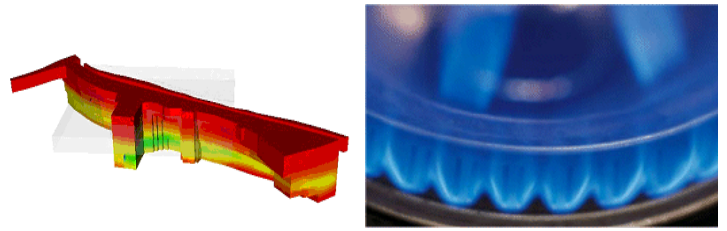


Cold Water Plume Modeling LNG Revaporization Facility

ExxonMobil, Sabine Pass, Texas



Situation

The purpose of this study was to compute the dimensions of the cold water plume at proposed ExxonMobil LNG terminal and compare those dimensions to standards available from various agencies. The computations were done for a single configuration of the intake and discharge structures and two process cases: “Coldest Seawater” and “Warm Seawater”.

Approach

A three dimensional hydrothermal model, GEMSS® (Generalized Environmental Modeling System for Surfacewaters) was used to model the discharge at Sabine Pass. GEMSS-HDM (Hydrodynamic Module) computed detailed currents, salinities and temperatures over an area encompassing the intake and discharge locations using observed tides and winds and the proposed plant pumping rates and temperature changes. Model results were displayed using the GEMSS® built-in GIS component. GEMSS-TAM (Thermal Analysis Module) was used to predict the cold water plume dimensions.

The model simulated the thermal plume discharge. The intake and outfall locations, discharge flow rate, velocity and temperature change were used to predict the resulting thermal plume. Since water quality standards are not available for cold water plumes, the modeled plume dimensions were compared with standards available from various other agencies, including World Bank Standards. Because of the varying plume sizes, a probabilistic method was used to estimate the plume dimensions. For summer simulations, a significant temperature plume was predicted. Though the two scenarios were demonstrated to be in full

compliance with the width standards in the Port Arthur Canal, both predictions showed exceedances against the World Bank Standard for the 95% probability temperature depression.

Results

The modeled cold water plumes were used by the client for making strategic decisions regarding the feasibility of construction of this facility. Alternative designs were proposed to increase the temperatures of the effluent in order to meet compliance.

