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December 9, 2005

Mr. Mike Gearheard, Director, Office of Water and Watersheds
U.S. Environmental Protection Agency
Region 10, OWW-135
1200 Sixth Avenue
Seattle, Washington 98101

BP Exploration (Alaska), Inc. (BPXA) - Endicott Operations
Additional Information
Application for NPDES Permit AK-003866-1 Reissuance

Dear Mr. Gearheard:

BP Exploration (Alaska) Inc. (BPXA) is providing additional information to be included in the administrative record of the application for re-issuance of the BPXA Endicott Operations NPDES Permit. The original application was submitted on November 11, 2004, in accordance with NPDES Permit No. AK-003866-1, Section V.B. Duty to Reapply.

BPXA is designing an additional treatment unit to produce low-salinity water for enhanced oil recovery, called the Lo-Sal project. The Lo-Sal project was only briefly mentioned in the original application. The enclosed information provides greater detail on the Lo-Sal project. The Lo-Sal project is anticipated to be implemented in 2007.

Additional information was added to the following pages of the NPDES Application:

- Six page Overview, which replaces the five page overview in the original application. This revision includes detail of the Lo-Sal project, and also additional information explaining the intermittent nature of Seawater Treatment and Potable Water Plant wastewater discharge.
- Three diagrams which replace a single diagram IIA-2 in the original application.

- Page 2 of 5 from Form 2C, to replace the same page in the original application. The revision includes an additional treatment stage to be used in the Lo-Sal project : micro filtration.

If you have any questions concerning this submittal or require additional information, please contact Judy Kitagawa at (907) 564-4456.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

Bernard Looney
Vice President BPXA

Enclosure

cc: Lynn Kent, ADEC-Anchorage
Sharmon Stambaugh, ADEC-Anchorage

OVERVIEW

This National Pollution Discharge Elimination System (NPDES) permit application (Forms 1 and 2C) provides information for the Endicott Operations located on an artificial island/causeway complex located in the nearshore area just offshore of the Sagavanirktok River Delta in Stefansson Sound of the Alaskan Beaufort Sea. This facility, also known as the Endicott Project, or Endicott, operates in accordance with the U.S. Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System (NPDES) Permit AK-003866-1 (USEPA, 2000). The original NPDES permit for this facility was issued in January 1986 (to Standard Alaska Production Company). The most recent permit was issued to BP Exploration (Alaska), Inc. (BPXA) in April 2000.

Endicott includes a seawater treatment plant (STP) and a potable water (POW) unit (desalination plant), both of which send effluent to the combined wastewater discharge (Outfall 001); a wastewater treatment plant (WWTP; Outfall 001A), which also sends effluent to the combined wastewater discharge; and a continuous flush system (formerly the marine life return system, MLRS; Outfall 002). Information concerning these outfalls is provided below.

In addition to these flows, the firewater distribution system at Endicott had previously been permitted for discharge to surface waters (in the existing permit as Outfall 003). However, this flow has not been included in this application as a potential discharge because the firewater at Endicott does not actually flow to a discrete outfall but is generally dispersed onto the facility's gravel pad where it may percolate or run off into the Beaufort Sea or evaporate to the atmosphere. As such, this flow is already covered by the general storm water permit, *North Slope General NPDES Permit AKG-33-0063,* as authorized on February 19, 2004 for Endicott.

As required by the application, area maps are provided in Exhibits XI-1 and XI-2. Exhibit IIA-1 provides a line drawing of the overall facility. Exhibits IIA-2 through IIA-6 provide process flow diagrams for the individual discharges or flows at the facility. Information contained in this application is primarily based on the last year of operation and monitoring (July 2003 through June 2004). Other data are estimated from operational history, process design, and proposed future operational conditions.

It is anticipated that operational conditions at Endicott will change within the next three years, with the implementation of a low salinity waterflood project. Process flow diagrams include both current operating conditions and potential conditions.

Combined Wastewater Discharge – Outfall 001

This outfall currently consists of streams from the STP and the POW unit that are commingled prior to discharge through the main outfall (Outfall 001). Both of these streams may be intermittent. The STP may not be in operation if enough produced water exists in a reservoir and the addition of waterflood is not necessary for enhanced oil recovery. The POW unit may not be in operation if potable water is being hauled by truck from another potable water plant on the north slope. In addition, this revision includes information concerning the LoSal™ Seawater Processing Unit that is in the planning phase now and is expected to be a part of the STP and become operational during 2007. For purposes of this narrative, each of these discharges will be discussed separately. As in the existing permit, however, the data provided in this application are based on the commingled wastestream (i.e., both STP and POW

outflows combined). In addition, effluent from the WWTP, labeled Outfall 001A, is discharged through the combined main outfall. This wastestream is discussed separately below.

The use of water clarifying agents on the incoming seawater prior to further processing at the STP or the POW unit is sometimes necessitated by the high suspended sediment loads seen in the Beaufort Sea in the vicinity of the Sagavanirktok River Delta, particularly during spring breakup and summer conditions. Four clarifying agents (Nalco 7607, 7768, 3332, and Chemlink 4835) are specifically approved in the existing permit for use at Endicott at applications of no more than 1 part per million (ppm). However, for purposes of this application, BPXA suggests that the new permit be less restrictive in terms of specifying the use of brand name chemicals. Past experience has shown that other products may be available that are more effective in terms of reducing suspended sediments, and these may in fact be less toxic in nature than those products approved by the existing permit. The existing permit also outlines the procedure that would be required to have EPA and ADEC approve other clarifying agents, including the submittal of acute toxicity test results for each agent. As an alternative to specifying approved clarifying agents in the permit, BPXA requests that coagulants and flocculants be addressed in the Best Management Practices Plan (BMP).

Bulk solids (sediment) that do not contain clarifying agents or other chemicals removed from the seawater intake basin or from the clarifier are placed on the pad following BMP procedures in such a way that snow or rain runoff will not increase turbidity in the receiving waters.

Strainer/Filter Systems Backwash from STP (Exhibit IIA-2)

The current STP facility provides treated seawater that is used for injection into the petroleum reservoir to maintain formation pressures and allow enhanced oil recovery (EOR) from production wells. Effluent from the STP that is discharged to Outfall 001 consists of a continuous flow of seawater and naturally-occurring particulates from the backwash of the strainer/mixed media filter systems that are used to remove particulates from the seawater. Backwash residues from the strainer system are unheated; backwash residues from the mixed media filters have been subject to warming. Disinfection (injection of chlorine) is used after straining but prior to the filters to prevent biofouling. No other chemicals or additives needed to treat the seawater prior to injection are used at process locations upstream of the filter backwash line. By 2007, an additional LoSal™ Seawater Processing unit is projected to be in place at Endicott. This is more fully described below.

An estimated continuous flow averaging approximately 6,300,000 gallons per day (gpd) will be discharged from the STP through Outfall 001. This projected volume includes increased discharges from the LoSal™ unit projected to be in place by 2007.

- A heated seawater line flows from downstream of the strainer system back to the intake basin or to the Continuous Flush System (Outfall 002). There is no use of seawater for cooling equipment (i.e., no process cooling water) at the facility.
- The filter feed strainers are continuously backwashed with the backwash residues going directly to the main outfall. The media filters are backwashed as needed based on differential pressure, suspended solids concentrations, and filtering rates.
- This process includes the use of disinfection as needed to prevent biofouling. When necessary, sodium hypochlorite injection is used between the filter feed strainers and the media filters to prevent biological (bacterial) growth in the system. A dechlorinating agent (such as sodium sulfite) is used as needed on the main outfall line downstream of both the strainer and filter backwash lines to reduce residual chlorine prior to discharge through the main outfall. Since

chlorination is at times a necessary part of the STP process at this facility, Total Residual Chlorine (TRC) levels should be monitored if and when chlorine disinfection is employed.

- Other additives and chemicals currently needed to prepare the seawater for injection, such as oxygen scavengers, antifoamers, corrosion inhibitors, and disinfection agents, are used downstream of the existing strainer/filter systems and their backwash lines. Because of where they are currently used in the flow process, these agents cannot recycle to the intake basin nor be discharged through the main outfall. With the implementation of the LoSal™ Seawater Processing unit, chemical additives will be handled as described below.

- The use of organic biocides is allowed in the existing permit, with requirements in place to prohibit discharge of these agents through the backwash systems. At present, however, organic biocides are used downstream of any process areas that could flow to the main outfall. With the implementation of the LoSal™ Seawater Processing unit, biocide use will be closely controlled through the use of positive isolation from the process as well as the outfall, and all biocide wastes will be collected for disposal as described below.

LoSal™ Seawater Processing (Exhibit IIA-2, Detail A, and Detail B)

The Endicott LoSal™ process will consist of Microfiltration (MF) and Reverse Osmosis (RO) processing technology to produce a product stream of low salinity water from treated seawater coming from the existing STP as described above. Treated water from the existing STP multimedia filters will be heated and then processed through the LoSal™ module prior to injection for EOR. The LoSal™ process will produce 1,460 gallons per minute (gpm) of low salinity water from a feed stream of 4,085 gpm of treated seawater; the balance of 2,625 gpm will be discharged via the main outfall. The LoSal™ process waste streams are of three general categories: MF continuous backwash, RO brine concentrate, and batch discharge of dechlorinated and neutralized wastewater from MF/RO cleaning operations.

- The MF package consists of 4 banks of 40 each MF vessels. Each bank will be backwashed automatically for 1 minute every fifteen minutes. No special cleaning chemicals will be added for the backwashing cycle. The backwash will remove the particulate matter that accumulates in the MF cartridges.
- The RO membranes will produce a brine reject stream with a flow of roughly 50% of the feed stream and a total dissolved solids (TDS) concentration of 1,800 – 60,000 milligrams/liter (mg/l) depending on the seawater intake quality as influenced by seasonal conditions.
- Twice per day, each of the four banks of MF vessels will be treated with a concentrated hypochlorite solution for disinfection. Following the disinfection treatment, the solution will be discharged into a neutralization tank to be dechlorinated prior to discharge to the main outfall.
- Once per month, a deep cleansing of the MF and RO vessels with an acidic inorganic descaling solution will be carried out. This solution will be discharged to the neutralization tank and treated prior to discharge to the main outfall.
- Once per month, the RO membranes will be treated with an organo-bromine biocide solution. Prior to treatment, the selected bank of RO vessels will be positively isolated from the process and the outfall, then completely flushed to the spent biocide tank for disposal. This waste stream will not be discharged to the sea.

Potable Water System (Exhibit IIA-3)

Effluent from the POW unit is intermittent and primarily consists of brine produced by the RO desalination filters during the making of potable water for use in the living quarters and as utility water. Desalination effluent is brine with approximately twice the concentration of naturally occurring minerals

and salts in the ambient seawater. Brine output averages 20,000 gpd when the RO unit is in use. Backwash flows mix with the brine and with STP effluent before being discharged through the main outfall. Prior to entering the RO unit, the seawater is heated and may also be treated with coagulants, scale inhibitors, and antifoam agents.

- Closed-loop heat exchangers are used to heat seawater entering the POW system before it flows to the flocculation tank. Backwash that flows from the flocculation tank has been heated.
- Coagulant is applied to the seawater as it flows to the flocculation tank. Under the existing permit, a pre-approved coagulant (e.g., Nalco 7768) can be used in applications of no more than 1 ppm to clarify the seawater at Endicott. Backwash from the flocculation tank may contain trace amounts of coagulant.
- Backwash from the primary filters used downstream of the flocculation tank is also mixed with brine from the RO unit before it commingles with the STP effluent to be discharged through the main outfall.
- Scale inhibitor and antifoamer agents are injected into the seawater downstream of the primary filters as it is pumped to the RO unit. High salinity brine flows from the RO unit to the main outfall.
- The addition of all other chemicals (corrosion inhibitor, disinfection agent, pH buffering agents) occurs downstream of the RO unit. All chemicals used in this process downstream of the RO unit are NSF-approved for use in drinking water.

Combined Wastewater Discharge

Data provided in Section V of Form 2C of this permit application for Outfall 001 include the outflows from both the STP and POW unit, as the flow is commingled prior to sampling. Data are as follows:

- Flow data presented are from the period of July 2003 through June 2004. Flow data presented in Form 2C, Part II.B are estimates based on historical data and predicted future operating conditions.
- Temperature, pH, and TRC data presented are from the period of July 2003 through June 2004.
- Data for Biological Oxygen Demand (BOD_5), Chemical Oxygen Demand (COD), Total Organic Carbon (TOC), Total Suspended Solids (TSS), and Ammonia (as Nitrogen [N]) as required by this application were not included in the existing permit's monitoring requirements for this wastestream. In order to provide data for inclusion in this application, three grab samples for analysis of each of these parameters were collected in October and November 2004. EPA-approved methods were utilized for sampling and analysis and data are reported herein.

Sanitary Wastewater – Outfall 001A (Exhibit IIA-4)

The WWTP handles an average flow of 11,500 gpd of domestic waste and sewage from the living quarters at the Endicott facility. At present, treated wastewater is discharged through the main outfall along with effluents from the STP and the POW unit. However, BPXA proposes to inject the treated wastewater from the WWTP to Class II Enhanced Oil Recovery (EOR) wells as early as 2005, but will keep Outfall 001 for WWTP discharges as an alternative to injection. For purposes of this application, it is assumed that the main outfall will continue to be the primary means of wastewater disposal.

- Sanitary wastes from the living quarters are initially processed in the WWTP using rotary screens. Solids from the rotary screens are trucked to the North Slope Borough Solid Waste Landfill under the State of Alaska Permit 0231-BA006 (Oxbow Landfill).

- Screened wastewater then flows into an equalization basin, an aeration tank, and into a clarifier tank. After settling, treated sludge is trucked to the Class I Underground Injection Control (UIC) at Pad 3 for disposal under EPA Permit AK-1I004-A.
- The clarified wastewater flows to a disinfection tank, where a chlorinated disinfection agent such as calcium hypochlorite feeds into the system. Dechlorination using a bioneutralizer (e.g., sodium sulfite) takes place before the effluent is discharged to the main outfall. Use of a bioneutralizer allows for the removal of chlorine without the addition of BOD.
- A small batch process alternate system for treating backwash flows from the primary clarifier/filter tank through a secondary equalization basin, aeration chamber, and clarification tanks. The treated backwash waste then re-enters the system.
- The existing permit requires the monitoring of sanitary waste-related parameters (TSS, BOD_5, and Fecal Coliform) only when this wastestream is discharged to the main outfall. In addition, pH and flow are monitored as called for by the existing permit.

Data provided in Section V of Form 2C of this permit application for Outfall 001A are as follows:

- Flow data presented are from the period of July 2003 through June 2004. Flow data presented in Form 2C, Part II.B are estimates based on historical data and predicted future operating conditions.
- BOD_5, TSS, pH, TRC, and Fecal Coliform data presented are from the period of July 2003 through June 2004.
- Monitoring for COD, TOC, and Ammonia as required by this application are not included in the existing permit's monitoring requirements for this wastestream. In order to provide data for inclusion in this application, three grab samples for analysis of each of these parameters were collected in October 2004. EPA-approved methods were utilized for sampling and analysis and data are reported herein.

Continuous Flush System – Outfall 002 (Exhibit IIA-5)

A flow with an average rate of approximately 2,900,000 gpd will be drawn through the Continuous Flush System as needed to minimize ice formation and debris accumulation in the intake basin.

- Intake seawater is typically heated for freeze protection. There is no use of continuous flush seawater for cooling equipment (i.e., no process cooling water).
- As noted above, this process was originally designed to be a marine life bypass. However, in practice it has been used instead to prevent algae (kelps) and debris from accumulating in the intake basin and as freeze protection.
- No chlorination or other chemical treatment is used for this process stream.

Data provided in Section V of Form 2C of this permit application for Outfall 002 are as follows:

- Flow and temperature data presented are from the period of June 2003 through May 2004. Flow data presented in Form 2C, Part II.B are design estimates.
- Monitoring of other parameters (BOD_5, COD, TOC, TSS, Ammonia, and pH) is not required under the existing permit for Outfall 002 and therefore, no data are available.

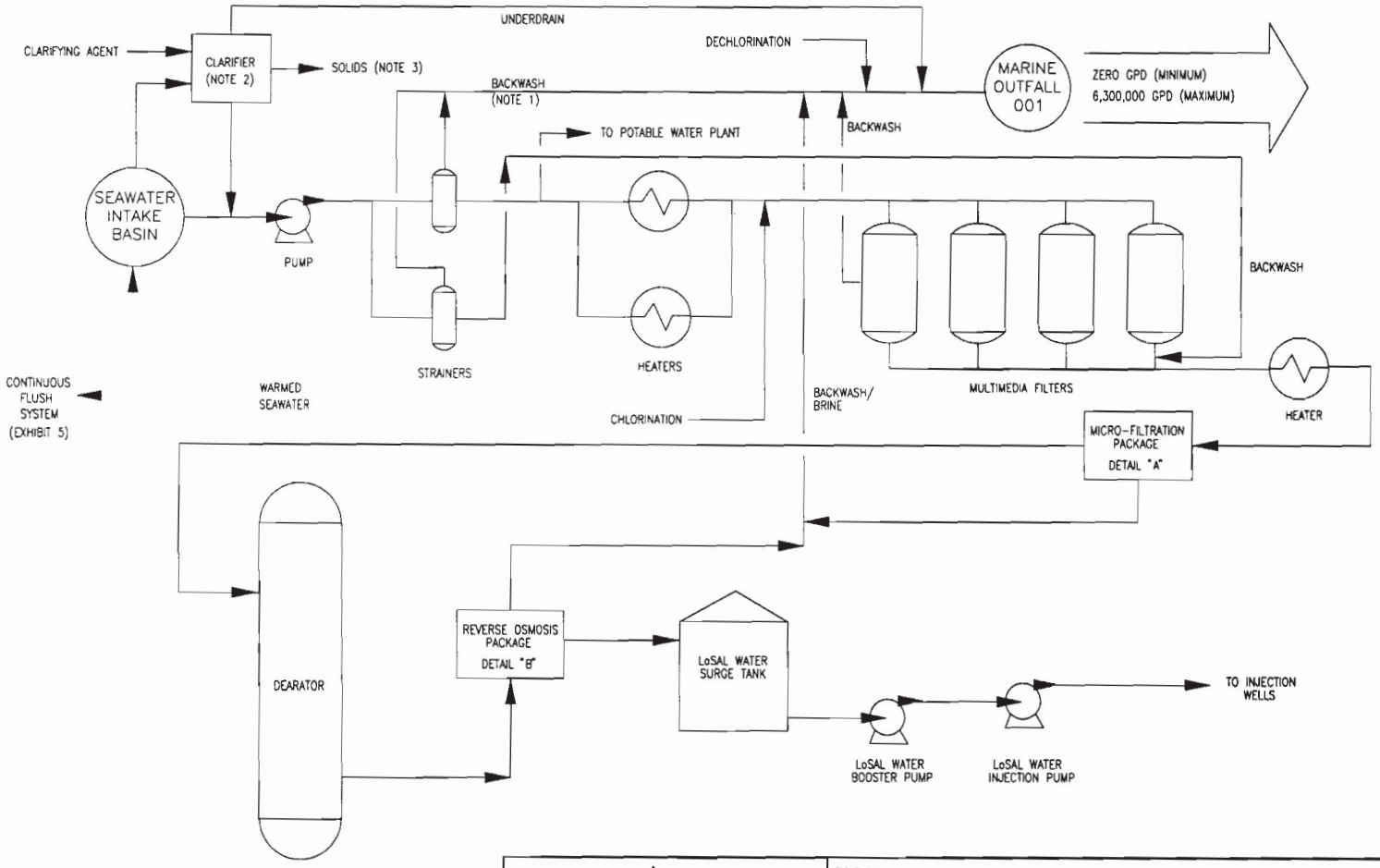
Firewater Distribution System – Formerly Outfall 003 (Exhibit IIA-6)

As noted above, while this stream is permitted by the existing permit, this flow is covered by the general storm water permit for the North Slope (AKG-33-0063), Section II.F.3.b. (Allowable Non-Storm Water Discharges).

General Notes Regarding the Permit Application Generated Using the Permit Application Software System (PASS):

- For purposes of this application, it is assumed that trace concentrations of naturally-occurring metals and nutrients exist in the seawater coming into the intake basin; these parameters are shown as being "Present in seawater intake" and are assumed to be present at low levels in the effluent as well.
- For purposes of this application, it is assumed that the freshwater source (POW) that feeds into the living quarters is of drinking water quality and, because it has had all particulates removed and has been subjected to the RO process, is virtually free of salts, nutrients, and trace metals. Based on this assumption, it is assumed that these parameters are not part of the intake into the WWTP.

NO.	DATE	REVISION	BY	CHK	APP	NO.	DATE	REVISION	BY	CHK	APP



NOTES:

GPD = GALLONS PER DAY
NOTE 1 - BACKWASH SOURCE FOR STRAINERS INTERNAL IN THE STRAINERS
NOTE 2 - SUMMER ONLY
NOTE 3 - MANAGED BY BMP

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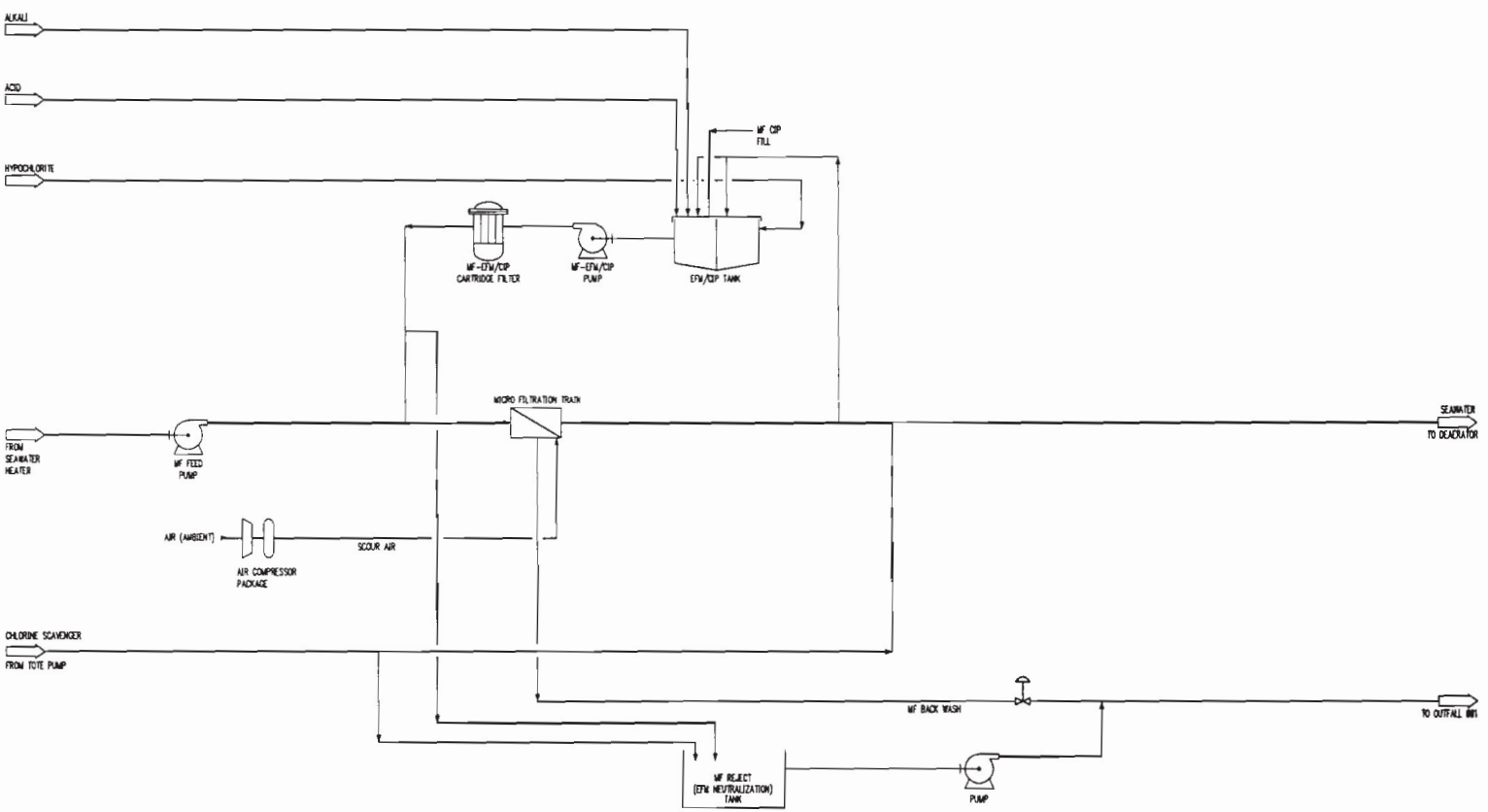
TITLE OF DRAWING:

ENDICOTT NPDES PERMIT APPLICATION ENDICOTT ISLAND SEAWATER TREATMENT PLANT OUTFALL ØØ1

DRAWING NUMBER	REV	SHT
EXHIBIT IIA-2	—	—

WORK ORDER: — MOD: OF —

NO.	DATE	REVISION	BY	CHK	APP	NO.	DATE	REVISION	BY	CHK	APP



LEGEND:
CIP - CLEAN IN PLACE
EFM - ENHANCED FLUX MANAGEMENT
MF - MICRO FILTRATION

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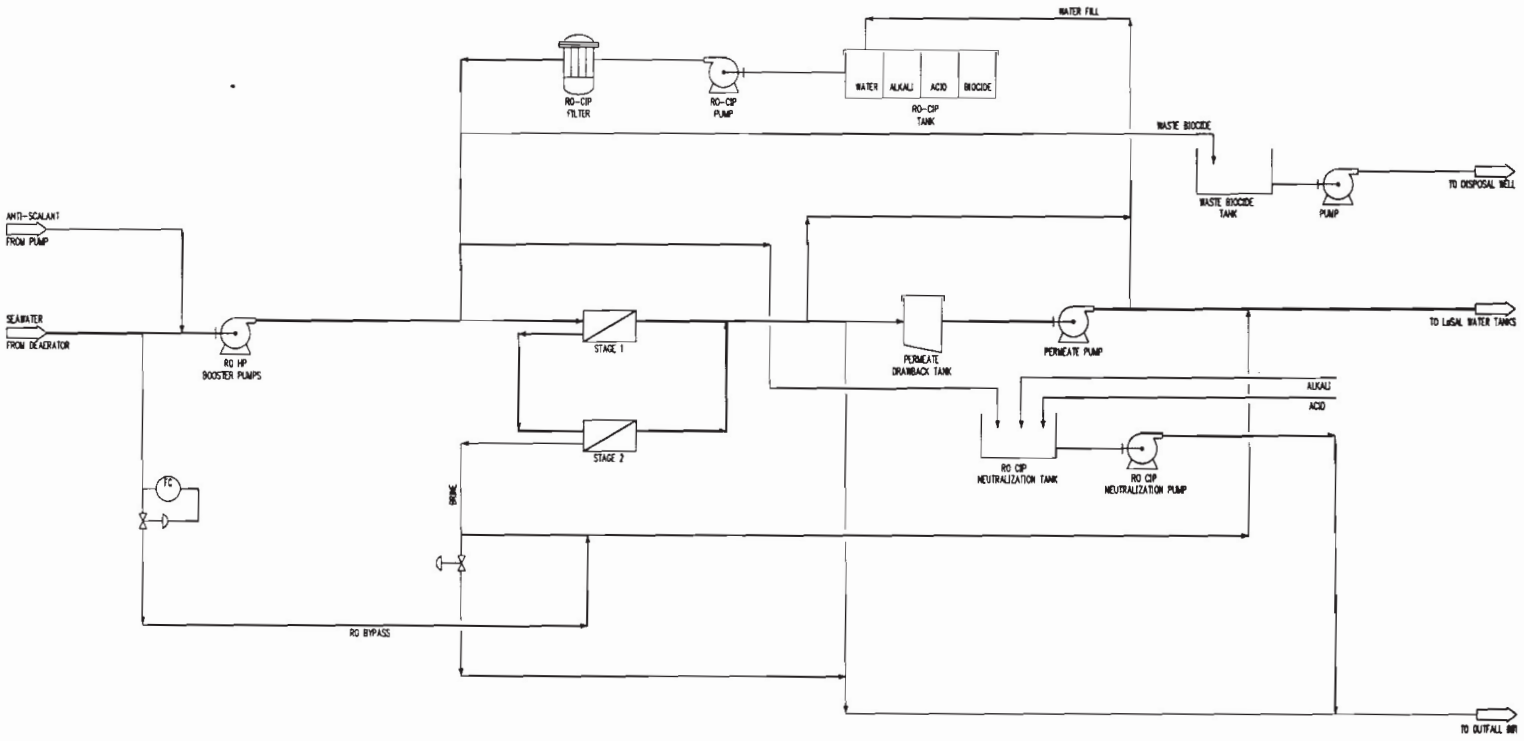
TITLE OF DRAWING:
ENDICOTT NPDES
PERMIT APPLICATION ENDICOTT ISLAND
SEAWATER TREATMENT PLANT OUTFALL 001

DRAWING NUMBER	REV	SHT
EXHIBIT IIA-2 DETAIL "A"	–	–

WORK ORDER: –
MOD:
OF –

NO.	DATE	REVISION	BY	CHK	APP	NO.	DATE	REVISION	BY	CHK	APP



LEGEND:
CIP - CLEAN IN PLACE
RO - REVERSE OSMOSIS

bp

TITLE OF DRAWING:

ENDICOTT NPDES PERMIT APPLICATION ENDICOTT ISLAND SEAWATER TREATMENT PLANT OUTFALL ØØ1

DRAWING NUMBER	REV	SHT
EXHIBIT IIA-2 DETAIL "B"	–	–
WORK ORDER: –	MOD:	OF –

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER (list)	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT	
	a. OPERATION (list)	b. AVERAGE FLOW (include units)	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1
001	Combined Wastewater	6,300,000 gallons per day (gpd)	Screening	1-T
			Multimedia Filtration	1-Q
			Microfiltration	
			Chlorine Disinfection	2-F
			Dechlorination	2-E
			Flocculation	1-G
			Scale Inhibitor	2-K
			Heating	
			Antifoamer	
			Reverse Osmosis	1-S
			Ocean Discharge Through Outfall	4-B
001A	Sanitary Wastewater	11,500 gpd	Screening	1-T
			Pre-aeration	3-E
			Aerobic Digestion	5-A
			Clarifying	1-U
			Filtration	
			Chlorination	2-F
			Dechlorination	2-E
			Ocean Discharge Through Outfall	4-B
			Mixing (Equalization Tank)	1-O
002	Continuous Flush System	2,900,000 gpd	Heat Treatment	
			Ocean Discharge Through Outfall	4-B

OFFICIAL USE ONLY (effluent guidelines sub-categories)