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PRINCIPAL

Date: January 25, 2014

To: McCullough Research Clients

From: Robert McCullough

Subject: Energy Northwest Losses in the 2013 Forward Purchase of Nuclear Fuel

On May 15 and May 16, 2012, Energy Northwest signed contracts with the U.S. Department of Energy (DOE), the United States Enrichment Corporation (USEC), and the Tennessee Valley Authority (TVA) as part of a politically motivated transaction to subsidize the ailing owner of the Paducah Gaseous Diffusion Enrichment Facility at Paducah, Kentucky.

A condition set by the Energy Northwest board was that the transaction should show at least a $50 million net present value:

> Financial Requirements
>
> • At least $50 million in Net-Present Value at a 12 percent discount rate needs to be assumed[1]

There is a serious question whether the transaction ever did meet that condition. At the time of the March 26, 2012 and April 10, 2012 board meetings, the net present value of the transaction was -$150 million in Energy Northwest's own calculations.[2] Actually, the transaction was even less attractive since the market prices had fallen from the assumed levels and the choice of discount rate was questionable.

The most direct way to understand the potential losses is:

[1] Energy Northwest. *2012 Uranium Enrichment Program*. 26 Apr. 2012. Page 7.
[2] Energy Northwest. *Pre-Meeting Materials Package*. 26 Apr. 2012. Page 37.

1. In fiscal year 2013 (July 2012 through June 2013) Energy Northwest bought $711 million dollars of "forward" nuclear fuel components at $160 per unit.[3,4] The same components are worth approximately $99 per unit today.[5]
2. The total loss today on this component of the Paducah transaction is approximately $270,840,000.
3. The losses are partially offset by a lucrative contract with the Tennessee Valley Authority that will earn approximately $144/unit and a grant of UF6 from the U.S. Department of Energy.
4. A detailed analysis of the transaction, using Energy Northwest's own model and assumptions, indicates a loss of $206,000,000 at current market prices.

The board presentations on April 26, 2012 and May 10, 2012 were sketchy and misleading. An accounting misstep changed a transaction that was deeply in the red into an apparently profitable transaction.

The background of this unusual transaction can be traced to a decision over previous years by the US Department of Energy to subsidize the United States Enrichment Corporation by transfers of nuclear fuel under a variety of guises at below market rates. The fuel in question, UF6, is an intermediate step in the complex process of fueling a commercial nuclear plant. The UF6 is the "feed" that plants like USEC's Paducah plant enrich to create the fuel that will support fission. After enrichment, the fuel goes through yet another stage before it can be used.

The Government Accounting Office criticized seven of the Department of Energy transactions with "feed." Of these, six were with USEC.[6] The Paducah transaction was a logical follow on to the earlier transactions with subsidized feed allowing one year of additional operations at the superannuated plant.

Descriptions of the Paducah transaction vary between BPA, Energy Northwest, USEC, and the Department of Energy. Our primary sources are the TVA, Department of Energy, and USEC contracts plus the Energy Northwest board presentations of March 26, 2012 and May 10, 2012.[7,8,9,10,11] The fact sheet on the transaction from the Department of Energy is also useful.[12]

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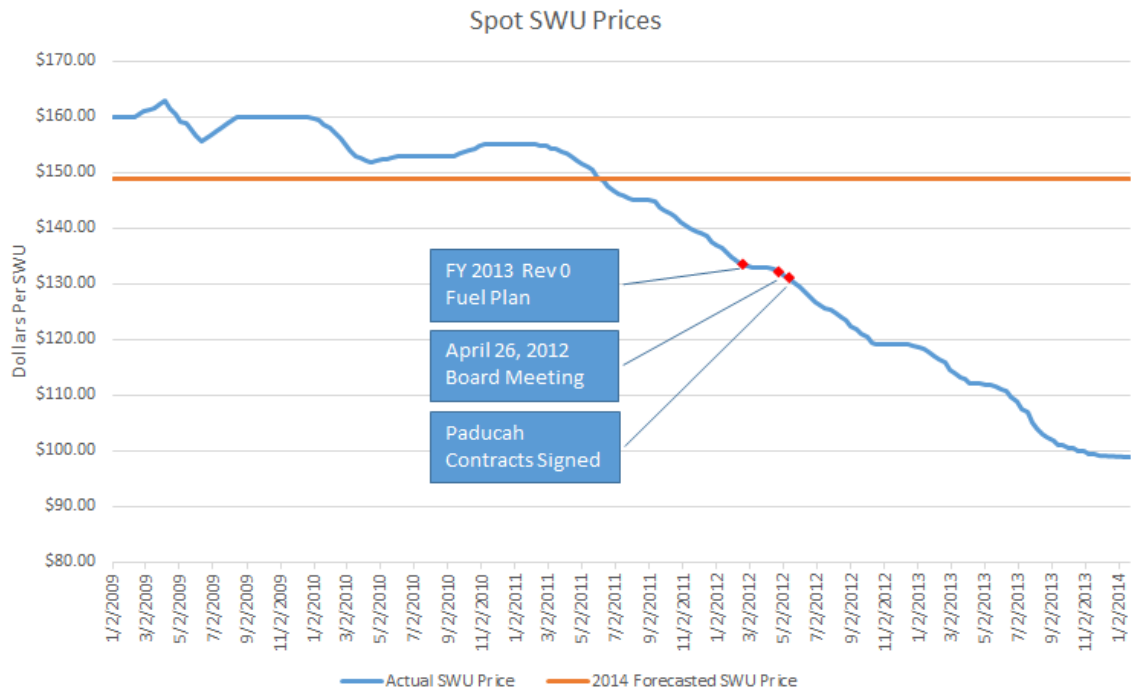
[3] Rockett, Eric. *2012 Uranium Enrichment Program*. Energy Northwest. 26 Apr, 2012. Page 20.
[4] Praetorius, Scott. *2012 Uranium Enrichment Program*. Energy Northwest. 26 Apr, 2012. Page 10.
[5] UxC. *UxC Nuclear Fuel Price Indicators*. http://www.uxc.com/review/uxc_Prices.aspx 25 Jan. 2014.
[6] Government Accounting Office. *Excess Uranium Inventories Clarifying DOE's Disposition Options Could Help Avoid Further Legal Violations. Report to Congressional Committees*. Sep. 2011. Page 6.
[7] *Enriched Product and UF6 Supply Agreement between Tennessee Valley Authority and Energy Northwest*. 15 May 2012.

Simply stated, the Paducah enrichment facility faced closure since it could not find customers at its high cost. Energy Northwest paid $711 million to USEC for 4,440,000 units of enrichment – approximately $160/unit.[13]

The chart below shows prices in the enrichment market since 2009:



All commodity speculations are risky. Purchasing forward commodities in a falling market is particularly dangerous – in this case, comparable to trying to fill an inside straight in poker.

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[8] *Agreement between the U.S. Department of Energy and Energy Northwest for the Transfer of Depleted Uranium Hexafluoride and the Storage of Low Enriched Uranium.* 15 May 2012.
[9] *Agreement between Energy Northwest and United States Enrichment Corporation USEC Contract.* 16 May 2012
[10] Energy Northwest. *2012 Uranium Enrichment Program*. 26 Mar. 2012.
[11] Energy Northwest. *Tails Fuel Procurement Transaction*. 10 May 2012.
[12] U.S. Department of Energy. *Background Fact Sheet Transfer of Depleted Uranium and Subsequent Transactions.* May 2012.
[13] The term of art in the industry is Seperative Work Unit or "SWU."

USEC received the Paducah plant from the U.S. Department of Energy in 2000. The plant is a sixty year old enrichment facility using gaseous diffusion technology from the Manhattan Project. Modern enrichment facilities are significantly more cost effective and energy efficient. The new Eunice enrichment facility in New Mexico, for example, uses only a fraction of the electricity (6%) required to enrich nuclear fuel at Paducah.

The introduction of the new technology has reduced prices markedly in the world market for nuclear fuel enrichment. It has also caused the closure of nearly all plants using the older technology. Like many other commodities, nuclear fuel enrichment has fallen dramatically since 2009 when it reached the price of $162.40/unit. Since then the price has fallen continuously. Today, the spot price is approximately $99/unit.

In this specific case, the fall in price was predictable. The new technology allows enrichment at a dramatically lower cost. As the older plants like Paducah have faced the falling costs, they have gradually been removed from service.

Starting 2015 and ending in 2022, the Tennessee Valley Authority will pay $732,000,000 million for most of the transaction.[14] Unfortunately, the delay in their payments reduces the value considerably. Since enriched nuclear fuel is storable at little or no cost, TVA could have purchased all of their share immediately – as did Energy Northwest for their share. The delay in delivering enriched fuel components to TVA has no operational meaning except as a method to reduce the effective cost of TVA's purchases.

The table below is taken from the March 26, 2012 board presentation. It represents a simple spreadsheet evaluation of the transaction. It is a bit difficult to read since the flow of calculations is not obvious. It can also prove challenging since several of the cells in the "subtotal" column would appear to be in error.[15]

[14] TVA's share is different for "feed" and enrichment. They will receive 2,900,000 SWUs of the 4,440,000 processed at USEC, for example.

[15] The column entitled "subtotal" is the simple total of the values to the right on the same row. The Energy Northwest subtotals for the "10yr Fuel Plan Purchases – Project" should be -357, not -912. The subtotal for "10yr Fuel Plan Purchases - No Project" should be 760, not 1,314. Curiously, the materials from Bank of America corrected the error, but inserted fuel costs for FY 2012, which was also in error. See page 17 of the *Pre-Meeting Materials Package.*

Decision Model (Financial)

Uranium Purchase - Economic Value

Cash Flow Table

	Subtotal	0 2012	1 2013	2 2014	3 2015	4 2016	5 2017	6 2018	7 2019	8 2020	9 2021	10 2022	11 2023	12 2024	13 2025	14 2026	15 2027	16 2028
Processing Costs	(795)		(795)															
USEC Participation	84		84															
Bond Proceeds	711		711															
Interest Payments	(126)		(17)	(17)	(17)	(16)	(15)	(16)	(13)	(6)	(6)	(2)						
Principal Payments	(715)		-	-	(70)	(24)	(25)	(103)	(279)	(26)	(129)	(51)						
Forward Sales	732			-	70	24	25	110	281	26	129	66	-					
10yr Fuel Plan Purchases - Project	(312)		(27)	(43)	(26)	-	(30)	(18)	(28)	-	-	(42)	-	(38)	-	(38)	-	(51)
10yr Fuel Plan Purchases - No Project	1,314		27	47	28	53	23	55	28	68	32	71	33	73	35	75	36	75
EN Budget	283		(17)	(14)	(14)	37	(23)	23	(11)	61	26	42	33	34	35	36	36	8
BPA Budget	283	(4)	(16)	(14)	(1)	22	(11)	14	7	53	30	40	33	34	35	36	29	6
Rate Period Benefit	283			(36)		11		22		82		73		70		65		6

NPV Table

Discount Rate	NPV
1%	$260m
3%	$205m
6%	$144m
9%	$101m
12%	$70m

Rate Period	Benefit
14/15	(36)
16/17	11
18/19	22
20/21	82
22/+	214

Assumptions

Processing Cost @ $154/SWU	$ 770.0
Contingency $25m	$ 25.0
Total Project Funding Requirements	$ 795.0

Optimized Principal and Interest Repayment
USEC SWU cost @ $154
USEC assignment of TVA SWU sales $70.0M
USEC participation $84m. (1.0m SWU participation)
CGS consumes balance of unsold inventory

[16]

The net present value benefit of the transaction at a 12% discount rate is the number outlined in yellow at the bottom. This is the present value of the "EN Budget" row.

The EN Budget row is the sum of the rows entitled "Interest Payments", "Principal Payments", "Forward Sales," "10yr Fuel Plan Purchases – Project," and "10yr Fuel Plan Purchases – No Project."

The first column, "subtotal", is not actually used in the calculation and poses some difficulties. The column is generally the simple sum of the values to its right. In two cases, "10yr Fuel Plan Purchases – Project" and "10yr Fuel Plan Purchases – No Project," it reports erroneous totals. The errors do not affect the conclusions of the model.

The "Interest Payments" and "Principal Payments" reflect the bonds issued to pay for the fuel and these values are not calculated in this spreadsheet. The forward sales are the proceeds from the TVA contract assuming that no delays have been elected by TVA.[17]

The last two rows are the most important -- "10yr Fuel Plan Purchases – Project" and "10yr Fuel Plan Purchases – No Project." These values are taken from the 2013

[16] Praetorius, Scott. *2012 Uranium Enrichment Program*. Energy Northwest. 26 Apr, 2012. Page 12.
[17] *Enriched Product and UF6 Supply Agreement between Tennessee Valley Authority and Energy Northwest.* 15 May 2012. Pages 8 And 16.

Fuel Plan Revision 0 and Revision 1.[18,19] Since Energy Northwest has not posted these documents for the past five years, I have attached the relevant pages as Attachment A.

The basic logic of the Energy Northwest spreadsheet is that the final NPV benefit or loss is equal to the amount of financing savings, the forward sales proceeds, and the fuel savings minus the $711 million capital cost.

Given the difficulty of reading the Energy Northwest spreadsheet, it is easier to understand when the calculations are conducted in the more common top-down and left to right format. The following spreadsheet restates the Energy Northwest calculations in a more user-friendly fashion:

Commodity Transaction*

Year	Investment	TVA Revenues	Net Fuel Savings	Total
Source	April 26, 2012 Board Briefing	TVA Contract	2013 Fuel Plan Rev. 0 and 2013 Fuel Plan Rev. 1	
FY 2013	$ (711)	$ -	$ -	$ (711)
FY 2014		$ -	$ 4	$ 4
FY 2015		$ 70	$ 3	$ 73
FY 2016		$ 24	$ 53	$ 77
FY 2017		$ 25	$ (7)	$ 18
FY 2018		$ 110	$ 37	$ 147
FY 2019		$ 281	$ -	$ 281
FY 2020		$ 26	$ 68	$ 94
FY 2021		$ 129	$ 32	$ 161
FY 2022		$ 66	$ 29	$ 95
FY 2023			$ 33	$ 33
FY 2024			$ 35	$ 35
FY 2025			$ 35	$ 35
FY 2026			$ 37	$ 37
FY 2027			$ 36	$ 36
FY 2028			$ 8	$ 8
FY 2012 NPV @ 12%	$ (635)	$ 340	$ 144	$ (150)

Financial Transaction*

Year	Bond Proceeds	Interest	Principal	Total
		April 26, 2012 Board Briefing	April 26, 2012 Board Briefing	
FY 2013	$ 711	$ (17)	$ -	$ 694
FY 2014		$ (17)	$ -	$ (17)
FY 2015		$ (17)	$ (70)	$ (87)
FY 2016		$ (16)	$ (24)	$ (40)
FY 2017		$ (16)	$ (25)	$ (41)
FY 2018		$ (16)	$ (109)	$ (125)
FY 2019		$ (13)	$ (279)	$ (292)
FY 2020		$ (6)	$ (26)	$ (32)
FY 2021		$ (6)	$ (129)	$ (135)
FY 2022		$ (2)	$ (51)	$ (53)
FY 2023				$ -
FY 2024				$ -
FY 2025				$ -
FY 2026				$ -
FY 2027				$ -
FY 2028				$ -
	$ 635	$ (79)	$ (334)	$ 221

*** in millions of dollars**

[18] Praetorius, Scott. *FY 2013 Fuel Management Plan Rev. 0*. Energy Northwest. Mar. 2012.
[19] Praetorius, Scott. *FY 2013 Fuel Management Plan Rev. 1*. Energy Northwest. July 2013.

The basic analysis of the Paducah transaction reveals that on the date of the board presentations, using Energy Northwest's own model and assumptions, Energy Northwest would lose $150 million from buying overpriced fuel components that it could not use for many years. The reason why Energy Northwest reported that they would lose on the commodity transaction is clear from the examination of the Fuel Plans before and after the transaction. Energy Northwest had already committed to most of their fuel requirements in upcoming years. The purchases from Paducah were at higher costs than those forecasted in their Fuel Plans and, to a significant degree, not useful until existing inventories and purchases had been utilized.

The board presentations reported a $71 million "gain" because their savings from the financial transaction gave the mistaken impression that they offset the commodity loss.

The term "financial transaction" does not appear in their spreadsheet. It does not appear in either of the two board presentations, nor in the minutes of the board meetings.[20,21]

As it happens, only the keenest eye would have noticed that without the "financial transaction" the plan was expected to lose $150,000,000. This value can be found in Brent Ridge's model sensitivities table on page 11 of the May 10, 2012 presentation as well as the pre-meeting materials.[22]

How did Energy Northwest plan to make $220 million from financing the fuel transaction in order to offset the loss on the commodity transaction?

Energy Northwest borrowed $711 million dollars at approximately 5% interest.[23] The model discounts the repayment and interest at 12%. Any investment will appear profitable if the discount rate is sufficiently higher than the interest rate. This is what has occurred here. Even worse, given the assumptions in the model, the net present value would have increased markedly if Energy Northwest had borrowed even more money – even if it didn't need or use it.

[20] Barwick, Susan. *Minutes of Energy Northwest Special Executive Board Meeting.* Energy Northwest. 26 Apr. 2012.
[21] Pattie, Lilly. *Minutes of the Special Meeting of the Executive Board of Energy Northwest.* Energy Northwest 10 May 2012.
[22] Ridge, Brent. *Tails Fuel Procurement Transaction*. Energy Northwest. 10 May 2012. Page 11.
[23] The actual interest rate varied by issue.

The perverse result at Energy Northwest comes from an unusual definition of "benefits." If there was a possible investment with a yield of 12%, borrowing at 5% would have conferred an enormous profit -- $221 million in this case. However there were no 12% investments available to Energy Northwest to recoup these costs. Therefore any estimate of profits from borrowing at 5% and discounting at 12% should simply be dismissed.

This is a common ploy among real estate promoters who will "pump" spreadsheet results by assuming that the real estate purchaser can invest proceeds at a higher rate than he can borrow them. Obviously, if this was true, you would simply borrow money and reinvest it at the higher return – there would be no reason to pursue a risky investment.

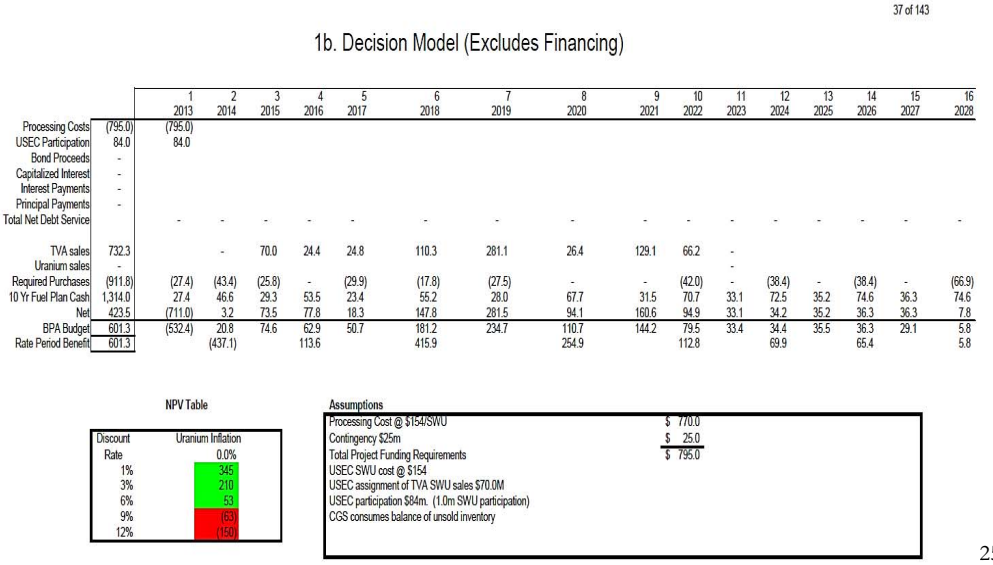
For example, suppose that you developed a new theory for playing slot machines at a local casino. You borrow $1,000 from your bank at 5% to be paid off in equal installments over the next decade. With your thousand dollars you insert 4,000 quarters into the slot machine. At the end of a long day, you have $940 dollars.[24] Since gambling is a risky operation, you discount the cash flows by 12%. Surprisingly, the net present value of the project is positive – very positive:

Year	**Proceeds**	**Costs**	**Profit**
2014	$ 940.00	($129.50)	$810.50
2015		($129.50)	($129.50)
2016		($129.50)	($129.50)
2017		($129.50)	($129.50)
2018		($129.50)	($129.50)
2019		($129.50)	($129.50)
2020		($129.50)	($129.50)
2021		($129.50)	($129.50)
2022		($129.50)	($129.50)
NPV@12%	$ 940.00	($772.84)	$167.16

The result, a profit of $167.16, is illusory. Since the discount rate is higher than the interest rate, future payments are devalued as if they were at risk. In the real world, the interest and principal owed to a bank are utterly certain – it is the earnings from gambling that are uncertain. A standard cash flow analysis would show the net present value of the financing equal to the face value at issue.

[24] Slot machines have an expected loss of 6%. The invested $1,000 would return only $940.

A very careful Energy Northwest board member could have found this on page 37 of the pre-meeting materials:



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1b. Decision Model (Excludes Financing)

		1 2013	2 2014	3 2015	4 2016	5 2017	6 2018	7 2019	8 2020	9 2021	10 2022	11 2023	12 2024	13 2025	14 2026	15 2027	16 2028
Processing Costs	(795.0)	(795.0)															
USEC Participation	84.0	84.0															
Bond Proceeds	-																
Capitalized Interest	-																
Interest Payments	-																
Principal Payments	-																
Total Net Debt Service		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TVA sales	732.3		-	70.0	24.4	24.8	110.3	281.1	26.4	129.1	66.2	-					
Uranium sales	-											-					
Required Purchases	(911.8)	(27.4)	(43.4)	(25.8)	-	(29.9)	(17.8)	(27.5)	-	-	(42.0)	-	(38.4)	-	(38.4)	-	(66.9)
10 Yr Fuel Plan Cash	1,314.0	27.4	46.6	29.3	53.5	23.4	55.2	28.0	67.7	31.5	70.7	33.1	72.5	35.2	74.6	36.3	74.6
Net	423.5	(711.0)	3.2	73.5	77.8	18.3	147.8	281.5	94.1	160.6	94.9	33.1	34.2	35.2	36.3	36.3	7.8
BPA Budget	601.3	(532.4)	20.8	74.6	62.9	50.7	181.2	234.7	110.7	144.2	79.5	33.4	34.4	35.5	36.3	29.1	5.8
Rate Period Benefit	601.3		(437.1)		113.6		415.9		254.9		112.8		69.9		65.4		5.8

NPV Table

Discount Rate	Uranium Inflation 0.0%
1%	345
3%	210
6%	53
9%	(63)
12%	(150)

Assumptions

Processing Cost @ $154/SWU	$ 770.0
Contingency $25m	$ 25.0
Total Project Funding Requirements	$ 795.0
USEC SWU cost @ $154	
USEC assignment of TVA SWU sales $70.0M	
USEC participation $84m. (1.0m SWU participation)	
CGS consumes balance of unsold inventory	

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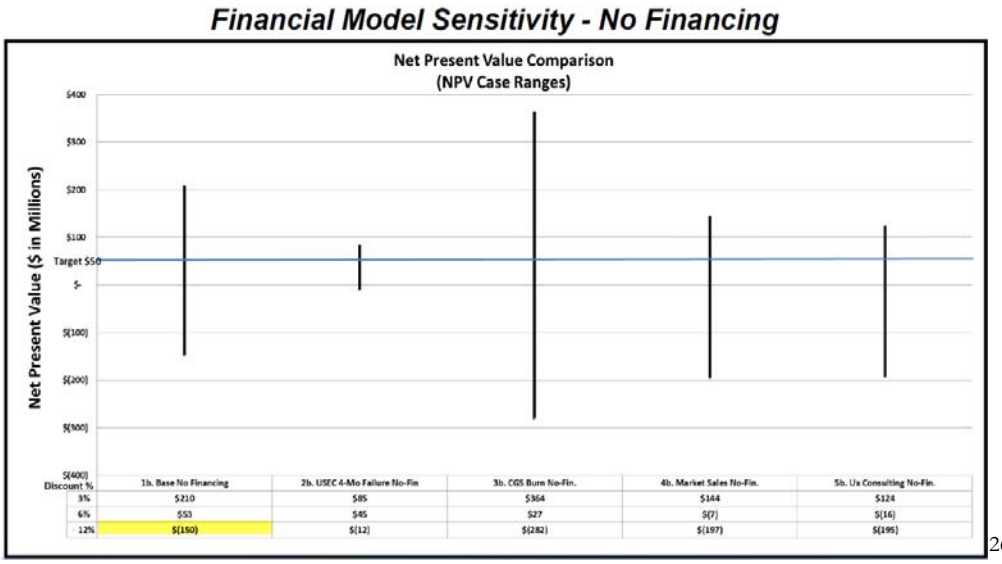
This version of the model was contained in the hundred plus pages sent to the Energy Northwest board in preparation for the meeting on April 26, 2012. This page derives the sensitivity result that Mr. Ridge reported on page 11 of the May board presentation:

[25] Energy Northwest. *Pre-Meeting Materials Package.* 26 Apr. 2012. Page 37.



[26]

This chart is not easily understood. Mr. Ridge was showing some of the alternative discount rates from the Energy Northwest model reproduced above while not including the unlikely savings from the financial transaction.

A standard cost benefit analysis analyzes the cost and benefits of the specific transaction under consideration. This is Energy Northwest's usual approach. In 2012, Energy Northwest staff reviewed a proposal to change the operations at the nuclear station with enhancements called ARTS/MELLLA.[27] The spreadsheet underlying the

[26] Ridge, Brent. *Tails Fuel Procurement Transaction*. Energy Northwest. 10 May 2012. Page 11.
[27] Snyder, Jim. Project Review Committee Meeting Project 628801 - PRNM and ARTS/MELLLA. Energy Northwest. 5 July 2012. Page 2.

> The existing neutron monitoring system is obsolete. Replacement parts are costly and becoming difficult to obtain. Significant station resources are expended in corrective maintenance and surveillance costs. Also, the existing system is vulnerable to surveillance-induced half scrams and spiking of the Local Power Range Monitors (LPRM). Installation of a new safety related digital Power Range Neutron Monitoring (PRNM) system corrects these problems. PRNM is needed to be able to implement ARTS/MELLLA which will expand our current operating domain. This will provide additional operational flexibility when operating at rated power, leading to fewer downpowers to manipulate control rods, especially during the last part of the operating cycle, and would eliminate nuisance alarms caused by our current system. Cost benefit is that seven fewer fuel bundles will be needed each cycle and net electrical generation will increase due to running RRC pumps at slower speed. Surveillance costs will also be reduced. Estimated savings are $7M per year plus a one-time cost savings for not having to clean jet pump nozzles.

ARTS/MELLLA proposal sets out the actual costs and savings, deriving the net present value, the internal rate of return, and the years until the investment is paid back:

	Escalation	Discount	Capital Costs	per 2 years	Increased Net Generation	Annual Surveillance/ Maint/Parts	Downpower Reductions	One-time	NPV	CumNPV	Pay Back Years
FY09	1	1	($2,412)						($2,412)	($2,412)	1
FY10	1.035	0.93897	($8,150)						($8,150)	($10,561)	2
FY11	1.071225	0.88166	($6,606)						($6,606)	($17,167)	3
FY12	1.108718	0.82785			$3,618	$340	396		$4,354	($12,813)	4
FY13	1.147523	0.77732		$4,103	$3,516	$330	385		$8,335	($4,478)	5
FY14	1.187686	0.72988		$ -	$3,417	$321	374		$4,112	($366)	6
FY15	1.229255	0.68533		$3,875	$3,321	$312	364		$7,872	$7,506	7
FY16	1.272279	0.64351		$ -	$3,227	$303	353		$3,884	$11,389	
FY17	1.316809	0.60423		$3,660	$3,136	$294	344		$7,434	$18,824	
FY18	1.362897	0.56735		$ -	$3,048	$286	334		$3,668	$22,492	
FY19	1.410599	0.53273		$3,457	$2,962	$278	324		$7,021	$29,513	
FY20	1.45997	0.50021		$ -	$2,879	$270	315		$3,464	$32,978	
FY21	1.511069	0.46968		$3,265	$2,798	$263	306		$6,631	$39,609	
FY22	1.563956	0.44102		$ -	$2,719	$255	298		$3,272	$42,881	
FY23	1.618695	0.4141		$3,083	$2,642	$248	289	$4,692	$10,955	$53,836	
FY24	1.675349	0.38883		$ -	$2,568	$241	281		$3,090	$56,926	
Total			($17,167)	$21,443	$39,853	$3,741		$4,692			
								IRR		23%	
								Payback years		7	

[28]

It should be noted that the standard cost benefit analysis in the ARTS/MELLA proposal does not consider the savings calculated from the difference between the discount rate and the cost of capital. The presentations to the board in the spring of 2012 were considerably less professional, even though the total transaction was much larger.

Unfortunately, this was not the only problem with the financial results given to the board in April and May.

In March of 2012, Mr. Praetorius has forecasted a price for 2013 at $149/unit.[29] On May 10, 2012, the price had already fallen to $131.18/unit.[30]

Obviously, assuming a price 21% higher than the prices in place on the date of the presentation was a problem.

A second problem had to do with the counterparty – USEC. There was a serious risk of bankruptcy at the United States Enrichment Corporation. USEC bond yield on

[28] Snyder, Jim. Project Review Committee Meeting Project 628801 - PRNM and ARTS/MELLLA. Energy Northwest. 5 July 2012. Page 11.
[29] Praetorius, Scott. *FY 2013 Fuel Management Plan Rev. 0*. Energy Northwest. Mar. 2012. Page 12.
[30] UxC. *UxC Historical Ux Price Charts*. <http://www.uxc.com/review/uxc_PriceChart.aspx?chart=spot-swu-full> 25 Jan. 2014.

the day of the presentation was 38%. This represented investor's risk premium in lending money to USEC.

The USEC faced many challenges during this period:

1. Proposed delisting of its equity from the New York Stock Exchange

2. Down rating of USEC bonds to junk bond status.

3. Severe doubt about its proposed new enrichment technology.

4. The imminent closure of the Paducah facility.

Investors had deeply discounted the company's bonds. The premium for trusting USEC for one year had risen to 38% which made the assumed 12% discount rate used in the model terribly low from the viewpoint of other investors.

Imputing the actual prices for nuclear fuel components and the correct discount rate into Energy Northwest's model yields a massive expected commodity loss -- $384 million.

Fortunately, the gamble that USEC did not declare bankruptcy and the nuclear fuel components were delivered was successful. At the end of the Paducah transaction USEC closed the plant and recently announced that it will be entering bankruptcy in the near future.

Today, Energy Northwest owns the nuclear fuel components and has a commitment to deliver the majority to TVA. The contract between Energy Northwest and TVA is very unusual for a contract for forward commodities, without many of the protections universal in the industry. Since, from TVA's point of view, the contract is severely out of the money, buyer's remorse may well set in before 2022. If so, Energy Northwest has proceeded without the protections of a standard forward commodity contract. This means that the discount rate is no longer 38%, but would be the discount rate of any long term commodity trade for a commodity with volatile prices.

The following calculation uses Energy Northwest's model, fuel plans, and assumptions. The primary change is a reduction in 2014 prices to current levels and the elimination of the "earnings" from financing transaction:

Commodity Transaction*

Year	Investment	TVA Revenues	Net Fuel Savings	Total
Source	April 26, 2012 Board Briefing	TVA Contract	2013 Fuel Plan Revision. 0 and 2013 Fuel Plan Rev. 1 Updated to 1/20/2014	
FY 2013	$ (711)	$ -	$ (12)	$ (723)
FY 2014		$ -	$ 2	$ 2
FY 2015		$ 70	$ 3	$ 73
FY 2016		$ 24	$ 37	$ 61
FY 2017		$ 25	$ (5)	$ 20
FY 2018		$ 110	$ 27	$ 137
FY 2019		$ 281	$ (3)	$ 278
FY 2020		$ 26	$ 41	$ 67
FY 2021		$ 129	$ 22	$ 151
FY 2022		$ 66	$ 23	$ 89
FY 2023			$ 23	$ 23
FY 2024			$ 28	$ 28
FY 2025			$ 23	$ 23
FY 2026			$ 30	$ 30
FY 2027			$ 24	$ 24
FY 2028			$ 6	$ 6
FY 2012 NPV @ 12%	$ (635)	$ 340	$ 89	$ (206)

*** in millions of dollars**

As of today, shorn of the financial "pump" and faced with falling prices, Energy Northwest's model indicates a $206 million dollar loss on the Paducah transaction.

Attachment A:

Tables from the 2013 and 2014 Fuel Plans

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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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SECTION 6 TABLES AND FIGURES

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

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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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SECTION 6 TABLES AND FIGURES

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
2012	1,318,783	527,275	488,609			
2013	4,824,716	1,846,534	26,874	408,419	247,556	248
2014	428,507	164,000	112,500			
2015	154,158	59,000	117,000	422,026	255,803	256
2016						
2017			225,000	422,026	255,803	256
2018			132,000			
2019			206,800	422,026	255,803	256
2020						
2021				422,026	255,803	256
2022			250,000			

Table 4

Nuclear Material Totals

Fiscal Year	Natural UF_6 KgU	Enriched Uranium Product UF_6	Enriched Uranium Product SWU
2013	2,122,049	723,684	606,560
2014	2,139,344	886,491	708,743
2015	2,045,771	671,411	559,209
2016	2,045,771	671,411	559,209
2017	1,752,362	574,999	507,771
2018	1,580,228	766,026	627,665
2019	1,310,552	643,276	559,696
2020	1,310,552	643,276	559,696
2021	1,310,552	221,250	303,892
2022	883,998	647,804	553,892

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Tables and Figures

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

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SECTION 6 TABLES AND FIGURES

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	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	Enriched Uranium Product 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

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