of the current market and allow for new mines and enrichment facilities to enter production and help restore prices to more historic levels. The primary focus, for the next few years, will be on management and optimization of the inventory.

Fabrication Services

Currently, Columbia is operating in Cycle 19 with the third reload and final reload of ATRIUM-10 fuel. A fabrication services contract for Columbia Generating Station for three reloads, was awarded to GNF in June 2007. The 2009 refueling outage will be the first reload of GNF's GE14 fuel design. There is the option to begin loading the advanced GNF2 design beginning in 2011. A detailed evaluation will be done to determine the merits of loading the GNF2 design prior to making a recommendation to management for the 2011 reload.

Fuel Management Physical Requirements

The assumed cycle energies and fuel designs are used to develop multi-cycle reload material requirement projections. The projected reload material requirements are integrated with the existing inventory levels to project procurement requirements into the future. Table 4 summarizes those requirements over the next ten years.

Table 3 shows Purchases, Natural Uranium Inventory, Enriched Uranium Inventory and Fuel Fabrication requirements. Table 4 shows that there are no planned procurements or scheduled deliveries until FY2011.

Uranium is purchase in natural UF6 form and added to the natural UF6 inventory. When enrichment services are purchased the necessary quantity of natural UF6 is transferred to the enriched UF6 inventory column along with the associated enrichment services (SWU). The enriched UF6 is deducted from the inventory when fabricated into fuel assemblies.

Table 3
Fuel Inventory Projections

	Purchase		Natural Uranium Inventory	Enriched Uranium Inventory		Fuel Fabrication		
FY	UF_6	SWU	UF_6	UF_6	SWU	UF_6	SWU	Assemblies
2009	0	0	464,061	839,577	517,209	410,223	243,787	256
2010	0	0	464,061	839,577	517,209			
2011	150,000	137,500	422,287	621,128	410,922	410,223	243,787	256
2012	150,000	137,500	380,513	812,901	548,422			
2013	150,000	137,500	338,740	633,809	416,244	370,867	269,679	256
2014	150,000	137,500	296,966	825,582	553,744			
2015	225,000	261,250	157,596	819,086	545,315	370,867	269,679	256
2016	225,000	261,250	18,225	1,183,456	806,565			
2017	0	0	18,225	812,589	536,886	370,867	269,679	256
2018	370,867	0	389,092	812,589	536,886			
2019	0	0	389,092	441,722	267,207	370,867	269,679	256
2020	370,867	0	759,959	441,722	267,207			

Spent Fuel Storage and Disposal

DOE Spent Fuel Contract

While courts have now ruled that DOE had a binding obligation to begin acceptance of spent nuclear fuel no later than January 31, 1998, DOE estimates that they will not be accepting fuel at the completed repository until sometime after 2012. Energy Northwest is pursuing legal action against DOE regarding to DOE's failure to begin accepting spent fuel in 1998. An estimated cost of $2.7 million is included for FY2009 to cover the cost of the ongoing legal action.

On-Site Spent Fuel Storage

Columbia Generating Station lost full-core offload capability during the delivery of new fuel in 1999. Without further additions of spent fuel storage capacity, the last refueling possible at Columbia Generating Station would have been in the spring of 2003.

A project to build an Independent Spent Fuel Storage Installation (ISFSI) using NRC approved dry storage casks was approved. The ISFSI, located just north of the Deschutes Building, is capable of being expanded to hold the lifetime spent fuel requirements of Columbia Generating Station. The first fifteen (15) storage casks have been loaded moving 1,020 assemblies from the spent fuel pool to the ISFSI. A cask loading campaign commenced in February 2008. The schedule is for the loading of twelve (12) casks with spent fuel during the campaign.

To maintain full core discharge capability, twelve (12) dry spent fuel storage casks must be loaded every three cycles. Cost of a MPC is estimated to be $811,925 each with welding costs estimated to be $70,000 per MPC. Future costs have not been escalated. The costs for the MPCs and closure welds are treated as a fuel expense and are included in this Fuel Plan in the category of Spent Fuel. The costs of the overpacks, facility, and common equipment are treated as a plant capital addition.

Active Contracts

Appendix A contains descriptions of the currently active fuel management contracts. The first contract listed is the Fuel Fabrication Services Contract (C-31700) with Framatome ANP (now AREVA). During FY-2009

Columbia Generating Station will be in the second half of Cycle 19 which is operating with the third and final reload of ATRIUM-10 fuel.

The second contract listed in Appendix A is the Enriched Uranium Loan with Global Nuclear Fuels (GNF) (C-31124). Six lots of material are currently in storage at GNF since GNF no longer has need for the material as working stock. New opportunities are being explored for revenue generation for these materials.

The third contract listed in Appendix A is the long-term uranium enrichment contract with Urenco, Ltd. Urenco will be supplying 775,000 SWU over calendar years 2003 through 2009 and an additional 750,000 SWU from 2010 through 2015.

The fourth contract listed in Appendix A is the new GNF fuel fabrication services contract. This contact covers fuel fabrication and associated services for the 2009, 2011, and 2013 reloads supplying either the GE14 or GNF2 fuel design.

Section

5

Nuclear Fuel Costs

Nuclear Fuel in Process

A measure of nuclear fuel cost is the Fuel-in-Process costs, or the costs to fabricate finished fuel assemblies.

The final costs for the reload batch for Cycle 19 are shown in Table 4.

Table 4

Fabrication Batch Cost

Component	CGS1-19
Uranium	$18,552,888
Conversion	$2,093,231
Enrichment	$18,477,743
Fabrication	$22,804,906
Sales Tax	$3,247,281
TOTAL	$65,176,048
# of Assemblies	272
Cost per Assembly	$239,618
Cask Cost	$15,843
Total Unit Cost	$255,461

Fuel Loan Revenue

There are currently no firm revenue contracts for the loaned strategic inventory. The uranium on loan to AREVA-NC will be paid with conversion services in lieu of cash payments. The enriched uranium inventory at GNF will be evaluated for new loan opportunities since it is no longer required by GNF as working stock.

Nuclear Fuel Cash Flows

A summary of cash flows by fuel component and fiscal year for the next ten years is given in Table 5. Cash flows for nuclear fuel by month for each component for the next five years are shown in Tables 6 through 10. The cash flows are in today's dollars including the costs associated with the nuclear material (uranium, conversion, enrichment).

Table 5
Cash Flow Summary By Fiscal Year
(X$1,000)

Year	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
2009	$0	$0	$0	$1,143	$26,253	$4,597	$0	$8,671	$40,664
2010	$0	$0	$0	$1,177	$2,268	$0	$0	$8,270	$11,715
2011	$33,667	$1,793	$16,862	$1,213	$21,636	$5,495	$0	$8,222	$88,887
2012	$33,157	$1,830	$17,060	$1,249	$870	$0	$5,581	$7,481	$67,227
2013	$31,981	$1,847	$17,258	$1,286	$23,253	$7,129	$6,167	$8,847	$97,768
2014	$28,454	$1,884	$17,454	$1,325	$870	$0	$1,250	$8,158	$59,395
2015	$38,801	$2,826	$32,776	$1,365	$25,157	$8,377	$0	$8,847	$118,149
2016	$37,772	$2,826	$33,142	$1,406	$870	$0	$0	$8,158	$84,174
2017	$0	$0	$0	$1,448	$27,227	$8,971	$0	$8,847	$46,492
2018	$62,260	$4,751	$0	$1,491	$870	$0	$5,581	$8,158	$83,110
FY09-18	$266,091	$17,756	$134,552	$13,103	$129,273	$34,569	$18,579	$83,659	$697,582

Table 6
FY-2009 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-08	$ -	$ -		$95	$578				$674
Aug-08				$95	$578			$2,191	$2,864
Sep-08				$95	$578				$674
Oct-08				$95	$578				$674
Nov-08				$95	$578			$2,184	$2,857
Dec-08				$95	$578				$674
Jan-09				$95	$578				$3,572
Feb-09				$95	$578			$2,184	$2,857
Mar-09				$95	$578				$674
Apr-09				$95	$578				$674
May-09				$95	$20,469	$4,597		$2,113	$24,375
Jun-09				$95					$95
Total	$ -	$ -	$ -	$1,143	$26,253	$4,597	$ -	$8,671	$40,664

Table 7
FY-2010 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-09	$ -	$ -		$98	$189				$287
Aug-09				$98	$189			$1,547	$1,834
Sep-09				$98	$189				$287
Oct-09				$98	$189				$287
Nov-09				$98	$189			$2,266	$2,553
Dec-09				$98	$189				$287
Jan-10			$ -	$98	$189				$287
Feb-10				$98	$189			$2,266	$2,553
Mar-10				$98	$189				$287
Apr-10				$98	$189				$287
May-10				$98	$189			$2,192	$2,479
Jun-10				$98	$189				$287
Total	$ -	$ -	$ -	$1,177	$2,268	$ -	$ -	$8,270	$11,715

Table 8
FY-2011 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-10	$33,667	$1,793		$101	$132				$ 35,692
Aug-10				$101	$132			$2,260	$ 2,493
Sep-10				$101	$132				$ 233
Oct-10				$101	$132				$ 233
Nov-10				$101	$132			$2,248	$ 2,481
Dec-10				$101	$132				$ 233
Jan-11			$16,862	$101	$132				$ 20,903
Feb-11				$101	$132			$2,248	$ 2,481
Mar-11				$101	$132				$ 233
Apr-11				$101	$132				$ 233
May-11				$101	$20,316	$5,495		$1,466	$ 23,569
Jun-11				$101					$ 101
Total	$33,667	$1,793	$16,862	$1,213	$21,636	$5,495	$ -	$8,222	$ 88,887

Table 9
FY-2012 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-11	$33,157	$1,830		$104	$72		$465		$ 35,629
Aug-11				$104	$72		$465	$804	$ 1,446
Sep-11				$104	$72		$465		$ 642
Oct-11				$104	$72		$465		$ 642
Nov-11				$104	$72		$465	$2,242	$ 2,883
Dec-11				$104	$72		$465		$ 642
Jan-12			$17,060	$104	$72		$465		$ 17,701
Feb-12				$104	$72		$465	$2,242	$ 2,883
Mar-12				$104	$72		$465		$ 642
Apr-12				$104	$72		$465		$ 642
May-12				$104	$72		$465	$2,193	$ 2,835
Jun-12				$104	$72		$465		$ 642
Total	$33,157	$1,830	$17,060	$1,249	$870	$ -	$5,581	$7,481	$ 67,227

Table 10
FY-2013 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	Cash Flow
Jul-12	$31,981	$1,847		$107	$132		$514		$ 34,581
Aug-12				$107	$132		$514	$2,237	$ 2,990
Sep-12				$107	$132		$514		$ 753
Oct-12				$107	$132		$514		$ 753
Nov-12				$107	$132		$514	$2,228	$ 2,981
Dec-12				$107	$132		$514		$ 753
Jan-13			$17,258	$107	$132		$514		$ 18,011
Feb-13				$107	$132		$514	$2,228	$ 2,981
Mar-13				$107	$132		$514		$ 753
Apr-13				$107	$132		$514		$ 753
May-13				$107	$21,933	$7,129	$514	$2,155	$ 31,838
Jun-13				$107			$514		$ 621
Total	$31,981	$1,847	$17,258	$1,286	$23,253	$7,129	$6,167	$8,847	$ 97,768

Appendix A
Active Fuel Contracts

CONTRACT C-31700
NUCLEAR FUEL FABRICATION SERVICES
FRAMATOME ANP

SCOPE

E nergy Northwest contracted with Framatome ANP in January 2002, to supply fuel design, licensing, and fabrication services for three consecutive *reloads for Columbia Generating Station.* The last reload under this contract was delivered in the spring of 2007.

CONTRACT C-31124 (Amended)
ENRICHED URANIUM LOAN
GLOBAL NUCLEAR FUEL

SCOPE

E nergy Northwest loaned enriched uranium in the form of UF_6 to Global Nuclear Fuel (GNF) for use as working inventory at their fuel fabrication facility in Wilmington, North Carolina. In exchange Energy Northwest will receive the equivalent amounts of the same product plus loan fees when the EUP is used by GNF.

QUANTITY

Lot #	EUP (kgU)	Assay	Feed (kgU)	SWU	Tails Assay
1	14,469.916	4.40%	162,337.983	80,047.573	0.35%
2	3,790.751	4.00%	34,124.337	20,000.000	0.30%
3a	7,041.262	4.95%	79,664.836	50,000.000	0.30%
3b	9,476.876	4.00%	85,310.842	50,000.000	0.30%
4a	18,593.753	4.00%	170,621.683	100,000.000	0.30%
4b	18,953.753	4.00%	170,621.683	100,000.000	0.30%
5	28,165.047	4.95%	318,659.344	200,000.000	0.30%
6	23,009.664	4.95%	293,189.139	150,000.000	0.35%

SECURITY

The Stored EUP will be covered by an irrevocable standby Letter of Credit equal to the market value of the material.

RETURN OF MATERIAL

The Stored EUP will be returned on a schedule commensurate with reactor needs. In the event of a supply disruption, the material or a portion thereof may be recalled with six months notice.

CONTRACT 313337
ENRICHMENT SERVICES
URENCO LTD.

BASE SCOPE

Energy Northwest contracted with Urenco LTD. in January 2003 to supply 525,000 SWU of enrichment services for delivery over calendar years 2005 to 2009. The contract was amended (twice) to procure an additional 250,000 SWU. In January 2006, Energy Northwest issued RFP 640137 for 750,000 SWU to be delivered between calendar years 2010 – 2015 and the contract extended through 2015. The contract was amended to move the 225,000 SWU for delivery in 2007-2009 to 2014 and 2015.

PRICE

The contract pricing is 25% fixed priced and 75% base escalated by Gross Domestic Product Implicit Price Deflator (GDP-IDP).

SCHEDULES

Delivery Quantity	Delivery Date
125,000 SWU/year	2010-2013
237,500 SWU/year	2014, 2015

FLEXIBILITY

Quantity flexibility is allowed by the contract, ± 10%, on any delivery, with a minimum total quantity specified over the life of the contract.

CONTRACT 313179
URANIUM, CONVERSION AND/OR ENRICHMENT SERVICES
UG USA.

BASE SCOPE

Energy Northwest established a no-requirements contract with UG USA in 2003 to supply uranium, conversion and/or enrichment services over calendar years 2003 to 2009. Each individual purchase under the contract will require approval of Energy Northwest Management, Executive Board and Bonneville Power Administration, as required.

PRICE

The contract price will be determined for each purchase at time of offer.

SCHEDULES

Delivery Quantity	Delivery Date
Determined at time of Offer	Determined at time of Offer

CONTRACT 324350
NUCLEAR FUEL FABRICATION SERVICES
GLOBAL NUCLEAR FUEL

SCOPE

E nergy Northwest contracted with GNF in June 2007, to supply fuel design, licensing, and fabrication services for three consecutive reloads for Columbia Generating Station.

SCHEDULES

The first reload under this contract will be delivered in the spring of 2009. The scope of this contract will meet the needs of Columbia Generating Station for reload fabrication services through 2013.

FUEL DESIGNS

The first reload under this contract will be fabricated with the GE14 fuel design. Energy Northwest has the option to load the new advanced GNF2 design in the 2011 and 2013 reloads. Further evaluation is required to support the decisions on if and when to load the GNF2 design.

Energy Northwest
Columbia Generating Station

FY 2008
Fuel Management Plan

March 2007

Lisa L Ferek

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Section 1

Introduction

The Project Agreement between Energy Northwest and Bonneville Power Administration (BPA) for Columbia Generating Station requires Energy Northwest to submit with each Annual Budget a Ten-Year Fuel Management Plan.

This Fuel Plan for FY-2008 covers the period from July 1, 2007, through June 30, 2017. This Fuel Plan includes a cash flow analysis for expenditures and credits for each major component of the fuel cycle by month for the first five (5) years. Also, the contracts for each component of the fuel cycle are discussed.

Section 2

Assumptions

Economic

Table 1 gives this year's assumptions for uranium, conversion and enrichment prices. The price estimates are a composite of prices provided by Ux Consulting Company, LLC, and long term contract prices, where available. By comparison, the January 2007 spot market prices are $75.00 per lb for U_3O_8, $11.50 per KgU for conversion services and $135.00 per SWU for enrichment services. The market-fundamental-based models used for these kinds of predictions are unable to cope with the subjective nature of the market and foresee the conditions that ultimately have led to the current trend in market prices.

The price projections for uranium, conversion and enrichment market prices have increased relative to last year's projections. The uranium market projections predict that prices will stabilize in the 2010-2013 time-frame as new mines come into production. The market projections for enrichment show a sharp increase from the 2006 forecast with prices peaking in the 2011-2014 time frame and then decreasing once new enrichment plants are at full capacity. If accurate, these trends would result in significant increases in future Columbia Generating Station fuel costs.

Energy Northwest's significant uranium inventory and the long-term enrichment contract with Urenco aid in minimizing the near term impact of the rapid rise in fuel prices. The prices from the long-term enrichment contract were factored into the price forecast shown in Table 1.

Costs for the independent spent fuel storage installation are not included in the fuel cost but are reflected as a plant capital project in the Operating and Maintenance budget. However, the costs for the multi-purpose canisters (MPCs) and closure welds, including leak testing, are considered fuel expenses and are included in the report as a separate major cash flow component.

The fabrication contract with AREVA to supply the fuel fabrication services for Cycles 17 through 19 is nearly complete. A fuel fabrication competitive bid process is underway. For conservatism, transition to a new fuel vendor is assumed in the cash flows to ensure adequate funding regardless of which vendor is chosen.

Table 1
Projected Fuel Prices [1]

Projected Fuel Prices			
Year	Uranium $/lb	Conversion $/KgU	Enrichment $/SWU
2008	$83.99	$11.75	$152.50
2009	$85.99	$11.75	$156.00
2010	$85.99	$11.75	$122.63
2011	$85.99	$11.75	$124.07
2012	$85.99	$11.75	$125.51
2013	$85.99	$11.75	$126.94
2014	$85.99	$11.75	$125.46
2015	$85.99	$11.75	$126.86
2016	$85.99	$11.75	$145.50
2017	$85.99	$11.75	$145.50

[1] Prices expressed in current (2007) dollars.

Fuel Cycle

Table 2 shows the assumptions for the fuel cycles used in this plan. Minor changes may occur in the process of design finalization. The planned energy requirements are consistent with the energy requirements supplied by BPA in accordance with the Project Agreement.

Both Final Feedwater Temperature Reduction (FFTR) and Thermal Power Level Coast-down are planned for cost optimization during the final five to seven weeks of the operating run. During FFTR, the operation of the plant is extended at 100% thermal power level for 8-10 days while the electrical power level gradually decreases by about 1%. During coast-down, the power level is expected to decrease at a rate of 0.5% per day. The Fuel Management Plan assumes 9 days of FFTR and 30 days of coast-down for a total of 39 days of cycle extension for all future cycles. The energies specified in Table 2 are within the acceptable range provided by BPA for the FY 2007 Fuel Management Plan.

The generation factor refers to the amount of energy that is expected to be generated relative to the maximum potential generation from when the generator is synchronized to the grid to when the reactor is shut down for the outage.

The generation factor and outage length are the critical parameters that determine the cycle energy from which the fuel requirements and ultimately the fuel budget is derived.

Another important assumption is the electrical generator output. A value of 1131 MW is used to reflect a seasonal average value.

Table 2
Fuel Cycle Assumptions

Fiscal Year	Generation GWhr	Outage Length (Days)	Cycle	Energy FPD	Generation Factor %
2007	8,361	28	19	642	92%
2008	9,140				
2009	8,361	28	20	642	92%
2010	9,115				
2011	8,361	28	21	642	92%
2012	9,140				
2013	8,361	28	22	642	92%
2014	9,115				
2015	8,361	28	23	642	92%
2016	9,140				
2015	8,361	28	24	642	92%
2016	9,140				

Energy FPD = Operating Calendar Days x GF – Days lost during startup – Days lost during coastdown

Section 3

Nuclear Fuel Market

Uranium Market

The uranium market continues to increase dramatically. In January 2003 the price of uranium was $10.20 per pound whereas in January 2006 it had increased to $37.50 per pound. Currently, the price stands at $75.00 per pound in January 2007. The price increase is being driven by the need for increased primary production to meet demand as quantities available from excess inventories and stockpiles have essentially been committed. The market began to rise in response to supply disruptions such as the fire at WMC's (now BHP Billiton's) Olympic Dam mine, the flood at Cameco's McAruther River mine, and the sudden termination of deliveries to GNSS Limited by the Russian authority, Tenex. The dramatic price increase has moved utilities to sign contracts for their uncommitted requirements for the next three years in an attempt to mitigate supply disruptions and limit their vulnerability to further price increases.

A number of investment funds have also entered the market buying uranium, which places additional demand on already short supplies. Although this has contributed to the price rise, it also provides a source of liquidity to the market since the investors are solely looking for a return-on-investment. As prices continue to rise, the investment funds may become a source of supply instead of or in addition to demand.

The market is projected to continue to increase for the next 5 years, with prices stabilizing and starting to decrease after 2012. However, a number of things could cause prices to continue to increase. There are two critical items that could have a significant impact on price. The first is how quickly new mines come into production. If the new mines are delayed then prices will rise as near term demand increases. This has recently occurred with Cameco's new Cigar Lake mine, which flooded in October 2006 delaying initial production by an estimated 1-3 years. Cigar Lake is currently the largest new mine scheduled to come into production. This has resulted in Cameco reducing scheduled deliveries in 2007 to customers forcing utilities to draw on inventory. The second is the impact of new nuclear plants being ordered both in the US and internationally. New plants result in higher demand as initial cores for those reactors are purchased in the market well in advance of initial startup.

Conversion Services

Spot conversion prices have stabilized at $11.75 and are predicted to main stable for the foreseeable future. The current price levels allow for new expansion needed by the market to upgrade or replace aging plants.

Cameco has signed a 10 year toll-conversion agreement with BNFL to acquire uranium conversion services from British Nuclear Fuels plc (BNFL's) Springfields plant in Lancashire, UK. Previously, this plant was slated to be closed in 2006. As a result, the price gap between European and North American conversion has been eliminated. The European converter, Comhurex, has announced plans for building another conversion facility. In addition, Cameco and ConverDyn have both started to expand their North American operations.

Enrichment Market

The SWU market has seen modest price increases over the past few years. However, due to the high uranium prices, the rate of price increases in the enrichment market has begun to increase - with significantly higher prices a very good possibility. Enrichment customers have the option to order enrichment services with a range of tails assays. The higher the tails assay the more uranium feed required and the less enrichment services. The lower the tails assay the more enrichment services required and less uranium feed. At the current prices, the optimum tails assay has reduced from 0.30 wt% to 0.20%. The result is an increase by about 25% in enrichment demand to reduce the uranium feed about 20%. The spot price in January 2006 was $116.00 per SWU and has risen to $135 per SWU in January 2007. However, price could likely increase to $175 per SWU by January 2008. The price increase is also being driven by limited supply to meet the higher demand in the face of rising supply costs. Both the US and European gaseous diffusion plants (GDP) expect their production costs to increase due to an increase in power prices. Electricity costs account for nearly 60% of the SWU costs at GDP enrichment plants. The average electricity cost for the US GDP has increased 50% and the European GDP it is estimated to have increased 100%.

Another factor fueling price increases in the near term is the fact that all three Western suppliers are in the process of either replacing their costly gaseous diffusion with centrifuge technology or expanding their existing capacity. Urenco has broken ground on an enrichment facility in New Mexico using its proven centrifuge technology. In addition, Urenco has received approval to increase the capacity of their Gronau facility in Germany. The United States Enrichment Corporation (USEC) is developing their own centrifuge technology to replace the GDP at Paducah, KY. AREVA's subsidiary Eurodif has signed an agreement with Urenco to use Urenco's centrifuge technology to replace their GDP facility at Tricastin in France. A new development is that General Electric is looking to deploy the SILEX laser enrichment technology which has been demonstrated at the lab scale.

Tenex, the Russian enricher, is currently eliminated from the US market due to an earlier DOC ruling.

Fuel Fabrication

The fabrication market took a turn for the positive with the announcement that Westinghouse was going to supply Exelon with BWR fuel from its Columbia, South Carolina, plant starting in 2006. The fabrication award was for a total of sixteen reloads at four of Exelon's reactors. The award will keep Westinghouse as a viable competitor in the US BWR fuel fabrication market. In addition, the renewed interest in new plant construction has resulted in significant investment by the GNF, AREVA, and Westinghouse in their fabrication processes and methodologies.

Energy Northwest has decided to go out for bids for the supply of fuel fabrication services in 2009, 2011, 2013 (Cycles 20-22). The bid evaluation and negotiation process is expected to be completed in the very near future. The rapid rise in uranium prices has resulted in a situation where the actual cost of fabrication is minor compared to how efficiently a fuel design utilizes the contained uranium while maintaining operating margins and flexibility. All of the fuel fabricators have been making improvements to the design to improve their uranium efficiency and also provide for more operational margin.

Section 4

Fuel Management Strategy

Fuel Cycle Designs

During FY2008, Columbia will be in the first half of Cycle 19, which is the station's fourth twenty-four month cycle. The reload was comprised of 272 assemblies, of the ATRIUM-10 design, with an average enrichment of 4.14 wt% U^{235}. The Cycle 19 core has energy available to be able to operate for the equivalent of 100% power for 642 days, including 39 days of cycle extension from 9 days of FFTR and 30 days of coast-down.

ATRIUM-10 is a fuel design composed of 91 fuel rods in a 10x10 array with nine positions displaced by a water-filled square channel. The 91 fuel rods are comprised of 83 full-length rods and 8 part-length rods (approximately two-thirds length). The fuel assemblies are designed with natural uranium fuel pellets at each end to form a reflector for neutron economy.

Fuel Procurement Strategy

Energy Northwest is in a remarkable position in the market. The current enriched uranium inventory in storage at GNF will meet the requirements for the 2009, 2011 and 2013 reloads. In addition, there is one reload of natural uranium that will be enriched for the 2015 reload.

The current plan has spot market uranium purchases beginning in FY2011. These purchases are planned in the event that the forward prices continue to escalate and early purchases make financial sense. There is no new enrichment procurement needed until the FY2020.

Fuel Procurement Activities

The large inventory of uranium will allow Energy Northwest to stay out of the current market and allow for new mines and enrichment facilities to enter production and help restore prices to more historic levels. The primary focus, for the next few years, will be on management and optimization of the inventory.

Fabrication Services

A fabrication services contract for Columbia Generating Station for three reloads, with an option for two future reloads, was awarded to Framatome-ANP (now AREVA) in January 2002. Currently, Columbia is operating in Cycle 18 with the second reload of ATRIUM-10 fuel.

Fuel Management Physical Requirements

The assumed cycle energies and fuel designs are used to develop multi-cycle reload material requirement projections. The projected reload material requirements are integrated with the existing inventory levels to project procurement requirements into the future. Table 4 summarizes those requirements over the next ten years.

Table 3 shows Purchases, Natural Uranium Inventory, Enriched Uranium Inventory and Fuel Fabrication requirements. Table 4 shows that there are no planned procurements or scheduled deliveries until FY2011.

Uranium is purchase in natural UF6 form and added to the natural UF6 inventory. When enrichment services are purchased the necessary quantity of natural UF6 is transferred to the enriched UF6 inventory column along with the associated enrichment services (SWU). The enriched UF6 is deducted from the inventory when fabricated into fuel assemblies.

Table 3
Revised Fuel Inventory Projections

	Purchase		Natural Uranium Inventory	Enriched Uranium Inventory		Fuel Fabrication		
FY	UF_6	SWU	UF_6	UF_6	SWU	UF_6	SWU	Assemblies
2007	0	0	464,061	1,249,800	760,996	451,048	274,706	272
2008	0	0	464,061	1,249,800	760,996			
2009	0	0	464,061	839,577	517,209	410,223	243,787	256
2010	0	0	464,061	839,577	517,209			
2011	150,000	137,500	422,287	621,128	410,922	410,223	243,787	256
2012	150,000	137,500	380,513	812,901	548,422			
2013	150,000	137,500	338,740	633,809	416,244	370,867	269,679	256
2014	150,000	137,500	296,966	825,582	553,744			
2015	225,000	261,250	157,596	819,086	545,315	370,867	269,679	256
2016	225,000	261,250	18,225	1,183,456	806,565			
2017	0	0	18,225	812,589	536,886	370,867	269,679	256
2018	370,867	0	389,092	812,589	536,886			
2019	0	0	389,092	812,589	267,207	370,867	269,679	256
2020	370,867	0	759,959	812,589	267,207			

Spent Fuel Storage and Disposal

DOE Spent Fuel Contract

While courts have now ruled that DOE had a binding obligation to begin acceptance of spent nuclear fuel no later than January 31, 1998, DOE estimates that they will not be accepting fuel at the completed repository until sometime after 2012. Energy Northwest is pursuing legal action against DOE regarding to DOE's failure to begin accepting spent fuel in 1998. An estimated cost of $900,000 is included for FY2008 to cover the legal action. Additional costs for future years will be included in next year's fuel plan document in order to assess the status of the lawsuit at that time.

On-Site Spent Fuel Storage

Columbia Generating Station lost full-core offload capability during the delivery of new fuel in 1999. Without further additions of spent fuel storage capacity, the last refueling possible at Columbia Generating Station would have been in the spring of 2003.

A project to build an Independent Spent Fuel Storage Installation (ISFSI) using NRC approved dry storage casks was approved. The ISFSI, located just north of the Deschutes Building, is capable of being expanded to hold the lifetime spent fuel requirements of Columbia Generating Station. The first fifteen (15) storage casks have been loaded moving 1,020 assemblies from the spent fuel pool to the ISFSI. The next cask loading campaign is scheduled for FY2008. As of the loading of the new fuel for Cycle 19 into the fuel pool, full-core offload capability will again be lost. However, four (4) casks (multi-purpose canisters and overpacks) have been procured and maintained onsite in the event that an emergency full core offload is required until the next scheduled cask loading campaign.

To maintain full core discharge capability, twelve (12) dry spent fuel storage casks must be loaded every three cycles. Costs of the MPC are estimated to be $811,925 each with welding costs estimated to be $70,000 per MPC. Future costs have not been escalated. The costs for the MPCs and closure welds are treated as a fuel expense and are included in this Fuel Plan in the category of Spent Fuel. The costs of the overpacks, facility, and common equipment are treated as a plant capital addition.

Active Contracts

Appendix A contains descriptions of the currently active fuel management contracts. The first contract listed is the Fuel Fabrication Services Contract (C-31700) with Framatome ANP. During FY-2008 Columbia Generating Station will be in Cycle 18 which will be operating with the second reload of Framatome ANP ATRIUM-10 fuel.

The second contract listed in Appendix A is the Enriched Uranium Loan with Global Nuclear Fuels (GNF) (C-31124). Six lots of material are currently in storage at GNF since GNF no longer has need for the material as working stock. New opportunities are being explored for revenue generation for these materials.

The third contract listed in Appendix A is the long-term uranium enrichment contract with Urenco, Ltd. Urenco will be supplying 775,000 SWU over calendar years 2003 through 2009 and an additional 750,000 SWU from 2010 through 2015.

Section 5

Nuclear Fuel Costs

Nuclear Fuel in Process

A measure of nuclear fuel cost is the Fuel-in-Process costs, or the costs to fabricate finished fuel assemblies.

The preliminary estimated costs for the reload batch for Cycle 19 are shown in Table 4.

Table 4
Estimated Fabrication Batch Cost

Component	CGS1-19
Uranium	$18,630,190
Conversion	$2,092,428
Enrichment	$18,114,133
Fabrication	$23,464,506
Sales Tax	$4,588,756
TOTAL	$66,890,013
# of Assemblies	272
Cost per Assembly	$245,919
Cask Cost	$15,843
Total Unit Cost	$261,762

Fuel Loan Revenue

There is currently no firm revenue contracts for the loaned strategic inventory. The uranium on loan to AREVA-NC will be paid with conversion services in lieu of cash payments. The enriched uranium inventory at GNF will be evaluated for new loan opportunities since it is no longer required by GNF as working stock.

Nuclear Fuel Cash Flows

A summary of cash flows by fuel component and fiscal year for the next ten years is given in Table 5. Cash flows for nuclear fuel by month for each component for the next five years are shown in Tables 6 through 10. The cash flows are in today's dollars including the costs associated with the nuclear material (uranium, conversion, enrichment).

Table 5
Cash Flow Summary By Fiscal Year
(X$1,000)

Year	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	D&D	Cash Flow
2008	$0	$0	$0	$1,484	$2,821	$0	$1,856	$8,056	$0	$14,218
2009	$0	$0	$0	$1,529	$23,083	$4,597	$0	$8,658	$0	$37,867
2010	$0	$0	$0	$1,575	$749	$0	$0	$8,032	$0	$10,356
2011	$33,702	$1,763	$16,862	$1,622	$21,186	$5,495	$0	$8,658	$0	$89,287
2012	$33,702	$1,763	$17,060	$1,671	$749	$0	$5,581	$8,056	$0	$68,580
2013	$33,702	$1,763	$17,258	$1,721	$22,803	$7,178	$6,167	$8,658	$0	$99,249
2014	$33,702	$1,763	$17,454	$1,772	$749	$0	$1,250	$8,032	$0	$64,722
2015	$50,553	$2,644	$32,776	$1,825	$24,707	$8,793	$0	$8,658	$0	$129,957
2016	$50,553	$2,644	$33,142	$1,880	$749	$0	$0	$8,032	$0	$96,999
2017	$0	$0	$0	$1,937	$26,777	$9,632	$0	$8,658	$0	$47,003
FY08-17	$235,913	$12,338	$134,552	$15,078	$97,596	$26,063	$14,854	$74,839	$0	$611,234

Table 6
FY-2008 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	D&D	Cash Flow
Jul-07				$124	$235		$155			$513
Aug-07				$124	$235		$155	$1,521		$2,035
Sep-07				$124	$235		$155			$513
Oct-07				$124	$235		$155			$513
Nov-07				$124	$235		$155	$2,194		$2,708
Dec-07				$124	$235		$155			$513
Jan-08				$124	$235		$155			$513
Feb-08				$124	$235		$155	$2,194		$2,708
Mar-08				$124	$235		$155			$513
Apr-08				$124	$235		$155			$513
May-08				$124	$235		$155	$2,146		$2,660
Jun-08				$124	$235		$155			$513
Total	$ -	$ -	$ -	$1,484	$2,821	$ -	$1,856	$8,056	$ -	$14,218

Table 7
FY-2009 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	D&D	Cash Flow
Jul-08	$ -	$ -		$127	$261					$389
Aug-08				$127	$261			$2,189		$2,578
Sep-08				$127	$261					$389
Oct-08				$127	$261					$389
Nov-08				$127	$261			$2,180		$2,569
Dec-08				$127	$261					$389
Jan-09				$127	$261	$2,899				$3,287
Feb-09				$127	$261			$2,180		$2,569
Mar-09				$127	$261					$389
Apr-09				$127	$261					$389
May-09				$127	$20,469	$1,699		$2,109		$24,404
Jun-09				$127						$127
Total	$ -	$ -	$ -	$1,529	$23,083	$4,597	$ -	$8,658	$ -	$37,867

Table 8
FY-2010 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	D&D	Cash Flow
Jul-09	$ -	$ -		$131	$62					$194
Aug-09				$131	$62			$1,521		$1,715
Sep-09				$131	$62					$194
Oct-09				$131	$62					$194
Nov-09				$131	$62			$2,194		$2,388
Dec-09				$131	$62					$194
Jan-10			$ -	$131	$62					$194
Feb-10				$131	$62			$2,194		$2,388
Mar-10				$131	$62					$194
Apr-10				$131	$62					$194
May-10				$131	$62			$2,123		$2,316
Jun-10				$131	$62					$194
Total	$ -	$ -	$ -	$1,575	$ 749	$ -	$ -	$8,032	$ -	$10,355

Table 9
FY-2011 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	D&D	Cash Flow
Jul-10	$ 33,702	$1,763		$135	$87					$ 35,687
Aug-10				$135	$87			$2,189		$ 2,412
Sep-10				$135	$87					$ 222
Oct-10				$135	$87					$ 222
Nov-10				$135	$87			$2,180		$ 2,402
Dec-10				$135	$87					$ 222
Jan-11			$16,862	$135	$87	$3,809				$ 20,893
Feb-11				$135	$87			$2,180		$ 2,402
Mar-11				$135	$87					$ 222
Apr-11				$135	$87					$ 222
May-11				$135	$20,316	$1,686		$2,109		$ 24,246
Jun-11				$135						$ 135
Total	$ 33,702	$1,763	$16,862	$1,622	$ 1,186	$ 5,495	$ -	$8,658	$ -	$ 89,287

Table 10
FY-2012 Nuclear Fuel Cash Flow Budget
(X$1,000)

Date	Uranium	Conv.	Enrich	Staff	Fab	Tax	Casks	Disposal	D&D	Cash Flow
Jul-11	$ 33,702	$1,763		$139	$62		$465			$ 36,131
Aug-11				$139	$62		$465	$1,521		$ 2,188
Sep-11				$139	$62		$465			$ 667
Oct-11				$139	$62		$465			$ 667
Nov-11				$139	$62		$465	$2,194		$ 2,861
Dec-11				$139	$62		$465			$ 667
Jan-12			$17,060	$139	$62		$465			$ 17,726
Feb-12				$139	$62		$465	$2,194		$ 2,861
Mar-12				$139	$62		$465			$ 667
Apr-12				$139	$62		$465			$ 667
May-12				$139	$62		$465	$2,146		$ 2,813
Jun-12				$139	$62		$465			$ 667
Total	$ 3,702	$1,763	$17,060	$1,671	$ 749	$ -	$5,581	$8,056	$ -	$ 68,580

Appendix A
Active Fuel Contracts

CONTRACT C-31700
NUCLEAR FUEL FABRICATION SERVICES
FRAMATOME ANP

BASE SCOPE

Energy Northwest contracted with Framatome ANP in January 2002, to supply fuel design, licensing, and fabrication services for three consecutive reloads for Columbia Generating Station.

PERFORMANCE SCHEDULES

The first reload under this contract was delivered in the spring of 2003. The scope of this contract will meet the needs of Columbia Generating Station for reload fabrication services through 2007.

All reload campaign notices are specified in relationship to the "scheduled delivery date" or SDD. The key dates from a fuel management perspective are as follows:

Notice	Schedule
Set preliminary fuel reload requirements	SDD-15 months
Set the scheduled delivery date for fuel	SDD-12
Set final fuel reload operating requirements	SDD-5½
Final reload core design	SDD-4½
Supply of enriched uranium product	SDD-3½
Final revision of fabricated reload batch size	SDD-2

FLEXIBILITY

Considerable flexibility is allowed by the contract to avoid carrying large fuel inventories in order to anticipate and provide for variations in operating schedule or generation.

Energy Northwest establishes the base quantity of fabricated fuel assemblies ten months prior to the Scheduled Delivery Date. This quantity can be adjusted by +8 to -24 fuel assemblies anytime until four months prior to the Scheduled Delivery Date. From four to two months prior to the Scheduled Delivery Date Energy Northwest can modify the fabricated batch size by +4 to -8 fuel assemblies.

[redacted]

CONTRACT C-31124 (Amended)
ENRICHED URANIUM LOAN
GLOBAL NUCLEAR FUEL

SCOPE

Energy Northwest loaned enriched uranium in the form of UF_6 to Global Nuclear Fuel (GNF) for use as working inventory at their fuel fabrication facility in Wilmington, North Carolina. In exchange Energy Northwest will receive the equivalent amounts of the same product plus loan fees.

QUANTITY

Lot #	EUP (kgU)	Assay	Feed (kgU)	SWU	Tails Assay
1	14,469.916	4.40%	162,337.983	80,047.573	0.35%
2	3,790.751	4.00%	34,124.337	20,000.000	0.30%
3a	7,041.262	4.95%	79,664.836	50,000.000	0.30%
3b	9,476.876	4.00%	85,310.842	50,000.000	0.30%
4a	18,593.753	4.00%	170,621.683	100,000.000	0.30%
4b	18,953.753	4.00%	170,621.683	100,000.000	0.30%
5	28,165.047	4.95%	318,659.344	200,000.000	0.30%
6	23,009.664	4.95%	293,189.139	150,000.000	0.35%

SECURITY

The Stored EUP will be covered by an irrevocable standby Letter of Credit equal to the market value of the material.

RETURN OF MATERIAL

The Stored EUP will be returned on a schedule commensurate with reactor needs. In the event of a supply disruption, the material or a portion thereof may be recalled with six months notice.

CONTRACT 313337
ENRICHMENT SERVICES
URENCO LTD.

BASE SCOPE

Energy Northwest contracted with Urenco LTD. in January 2003 to supply 525,000 SWU of enrichment services for delivery over calendar years 2005 to 2009. The contract was amended (twice) to procure an additional 250,000 SWU. In January 2006, Energy Northwest issued RFP 640137 for 750,000 SWU to be delivered between calendar years 2010 – 2015 and the contract extended through 2015.

PRICE

The contract pricing is 25% fixed priced and 75% base escalated by Gross Domestic Product Implicit Price Deflator (GDP-IDP).

SCHEDULES

Delivery Quantity	Delivery Date
50,000 SWU	2003
300,000 SWU	2005
200,000 SWU	2006
225,000 SWU	2007 - 2009
750,000 SWU	2010 - 2015

FLEXIBILITY

Quantity flexibility is allowed by the contract, ± 10%, on any delivery, with a minimum total quantity specified over the life of the contract.

CONTRACT 313179
URANIUM, CONVERSION AND/OR ENRICHMENT SERVICES
UG USA.

BASE SCOPE

Energy Northwest established a no-requirements contract with UG USA in 2003 to supply uranium, conversion and/or enrichment services over calendar years 2003 to 2009. Each individual purchase under the contract will require approval of Energy Northwest Management, Executive Board and Bonneville Power Administration, as required.

PRICE

The contract price will be determined for each purchase at time of offer.

SCHEDULES

Delivery Quantity	Delivery Date
Determined at time of Offer	Determined at time of Offer