EXECUTIVE SUMMARY

(Redacted) currently utilizes water treatment and cooling water additives as manufactured and sold by (redacted). Due to logistical and economical reasons, (redacted) desires to switch to a new chemical supplier; specifically (redacted) and (redacted). Since the (redacted) chemicals and the (redacted) chemicals are not exactly the same formulation, such a change imparts a new or expanded discharge of a Pollutant of Concern (POC).

As part of the antidegradation review, several alternatives were evaluated as follows:

- Do nothing and use (redacted) chemicals
- Land application of discharge water
- Evaporative Crystallization
- Alternate (redacted)chemical use

Based on the information presented in this Alternative Analysis, it is apparent that the option "Alternate (redacted) Chemical Use" provides a significant reduction in cost and operational issues associated with the facility. The continued operation of a business such as an (redacted) plant is based on the ability to profit. Current market conditions warrant stringent control of variable costs. In this case, the chemical system is an integral· part of keeping (redacted) competitive and operational. The benefit of their continued operation includes employment of approximately 60 employees and economic benefit to the local area and region.

In addition, information provided by (redacted) suggests that the amount of chemicals used (lbs) and the overall toxicity of the discharge water should be reduced. The Appendix contains a chemical comparison between (redacted) and (redacted) which includes toxicity information. As shown, the toxicity of the (redacted) products is similar or less toxic than the current chemicals. In addition, the switch to (redacted) products could reduce the amount of ground water needed to operate the facility by as much as 40,800,000 gallons per year.

No public comments were received during the 30 day public comment period.

SECTION 1
EXISTING CONDITIONS

1.1 General

The (redacted) facility is an (redacted) facility which utilizes the (redacted) process to convert the sugars in the feed stock (corn) into (redacted). This process does not have a wastewater stream.

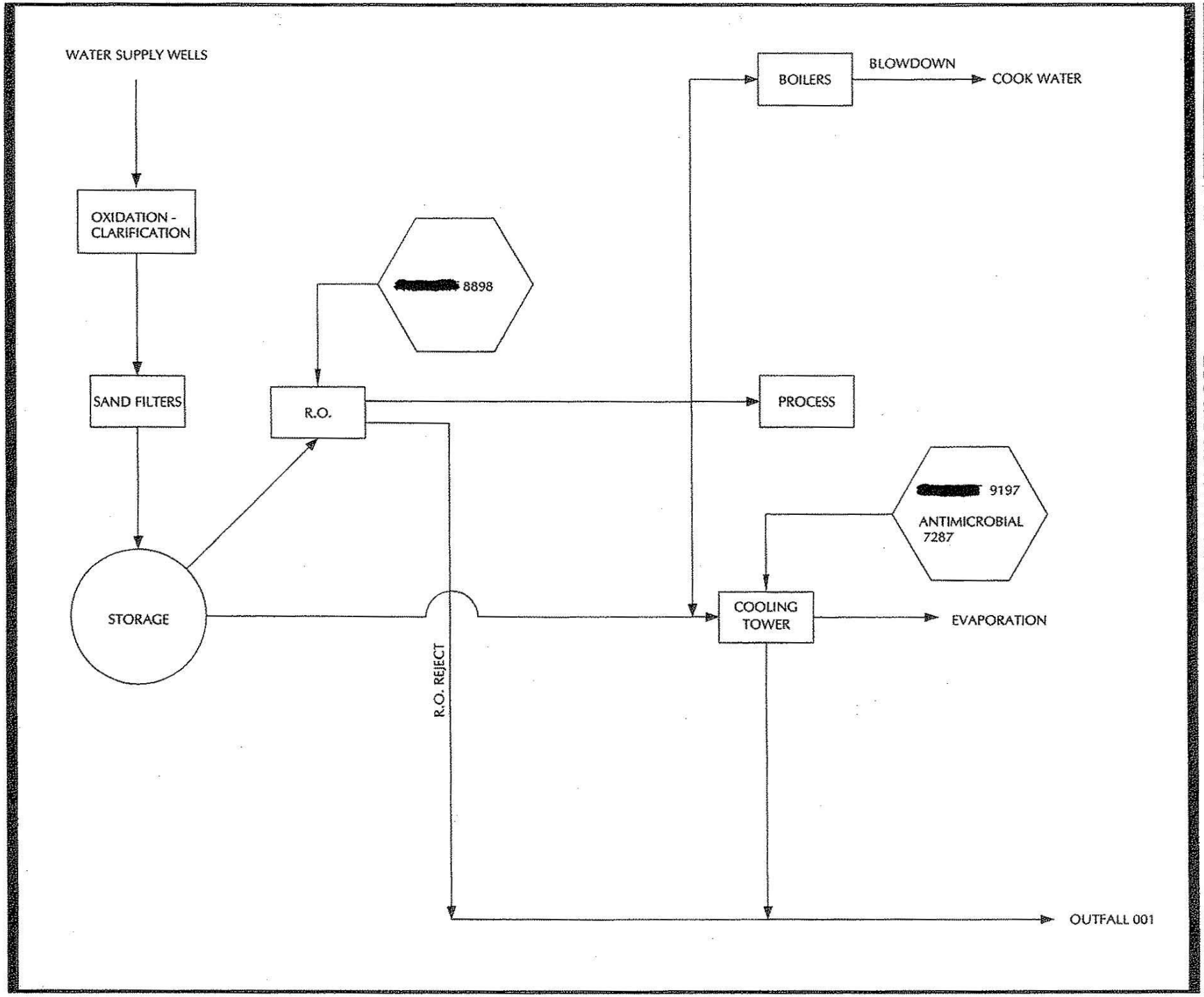
The wastewater discharge from the facility is associated with supporting processes. Raw ground water is first passed through multi-media filters. A portion of the filtered water is further refined through a reverse osmosis system. Within the (redacted) plant, water is used for process supply ((redacted) production), boiler makeup and cooling. Figure 1 shows the basic water use through the facility and current chemical application points.

1.2 Current Water Chemicals

Throughout the water use process, various chemicals are utilized to aid in the efficiency and maintenance of the system. Figure 1 shows the current chemical application point along with the chemicals currently used and permitted. Table 1 shows the application of the current chemicals. As previously mentioned, the current chemical supplier is (redacted). The trade name chemicals shown in Table 1 are as supplied by (redacted).

Table 1 - (redacted) Chemicals

Chemical Trade Name	Process	Use
Antimicrobial 7287	Cooling Tower	Non-oxidizing biocide
(redacted) 9197	Cooling Tower	Scale and corrosion inhibitor
(redacted) 8898	RO Unit	Scale inhibitor



YAGGY COLBY ASSOCIATES

ENGINEERS
SURVEYORS • PLANNERS
LANDSCAPE ARCHITECTS

215 NORTH ADAMS
MASON CITY, IOWA 50401
641-424-6346
FAX 641-424-0251
EMAIL INFO@YAGGY.COM

ALTERNATIVES ANALYSIS REPORT [redacted]

EXISTING CHEMICAL USAGE SCHEMATIC

PROJECT NUMBER 11610
COMPUTER FILE 11610FIGURES.DWG
DATE DECEMBER, 2011
DRAWN BY T.MADDEN
CHECKED BY
REVISIONS

SHEET NUMBER

FIGURE 1

OF SHEETS

1.3 Receiving Stream

Outfall 001 discharges directly to the Missouri River. This receiving stream is designated as Class A1 primary contact recreational use water, Class B(WW1) for support of warm water fish population with a resident aquatic community and Class HH for waters used as drinking water sources and/or fish routinely harvested for human consumption.

The Missouri River in the area of Outfall 001 is listed as impaired by a non-pollutant stressor - flow alteration and habitat alteration.

SECTION 2
RECEIVING STREAM NETWORK

2.1 General

The discharge receiving stream network consists of discharge to Missouri River. The current receiving stream network designation and Impairment Status are summarized below. UAA status is not applicable to this receiving stream network.

Table 2 - Current Stream Designation (Summarized for entire reach)

Stream	Current Designation	Source
Missouri River	Al, B(WW-1), HH, C	2/17/10 Surface Water Classification Document

Table 3 - UAA Status

Stream	Impairments	TMDL Status	Notes
Missouri River	Non-pollutant stressor	N/A	Multiple downstream segments impaired

2.2 Effluent Limits

Table 4 lists the current effluent limits associated with Outfall 001 (NPDES (redacted)).

Table 4 - Current NPDES Effluent Limits (final)

Wastewater Parameter	Season	Type of Limit	% Removal	Effluent Limitations							
				Concentration				Mass			
				7 Day Average/Min	30 Day Average	Daily Maximum	Units	7 Day Average/Min	30 Day Average	Daily Maximum	Units
Total Suspended Solids	Yearly	Final			30.0	45.0	MG/L				
PH (Minimum - Maximum)	Yearly	Final		6.0		9.0	STD Units				
Chlorine, Total Residual	Yearly	Final				2.91	MG/L			14.765	Lbs/Day

SECTION 3
DESIGN CONDITIONS

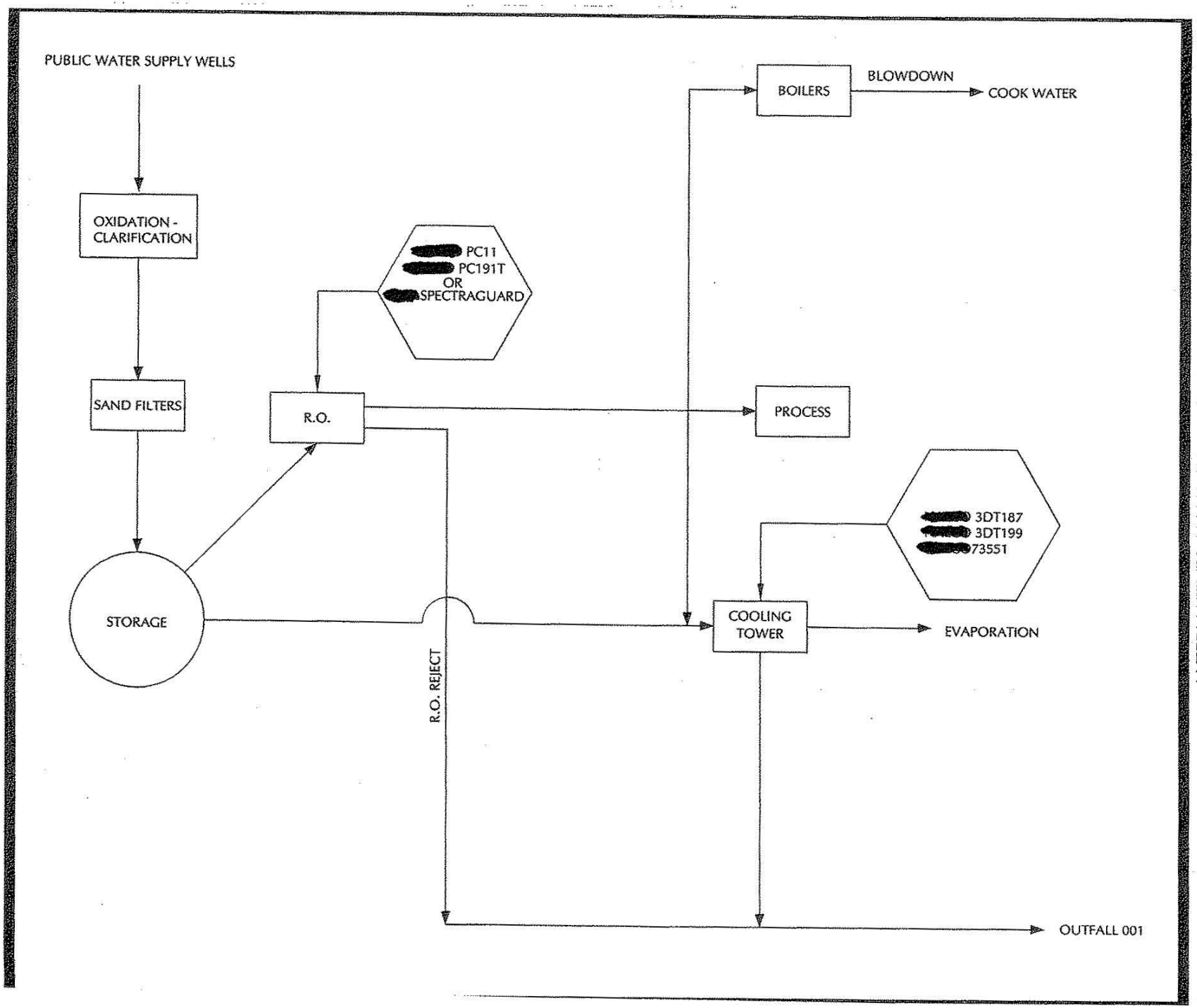
3.1 General

Due to costs, supply issues and operational logistics, (redacted) would like to have the ability to utilize alternate chemical suppliers. Since each chemical supplier distributes their own proprietary chemical, a change in supplier requires a change in chemical. In general, the discharge rate and volume from the facility will not be affected.

The following table shows where and for what purpose the current chemicals are utilized along with the proposed replacement. Figure 2 shows the schematical layout of the water system along with chemical application points for the proposed chemicals. Material Safely Data Sheets (MSDS) for each chemical proposed can be found in the Appendix.

Table 5 - Chemical Use

Process	Current Chemical (redacted)		Proposed Chemical (redacted)	
	Name	**Purpose**	**Name**	**Purpose**
RO Unit	9197	Scale Inhibitor	PC191T	Scale Inhibitor
			(redacted) SpectraGuard*	Scale Inhibitor
			PC-11	Biocide
Cooling Tower	Antimicrobial 7287	Non-oxidizing biocide		
	(redacted) 9197	Scale and corrosion inhibitor	3DT187	Corrosion inhibitor
			3DT199	Copper inhibitor
			73551	Dispersant



YAGGY COLBY ASSOCIATES

ENGINEERS
SURVEYORS • PLANNERS
LANDSCAPE ARCHITECTS

315 NORTH ADAMS
MASON CITY, IOWA 50401
641-424-6344
FAX 641-424-0231
EMAIL INFO@YAGGY.COM

ALTERNATIVES ANALYSIS REPORT

PROPOSED CHEMICAL USAGE SCHEMATIC

PROJECT NUMBER 11610
COMPUTER FILE 11610FIGURES.DWG
DATE DECEMBER, 2011
DRAWN BY T.MADDEN
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FIGURE 2

OF SHEETS

SECTION 4
ALTERNATIVE DEVELOPMENT AND ANALYSIS

4.1 General

The following is a representative listing of alternates which would be considered feasible for this facility. It is likely that other exotic or experimented means and methods of disposal likely exist. However, such alternatives would certainly be more costly. The following alternatives are classified as Non Degrading Alternative (NDA), Less Degrading Alternative (LDA) or Base Pollution Control Alternative (BPCA).

4.2 Alternative 1 - Use Existing Chemical (LDA)

This alternative would continue to utilize the current chemicals from the current chemical supplier (redacted). This alternative would be considered the base project when comparing costs. System operation would remain the same. However, this alternative is not preferred due to costs, single source provider, potential delivery/timing concerns and excess water usage.

Operational history shows that the use of the current chemicals results in fouling of cooling tower media, necessitating more frequent replacement. In addition, the buildup of bio film in the plate type heat exchanges significantly lowers efficiencies. The economic evaluation found further on in this report takes these issues into consideration.

4.3 Alternative 2 - Land Application (NDA)

For this alternative, the wastewater produced by the facility would be land applied. In addition to the physical task of applying the water, a storage pond which meets the requirements of the Iowa Department of Natural Resources (DNR) Design Standards and sized according to Chapter 21 of the Standards must be constructed. In this case, the minimum size of the storage pond would be 200 days. Based on current water use information the storage capacity would be approximately 64 million gallons. Based on a 10' deep storage lagoon, this alternative would require approximately 20 acres of land.

Assuming an application rate of 1O" per month per acre between May to October, the application area would be an additional 40 acres of land. Fignre 3 shows one potential configuration of this alternative.

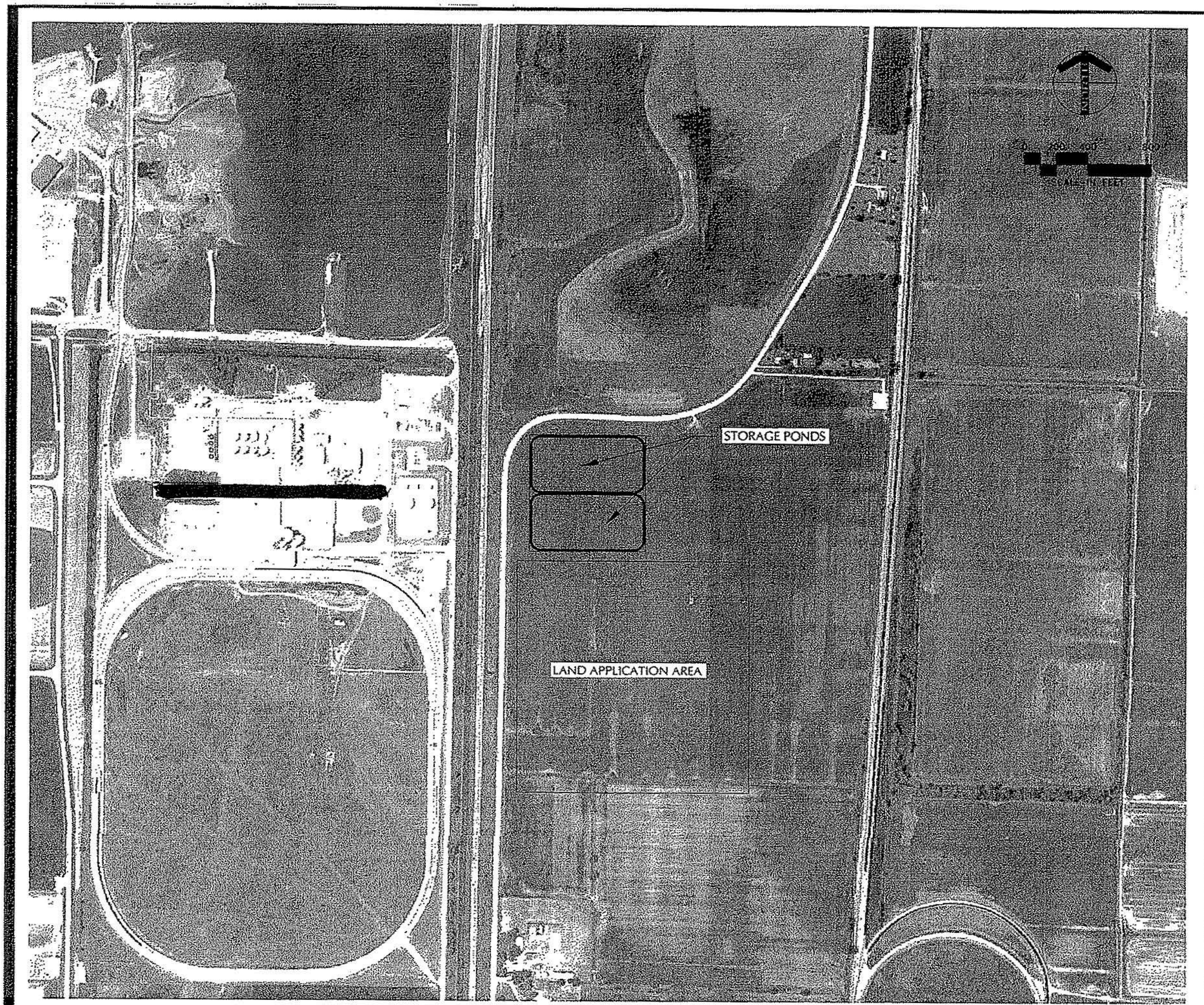
4.4 Alternative 3 - Evaporative Crystallization (NDA)

This alternative would evaporate off enough water such that·the resulting solution is super saturated. In such a case, the dissolved solids form crystals and can be removed from the system. Figure 4 shows a typical configuration. In this process, it is possible to re-use the condensate within the process.

4.5 Alternative 4 -Alternate Chemical Supplier (BPCA)

For this alternative, a different chemical manufacturer would be utilized. The need for other than sole source providers is necessary for cost control, chemical availability and to minimize disruption in operation of the facility. No physical changes are required within the plant to switch chemical suppliers. In addition, by simply making a change in chemical suppliers, the proposed chemicals also address critical issues that the current chemical suppliers cannot address. These include biological fouling of the cooling tower (due to pH) and subsequent plugging of the heat exchanger. Figure 2 shows the proposed chemical feed points and chemicals to be used.

It is vitally important to realize that the alternate chemical supplier applies to all chemicals listed. Individual (redacted) chemicals are not compatible with (redacted) chemicals. Therefore, the switch in chemical suppliers must be across the board, with the exception of general chemicals such as sodium hypochlorite, etc.



YAGGY COLBY ASSOCIATES

ENGINEERS
SURVEYORS • PLANNERS
LANDSCAPE ARCHITECTS

215 NORTH ADAMS
MASON CITY, IOWA 50401
641-424-6344
FAX 641-424-0351
EMAIL INFO@YAGGY.COM

ALTERNATIVES ANALYSIS REPORT [redacted]

ALTERNATE 2 - LAND APPLICATION

PROJECT NUMBER 11610

COMPUTER FILE 11610FIGURES.DWG

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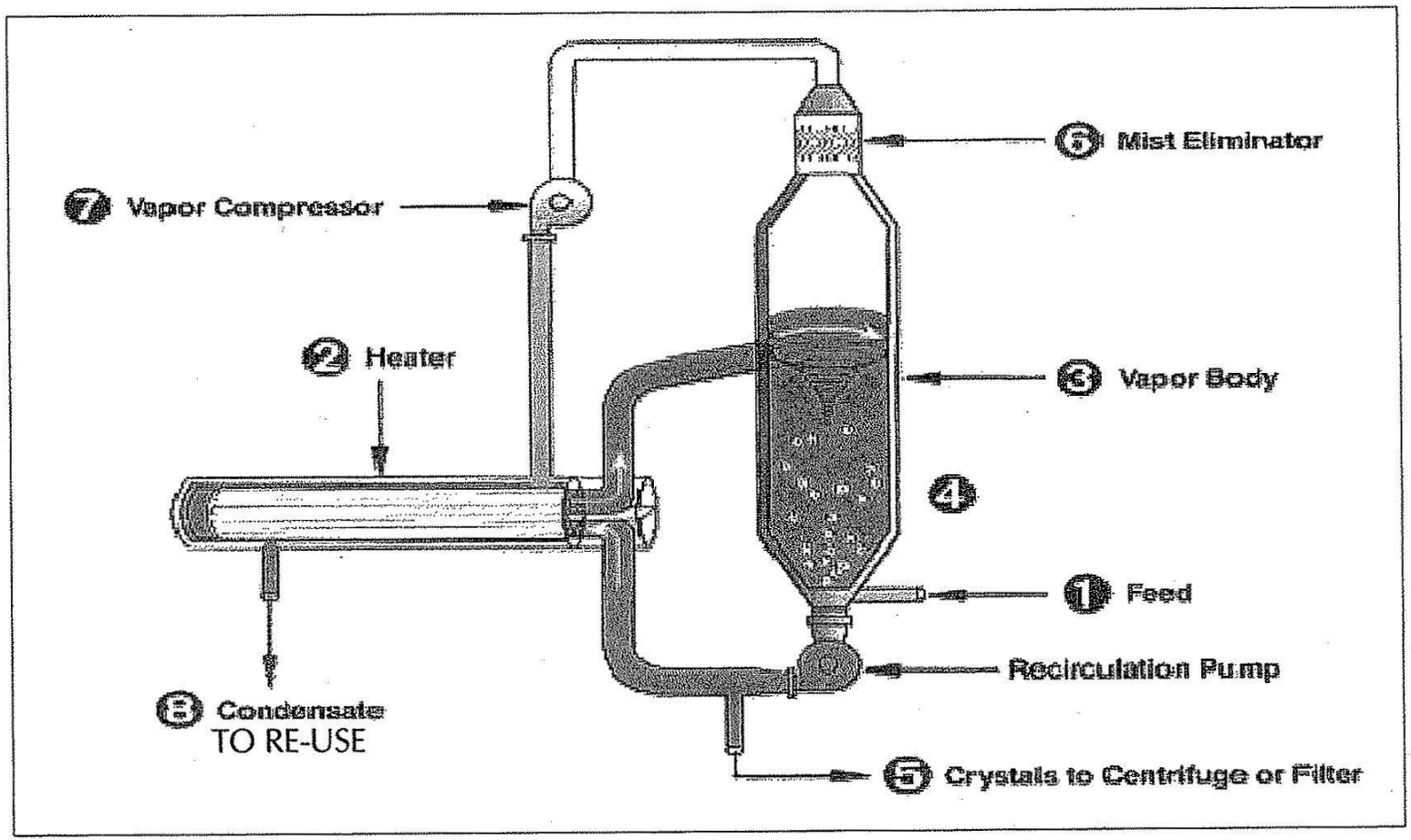
SHEET NUMBER

FIGURE 3

OF SHEETS



YAGGY COLBY ASSOCIATES

ENGINEERS
SURVEYORS • PLANNERS
LANDSCAPE ARCHITECTS

215 NORTH ADAMS
MASON CITY, IOWA 50401
641-424-6344
FAX 641-424-0331
EMAIL INFO@YAGGY.COM

ALTERNATIVES ANALYSIS REPORT

ALTERNATE 4 - EVAPORATIVE CRYSTALLIZATION

PROJECT NUMBER 11610
COMPUTER FILE 11610FIGURES.DWG
DATE DECEMBER, 2011
DRAWN BY T.MADDEN
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SHEET NUMBER

FIGURE 4

OF SHEETS

SECTION 5
ECONOMIC EVALUATION

5.1 General

The following tables present the present worth cost of the alternatives previously developed. All costs are based on recent bid results, information from equipment suppliers, estimating of guidance, chemical suppliers and standard engineering judgment. Net present worth costs were calculated using a 4.125% annual interest on a 20 year period as noted in 18 CFR 704.39.

Table 6 - Summary of Costs

Alt. No.	Description	Total Present Worth
1	Use Existing Chemicals	$4,138,740
2	Land Application	$3,708,510
3	Evaporative Crystallization Alternative (redacted) Chemical	$16,245,990
4	Supplier	$1,954,190

Table 7 - Alternative 1 - Use Existing Chemicals

Capital Cost Present Worth					
Item No.	**Item**	**Qty**	**U/M**	**Unit Price**	**Total**
	Direct costs				
1	None				
	Direct Subtotal				**$ -**
	Indirect costs				
2	Engineering				$ -
3	Legal and Administrative (5%)				$ -
4	Contingency (15%)				$ -
	Indirect Subtotal				**$ -**
	Total Capital Costs				**$ -**

Annual O&M Present Worth			
Item No.	**Item**	**Amount**	**Present Worth**
5	(redacted) 9197	$ 250,346	$ 3,364,930
6	(redacted) 8898	$ 2,476	$ 33,280
7	Antimicrobial	$ 55,094	$ 740,530
	Total O&M		**$ 4,138,740**

Summary		
Item No.	**Item**	**Present Worth**
15	PW Capital Cost	$ -
16	PW Annual O&M	$ 4,138,740
	Total Net Present Worth Cost	**$ 4,138,740**

Table 8 - Alternative 2 - Land Application

Capital Cost Present Worth					
Item No.	**Item**	**Qty**	**U/M**	**Unit Price**	**Total**
	Direct costs				
1	Mobilization	1	LS	$ 45,000	$45,000
2	Storage Lagoon	74,350	CY	$ 4	$ 278,800
3	Synthetic Liner	106,475	SY	$ 10	$ 1,064,800
4	Piping	1	LS	$ 45,000	$ 45,000
5	Irrigation Pumping System	1	LS	$ 35,000	$ 35,000
6	Irrigation System	1	LS	$ 275,000	$ 275,000
7	Restoration	1	LS	$15,000	$15,000
	Direct Subtotal				**$ 1,758,600**
	Indirect costs				
8	Engineering				$ 263,800
9	Legal and Administrative (5%)				$ 87,900
10	Land Purchase				$ 1,200,000
11	Contingency (15%)				$ 263,800
	Indirect Subtotal				**$ 1,815,500**
	Total Capital Costs				**$ 3,574,100**

Annual O&M Present Worth			
Item No.	**Item**	**Amount**	**Present Worth**
12	Annual Maintenance	$ 10,000	$ 134,410
	Total O&M		**$ 134,410**

Summary		
Item No.	**Item**	**Present Worth**
13	PW Capital Cost	$ 3,574,100
14	PW Annual O&M	$ 134,410
	Total Net Present Worth Cost	**$ 3,708,510**

Table 9 - Alternative 3 - Evaporative Crystallization

Capital Cost Present Worth					
Item No.	**Item**	**Qty**	**U/M**	**Unit Price**	**Total**
	Direct costs				
1	Mobilization	1	LS	$ 7,500	$ 7,500
2	Crystallization Equipment	1	LS	$ 825,000	$ 825,000
3	Process Piping	1	LS	$ 75,000	$ 75,000
4	Gas Piping	1	LS	$ 25,000	$ 25,000
5	Electrical	1	LS	$ 9,500	$ 9,500
6	Centrifuge	1	LS	$ 25,000	$ 25,000
7	Condensate Storage Tank (250,000 gal)	1	EA	$150,000	$150,000
8	Return Pumping	1	LS	$ 45,000	$ 45,000
9	Restoration	1	LS	$ 10,000	$ 10,000
	Direct Subtotal				**$ 1,172,000**
	Indirect costs				
10	Engineering				$ 175,800
11	Legal and Administrative (5%)				$ 58,600
12	Land Purchase				$ 10,000
13	Contingency (15%)				$ 175,800
	Indirect Subtotal				**$ 420,200**
	Total Capital Costs				**$ 1,592,200**

Annual O&M Present Worth			
Item No.	**Item**	**Amount**	**Present Worth**
14	Electrical	$ 105,120	$ 1,412,930
15	Gas	$ 955,000	$ 12,836,280
16	Land Fill Fees	$ 30,100	$ 404,580
	Total O&M		**$ 14,653,790**

Summary		
Item No.	**Item**	**Present Worth**
17	PW Capital Cost	$ 1,592,200
18	PW Annual O&M	$ 14,653,790
	Total Net Present Worth Cost	**$ 16,245,990**

Table 10 - Alternative 4 - Alternative (redacted) Chemical Supplier

Capital Cost Present Worth					
Item No.	**Item**	**Qty**	**U/M**	**Unit Price**	**Total**
	Direct costs				
1	None				$ -
	Direct Subtotal				**$ -**
	Indirect costs				
2	Engineering				$ -
3	Legal and Administrative (5%)				$ -
4	Contingency (15%)				$ -
	Indirect Subtotal				**$ -**
	Total Capital Costs				**$ -**

Annual O&M Present Worth			
Item No.	**Item**	**Amount**	**Present Worth**
5	(redacted) 3DT187	$ 78,939	$ 1,061,030
6	(redacted) 3DT199	$ 9,999	$ 134,400
7	(redacted) 73551	$ 5,540	$ 74,460
8	(redacted) PC-11	$ 24,750	$ 332,670
9	(redacted) PC-191T or (redacted) SpecraGuard	$ 26,161	$ 351,630
	Total Capital Costs		**$ 1,954,190**

Summary		
Item No.	**Item**	**Present Worth**
10	PW Capital Cost	$ -
11	PW Annual O&M	$ 1,954,190
	Total Net Present Worth Cost	**$ 1,954,190**

SECTION 6
POLLUTANTS OF CONCERN

6.1 General

Table 11 lists out the Pollutants of Concern (POC) associated with this report. It should be noted that the chemical trade names are listed below. The MSDS located in the Appendix should be referenced for specific chemical information. In addition, Table 12 shows the concentration of each chemical reasonably expected to be found in the effluent.

None of the chemicals contain any substances or result in any degradation products that would contribute to sludge deposits, floating debris, oil, grease, scum, objectionable odor, color, turbidity, or undesirable or nuisance aquatic life. None of the chemicals contain any elements or compounds included in Table 1 of Section 567 IAC 61.3(3) of the Iowa Administrative Code and do not have any known bioaccumulative, mutagenic, teratogenic or carcinogenic effects when introduced into the aquatic environment. In addition, none of the chemicals or their degradation products alone or in combination with other substances present in the discharge or receiving waters produce additive or synergistic toxicity effects. All chemicals are equally biodegradable or persistent in the aquatic

environment.

In general, the sole potential effect to the receiving stream's water quality for the chemicals noted is aquatic toxicity. The maximum concentrations of all chemicals are significantly below the LC_{50} for the species noted.

The (redacted) chemicals are currently used and their presence in the discharge constitutes an existing water quality condition. As previously mentioned, the (redacted) chemicals are different than the current chemicals, thereby meeting the Antidegradation Implementation Procedure definition of degradation. In addition, they are considered Pollutants of concern as 1hey consist of "pollutants which are reasonably expected to be present in the discharge and may reasonably be expected to negatively affect 1he beneficial uses of the receiving water.

As shown in Table 13, and noted in 1he charts found in Appendix 1, the proposed chemicals have been determined to pose less toxicity than the (redacted) chemicals.

Table 11 - Pollutants of Concern

Chemical Trade Name	Secondary or WQBEL	Beneficial Use Affected	Tier
Existing Fremont Industries Chemicals			
(redacted) 9197	None	Aquatic Life	2
(redacted) 8898	None	Aquatic Life	2
Antimicrobial 7287	None	Aquatic Life	2
Proposed (redacted) Chemicals			
3DTI87	None	Aquatic Life	2
3DT199	None	Aquatic Life	2
73551	None	Aquatic Life	2
PC-11	None	Aquatic Life	2
PC-191T	None	Aquatic Life	2
(redacted) Spectraguard*	None	Aquatic Life	2

*(redacted) SpectraGuard will be used as a substitute for PC-191T, not in conjunction with.

Table 12 - Estimated Effluent Concentrations

Chemical Trade Name	Effluent Concentration	Notes
Existing Fremont Industries Chemicals		
(redacted) 9197	52-200 mg/l	As polymer
Antimicrobial 7287	9-12 mg/l	As product
(redacted) 8898	1.5-2.5 mg/l	As product
Proposed (redacted) Chemicals		
3DTI87	8.82 mg/l	As polymer
3DT199	2.4 mg/l	As NaBZT
73551	1.0 mg/l	As surfactant
PC-11	3.6 mg/l	As active
PC-191T	0.7 mg/l	As polymer
(redacted) Spectraguard*	20-25 mg/l	As polymer

Note: All information provided by manufacturer

*(redacted) SpectraGuard will be used as a substitute for PC-191T, not in conjunction with.

Table 13 - Toxicity Information

Chemical Trade Name	Effluent Concentration	Toxicity
Existing Fremont Industries Chemicals		
(redacted) 9197	52-200 mg/l as polymer	Minnow: 2026.3 mg/l (96 hr) Rainbow Trout: 2422 mg/l (96 hr)
Antimicrobial 7287	9-12 mg/l as product	Minnow: 1.4 mg/l (96 hr) Rainbow Trout: 1.0 mg/l (96 hr)
(redacted) 8898	1.5-2.5 mg/l as product	Rainbow Trout: 1113 mg/l (96 hr) Daphnia: 1464 mg/l (96 hr)
Proposed (redacted) Chemicals		
3DTI87	4.81 mg/l as polymer	Minnow: 1875 mg/l (96 hr) Rainbow Trout: 2422 mg/l (96 hr)
3DT199	1.31 mg/l as NaBZT	Minnow: 164 mg/l (96 hr) Rainbow Trout: 36.2 mg/l (96 hr)
73551	0.55 mg/l as surfactant	Minnow: 996 mg/l (96 hr) Rainbow Trout: 1000 mg/l (96 hr)
PC-11*	0.0 mg/l as active	Minnow: 1.36 mg/l (96 hr) Rainbow Trout: 3.6 mg/l (48 hr)
PC-191T	0.91 mg/l as polymer	Rainbow Trout: 4350 mg/l Cerio Daphnia: 1673 mg/l (48 hr)
(redacted) Spectraguard**	20-25 mg/l as polymer	Fathead Minnow: 750 mg/l (96 hr) Cerio Daphnia: 750 mg/l (48 hr)

Note: All information provided by manufacturer
*Expected residual in the effluent is 0.0 mg/l due to short (30 min) half life
**(redacted) SpectraGuard will be used as a substitute for PC-191T, not in conjunction with.

SECTION 7
ALTERNATIVE EVALUATION

7.1 General

Each of the previously developed alternatives is evaluated based on whether or not it is reasonable, practical, economically efficient and affordable. Table 14 depicts this information.

Table 14 - Alternative Classification and Evaluation

Alt No.	BPCA, NDA, or LDA	Is the Alternative Practicable?	Is the Alternative Economically Efficient?	Costs in terms of BPCA	Is the Alternative Affordable?	Is the Alternative Reasonable?
1	LDA	Yes	No	212%	Yes	No
2	NDA	Yes	No	190%	Yes	No
3	NDA	No	No	831%	No	No
4	BPCA	Yes	Yes	100%	Yes	Yes

SECTION 8
ALTERNATIVE SELECTION

8.1 General

The preferred alternative is Alternative 4 - Alternate Chemical Usage. This alternative is preferred because it provides a significant cost savings. In addition, the ability to utilize chemicals from more than one supplier provides an intangible benefit when it comes to potential issues associated with a sole source provider. These benefits include lower likelihood of shutdowns or variances in water quality due to shortages, customer service and

logistical issues.

8.2 Justification of Degradation

The preferred alternative will result in degradation for the chemicals listed. This degradation is based on the fact that currently these chemicals are not used at the facility and are therefore not found in the discharge stream. However, the general water quality will be improved due to the fact that the noted toxicity of the proposed chemicals is less than that noted for the current chemicals.

Alternatives which eliminate discharge are either cost prohibitive (crystallization) or not economically sensible in a competitive market. Alternatives that are less degrading are note economically sensible in a competitive market.

In addition, the preferred alternative results in Jess water usage. Overall, the amount of total water used will decrease by 40,800,000 gallons per year.

SECTION 9
SOCIAL/ECONOMIC IMPORTANCE

9.1 General

The preferred alternative introduces new POC to the receiving stream and is more degrading than the existing chemical usage by definition. However, toxicity information supplied by the manufacturer indicates that the overall water quality will increase due to lower toxicity.

9.2 Identification of Effected Entities

As previously noted, (redacted) is an ethanol production facility. The effected entity of this alternative analysis is (redacted).

9.3 Identification of Relevant Factors

Since (redacted) is a business entity, the ability to remain competitive and profitable are significant issues surrounding the operation and maintenance of the facility. It is imperative that all O&M activities are as effective as possible to maintain market competitiveness. The chemical usage is a direct operational expense which must be minimized as part of an overall operation plan to remain competitive. In addition to the direct costs previously identified, the ability to utilize chemicals from more than one source is extremely important.

Unplanned shutdowns or variances in water quality can play a significant role in company profitability and compliance issues. Although these conditions cannot have a value directly placed on them, the effect in nonetheless significant.

9.4 Social and Economic Concerns

The (redacted) facility employs approximately 60 people. In addition, the facility purchases a significant amount of local commodities including com. The effect the facility has had on local economic conditions is significant. Loss of this facility would displace approximately 60 employees, remove county tax values and impact local corn prices.

Due to limited margins in the (redacted) business, it is not uncommon for new plants to not start up when completed or existing facilities to close. Evidence of these situations can be found in the news with some frequency. While the operation and maintenance of the water system in and of itself would likely not necessitate the facility to shutdown, it is certainly a key component in the overall economic health of the facility.