

TO: CITY MANAGER

DATE: 2000 07 06

FROM: DIRECTOR ENGINEERING

FILE: 10-08-11(01)

SUBJECT: CHEVRON CANADA REFINERY LIMITED

PURPOSE: TO PROVIDE AN UPDATE ON VARIOUS ISSUES RAISED BY COUNCIL AS A RESULT OF RECENT INCIDENTS AT CHEVRON CANADA REFINERY LIMITED, IN BURNABY

RECOMMENDATION:

1. **THAT** this report be received for information purposes.

REPORT

1.0 INTRODUCTION

This report provides an update on various issues raised by Council as a result of recent incidents at Chevron Canada Refinery Limited in Burnaby.

2.0 SUMMARY OF INCIDENTS

The following incidents, some of which are directly attributed to upset conditions at Chevron Canada Refinery Limited operations, have raised concerns with respect to potential risk to public safety:

- a) Elevated Levels of Ambient Sulphur Dioxide Levels (December 22-27, 1999)

According to the information provided by the G.V.R.D., on December 23 and December 27, 1999, ambient sulphur dioxide levels at the Capitol Hill air quality station exceeded the Federal Maximum Acceptable Air Quality Objective 1-hour average and Federal Maximum Acceptable Air Quality Objective 24-hour rolling average respectively. The Hourly Objective was exceeded by 50 ppb while the 24-Hour Objective was exceeded by 2 ppb.

Emissions of sulphur dioxide from Chevron Canada Refinery Limited were noted to be within the permitted levels during this period by the G.V.R.D. staff. However, given the ambient sulphur dioxide levels exceedances, G.V.R.D. recommended Chevron to curtail their sulphur dioxide levels and this was voluntarily complied with Chevron. On December 28, 1999, ambient sulphur dioxide levels returned to below federal guidelines.

G.V.R.D. concluded that this episode appears to have been driven by the intense meteorological conditions (i.e. temperature inversion) which existed over the region at the time, rather than by any change in emission source profiles.

b) Diesel Fuel / Oily Odours (March 29 - April 03, 2000)

Chevron Canada Refinery Limited was shut down for maintenance from March 10 through March 31, 2000 with various units starting up during the period of March 28 to April 07, 2000, and the whole refinery was operating normally by April 10, 2000.

During the initial startup period on the night of March 29, 2000, Chevron identified hydrocarbon in their cooling water. At about the same time, Chevron started receiving complaints from neighbouring residents of a diesel like odour. Investigation by Chevron staff revealed that the cooling water in the refinery had been contaminated by aviation fuel in heat exchangers. These units were isolated to prevent continuing contamination. Subsequently, contaminated cooling water was directed to the refinery's waste water treatment system which discharges to the G.V.R.D. sanitary system. The water removed for treatment was replaced with fresh uncontaminated water.

As a result of this incident, the G.V.R.D. required Chevron to file a report, including the events leading up to the leak, actions taken to isolate the source, submission of sampling results and procedures to treat the cooling water during the treatment period, and steps Chevron would take to prevent the recurrence of such an event. This was complied with by Chevron.

c) Catalyst Emission (April 06/07, 2000)

Between 16:00 h. April 06 to 09:00 h. April 07, 2000, and 18:00 hrs. to 21:00 hrs. April 07, 2000, Chevron experienced operational problems which resulted in release of catalyst into the neighbourhood. The source of the emissions was determined to be from the Fluid Catalytic Cracker Regenerator stack (FCC). The total loss of catalyst during these periods was estimated to be 2 tonnes.

Two samples of the catalyst were collected by the G.V.R.D. - one sample ("test") from the a vehicle at 4362 Cambridge Street, Burnaby, and the second sample ("control") from

Chevron Refinery. The samples were forwarded to external laboratories for analysis. The sample results were subsequently forwarded by the G.V.R.D to the Simon Fraser Health Region for their evaluation with respect to the public health impact. A Pollution Prevention Order under the G.V.R.D. Air Quality Management Bylaw was issued to Chevron as a result of this incident.

At the June 19, 2000 Council Meeting, Council received correspondence from Mr. Rick Kwan, Simon Fraser Health Region which concluded that "Based on the above information the catalyst emissions from the April 6/7 FCCR incident is not likely to present a long-term health risk to the adjacent residents."

d) MTBE / Diesel Spill (May 17, 2000)

On May 17, 2000 at approximately 9:55 p.m., staff were notified by the G.V.R.D. regarding an Methyl Butyl Tertiary Ether (MTBE - octane enhancer) spill at Chevron Canada Refinery Limited blending and shipping area. Staff, upon being notified ensured that officials from the Simon Fraser Health Region and Provincial Emergency Program were notified of the event. Upon arriving at the site, staff were informed of the following:

At 8:15 p.m., Tank #153 which was receiving MTBE / Diesel product (75:25 mix ratio) from Trans Mountain Pipeline overflowed for approximately 10 minutes. Initial reports estimated that up to 500 barrels of MTBE / Diesel product was spilled and contained in the impoundment area within Chevron Canada Refinery Limited property. Chevron initiated placement of foam on the spilled product to reduce the risk of fire and odours, and initiated pumping of it to Tank #27. Staff in conjunction with the Ministry of Environment, Lands and Parks, inspected the containment and foreshore area and noted that the product was contained within Chevron property.

According to Chevron, as a part of the post incident remediation, all water that had any concentration of MTBE / Diesel mix (approximately 30,000 barrels) was recovered and stored in a tank. The soil from both the impound basin and the foreshore basin was put into bins located on Chevron property. Both the water and the soil will be appropriately remediated. Chevron concluded that their revised estimates on spilled volume was 150 to 200 barrels.

In order to prevent a reoccurrence, Chevron advise that they undertook the following immediate actions: temporary 3 feet reduction in Tank #153 safe oil height to provide a wide margin of safety; review requirements of receiving MTBE with Chevron staff; requiring operators to check the gauges with a manual reel gauge prior to every fill of the MTBE tanks; and review by the Operations Manager for any plan requiring a crude receipt tank to be taken to safe oil height.

Other measures that are to be implemented by Chevron include: additional (permanent) lowering of the safe oil height of Tank #153 allowing for an additional 20 minute contingency; reviewing and revising procedures (if required) for receiving MTBE and ensuring that operators are trained on revised procedures; continuing with tank automation program for Area 1 giving priority to MTBE tank high level alarms and third party transfers.

On May 31, 2000, Council met with Chevron officials to receive information on the status on the recent incidents and advocated Chevron to undertake an independent risk assessment.

On June 02, 2000, City staff met with Chevron to review the incident, Chevron's Emergency Response Plan and Chevron's agency call out procedures.

On June 29, 2000, the Ministry of Environment, Lands and Parks stated that they it has also completed its review of the May 17, 2000 MTBE / Diesel spill at the Refinery. According to the Ministry staff, a report on the incident will be submitted to the Minister by July 07, 2000.

e) Vacuum Truck Incident (May 26, 2000)

At approximately 5:00 p.m., Friday May 26, 2000, two contractors working at the Chevron Refinery were injured as a result of an incident that occurred while they were unloading material from a vacuum truck. The injured workers were attended to by Burnaby Fire and paramedics and were taken to hospital for treatment. An investigation of the above incident was conducted by WCB.

3.0 ENVIRONMENTAL RISK ASSESSMENT

On June 27, 2000, the Minister of Environment issued a press release which in part stated the following:

" Chevron has voluntarily agreed to undertake a three-part review of the environmental operations at its Burnaby refinery. The recent series of accidents at Chevron has given rise to a range of concerns. Ministry staff will be working closely with the company, the Greater Vancouver Regional District, the City of Burnaby and the public to make sure these studies are carried out in a comprehensive, credible and timely manner.

Chevron will be required to submit terms of reference to the Ministry of Environment, Lands and Parks and the G.V.R.D. for:

- An environmental review of the refinery and its operations to ensure that Chevron is meeting its obligations under its permits.

- A public safety risk assessment to review the potential impact of the refinery on the community and the response to accidental release. The risk assessment will involve the ministry, the G.V.R.D., Burnaby, the Simon Fraser Health Unit and other members of the community advisory panel.
- A groundwater investigation to find out if contaminants originating from the Chevron site are migrating, or may in the future migrate, via groundwater to Burrard Inlet.

The review, risk assessment and groundwater investigation will be undertaken by qualified, independent professionals acceptable to the ministry.

The Ministry will:

- Review and approve the terms of reference for the Chevron studies, monitor the work and ensure compliance with the recommendations.
- Complete a review of the May 17 diesel MTBE spill at the refinery.
- Participate in the existing community advisory panel to work with the community and address ongoing environmental issues and public concerns around the Chevron refinery.

The draft terms of reference for Chevron environmental reviews will be submitted to the ministry's regional pollution prevention manager this week. A further announcement will be made within a month, about the time frame to complete these studies. "

On June 29, 2000, staff forwarded a letter to Mr. Jim McCracken, Regional Director, B.C. Ministry of Environment, Lands and Parks, outlining inclusion of issues previously expressed by Council and staff in the review's Terms of Reference (see Attachment #1). According to recent discussion with Ministry staff, the Terms of Reference will be finalized by July 28, 2000.

4.0 PUBLIC MEETING

Staff attended a meeting hosted by Svend Robinson, MP, at Gilmore Community School on June 29, 2000 in response to concerns raised from areas residents to him on recent incidents at Chevron Refinery, in particular the MTBE spill.

At the meeting, roles and responsibilities of various agencies were clarified. Comments and concerns from attendees related to: non-compliance of above ground storage tanks at Chevron Refinery with *CCME Environmental Code of Practice for Above Ground Storage Tanks Containing Petroleum Products* (1994); lack of communication between agencies; odours; timelines for phasing out MTBE; public notification process; permit compliance; sulphur dioxide emissions; and permanent removal of Chevron from existing site.

5.0 PUBLIC / COMMUNITY NOTIFICATION PROCESS

At the May 01, 2000 Council Meeting, Council received a report (Item #10, Managers Report No.13) from staff on Chevron Canada Limited - Air Emission Notification Process. This report in part stated that "A public / community notification procedure will be developed by the G.V.R.D. and Chevron in consultation with the City and the North Burnaby Chevron Community Advisory Panel (CAP). This issue will be discussed at the next CAP meeting which will be held in early May." Council, upon review of the above report, requested that a report on the draft public notification process be forwarded Council for comments prior to its finalization.

On May 16, 2000, staff attended the CAP meeting and obtained input from its members. On June 14, 2000, a meeting was held between G.V.R.D, B.C. Ministry of Environment, Simon Fraser Health Region, City and Chevron to review the public notification procedures. A draft public notification process has recently been circulated to the above agencies for review (including Burnaby). A report on the final draft public notification process will be provided to Council prior to its finalization.

For Council's information, the Emergency Coordinator will be preparing a separate report on "Shelter-In-Place" for the next Emergency Planning Committee meeting.

6.0 DISCHARGE OF REFINERY PROCESS WATER TO THE G.V.R.D. SANITARY SEWER

Chevron Canada Limited has an existing permit (SC-100010-VSA) from the G.V.R.D for the disposal of biologically treated process water to the sanitary sewer.

Authorized sources of process water include water from: process area; tank water bottoms, oily water returns, contaminated storm water from outside process area, waste treatment bio bends and reformer catalyst regeneration.

Information regarding compliance to the permitted levels is provided in the G.V.R.D. report noted under Section 10 of this report.

7.0 DISCHARGE OF ON-SITE SURFACE RUN-OFF TO BURRARD INLET

Chevron Canada Limited has an existing permit (PE-4970) from the B.C. Ministry of Environment, Lands and Parks for disposing treated effluent. Treated effluent, which includes storm water, uncontaminated cooling water and steam condensate, is discharged to gravity separators and settling ponds prior to discharging from two separate pipes into Burrard Inlet.

Monitoring of the effluent, including sampling parameters, sampling frequency and reporting procedures is stipulated in the permit. According to the Ministry staff, effluent sampling is primarily conducted by Chevron with the Ministry staff obtaining samples as required. Information on compliance record to the existing permit is attached. (see Attachment #2).

It is staff's understanding that there are two applications filed by Chevron Canada Refinery with the B.C. Ministry of Environment to amend the existing permit (PE-4970). The first application filed on July 07, 1998 proposes an amendment to the testing methods for hydrocarbons and total suspended solids. The second application filed on February 01, 1999, is requesting amendment to divert biologically treated process water to Burrard Inlet. According to the Ministry staff, both applications are still being reviewed and a decision will be made in fall of this year.

It is anticipated that the recent application by Chevron will be assessed by Burrard Inlet Environmental Action Program (BIEAP). Also, given the newly adopted Canada Marine Act, it is expected that the Vancouver Port Authority will be assessing the application.

8.0 REGIONAL AMBIENT AIR QUALITY MONITORING STATIONS - HARBOURVIEW (CAPITOL HILL) AND KENSINGTON AVENUE (BURNABY NORTH)

At the June 19, 2000 Council Meeting, Council inquired about the air quality parameters which are being monitored at the above regional ambient air quality stations.

a) Harbourview (Capitol Hill) Ambient Air Quality Monitoring Station

Parameters which are monitored on a continuous basis at this station include sulphur dioxide, total reduced sulphur, wind speed/ wind direction, temperature and relative humidity.

In addition, beginning spring of 1998, G.V.R.D. undertook a two year sampling program on a quarterly basis for ozone, nitrogen dioxide and inhalable particulate (PM10) using their Mobile Air Monitoring Unit (MAMU). According to the G.V.R.D., MAMU was located at the above station during the following dates:

April 06-30, 1998; July 09-29, 1998; October 01-21, 1998; January 21-February 15, 1999; June 08-29, 1999; August 05-26, 1999; November 15-25, 1999; December 15-23, 1999; and March 06-27, 2000.

The selected dates were based on monitoring requirements for various projects in the District, staff availability and the servicing needs.

The two year monitoring program is now complete. Following the review of data, a decision will be made regarding the need for additional permanent monitoring parameters at this station.

b) Kensington Avenue (Burnaby North) Ambient Air Quality Monitoring Station

Parameters which are monitored on a continuous basis at this station are: sulphur dioxide, total reduced sulphur, nitrogen dioxide, carbon monoxide, ozone, inhalable particulate (PM10) and wind speed / wind direction. Inhalable particulate has been monitored at this station since May, 1994.

9.0 SULPHUR DIOXIDE EMISSIONS

According to the G.V.R.D, there is a general decrease in ambient sulphur dioxide between 1995 to 1999 as the sulphur content of fuels, particularly in the transportation sector, declines.

The most recent G.V.R.D. Emission Inventory indicates that 4,000 tonnes/year of sulphur are emitted by all sources in the G.V.R.D. Of the total 30%, or about 1,200 tonnes/year are emitted by Chevron Canada Refinery in Burnaby.

The G.V.R.D Air Quality Management Permit issued to Chevron Canada Refinery for sulphur dioxide was 2,360 tonnes in 1995 and 1,750 tonnes in 1999. The current permit has a requirement for works that will further reduce authorized emissions from Chevron's Crude Unit Furnaces by a further 93 tonnes of sulphur dioxide.

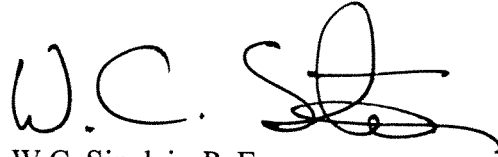
However, actual emissions (based on stack test data and/or engineering calculations based on US EPA emission factor calculations report) reported the following sulphur dioxide emissions from Chevron Canada Refinery: 1,640 tonnes in 1995 and 1,260 tonnes in 1999.

10.0 G.V.R.D. REPORTS

As previously stated, the G.V.R.D. has the regulatory mandate for air emissions and discharges (to the sanitary sewer system) from Chevron Canada Refinery Limited. Attached are current G.V.R.D. staff reports to be submitted to the regional Planning & Environment and Sewerage and Drainage Committees regarding air emissions and sewerage discharge from Chevron Canada Limited (see Attachments #3 & 4 respectively).

11.0 CONCLUSION

It is recognized that in the past few years, Chevron has undertaken numerous operational upgrades at their facility. However, given the series of recent incidents, Chevron has lost the public trust. Recognizing this, Chevron has voluntarily agreed to undertake an environmental review / public risk assessment / ground water study of their facility. All regulatory agencies also recognize the need for better communications amongst themselves and the need for being more vigilant in ensuring regulatory compliance.



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

DD:
Attachments

cc: Director Planning and Building
Fire Chief
Emergency Coordinator



4949 Canada Way, Burnaby, B.C. V5G 1M2
Engineering Department

File: 10 08 11 (01)

B.C. Ministry of Environment, Lands and Parks
2nd Floor, 10470 152nd Street
Surrey, BC V3R 0Y3

Attention: Mr. Jim McCracken, Regional Director

Dear Mr. McCracken :

**Re: Chevron Canada Refinery, 5201 Penzance Drive, Burnaby, BC
Terms of Reference for Environmental Review/Public Safety
Risk Assessment and Groundwater Investigation**

It is my understanding that Chevron Canada Limited will be submitting draft Terms of Reference to your Ministry and the G.V.R.D. for approval prior to undertaking an environmental review/public safety risk assessment and groundwater investigation. The City has been advocating for this environmental review/safety risk assessment and is pleased to see that it will be undertaken.

City Councillors and staff have expressed previously some issues and concerns that they would like to see addressed in such a review. We would like to take this opportunity to identify some items that the City would ask be included in the review's Terms of Reference. Attachments 1 and 2 provide an itemized listing of issues and Fire Department comments respectively.

We would ask that these issues be taken into consideration. If you require any additional information, please contact Dipak Dattani at 294-7771.

Yours truly,

A handwritten signature in black ink, appearing to read "W.C. Sinclair".

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

WCS:jh
Attach.

cc: G.V.R.D. Attn: Barry Mills, Manager Air Quality
4330 Kingsway, Burnaby, BC V5H 4G8

File # 10-08-11-01

FAXED
JUNE 29

www.city.burnaby.bc.ca

Telephone: (604) 294-7460
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2000 06 29

Attachment #1

CHEVRON CANADA REFINERY LIMITED, BURNABY, B.C.

ENVIRONMENTAL REVIEW / PUBLIC SAFETY RISK ASSESSMENT

Review the following:

- Age and condition of all infrastructure including but not limited to storage tanks, processing units, asphalt loading facility, piping, valves, hydrants, dykes, settling/containment ponds;
- Operation, Maintenance and Upgrade of all infrastructure;
- Product management and throughput capacity;
- Storage Tanks:
 - Structural Integrity;
 - Automated overflow alarm protection;
 - Seismic upgrade;
 - Floating seals integrity;
- Air Quality:
 - Emission equipment to control all emissions (including fugitive) from all operational sources;
 - Emission trends and proposed reduction approach for sulphur dioxide, nitrogen dioxide, volatile organic carbons, particulate matter (PM10);
 - Appropriateness and location of ambient regional air quality monitoring stations including monitoring parameters;
- Solid waste management including:
 - Contaminated soils / sludge;
 - On-site bio-landfill.
- Liquid waste management and associated treatment:
 - Surface run-off and uncontaminated cooling water to Burrard Inlet;
 - Process water discharge to sanitary sewer;
 - Groundwater;

- On-site and off-site traffic management:
 - Road dyke system;
 - Protection of propane tanks, storage tanks, pipelines, valves, controls from traffic;
- Spill containment systems including but not limited to size, condition, elevation and automated alarms system(s);
- Upset Conditions:
 - Spill prevention - public awareness program; community awareness and emergency response program;
- Emergency Preparedness and Response:
 - Emergency Response Plan(s);
 - Spill response equipment;
 - Response strategies for all petroleum products;
 - Response strategy of identified petroleum product which, in event of an incident, could cause vaporize and impact neighboring residents.
 - Public notification.
- Resource allocation to adequately address environmental and public safety related matters;
- Training and records management.
- Compliance to various permits issued by governmental agencies;

BURNABY FIRE DEPARTMENT**INTER-OFFICE COMMUNICATION**

TO: ENVIRONMENTAL ENGINEERING, MANAGER 2000 JUNE 29
Dipak Dattani

FROM: FIRE CHIEF

SUBJECT: RISK ASSESSMENT - CHEVRON

During our discussion this morning I outlined a number of concerns that the Burnaby Fire Department would like considered as part of the risk analysis process.

First of all, I would like to see a complete review of the Burnaby Refinery Contingency Plan as it relates to the role of the Burnaby Fire Department.

The current contingency plan is very unclear as to the notification or alerting process, especially when the Department is called upon to assist at those incidents other than fire.

Fire Department resources are strategically located near the refinery (Willingdon & Hastings) and are able to respond and arrive within minutes of being notified.

Upon arrival, the Department would initiate containment, limit the spread of spilled product or take the appropriate action until the arrival of trained refinery staff.

This should be looked upon favourably by Chevron and allow us the opportunity to error on the side of caution.

Currently, when the Burnaby Fire Department arrives on the scene, especially outside normal working hours, we have experienced limited resources available to brief the Department on details of the incident.

Through the risk assessment process, consideration must also be given to upgrading the facility wherever possible, with sensors or overflow warning alarms to eliminate as much as possible the occurrence of human error.

While reviewing the Burnaby Refinery Contingency Plan I noticed the Gasoline / MTBE and Middle Distillate Fuels are characterized as:

- highly flammable due to vapour formation, especially gasoline
- spread quickly across the surface of the water in a thin film or sheen
- fairly strong odour may be present, at non-toxic levels


The note under Containment and Recovery explains that gasoline or MTBE should not be contained or boomed under any circumstance due to the risk of fire or explosion.

To facilitate this safety measure, the holding pond where product is contained could be upgraded to include automatic sensors and foam monitors, which would be activated during a spill.

The following are concerns identified for consideration.

1. Revise Burnaby Refinery Contingency Plan to clearly define the Burnaby Fire Department role and responsibilities.
2. Burnaby Fire Department should be required to attend all product spills.
3. Upon arrival, Burnaby Fire Department must be briefed regarding details of the incident in progress.
4. Utilize Burnaby Fire Department personnel and expertise until the arrival of Chevron's call-out personnel.
5. Chevron should produce a revised inventory and location of safety equipment list.
6. Review of the "Burrard Inlet Mutual Aid Group" - at 17 May 2000 - spill initially lacked a sufficient supply of foam and when Mutual Aid was initiated the wrong foam was delivered.
7. Chevron should install automatic foam system to blanket spilled product.
8. Upgrade spill pond with sensors and foam monitors.
9. Initiate - further site familiarization tours for Burnaby Fire Department personnel and joint training exercises with Chevron and Burnaby Fire Department crews.

The Burnaby Fire Department is prepared to discuss these matters in more detail upon request.


J.A. (John) Stewart
Fire Chief

JAS/sc



To: file

Date: July 5, 2000

File: PE-4970

Re: Non-Compliance of Chevron's effluent permit PE-4970

Attached is a table of instances of non-compliance Chevron has had with their effluent permit PE-4970 since Chevron Canada Ltd. pleaded guilty to charges relating to two spills resulting in fines totaling \$150,000 in July 1997.

It should be noted that **Area 1** is the tank farm. The storm water discharge is continuous, depending on the tide. The discharge can be stopped when the company finds that they are in non-compliance. **Area 2** is the refinery. The storm water is collected in basins, tested and discharged on a batch basis exempt during heavy rainfall when the discharge may be continuous.

The comment column contains information pertaining to the Non-Compliance List and may not necessarily be releasable under the *Freedom of Information and Protection of Privacy Act*.

David Robertson
Pollution Prevention
Industrial Section

FEED FAX THIS END

FAX	
To:	<u>Dipak</u>
Dept:	_____
Fax No.:	_____
No. of Pages:	<u>2</u>
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Ministry of
Environment,
Lands and Parks

BC Environment
Lower Mainland Region
Pollution Prevention

Mailing/Location Address:
10470 152 Street
SURREY BC V3R 0Y3

Telephone: (604) 582-5248
Facsimile: (604) 584-9751
or (604) 582-5335

Chevron Canada Ltd. Compliance with permit PE-4970

List	Quarter	Violation	discharge vs permit limit	comment
21st NC List	1st 2000	Area 1 TEH	12.6 vs 10 mg/L	
		Area 1 phenol	0.575 vs 0.5 mg/L	
		Area 2 TEH	28.1 vs 5 mg/L	
	4th 1999	Area 1 TEH	10.8 vs 10 mg/L	
			36.4 vs 10 mg/L	
		Area 2 TEH	7.3 vs 5 mg/L	8.4 vs 5 mg/L
20th NC List	3rd 1999	Area 1 TEH	21.8 vs 10 mg/L	
		Area 1 TEH	14.4 vs 10 mg/L	
		Area 2 TEH	23 vs 5 mg/L	
	2nd 1999	Area 2 TEH	23 vs 5 mg/L	
		Area 2 TSS	30 vs 20 mg/L	
	19th NC List	1st 1999	All data in compliance	
4th 1998		Area 1 TSS	4 of 12 results non-compliant	
18th List	3rd 1998	Area 2 flow	4 results not submitted	
		Area 2 O&G	8 vs 5 mg/L	
	2nd 1998	All data in compliance		
17th List	1st 1998	Area 1 TSS	14 of 38 results >20 mg/L	
		Area 1 O&G	22 vs 10 mg/L	
	4th 1997	Area 1 TSS	10 of 29 results >20 mg/L	
		Area 1 O&G	34 vs 10 mg/L	
		Area 2 pH	5.6 vs (6.0 to 8.5)	
		Area 2 O&G	2 of 26 samples >5mg/L	
	3rd 1997	Area 1 TSS	6 of 12 samples >20 mg/L	

TSS total suspended solids
 TEH total extractable hydrocarbons
 O&G oil and grease



Committee Meeting Date: July 12, 2000

To: Planning and Environment Committee

From: Bob Smith
Administrator, Air Quality Control

Date: June 30, 2000

RE: **Chevron Refinery and Tank Farm Update**

Recommendation:

That the Planning and Environment Committee receive the report *Chevron Refinery and Tank Farm Update*, dated June 30, 2000 for information.

1. PURPOSE

In response to a request from the Committee at its June 14, 2000 meeting, this report provides an update on emission reduction activities at Chevron facilities and describes several emission incidents that have occurred in the last few months.

2. CONTEXT

Chevron Canada Limited operates an oil refinery located in North Burnaby at the base of Capitol Hill and a nearby tank farm at the foot of Willingdon Ave. Both facilities hold permits for emissions to the air under the GVRD Air Quality Management Bylaw.

Permits

Permit requirements for the refinery include quarterly submission of information related to emissions, including: a refinery sulphur balance; emissions from storage tanks and equipment leaks; stack sampling of key emission sources; fuel combustion data; and venting and flaring activity. In addition, the permit requires the installation of continuous emission monitors on the Fluid Catalytic Cracking Unit (the largest single source in the refinery) and the Sulphur Recovery Plant, which have been completed.

The tank farm permit requires annual reporting of hydrocarbon losses from storage tanks, tank truck and marine vessel loading activities, and equipment leaks. Further, Chevron is required to adhere to the Canadian Council of Ministers of the Environment (CCME) environmental code of practice for equipment leaks which includes annual testing and repair requirements for leaks

detected. Adherence to the CCME "Environmental Guidelines for Controlling Emissions of Volatile Organic Compounds from Above Ground Storage Tanks" is also required. This includes annual measurements of seal gaps between roofs and tank walls to ensure good contact is made, and a program of replacement of all single-sealed tanks with double seals by 2004. Other operational reporting is also required.

The GVRD permits have resulted in the following emission reductions activities at both the tank farm and refinery.

- A. At the tank farm, 127 small, older tanks are to be replaced by 11 new, larger tanks. All new tanks must meet the CCME criteria, including double sealing, which is essentially the same as the requirements imposed on similar facilities in California. While the overall storage capacity will increase by about 16%, use of double (primary and secondary) seal technology will result in a 10% reduction in hydrocarbon emissions.

Double seals are also required on the existing tanks that are not scheduled for replacement. Most of these tanks have been so fitted, and the rest are to be either decommissioned or have secondary seals added by 2004. In addition to emission controls, the tank program includes seismic and spill prevention upgrades. The more odourous materials are to be moved away from the tank farm fence line to help reduce neighbourhood odour impacts.

- B. Staff negotiated installation of a Vapour Recovery Unit (VRU) for the loading dock at the tank farm, which was completed in 1999. Basically, the VRU collects displacement vapours from ships and barges when they are loaded with stored product. While not all barges have yet been modified by their owners for connection to the new VRU, many have been, and the rest are scheduled for conversion. This is the most significant hydrocarbon reduction measure at the tank farm. To put it into perspective, hydrocarbon emissions from the tank farm prior to installation of the VRU were approximately 250 tonnes/year. After installation (beginning in the year 2000), emissions are estimated to be 180 tonnes/year and approximately 80 tonnes/year when all vessels have been converted. This is the only VRU to be installed at a marine vessel loading dock north of California on the West Coast.
- C. Installation of a Vapour Recovery Unit at the Tank Truck Loading Rack was required in the tank farm permit issued by the GVRD. It was completed in 1992 and significantly reduced odours in the area, as the loading rack is located in close proximity to area residents. It reduced hydrocarbon emissions by about 400 tonnes/year.
- D. The refinery permit includes the replacement of burners for the furnaces with Ultra Low NOx (nitrogen oxides) equipment. Over half of the furnaces have been retrofitted with such burners, and the program is ongoing. In 2001, two additional furnaces will have their burners replaced with this newer technology. Nitrogen oxides are one of the precursors to smog formation.
- E. A state-of-the-art Sulphur Recovery Unit was completed in 1994 and upgraded in 1998. This unit removes sulphur from refinery fuel gas before it is burned in the furnaces. The upgrading in 1998 was necessary to accommodate the production of low sulphur and low benzene gasoline to meet fuel quality regulations imposed by the provincial government for implementation in 1999.

- F. In part because of increasing particulate emissions from the fluid catalytic cracking (FCC) process, new cyclone control equipment was installed during the March, 2000 maintenance shutdown of the refinery. Results of testing required in the permit indicate a 40% improvement in particulate emissions compared to previous tests. The permit also requires the use of a special catalyst in the FCC, which further reduces sulphur oxide emissions.

In the US, there are two levels of emission control, one for existing refineries and the other for new operations, the latter known as New Source Performance Standards (NSPS). Emission requirements in the Permits issued to Chevron are consistent with existing petroleum refining and storage facilities in California. As equipment is upgraded or new processes are added, the District would expect that levels similar to the NSPS requirements would be achieved.

Recent Incidents

Several air quality incidents have occurred recently in the area which were attributable to Chevron.

- A. The first took place on December 23 & 27, 1999 when a high pressure weather system moved into the Region from offshore. Sulphur dioxide (SO₂), measured at the monitoring station on Capitol Hill, exceeded the federal Maximum Acceptable Objective once on each of those two days. While the levels were marginally above the Objective, they were higher than normally measured at this site. The only other time when levels exceeded this Objective was in 1996. The December, 1999 occasion was a period in the entire Lower Fraser Valley of extremely stable meteorology consisting of poor ventilation (virtually no winds) and a pronounced temperature inversion. Air quality readings were elevated throughout the region. Air Quality staff contacted Chevron to determine the source of any excessive emissions, however operations were typical of normal operation. Upon notification by the GVRD, Chevron temporarily modified operations to reduce sulphur oxide emissions. Ambient SO₂ levels returned to normal once the ventilation improved.

Sulphur dioxide levels measured in the GVRD are generally very low and continue to decrease as the sulphur content of fuels, particularly in the transportation sector, declines. The most recent GVRD Emission Inventory indicates that 4000 tonnes/year of sulphur are emitted by all sources in the GVRD. This is down from 8500 tonnes/year in 1985. Of the total 30%, or about 1200 tonnes/year is emitted by Chevron. For comparison, information from the Bay Area in San Francisco indicates that petroleum refineries are responsible for well over 30% of the 30,000 tonnes/year emitted in that area. Therefore, Chevron's sulphur emissions are consistent with those at California refineries using similar emission control technology.

- B. A second incident occurred between March 29 and April 3. The refinery was shut down for maintenance for most of the month of March and was restarting operations when complaints regarding odours began to be received. The problem was traced to leaking heat exchangers which allowed jet fuel to contact the cooling water system, resulting in an odourous emission. The heat exchangers were isolated, but treatment of the large volume of water to remove the jet fuel contamination took some time. Jet fuel, by its nature, is very odourous and can be detected at very low concentrations, thereby giving rise to the complaints.

The GVRD required Chevron to report on this incident, including the events leading up to the leak, actions taken to isolate the source, submission of sampling results and procedures to treat the cooling water during the treatment period, and steps Chevron would be taking to prevent the recurrence of such an event. All of this information was subsequently submitted, including a review of heat exchanger inspection and testing frequency.

As a consequence of this event, GVRD, Burnaby and Simon Fraser Health Region staff also identified a need for improved event communication between them. While each agency separately received early notification of complaints, during this event, integrated information between the parties was lacking. The related staff have since met and revised their procedures to improve inter-agency communication and ensure early notification of any future incidents.

- C. On April 6/7, a release of catalyst from the Fluid Catalytic Cracker occurred during start-up after the March maintenance shutdown. It resulted in the deposition of catalyst on properties in the vicinity and the receipt of complaints from the public. The cyclones for controlling particulate from this process unit were replaced during the shutdown, but start-up operational problems with the new equipment resulted in the release.

Air Quality staff responded to the complaints immediately and a sample of the material at a nearby residence was collected. It was sent, along with a sample of catalyst, to a commercial laboratory for analysis. Results showed the sample to consist of silica, aluminum, iron, and trace amounts of other material. These results and a GVRD estimate of the concentration of catalyst in the air were then sent to the Simon Fraser Health Region for an assessment of health implications. This assessment focused on the chemical make-up of the material and the quantity of inhalable particulate (PM_{10}) in the sample. The subsequent health report (Attachment 1) indicated the constituents of the catalyst were common elements in the earth's crust and not a serious concern. Further, the low level of inhalable particulate was determined to "present little threat to the health of residents living near the refinery as compared to their daily exposure of PM_{10} from vehicular emissions."

Recognizing the potential for a more serious discharge from this source, the GVRD issued a Pollution Prevention Order to Chevron. This Order required that immediate steps be taken to control the discharge and that a report on such actions be filed with the GVRD. The response outlines the procedure Chevron will follow when starting the FCC after a shutdown to avoid a repeat of this incident.

- D. The most recent incident involved a spill of a mixture of methyl tertiary butyl ether (MTBE) and diesel oil on May 17. A storage tank overflowed as it was being filled and about 500 barrels of this material were discharged into a containment pond designed for such emergencies. The material in the pond was covered with foam as a precaution against potential ignition and to minimize the generation of odours from evaporation. Very few odour complaints were received from residents. The main concern about this incident is the potential contamination of ground water, but investigations by federal and provincial agencies indicate that it was entirely contained.

MTBE is a gasoline additive which enhances combustion and reduces motor vehicle tail pipe emissions. However, it has been detected in ground water in California and its use is being phased out there. Chevron has indicated that it plans to stop using MTBE as well, consistent with California phase-out plans.

The Air Quality Department and the Source Control group in the Policy and Planning Department currently issue a joint semi-annual non-compliance list showing the companies that have experienced incidents of non-compliance with their Permits during a particular reporting period. Chevron has appeared six times on this list since 1996, all related to emissions to the air. A summary of these incidents is shown in Attachment 2. In all cases, remedial action was taken and compliance confirmed, or in the case of the last three incidents relating to crude oil furnaces, burners are being replaced with the latest technology to meet Permit requirements.

Monitoring

The GVRD operates an air quality monitoring station on Capitol Hill specifically to detect emissions from the refinery. Entirely funded by Chevron, this station measures sulphur dioxide and total reduced sulphur which are indicator contaminants for the refinery. Barring any other obvious reasons such as the meteorology in December, 1999, high levels of these air contaminants would be indicative of abnormal emissions from the refinery. Other than those noted above, no levels above the Maximum Acceptable have been detected since the station was installed six years ago.

To supplement monitoring by this permanent station, the GVRD's Mobile Air Quality Monitoring Unit (MAMU) has been located on Capitol Hill for periods of two-three weeks each Quarter since 1998. MAMU has a full array of monitors, including inhalable particulate (PM₁₀), similar to other continuous air monitoring stations in the Region. Measurements since this program began are comparable to other stations in the GVRD with no evidence of abnormal impacts from Chevron.

The GVRD participates in a federal program that samples the air for a variety of hydrocarbons, some of which could be a source of odours. The North Burnaby area is one of the sampling points, but results are not yet available from Environment Canada. To enhance this hydrocarbon monitoring, the District is currently investigating the acquisition of a monitor that will provide more immediate information on hydrocarbon levels in the Capitol Hill area.

GVRD Involvement

As noted above, the Air Quality Department has issued Permits for Chevron's refinery and tank farm to authorize emissions. Many of the emission control programs that have been completed or are currently underway are the result of implementation of the GVRD Air Quality Management Plan.

Determination of compliance with these Permits is a large part of staff activities, and regular inspections of the facilities are conducted. Complaints from the public, usually about odours in the area, can be lodged with the GVRD both during the day and in the off hours, and staff will

investigate them. Site inspections result from complaints, emission monitoring, operational advisories and from other compliance related activities result in frequent contact with Chevron.

Staff are also proactive in detecting odours from the two facilities by patrolling areas in North Burnaby on a random basis, with a focus on those times when meteorology is conducive to a build-up of odours.

Chevron has formed a Community Advisory Panel (CAP) consisting of environmental, business, and residential groups and associations to discuss environmental and safety issues at its two facilities. While GVRD is not a member of this panel, staff attend all meetings and regularly present emission-related information. CAP has been particularly helpful in providing feedback to staff on emission control initiatives.

Chevron has recently committed to an independent review of its operations. This will be a three-part process, the first of which will review the refinery operations to ensure Chevron meets its permit obligations for all discharges. The second part will include a public safety risk assessment which will review Chevron's impacts on the community, including public safety issues if releases occur and a public notification process. The third aspect includes an investigation to determine if there is any migration of pollutants to ground water. Terms of Reference will be reviewed by the regulators, including the GVRD. The information will be available to the public, focusing through the Community Advisory Panel.

Staff participated with the Federal and Provincial regulators in a June 29 public meeting organized by MP Svend Robinson. This meeting provided a forum for residents to ask questions directly of the agencies responsible for controlling discharges from Chevron's facilities.

4. CONCLUSION

The GVRD Air Quality Department regulates emissions from Chevron's facilities through issuance of Permits. They are the main vehicle for requiring emission reductions consistent with the GVRD Air Quality Management Plan. In general, both facilities are in compliance with the permits, however the recent accidental releases point to a need for greater vigilance and development of new pollution prevention mechanisms.

Attachments:

1. Letter to Silvano Padovan, Senior Officer, GVRD, from R. Kwan, Manager Health Protection, Environmental Health Services, Simon Fraser Health Region dated June 12, 2000 regarding *Chevron Refinery Catalyst Emissions*.
2. GVRD Air Quality Department Non-Compliance Report for Chevron Canada Ltd., 1995 - 1999



Environmental Health Services

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Facsimile: (604) 918-7520

FAX SENT TO: 432-6251

June 12, 2000

AQ ROUTING
 File # AQ1001/17
 Division _____
 Action Copy SP, DJB
 Info Copy _____

Greater Vancouver Regional District
Air Quality Department
4330 Kingsway
Burnaby BC V5H 4G8

ATTENTION: Silvano Padovan
Senior Officer, Air Quality Control Division

Dear Mr. Padovan:

RE: CHEVRON REFINERY CATALYST EMISSIONS

We have reviewed the lab results of the "control" and "test" samples provided to us in your May 11, 2000 letter. The lab results confirmed that the source of the particulate material collected from a car windshield at 4362 Cambridge Street was originated from the Fluid Catalytic Cracker Regenerator (FCCR) stack.

On the compositional analysis, most of the particulate mass (90%) is made up of silicon (49%), aluminium (34%) and iron (7%). These are relatively common elements in the earth's crust and are not of serious toxicological concern.

From a human health perspective, the size distribution of the particles is significant. None of the "control" and a relatively small percentage of the "test" sample (5.6%) are PM₁₀ (less than 10 micrometers in size). Only the small particles (PM₁₀) are capable of being inhaled into our lungs. Based on the size of the particles in the lab report one would expect that virtually all of the released catalyst settled to the ground in the immediate vicinity of the refinery.

Since we have no data on the actual PM₁₀ concentration as well as the concentration of the catalyst emission from the April 6/7 incident, we used a PM₁₀ estimate provided by GVRD and a catalyst concentration estimate provided by Chevron Canada to provide the following opinion.

1. PM₁₀ Concentration

The GVRD, using a SCREEN computer dispersion model, estimated a 24 hour average PM₁₀ concentration of 2.4 µg/m³ at downwind distances from the FCCR stack. The 2.4 µg/m³ concentration is relatively constant from 0.2 Km to 5.0 Km away from the FCCR stack. At less than 0.2 Km, the PM₁₀ concentration is less than 2.4 µg/m³.

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At this time there are no federal or provincial air quality objectives for PM₁₀ in Canada. The current standards promulgated by the US Environmental Protection Agency are 150 µg/m³ and 50 µg/m³ for 24 hour and annual averages respectively. The California Air Resources Board (CARB) adopted standards of 50 µg/m³ and 30 µg/m³ for 24 hour and annual averages. The GVRD adopted a PM₁₀ Acceptable 24 hour Objective of 50 µg/m³ for a 24 hour average.

The PM₁₀ data from the Kensington Park Ambient Air Monitoring Station at 6400 East Hastings Street showed that PM₁₀ concentrations during the April 6/7 event and several days after the event were well below the 50 µg/m³; the concentrations were between 6 µg/m³ to 19 µg/m³ from April 6 to April 11.

In addition to the above information, the GVRD's 1998 Annual Report showed that the mean 1 hour PM₁₀ value at the Kensington Park site as 13 µg/m³. At the same site, the one hour maximum PM₁₀ value for 1998 was 143 µg/m³.

In another report released by the GVRD in January 1999 - "Capital Hill Special Monitoring Program - Interim Report" it showed that PM₁₀ concentrations, collected over three week periods in spring, summer and fall of 1998, at Grosvenor Crescent (Capital Hill), are similar to those at Kensington Park. However, the top 2% of the measured PM₁₀ levels and the number of exceedances of the PM₁₀ 24 hour objectives were both higher at Kensington Park. This is probably due to greater vehicular traffic flow at the Kensington Park site.

Based on the above information, the discharge of PM₁₀ resulting from the April 6/7 FCCR incident presents little threat to the health of the residents living near the refinery as compared to their daily exposure of PM₁₀ from vehicular emissions.

2. Concentration of Catalyst Emissions

The information provided in the Material Safety Data Sheet where it mentioned the carcinogenicity of nickel compounds (p. 6) is not an appropriate reference given the exposure scenario with this release. MSDS information is for ongoing workplace exposure and not for a single incident. The American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value (TLV) for the catalyst emission is 10 mg/m³. TLV refers to airborne concentration of substances and represents conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. Because of wide variation in individual susceptibility, a small percentage of workers may experience discomfort at concentrations at or below the threshold limit.

Staff of Chevron Canada estimated the concentration of the catalyst to be 0.5 mg/m³. This estimate was based on the following assumptions: height of the dust plume - 225', radius of the plume - 5000' (Hastings to the Burrard Inlet), and wind speed at 1 MPH or 5280'/hr.

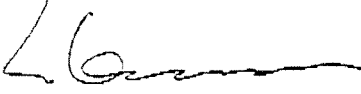
Even assuming Chevron's estimate is off by a factor of 10, it is still well within the ACGIH's TLV limit of 10 mg/m³ and this limit is for ongoing chronic exposure.

Given this information the catalyst emissions from the April 6/7 FCCR incident is not likely to present a long-term health risk to the adjacent residents.

Should you have any questions pertaining to this matter please call me at 918-7516.

Yours truly,

SIMON FRASER HEALTH REGION



Rick Kwan, CPHI(C)
MANAGER
HEALTH PROTECTION

RK:ge

cc Dipak Dattani, Manager, Environmental Services, City of Burnaby
Medical Health Officer, SFHR
Director Environmental Health Services, SFHR

GYRD AIR QUALITY DEPARTMENT NON-COMPLIANCE REPORT
FOR CHEVRON CANADA LTD. 1995-1999

Source of Emission	Details of Non-compliance
Sulphur recovery unit	<ul style="list-style-type: none"> • Exceeded limit for sulphur oxides on May 31, 1996. • Notice of Violation issued; • permittee investigated cause of exceedance and options to improve efficiency.
Fluid Catalytic Cracker	<ul style="list-style-type: none"> • Exceeded particulate matter restriction on May 13, 1997. • Notice of Violation issued. • Repaired FCC regenerator cyclone. Retest of emissions demonstrated compliance with permit restriction.
Sulphur recovery unit	<ul style="list-style-type: none"> • Exceeded particulate matter restriction on December 3, 1997. • Notice of Violation issued. • Maintenance and repairs were done and test results completed show compliance
Crude oil furnace	<ul style="list-style-type: none"> • Exceeded Sulphur Oxides and Nitrogen Oxides restrictions on May 8, 1998. • Notice of Violation issued. • Changes were made in the furnace operating parameters; a retest on July 14, 1998 demonstrated compliance with the Sulphur Oxides restriction. Investigation into the Nitrogen Oxides exceedance is continuing.
Crude oil furnace	<ul style="list-style-type: none"> • Exceeded Nitrogen Oxides permit restriction on July 14, 1998. • Notice of Violation issued. • Changes were made in the furnace operating parameters; a retest on August 14, 1998 provided results which were marginally above the permit limit. Investigating emission reduction options.
Crude oil furnace & Splitter furnace	<ul style="list-style-type: none"> • Exceeded the following permit restrictions: Crude furnace nitrogen oxides and sulphur oxides on 26-May-99; Splitter furnace nitrogen oxides on 14-May-99. • Notice of Violation issued. • New ultra low NOx burners to be installed on crude furnace. High sulphur stream to crude furnace will be eliminated to reduce sulphur oxide emissions. Splitter furnace adjustments made; retest demonstrated compliance. Permit amendment reduced SO_x and NO_x limits to reflect equipment upgrade requirements.



Greater Vancouver Regional District
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Policy and Planning Department

Telephone (604) 432-6375

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Committee Meeting Date: July 13, 2000

TO: Sewerage and Drainage Committee

FROM: Cristina Jacob, Superintendent, Source Control

DATE: June 30, 2000

SUBJECT: History of Chevron Refinery's Sewer Discharge and Related Stormwater and Groundwater Issues

Recommendation:

That the Board receive for information the report dated June 30, 2000 titled *History of Chevron Refinery's Sewer Discharge and Related Stormwater and Groundwater Issues*.

1. PURPOSE

To provide the information requested by the Committee at the June 16, 2000 meeting. Staff was requested to provide a report describing the history of the Chevron refinery's discharge to the sanitary sewer and information related to Chevron's application to the provincial Ministry of Environment to discharge process wastewater and stormwater to Burrard Inlet. To provide additional context for this information, the report includes updates on the District's stormwater and groundwater initiatives.

2. CONTEXT

Chevron Canada Ltd. operates a petroleum refinery at 5201 Penzance Drive, in Burnaby. They discharge process wastewater and stormwater runoff from the process areas to the sanitary sewer, under GVS&DD Waste Discharge Permit No. SC-100010-VSA. Chevron discharges stormwater runoff from non-process areas directly into Burrard Inlet, under provincial effluent Permit No. PE-4970. The company discharges air contaminants to the atmosphere under a GVRD Air Quality Permit.

Over the past several months, Chevron has experienced a number of accidental releases of contaminants to the atmosphere and, most recently in May, experienced a major methyl tertiary butyl ether (MTBE) spill onto their site. Although none of these incidents were related to, or resulted in discharge to the sanitary sewer, the Sewerage and Drainage Committee expressed an interest in receiving the following information:

4.10

History of Chevron Refinery's Sewer Discharge and Related Stormwater and Groundwater Issues
Sewerage and Drainage Committee, July 13, 2000

- the history of wastewater discharges from the Chevron refinery,
- the performance history of Chevron's current wastewater treatment system for sanitary sewer discharges and compliance with their Waste Discharge Permit,
- Chevron's application to divert their process wastewater and process area stormwater runoff to Burrard Inlet,
- an assessment of the adequacy of Chevron's wastewater treatment system for discharge into the Inlet,
- a summary of the governance framework for Chevron's spill reporting,
- a summary of the District's industrial stormwater initiatives, and
- a summary of the District's groundwater initiatives.

(a) History of Wastewater Discharges from the Chevron Refinery

Chevron Canada Ltd. has operated the petroleum refinery at its current location since the early 1950s. Originally, the refinery discharged all of its process wastewater and stormwater runoff directly into Burrard Inlet, under a provincial Pollution Control Permit. In the early 1970s, the refinery was required to meet more stringent criteria for discharge directly to the environment, or alternatively, make application to the GVRD to discharge to the sanitary sewer.

In the mid 1970s, Chevron installed a primary wastewater treatment system and in June of 1977 received approval from the GVRD to divert their process wastewater and contaminated stormwater from their process areas to the GVRD sanitary sewer system. The discharge to sanitary sewer was first regulated by the GVRD under the terms of the 1972 GVS&DD Refineries Agreement. This agreement contained discharge quality objectives that were based upon federal petroleum refinery guidelines. A Waste Management Order was issued to Chevron in 1988, replacing the 1972 Agreement. This Order, issued by Source Control under the provisions of the Waste Management Act, specified a regular discharge-monitoring program and discharge limits based on the objectives in the 1972 Agreement.

The Waste Management Order also specified a maximum allowable discharge rate of 1.8 m³/minute. Chevron was informed by GVRD sewer operations staff that no further capacity was available in the Willingdon Avenue combined trunk sewer and that it may be further restricted in the future, given the rising frequency of combined sewer overflows to Burrard Inlet at the Willingdon outfall, even during dry weather. Chevron expressed their concerns with this constraint on both their current operation and future expansion plans.

Upon enactment of the GVS&DD Sewer Use Bylaw in June of 1990, Source Control began issuing Waste Discharge Permits to industries previously regulated under Waste Management Orders. Around this same period, Chevron made known its intention to upgrade to a secondary level of wastewater treatment, utilizing a new deep shaft biological process. They contended that the upgrade would allow them to meet both the GVRD requirements for discharge to sanitary sewer and the provincial Ministry of Environment's requirements for direct discharge to Burrard Inlet. Chevron made it clear at the time that a primary driver for this initiative was the lack of current and future capacity in the GVRD sanitary sewer system.

On July 31, 1995 Chevron's Waste Management Order was replaced by Waste Discharge Permit No. SC-100010-VSA. This Permit, which remains in effect today, specifies the maximum

discharge rate of 1.8 m³/minute previously imposed, and contains a phased implementation of discharge limits based on the Environment Canada Petroleum Refinery Regulations and Guidelines for existing and new refineries. These limits are comparable to those imposed on refineries in Ontario which discharge directly into the Great Lakes and are more stringent than the limits specified in the Order that regulated Chevron's discharge from 1988 to 1995.

The secondary treated effluent from Chevron is conveyed to the Iona WasteWater Treatment Plant where it is ultimately discharged to the Georgia Strait. During periods of high rain, Chevron's effluent is part of the Combined Sewer Overflows that are discharged into the Burrard Inlet at the District's Willingdon Avenue outfall.

(b) Performance of Chevron's Secondary Treatment System and Permit Compliance

Chevron completed construction and commissioned the secondary upgrade in September 1996. Significant improvements in effluent quality were immediately noted. Chevron has continued to improve the performance of the system and, over the past two years, has demonstrated a very high level of compliance with the final discharge criteria that came into effect on June 30, 1998. Exceedances of some parameters are still noted on occasion, and continue to be addressed by Chevron through fine-tuning. Such occasional exceedances are typical of complex, state of the art treatment technologies. Charts of the performance by parameter are included as **Attachment A**. In accordance with established administrative policies, Chevron is considered to be in minor non-compliance and has not qualified for inclusion on the Source Control Non-Compliance List to date.

c) Chevron's Application to Discharge Process Wastewater and Process Area Stormwater Runoff to Burrard Inlet

Chevron's discharge to the District's sanitary system is made up of process wastewater, stormwater runoff from the process area, tank water bottoms, and oily water returns. All these sources of water are passed through Chevron's secondary treatment system where they are pre-treated prior to being discharged into the sanitary sewer. As mentioned previously, Chevron currently discharges clean stormwater runoff, effluent from the petroleum bulk handling area and uncontaminated cooling water to Burrard Inlet in accordance with their provincial effluent Permit. These sources are passed through a primary treatment system prior to being discharged into the Inlet.

Chevron has submitted an application, dated February 1, 1999, to the Ministry of Environment Lands and Parks to divert their process wastewater and process area stormwater runoff from the GVS&DD sanitary sewer to Burrard Inlet. A copy of the application is provided as **Attachment B**. Chevron contends that their secondary wastewater treatment system has been fine tuned to the point where the discharge can consistently meet the limits in their GVRD Waste Discharge Permit and those currently specified in their provincial effluent Permit for their existing discharge of stormwater to the Inlet.

Chevron's application proposes a new set of discharge criteria for the combined discharge of all process wastewater and stormwater runoff to Burrard Inlet. These criteria are based on the current Environment Canada Petroleum Refinery Regulations and Guidelines for existing and new refineries and are equivalent to, or more stringent than those contained in their current

provincial effluent Permit for discharge of stormwater to the inlet and their GVRD Permit for discharge to the sanitary sewer. A comparison of the criteria is included on page four of the application. Chevron indicates that the diversion will provide a benefit of off-loading the volumes in the GVRD sanitary sewer system.

Recognizing that the process of evaluating the above-noted proposal would be a lengthy one, Chevron also requested in their application consideration of a more urgent request to divert a portion of the current sanitary sewer discharge to the inlet during high rainfall conditions. They indicated that, during such events, they often generate more wastewater than can be discharged to the GVRD sanitary sewer, given the maximum discharge rate of 1.8 m³/minute imposed in their Waste Discharge Permit. This has resulted, on numerous occasions, in the need to bypass secondary treatment prior to discharge to sanitary sewer. Chevron indicates in their application that, during one severe event, partially treated process wastewater spilled over into the stormwater system and ultimately into the inlet.

To address this concern, Chevron requested approval from the Ministry of Environment, Lands and Parks to divert, during heavy rainfall events, any volume of fully treated wastewater in excess of the 1.8 m³/minute specified in the GVRD Permit, directly into their existing stormwater discharge to the inlet. They contend that thus they would have an overall positive impact on the GVRD sewer system and the inlet by maximizing the level of treatment used on all water discharged.

To date, Chevron has received no official correspondence from the Ministry of Environment, Lands and Parks regarding the above-noted application.

(d) Adequacy of Chevron's Wastewater Treatment System for Discharge into Burrard Inlet

The District's authority for regulation pertains to wastewater discharges into the GVS&DD sanitary sewer system, not to those discharging directly to the receiving environment. As such, the District does not have either the jurisdiction or the in-house capability to conduct a formal assessment of Chevron's application for discharge to Burrard Inlet. Chevron's application will be assessed by provincial and federal environmental agencies most likely within the review process managed by the Burrard Inlet Environmental Action Program (BIEAP). Given the newly adopted Canada Marine Act, it is expected that the Vancouver Port Authority will conduct their own review and may play a major role in granting the authorization to discharge into the Inlet.

It can be stated, however, that Chevron has demonstrated a very high level of compliance with the discharge criteria specified in their Waste Discharge Permit over the past two years. These criteria are based on the Environment Canada Petroleum Refinery Regulations and Guidelines for existing and new refineries. As such they are very similar to the criteria currently specified in Chevron's current provincial effluent Permit for their stormwater discharges and those that

Chevron has requested for the discharge of combined process wastewater and stormwater to the inlet. If the Ministry of Environment, Lands and Parks were to issue an effluent Permit specifying these criteria, by inference, Chevron's compliance level would likely be very high if the current wastewater treatment system continued to be operated in a similar manner.

(e) Governance Framework for Chevron Spill Reporting

Chevron's Waste Discharge Permit requires immediate 24 hour reporting to an on-call Source Control Officer, of any spills that have been accidentally discharged, or have the potential to be discharged to the sanitary sewer.

Depending on the nature of the spill, Chevron also has direct or indirect spill reporting responsibilities to the following agencies: the RCMP, Burnaby Fire and Ambulance, GVRD Air Quality, Burnaby Health, Canadian Coast Guard, B.C. Environmental Protection Service, Environment Canada and the Port of Vancouver Harbour Master. A copy of Chevron's spill notification process from their Burnaby Refinery Contingency Plans, last amended in April 2000, is included as **Attachment C**.

(f) District's Policy on Industrial Stormwater Discharges

The GVS&DD Sewer Use Bylaw prohibits the discharge of storm waste into the sanitary sewer. However, the District has grandfathered operations that had stormwater in their discharge to sewer prior to the Bylaw adoption in 1990. Due to increasing concerns with sewer overflows and available conveyance capacity during wet weather periods, these operations have been encouraged by the District to divert the stormwater component of their discharge away from the sanitary sewer. Very few authorizations to discharge stormwater into the sanitary have been issued by the District over the past ten years. These authorizations were issued conditional on available sewer capacity and most of them were issued for short duration.

Excessive rainfall-derived infiltration and inflow (I/I) is a significant contributing factor in sanitary sewer overflow incidents and therefore is one of the major issues being addressed in the LWMP. The GVRD Liquid Waste Management Plan Stage 2 (LWMP) outlines policies and commitments that will target the location and reduction of rainfall-derived I/I sources, including the stormwater component of Waste Discharge Permits issued under the Regional Sewer Use Bylaw. One of the policies in the draft LWMP Stage 2 document states that *"The District, in addition to not issuing new authorizations for discharges of stormwater into sanitary sewers, will continue the program of eliminating all stormwater contributions allowed under the existing industrial permits."*

In working towards the goal of eliminating all stormwater contributions allowed under the existing Waste Discharge Permits, the District will take a consistent approach that balances costs with goals and produces clear benefits. The District will also consider alternatives to elimination of stormwater if it can meet the intended goal of reducing peak flow demands and the resulting conveyance problems. The District has proposed the following approach:

- i) Permittees tributary to local sewers that have difficulty accommodating peak flow demands and experience overflows will be required to commit to a mandatory stormwater reduction/elimination program. At present, staff is requesting that a plan be submitted to the District outlining various options and costs for alternative management of the stormwater. The District staff will work with these permittees throughout the process in identifying the most viable option for the management of stormwater generated on their site. In cases where the stormwater runoff is relatively clean and meets all relevant

standards and criteria, diverting the runoff into the receiving environment, such as Burrard Inlet, may be the most viable option.

- ii) A pilot study on potential reduction/elimination of stormwater discharges to the sanitary sewer will be conducted with two companies that have consistently contributed to sanitary sewer overflow (SSO) or combined sewer overflow (CSO) events in the past. These companies have been requested to submit a stormwater reduction/elimination plan for immediate implementation. Because the results of this pilot study will ultimately benefit both the District and other permittees, the District may be able to make a financial contribution to a portion of the cost of preparing the stormwater reduction/elimination plan for the two pilot companies. Any such proposal would be brought forward for the Committee's consideration.
- iii) All other permittees who discharge stormwater into the sanitary sewer will be requested to voluntarily reduce or control their stormwater discharges.

This approach enables further information to be gathered while still proactively addressing discharges of immediate concerns. Once the results of the pilot study, further investigations, and consultation are completed, staff will present policy options for implementation of this LWMP commitment related to stormwater discharges into the sanitary sewer system.

While Chevron is not one of the companies covered by the pilot study, their initiative to divert treated stormwater from the sanitary sewer to the Burrard Inlet is consistent with the District's effort to minimize the inflow of industrial stormwater into the sanitary sewer. A direct benefit of this initiative will be reduced CSOs into the Burrard Inlet via the Willingdon Avenue outfall.

(g) District's Policy on Contaminated Groundwater Discharges

The District's policy on contaminated groundwater discharges, developed in consultation with REAC and RFAC, have been in effect since January 1997. The policy states that, conditional on available sewer capacity, contaminated groundwater will be accepted into the sanitary sewer system, subject to terms and conditions stipulated in permits issued by the District. A copy of the policy is attached to this report as **Attachment D**.

While this policy does not impact the Chevron refinery site, there are numerous Chevron service stations throughout the District that have or are carrying out groundwater remediation operations. All these sites have been issued Permits under the Regional Sewer Use Bylaw either by the District or the City of Vancouver staff, depending on their location. Permits stipulate the allowable discharge volume and quality, monitoring requirements, and treatment works. They also contain a Flow Curtailment clause that states that dischargers may be required to immediately curtail or cease discharge in the event of hydraulic capacity constraints or other emergency conditions within the sanitary sewer system.

Due to severe capacity constraints during heavy rains that lead to sanitary sewer overflows, the District is currently reviewing this policy. It may be more appropriate to restrict the groundwater discharges to dry-weather periods and divert large, multi-year discharges from the sanitary sewer to the receiving environment, assuming those discharges would be adequately treated. Due to the

complexity of this issue, staff propose to prepare a separate report on the progress of this review for presentation to the Committee in the fall. The review of this policy was discussed at the Regional Engineers Advisory Committee several times. A progress report on the review work is due for REAC in the fall.

3. ALTERNATIVES

N/A

4. CONCLUSION

Chevron Canada Ltd. has been discharging process wastewater and contaminated runoff from their process area to the District's sanitary sewer since 1977. These wastes received only primary treatment until the fall of 1996 when Chevron commissioned their state-of-the-art secondary treatment system. Significant improvements in effluent quality were immediately noted. Over the past two years, Chevron demonstrated a high level of compliance with the most stringent discharge criteria stipulated in their sewer discharge permit that came into effect in June 1998. Exceedances of some parameters are still noted on occasion. In accordance with established administrative policies, Chevron is considered to be in minor non-compliance and has not qualified for inclusion on the Source Control Non-Compliance List.

In February 1999, Chevron submitted an application to the Ministry of Environment Lands and Parks to divert their process wastewater and process area stormwater from the GVS&DD sanitary sewer to Burrard Inlet. Chevron contends that their secondary treated effluent can meet the provincial requirements for direct discharges to Burrard Inlet. Their application will likely be reviewed by both provincial and federal environmental agencies as part of the review process managed by BIEAP.

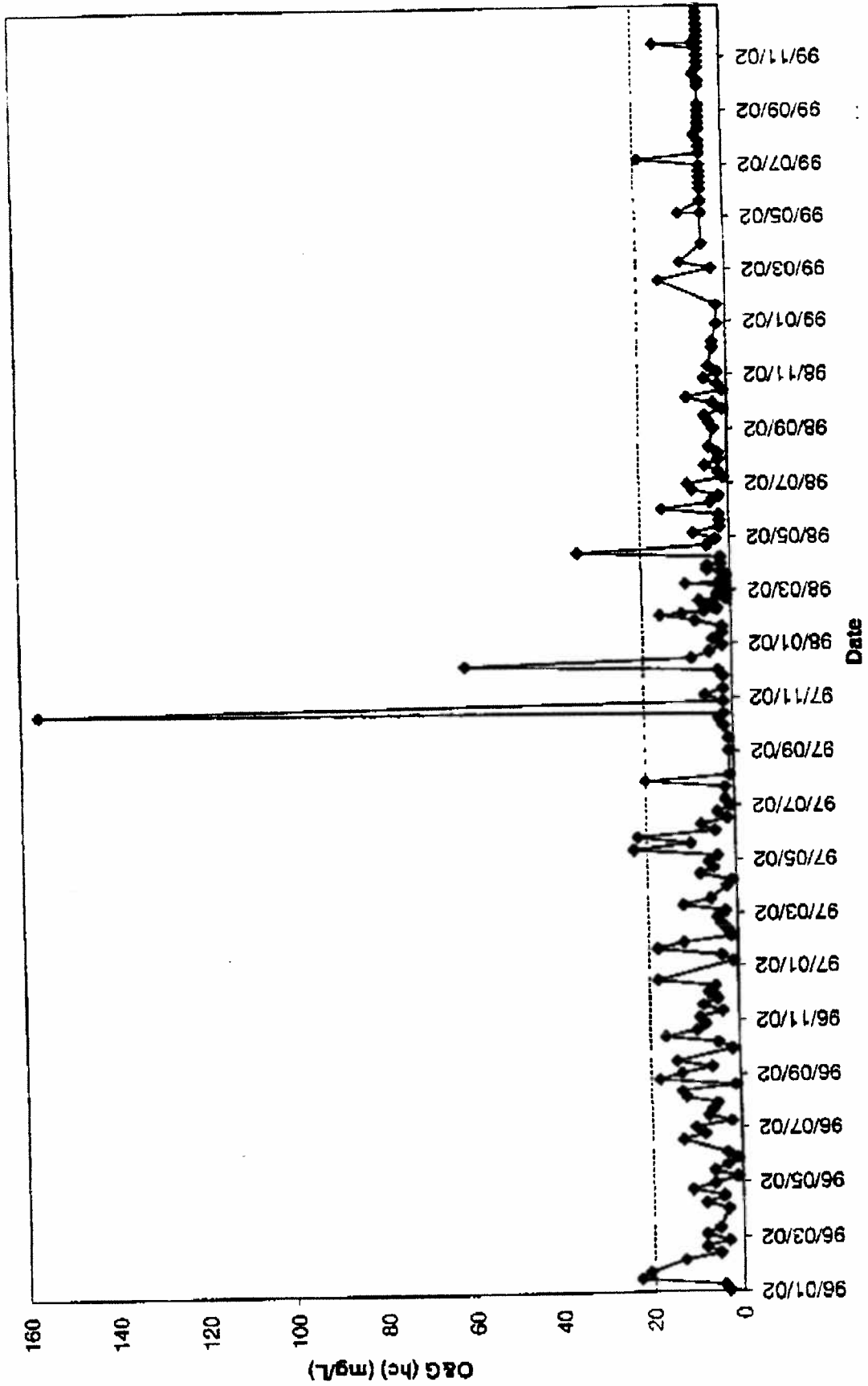
Attachments:

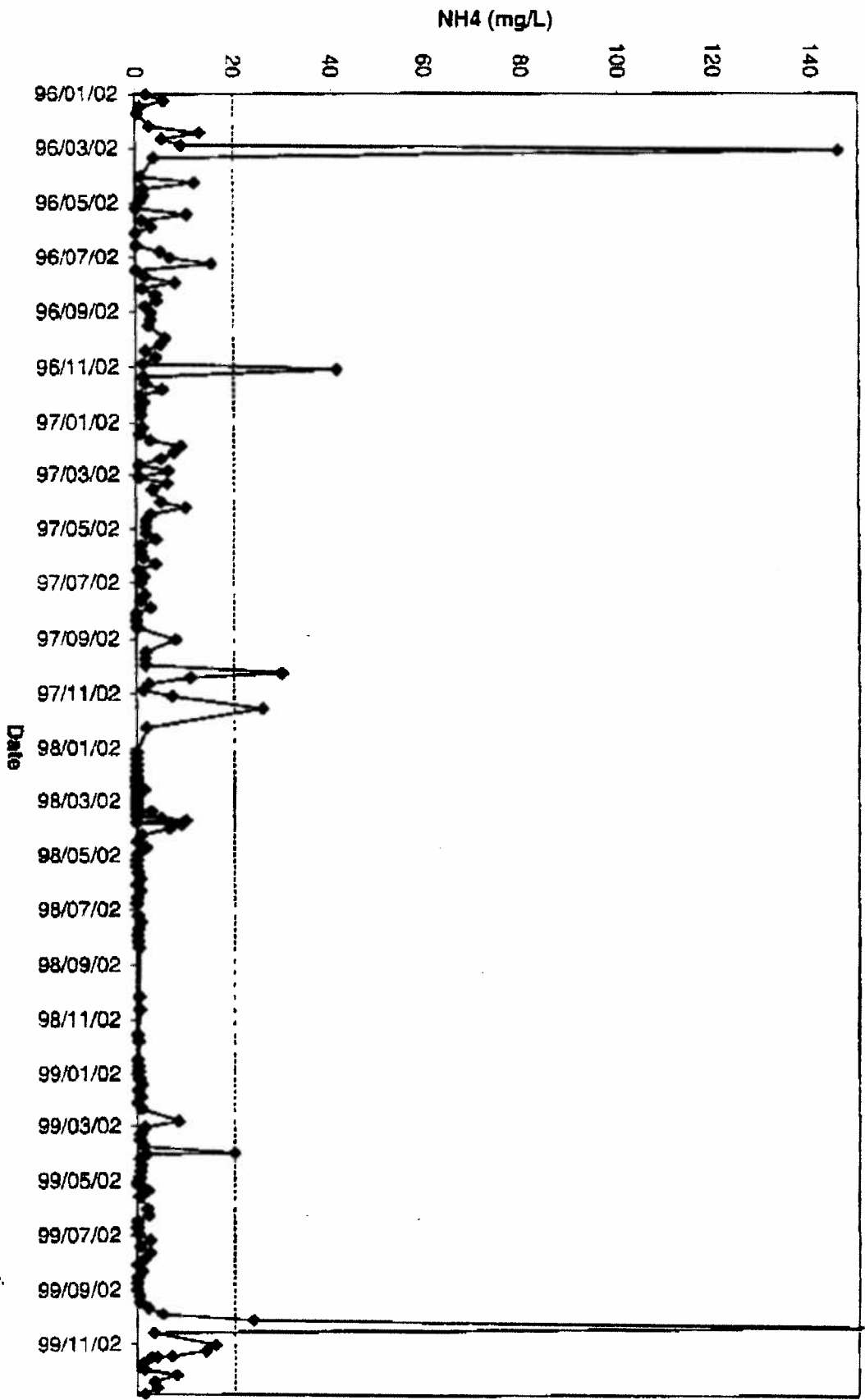
- A. Charts of Chevron's Performance by Parameter
- B. Application to Discharge Process Wastewater and Process Area Stormwater to Burrard Inlet
- C. Chevron's Oil Spill Notification Process
- D. GVS&DD Policy on Disposal of Contaminated Groundwater to the Sanitary Sewer.

ATTACHMENT A

----- = Permit limit of 20 mg/L

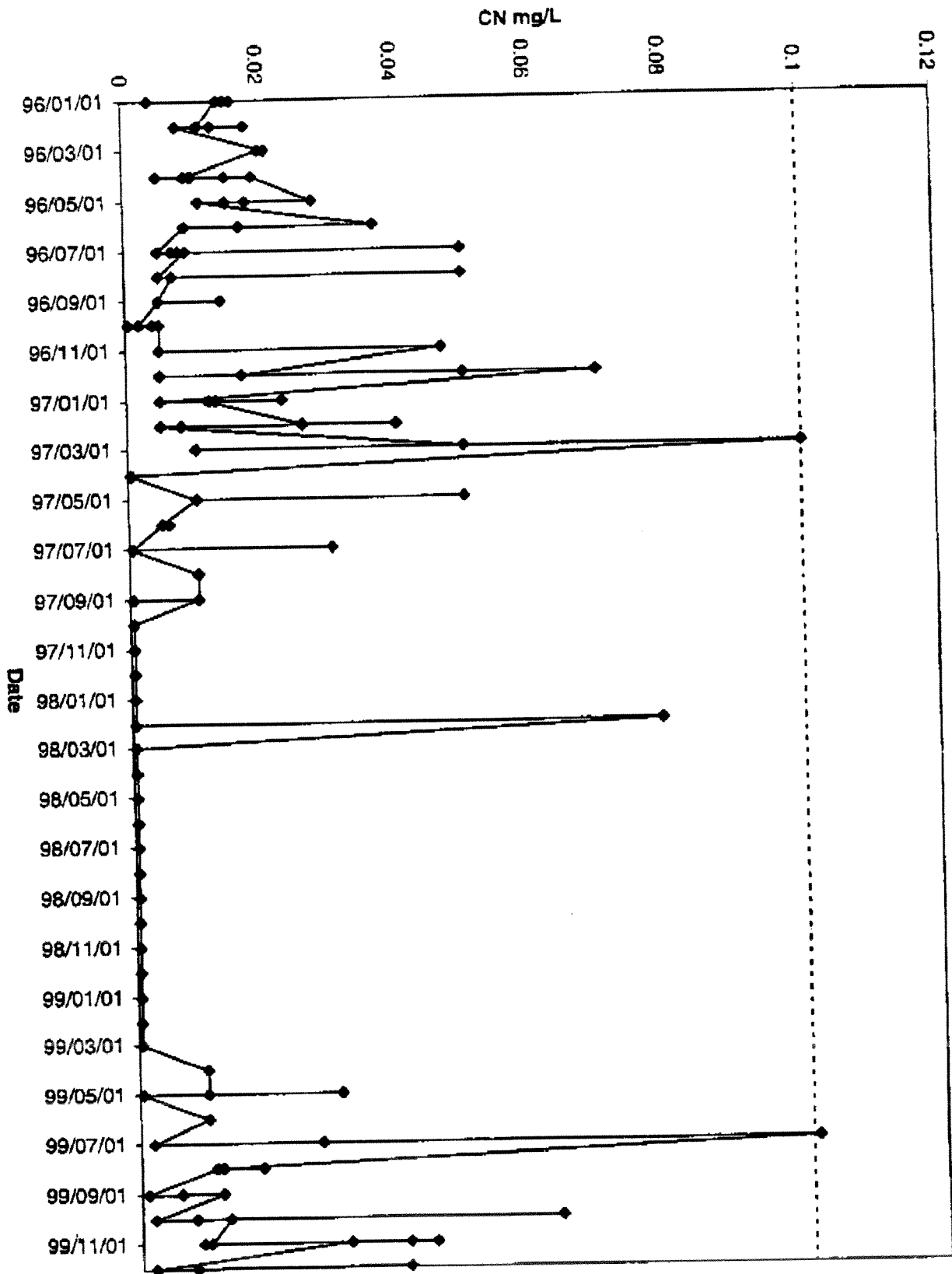
Chevron Hydrocarbon Oil & Grease Trend





Chevron Ammonia Trend

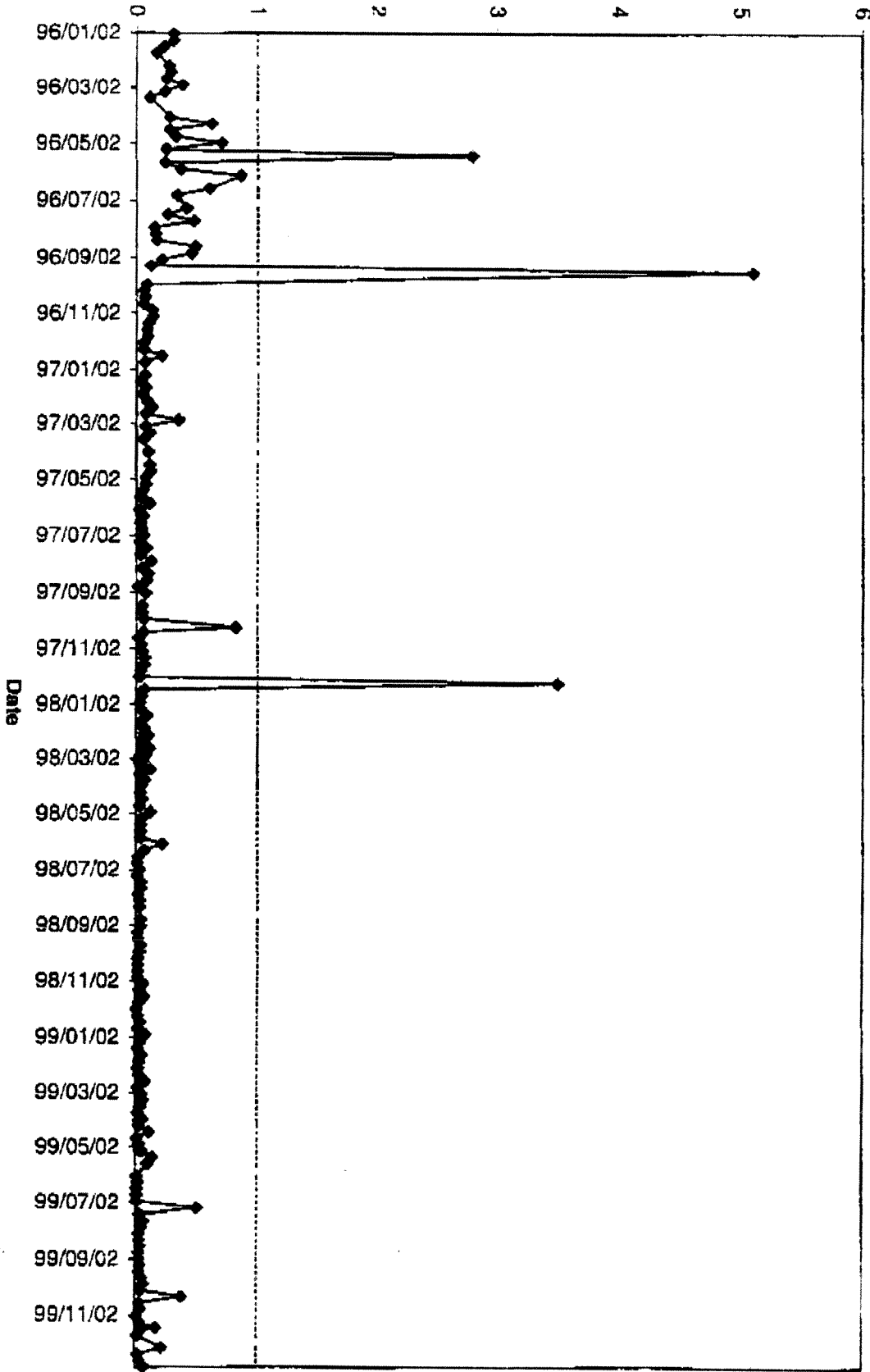
----- = Permit limit of 20 mg/L



Chevron Total Cyanide Trend

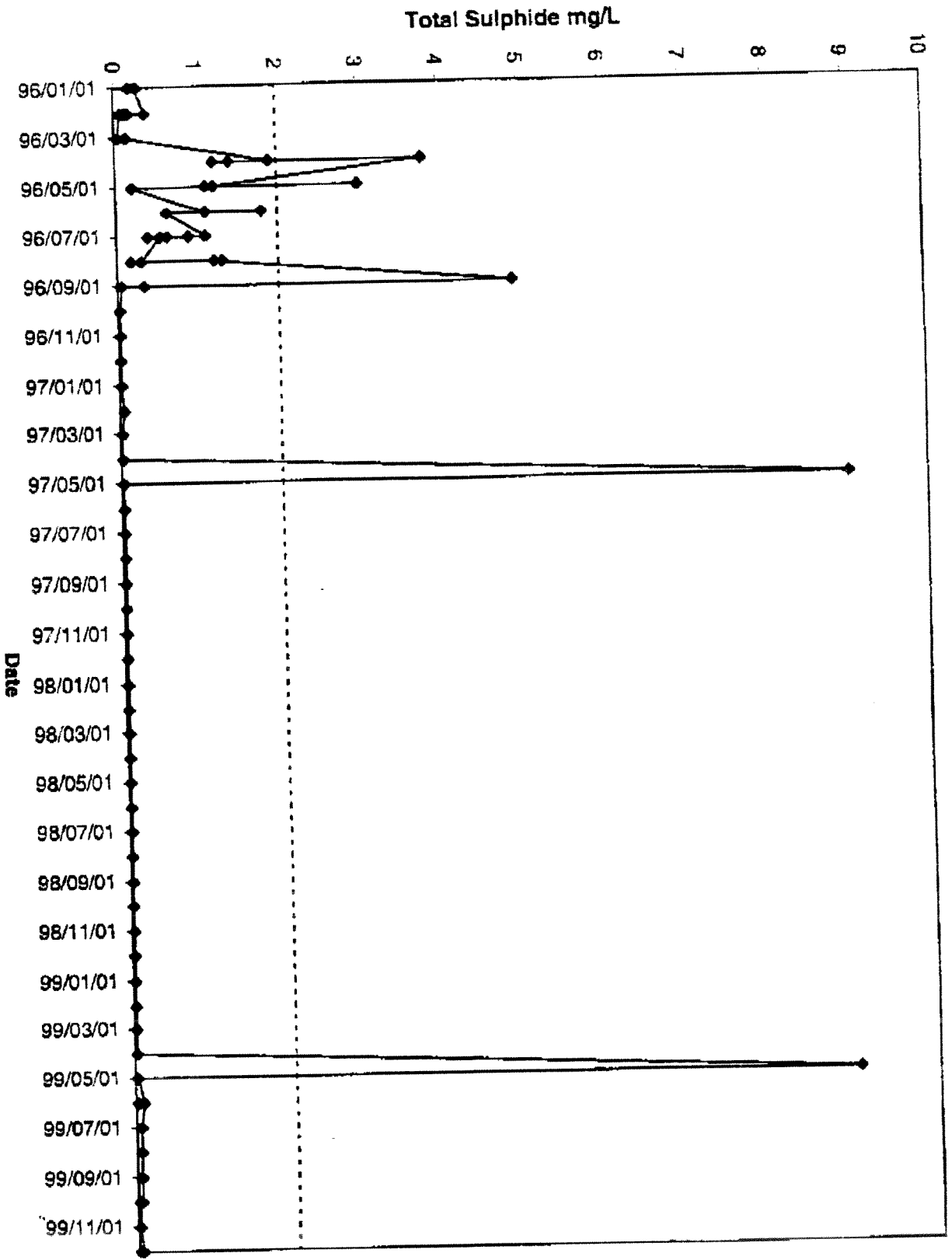
----- = Permit limit of 0.1 mg/L

Total Phenols (mg/L)



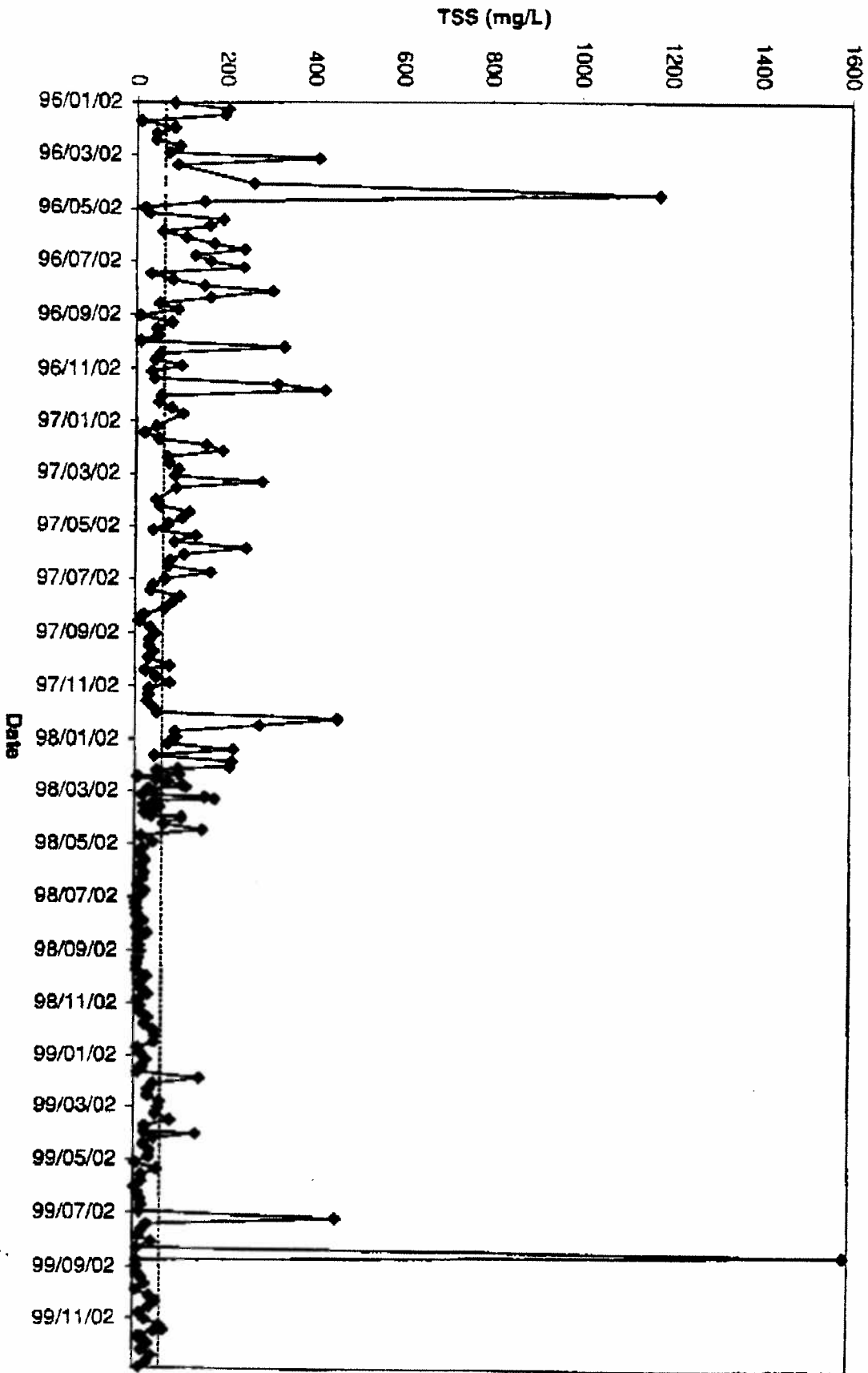
Chevron Total Phenols Trend

----- = Permit limit of 1 mg/L



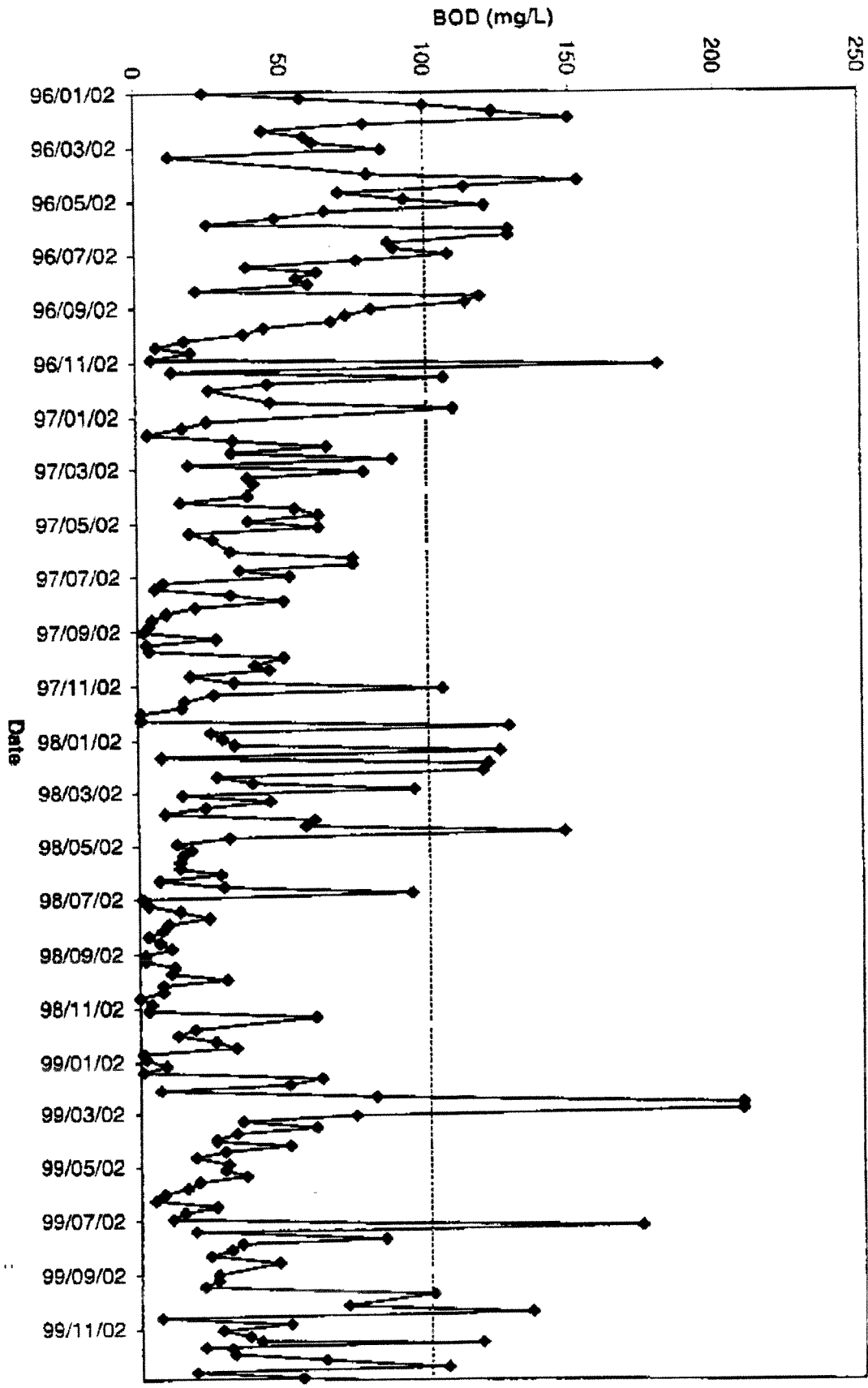
Chevron Total Sulphide Trend

----- = Permit limit of 2 mg/L



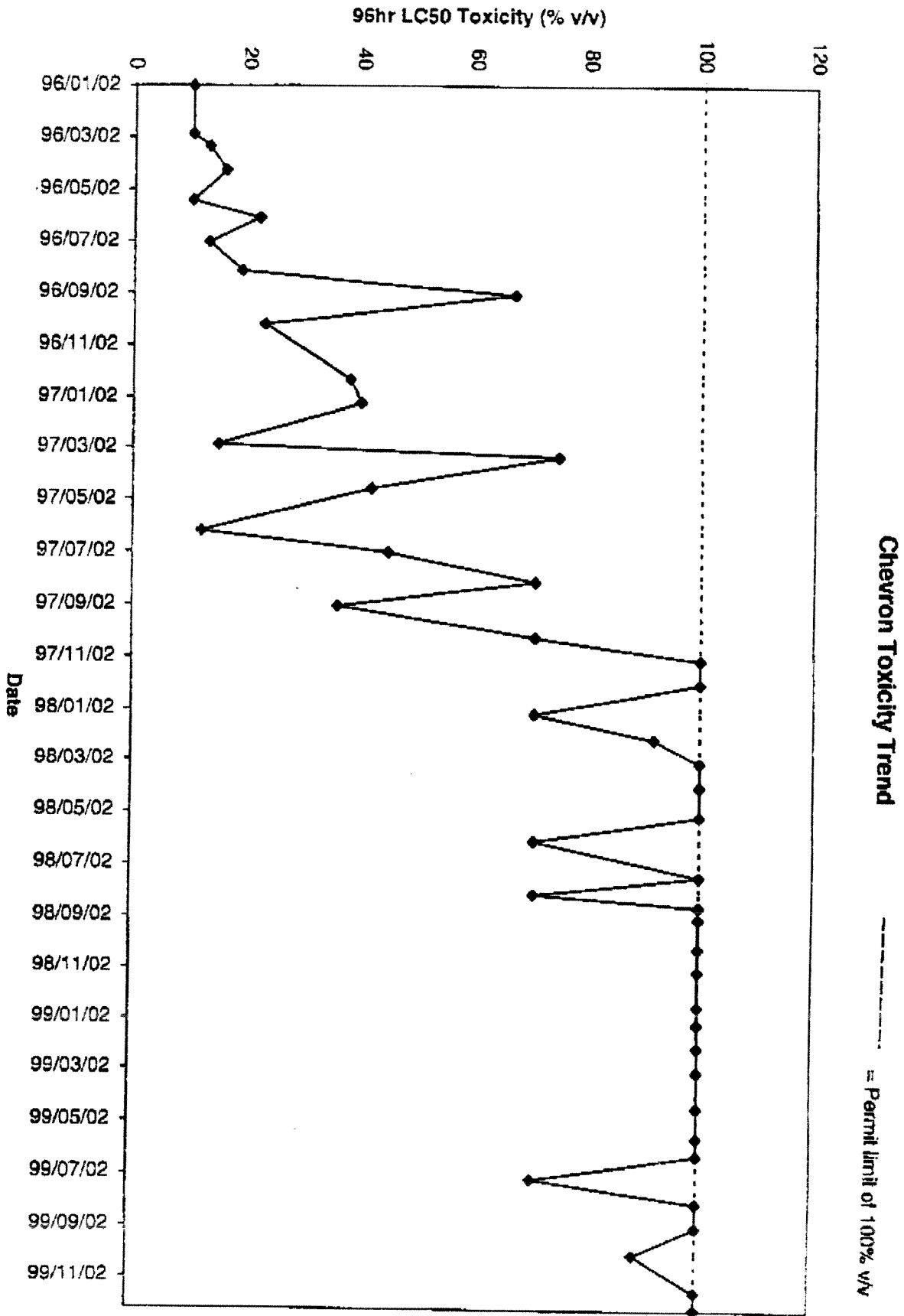
Chevron TSS Trend

----- = Permit limit of 40 mg/L



Chevron BOD Trend

----- = Permit limit of 100 mg/L



ATTACHMENT B

February 1, 1999

RECEIVED

FEB 04 1999

LOWER MAINLAND REGION

FILE NO. _____

File: 320.05.01
Permit: PE-4970



Chevron Canada Limited
1500 - 1080 West Pender Street
Vancouver, BC V6E 3T4
Phone (604) 668-5300

Refinery
355 North Willingdon Avenue
Burnaby, BC V5C 1X4
Phone (604) 257-4040
Fax (604) 257-4030

P.M. Stephan
Senior Engineer - Environment
Phone (604) 257-4037
Fax (604) 257-4030
e-mail pmst@chevron.com

Regional Waste Manager
Ministry of Environment, Lands & Parks
Lower Mainland Region
10470, 152nd Street
Surrey, BC
V3R 0Y3

Dear Sir:

Further to previous correspondence we wish to apply for an amendment to permit number PE-4970.

As you know, in September 1996 Chevron Canada Limited put into operation a biological treatment system for the petroleum refinery process water. Since that time operations have been tuned and are now at the point where we believe that the treated effluent can be discharged directly to Burrard Inlet. The treatment system produces water that meets all the Environment Canada Petroleum Refinery Regulations and Guidelines for existing and new refineries in addition to all the limits in the Permit that we have with the GVRD. This change in discharge location will have the benefit of off-loading the volumes in the GVRD sewer system as the treatment that previously had been provided, plus further treatment, is now carried out within the refinery.

Attached are two data tables:

The first is a summary of all the analytical data collected during 1998 for parameters that may be of concern.

The second summarizes the current permit limits for the existing storm water discharge to Burrard Inlet, the process water discharge to the GVRD sewer system and proposes a set of limits and conditions for the combined discharge of storm and process water to Burrard Inlet.

We request therefore that the current permit be amended to allow us to discharge the combined storm and process water to Burrard Inlet.

A linked but more urgent request is to be able to discharge a portion of the process water, in combination with storm water to the Inlet during high rainfall conditions. During the past year, additional areas have been paved because of new process units being built for producing the "reformulated" gasoline required by BC Provincial Regulations and runoff has been collected and directed into the process water treatment system. During the current rainy season these additional areas have generated more water volume that we can discharge to the GVRD sewer system. Consequently there have been occasions when the whole treatment system has been overwhelmed and at least one occasion when a quantity of water that had only intermediate treatment had to be discharged with the storm water into Burrard Inlet. On other occasions the extra volume was pumped to the GVRD, but only at the expense of bypassing the final treatment stage. The potential in the GVRD system with the extra flow from our system is the overflow of "combined" sewage into the Inlet at the north end of the Willingdon Avenue sewer.

The option for which we request approval is to permit the discharge of the volume in excess of the current GVRD limit of 1.8m³/min of the tertiary treated effluent into the storm water discharge into Burrard Inlet. This would have an overall positive impact on the GVRD sewer system and the Inlet by maximizing the level of treatment used on all the water discharged.

Yours very truly,



Atach.

cc: P.M. Duda, J.K. Kidd, G.G. Hughes, J. Ng
cc: Deputy Sewage Control Manager
Greater Vancouver Sewerage and Drainage District
4330 Kingsway, Burnaby, BC V5H 4G8

Area 2 => GVRO

	pH	Sulphide mg/L	TEH mg/L	Oil & Grease mg/L	Suspended solids mg/L	VSS mg/L	COO mg/L	BOD mg/L	CN- mg/L	Ammonia mg/L	Phenols mg/L
Min	5.6	0.000	0.00	0.0	3.0	0.0	28	0	0.000	0.00	0.002
Max	10.8	0.060	41.80	25.8	300.0	120.0	886	147	0.480	7.10	2.820
Average	7.4	0.009	4.93	8.2	43.2	22.9	166	30	0.024	0.47	0.077
Median	7.4	0.000	2.90	2.1	24.7	17.5	110	14	0.005	0.10	0.032

	MTBE mg/L	Sulphate mg/L	Phosphate mg/L	Nitrate mg/L	Nitrite mg/L	LC80 %	EC90 %	Metals Cr, Cu, Ni, Pb, Zn	BTEX	PAH
Min	0.006	0	1.3	0.00	0.00	71	3	0.00	0.0000	0.0000
Max	7.510	804	4.1	390.00	70.00	100	100	0.45	0.1700	0.0006
Average	1.118	186	2.6	12.98	1.33	94	78	0.15	0.0188	0.0002
Median	0.039	189	2.5	6.40	0.05	100	100			

	pH	Sulphide Kg/MM3	TEH Kg/MM3	Oil & Grease Kg/MM3	Suspended solids Kg/MM3	VSS Kg/MM3	COO Kg/MM3	BOD Kg/MM3	CN- Kg/MM3	Ammonia Kg/MM3	Phenols Kg/MM3
Min	5.6	0.00	0.00	0.0	0.8	0.0	7.4	0.1	0.000	0.0	0.001
Max	10.8	0.02	10.61	6.5	76.2	30.5	219.9	37.2	0.122	1.8	0.886
Average	7.4	0.00	1.25	1.6	11.0	5.8	42.2	7.7	0.006	0.1	0.020
Median	7.3	0.00	0.74	0.5	8.3	4.4	27.8	3.6	0.001	0.0	0.008

EC Range, Minutely 0.3 8.6 20.5
 One day 8.0 - 9.5 0.9 19.7 34.2
 Max Daily 1.4 21.4 42.8

Stormwater Allowance (Regulations)

Kg / Mile / Day 1.0 3.0 0.1
 Kg / Mile/mo 25.0 75.0 2.5

	MTBE Kg/MM3	Sulphate Kg/MM3	Phosphate Kg/MM3	Nitrate Kg/MM3	Nitrite Kg/MM3
Min	0.0	0.0	0.34	0.0	0.0
Max	1.9	153.3	1.04	88.9	17.8
Average	0.3	47.3	0.67	3.3	0.3
Median	0.0	42.8	0.64	1.6	0.0

Metals Cr, Cu, Ni, Pb, Zn	BTEX Kg/MM3	PAH Kg/MM3
0.00	0.000	0.000
0.11	0.043	0.000
0.04	0.004	0.000

	pH	Sulphide Kg/day	TEH Kg/day	Oil & Grease Kg/day	Suspended solids Kg/day	VSS Kg/day	COO Kg/day	BOD Kg/day	CN- Kg/day	Ammonia Kg/day	Phenols Kg/day
Min	5.6	0.000	0.0	0.0	6	0	60	0.4	0.00	0.0	0.004
Max	10.8	0.123	88.0	52.7	617	267	1781	301.7	0.99	14.6	5.388
Average	7.4	0.006	10.1	12.7	89	47	342	82.0	0.06	1.0	0.188
Median	7.3	0.000	6.0	4.3	61	38	225	29.3	0.01	0.2	0.066

	MTBE Kg/day	Sulphate Kg/day	Phosphate Kg/day	Nitrate Kg/day	Nitrite Kg/day
Min	0.0	0.0	2.71	0.0	0.0
Max	16.4	1241.6	8.43	718.8	144.0
Average	2.3	383.5	5.39	26.7	2.7
Median	0.1	348.7	5.20	13.2	0.1

Metals Cr, Cu, Ni, Pb, Zn	BTEX kg/day	PAH kg/day
0.00	0.000	0.0000
0.93	0.350	0.0012
0.32	0.035	0.0005

1984 Crude rate 50.951 MBPD 8.101 M3/3PD
 Flow Rate to GVRO 313.9 KGPM 377.0 USGPM 1.43 M3/Mn

WATER DISCHARGED TO BURRARD INLET

Limits	BCMOB - Area 2 Current	GVRD - Sewer Client	Proposed Area 2 to Burrard Inlet Storm & Process Combined
Sample frequency	1/wk	1/wk	3/wk
Sample type	Grab	Composite (1/wk)	Composite
pH - Daily	6.0 - 8.5	6.0 - 10.5 Max.	6.0 - 9.5
TBH	5 mg/Litre	Month Average	
Suspended Solids (TSS)	20 mg/Litre	10 mg/Litre	5 mg/Litre
Suspended solids (VSS)		40 mg/Litre	
Phenols		0.5 mg/Litre	40 mg/Litre
Ammonia		10 mg/Litre	0.5 mg/Litre
Sulphide		0.3 mg/Litre	5 mg/Litre
BOD / <i>CA</i>		100 mg/Litre	0.3 mg/Litre
Total cyanide		0.1 mg/litre	50 mg/Litre
Total Chromium - monthly		0.3 mg/Litre	0.1 mg/litre
Total Le - monthly		0.1 mg/Litre	0.3 mg/Litre
Total Zinc - monthly		1.0 mg/Litre	0.1 mg/Litre
BTX - monthly		1.0 mg/Litre	1.0 mg/Litre
PAH - quarterly		0.05 mg/Litre	1.0 mg/Litre
Toxicity	100% LC ₅₀ - quarterly		0.05 mg/Litre
Flow rate (max)	18,000 m ³ / day		100% LC ₅₀ - monthly
Discharge Temp. Max.		50°C	20,000 m ³ / day

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ATTACHMENT C

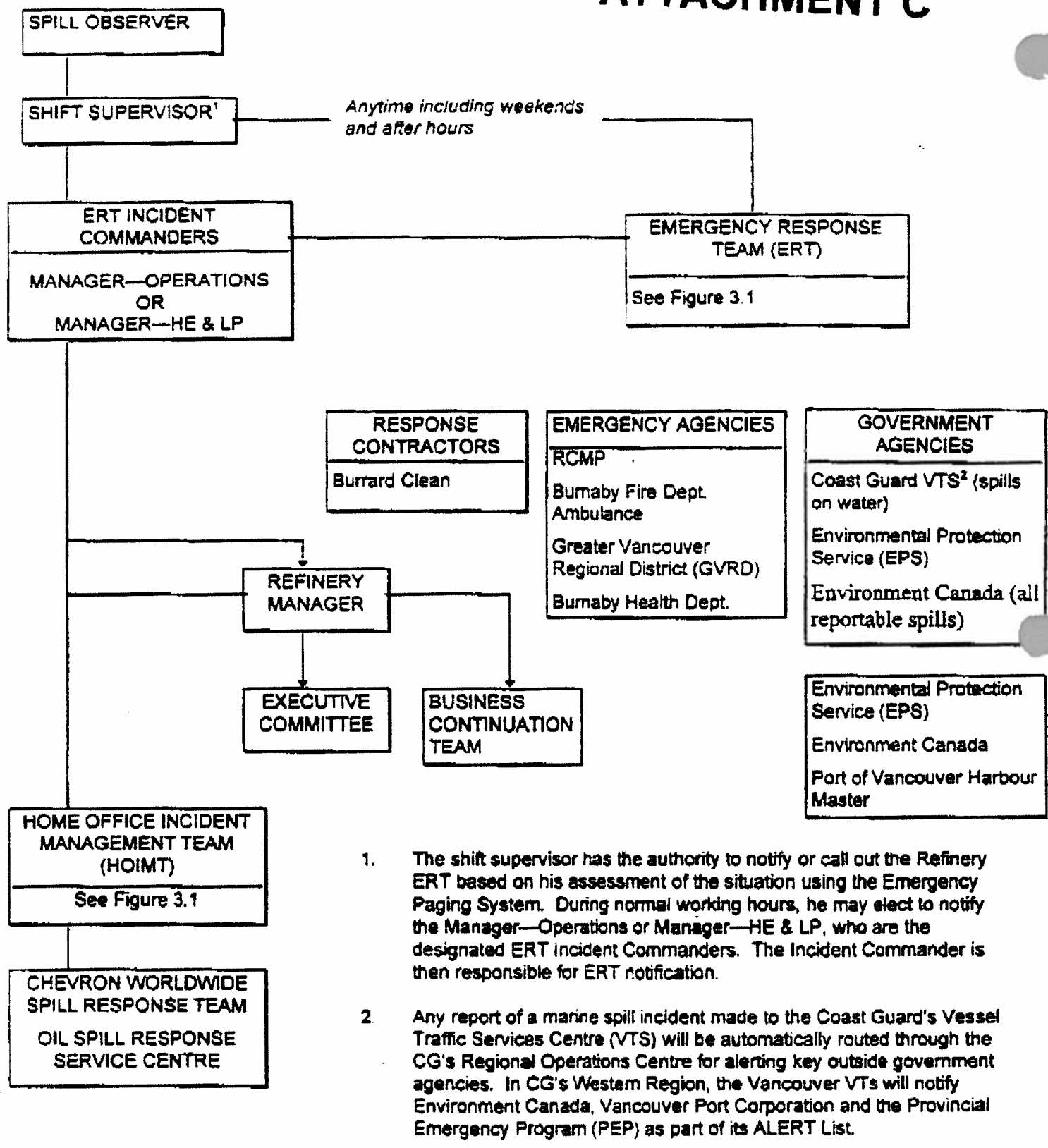


Figure 3.1 - INITIAL OIL SPILL NOTIFICATION PROCESS

ATTACHMENT D

GVS&DD POLICY ON DISPOSAL OF CONTAMINATED GROUNDWATER TO THE SANITARY SEWER

Effective Date: January 1, 1997

This policy was formulated based on input from municipal representatives including: a Groundwater Working Group, the Regional Engineers Advisory Committee, and the Regional Finance Advisory Committee.

- Conditional on available capacity of both the municipal and District sanitary sewer systems, contaminated groundwater will be accepted into the sanitary sewer system subject to adequate pre-treatment, compliance with the GVS&DD Sewer Use Bylaw No. 164, and other terms and conditions that may be imposed, including temporary discharge curtailment.
- Requests for discharges will be processed by the District only after they are approved in principle by the host municipality. The Permits will incorporate both the municipal and District limitations/requirements on the discharge and will specify the total volume of discharge estimated for the entire term of the Permit.
- The City of Vancouver's Environmental Protection Group will administer discharge permits and fees for contaminated groundwater discharges within the City, as a continuation of their Board-delegated powers to issue Permits under the Regional Bylaw 164 within the City boundaries.
- Upon request from municipalities, the District will administer collection of municipal fees for the disposal of contaminated groundwater into the sanitary sewer. Discharge fees will be set by individual municipalities in accordance with their own sewer rate policies. The municipal discharge fees should recover costs for both the municipality's and the District's sewerage services. The District will provide its costs to municipalities annually as part of their process of setting the discharge fees.
- Unless otherwise requested by the host municipality, the District will issue Permits for contaminated groundwater discharges only upon receiving payment of a municipal discharge fee to recover the cost of providing sewer services for the discharge. Permits will not be issued for terms longer than one year. No rebates will be issued if the measured discharged volume is less than the permitted level. Unauthorized total volumes will be considered a violation of the Permit.
- Specific limits developed for contaminants found in groundwater discharges (e.g. BTEX, PAHs) will be reviewed periodically to ensure adequate protection of the sewer system and the environment.
- A diagram of the process described by this policy is attached as Figure 1.

CONTAMINATED GROUND WATER DISCHARGES

PERMIT ISSUANCE AND FEE COLLECTION PROCESS

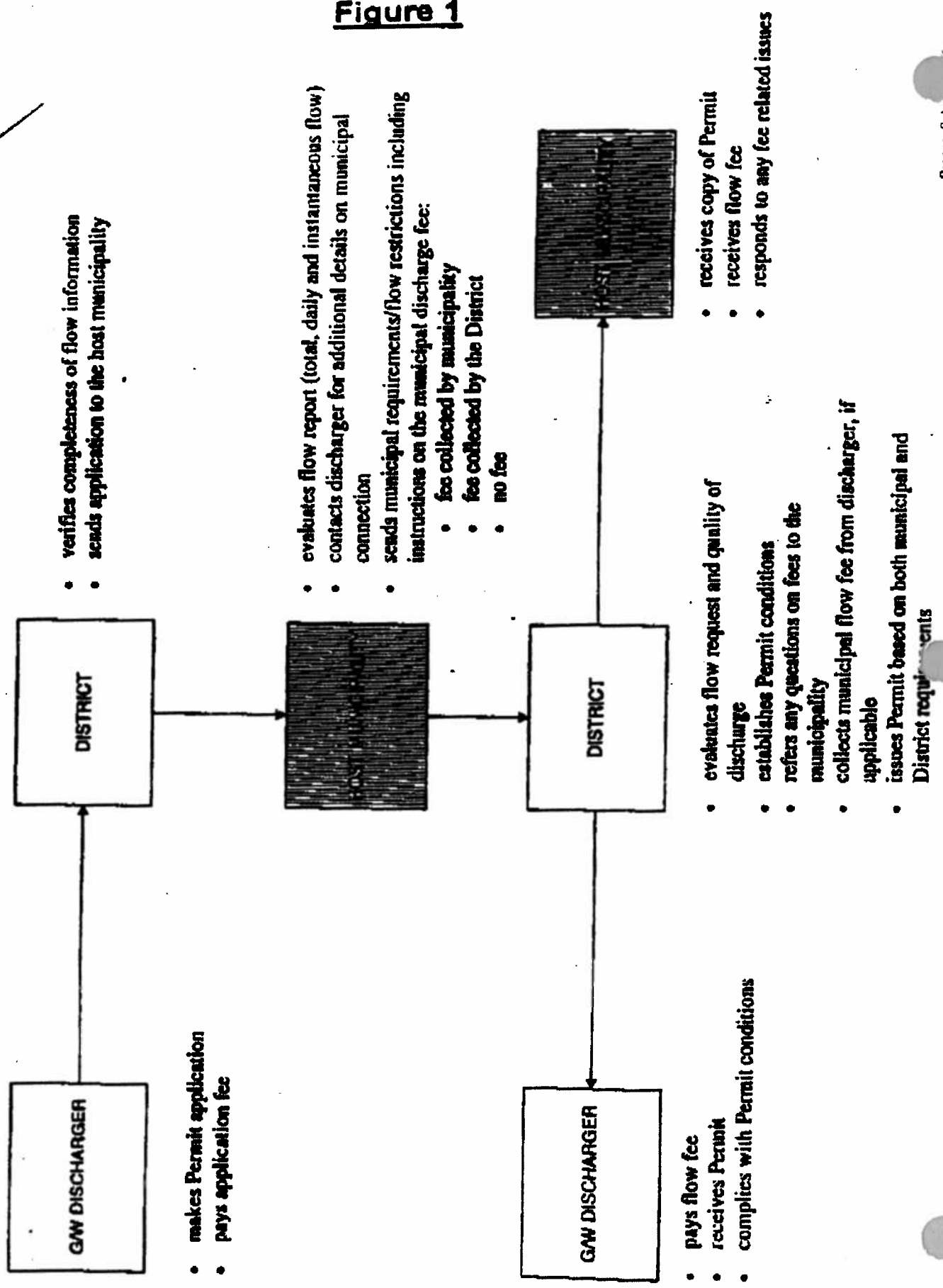


Figure 1