Memorandum

DATE:	**August 12, 2009** Refer to File No.: 1009-002-06
TO:	**Chris Hanks, Director, Environmental and Social Responsibility**
	Bill Paterson, Manager, Environmental Compliance
	Jill Turk, Environmental Technician, Environmental and Social Responsibility
FROM:	**Kevin Esseltine, Fisheries Biologist**
CC:	**Deborah Muggli (Project Manager); François Landry (Manager of Fisheries Services)**
SUBJECT:	**Reconnaissance Survey of Potential Water Source Lakes in the Gas Cache Lake Area**

Introduction

Rescan fisheries biologists were requested to conduct a reconnaissance survey of fish habitat at two lakes in the Gas Cache Lake area, Hope Bay Belt Project. These lakes were suggested as potential water sources for Newmont's drilling activities in the Project area. This report is intended as a memorandum to provide Newmont with fish habitat information to support an application for a water use permit.

Methods

A reconnaissance survey of the two lakes was conducted on August 6, 2009 by Kevin Esseltine (Fisheries Biologist). Lake 1 is known locally at Gas Cache Lake. Lake 2 is unnamed and located approximately 5 km north of Gas Cache Lake. A map of the lakes was provided by Jill Turk (see attached map).

An aerial survey of each lake was conducted with a helicopter. During the aerial survey, observations of littoral zone depth, substrates, important habitat features (e.g. shoals), and lake inlets and outlets were recorded. Aerial photographs were taken to document the above habitat features.

A survey of each lake outlet was conducted following the aerial survey. Fish habitat at the outflow stream was assessed for all life stages (e.g. spawning, rearing, overwintering, adult feeding) and overall stream habitat quality was rated (e.g. none, marginal, important, or critical).

Results

Lake 1 (Gas Cache Lake)

Aerial observations of Gas Cache Lake (Plate 1) demonstrated that the majority of the lake's littoral zone is located on the eastern portion of the lake. Potential spawning habitats (e.g. rounded cobble substrate) were identified on this shoreline (Plate 2). The western shoreline; however, was predominantly bedrock substrate with relatively less littoral zone. Generally, the eastern shoreline is likely more productive fish habitat compared to the western shoreline. Mid-lake shoals were not observed during the aerial flight.

The outlet of Gas Cache Lake (Plate 3) was surveyed for important fish habitat features. Ninespine stickleback were observed in high abundance at the lake outflow. One adult lake trout and one juvenile cisco (Plate 4) were also observed at the mouth of the outflow. An abundance of emergent and submergent aquatic vegetation was observed at the site, which provides cover for fish (Plate 5). Stream substrate consisted of predominantly of sand and fine materials with some overlying organic deposits. Coarse substrates were not observed.

Due to the abundance of cover, the outlet stream provides good rearing habitat for all species. Spawning habitat in the outlet was rated as good for ninespine stickleback, while spawning habitat for other species was not present. Overall, the outflow was rated as important for its high productive capacity and habitat to support ninespine stickleback for all life stages.

Lake 2

Aerial observation demonstrated that Lake 2 is very shallow with significant littoral habitat and one large mid-lake shoal (Plate 6). Only one small inlet and one outlet were observed. Littoral habitat consisted predominantly of bedrock and large boulders, with fine clay substrates (Plate 7 and Plate 8). A high sediment load was observed throughout the lake. Thus, much of the littoral habitat was rated as marginal.

The outflow stream was very shallow at the time of survey, with depths ranging from 6 cm to 21 cm (Plate 9). Stream bed substrate was completely organic material overlying fine clay. Cover for fish consisted of semi-aquatic grasses and overhanging vegetation. Several ninespine stickleback were observed using the lake outflow. Other fish species were not observed at the outlet. Ninespine stickleback habitat was rated as fair for rearing, poor for spawning, poor for migration, and none for overwintering. Overall, fish habitat at the outlet was rated as marginal.

Discussion and Summary

Reconnaissance surveys of the two lakes proposed as additional water source lakes were found to be fish-bearing waterbodies. Gas Cache Lake supports habitat for a minimum of three fish species (lake trout, cisco, and ninespine stickleback), while Lake 2 was found to support ninespine stickleback at a minimum. Shoreline shoals that could be used for spawning were present at Gas Cache Lake, while the shoreline habitat at Lake 2 was rated as marginal. The outlets for each lake supported fish. The outlet of Gas Cache Lake was particularly productive. Lake trout and cisco observed using habitat along the lake margin, while ninespine stickleback were observed in high abundance in the outlet stream.

We trust that this memorandum provides general fish habitat information to support Newmont's application for a water use permit. If you have any further questions regarding this subject please contact me at your earliest convenience.

Sincerely,

Kevin Esseltine, M.Sc.

cc. Deborah Muggli
François Landry

Plate 1. Aerial view of Lake 1 (Gas Cache Lake).

Plate 2. Potential lake trout spawning habitat located on the eastern shore of Lake 1 (Gas Cache Lake).

Plate 3. Outlet of Lake 1 (Gas Cache Lake).

Plate 4. Juvenile cisco captured at the mouth of Lake 1 (Gas Cache Lake) outflow.

Plate 5. Aquatic vegetation providing cover for ninespine stickleback.

Plate 6. Aerial view of Lake 2. Note the large mid-lake shoal.

Plate 7. Representative habitat along the shore of Lake 2.

Plate 8. Bedrock and large boulder substrates with clay deposition.

Plate 9. Stream habitat at Lake 2 outflow.

Regional Drilling Targets - Gas Cache Area