DRAFT MEETING MINUTES

NANISIVIK MINE ENVIRONMENTAL EFFECTS MONITORING
TAP STUDY DESIGN TELECONFERENCE

Thursday, December 11, 2003
11:00 a.m. to 12:30 p.m.

Attendees:

Robert Carreau	Breakwater Resources Ltd.
Murray Markle	Nanisivik Mine
Malcolm Stephenson	Jacques Whitford Environment Limited
Dionne Filiatrault	Nunavut Water Board, Gjoa Haven
Meighan Wilson	Indian and Northern Affairs Canada, Yellowknife
Christopher Baron	Freshwater Institute, Fisheries and Oceans Canada, Winnipeg
Stephen Harbicht	Environment Canada, Yellowknife
Jenny Ferone	Environment Canada, Edmonton

Regrets:

Colette Meloche	Environment Canada, Iqaluit
Anne Wilson	Environment Canada, Yellowknife

Introductions

- Attendees introduced themselves. Malcolm confirmed that all TAP members had received the memorandum and background letters he had provided by email the week before. Malcolm suggested working through the memorandum in order, by section.

A) Section 2.0 Background

2.3 Water Quality Monitoring:

- Jenny clarified the requirement for water quality monitoring to be conducted four times per calendar year (not less than one month apart) from the exposure area surrounding the point of entry of effluent into water from each final discharge point and from related reference areas, as well as at the same time and in the same location as the biological monitoring, if this latter location does not correspond to the water quality monitoring stations.

2.4. Effluent and Water Quality Monitoring Report:

- Jenny clarified the timeline for Recognized Closed Mine is 36 months, therefore that monitoring should continue for 36 months from July 30, 2003 (date the letter of intent to become a recognized closed mine was received by the AO), to July 2006.

B) Section 3.0 Application of the MMER to Nanisivik Mine

3.1 Effluent and Water Quality Monitoring:

- The TAP agreed that if no effluent was being discharged from the East Adit Final Discharge Point, then no monitoring would be required at that point, but that if effluent discharge were to resume, then effluent characterization, sublethal toxicity testing, and water quality monitoring (in the exposure and related reference area) would be required.

- Currently water quality has been monitored at the exposure area surrounding the West Twin Lakes final discharge point (159-4). Composite samples have been collected across the stream during the open water season of 2003. The question was raised as to whether or not the water quality monitoring exposure area could be moved to 159-9 (about 1.5 km downstream) from the current location at the area surrounding the final discharge point (159-4). Jenny explained that the TAP would review the 2003 water quality data when it was submitted in March 2004, and re-visit the request at that time. *Malcolm:* Was it confirmed that monitoring will now be conducted at 2 (¼ and ¾ distance) locations in the stream?

- Steve asked about flow conditions in West Twin Creek: Murray confirmed flow was generally high and then tapered off throughout the summer, but that 2003 was slightly different due to a big storm in August. Bob explained that the creek's flow is variable when effluent is being discharged (beginning early July).

3.2 Benthic Invertebrate Study:

- Malcolm gave an overview of the study design for the benthic invertebrate community. Generally the TAP agreed with the approach, with some clarifications: 1) Jenny clarified the definition of the terms "area" vs. "station". 2) The minimum distance between stations was discussed. Malcolm proposed station spacing at 5 m intervals. The EEM guidance generally states the minimum guidance between

stations is 20 m, however since the dimensions of the creek are small, the TAP recognized that spacing may have to be less than this. Malcolm will look into what maximum spacing will be achievable for the benthic survey and present this in the Study Design (Malcolm, is this what you noted as well?). 3) Malcolm confirmed that the results from the 2 sets of near field stations (located at ¼ and ¾ width across the stream) would not be pooled, but would be presented separately. 4) The TAP agreed that they are comfortable with a visual estimation of particle size (with photos) for the benthic survey (with photos) since no fines are present in substrate of upper Twin Lakes Creek .

Action Item: Jenny will confirm with the National EEM Office that since no fines are present in substrate of upper Twin Lakes Creek, a visual estimation of particle size, with photos will meet EEM requirements.

Section 3.3 Adult Fish Survey: The remainder of the teleconference focused on the EEM Adult Fish Survey requirement, and how this could be best met given the site specific factors at Nanisivik mine. The following points were discussed:

- Malcolm explained that Twin Lakes Creek is a high gradient stream with a series of falls (barriers) and is naturally fishless. The first location where fish are present is downstream in the marine environment. However, due to other influences on the stream (e.g. sulphide and metals loading in an old mined area, a small sewage source from the townsite, the mine feels the environment is confounded by other factors by the time flow reaches Strathcona Sound.

- The mine feels the legalities and costs associated with conducting a mesocosm study (an approved EEM alternative to the AFS) are prohibitive.

- Jenny reviewed the structure of the EEM program, with the goals of each phase. For the metal mining EEM program, successive EEM studies should answer the following 4 questions: 1) is there an effect; 2) is the effect mine related, 3) are the magnitude and geographical extent of the effect known and 4) is the mine related cause of the effect known. The first EEM study at Nanisivik need only address whether or not effects are found. In order to confirm whether or not any effects found are related to the mine effluent (to address the next question), a second EEM study would be designed around any confounding factors as best as possible, which in some cases may mean using alternative methods (e.g. mesocosms, caged bivalves). Since Nanisivik intends to become a recognized closed mine, the first EEM study will be the last EEM study, the aim of this study only need evaluate the first question:

is there an effect? Therefore, a marine wild fish survey, even if it did not address all confounding factors, would be acceptable to the TAP.

- Steve gave a description of the aquatic environment based on his field experience in the area.
    - Large numbers of sculpin (primarily shorthorn sculpin and fourhorn sculpin) were caught in the past using gill nets in the area between the dock and the mouth of the creek. Steve, do I have the location correct?
    - That there were at least 2 species of bivalves in the area, with beds of shellfish near the dock.
    - Abundant sculpin populations have also been observed across the Sound at the inflow of Strathcona River (*? Steve, please confirm the name),* and could be a potential reference area for a marine fish survey.
- The pattern of effluent mixing within Strathcona Sound was discussed:
    - Malcolm expressed his concerns with the degree of mixing between the freshwater and marine water, and that if the freshwater layer remains at the surface that fish may not be exposed to effluent.
    - Steve recalled that the freshwater remains at the surface during the spring, but that there is a lot of tidal action and currents in the area that influence mixing. It was suggested that perhaps later in summer, possibly as the temperature differences between the freshwater and seawater lessen, more mixing occurs.
    - Steve recalled observing the effluent plume moving from the south shore outwards with the tides.
    - The TAP asked how far offshore the stratification occurs, and Malcolm explained that during the reconnaissance last summer, melting ice contributed to the freshwater surface layer and likely extended across most of the Sound (Malcolm, is this what you have as well?) The sound is 50-60 feet deep within 100 m offshore.
    - Steve explained that they set their nets right offshore near the mouth of the creek, where it was not as deep.

- Fish Survey Alternatives were discussed:
    - Malcolm suggested using the Inland Silverside Sublethal Test two times per year as an alternative for the fish survey, using water from the mouth of the creek.
    - The TAP asked for details re: test length. Chris asked for clarification on the test endpoints that would be generated. The TAP expressed some concern that only survival and growth endpoints would be generated.
    - Jenny mentioned that she had been in contact with several EEM regional coordinators and Environment Canada scientists regarding alternative study options for the marine environment (and the Nanisivik scenario, specifically), and that other than the mesocosms and caged bivalve studies, no other suitable alternatives are sufficiently developed to meet EEM requirements.

- Marine Wild Fish Survey considerations were discussed:
    - The TAP agreed that the degree of fish exposure to effluent is difficult to predict without more detail on the mixing characteristics in the Sound. Some TAP members felt that since Creek water with effluent is flowing into the Sound throughout the summer, there is likely some effluent exposure of fish in the near shore environment over the course of the open water season.
    - Malcolm asked Steve if he knew how sessile sculpin populations in the Sound were. Steve wasn't sure, but they had found sculpin at all ranges (Steve, my notes aren't detailed here, do you remember if the "range" would have referred to depth or to a wide area?).
    - Some TAP members felt that even if a wild fish survey showed that there were no effects on fish, this was still valuable information.
    - Bob mentioned his concern that the final EEM report for Nanisivik could show effects on fish, but that if the study was confounded by other factors (other than mine effluent), there would be no study required to confirm the effects were mine effluent related.

Action Items for Fish Survey:

- Jenny will discuss the Inland Silverside test as a possible Fish Survey alternative with the National EEM Office, and discuss the options with the TAP in the next few days.

- Malcolm will call Jenny the following morning to review decisions/options.

Follow Up to Teleconference (Response to Action Items):

- Dec 12, 2003 - The National EEM Office informed Jenny that using an increased frequency Inland Silverside test will not be acceptable as an alternative for the Fish Survey, since, due to the short time of the test, only survival and growth endpoints will be generated.

- Dec 12, 2003 - Malcolm informed Jenny that the mine is prepared to go ahead with the wild fish survey if the Inland Silverside test is not acceptable as an alternative, however he is concerned that sculpin gonads may not be fully mature during summer (based on July 2003, reconnaissance). It was discussed that perhaps if sampling were done in August, the gonads may be in a more mature condition.

- Dec 12, 2003 - The TAP agrees with the mine's proposal to conduct a wild fish survey in Strathcona Sound, and understands the concern that the sculpin gonads may not be fully mature at the time of sampling. Jenny forwarded this information to Malcolm by email Dec. 15, 2003.