Environmental Law Centre
UNIVERSITY OF VICTORIA

July 27, 2006

**VIA FACSIMILE 387-8897**

Attention: Mr. Jim Hofweber
Acting Director of Environmental Management Branch
**Ministry of the Environment for British Columbia**
PO Box 9342, Stn. Prov. Govt.
Victoria, BC, V8W 9M1
Tel: (250) 387-9971
Email: Jim.Hofweber@gov.bc.ca

Dear Mr. Hofweber:

**Re: Request that the Director make a determination of whether a site is contaminated pursuant to s. 81(1) of the *Environmental Management Act***
**Our File No. 2006-02-06**

For approximately 32 years during the late 1800s and early 1900s, the coal gasification plant Nanaimo Gas Works operated in Nanaimo. Based on the size of the plant and its duration of operation, it is estimated that Nanaimo Gas Works produced between 2-13 million litres of coal tar, with four million litres being a conservative estimate. In addition, the plant likely produced approximately 40,000 tons of toxic coke. (See the attached documents.) According to historical maps of the area, coke, coal tar and other contaminants were stockpiled at the edge of the then-existing shoreline near the Civic Arena.[1] Since that time, the coke/coal tar heap has been replaced by the Pearson Bridge and the former coal gasification plant (FCGP) is no longer visible. Hence, the question begs to be answered: "What happened to all of the coke, coal tar and other toxic materials produced by the coal gasification plant?"

[1] See the 1909 Fire insurance historical aerial map attached.

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Section 81(1) of the *Environmental Management Act* ('EMA') states that if a director is satisfied that an activity was performed in a manner that was likely to cause pollution, he can order that person to investigate the site in question.[2] We submit that because:

- **clean up of former coal gasification plants in Canada is both necessary and commonplace;**
- **the adverse effects of coal tars and related byproducts are sufficiently known; and**
- **due to the lack of proper removal of the coal tars and byproducts produced in Nanaimo;**

as a matter of prudence, the director should issue a pollution prevention order pursuant to s. 81(1) of the EMA to determine the location of the millions of litres of coal tar and thousands of tons of coke that are missing -- and determine the relative harm, if any.

**The necessity to clean up former coal gasification plants**

The necessity of cleaning up coal gasification plant sites is not at issue. Canadian governments have widely recognized the inherent hazards, and acknowledged the need for extensive cleanups of such sites. British Columbia has spent many millions of dollars to cap the False Creek Expo lands and treat leachate in Vancouver, and millions more are being spent to clean up Rock Bay in Victoria.

<u>False Creek</u>

The former coal gasification operation that occurred on the False Creek Expo lands of the Vancouver area was the largest in British Columbia.[3] Being the largest such site, it was a proportionately large contaminated area. Today's numbers show that $84 million has

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[2] **s. 81(1) states:** If a director is satisfied on reasonable grounds that an activity or operation has been or is being performed by a person in a manner that is likely to release a substance that will cause pollution, the director may order a person referred to in subsection (2), at that person's expense, to do any of the following:

(a) provide to the director information the director requests relating to the activity, operation or substance;

(b) undertake investigations, tests, surveys or any other action the director considers necessary to prevent the pollution and report the results to the director;

(c) acquire, construct or carry out any works or measures that are reasonably necessary to prevent the pollution;

(d) adjust, repair or alter any works to the extent reasonably necessary to prevent the pollution.

[3] Reidar Zapf-Gilje, Guy Patrick, Robert McLenehan "Overview of the remediation process at sites with creosote related contamination in soil, groundwater, and river sediment" in Can. J. Civ. Eng. **28** (Suppl. 1) (2001) page 142 <http://article.pubs.nrc-cnrc.gc.ca/ppv/RPViewDoc?_handler_=HandleInitialGet&journal=cjce&volume=28&calyLang=eng&articleFile=l00-104.pdf>.

been allocated to clean up this site that was heavily contaminated with the same substances that were used in Nanaimo.[4]

The former coal gasification sites at False Creek and in Nanaimo are strikingly similar. Both sites:

- were located on a fish-bearing navigable waterway;
- were in operation for many decades;
- placed contaminating materials along the shoreline; and
- employed random on-site filling with fill material containing coal waste (includes coal tar, coke and other byproducts).

All these factors played an important role in determining the extensive remediation efforts that have been necessary at False Creek.

Rock Bay

The Rock Bay site in Victoria is another site of a former coal gasification plant located near the water. The industrial activity that took place at this location severely contaminated the lands with coal tar and other heavy metals and, as with False Creek and Nanaimo, historical documents show that contaminated soil was used for in-filling. As a result, in May 2004, BC Hydro and Transport Canada announced a joint project to clean up the contamination.

The Rock Bay Project is one of province's largest remediation projects. Just in the initial stage of the clean-up, 103,000 tonnes of contaminated soils were removed and treated ex-situ.[5] Remediation at Rock Bay will cost more than $30 million. This remediation project is another large-scale initiative that reflects just how severe the environmental problems produced by coal gasification plants are.

**Dangers of Coal Tars and Coke**

The adverse environmental and health effects of FCGPs are widely known. During the process of coal gasification, many potential contaminants of concern (PCOCs) are created, including coke and coal tar. Coke is created at the initial stage of the process when, after heating, only 40% of the coal is converted into gas and the remaining 60% remains as a byproduct in the retort oven. The composition of coke includes heavy metals of lead, arsenic, copper, thallium and zinc in sufficient quantities to be poisonous and extremely harmful to one's health.[6] Coal tar, on the other hand, is produced in the final step and remains as sludge after the coal gas is housed in storage tanks. This byproduct

[4] *Neal Hall*, "Cleaning up Britannia Mine site to cost $99 million", Vancouver Sun , June 10, 2006 < http://www.canada.com/vancouversun/news/story.html?id=7daaad90-7a09-4fcb-ad94-f44a4557fbdb>
[5] Transport Canada, "Environmental Performance Report 2004/2005" at page 18 <http://www.tc.gc.ca/programs/Environment/EMS/epr0405/docs/TP13970E%20C.pdf>.
[6] http://tarpondscleanup.ca/default.asp?T=2&M=7

consists chemically of over two hundred compounds including benzene, toluene, phenols, xylenes, and other polynuclear aromatic hydrocarbons (PAHs).[7] Among other things, coal tars:

- are carcinogenic;[8]
- can have adverse affects on the central nervous system;[9]
- seriously pollute soils and groundwater[10]; and
- are harmful to fish and wildlife.

Recognizing the proven toxicity of the byproducts of the coal gasification process, the whereabouts of the millions of missing litres of coal tars and the thousands of tons of missing coke becomes a critical question. Where did all of the coal tar and coke produced in Nanaimo end up? Until we know where those contaminants are, we cannot know whether similar clean up measures are necessary to protect public health and the environment in Nanaimo.

**The Coal Tars and Coke Have Not Been Removed Safely**

Approximately four million litres of coal tar, tens of thousands of tons of coke and other toxic materials were produced at the site of the former coal gasification plant. Not only is there no evidence to show that these materials were safely removed -- research has shown that there have not been any environmental investigations to date with respect to this site.[11]

Considering the following facts:

- a massive quantity of toxic material was produced;
- it was not properly disposed of; and
- as evidenced at False Creek and Rock Bay, it was common practice to use contaminated materials as infill;

there is a probability that a significant portion of the former coal gasification plant materials are still on site. Alternatively, they may have been used as fill in other nearby areas. In either case, they may pose a threat to human health and the environment.

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[7] http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s048coal.pdf Coal tar report

[8] According to the Agency for Toxic Substances and Disease Registry (ATSDR), a federal public health agency of the U.S. Health and Human Services, benzenes and polynuclear aromatic hydrocarbons (PAHs) that are found within coal tar are known carcinogens. (http://www.atsdr.cdc.gov/HAC/PHA/fair/fcg_p1.html)

[9] According to the Agency for Toxic Substances and Disease Registry (ATSDR), a federal public health agency of the U.S. Health and Human Services, toluene and benzene affect the central nervous system and therefore can lead to death. (http://www.atsdr.cdc.gov/HEC/CSEM/benzene/physiologic_effects.html)

[10] A former coal gasification plant in Kingston, ON contaminated the soils and groundwater around the area of the plant and is now undergoing 2.2 million dollars of cleanup (http://www.cityofkingston.ca/residents/environment/coaltar/index.asp)

[11] Personal communication with John Ward, Ministry of the Environment.

There is no apparent evidence that due care was used in disposing of the coal tars/coke produced by the plant. The piles of these materials were likely disposed of in the early 1920s, after the FCGP closed in 1919. Judging by standard practices at similar facilities of the same era, the toxic piles were likely disposed of nearby in order to save the expense of transporting such massive amounts of material in an era before large dump trucks. The easiest and least expensive way to deal with the contaminated waste was likely to simply use it as infill for:

- the small inlet that used to exist immediately west of the south end of the current Pearson bridge;
- the area around the current intersection of Terminal Avenue and Comox Street; and
- the lands east of the southern end of the current Pearson Bridge.

The important question remains: Where did the coal tar, coke and other toxic materials get used as fill, and how much is still located at the original site?

**Summary**

In light of the scientific information about the adverse health and environmental effects of coal tars and coke, and the historical information about the location of massive volumes of these materials in Nanaimo, with no evidence of proper disposal, there is reason for concern. The similarities of operations, materials used and methods employed at the former coal gasification plants at False Creek, Rock Bay and Nanaimo are striking, and there is nothing to indicate that Nanaimo has not suffered similar contamination.

Therefore, on behalf of concerned Nanaimo resident William L. Woldnik, we ask the director to issue a pollution prevention order concerning the FCGP of Nanaimo, British Columbia pursuant to s. 81(1) of the EMA. This order should direct that the location and extent of the contamination be ascertained.

If the Ministry accepts that the FCGP in Nanaimo is a concern and that the director should determine whether the site is contaminated, on behalf of Mr. Woldnik, we submit that the following measures be reviewed and considered:

- investigate areas of potential environmental concern (APEC) sites via borehole drilling to test soil quality, and/or monitoring well installation to test water quality. Likely areas include:
    - location of the former coal gasification plant;
    - the soil below the embankment of the Pearson Bridge;
    - any locations where infilling took place, if it is likely that coal gasification toxic wastes were used. This should include the area of the small inlet that was filled immediately west of the south end of the Pearson bridge; the area around the intersection of Terminal and Comox; and the lands east of the southern end of the current Pearson Bridge.

- collect information on past practices of dumping unknown fill in areas around the city and classify them as APECs. Among other things, this should include more research into where the coal wastes may have been used as infill. Our client may be able to assist with this research;

- conduct water testing of the Millstone River to determine whether:
    - deleterious substances are present;
    - water quality poses a threat to fish and/or fish habitat;
    - water quality poses a health threat;

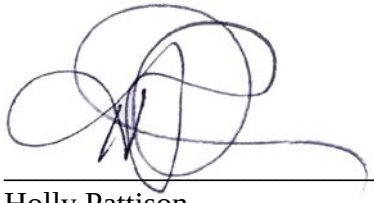
- inquire with the Department of Fisheries and Oceans to determine if there are records of fish in nearby waters suffering from fish lesions and/or other signs of polycyclic aromatic hydrocarbon (PAH) contamination from coal-related pollutants;

- if appropriate, declare the area of the FCGP and areas contaminated with infill as contaminated sites and have the areas remediated.

In sum, given the amount of coal tars, coke and other toxic materials that were likely produced, the toxicity of the substances, the lack of safe removal of the contaminants, the common industrial practice of using coal gasification plant waste materials to infill, and the pattern of what has taken place at other former coal plant sites in British Columbia, we request that the Ministry act pursuant to s. 81(1) of the EMA, and issue a pollution prevention order to determine the location and extent of the contamination of the Nanaimo former coal gasification plant site.

Sincerely,

Eileen Blackmore



Holly Pattison
Program Administrator
Environmental Law Centre

Enclosures

cc: B. Woldnik

# ***NANAIMO COAL GASIFICATION PLANT COKE PRODUCTION CALCULATIONS***

The following figures are based on:

- one ton of coal producing 12 gallons of coal tar
- 40% per ton of coal going to gas and 60% as other byproducts during the gasification process. The 60% as "other byproducts" is assumed to be 100% coke for these calculations.
- Previously calculated coal tar figures (attached) .

***Calculation # 1  Maximum amount of coke produced over the life of the plant***

2,978,520 gal of coal tar (from coal tar calculations = 248,210 tons of coal
12 gallon of coal tar per ton of coal

248,210 tons of coal x 60% = 148,926 tons of coke

***Calculation # 2 Minimum amount of coke produced over the life of the plant***

525,600 gal of coal tar (from coal tar calculations = 43,800 tons of coal
12 gallon of coal tar per ton of coal

43,800 tons of coal x 60% = 26,280 tons of coke

***Calculation # 3 coke production based on 4 million litres (881,057 gallons) of coal tar production***

26,280 tons of coke (minimum production) x 1.68 (multiplier for 4 million litres of coal tar ) = 44,150 tons/coke

***Coke Production in Perspective***

To put it in perspective -- a salesman at a local Truck Dealership advised that a modern tandem on road dump truck (tandem axel) will carry about 15 tons of gravel legally or about 12 yards of material. Thus 44,150 tons of coke would require 2,943 modern dump trucks to haul it away. This number assumes the coke would be as compact as gravel -- which in fact is not true. The coke would be a lot bulkier as so more trucks would be needed than calculated.

**KEY EQUATION: 1 tonne coal = 10,000 ft$^3$ coal gas = 12 gallons of coal tar**

**<u>Calculation #1 – Maximum Coal Tar Production - with increasing production</u>**

**1887-1889**
If for the first 2 years (1887 to 1889) there was a daily production of 20,000 ft $^3$ of coal gas…then that would mean there would be a daily production of 24 gallons of coal tar

$$2 \times 365 days \times 24 \frac{gallons}{day} \equiv 17{,}520 gallons$$

**1889 to 1892**
The next 3 years, production doubled. Therefore the daily production would have been 40,000 ft$^3$ of coal gas and 48 gallons of coal tar.

$$3 \times 365 days \times 48 \frac{gallons}{day} \equiv 52{,}560 gallons$$

**1892 to 1895**
The next 3 years, production doubled. Therefore the daily production would have been 80,000 ft$^3$ of coal gas and 96 gallons of coal tar.

$$3 \times 365 days \times 96 \frac{gallons}{day} \equiv 105{,}120 gallons$$

**1895 to 1919**
The next 24 years saw storage capacity almost quadrupled. Nothing is noted about how much production was increased.

<u>At a minimum:</u>
The daily production didn't change from the previous 3 years where the daily production would have remained at 80,000 ft$^3$ of coal gas and 96 gallons of coal tar

$$24 \times 365 days \times 96 \frac{gallons}{day} \equiv 840{,}960 gallons$$

<u>At a maximum:</u>
Would have the daily production increased to 320,000 ft$^3$ which would yield 384 gallons of coal tar daily

$$24 \times 365 days \times 384 \frac{gallons}{day} \equiv 3{,}363{,}840 gallons$$

**TOTAL = minimum** = (17520 + 52560 + 105120 + 840960) gallons
= **1,016,160 gallons = 3,846,584 liters**

**maximum** = (17520 + 52560 + 105120 + 3363840) gallons
= **3,539,040 gallons = 13,367,200 liters**

**<u>Calculation # 2 – Minimum Coal Tar Output -- assuming continuous production</u>**

**1887 to 1891**
The first 4 years remained at original daily production of 20,000 $ft^3$ of coal gas and 24 gallons of coal tar

$$4 \times 365 days \times 24 \frac{gallons}{day} \equiv 35{,}040 gallons$$

**1891 to 1919**
During the next 28 years, production capacity doubled where the daily amount of coal gas produced would have been 40,000 $ft^3$ and 48 gallons and coal gas.

$$28 \times 365 days \times 48 \frac{gallons}{day} \equiv 490{,}560 gallons$$

**Total** = (35040 + 490560) gallons
= **525,600 gallons = 1,989,612 liters**