Attachment 2D
Additional Information for NPDES Permit Application

Application for Permit to Discharge Process Wastewater

Form 2D

Application Section VII.

Description of intake water and outfall

SCV Combustion Water

Water from the submerged combustion vaporizers (SCVs) is generated as a result of condensation of water in the exhaust gas stream which passes through the water bath. Additionally, some combustion gases (e.g., nitrogen oxides, or NO_x) will dissolve in the water bath, making it slightly acidic. In order to neutralize the water bath, an alkaline (sodium carbonate) solution will be added. The pH of the water in the water baths will be continuously monitored and adjusted. The design duty overflow of water from a single SCV is 6.3 m^3/hr (1,664 gal/hr, 39,936 gal/day, or GPD). With an average of five of the eight SCVs operating daily, this corresponds to a water production of 199,680 GPD.

The combustion water leaving the SCV overflow will be utilized as service/potable water, with any excess discharged to the sea. No water treatment is anticipated for either disposal to sea or for use as service water.

Nitrates are produced when dissolved NO_x is neutralized. A typical concentration of nitrates expected in the effluent would be 5 mg/l. The USEPA regulations on drinking water quality permit a maximum nitrate concentration of 10 ppm (10 mg/l). Consequently, no treatment for nitrates is deemed necessary.

To inhibit corrosion of stainless steel components within the SCV, an automatic pH control system will be provided to maintain the pH in the water between 6 to 9. The system will be comprised of a storage hopper containing 50 tons, or three months' supply, of anhydrous sodium carbonate (Soda Ash; Na_2CO_3). Storage capacity is based on a normal natural gas send-out rate. The hopper will be nitrogen purged to inhibit water absorption. Sodium carbonate will be loaded into the storage hopper by pneumatic conveying equipment. Two agitated sodium carbonate solution tanks will mix the sodium carbonate with service water to a 12% solution. This strength represents the saturation point at 54^oF. Each tank will hold one day's supply. Pumps will circulate the sodium carbonate solution around a ring main. The SCV control system will automatically draw the required amount of solution to maintain pH in the water bath.

Based upon this scenario, the water quality that can be anticipated from the SCV water bath, per vendor specifications, would be:

Nitrate	5mg/l
Sulfates	Maximum sulfate per the feed water. Minimum will be close to zero as the water is diluted by the water generated from the combustion process.
Sodium	50mg/l
Total Dissolved Solids	Will depend on the feed water. Due to dilution by the water generated from the combustion process TDS will fall to a minimum. Typical measured value is 485mg/l

Service/Potable water

Service/potable water is sourced from the SCVs water overflow. The water overflow is pumped to the FSRU's fresh water storage tanks, with excess water from the SCVs diverted directly to sea. The water is suitable for use as service water without treatment. Some of this service water will be diverted for urea mixing to use as NO_x control on the power generator engines.

For potable water, service water will be treated with ultraviolet light (UV) in a UV oxidation unit, then filtered through a 1-micron filter, then filtered again through an activated charcoal filter. This method avoids the need for storing or using chlorine gas or sodium hypochlorite onboard the FSRU.

Gray Water Discharge

Gray water from the living quarters, such as water from showers and sinks, will be accumulated for onboard treatment and discharge. Gray water will be treated using filtration to separate particulate matter, and UV oxidation to destroy dissolved organic materials. Water discharge of the treated gray water will be in conformance with the NPDES permit, at an average flow of 2,625 GPD (Figure 2D-1). This flow rate is based upon an average water use of 75 gallons per day per person, for an operating staff of 35. The maximum usage would be 100 gallons per day, or a 3,500-GPD discharge from the gray water outfall.

Stormwater Discharge

The stormwater outfall will discharge treated water from the oil-water separator at the facility. Oily water is rainwater and washdown water drainage that is captured by equipment skid drain pans. The rotating equipment on deck that requires lube oil will be equipped with drain pans, including boil-off gas compressors, booster pumps, and hydraulic equipment such as the material handling cranes (Figure 2D-2). An open drain system will collect stormwater, wash water or other fluids that might collect on the equipment skids. The drains will flow to the oil-water separator. The capacity of the drain system will be designed to handle the expected maximum rainfall rate that would be captured by the equipment skids. Annual average rainfall in the Project location is measured at 13.9 inches per year, with a maximum of 29 inches and a

minimum of 4 inches per year. The outfall will have an average discharge rate of 1.73 million gallons per year through the oil-water separator. This rate represents the average discharge anticipated during an average year of storm events, based upon the deck surface area of the FSRU (199,854 ft^2). The maximum rate per storm event would be 12,900 GPD, based upon an instantaneous storm event equivalent to a 2-year storm in the Oxnard Plains of 2.5 inches within 24 hours. Equipment washdown will not occur during a storm. No free oil will be discharged. Oil and engine waste, including lube oil, hydraulic fluid, and engine coolant, will be collected and transferred to waste oil tanks for eventual transport to an onshore reclaiming facility. The separated water would be discharged from the storm outfall.