NALCO

Mr. Jay Hamilton

CC. Mr. Jim Rosser

I appreciate you allowing us to assist you all in choosing the appropriate chemistry for your cooling water program for the Lightning Dock Project. As we have discussed, the nearby Tilapia hatchery is going to be of primary concern when determining which chemistries will be suitable for this system. Although contamination is not likely, it is important to protect the environment from even the slightest possibility of toxic conditions.

The primary operational concerns that need to be addressed in the cooling water will be Corrosion, scaling, fouling, and microbiological contamination$_{(c,s,f,m)}$. The appropriate chemistry for each concern has been specified below with an explanation of why we need to utilize each in efforts to guarantee the safety of the Tilapia. Our laboratory studies have not been tested on Tilapia specifically so we have referenced the results for a similar fish, the Fathead Minnow. Fathead minnow is also a warm freshwater species that shares tilapia's geographical/climate distribution. Tilapia is also a hardy fish, similar in sensitivity to the fathead minnow and even hardier since it can tolerate extreme conditions such as lower oxygen concentration and higher temperatures.

3DT189$_{(c,s,f)}$ – This is a multifunctional corrosion, scale, and deposit control chemical that is designed to eliminate the variability in feeding separate chemicals to control individual tasks. By feeding one chemical we will eliminate a great deal of the risk of overfeeding any individual components that could potentially be hazardous if introduced to the water table. This product has a Fathead Minnow 96-hr LC50 of 3,750 mg/L or ppm. Based on toxicity categorizations from the US EPA, this product can be seen as practically non-toxic to fish. We have designed a system that will allow you all to provide real-time control of the effluent at an exact residual concentration that is proposed at 80 ppm. In the event that this residual is exceeded the controller's communication port will send an alarm to each of the Nalco representatives as well as plant personnel via email or telemetry. As previously stated, this product is practically not toxic with critical limits much greater than the recommended dosage.

Nalco 3DT189:

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Fathead Minnow	96 hrs	3,750 mg/l	Product
Rainbow Trout	96 hrs	1,830 mg/l	Product

*See MSDS and product bulletins for additional product specifications

Bleach$_{(m)}$ – This chemical will be used for daily biological control. Operational personnel will be monitoring the free residual along with ORP monitoring and reporting to maintain the recommended 0.20 - 0.30 free halogen residual. Chlorine scavenger feed system will be readily available to scavenge excess halogen as necessary. I have attached the toxicity data for bleach although it does not specify the Fathead Minnow or Tilapia, but for

BEFORE THE OIL CONSERVATION DIVISION
Hidalgo, New Mexico
Case No. 14246..... Exhibit No. 13
Submitted by:
RASER POWER SYSTEM, LLC
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rainbow trout (a much more sensitive species, hence protective of fish health in general), and of the bluegill sunfish, that akin to the fathead minnow lives in similar geographic and climatic areas as the tilapia. The inland silverside is an estuarine/marine species, and as a rule of thumb is typically more resistant than freshwater species to chemical effects. All fish tested prove to have a much higher toxicity residual than your operation will involve. Toxicity data for LC50 show exposure limits to 96 hours while your system should have real-time data monitoring and alarming capabilities to scavenge excess residual immediately when necessary.

Bleach – Cont'd

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Rainbow Trout	96 hrs	1.94 mg/l	Product
Bluegill Sunfish	96 hrs	5.3 mg/l	Product
Inland Silverside	96 hrs	16.88 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	1.57 mg/l		Product
Mysid Shrimp (Mysidopsis bahia)	96 hrs	33.76 mg/l		Product

Towerbrom 960$_{(m)}$ - A supplemental biocide is recommended for periods of high biological activity. This biocide has been shown to provide excellent biological remediation and is the choice remedial biocide when there is any chance of exposure to wildlife. This product has a Fathead Minnow LC50 of 0.70 mg/L or ppm as product at 96 hours of exposure. This product will also allow complete control for oxidant scavenging as a precautionary measure before re-injection takes place.

Towerbrom 960:

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Fathead Minnow	96 hrs	0.7 mg/l	50% Active Ingredient
Sheepshead Minnow	96 hrs	3.42 mg/l	
Inland Silverside	96 hrs	2.7 mg/l	50% Active Ingredient

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	2.5 mg/l		50% Active Ingredient
Mysid Shrimp (Mysidopsis bahia)	48 hrs	3.54 mg/l		
Mysid Shrimp (Mysidopsis bahia)	96 hrs	4.4 mg/l		50% Active Ingredient
Ceriodaphnia dubia	48 hrs	1.02 mg/l		Product

*See MSDS and product bulletins for additional product specifications

The chosen products all have the ability to be closely controlled and monitored to insure safe effluent chemistry. Each product has negligible critical limit or will be limited to stay much below contaminant limits. This program has been determined to be the optimum choice when there is risk of exposure to wildlife habitat, fresh water, surface water or groundwater sources. The cooling water chemistry should prove harmless to wildlife and other surroundings through continuous monitoring and this environmentally conscious approach to preserving the quality of the cooling water system.

The following chemical will serve as the oxidant scavenger used to guarantee effluent limitations are not exceeded.

Nalco 7408 – As a precautionary measure, a Nalco 7408 feed system will be set up to scavenge any excess residual oxidant prior to effluent re-injection. This product is capable of scavenging any free oxidant at a very low dosage. Typical free chlorine residual due to bleach and Towerbrom 960 feed will be between 0.20 and 0.30 mg/L or ppm. Nalco 7408 will be fed at 3.66 ppm per ppm of free oxidant to be scavenged. This will bring the theoretical maximum dosage of Nalco7408 to less than 10 ppm. This product has a Fathead Minnow LC50 of 382 mg/L or ppm as product at 96 hours of exposure. Critical limits are so much greater than maximum expected dosage that contamination with this product should not be a concern.

Nalco 7408:

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Rainbow Trout	96 hrs	> 100 mg/l	Product
Fathead Minnow	96 hrs	382 mg/l	Similar Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	275 mg/l		Product
Daphnia magna	48 hrs	728 mg/l		Similar Product

*See MSDS and product bulletins for additional product specifications