CAPITAL COMMITMENT BUDGET - FOURTH FISCAL QUARTER 1985

Aberdeen Chemical Plant

VCM/Propane Gas Detection System — $105,000

Project Description

The VCM tank farm area will be equipped with an additional gas monitoring system for detection of VCM vapor releases. The system will have eight strategically located gas sensors, four at the VCM tank car unloading area, two at the VCM compressor shed, one at the actuated VCM valves at the sphere, and one at the sphere VCM transfer pumps. The system will activate alarms in the vinyl control room. In addition, a blower will be provided to pressurize the north fire pump houses. The blower's controls will be tied into the alarms in the control room so that the blower starts automatically whenever a VCM release is detected at the VCM tank farm.

The boiler propane storage area will be equipped with a gas monitoring system to detect propane gas releases. The system will have four gas sensors; two near the propane storage tanks and transfer pumps, and two near the propane vaporizers. The system will activate alarms in both the boiler control room and the vinyl control room.

Problem Description

Presently, there are six fixed point monitor locations at the VCM tank farm that are tied into the plant fixed point monitoring system. These existing monitors do not provide immediate vapor detection and are not distributed throughout the entire VCM tank farm area. Since this area is not monitored by plant personnel the majority of the time, and since it has the potential for a serious release, additional protection is needed.

The pump house for Number 1, 2, 3, and 4 firepumps is located 300 feet north of the VCM tank farm area. Electrical equipment located inside the fire pump house pose a potential explosion hazard. There is also a risk that a rich VCM atmosphere inside the pump house would cause the diesel fire pumps to runaway and fly apart. This project provides a pressurization blower for the fire pump house to prevent VCM vapors from entering the building.

Problem Description - continued

Propane is used as an alternate fuel source for the plant's boilers and is stored east of the boiler house near the plant's property line. The storage facility consists of three tanks, two pumps, three vaporizers for liquid propane, and three propane gas surge drums. This area is not equipped with any leak detection instrumentation. Due to the potential fire hazard, the proximity to private property and because the area is not consistently monitored by plant personnel, propane gas leak detection is needed. This project provides a propane gas monitoring system in this area that will notify personnel in both the boiler and vinyl control rooms of a propane gas release.

Alternative

A water curtain to protect the pump house from VCM vapors was investigated as an alternate to the blower system. The blower system was determined to be a more effective means of protecting against vapors entering the building.

Project Economic Summary

No economics are prepared for this safety project.

The cost estimate and process design are of budget quality and were prepared by the plant.

The project will be AFE'd in the fourth quarter of fiscal 1985 with project completion expected in the fourth quarter of fiscal 1985.

CAPITAL COMMITMENT BUDGET - 4TH FISCAL QUARTER 1985

Aberdeen Chemical Plant

Vinyl Area Cooling Water pH Control — $79,000

Project Description

This project will provide for the addition of pH control to the cooling water treatment programs of No. 3 and No. 4 cooling towers in the vinyl area. pH control will be accomplished through the addition of sulfuric acid to the circulating cooling water. Each tower will have an acid dilution trough and a pH controller. A bulk sulfuric acid tank and small day tank will also be installed to supply both systems.

Problem Description

Presently, plant cooling water is treated with chemicals to minimize fouling and corrosion in the heat transfer equipment. The process water used as make up water for the cooling towers contains a high level of hardness in the form of calcium and a high pH. The current cooling tower water treatment program uses a polyacrylate-phosphonate agent to minimize calcium carbonate scale formation. This system is only effective in preventing scaling of saturated calcium carbonate. Because of the high temperature (greater than 140°F) seen by the cooling water in the reactor jackets and condensers, the towers must be operated at 2 cycles or less to prevent supersaturation of the calcium carbonate and the resulting calcium scale deposits. These deposits lead to an eventual loss of heat transfer capability of the equipment requiring periodic acid cleaning of the reactor cooling water jackets and condensers. Operation of the cooling tower at low cycles results in high costs for water treating chemicals and also high usage of makeup water.

The cooling water cycles can be increased by the installation of a continuous pH control system using sulfuric acid.

Sulfuric acid will be fed into the water to neutralize the incoming hardness of the make-up water. The sulfuric acid reacts with the calcium tying it up as calcium sulfate, thereby reducing the formation of the calcium carbonate scale. The solubility of calcium sulfate is much greater than the calcium carbonate, allowing the circulating water to tolerate a higher level of calcium. This will allow the towers to be operated at higher cycles of concentration without the danger of scale formation.

Alternatives

Expanding the system to control pH on the No. 2 vinyl cooling tower was considered, but no increase in cycles would be gained due to the extremely high drift losses from this tower.

Project Economic Summary

Revenues for this project result from reduced water treating chemicals, reactor jacket and condenser acid cleanings and make-up water requirements. These savings provide the project with an Internal Rate of Return of 38% and discounted payback period of 4.5 years. The NROI for the project is 26.9% and the capital productivity index is 1.95.

The process design and cost estimate were prepared by the plant and are of budget quality.

The project will be AFE'd in the fourth quarter of fiscal 1985 with project completion expected in the third quarter of fiscal 1986.

VINYL AREA COOLING WATER pH CONTROL

PROJECT ECONOMIC SENSITIVITY ANALYSIS

Base Case: Construction Capital $79,000 IRR: 38%

Possible Variances			% IRR	
Minus	Plus		Impaired To	Improved To
+30%	-15%	Construction Capital[1]	29	44
-20%	+20%	Revenues	29	45
		Constant Costs and Revenues[2]	32	--

(1) Corresponds to accuracy of budget quality estimate.

(2) First year costs and revenues (except depreciation) held constant throughout the life of the project.

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VINYL AREA COOLING WATER pH CONTROL

PROJECT ECONOMIC ASSUMPTIONS

Revenues

1. Revenues will result from operating the cooling towers at 4 cycles of concentration (based on alkalinity) rather than 2 cycles. This will reduce the make-up water requirement 31.5MM gallons per year. Based on a pumping cost of $78/MM Gal., first year savings are estimated to be $2,500. These savings are escalated at 6.0% per year.

2. Chemical treatment costs will be reduced by operating at the higher cycles. Operation of the towers at 4 cycles versus 2 cycles result in a 65% savings in chemical feed costs. This will result in a first year savings of $37,500. These savings are escalated at 5.4% per year.

3. The frequency of reactor jacket and condenser cleaning is estimated to decrease 75%. Since 1982, approximately $39,000 has been spent on reactor acid cleaning. First year savings are estimated to be $8000. These savings are escalated at 6.7% per year.

Costs

1. The cost of sulfuric acid for pH control is estimated to be $3,400 in the first year. This cost is escalated at 5.4% per year.

2. Maintenance costs are 5% of construction capital escalated at 6.7% per year.

3. Insurance and taxes are 2% of construction capital escalated at 5.8% per year.

VINYL AREA COOLING WATER pH CONTROL

CALCULATION OF PROJECT ECONOMICS ($M)

Project Year	-1	1	2	3	4	5	6	7	8	9	10
Revenues											
Chemicals Savings		37.5	39.5	41.7	43.9	46.3	48.8	51.4	54.2	57.1	60.2
Water Savings		2.5	2.6	2.8	3.0	3.2	3.3	3.5	3.8	4.0	4.2
Acid Cleanings		8.0	8.5	9.1	9.7	10.4	11.1	11.8	12.6	13.4	14.3
Total		48.0	50.7	53.6	56.6	59.8	63.2	66.8	70.5	74.5	78.8
Costs											
Maintenance		3.9	4.2	4.5	4.8	5.1	5.5	5.8	6.2	6.6	7.1
Insurance And Taxes		1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.5	2.6
Acid Usage		3.4	3.6	3.8	4.0	4.2	4.4	4.7	4.9	5.2	5.5
Depreciation-Construction Capital		11.8	17.4	16.6	16.6	16.6	0.0	0.0	0.0	0.0	0.0
Total Costs		20.8	26.8	26.6	27.2	27.9	12.0	12.7	13.5	14.3	15.2
Taxable Income		27.2	23.9	26.9	29.4	31.9	51.2	54.1	57.1	60.2	63.6
Income Tax		13.1	11.5	12.9	14.1	15.3	24.6	25.9	27.4	28.9	30.5
Investment Tax Credit		6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
After Tax Income		20.5	12.4	14.0	15.3	16.6	26.6	28.1	29.7	31.3	33.1
Operating Cash Flow		32.3	29.8	30.6	31.9	33.2	26.6	28.1	29.7	31.3	33.1
Investment											
Construction Capital	(79.0)										
Net Cash Flow	(79.0)	32.3	29.8	30.6	31.9	33.2	26.6	28.1	29.7	31.3	33.1

Internal Rate Of Return = 38%
Capital Productivity Index = 1.95
Discounted Payback Period, Years = 4.5 Based On Cost Of Capital Of 15.0%
NROI = 26.9%

CAPITAL COMMITMENT BUDGET - FOURTH FISCAL QUARTER 1985

Aberdeen Chemical Plant

Dry Blend Blender Cooling Revision $27,000

Project Description

This project will provide the capability to use cooling tower water to cool the dry blend product blenders. The project will provide a cooling water supply header to the blenders, an in-line pump at the discharge of the blenders, and a cooling water return header.

Problem Description

The dry blend product blenders presently use one pass well water for cooling. One pass well water is used because the jackets on the blenders are rated at only 15 PSIG. With this pressure limitation, the use of cooling tower water is not possible because the pressure of the water exiting the blenders is less than that in the cooling water return lines. Presently the one pass cooling water enters a sewer as it exits the blender jackets. The plant's well water system is supplemented by city water upon demand, therefore the use of well water for this application increases the amount of purchased city water that is consumed in the plant.

The installation of the in-line pump at the discharge of the coolers and the cooling water piping will allow cooling tower water to be used to cool the blenders. This will reduce the amount of city water that is purchased. The well water supply system to the blenders will remain intact so that it can be used in the future if there are any problems with the cooling tower water system.

Alternatives

An alternative of discharging the water from the blenders to a sump and using a sump pump to return the water to cooling tower was considered. This alternative was more costly than using an in-line pump.

Project Economic Summary

Revenues for this project result from using cooling tower water instead of one pass well water for cooling the dry blend product blenders. These revenues result in a first year savings of $20,000. These revenues provide the project with a 46% Internal Rate of Return and a 3.8 year discounted payout period. The NROI for the project is 32% and the capital productivity index is 2.38.

The process design and cost estimate are of budget quality and were prepared by the plant.

This project will be AFE'd in the fourth quarter of fiscal 1985 with project completion expected in the thrid quarter of fiscal 1986.

DRY BLEND BLENDER COOLING REVISION

PROJECT ECONOMIC SENSITIVITY ANALYSIS

Base Case: Construction Capital $27,000 IRR 46%

Possible Variances			% IRR	
Minus	Plus		Impaired To	Improved To
+30%	-15%	Construction Capital[1]	36	53
-20%	+20%	Revenues	42	63
		Constant Cost & Revenues[2]	40	--

(1) Corresponds to accuracy of budget quality estimate.

(2) First year costs and revenues (except depreciation) held constant throughout the life of the project.

DRY BLEND BLENDER COOLING REVISION

PROJECT ECONOMIC ASSUMPTIONS

Revenues

1. Revenues result from reducing city water usage by 100 GPM. This reduction provides first year savings of $20,000 based on a city water cost of 0.31¢ per standard cubic foot. The amount of city water saved is constant over the life of the project and the cost of the water is escalated at 6.0% per year.

Costs

1. Electrical costs for operating the new pump with a 5 hp motor and a 90% stream factor result in a first year cost of $1330/yr escalated at 6% per year.

2. Maintenance costs are 5% of construction capital escalated at 6.7% per year.

3. Insurance and taxes are 2% of construction capital escalated at 5.8% per year.

DRY BLEND BLENDER COOLING REVISION

CALCULATION OF PROJECT ECONOMICS ($M)

Project Year	-1	1	2	3	4	5	6	7	8	9	10
Revenues											
Cooling Water Savings		20.0	21.2	22.5	23.8	25.2	26.8	28.4	30.1	31.9	33.8
Costs											
Maintenance		1.3	1.4	1.5	1.6	1.7	1.9	2.0	2.1	2.3	2.4
Insurance And Taxes		0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9
Transfer Pump-Electrical Costs		1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2
Depreciation-Construction Capital		4.0	5.9	5.7	5.7	5.7	0.0	0.0	0.0	0.0	0.0
Total Costs		7.2	9.4	9.3	9.5	9.8	4.4	4.6	4.9	5.2	5.5
Taxable Income		12.8	11.8	13.2	14.3	15.5	22.4	23.7	25.1	26.7	28.3
Income Tax		6.1	5.7	6.3	6.8	7.4	10.7	11.4	12.1	12.8	13.6
Investment Tax Credit		2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
After Tax Income		8.8	6.2	6.8	7.4	8.0	11.6	12.3	13.1	13.9	14.7
Operating Cash Flow		12.8	12.1	12.5	13.1	13.7	11.6	12.3	13.1	13.9	14.7
Investment											
Construction Capital	(27.0)										
Net Cash Flow	(27.0)	12.8	12.1	12.5	13.1	13.7	11.6	12.3	13.1	13.9	14.7

Internal Rate Of Return = 46%
Capital Productivity Index = 2.38
Discounted Payback Period, Years = 3.8 Based On Cost Of Capital Of 15.0%
NROI = 32%

CAPITAL COMMITTMENT BUDGET - FOURTH FISCAL QUARTER 1985

Aberdeen Chemical Plant

Masterbatch Bulk Resin Handling — $47,000

Project Description

This project will provide the capability to use bulk resin in the masterbatch step of the dry blend operation. The project will provide for the modification and relocation of an existing bin which will be mounted on load cells. The existing resin transfer line from the bulk storage silos will be revised to supply the relocated bin. Also, a new transfer line from the bin to the masterbatch ribbon blender will be installed.

Problem Description

Bagged resin is currently used to make up masterbatch used in the dry blending operation. In 1984 2.2MM pounds of resin was bagged for this purpose. The use of bagged resin to make up masterbatch increases the cost of packaging materials used in the plant.

The installation of a bulk resin handling system for dry blend masterbatch operation will reduce these costs. An existing out-of-service bin will be mounted on load cells. Resin will be transferred from the bulk resin storage silos using an existing resin transfer system to the bin. The resin will be weighed, then transferred, when needed, through a new line to the masterbatch ribbon blender.

Alternatives

No alternatives were considered for this cost savings project.

Project Economic Summary

Revenues for this project result from eliminating the material costs to bag the resin used in masterbatching. These savings provide the project with an Internal Rate of Return of 32% and a discounted payback period of 5.2 years. The project has an NROI of 20% and the capital productivity index is 1.69.

The process design and cost estimate are of budget quality and were prepared by the plant.

The project will be AFE'd in the first quarter of fiscal 1986 with project completion expected the fourth quarter of fiscal 1986.

MASTERBATCH BULK RESIN HANDLING

PROJECT SENSITIVITY ANALYSIS

Base Case: Construction Capital $47,000 IRR: 32%

Possible Variances Minus	Plus		% IRR Impaired To	% IRR Improved To
+30%	-15%	Construction Capital(1)	24	37
-20%	+20%	Revenues	24	38
		Constant Costs and Revenues(2)	25	--

(1) Corresponds to accuracy of a budget quality estimate.

(2) First year costs and revenues (except depreciation). held constant throughout the life of the project.

MASTERBATCH BULK RESIN HANDLING

PROJECT ECONOMIC ASSUMPTIONS

Revenues

1. Revenues for this project result from eliminating the material costs to bag the resin used in masterbatching. These savings are estimated to be $22,800 in the first year based on a material cost of $0.0076/lb PVC for the 3.0MM lbs. of resin needed. Resin requirements are based on dry blend production figures provided by the Business Area. These savings are escalated at 7.0% per year for the life of the project.

Costs

1. Electrical costs for the operation of the transfer blowers are $1,200 per year escalated at 6.0% per year.

2. Maintenance costs are 5% of construction capital escalated at 6.7% per year.

3. Insurance and taxes are 2% of construction capital escalated at 5.8% per year.

MASTERBATCH BULK RESIN HANDLING

CALCULATION OF PROJECT ECONOMICS ($M)

Project Year	-1	1	2	3	4	5	6	7	8	9	10
Revenues											
Bagging Costs		22.8	24.4	26.1	27.9	29.9	32.0	34.2	36.6	39.2	41.9
Costs											
Maintenance		2.3	2.5	2.7	2.9	3.0	3.3	3.5	3.7	3.9	4.2
Insurance And Taxes		0.9	1.0	1.1	1.1	1.2	1.2	1.3	1.4	1.5	1.6
Blower Electrical Costs		1.2	1.3	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
Depreciation-Construction Capital		7.0	10.3	9.9	9.9	9.9	0.0	0.0	0.0	0.0	0.0
Total Costs		11.5	15.1	14.9	15.3	15.6	6.1	6.5	6.9	7.3	7.8
Taxable Income		11.3	9.3	11.2	12.7	14.3	25.9	27.7	29.7	31.8	34.1
Income Tax		5.4	4.5	5.4	6.1	6.9	12.4	13.3	14.3	15.3	16.4
Investment Tax Credit		3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
After Tax Income		9.6	4.8	5.8	6.6	7.4	13.5	14.4	15.5	16.6	17.7
Operating Cash Flow		16.7	15.2	15.7	16.5	17.3	13.5	14.4	15.5	16.6	17.7
Investment											
Construction Capital	(47.0)										
Net Cash Flow	(47.0)	16.7	15.2	15.7	16.5	17.3	13.5	14.4	15.5	16.6	17.7

Internal Rate Of Return = 32%
Capital Productivity Index = 1.69
Discounted Payback Period, Years = 5.2 Based On Cost Of Capital Of 15.0%
NROI = 20%