

TO: CITY MANAGER

DATE: 2002 03 19

FROM: DIRECTOR ENGINEERING

FILE: 10 08 11 (01)

SUBJECT: CHEVRON CANADA REFINERY LIMITED

PURPOSE: To provide comments and update on various studies commissioned by Chevron Canada Limited and the B.C. Ministry of Water, Land and Air Protection to review Chevron's Burnaby Refinery Operations

RECOMMENDATION:

1. **THAT** this report be received for information purposes.
2. **THAT** copies of this report be sent to:
 - Chevron Canada Ltd.
 - Environment Canada
 - B.C. Ministry of Water, Land and Air Protection

R E P O R T

1.0 INTRODUCTION

Following a series of incidents at Chevron's Burnaby Refinery in late 1999 and early 2000, Chevron Canada Limited commissioned the following three environmental studies in June 2000.

- a) Environmental Compliance Audit which involves a review of the refinery operations to ensure that Chevron is meeting its obligations under its permits;
- b) Public Safety Risk Assessment which involves a review of the potential impact of the refinery on the community and the response to accidental release; and
- c) Perimeter Groundwater Monitoring Program which determines if contaminants originating from the Chevron site are migrating, or may in the future migrate, via groundwater to Burrard Inlet.

In addition, the B.C. Ministry of Water, Land and Air Protection (previously called the B.C. Ministry of Environment, Lands and Parks) lead a Human Health Risk Assessment study to determine impacts of Chevron Refinery air emissions on the neighbouring residents.

The Terms of Reference for the three Chevron studies, acceptable to the B.C. Ministry of Water, Land and Air Protection (BCWLAP), were developed in collaboration with the City, Fraser Health Authority (previously called Simon Fraser Health Region), the G.V.R.D. and Chevron/North Burnaby Community Advisory Panel (CAP). Similarly, a list of "acceptable" consultants was developed collaboratively and it was left up to Chevron to select specific consultants for the three studies commissioned by them.

On December 11, 2000, Chevron Canada Limited had selected project consultants for each of the three studies. At around the same time, BCWLAP separately selected Dr. Susan Kennedy and her team from UBC to undertake the Human Health Risk Assessment study.

The following report provides comments and update on the various studies commissioned by Chevron Canada Limited and the B.C. Ministry of Water, Land and Air Protection to review Chevron's Burnaby Refinery Operations.

2.0 ENVIRONMENTAL COMPLIANCE AUDIT

The Environmental Compliance Audit, undertaken by Dillon Consulting Ltd. of Richmond, B.C., focussed on: air emissions, waste water and storm water discharges, solid waste disposal and spill management measures (prevention, containment and response). The study was completed in October 2001. Presentation of the study findings were made to agencies, Council, and CAP. Chevron's Fall 2001 Neighbourhood News, sent to the neighbouring residents, also summarized the study findings. Chevron also held a Public Open House on November 27, 2001 at the Confederation Seniors Centre and invited residents to learn more about the study findings. A questionnaire was also made available to the attendees at the Open House.

The key issues and findings of the above audit are noted below. A complete copy of the Environmental Compliance Audit study is also available in the Engineering Department for review.

2.1 Audit Process

The audit consisted of interviews with the refinery staff, agencies and citizen groups; review of the Refinery's files for records regarding administration of their various environmental operating permits, review of correspondence with regulators, tour of the specific facilities

at the Refinery; review of publicly available information and records from various governmental agencies with respect to the environmental performance and compliance of the Refinery; and, comparing the Refinery's operating records to relevant regulations.

Staff Comment:

The audit process is acceptable.

2.2 Air Emissions

Air emissions from the Refinery are regulated by GVRD Permit GVA0117 (for the Refinery and Area 2 Tank Farm) and GVA0118 (for Area 1 Tank Farm). Compliance with Permit GVA0117 is pollutant based and according to the study, Chevron does comply with this Permit. Compliance with GVA0118 is noted to be performance based for Volatile Organic Carbon (VOC) and odour controls. It is also noted that Chevron has been on the GVRD Air Quality Non-Compliance List six times since 1997. The GVRD and the City have also attributed numerous odour complaints to the Refinery during the time period covered by the audit.

According to the study, between 1985 and 1998 the production rate at the Refinery did increase. As a result, the annual tonnage of emissions for nitrogen oxides (NO_x), particulate matter (PM) and sulphur dioxide (SO₂) have increased while the quantity of carbon monoxide (CO) and VOC's have decreased. Based on the emission factor - the quantity of pollutant emitted (e.g. grams of pollutant) per unit of operating capacity (e.g. barrels of crude oil processed), the emission factors for all criteria air contaminants have decreased between the same period.

When compared to the total emissions (anthropogenic and natural) in the Lower Fraser Valley between the 1995 and 1999, it is noted that Chevron contributed a significant fraction of the total emission for SO₂ which ranged from 24% to 28%.

With respect to the comparison of Hazardous Air Pollutants (MTBE, xylenes, toluene, benzene and ethylbenzene) and Criteria Air Contaminants (CO, NO_x, PM, SO₂ and VOC's) emission factors between Chevron Refinery and select refineries operating in California for the year 1996, it is noted that Chevron Refinery has higher MTBE, SO₂ and VOC emission factors than those operating in California.

On management of VOC emissions, the study notes that Chevron is moving towards a full compliance by 2004 with the Canadian Council of Ministers of the Environment (CCME) Code of Practice for Controlling VOC's from Above Ground Storage Tanks. In addition, the Leak Detection and Repair (LDAR) program in Area 1 and Area 2 has been recently

implemented with the intent of further reducing VOC's fugitive emissions. With respect to the marine vessel and tank truck loading and unloading facilities, vapour recovery units are in operation during the transfer of materials.

In addressing the broader green house gas emission issue, Dillon notes that if desired, CO2 emissions from the Refinery can be better managed by looking at rational energy use at the Refinery which could involve improving heat exchange between Refinery streams, recovery of excess gases and their use as a fuel (e.g. flare stack), and the use of heat content of the flue gases.

Staff Comment:

The annual tonnage of NOx, PM and SO2 between 1985 and 1998 has increased. The current Human Health Risk Assessment study may likely provide a guidance on the impact of these increasing emissions on the neighbouring residents. Mitigation strategies could then be developed by the mandating agency if required.

MTBE is being phased out at Chevron Refinery in 2002 and as such will be eliminated it as an air contaminant. Appearing elsewhere in the Council Agenda is a staff report which discusses on management of groundwater contaminated by MTBE.

With respect to the VOC emissions, it is noted that the current VOC emissions will decrease when the LDAR program is fully implemented, all marine vessels are connected to the VRU and the tank upgrade program is completed. In the mean time, the current Human Health Risk Assessment study may likely provide a guidance on the impact of these emissions on the neighbouring residents.

2.3 Waste Water and Storm Water Management

Liquid wastes comprise of storm run-off water in Areas 1 and 2 of the Refinery as well as process wastewater from the refining / process section of Area 2. The Refinery currently holds a permit from the GVRD (Permit No. SC-100010-VSA) for discharges of treated process water to the sanitary sewer and from the BCWLAP (Permit PE-4970) for discharges of stormwater to Burrard Inlet.

Additionally, Chevron also has to comply with the Federal Guidelines Respecting the Quality of Liquid Effluent from Existing Petroleum Refineries. Chevron must monitor and report upon the quality of the storm water and sanitary sewer discharges from Area 1 and Area 2. Parameters which Chevron must monitor include Total Suspended Solids (TSS), Oil and Grease, phenols, nitrate nitrogen and sulphide.

According to the study findings, it is noted that the Refinery was in minor non-compliance in 1999 with Permit No. SC-100010-VSA and that there was increasing compliance in 2002 when compared to 1999. However, it was also noted that there were some data points missing in 2000.

The Refinery has a 97% compliance record during the period audited for compliance with Permit PE-4970. However, Chevron has been included in seven Provincial Non-Compliance Lists.

The Refinery has a good record of compliance with the federal Guidelines.

Staff Comment:

It is staff's understanding that Chevron had filed an Application with the BCWLAP in 1999 requesting an amendment to Permit PE-4970 to divert biologically treated process water from sanitary sewer to the Inlet. The Ministry has not made a decision on the application to date. Staff will monitor this issue and appropriately inform Council.

2.4 Solid Waste Management

a) Special Waste Land Treatment Facility (Located in Area 2)

Chevron has a permit from the BCWLAP (Permit No. PR-7112) to operate a special waste land treatment facility (landfarm) and to discharge refuse from the Refinery to that facility. The leachate / surface water from the landfarm are pumped to the effluent treatment plant in Area 2. Groundwater monitoring wells are also placed upstream and downstream of the facility. The study notes that in 1998 the Refinery undertook to upgrade the landfarm by installing an impermeable liner at the interface with native soil. In reviewing the groundwater monitoring data (pH, organic carbon and metals) between periods of 1998 to 2000, the study notes that the groundwater has been affected by constituents of the landfarm.

b) Special Waste Management

Dillon notes that Chevron has a good understanding of the required Provincial and Federal regulations relating to management of Special Wastes, including transportation and disposal.

In reviewing the Special Waste Manifests, they are well organized and dated past the statutory two year history; however, significant temporal gaps in the files suggest that some manifests are either not being filled out, or are being stored elsewhere at the Refinery.

In inspecting the partially lock-blocked area east of the Refinery processing area used for temporary storage of suspect waste materials, Dillon recommended construction of a more secure temporary storage area by installing curbing in the existing storage area.

Staff Comment:

The Perimeter Groundwater study may assist in addressing groundwater contamination from the landfarm area. It is staff's understanding that Chevron is taking appropriate action in management of their records. In addition, Chevron has sought clarifications from Dillon on the requirements to further secure the temporary storage area.

2.5 Spill Management Measures

a) Spill Response

Dillon feels that the emergency response initiatives currently in place at the Refinery should be adequate to handle response to plant emergencies as long as their Emergency Response Team members continue to receive ongoing training, which they receive currently.

b) Above Ground Storage Tanks (AST) - Containment of Potential Releases

Dillon randomly selected ten AST's (seven in Area 1 and three in Area 2) for review and noted that some of the AST's were showing visual signs of wear and tear, and or leakage. The area around a number of the AST's was found to have moderate amount of product staining near flanges and valves.

For most AST's at the Refinery, and for a significant part of Area 1, Chevron's containment works do not meet the CCME Code of Practice for AST's. In the event of a spill, the product would spill into the tank cut, contaminating the ground surrounding the tank. Chevron is aware of this and is currently implementing an upgrade plan for these works. Chevron has committed to Environment Canada to comply with the CCME Code for AST's. The compliance timeline is 2009.

c) Spill Prevention

Dillon recommended that Chevron maintain written records of all high level alarm tests, gauge checks, and water dips for AST's in Area 2 to satisfy the requirement of Section 4.3.16 of the National Fire Code.

d) Marine Loading Facility

The study noted that, in an event of a spill, the Refinery have a method in place for plugging the drain hole under the main pipe chase of the pier. In addition, given the flanged joints on

the loading tower and the arm at the marine facility, and its position over the water during loading, the Refinery should investigate options for pressure testing this unit and review the adequacy of spill prevention and containment.

Staff Comment:

Chevron should be encouraged to aggressively comply with the CCME Code of Practice for Above Ground Storage Tanks. It is understood from Chevron that all existing hydrocarbon tanks have been fitted with high level alarms and all new tanks are being designed and constructed with release prevention barriers, remote level monitoring and double tank seals. In addition, upgrades to the impoundment basin in Area 2 are underway and scheduled for completion by the year end.

3.0 PUBLIC SAFETY RISK ASSESSMENT STUDY

The Public Safety Risk Assessment Study, undertaken by A.D. Little of Cambridge Massachusetts, focussed on:

- a) identifying areas of the Refinery operations where there is potential for an impact to the community as a result of an accidental release with routine operations, and determine risks using CCRA Risk Assessment Guidelines;
- b) and examining the Emergency Response and Contingency Plans, including the roles and responsibilities of various agencies. The study did not address worker safety, long terms health issues, or environmental impacts. In addition, the focus of the Public Safety portion of the study was on potential safety impacts from significant unplanned releases, not the odours, noises, and other associated aspects of routine Refinery operations.

The study was completed in October 2001. As with the Environmental Compliance Audit, presentations of the study finding were made to agencies, Council, and CAP. Chevron's fall 2001 Neighbourhood News, sent to the neighbouring residents, also summarized the study findings. Chevron also held a Public Open House on November 27, 2001 at the Confederation Seniors Centre and invited residents to learn more about the study findings. A questionnaire was also made available to the attendees at the Open House.

The key findings of the above study are summarized below. For Council's information Chevron had communicated to the City that for security reasons due to the recent events in the United States, Chevron had deleted details on risk scenarios in their broad presentation to the public. The specific details of various risk scenarios and methodologies by which they

are characterized were presented in a report to City staff with a request that the City support Chevron's desire to maintain a degree of confidentiality surrounding the dissemination of this information.

3.1 Public Safety Risk Assessment Process

The risk assessment process included interviewing refinery engineers and other staff; reviewing reports; and examining operating units / equipment in Area 1 and Area 2 of the Refinery. Potential hazards were identified and a risk matrix was developed to help prioritize the risks into High, Medium and Low categories based on frequency and severity of event.

The evaluation of Chevron's Emergency Response and Contingency Plan involved review of the Plan; interviewing of Chevron staff and various agencies; review of current notification process; review of alternate notification and response models; and consideration of advantages and disadvantages of shelter-in-place versus evacuation.

Staff Comment:

Staff have reviewed the risk assessment methodology and are satisfied with the approach taken.

3.2 Public Safety Risk Assessment Findings

There were no high priority scenarios identified. There were four scenarios noted to be of medium priority for the Refinery to review and seek opportunities to further reduce / control the risk level or to improve emergency response plans. These scenarios address failures of equipment across a number of different parts of the refinery.

Staff Comment:

Chevron continues to analyze the medium risk scenarios and identify possible options to reduce or control the level of risk to the local community. A new control building is being constructed and plans are in place for the installation of new remote monitoring equipment that will facilitate improved monitoring of the blending and storage tanks in Area 1.

3.3 Chevron's Emergency Response and Contingency Plan

According to the study findings, Chevron's existing Emergency Response and Contingency Plan is not as up-to date and user friendly as it could be. Greater use of flow charts could facilitate the ease of use. The plans that Chevron supplied to the Fire Department are not as complete as those available to Chevron personnel as they only address oil spill response as

required by the Coast Guard. The complete plan also includes fire and hazardous materials response. Chevron is also presently reviewing the location of their current command post.

With respect to communication with the local agencies, the study notes that there is an opportunity to establish a better working relationship with the City. The study makes several suggestions including more joint drills, refresher tours for Fire Department personnel, and advance notice to the Fire Department of on-site activities that might raise public concern or interest such as increased flaring, maintenance activities that may produce some odours etc. Several alternate roles for Chevron, RCMP, and the Fire Department should be considered in terms of communications right after the incident.

Staff Comment:

It is staff's understanding that Chevron is working towards revising their Emergency Response and Contingency Plan. In addition, a working committee to address initial emergency community notification has been struck with City, Fraser Health Authority, GVRD and BCWLAP. A strategy to improve and better coordinate the refinery's emergency communication and community notification plan is currently being developed.

4.0 PERIMETER GROUNDWATER MONITORING STUDY

The Perimeter Groundwater Monitoring study, undertaken by Golder Associates Limited of Burnaby, focussed on: determining whether potential constituents of concern originating from the Refinery are migrating or may migrate in future migrate through groundwater toward off-site receptors (i.e. Burrard Inlet).

The first phase of the study has just been completed and involved installation of nested groundwater monitoring wells (4 in Area 1 and 4 in Area 2) in areas under which the migration of potential contaminants in groundwater is inferred to be most probable (based on up-gradient facilities and surfacial characteristics). Sampling was also undertaken in Confederation Park where Chevron's pipeline corridor crosses Rainbow Creek.

Staff are presently reviewing and evaluating the raw data which was provided by Chevron to the agencies on March 14, 2002. According to Chevron, a copy of the complete report will be made available to the agencies by March 22, 2002. Chevron is intending to meet with Council on March 25, 2002 to present the findings of the above study and provide an update on their follow-up on the recommendations made by Dillon and A.D. Little.

Staff will appropriately report to Council on the above study after reviewing the complete report.

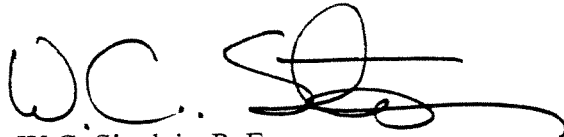
5.0 HUMAN HEALTH RISK ASSESSMENT STUDY

According to the consultant undertaking the Human Health Risk Assessment (HHRA) study, a draft report will be made available to the HHRA Advisory Committee by end of March, 2002. The draft report will also be submitted for peer review. At the time of preparing this report, staff did not have specific information as to when a final report would be made available to the public.

6.0 CONCLUSION

A number of studies initiated to look at Chevron Refinery's operation and its potential associated impacts to the neighbouring residents are completed. While it is recognized that it has taken time to arrive to this stage, completion of the Perimeter Groundwater and Human Health Risk Assessment studies in the near future will allow the development of strategic direction to address outstanding environmental issues at Chevron Refinery.

This is for Councils information.



W.C. Sinclair, P. Eng.
DIRECTOR ENGINEERING

DD:

cc: Director Planning and Building
Fire Chief
Emergency Coordinator