

Environmental Protection Operations
Qimugjuk Building 969 P.O. Box 1870
Iqaluit, NU X0A 0H0
Tel: (867) 975-4631
Fax: (867) 975-4645

10 January 2011

EC File: 4703 001 043
NWB File: 3BC-MAR1014

Richard Dwyer
Licensing Administrator
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Via email: licensingadmin@nunavutwaterboard.org

RE: 3BC-MAR1014 Spill Plan & AR Plan

Environment Canada (EC) has reviewed the above-mentioned Spill Response Plan and Abandonment and Restoration (A&R Plan) submitted to the Nunavut Water Board (NWB). The following specialist advice has been provided pursuant to the *Canadian Environmental Protection Act*, Section 36(3) of the *Fisheries Act*, the *Migratory Birds Convention Act*, and the *Species at Risk Act*.

The Mars Society has submitted a Spill Response Plan and an A&R Plan to the NWB as requirements Part H, Item 1 and Part I, Item 1, respectively, of water license 3BC-MAR1014. In July 2000, the Mars Society established a research facility at the Houghton impact crater site on Devon Island, Nunavut, called the Flashline Mars Arctic Research Stations (FMARS). The research station is active between four to five weeks over the summer on an annual basis.

Upon review of the Plans, EC provides the following comments and recommendations for the NWB's consideration:

Spill Response Plan

- The Plan should include the following statement, "**all spills** of oil, fuel, or other deleterious materials, **regardless of size**, are to be reported to the NWT-NU 24hr Spill Line (867) 920-8130.
- Decanting of snow or water from the berm area should proceed only if the appropriate chemical analysis has determined that the contents will not violate the requirements of Section 36.3 of the *Fisheries Act*, such as contact with hydrocarbons.
- In Diagram 3, page 5 of the A&R Plan it shows that the fuel drums are unbermed. This information is relevant to the Spill Contingency Plan as EC recommends the use of secondary containment, such as self-supporting insta-berms, for storage of all barreled fuel rather than relying on natural depressions to contain spills. Photos on this page also show refueling practices.
- EC recommends that the proponent include the provision that drip pans be used when refueling equipment on site in order to help prevent spills from occurring.

- Refueling shall not take place below the high water mark of any water body and shall be done in such a manner to prevent hydrocarbons from entering any water body frequented by fish.
- A spill kit, including shovels, barrels, absorbents, etc. should be readily available at all locations where fuel is being stored or transferred in order to provide immediate response in the event of a spill.
- A section should be included in the Plan that provides direction regarding response action for spills on various types of terrain (e.g. spills on land, water, snow/ice, muskeg, etc.)
- EC recommends that a copy of the Plan should be posted at any location where these products are stored and at each fuel cache and refuel station, accessible to on-site crew members.
- EC recommends that a 24 Hour NWT/NU Spill Response Form be attached to the Plan.

Abandonment and Restoration Plan

- The Environment Canada Technical Document for Batch Waste Incineration provides guidance on appropriate incineration equipment and operating practices. In Section 1.3 and 1.4 of the Abandonment and Restoration Plan, it is proposed that a SmartAsh 100 Incinerator will be used to burn camp wastes and human solid waste. The Technical Document for Batch Waste Incineration recommends that small camps, incinerating less than 26 tonnes of waste per year, at a minimum use a forced air single chamber incinerator with an afterburner. The SmartAsh 100 Incinerator is a burn barrel with an air blower and does not meet the minimum recommended incineration equipment. The SmartAsh 100 Incinerator should not be used to burn camp wastes or human waste. Due to its low heat and high moisture content, human solid waste is very difficult to burn and should be only incinerated in equipment designed for this type of waste. Prior to burning human waste, a letter from the manufacturer stating the incineration equipment is suitable for burning this type of waste and the incineration equipment is capable of meeting the Canada-wide Standards for Dioxins and Furans emissions should be provided to the Board.

If there are any changes in the project EC should be notified as further review may be necessary. Comments previously submitted on behalf of EC regarding water license 3BC-MAR1014 on 5 November 2009 would still apply to this project (see attached). Please do not hesitate to contact the undersigned with any questions or comments with regards to the foregoing at (867) 975-4631 or by email at Paula.C.Smith@ec.gc.ca

Yours truly,



Paula C. Smith
Environmental Assessment Coordinator

cc: Carey Ogilvie (Head, Environmental Assessment-North, EPO, EC, Yellowknife, NT)
Ron Bujold (Environmental Assessment Technician, EPO, EC, Yellowknife, NT)
Allison Dunn (Sr. Environmental Assessment Coordinator, EPO, EC, Iqaluit, NU)
Dave Fox (Air Issues Specialist, EPO, EC, Yellowknife, NT)

References:

Canadian Council of Ministers of the Environment (2001). Canada-wide Standards for Dioxins and Furans. Available at: http://www.ccme.ca/assets/pdf/d_and_f_standard_e.pdf

Environment Canada (2009). Technical Document for Batch Waste Incineration. Available at: <http://www.ec.gc.ca/gdd-mw/default.asp?lang=En&n=F53EDE13-1>



**Environment Environnement
Canada Canada**

Environmental Protection Operations
Qimugjuk Building 969
P.O. Box 1870
Iqaluit, NU X0A 0H0
Tel: (867) 975-4631
Fax: (867) 975-4645

November 5, 2009

Our file: 4703 001 043
NWB file: 3BC-MAR0709

Richard Dwyer
Licensing Administrator
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0
Tel: (867) 360-6338
Fax: (867) 360-6361

Via email at: licensingadmin@nunavutwaterboard.org

Re: NWB 3BC-MAR-0709- Mars Society- Mars Project - Renewal- Type “B” Water License

On behalf of Environment Canada (EC), I have reviewed the information submitted with the above-mentioned application. The following specialist advice has been provided pursuant to Environment Canada's mandated responsibilities for the enforcement of the *Canadian Environmental Protection Act*, Section 36(3) of the *Fisheries Act*, the *Migratory Birds Convention Act*, and the *Species at Risk Act*.

The Mars Society would like to renew their water license to continue research at the Flashline Mars Arctic Research Station (FMARS) on Devon Island, NU. The Mars Society has been operating field programs from this site since 2001. The project is proposed to occur from October 2009 to September 2014. A crew of approximately 6 people will be employed during a 4 to 5 week period yearly.

Based on the information presented at this time, EC has no real concerns with the re-issuance of this water license. Comments and recommendations submitted for the project on March 22, 2007 in response to the NWB Water Licence Renewal, would apply to this water license application (see attached). Further, Environment Canada provides the following comments and recommendations for the Boards consideration:

Camp

- The proponent shall not deposit, nor permit the deposit of any fuel, chemicals, wastes or sediment into any water body. According to the Fisheries Act, Section 36(3), the deposition of deleterious substances of any type in water frequented by fish, or in any place under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter any such water, is prohibited.
- In the Mars Renewal Application, it is stated that sewage wastes will be incinerated. Sewage sludge has high moisture content and low heat content that will increase operating costs dramatically and lead to poor incinerator performance. It is unlikely that the sewage will be completely combusted and could lead to the release of pathogens into the environment. The high moisture materials can leak from the incinerator hearth and lead to equipment damage and present health hazards to workers.

EC recommends that sewage should not be burned in batch incinerators that are typically used in the north. Sewage should only be burned in incineration equipment designed for this type of waste. If the Mars Society decides to pursue sewage incineration, it should provide the Board with the design specifications of the incinerator and a letter from the manufacturer stating that this equipment is suitable for burning this type of waste.

EC has developed a Technical Document for Batch Waste Incineration, and is available at the following web link:

<http://www.ec.gc.ca/drgd-wrmd/default.asp?lang=En&n=82401EC7-1>

The technical document provides information on appropriate incineration technologies, best management and operational practices, monitoring and reporting. This information should be incorporated into an incineration management plan for the Mars Society camp. EC would be pleased to review this plan once it is made available.

Fuel storage/Spill Contingency Plan

- EC recommends the use of secondary containment, such as self-supporting insta-berms, for storage of all barreled fuel rather than relying on natural depressions to contain spills.
- As per Part G of the water licence, “the Licensee shall, within thirty (30) days of issuance of this Licence, keep on the site of operations a Spill Contingency Plan that will describe how petroleum products and hazardous materials will be handled, stored and disposed of, as well as how they will be contained and cleaned-up in the event of a spill.” EC does not feel that the current Spill Plan contains the information required by the water license. EC recommends that the proponent provide a revised version of the spill plan as a condition of the renewal of the license.

Wildlife and Species at Risk

- Section 6 (a) of the Migratory Birds Regulations states that no one shall disturb or destroy the nests or eggs of migratory birds. If active nests are encountered during project activities, the nesting area should be avoided until nesting is complete (i.e., the young have left the vicinity of the nest).
- Environment Canada recommends that food, domestic wastes, and petroleum-based chemicals (e.g., greases, gasoline, glycol-based antifreeze) be made inaccessible to wildlife at all times. Such items can attract predators of migratory birds such as foxes, ravens, gulls, and bears. Although these animals may initially be attracted to the novel food sources, they often will also eat eggs and young birds in the area. These predators can have significant negative effects on the local bird populations.
- Section 5.1 of the Migratory Birds Convention Act prohibits persons from depositing substances harmful to migratory birds in waters or areas frequented by migratory birds or in a place from which the substance may enter such waters or such an area.
- In order to reduce aircraft disturbance to migratory birds, Environment Canada recommends the following:
 - Fly at times when few birds are present (e.g., early spring, late fall, winter).
 - If flights cannot be scheduled when few birds are present, plan flight paths that minimize flights over habitat likely to have birds and maintain a minimum flight altitude of 650 m (2100 feet).
 - Minimize flights during periods when birds are particularly sensitive to disturbance such as migration, nesting, and moulting.
 - Plan flight paths to avoid known concentrations of birds (e.g., bird colonies, moulting areas) by a lateral distance of at least 1.5 km. If avoidance is not possible,

maintain a minimum flight altitude of 1100 m (3500 feet) over areas where birds are known to concentrate.

- Avoid the seaward side of seabird colonies and areas used by flocks of migrating waterfowl by 3 km.
- Avoid excessive hovering or circling over areas likely to have birds.
- Inform pilots of these recommendations and areas known to have birds.
- The following comments are pursuant to the Species at Risk Act (SARA), which came into full effect on June 1, 2004. Section 79 (2) of SARA, states that during an assessment of effects of a project, the adverse effects of the project on listed wildlife species and its critical habitat must be identified, that measures are taken to avoid or lessen those effects, and that the effects need to be monitored. This section applies to all species listed on Schedule 1 of SARA. However, as a matter of best practice, Environment Canada suggests that species on other Schedules of SARA and under consideration for listing on SARA, including those designated as at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), be considered during an environmental assessment in a similar manner.

Terrestrial Species at Risk ¹	COSEWIC Designation	Schedule of SARA	Government Organization with Primary Management Responsibility ²
Ivory Gull	Endangered	Schedule 1	EC
Peary Caribou	Endangered	Pending	Government of Nunavut
Red Knot (<i>islandica</i> subspecies)	Special Concern	Pending	EC
Peregrine Falcon (<i>anatum-tundrius</i> complex ⁴)	Special Concern	Schedule 1 (<i>anatum</i>) Schedule 3 (<i>tundrius</i>)	Government of Nunavut
Polar Bear	Special Concern	Pending	Government of Nunavut
Wolverine (Western Population)	Special Concern	Pending	Government of Nunavut

¹ The Department of Fisheries and Oceans has responsibility for aquatic species.

² Environment Canada has a national role to play in the conservation and recovery of Species at Risk in Canada, as well as responsibility for management of birds described in the *Migratory Birds Convention Act* (MBCA). Day-to-day management of terrestrial species not covered in the MBCA is the responsibility of the Territorial Government. Thus, for species within their responsibility, the Territorial Government is best suited to provide detailed advice and information on potential adverse effects, mitigation measures, and monitoring.

³ The *anatum* subspecies of Peregrine Falcon is listed on Schedule 1 of SARA as threatened. The *anatum* and *tundrius* subspecies of Peregrine Falcon were reassessed by COSEWIC in 2007 and combined into one subpopulation complex. This subpopulation complex was listed by COSEWIC as Special Concern.

Impacts could be disturbance and attraction to operations.

Environment Canada recommends:

- Species at Risk that could be encountered or affected by the project should be identified and any potential adverse effects of the project to the species, its habitat, and/or its residence noted. All direct, indirect, and cumulative effects should be considered. Refer to species status reports and other information on the Species at Risk registry at www.sararegistry.gc.ca for information on specific species.
- If Species at Risk are encountered or affected, the primary mitigation measure should be avoidance. The proponent should avoid contact with or disturbance to each species, its habitat and/or its residence.

- Monitoring should be undertaken by the proponent to determine the effectiveness of mitigation and/or identify where further mitigation is required. As a minimum, this monitoring should include recording the locations and dates of any observations of Species at Risk, behaviour or actions taken by the animals when project activities were encountered, and any actions taken by the proponent to avoid contact or disturbance to the species, its habitat, and/or its residence. This information should be submitted to the appropriate regulators and organizations with management responsibility for that species, as requested
- For species primarily managed by the Territorial Government, the Territorial Government should be consulted to identify other appropriate mitigation and/or monitoring measures to minimize effects to these species from the project.
- Mitigation and monitoring measures must be taken in a way that is consistent with applicable recovery strategies and action/management plans.

If there are any changes in the proposed project, EC should be notified, as further review may be necessary. Please do not hesitate to contact me with any questions or comments with regards to the foregoing at (867) 975-4631 or by email at carrie.spavor@ec.gc.ca.

Yours truly,

Original signed by

Carrie Spavor
Environmental Assessment Coordinator

c.c: Carey Ogilvie (Head, Environmental Assessment-North, EPO, Yellowknife, NT)
Ron Bujold (Environmental Assessment Technician, EPO, Yellowknife, NT)

Environmental Protection Operations
Qimugjuk Building 969
P.O. Box 1870
Iqaluit, NU X0A 0H0
Tel: (867) 975-4639
Fax: (867) 975-4645

March 22, 2007

Richard Dwyer
Licensing Trainee
P.O. Box 119
Gjoa Haven, NU
X0B 1J0
Tel: (867) 360-6338

via e-mail

RE: Robert Zubrin - 3BC-MAR – Mars Project – Water License Renewal

On behalf of Environment Canada (EC), I have reviewed the information submitted with the above-mentioned application. The following specialist advice has been provided pursuant to Environment Canada's mandated responsibilities for the enforcement of the *Canadian Environmental Protection Act*, Section 36(3) of the *Fisheries Act*, the *Migratory Birds Convention Act*, and the *Species at Risk Act*.

Mr. Robert Zubrin has submitted a renewal application for water use and waste disposal associated with camp operations for the Mars Project on Devon Island, Nunavut.

Environment Canada recommends that the following conditions be applied throughout all stages of the project:

- All sumps used for the disposal of camp sewage and grey water shall be located above the high water mark of any water body and in such a manner as to prevent the contents from entering any water body frequented by fish. Further, all sumps shall be backfilled upon completion of the field season.
- All fuel caches shall be located above the high water mark of any water body and in such a manner as to prevent the contents from entering any water body frequented by fish. Environment Canada recommends the use of secondary containment, such as self-supporting insta-berms, when storing barreled fuel on location.
- EC recommends the use of an approved incinerator for the disposal of combustible camp wastes. The proponent shall ensure that hazardous wastes, including waste oil, receive proper treatment and disposal at an approved facility.
- Spills shall be documented and reported to the 24 hour Spill Line at (867) 920-8130.
- All releases of harmful substances, regardless of quantity, are immediately reportable where the release:
 - is near or into a water body;
 - is near or into a designated sensitive environment or sensitive wildlife habitat;
 - poses an imminent threat to human health or safety; or
 - Poses an imminent threat to a listed species at risk or its critical habitat.
- Environment Canada has reviewed the Spill Contingency Plan (SCP) and feels that it is insufficiently developed and strongly recommends that the Plan be revised and submitted to the Nunavut water board. EC recognizes that the Mars Project has not had a spill to date however; it

is human nature to make mistakes and for accidents to occur. The Mars Project Spill Plan should include a clear chain of command and list of personnel that should be contacted in the event of a spill. The chain of command should identify specific individuals and provide their contact information and role in the event of a spill. The Plan should provide direction regarding how to respond to spills on various environments, such as snow, ice, muskeg, etc...The Plan should also include a list of equipment that will be available on-site.

If there are any changes in the proposed project, EC should be notified, as further review may be necessary. Please do not hesitate to contact me with any questions or comments with regards to the foregoing at (867) 975-4631 or by email at cindy.parker@ec.gc.ca.

Yours truly,

Original signed by

Cindy Parker
Environmental Assessment Technician

cc: (Colette Spagnuolo, Environmental Assessment & Contaminated Sites Specialist, Environment Canada, Iqaluit)