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June 19, 2009

Mr. John Kuterbach, Air Permits Program Manager
Ms. Rebecca Smith, Environmental Program Specialist
Air Permits Program
Alaska Department of Environmental Conservation
410 Willoughby Avenue, Suite 303
Juneau, AK 99801

RE: June 15, 2009 GVEA Comments on ADEC Preliminary BART Determination for
Unit No. 1, Healy Power Plant

Dear Mr. Kuterbach and Ms. Smith:

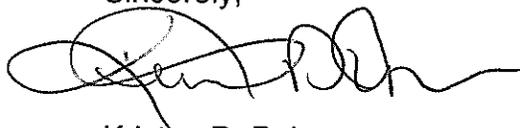
As a follow-up to our June 15, 2009 submittal to ADEC commenting on the Alaska Department of Environmental Conservation's ("ADEC's") preliminary BART determination for Unit No. 1 at the Healy Power Plant, Golden Valley Electric Association is submitting the enclosed spreadsheets in support of the Economic Analysis Summary prepared by CH2M Hill as set out in Attachment 3 of the June 15 letter. With this letter, we are providing two sets of spreadsheets, one based on an estimated NOx emissions rate of 0.28 lbs/MMBtu and the other based on 0.25 lbs/MMBtu (Attachments No. 1 and No. 2). We believe the spreadsheets will further assist ADEC in evaluating our June 15 comments.

The 0.28 lbs/MMBtu emission rate presented in our June 15 letter is a revised emissions rate from our submittals in July 2008, January 2009, and March 2009. In the earlier submittals, we used a value of 0.25 lb/MMBtu which was our best estimate of emissions on a typical operating day in the baseline year. For our June 15, 2009 submittal, we have refined our numbers, including the emissions rate, used in the cost effectiveness evaluation. Based on the 5-year rolling average emissions provided in Figure 1 in our March 18, 2009 submittal, the mean emission rate from the period May 19, 2003 to October 24, 2008 was 0.28 lb/MMBtu. Even though it is a more

conservative number than we used previously, it is a refinement based on a five year annual average that is consistent with the overall refinement of the cost analysis we provided in the June 15, 2009 letter. We note, however, that the 2008 twelve month average for NOx emissions at Healy Unit No. 1 is 0.25 lb/MMBtu and the 2007 twelve month average is 0.28 #/MMBtu. What is clear from these numbers is, like emissions rates from all similar power plants, the NOx emissions rate from Healy Unit No. 1 fluctuates. At Healy Unit No. 1, both the 0.25 lb/MMBtu and the 0.28 lb/MMBtu are reasonable and valid emissions rates upon which to base an economic analysis and demonstrate, in addition, the need for operational flexibility when determining permit limitations.

Thank you for your consideration of these materials. If you have any questions, please contact me at 451-5627.

Sincerely,



Kristen DuBois
Environmental Officer

Attachment No. 1
Attachment No. 2

cc: Mr. Tom Turner, ADEC

ECONOMIC ANALYSIS SUMMARY (0.28 lb/mmmbtu)			
Healy Unit 1		Boiler Design:	
Parameter	Current Operation	Wall Fired	Wall Fired
		NOx Control	NOx Control
		SCR	SCR
Case	1	15 year life	8 year life
NOx Emission Control System	LNB w/OFA	SCR	SCR
TOTAL INSTALLED CAPITAL COST (\$)	0	21,860,887	21,860,887
FIRST YEAR O&M COST (\$)			
TOTAL FIXED O&M COST	0	1,125,172	1,125,172
Reagent Cost	0	79,292	97,519
SCR Catalyst	0	90,000	110,689
TOTAL VARIABLE O&M COST	0	169,292	208,208
TOTAL FIRST YEAR O&M COST	0	1,294,464	1,333,380
FIRST YEAR DEBT SERVICE (\$)	0	2,553,998	4,678,584
TOTAL FIRST YEAR COST (\$)	0	3,848,461	6,270,611
CONTROL COST (\$/Ton Removed)			
NOx Removal Rate (%)	0.0%	75.0%	75.0%
NOx Removed (Tons/Yr)	0	310	310
First Year Average Control Cost (\$/Ton NOx Rem.)	0	12,397	20,200
PRESENT WORTH COST (\$)	0	31,021,252	34,262,853

INPUT CALCULATIONS 15 YEAR ANALYSIS (0.28 lb/MMBtu)

Healy Unit 1		Boiler Design: Wall Fired			
Parameter	Current Operation	NOx Control		Comments	Data Source
			SCR		
Case	1	6			
NOx Emission Control System	LNB w/OFA	SCR			
Unit Design and Coal Characteristics					
Type of Unit	PC	PC			
Net Power Output (kW)	25,000	25,000			
Net Plant Heat Rate (Btu/kW-Hr)	13,500	13,500			
Boiler Fuel	Usabelli Mine	Usabelli Mine			
Coal Heating Value (Btu/Lb)	6,766	6,766			
Coal Sulfur Content (wt.%)	0.17%	0.17%			
Coal Ash Content (wt.%)	13.66%	13.66%			
Boiler Heat Input, each (MMBtu/Hr)	338	338			
Coal Flow Rate (Lb/Hr)	49,882	49,882			
(Ton/Yr)	218,482	218,482			
(MMBtu/Yr)	2,956,500	2,956,500			
Emissions					
Uncontrolled NOx (Lb/Hr)	95	95			
(Lb/MMBtu)	0.28	0.28			
(Lb Moles/Hr)	3.15	3.15			
(Tons/Yr)	414	414			
NOx Removal Rate (%)	0.0%	75.0%			
(Lb/Hr)	0	71			
(Lb Moles/Hr)	0.00	2.36			
(Ton/Yr)	0	310			
NOx Emission Rate (Lb/Hr)	95	24			
(Lb/MMBtu)	0.28	0.07			
(Ton/Yr)	414	103			
General Plant Data					
Annual Operation (Hours/Year)	8,760	8,760			
Annual On-Site Power Plant Capacity Factor	1.00	1.00			
Economic Factors					
Interest Rate (%)	8.00%	8.00%			GVEA
Discount Rate (%)	10.00%	10.00%			GVEA
Plant Economic Life (Years)	15	15			GVEA
Installed Capital Costs					
SCR System Purchase	0	13,300,000	Note 1		Fuel Tech
Installation, Project Management, Miscellaneous (\$)	0	800,000	Note 2		GVEA
Relocation of Existing Unit #1 Equipment (\$)	0	300,000	Note 3		GVEA
New ID Fan and Motor (\$)	0	700,000	Note 4		GVEA
Installation, Reconnect Ducts, Management,	0	450,000	Note 5		GVEA
New Fan Motor Switchgear, Installation, Management (\$)	0	400,000	Note 6		GVEA
Unit #1 Off-line for SCR Duct Tie-in	0	1,917,406	Note 7		GVEA
Ductwork-Baghouse Support Stiffeners (\$)	0	350,000	Note 8		GVEA
Total Emission Control Systems (\$2009)	0	18,217,406			
Total Emission Control Systems (\$2009) Contingency	0	21,860,887	20% contingency		
NOx Emission Control System (\$/kW)	0	874			
Total Fixed Operating & Maintenance Costs					
Total Fixed O&M Cost (\$)	0	433,512	Note 9		Fuel Tech
Catalyst Replacement (\$)	0	90,000	Note 10		Fuel Tech
Cost of Replacing Lost Generation (\$)	0	414,131	Note 11		GVEA
Total Fixed O&M Cost (\$)	0	937,543			
Total Fixed O&M Cost w/Contingency (\$)	0	1,125,172	20% contingency		
Annual Fixed O&M Cost Escalation Rate (%)	3.00%	3.00%			
Reagent Cost					
Unit Cost (\$/Ton)	NA	NH3			Fuel Tech
(\$/Lb)	NA	450			
Molar Stoichiometry	NA	0.225			
Reagent Purity (Wt.%)	NA	1.00			
Reagent Usage (Lb/Hr)	NA	100%			
First Year Reagent Cost (\$)	NA	40			
Annual Reagent Cost Escalation Rate (%)	NA	79,292			
	NA	3.00%			
SCR Catalyst					
Annual SCR Catalyst (m3)	0	11	estimated		Fuel Tech
SCR Catalyst (\$/m3)	0	8,000			Fuel Tech
First Year SCR Catalyst	0	90,000			
Annual SCR Catalyst Cost Escalation Rate (%)	3.00%	3.00%			

Note 1: "SCR system purchase" includes: preliminary studies, detailed engineering, civil-foundation, I&C, electrical system modifications, BOP mechanical work, support steel including access, SCR system, SCR ductwork, catalyst, reagent system, demolition, building enclosure

Note 2: "SCR system owner's costs" includes: project management, engineering support costs, startup costs, project financing, code compliance, consumables, construction management

Note 3: "Relocation of Existing Unit #1 Equipment" includes: feasibility, engineering, construction-relocation costs, demolition costs for providing pathways inside Unit #1 for SCR supply and return ducts

Note 4: "New ID fan and motor purchase" includes: new ID fan, new ID fan motor

Note 5: "ID Fan owner's costs" includes engineering, fan and motor foundation modifications, fan inlet and outlet ductwork modifications, relocation of existing equipment, control system tie-in with interlocks, fan testing and balancing, project management, unknowns

Note 6: "New fan motor switchgear" includes: The existing switchgear is undersized for providing power to a new 1500 HP fan motor. Line item includes project management, engineering, construction and testing for new switchgear, relays.

Note 7: "Unit #1 Off-line for SCR Duct Tie-in" defined as: Unit #1 is expected to be off-line for 60 days to complete SCR duct tie-in to existing flue gas system. Assume Unit #1 loss of output covered by NP generating plant. Assumed current Unit #1 fuel/variable cost = \$47.28/MWH and current NP Fuel/variable cost = \$101.17/MWH. Difference is \$53.89/MWH. Assume Unit #1 to produce 593 MWh/day. Therefore, cost of Unit #1 off-line, supplemented with power from NP generating station to be: (60 days)(593 MWh/day)(\$53.89/MWh) = \$1,917,406

Note 8: "Ductwork-Baghouse Support Stiffeners" includes project management, engineering, materials and construction labor to install stiffener and support bracing on all flat surfaces subject to high negative pressure from SCR outlet duct to inlet of new ID fan, including entire baghouse structure

Note 9: "Assume 1.8 mils/kwh and 360 operating days per year" means reagent at \$450/ton delivered, system inspection, catalyst cleaning, and shift operations (defined as 1-manhour per shift) Calculated as: 669 MWh per day average (869,000 kwh/day * 0.0018 * 360 = \$433,500 per year)

Note 10: "Catalyst replacement" means a single layer will need to be replaced every two years at a cost of \$160,000, with \$20,000 added for shipping to Alaska. The annual average cost is \$90,000 per year.

Note 11: "Cost of Replacing Lost Generation" Fan motor to increase from 900 HP to 1500 HP due to SCR installation. Difference of 600 HP, (1 HP = 0.7457 kW) Therefore, 600 HP = 0.447 MW to be covered by firm capacity and energy at NP generating total cost of \$107.23/MWh (0.447 MW)(24 hr/day)(360 days/yr)(\$107.34 MWh @ NP) = \$414,131 per year

Healy Unit 1 Proforma 15 year analysis (0.28 lb/mmbtu)

Year	Date	TOTAL FIXED O&M COST	Reagent Cost	SCR Catalyst	TOTAL VARIABLE O&M COST	DEBT SERVICE	TOTAL ANNUAL COST	Control Cost (\$/Ton NOx Removed)
0	2009							
1	2010	1,125,172	79,292	90,000	169,292	2,553,998	3,848,461	12,397
2	2011	1,158,927	81,671	92,700	174,371	2,553,998	3,887,295	12,522
3	2012	1,193,695	84,121	95,481	179,602	2,553,998	3,927,294	12,651
4	2013	1,229,505	86,645	98,345	184,990	2,553,998	3,968,493	12,784
5	2014	1,266,391	89,244	101,296	190,540	2,553,998	4,010,928	12,920
6	2015	1,304,382	91,921	104,335	196,256	2,553,998	4,054,636	13,061
7	2016	1,343,514	94,679	107,465	202,144	2,553,998	4,099,655	13,206
8	2017	1,383,819	97,519	110,689	208,208	2,553,998	4,146,025	13,356
9	2018	1,425,334	100,445	114,009	214,454	2,553,998	4,193,785	13,509
10	2019	1,468,094	103,458	117,430	220,888	2,553,998	4,242,979	13,668
11	2020	1,512,137	106,562	120,952	227,515	2,553,998	4,293,649	13,831
12	2021	1,557,501	109,759	124,581	234,340	2,553,998	4,345,838	13,999
13	2022	1,604,226	113,052	128,318	241,370	2,553,998	4,399,593	14,172
14	2023	1,652,352	116,443	132,168	248,611	2,553,998	4,454,961	14,351
15	2024	1,701,923	119,937	136,133	256,070	2,553,998	4,511,990	14,535
Present Worth (% of PW)		10,078,885 32.5%	710,271 2.3%	806,188 2.6%	1,516,459 4.9%	19,425,908 62.6%	31,021,252 100.0%	6,662

INPUT CALCULATIONS 8 YEAR ANALYSIS (0.28 lb/mmbtu)

Healy Unit 1	Boiler Design:	Wall Fired	
Parameter	Current Operation	NOx Control	Comments
		SCR	
Case	1	6	
NOx Emission Control System	LNB w/OFA	SCR	
Unit Design and Coal Characteristics			
Type of Unit	PC	PC	
Net Power Output (kW)	25,000	25,000	
Net Plant Heat Rate (Btu/kW-Hr)	13,500	13,500	
Boiler Fuel	Usibelli Mine	Usibelli Mine	
Coal Heating Value (Btu/Lb)	6,766	6,766	
Coal Sulfur Content (wt.%)	0.17%	0.17%	
Coal Ash Content (wt.%)	13.65%	13.65%	
Boiler Heat Input, each (MMBtu/Hr)	338	338	
Coal Flow Rate (Lb/Hr)	49,882	49,882	
(Ton/Yr)	218,482	218,482	
(MMBtu/Yr)	2,956,500	2,956,500	
Emissions			
Uncontrolled NOx (Lb/Hr)	95	95	
(Lb/MMBtu)	0.28	0.28	
(Lb Moles/Hr)	3.15	3.15	
(Tons/Yr)	414	414	
NOx Removal Rate (%)	0.0%	75.0%	
(Lb/Hr)	0	71	
(Lb Moles/Hr)	0.00	2.36	
(Ton/Yr)	0	310	
NOx Emission Rate (Lb/Hr)	95	24	
(Lb/MMBtu)	0.28	0.07	
(Ton/Yr)	414	103	
General Plant Data			
Annual Operation (Hours/Year)	8,760	8,760	
Annual On-Site Power Plant Capacity Factor	1.00	1.00	
Economic Factors			
Interest Rate (%)	8.00%	8.00%	
Discount Rate (%)	10.00%	10.00%	
Plant Economic Life (Years)	8	8	
Installed Capital Costs			
SCR System	0	16,357,322	escalated to 2016 costs using a 3% escalation rate
Installation, Project Management, Miscellaneous (\$)	0	983,899	escalated to 2016 costs using a 3% escalation rate
Relocation of Existing Unit #1 Equipment (\$)	0	368,962	escalated to 2016 costs using a 3% escalation rate
New ID Fan and Motor (\$)	0	860,912	escalated to 2016 costs using a 3% escalation rate
Installation, Reconnect Ducts, Management,	0	553,443	escalated to 2016 costs using a 3% escalation rate
New Fan Motor Switchgear, Installation, Management (\$)	0	491,950	escalated to 2016 costs using a 3% escalation rate
Unit #1 Off-line for SCR Duct Tie-in	0	2,358,168	escalated to 2016 costs using a 3% escalation rate
Ductwork-Baghouse Support Stiffeners (\$)	0	430,456	escalated to 2016 costs using a 3% escalation rate
Total Emission Control Systems (\$2009)	0	22,405,112	
Total Emission Control Systems (\$2009) Contingency	0	26,886,134	20% contingency
NOx Emission Control System (\$/kW)	0	1,075	
Total Fixed Operating & Maintenance Costs			
Total Fixed O&M Cost w/Contingency (\$)		1,383,819	w/20% contingency and escalated to 2016 rates
Annual Fixed O&M Cost Escalation Rate (%)	3.00%	3.00%	
Reagent Cost			
First Year Reagent Cost (\$)	None	NH3	
Annual Reagent Cost Escalation Rate (%)	0	97,519	escalated to 2016 costs using a 3% escalation rate
	3.00%	3.00%	
SCR Catalyst			
First Year SCR Catalyst	0	110,689	escalated to 2016 costs using a 3% escalation rate
Annual SCR Catalyst Cost Escalation Rate (%)	3.00%	3.00%	

Healy Unit 1 Proforma 8 year analysis (0.28 lb/mmBtu)

Year	Date	TOTAL FIXED O&M COST	Reagent Cost	SCR Catalyst	TOTAL VARIABLE O&M COST	DEBT SERVICE	TOTAL ANNUAL COST	Control Cost (\$/Ton NOx Removed)
0	2016							
1	2017	1,383,819	97,519	110,689	208,208	4,678,584	6,270,611	20,200
2	2018	1,425,334	100,445	114,009	214,454	4,678,584	6,318,372	20,353
3	2019	1,468,094	103,458	117,430	220,888	4,678,584	6,367,566	20,512
4	2020	1,512,137	106,562	120,952	227,515	4,678,584	6,418,235	20,675
5	2021	1,557,501	109,759	124,581	234,340	4,678,584	6,470,425	20,843
6	2022	1,604,226	113,052	128,318	241,370	4,678,584	6,524,180	21,016
7	2023	1,652,352	116,443	132,168	248,611	4,678,584	6,579,548	21,195
8	2024	1,701,923	119,937	136,133	256,070	4,678,584	6,636,577	21,378
Present Worth (% of PW)		8,086,296 23.6%	569,851 1.7%	646,805 1.9%	1,216,656 3.6%	24,959,901 72.8%	34,262,853 100.0%	13,796

ECONOMIC ANALYSIS SUMMARY (0.25 lb/mmmbtu)

Parameter	Boiler Design:		Wall Fired	Wall Fired
	Current Operation	NOx Control	NOx Control	
		SCR	SCR	
Case	1	15 year life	8 year life	
NOx Emission Control System	LNB w/OFA	SCR	SCR	
TOTAL INSTALLED CAPITAL COST (\$)	0	21,860,887	21,860,887	
FIRST YEAR O&M COST (\$)				
TOTAL FIXED O&M COST	0	1,125,172	1,125,172	
Reagent Cost	0	67,965	83,588	
SCR Catalyst	0	90,000	110,689	
TOTAL VARIABLE O&M COST	0	157,965	194,277	
TOTAL FIRST YEAR O&M COST	0	1,283,136	1,319,448	
FIRST YEAR DEBT SERVICE (\$)	0	2,553,998	4,678,584	
TOTAL FIRST YEAR COST (\$)	0	3,837,134	6,256,680	
CONTROL COST (\$/Ton Removed)				
NOx Removal Rate (%)	0.0%	72.0%	72.0%	
NOx Removed (Tons/Yr)	0	266	266	
First Year Average Control Cost (\$/Ton NOx Rem.)	0	14,421	23,514	
PRESENT WORTH COST (\$)	0	30,919,785	34,181,446	

INPUT CALCULATIONS 15 YEAR ANALYSIS (0.25 lb/mmBtu)

Healy Unit 1		Boiler Design: Wall Fired			
Parameter	Current Operation	NOx Control		Comments	Data Source
		1	6		
Case		1	6		
NOx Emission Control System		LNB w/OFA	SCR		
Unit Design and Coal Characteristics					
Type of Unit		PC	PC		
Net Power Output (kW)		25,000	25,000		
Net Plant Heat Rate (Btu/kW-Hr)		13,500	13,500		
Boiler Fuel		Usibelli Mine	Usibelli Mine		
Coal Heating Value (Btu/Lb)		6,766	6,766		
Coal Sulfur Content (wt.%)		0.17%	0.17%		
Coal Ash Content (wt.%)		13.65%	13.65%		
Boiler Heat Input, each (MMBtu/Hr)		338	338		
Coal Flow Rate (Lb/Hr)		49,882	49,882		
(Ton/Yr)		218,482	218,482		
(MMBtu/Yr)		2,956,500	2,956,500		
Emissions					
Uncontrolled NOx (Lb/Hr)		84	84		
(Lb/MMBtu)		0.25	0.25		
(Lb Moles/Hr)		2.81	2.81		
(Tons/Yr)		370	370		
NOx Removal Rate (%)		0.0%	72.0%		
(Lb/Hr)		0	61		
(Lb Moles/Hr)		0.00	2.02		
(Ton/Yr)		0	266		
NOx Emission Rate (Lb/Hr)		84	24		
(Lb/MMBtu)		0.25	0.07		
(Ton/Yr)		370	103		
General Plant Data					
Annual Operation (Hours/Year)		8,760	8,760		
Annual On-Site Power Plant Capacity Factor		1.00	1.00		
Economic Factors					
Interest Rate (%)		8.00%	8.00%		GVEA
Discount Rate (%)		10.00%	10.00%		GVEA
Plant Economic Life (Years)		15	15		GVEA
Installed Capital Costs					
SCR System Purchase		0	13,300,000	Note 1	Fuel Tech
Installation, Project Management, Miscellaneous (\$)		0	800,000	Note 2	GVEA
Relocation of Existing Unit #1 Equipment (\$)		0	300,000	Note 3	GVEA
New ID Fan and Motor (\$)		0	700,000	Note 4	GVEA
Installation, Reconnect Ducts, Management,		0	450,000	Note 5	GVEA
New Fan Motor Switchgear, Installation, Management (\$)		0	400,000	Note 6	GVEA
Unit #1 Off-line for SCR Duct Tie-in		0	1,917,406	Note 7	GVEA
Ductwork-Baghouse Support Stiffeners (\$)		0	350,000	Note 8	GVEA
Total Emission Control Systems (\$2009)		0	18,217,406		
Total Emission Control Systems (\$2009) Contingency		0	21,860,887	20% contingency	
NOx Emission Control System (\$/kW)		0	874		
Total Fixed Operating & Maintenance Costs					
Total Fixed O&M Cost (\$)		0	433,512	Note 9	Fuel Tech
Catalyst Replacement (\$)		0	90,000	Note 10	Fuel Tech
Cost of Replacing Lost Generation (\$)		0	414,131	Note 11	GVEA
Total Fixed O&M Cost (\$)		0	937,643		
Total Fixed O&M Cost w/Contingency (\$)		0	1,125,172	20% contingency	
Annual Fixed O&M Cost Escalation Rate (%)		3.00%	3.00%		
Reagent Cost					
Reagent		None	NH3		
Unit Cost (\$/Ton)		NA	450		Fuel Tech
(\$/Lb)		NA	0.225		
Molar Stoichiometry		NA	1.00		
Reagent Purity (Wt.%)		NA	100%		
Reagent Usage (Lb/Hr)		NA	34		
First Year Reagent Cost (\$)		NA	67,965		
Annual Reagent Cost Escalation Rate (%)		NA	3.00%		
SCR Catalyst					
Annual SCR Catalyst (m3)		NA	11	estimated	
SCR Catalyst (\$/m3)		NA	8,000		Fuel Tech
First Year SCR Catalyst		NA	90,000		Fuel Tech
Annual SCR Catalyst Cost Escalation Rate (%)		3.00%	3.00%		

Note 1: "SCR system purchase" includes: preliminary studies, detailed engineering, civil-foundation, I&C, electrical system modifications, BOP mechanical work, support steel including access, SCR system, SCR ductwork, catalyst, reagent system, demolition, building enclosure

Note 2: "SCR system owner's costs" includes: project management, engineering support costs, startup costs, project financing, code compliance, consumables, construction management

Note 3: "Relocation of Existing Unit #1 Equipment" includes: feasibility, engineering, construction-relocation costs, demolition costs for providing pathways inside Unit #1 for SCR supply and return ducts

Note 4: "New ID fan and motor purchase" includes: new ID fan, new ID fan motor

Note 5: "ID Fan owner's costs" includes: engineering, fan and motor foundation modifications, fan inlet and outlet ductwork modifications, relocation of existing equipment, control system tie-in with interlocks, fan testing and balancing, project management, unknowns

Note 6: "New fan motor switchgear" includes: The existing switchgear is undersized for providing power to a new 1500 HP fan motor. Line item includes project management, engineering, construction and testing for new switchgear, relays.

Note 7: "Unit #1 Off-line for SCR Duct Tie-in" defined as: Unit #1 is expected to be off-line for 60 days to complete SCR duct tie-in to existing flue gas system. Assume Unit #1 loss of output covered by NP generating plant. Assumed current Unit #1 fuel/variable cost = \$47.28/MWH and current NP Fuel/variable cost = \$101.17/MWH. Difference is \$53.89/MWH. Assume Unit #1 to produce 593 MWh/day. Therefore, cost of Unit #1 off-line, supplemented with power from NP generating station to be: (60 days)(593 MWh/day)(\$53.89/MWh) = \$1,917,406

Note 8: "Ductwork-Baghouse Support Stiffeners" includes project management, engineering, materials and construction labor to install stiffener and support bracing on all flat surfaces subject to high negative pressure from SCR outlet duct to inlet of new ID fan, including entire baghouse structure

Note 9: "Assume 1.8 mils/kwh and 360 operating days per year" means reagent at \$450/ton delivered, system inspection, catalyst cleaning, and shift operations (defined as 1-manhour per shift) Calculated as: 669 MWh per day average (669,000 kwh/day) \$0.0018* 360 = \$433,500 per year

Note 10: "Catalyst replacement" means a single layer will need to be replaced every two years at a cost of \$160,000, with \$20,000 added for shipping to Alaska. The annual average cost is \$90,000 per year.

Note 11: "Cost of Replacing Lost Generation" Fan motor to increase from 900 HP to 1500 HP due to SCR installation. Difference of 600 HP (1 HP = 0.7457 kW) Therefore, 600 HP = 0.447 MW to be covered by firm capacity and energy at NP generating total cost of \$107.23/MWh(0.447 MW)(24 hr/day)(360 days/yr)(\$107.34 MWh @ NP) = \$414,131 per year

Healy Unit 1 Proforma 15 year analysis (0.25 lb/mmmbtu)

Year	Date	TOTAL FIXED O&M COST	Reagent Cost	SCR Catalyst	TOTAL VARIABLE O&M COST	DEBT SERVICE	TOTAL ANNUAL COST	Control Cost (\$/Ton NOx Removed)
0	2009							
1	2010	1,125,172	67,965	90,000	157,965	2,553,998	3,837,134	14,421
2	2011	1,458,927	70,004	92,700	162,704	2,553,998	3,875,628	14,565
3	2012	1,193,695	72,104	95,481	167,585	2,553,998	3,915,277	14,714
4	2013	1,229,505	74,267	98,345	172,612	2,553,998	3,956,115	14,868
5	2014	1,266,391	76,495	101,296	177,791	2,553,998	3,998,179	15,026
6	2015	1,304,382	78,790	104,335	183,124	2,553,998	4,041,504	15,189
7	2016	1,343,514	81,153	107,465	188,618	2,553,998	4,086,129	15,356
8	2017	1,383,819	83,588	110,689	194,277	2,553,998	4,132,093	15,529
9	2018	1,425,334	86,096	114,009	200,105	2,553,998	4,179,436	15,707
10	2019	1,468,094	88,679	117,430	206,108	2,553,998	4,228,199	15,890
11	2020	1,512,137	91,339	120,952	212,291	2,553,998	4,278,425	16,079
12	2021	1,557,501	94,079	124,581	218,660	2,553,998	4,330,158	16,274
13	2022	1,604,226	96,901	128,318	225,220	2,553,998	4,383,443	16,474
14	2023	1,652,352	99,808	132,168	231,977	2,553,998	4,438,326	16,680
15	2024	1,701,923	102,803	136,133	238,936	2,553,998	4,494,856	16,893
Present Worth (% of PW)		10,078,885	608,804	806,188	1,414,992	19,425,908	30,919,785	7,747
		32.6%	2.0%	2.6%	4.6%	62.8%	100.0%	

INPUT CALCULATIONS 8 YEAR ANALYSIS (0.25 lb/mmmbtu)

Healy Unit 1

Boiler Design: Wall Fired

Parameter	Current Operation	NOx Control	Comments
		SCR	
Case	1	6	
NOx Emission Control System	LNB w/OFA	SCR	
Unit Design and Coal Characteristics			
Type of Unit	PC	PC	
Net Power Output (kW)	25,000	25,000	
Net Plant Heat Rate (Btu/kW-Hr)	13,500	13,500	
Boiler Fuel	Usabelli Mine	Usabelli Mine	
Coal Heating Value (Btu/Lb)	6,766	6,766	
Coal Sulfur Content (wt.%)	0.17%	0.17%	
Coal Ash Content (wt.%)	13.65%	13.65%	
Boiler Heat Input, each (MMBtu/Hr)	338	338	
Coal Flow Rate (Lb/Hr)	49,882	49,882	
(Ton/Yr)	218,482	218,482	
(MMBtu/Yr)	2,956,500	2,956,500	
Emissions			
Uncontrolled NOx (Lb/Hr)	84	84	
(Lb/MMBtu)	0.25	0.25	
(Lb Moles/Hr)	2.81	2.81	
(Tons/Yr)	370	370	
NOx Removal Rate (%)	0.0%	72.0%	
(Lb/Hr)	0	61	
(Lb Moles/Hr)	0.00	2.02	
(Ton/Yr)	0	266	
NOx Emission Rate (Lb/Hr)	84	24	
(Lb/MMBtu)	0.25	0.07	
(Ton/Yr)	370	103	
General Plant Data			
Annual Operation (Hours/Year)	8,760	8,760	
Annual On-Site Power Plant Capacity Factor	1.00	1.00	
Economic Factors			
Interest Rate (%)	8.00%	8.00%	
Discount Rate (%)	10.00%	10.00%	
Plant Economic Life (Years)	8	8	
Installed Capital Costs			
SCR System	0	16,357,322	escalated to 2016 costs using a 3% escalation rate
Installation, Project Management, Miscellaneous (\$)	0	983,899	escalated to 2016 costs using a 3% escalation rate
Relocation of Existing Unit #1 Equipment (\$)	0	368,962	escalated to 2016 costs using a 3% escalation rate
New ID Fan and Motor (\$)	0	860,912	escalated to 2016 costs using a 3% escalation rate
Installation, Reconnect Ducts, Management,	0	553,443	escalated to 2016 costs using a 3% escalation rate
New Fan Motor Switchgear, Installation, Management (\$)	0	491,950	escalated to 2016 costs using a 3% escalation rate
Unit #1 Off-line for SCR Duct Tie-in	0	2,358,168	escalated to 2016 costs using a 3% escalation rate
Ductwork-Baghouse Support Stirrers (\$)	0	430,456	escalated to 2016 costs using a 3% escalation rate
Total Emission Control Systems (\$2009)	0	22,405,112	
Total Emission Control Systems (\$2009) Contingency	0	26,886,134	20% contingency
NOx Emission Control System (\$/kW)	0	1,075	
Total Fixed Operating & Maintenance Costs			
Total Fixed O&M Cost w/Contingency (\$)		1,383,819	w/20% contingency and escalated to 2016 rates
Annual Fixed O&M Cost Escalation Rate (%)	3.00%	3.00%	
Reagent Cost			
First Year Reagent Cost (\$)	None	NH3	
Annual Reagent Cost Escalation Rate (%)	0	83,588	escalated to 2016 costs using a 3% escalation rate
	3.00%	3.00%	
SCR Catalyst			
First Year SCR Catalyst	0	SCR Catalyst	
Annual SCR Catalyst Cost Escalation Rate (%)	0	110,689	escalated to 2016 costs using a 3% escalation rate
	3.00%	3.00%	

Healy Unit 1 Proforma 8 year analysis (0.25 lb/mmBtu)

Year	Date	TOTAL FIXED O&M COST	Reagent Cost	SCR Catalyst	TOTAL VARIABLE O&M COST	DEBT SERVICE	TOTAL ANNUAL COST	Control Cost (\$/Ton NOx Removed)
0	2016							
1	2017	1,383,819	83,588	110,689	194,277	4,678,584	6,256,680	23,514
2	2018	1,425,334	86,096	114,009	200,105	4,678,584	6,304,023	23,692
3	2019	1,468,094	88,679	117,430	206,108	4,678,584	6,352,786	23,875
4	2020	1,512,137	91,339	120,952	212,291	4,678,584	6,403,012	24,064
5	2021	1,557,501	94,079	124,581	218,660	4,678,584	6,454,745	24,258
6	2022	1,604,226	96,901	128,318	225,220	4,678,584	6,508,030	24,458
7	2023	1,652,352	99,808	132,168	231,977	4,678,584	6,562,913	24,665
8	2024	1,701,923	102,803	136,133	238,936	4,678,584	6,619,443	24,877
Present Worth (% of PW)		8,086,296	488,444	646,805	1,135,249	24,959,901	34,181,446	16,058
		23.7%	1.4%	1.9%	3.3%	73.0%	100.0%	