



Big Lake North SRS Bilge Water Feasibility Study



Project Location

North SRS boat launch facility in Big Lake, AK



Background

- Big Lake is listed as an impaired waterbody by the Alaska Department of Environmental Conservation (ADEC) due to high levels of Total Aromatic Hydrocarbons (TAHs)
- These high levels are generally linked to boat traffic and disposal of bilge water
- Lowering the TAH levels is necessary to minimize harm to aquatic life and swimmers at Big Lake

Design Criteria

The following criteria was provided by the Department of Natural Resources—Division of Parks and Outdoor Recreation:

- Reduce pollutants in bilge water to acceptable levels
- Consider system with low operational/maintenance costs
- System should minimize waste haul-out requirements
- System should be user friendly to boaters

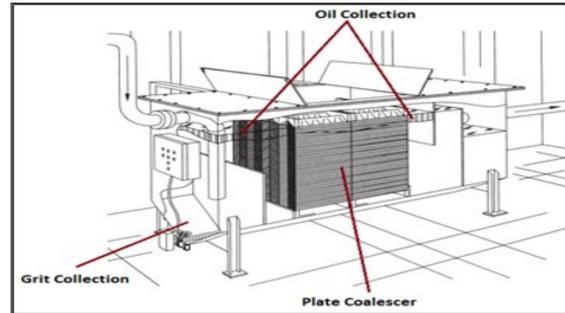
Literature Review

The following literature was reviewed and ultimately incorporated into the design of our system:

- ADEC study concerning TAH levels in Big Lake
- EPA bilge water study relating to bilge water production of ocean faring vessels
- Wisconsin study which determined the effect of motorized watercraft on aquatic species

Design

Design A



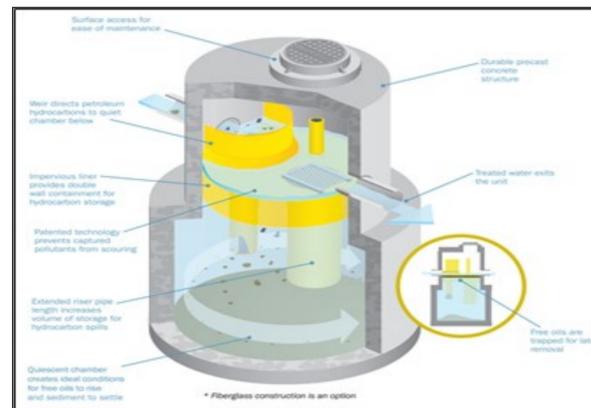
Design A is an Oil Water Separator (OWS) which uses plates to coalesce small oil Droplets. These oil droplets then collect in a holding tank for future disposal.

Considerations:

- The collection process will require a small ditch with a steel grate covering to collect bilge water.
- A dockside water pump would be required for boats not exiting the water at the launch.
- This system is installed aboveground, and should be as close to the dock as possible.
- The water returning to the lake will require additional purification to meet ADEC standards. An attachable granular activated carbon (GAC) unit would suffice.

Item	Pay Unit	QTY	Unit Price	Total Price
Removal of asphalt	SY	133	\$17.00	\$2,266.67
Concrete Apron	SY	133	\$300.00	\$40,000.00
18" CPEP	LF	150	\$63.00	\$9,450.00
OWS	EA	1	\$13,000.00	\$13,000.00
300 Gallon Tank	EA	1	\$1,500.00	\$1,500.00
GAC unit	EA	1	\$3,000.00	\$3,000.00
Mobilization	LS	1	\$10,000.00	\$10,000.00
Seeding	SY	28	\$50.00	\$1,388.89
Extras	LS	1	\$10,000.00	\$10,000.00
				Total \$85,000.00

Design B



Design B is a gravity controlled oil and grit separator (OGS) with a coalescing structure. It utilizes centrifugal force and non-turbulent flow to separate oil and grit that are suspended in water.

Considerations:

- This system also requires a ditch and steel grate to collect bilge water.
- When tested by Coventry University, the Stormceptor product line removed 97.8% of the suspended oil from water.
- This system is installed underground, and should also be close to the dock. The outlet flow should be on the East side of the dock, away from the swimming area.

Item	Pay Unit	QTY	Unit Price	Total Price
Removal of asphalt	SY	133.3	\$17.00	\$2,266.67
Borrow	CY	138.9	\$10.00	\$1,388.89
Concrete Apron	SY	133.3	\$300.00	\$40,000.00
18" CPEP	LF	150	\$63.00	\$9,450.00
Oil Grit Separator	EA	1	\$67,095.86	\$67,095.86
Mobilization	LS	1	\$20,000.00	\$20,000.00
Seeding	SY	27.78	\$50.00	\$1,388.89
				Total \$140,000.00

Engineering Analysis

The volume of bilge water expected was calculated with the following assumptions:

- The projected number of boats was linearly extrapolated from data showing number of boats in years 2011 and 2013, then projecting to year 2037.
- The majority of water collected in a boat's bilge is rainwater, with a 1:1000 oil/water ratio.
- It was assumed that boats 30% covered.
- The average rainfall is roughly 7.5 in./summer.



(Davis et al., 2014)

Scope of Work

- Determine the feasibility of constructing an onsite bilge water treatment system at Big Lake North SRS

Environmental Considerations

- The water returning to the lake after treatment must have a hydrocarbon concentration of less than 10 ppb.
- The highest observed TAHs concentrations occur during holiday weekends, and are significantly higher by the North SRS boat launch ramp
- Permits must be obtained if system is within 200 ft. of existing wells or 100 ft. of the lake shore.



Recommendations/Conclusions

- It is recommended that more data on the number of boats using Big Lake North be collected. Two years is insufficient data.
- It is also recommended that the financial feasibility of a buy back program for old engines be studied.
- Further support for the current efforts of Cook Inletkeeper is recommended; it appears that boater awareness is crucial to this issue.
- Moving the designated swimming area further away from the boat launch ramp is recommended.



Project Team



From left to right:
Rys Miranda (DNR-DPOR), Claire Cropper (PM), Peyton Briggs, Kieran Braun, Dr. Osama Abaza. (not pictured, Miles Allen)