

ITEM 4
MANAGER'S REPORT NO. 31
COUNCIL MEETING 86/05/05

RE: LETTER FROM DR. NANCY COCHRANE, 8011 WOODHURST DRIVE, BURNABY, B.C. V5A 4C6
AIR EMISSION ODOUR COMPLAINTS ASSOCIATED WITH SHELL CANADA TANK CLEANING
OPERATIONS

MUNICIPAL MANAGER'S RECOMMENDATIONS:

1. THAT the recommendation of the Chief Public Health Inspector be adopted.

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TO: MUNICIPAL MANAGER 1986 April 30

FROM: CHIEF PUBLIC HEALTH INSPECTOR

RE: AIR EMISSION ODOUR COMPLAINTS
ASSOCIATED WITH SHELL CANADA TANK CLEANING OPERATIONS

RECOMMENDATIONS:

1. THAT a copy of this report be forwarded to Dr. N. Cochrane, 8011 Woodhurst Drive, Burnaby, B.C., V5A 4C6.
2. THAT a copy of this report be forwarded to Shell Canada Products Limited, Shellburn Refinery, 201 Kensington Avenue, Burnaby, B.C., V5B 4B2.
3. THAT a copy of this report be forwarded to the Greater Vancouver Regional District, Air Quality Control, 4330 Kingsway, Burnaby, B.C., V5H 4G8.

SUMMARY:

In order to repair a faulty tank seal system and reduce future emissions of crude oil product vapours, Shell Canada recently conducted a crude oil tank cleaning process. This activity did, during periods of calm wind, emit a diesel-type odour to portions of a nearby residential area. The odour, although found objectionable by some residents, was not considered by the G.V.R.D. or Environmental Health Division staff to be a health risk. Ambient air monitoring at the tank farm and bordering residential properties did not detect any levels of pollutants associated with the tank cleaning operation.

Additional information pertaining to petroleum tank farm operations has been requested from Health and Welfare Canada, Environmental and Occupational Toxicology.

The G.V.R.D. Air Quality Control have advised that during 1985 this municipality's refinery operations were generally within permit levels.

The Environmental Health Division will continue to review refinery operations with G.V.R.D. officials. This will include a forthcoming report from Trans Mountain Pipe Line's consultants on methods to control crude oil odours during storage and shore-to-vessel product transfers.

A. INTRODUCTION

Scheduled to appear at the 1986 May 5 meeting of Council is a delegation of residents of Forest Hills Properties. The subject of their submission to Council is air pollution problems associated with a recent crude oil storage tank cleaning process, conducted by Shell Canada, Burnmount Tank Farm. Following are specific responses to issues and questions contained in the delegation's brief to Council.

In addition, it was felt appropriate to include in the report information pertaining to air quality issues which were previously requested by Council.

B. CRUDE OIL STORAGE TANK CLEANING

During the fall of 1985, the Environmental Health Division and the G.V.R.D. Air Quality Control were in receipt of complaints from residents of Forest Hills Properties regarding the emission of objectionable crude oil type odours from Shell Canada, Burnaby Mountain Tank Farm.

Shell Canada's Burnmount Tank Farm is used to store crude oil and petroleum products. The storage tanks are regulated by the G.V.R.D. Air Quality Control. A requirement of the G.V.R.D. is a yearly inspection and reporting to their office of the efficiency and condition of the tank seals and vents.

An inspection in late 1985 resulted in a report to the G.V.R.D. of a defective floating roof seal used to prevent product odour emissions on crude oil storage tank, No. 803. This crude oil storage tank is one of the closest to Forest Hills Properties. Shell Canada advised the G.V.R.D. of their decision to replace the defective single roof seal with a new double seal system.

The G.V.R.D. Air Quality Control approved Shell Canada's tank seal replacement program. The Environmental Health Division was consulted by Shell Canada in order to be updated on their program to reduce future crude oil odours and possible noise complaints due to the tank cleaning operation.

Upon receipt of the delegation's submission to Council, Shell Canada was requested to provide information on their tank cleaning process and air emission monitoring. Following is their Manager's 1986 April 28 response:

"In February 1986 we began a normal tank cleaning and maintenance procedure, after consultation with both the G.V.R.D. Air Pollution Control and Burnaby Environmental - Public Health staff. This procedure, which is standard throughout our industry, involved the following steps:

1. Drawing down the crude oil level to minimum low gauge.
2. Pumping the remaining crude oil bottoms to an adjacent operating crude oil tank.
3. Removing tank manway covers to allow primary visual inspection of the tank.
4. Cleaning tank bottoms sludge (consisting of dirt and wax) with diesel fuel and pumping this mixture to an adjacent operating crude oil tank.
5. Removing the old roof seal and replacing it with a new, modern double seal design.

The total operation required 3 months (Feb. 1986 to Apr. 1986) to complete. Total cost was in the order of \$250,000. During the course of the cleaning operations, it was necessary to pass air through the tank to allow workmen to operate within the tank itself. Since this operation takes place when diesel fuel is present, hydrocarbon-type nuisance odours are unavoidable. However, regular air quality monitoring was carried out.

Typical results of Shell's air quality testing during the cleaning operations are as follows:

Parameter*	LOCATION (Measurements downwind of tank)			Tank Farm/ Forest Hills Boundary
	At TK.803	20 ft. From TK.803	100 ft. From TK.803	
H ₂ S (ppm)	N.D.**	N.D.	N.D.	N.D.
SO ₂ (ppm)	N.D.	N.D.	N.D.	N.D.
Hydrocarbons	10 to 40	N.D.	N.D.	N.D.

* Analysis by: Dreager & Gas Tech. type gas tubes.
 ** N.D. = Non-Detectable

It is our understanding that both the Burnaby Health Department and G.V.R.D. staffs conducted similar tests at our property lines and within Forest Hills Properties and found similar results (i.e. non-detectable for all parameters).

Notwithstanding the above test results, and hence the non-health concerns, we were aware that the diesel cleaning portion of the procedure could, and in fact did, produce some odours within the community for short periods under certain atmospheric conditions. We attempted to minimize these odours during the course of the cleaning operation. In addition, we circulated a general letter to every home within Forest Hills Properties, explaining the procedure and inviting any concerned citizens to call us for further information. We received only 2 calls as a result of the letter. While we regret the inconvenience caused to our neighbours, the reason for the operation was to ensure better control of potential odours through installation of a double seal on TK.803.

It is our firm belief, as evidenced by the responsible procedures we instituted and by our test results and those of the appropriate public agencies, that at no time during the operation were our employees or our neighbours exposed to emissions which posed a health hazard. Also we are confident that the new seal will minimize any future nuisance impact of our tank farm operations on the surrounding community."

C. ISSUES PERTAINING TO THE ENVIRONMENTAL HEALTH DIVISION

1. Residents' Monitoring of Hydrogen Sulphide and Sulphur Dioxide
 During 1986 February, the Environmental Health Division was in receipt of complaints from Dr. N. Cochrane, 8011 Woodhurst Drive, regarding diesel fuel type odours and concerns of possible health effects.
 Inspections by the Environmental Health Division and G.V.R.D. Air Quality Control did confirm, during periods of very still air, periodic odours of diesel fuel in the Forest Hills Properties. Although these odours were at times detectable, and could constitute a nuisance to particular individuals, they were not considered by G.V.R.D. or Environmental Health Division staff to be a health hazard.

Due to Dr. N. Cochrane's insistence that Shell Canada's tank cleaning process was emitting hazardous levels of hydrogen sulphide and sulphur dioxide, the Environmental Health Division requested Shell Canada to monitor for these two chemicals at their Forest Hills Properties property line. In addition, Dr. N. Cochrane was given equipment by the Environmental Health Division for testing of the suspect chemicals, to be used when diesel odours were evident at her residence.

For the information of Council, hydrogen sulphide and hydrocarbons are chemicals which would be associated with product vapour emissions from a storage tank. Sulphur dioxide is associated with combustion processes only and not a product storage facility, such as Shell's tank farm.

The Environmental Health Division's records for 1986 March 03 detail discussions with Dr. N. Cochrane regarding her monitoring results for hydrogen sulphide and sulphur dioxide.

At no time were readings recorded showing any trace of hydrogen sulphide. The test equipment detailing zero readings for hydrogen sulphide are available in our department.

The readings of sulphur dioxide were questionable, as there is no known source of this chemical in the nearby community. Levels recorded by Dr. N. Cochrane would have resulted in an immediate requirement for medical treatment by residents of Forest Hills Properties. This did not occur.

Dr. N. Cochrane was advised of the very questionable readings for sulphur dioxide, due to the fact that there are no known sources in the nearby community. Dr. Cochrane was requested to immediately contact the Environmental Health Division, at any hour of the day, upon a reoccurrence of diesel-type odours in order that staff could perform air testing within her residence and property. No further requests were received from Dr. Cochrane for monitoring of diesel-type odours.

2. Response to Questions Contained in the Delegation's Brief

(i) Is technology available to capture the vapours emanating from the tanks during normal operations?

A double seal system and floating roof is currently used by the petroleum industry to control emissions of product odours from storage tanks. As Council is aware, Trans Mountain Pipe Line has contracted with an American consulting firm to explore other means of controlling emissions of crude oil vapours. This is referred to in (ii) below.

(ii) What different chemical substances are stored in the Shell tanks? Trans Mountain's tanks? (Is heavy crude with high sulphur content among these?)

Shell tanks: Three tanks are assigned for crude oil product storage of only low sulphur content. Four tanks are used for product storage for gasoline, diesel and stove oil.

Trans Mountain: Storage of crude oil products, which includes at times heavy crude. A report is expected by 1986 June 01 from Trans Mountain's consultants on means for preventing emissions during heavy crude product storage and vessel transfer.

- (iii) What vapours emanate from storage of these chemicals and what are the acceptable levels for these?
- A double seal system and single seal system are used to control product vapours which would consist of hydrocarbons and, for the crude oil storage tanks, hydrogen sulphide. There are no standards of which we are aware regarding concentrations of these substances. They are detectable at extremely low levels by humans, even though at these levels they are by no means a health hazard. Instrumentation has not been developed which can monitor these substances at levels equal to their detection by humans.
- (iv) What levels can be expected from tanks when they are double-sealed? Will all tanks be double-sealed?
- Shell Canada is confident that the double seal system on the crude oil tank will prevent a reoccurrence of objectionable crude oil type odour to the surrounding community. Not all of Shell Canada's tanks are sealed, however, they are regulated by a G.V.R.D. permit, which requires no emission of objectionable odours past Shell Canada's tank farm property line.
- (v) What are specific monitoring procedures currently used by Shell?
- A requirement of the G.V.R.D. permit is for visual inspection of the operating efficiency of the tank seal systems. There is no requirement for actual monitoring of emissions and, to our knowledge, this is not a requirement placed upon other similar tank farms or companies.
- (vi) Have all the tanks been cleaned?
- Shell Canada has advised that they do not have any scheduled tank cleaning operations in the near future. It should be pointed out that tank cleaning operations are required in a tank farm periodically.
3. Concerns Raised by a Questionnaire Conducted by Residents of Forest Hills Properties
- The Environmental Health Division is concerned regarding the allegation made by the delegation's brief, that
- "It is also clear from the survey of residents, that many have experienced symptoms common to exposure to toxic substances. A susceptibility to these toxic substances varies greatly between individuals, it is understandable that a variety of symptoms were reported."
- Information, which we have been able to collect at this time, and our past experience cannot support this statement. However, in order to ensure that there is no health risk to any resident within our municipality who lives in close proximity to petroleum product storage operations, we have requested the assistance of Health and Welfare Canada's Bureau of Occupational Health, Environmental and Occupational Toxicology Division. Specifically, we have requested their assistance in providing information on:
- (i) Analysis of the residents' survey.
 - (ii) Information on possible health risks to residents living in close proximity to petroleum product storage tanks.

(iii) Is there a specific health risk to residents living in close proximity to a tank farm when a tank cleaning process is being conducted?

(iv) What type of monitoring programs, other than visual inspections of seal systems, are in place across Canada to monitor product vapour emissions from tank farm operations?

The results of the information provided by Health and Welfare Canada will be forwarded to the delegation.

D. INFORMATION PERTAINING TO AIR QUALITY ISSUES PREVIOUSLY REQUESTED BY COUNCIL

Information was requested pertaining to the following questions:

(i) Is crude oil, with a higher sulphur content, being handled at the facility?

(ii) Are Municipal and Regional staff evaluating the machinery and equipment at the facilities?

(iii) What was the date of the last G.V.R.D. evaluation of the facilities and the particulars of adherence to G.V.R.D. requirements in this regard?

Following is the response received from the Greater Vancouver Regional District, Air Quality Control:

"Further to your request for information regarding emissions from refineries in Burnaby, the following is provided.

As you know, an amended permit was issued to Chevron in May, 1985 to allow for crude furnace and FCCU regenerator improvements. At that time, the entire permit was updated to reflect the knowledge gained over the past several years in terms of ambient air quality and source emission characteristics. Also included was a comprehensive monitoring and reporting program. Submitted reports and regulatory testing by our staff indicate that Permit requirements are being met.

If you recall during our meeting on February 4, 1986, I indicated that recent permit amendments have been issued to 3 of the 4 area refineries for emissions to the air. The permit issued to Shell is somewhat older and is scheduled for review in the near future. Emissions are generally within existing permit levels. An exception is the FCCU waste heat boiler sulphur oxide emission. While concentrations of this parameter currently exceed the existing permit level, they are comparable to the other 3 refineries. Ambient air levels of SOx continue to be very low.

As was the case in the original permit issued to Chevron, the current level reflects the limited information available at the time of its initial issuance. Similar criteria used to evaluate Chevron's recent application will be used during our upcoming review of Shell's emissions.

Historically, complaints relating to Regional emission sources have varied from year to year, normally ranging between 800 and 1,500. Although the number of complaints received in 1985 was near the higher end of this range, it was not a record year. While our analysis is not yet complete, initial indications are that regular sources were proportionately responsible for this increase. Undoubtedly, the extended warm, dry periods experienced in 1985 contributed significantly.

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Shell and Chevron were not exempt from this phenomenon although they experienced a normal number of process upsets and equipment maintenance shutdowns for the year. A few incidents which resulted in larger-than-normal numbers of complaints led to revisions of operating procedures to prevent similar occurrences.

In terms of crude oil sulphur content, permits issued by our office do not specifically restrict crude quality, but rather reflect emission quality. To meet permitted sulphur oxide emission limits, only low sulphur crudes are processed at local refineries. Typically, sulphur contents are about 0.5% and have not changed much from previous years.

As I indicated above, we will be reviewing Shell's permit shortly to ensure its consistency with the other refineries on Burrard Inlet and to ensure that ambient air quality objectives are not exceeded. Our staff will contact you at that time so that any comments you may wish to make can be included in our evaluation.

At this time, we do not anticipate changes to Chevron's permit. However, in keeping with our practice of imposing specific terms to our permits, another complete permit review will be conducted prior to its expiry on June 30, 1987. In addition, permits can be amended at any time should the need arise."

The Greater Vancouver Regional District has recently been given the authority to regulate air emissions from Trans Mountain Pipe Line, Westridge Terminal's flare system. G.V.R.D. staff are, at this time, discussing with Trans Mountain officials their regulating of this air emission source.

The Environmental Health Division will be reviewing with G.V.R.D. officials any amendments to existing or issuance of new permits for this municipality's petroleum operations.

Graeme V. Harvie.

G.V. Harvie, C.P.H.I.(C)
CHIEF PUBLIC HEALTH INSPECTOR

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cc: Director Administrative & Community Services
Medical Health Officer

