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AIR QUALITY ANALYSIS OF THE PROPOSED ENGINEERING REFINEMENT TO THE KUPARUK RIVER UNIT

Submitted by:

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Submitted to:

State of Alaska

Department of Environmental Conservation

and

U.S. Environmental Protection Agency Region X

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EXECUTIVE SUMMARY

The Kuparuk River Unit Owners are proposing a modification to the source inventory for the Kuparuk River Unit (KRU) to reflect current engineering design refinements proposed for the KRU. The proposed KRU engineering design refinements indicate a need for 395 MM Btu/hr of heater capacity and 10 MHP of turbine capacity. This requirement for heater and turbine capacity will be balanced by deletions of previously permitted, but currently non-essential, heater and turbine capacity in the KRU.

The purpose of this document is to request an administrative change to the Prevention of Significant Deterioration (PSD) permit issued for the KRU to incorporate the proposed Engineering Refinement to the KRU. To support this request an air quality impact analysis was performed to assess any air quality impact changes resulting from the proposed Engineering Refinement. The maximum predicted impacts for nitrogen dioxide (NO_2), total suspended particulate matter (TSP), and sulfur dioxide (SO_2) decreased for all averaging times.

Emissions of total hydrocarbons (THC) and carbon monoxide (CO) will decrease for the Engineering Refinement to the KRU. Since previous analyses for the impacts of ozone (O_3) and CO were extremely conservative, previously predicted impacts of O_3 and CO remain valid and were not repeated.

The predicted air quality impacts due to the proposed Engineering Refinement to the KRU will not approach any National Ambient Air Quality Standard (NAAQS) or PSD increment.

3.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

Design refinements in the Kuparuk River Unit result in minimal changes to the emissions from the facilities. Since there have been no increases in the level of emissions, the types of emitting sources, or other factors which might affect the choice of emission control technology, the emission controls proposed in the February 1983 permit application still represent BACT. For comparison, both the total potential emissions for the February 1983 permit application and the currently proposed emissions are shown in Table 3-1.

In the interest of clarity, the emission controls proposed as BACT are repeated here. The discussion of alternative controls and justification of the proposed BACT can be found in the original permit application.

Proposed Controls Representing BACT

An analysis has been performed to determine BACT for the proposed facilities in a manner consistent with national and EPA Region X guidelines. The two major types of emitting sources are turbines and heaters. While these combustion sources emit significant amounts of particulate matter (PM), sulfur dioxide (SO_2), carbon monoxide (CO), and hydrocarbons (HC), the pollutants of greatest concern are the oxides of nitrogen (NO_x). BACT for gas turbines and heaters was determined according to the precedents set in the Unit Owner's PWI/LPS/AL and Waterflood permits (Permit Nos. PSD-X-80-09 and PSD-X-81-01). The controls proposed as BACT are summarized below.

Turbines

NO_x emissions from the gas turbines are controlled by use of natural gas and dry controls incorporated into the combustion chamber design. This combination will meet the NSPS[1] limit of 150 x (14.4/Y) ppmv of NO_x in the

[1]New Source Performance Standard, Standards of Performance for Stationary Gas Turbines, Subpart GG, September 10, 1979. Y = manufacturer's heat rate at manufacturer's rated load.

TABLE 3-1. PROPOSED EMISSIONS DUE TO ENGINEERING DESIGN REFINEMENTS TO KUPARUK RIVER UNIT

Pollutant	February 1983 Permitted Emissions (t/y)	Currently Proposed Emissions (t/y)	Significant Level (t/y)
CO	2,789	2,564	100
NO_x	14,122	12,926	40
SO_2	85	84	40
PM	344	340	25
VOC	51	47	40[a]

[a]VOC (Volatile Organic Compound) emissions were conservatively assumed to be 10 percent of total hydrocarbon emissions.

exhaust and should be considered BACT. Other pollutants from the gas turbines are also limited by the choice of fuel (low sulfur, low ash).

Heaters

The NO_x emissions from heaters will be minimized by burning natural gas. This fuel choice also limits emissions of SO_2 and PM since natural gas contains very little sulfur and ash forming material. The emissions of all pollutants will be limited by periodic measurements of CO or O_2 in the flue gas to ensure proper combustion conditions.

Combined Waste Incinerator

In addition to the major emission sources (turbines and heaters), a multiple chamber refuse incinerator is included in the KRU design. The incinerator will combust about 765 pounds per hour of general refuse. The proposed incinerator will comply with Alaska air quality control regulations. These regulations include a visibility reduction limitation (may not exceed 20 percent opacity for three minutes in any one hour) and a particulate matter emission limitation (0.15 grains per standard cubic foot of exhaust gas corrected to 12 percent excess CO_2). The combination of adequate additional air and combustion temperature, a properly designed mixing chamber, and/or secondary burners will be used to minimize emissions. No additional controls are proposed as BACT for the incinerator.

Besides the combustion-related emissions, there will be fugitive hydrocarbon emissions from process equipment. The process fugitive emissions will be minimized.