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August 31, 2001

Indian and Northern Affairs Canada
Water Resources Division
3rd Floor – Bellanca Building
P.O. Box 1500
Yellowknife, NT
X1A 2R3



Attention: Meighan Wilson

Re: Request for Water Licence N7L1-1762 Amendment for Shell Canada - Camp Farewell

Dear Meighan,

Inuvialuit Environmental and Geotechnical, on behalf of Shell Canada, has researched the flow of the Mackenzie River – Middle Channel near Camp Farewell to better understand the dilution of the current release of effluent from the camp.

While we were unable to find any direct flow information for the Mackenzie River in the immediate vicinity of Camp Farewell, we utilized a model of the Mackenzie River system, which has been developed by Environment Canada, to estimate flow values for this reach of the river. Our contact at Environment Canada was Mr. Vir Khanna, an engineer based in Calgary.

Mr. Khanna has been developing the 1D Hydrometric model of the Mackenzie River over the past several years. This model allows the flows of a number of the channels of the Mackenzie River to be calculated using water level information. Upon speaking with Mr. Khanna we were able to secure modeled daily flow values for 1995 to 1999 for the Middle Channel at a water monitoring station 21 km upriver from Camp Farewell. The station is located below Langley Island at 69° 5' 7" N, 135° 7' 20" W; where Arvoknar Channel joins the Middle Channel.

We calculated a variety of flow averages based on the modeled information. The daily average over the five years was 4170 m³/s, the summer average was 7228 m³/s and the winter average was 1346 m³/s. Average monthly flows were also calculated for each month in the five year data set. The lowest average flow for a single month was 611 m³/s, which occurred during the winter season. Environment Canada validated the modeled information for the river in this area around Tununuk Point, using actual measured flow values. They determined that the model was fairly accurate for spring and summer flow values (+3% and -4% respectively), underestimated flow in the fall (-49%) and overestimated winter flow by 114%.

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To calculate the effluent dilution factor, the lowest average monthly flow of the five year period was used as the most conservative value. To allow for the model's overestimation of flow values in the winter we divided the lowest average monthly flow value in half ($305.5 \text{ m}^3/\text{s}$) and then calculated the dilution of the effluent discharged on the basis of this flow value.

According to their water license application, Camp Farewell currently releases no more than $150 \text{ m}^3/\text{day}$ of treated effluent into the Middle Channel. The estimated rate of discharge of the effluent reported in the municipal questionnaire included with Shell's water licence was 0.29 l/s ($0.00029 \text{ m}^3/\text{s}$). The dilution ratio of the effluent associated with this release was then calculated at greater than one million to one.

At present, the Camp Farewell water licence specifies discharge limits in accordance with the "Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories" for effluent discharged to a river with a dilution of $>10:1$ and $<100:1$. While we have received verbal approval to use the guidelines associated with an effluent dilution of $>100:1$ and $<1000:1$ for discharge to most channels of the Mackenzie River; the actual discharge dilution at Camp Farewell is significantly greater.

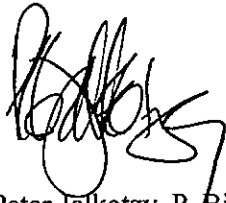
A RBC Wastewater Treatment Plant was installed for the 2000-2001 winter season. However, Shell was unable to achieve the wastewater effluent quality criteria set out in their water licence.

On behalf of Shell Canada, we would like to request a review of the Camp Farewell water licence with consideration given to amending the discharge limits to more accurately reflect the effluent discharge dilution for wastewater released from Camp Farewell.

Thank you for your attention to our comments and inquiry. If you have any questions or concerns, please contact myself at 219-1248 or by e-mail at peter.jalkotzy@ieg.ca.

Sincerely,

INUVIALUIT ENVIRONMENTAL & GEOTECHNICAL INC.



Peter Jalkotzy, P. Biol.
Vice President, Environment

Schedule III
(Subsection 6(1))

APPLICATION FOR LICENCE, AMENDMENT OF LICENCE, OR RENEWAL OF LICENCE

APPLICATION/LICENCE NO:
(amendment or renewal only) N7L1-1762

1. Name and Mailing Address of Applicant

Shell Canada Ltd.
400 – 4th Avenue SW
P.O. Box 100, Station M
Calgary, AB T2P 0J4
Attention: R. (Randy) H. Hetman

Telephone: 403-691-2521

Fax: 403-269-7948

2. Address of Head office in Canada if incorporated

Same as previous

Telephone:

Fax:

3. Location of Undertaking (describe and attach a map, indicating watercourses and location of any proposed waste deposits)

Camp Farewell; east shore of the Mackenzie River - Middle Channel, 50 km downstream from Tununuk Point (Bar C).

Latitude 69° 12' 30" N

Longitude 135° 06' 04" W

4. Description of Undertaking (describe and attach plans)

Revision of water quality requirements for wastewater discharged from water treatment system at Camp Farewell, due to calculated flow rates. For a description; see attached letter to Indian and Northern Affairs Water Resources Division, Meighan Wilson, dated August 31, 2001

5. Type of Undertaking

1. Industrial

2. Mining and milling

3. Municipal

4. Power

5. Agriculture

6. Conservation

7. Recreation

8. Miscellaneous (describe)

X

6. Water Use

To obtain water

To cross a watercourse

To modify the bed or bank of a watercourse

X

Flood Control

To divert water

To alter the flow of, or store, water

Other (describe) Release treated wastewater into the Mackenzie River – Middle Channel.

7. Quantity of Water Involved (litres per second, litres per day or cubic metres per year, including both quantity to be used and quantity to be returned to source)

Quantity of water to be used not to exceed 150 m³/day (150, 000 litres/day). Actual volume of water withdrawn from the Mackenzie River – Middle Channel is approximately 25, 000 litres/day; with approximately 25, 000 litres/day of treated water returned to the Mackenzie River – Middle Channel.

SCHEDULE III – Concluded

APPLICATION FOR LICENCE, AMENDMENT OF LICENCE, OR RENEWAL OF LICENCE - Concluded

8. Waste Deposited (quantity, quality, treatment and disposal)

Approximately 25 m³/day of effluent to be deposited. Sewage and grey water currently being treated using a Rotating Biological Contactor (RBC) system. Currently effluent is released to comply with the >10:1 to <100:1 dilution guidelines put forth in the *Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories* for discharge to a river.

9. Other Persons or Properties Affected By This Undertaking (give name, mailing address and location; attach list if necessary)

N/A

10. Predicted Environmental Impacts of Undertaking and Proposed Mitigation

No changes from original application.

11. Contractor and Sub-Contractors (names, addresses and functions)

Camp is being used by WesternGeco Oilfield Services;

Rick Calvert
WesternGeco
Mackenzie Delta Operations
P.O. Box 2313
#302 – 125 Mackenzie Road
Inuvik, NT
Phone: (867) 777-8875
Direct: (867) 777-8878
Fax: (867) 777-4002
Cell: (780) 814-0693
e-mail: calvert@calgary.geco-prakla.slb.com

12. Studies Undertaken to Date (attach list if necessary)

Enhanced Phase I Environmental Assessment – Golder & Associates

Enhanced Phase I Environmental Assessment – Inuvialuit Environmental Inc.

Phase I and II Environmental Site Assessment – Komex Environmental Ltd.

13. Proposed Time Schedule

Start date November 1, 2001

Completion date October 31, 2010

Randy H. Hetman
NAME (Print)

D.A.R./Construction Manager
TITLE (Print)


SIGNATURE

DATE

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APPLICATION FEE	Amount: \$ 30.00	Receipt No.: _____
WATER USE DEPOSIT	Amount: \$ _____	Receipt No.: _____

Dilution Ratio Calculation for Wastewater Currently Released to the Mackenzie River from Camp Farewell

Dilution ratio calculation is based on daily flow values modeled for Monitoring Station 10MC0110 near Camp Farewell on the Middle Channel of the Mackenzie River. Flow values were modeled with the One-D hydrodynamic model of the Mackenzie Delta developed by Environment Canada: Atmospheric & Hydrologic Sciences Division, Arctic Section. Model was calibrated for 1982-1995 and then was validated for 1996-1999. Model results are 'fairly good' for spring (+3%) and summer (-4%), but underestimates fall (-49%) and overestimates winter (-114%) flow. (As per communication from Vir Khanna of Environment Canada)

Monthly Flow Averages for Mackenzie River - Middle Channel in the Vicinity of Camp Farewell 1995 - 1999 (m³/s) (rounded to the nearest full unit)

Month	1995	1996	1997	1998	1999
January	1522	1190	2437	1588	1331
February	1210	990	1963	1703	1183
March	1101	930	1775	1883	1041
April	779	611*	1373	2087	692
May	5963	5519	7744	9938	6186
June	5891	9521	11066	9560	10254
July	3794	7960	8961	6456	8574
August	3563	7290	8063	5873	7851
September	4064	6891	6249	5968	7661
October	2232	4166	4931	5224	5899
November	841	1732	2759	2837	3193
December	1333	2077	1509	1371	928

* Lowest monthly flow average from 1955 - 1999 was 611 m³/s

To allow for overestimation of flow values during the winter season, the lowest average monthly flow value estimated by the model was divided in half:

$$611 \text{ m}^3/\text{s} / 2 = 305.5 \text{ m}^3/\text{s}$$

Estimated daily rate of discharge at camp farewell is 0.29 litres/s

$$0.29 \text{ litres/s} = 0.00029 \text{ m}^3/\text{s}$$

Dilution ratio is calculated as:

$$= \frac{\text{minimum average monthly flow}}{\text{average effluent flow released daily}}$$

$$= 305.5 \text{ m}^3/\text{s} / 0.00029 \text{ m}^3/\text{s}$$

$$= 1,053,448 \quad \text{or } 1,053,448 : 1$$