

- *What can go wrong?*
- *What would cause something to go wrong?*
- *What is the probability that something will go wrong?*
- *What are the consequences?*
- *How can risks be better managed?*

Risk assessments are technical in nature and generally include the following steps:

- **Definition of Scope**
The scope is defined by various criteria including (a) operational systems and functions, (b) physical and functional boundaries, (c) influences that may extend beyond boundaries, (d) the seriousness of the risks to be considered and (e) the technical, environmental, organizational and human circumstances that could potentially impact on safety.
- **Hazard and Impact Identification**
Systematic techniques are used to identify hazards such as toxic substances and hazards created by a facility's operation. Conditions that could lead to a failure or malfunction of operations (e.g., earthquake, fire, explosion) are also identified together with their probable impact.
- **Evaluation of Risk**
This process analyses occurrences and consequences for the purpose of determining the nature and likelihood of risks as they could potentially impact on human health, property and the environment.
- **Evaluation and Recommendations**
An assessment of consequences and other factors involving risk typically concludes with a range of alternatives and recommendations that enables the risk to be more effectively managed, and which in a broader context leads to an improvement in overall safety and health.

2. ESTIMATION OF CONSULTING COSTS FOR RISK ASSESSMENT

Two local consulting firms that conduct quantitative risk assessments were requested to estimate the fee they would charge to assess a medium size petroleum operation that employs 250 people. One source estimated that the fee

for a comprehensive assessment of such a facility would be between \$65,000 and \$110,000; the estimate from the second source was \$50,000 to \$125,000. If a consultant were retained to conduct a comprehensive, all-hazards evaluation of the entire City, the cost would likely be several orders of magnitude greater than the cost for a single petroleum company. A final fee would be highly dependent on a number of factors including the type and severity of the risks to be analyzed, the size and complexity of the operation, the amount of documented information that is already available, objectives to be achieved and the scope as determined and agreed upon by the client and consultant.

In addition to the consultant's fee is the time that a company's employees would be required to spend on the project. It is difficult to realistically estimate this cost because it involves several variables including the scope and complexity of a project, but it is well known that a consultant would be unable to make a detailed assessment without the significant participation of a company's personnel (especially senior officials and technical support staff).

The time expended by City staff would also vary according to the overall scope and complexity as defined by a Terms of Reference. Although difficult to quantify, it is estimated that this would be a modest cost given the fact that participation in a Risk Assessment for a refinery would primarily involve a company and its consultant. Considerable staff time, however, would be required for a risk assessment involving the community at large.

3. RISK ASSESSMENTS OF PETROLEUM COMPANIES IN BURNABY

As stated in the attached submission from the five petroleum companies that conduct business in Burnaby:

- "The companies treat risk management as the complete process of risk assessment and risk control as specified by the Canadian Standards Association - Risk Analysis Requirements & Guidelines - CAN/CSA - Q634 - 91."
- "Reviews of each company's programs are conducted on an ongoing basis by qualified personnel and ensure continued acceptable performance relative to all applicable laws, regulations, codes, standards and company

policies and procedures.”

- “Risk management is an integral component of the safety and reliability of operations and emergency preparedness, and forms an inherent part of the companies’ day-to-day management of facilities and operations.”
- “Through ongoing assessment and review processes, the implementation and performance of each company’s operations integrity and risk management programs is constantly improved to accommodate changes in regulations, industry standards and advances in technology.”
- “Operations are subject to federal, provincial and/or local laws which prescribe standards and requirements for many activities (including) safety and employment standards and equipment.”

Burnaby Fire Services Bylaw 8047 requires refineries to comply with the National Fire Protection Association Codes and Standards.

When applications are received for new development or major alterations or additions to existing facilities, reviews are conducted by a variety of departments including Planning, Fire and Environmental Health to ensure that any requirements relating to zoning, health, safety, emergency access, firefighting or other concerns are addressed. Building Permit approval is also required for new construction or alterations to existing structures; this approval process is followed by inspections related to building, electrical and plumbing and gas codes, as applicable.

The companies do not generally use external consultants to assess risks associated with their operations. As stated on page 7 of their attached submission, their operations are reviewed on an ongoing basis by qualified personnel and audited by an internal group that is at arms length of the operations being assessed. A spokesperson for the companies explained that the qualified staff and internal audit group referred to on page seven are normally senior technical/management employees who have expertise in risk management.

Companies that operate in Burnaby use well established methods of conducting risk assessments using trained and qualified employees. They are not required by law or regulations to use outside consultants.

4. SEISMIC INFORMATION ON WATER RESERVOIRS AND OTHER PUBLIC FACILITIES

Several recent infrastructure preparedness measures have been taken in the area of emergency planning with particular emphasis on seismic preparedness. These measures include the following:

Reservoirs

The City's 1996 Capital Budget contains \$50,000 to update the structural assessment of existing water reservoirs and pumping stations with respect to seismic protection. Results of this assessment will be used as the framework for future seismic upgrading of these structures.

The Greater Vancouver Water District (GVWD) recently strengthened its Vancouver Heights Reservoir and a structural investigation is scheduled to commence at the Central Park Reservoir in the near future.

Water Distribution System

In 1993 the GVWD conducted a Lifeline Study of the Regional Water Distribution System to evaluate the regional supply system's vulnerability to earthquake. The study included a number of recommendations for improving post-earthquake functionality, several of which are being or have already been implemented. Analysis of the seismic performance of the three dams that serve the Lower Mainland was not included in this study since each dam had been previously evaluated and steps are underway to correct identified deficiencies. Although these works are regional in nature they have a direct application to Burnaby in that the City derives its water supply from the GVWD.

Fire Halls

In 1990 the City commissioned a seismic study of Burnaby's six Fire Halls. Evolving from that study were seismic upgrades to Fire Halls #1, 2, 4, and 6. When Fire Hall #3 was replaced in 1994, it was constructed in compliance with the 1992 B.C. Building Code and Post Disaster Building Standards. It is not cost effective to upgrade Fire Hall #5 at this time in that this building is scheduled to be replaced in 1997.

Bridges

In 1992 the City commissioned a seismic design review of all City-owned road and

pedestrian bridges. From that study evolved the development of a 5 to 6 year phased upgrading program. The construction upgrades are approximately 50% complete and will continue over the next three years subject to budgetary funding.

Bonsor Recreation Centre

The Bonsor Recreation Centre is designated as a primary facility for the coordination and delivery of essential services (such as shelter, food and clothing) to evacuees who require accommodation as the result of a disaster. In 1994 the City installed an emergency back-up system that will provide electricity to the entire building in the event of a power failure.

Justice Building

The Justice Building is the headquarters for the RCMP Detachment and the City's Emergency Operations Centre (EOC). In 1993 the City commissioned a seismic evaluation of the Justice Building with particular emphasis on the EOC. Among other items the study identified the need to upgrade the existing emergency power supply. A contract to upgrade the emergency power supply to the entire Justice Building was issued this last March and is expected to become fully operational in August.

5. PREVIOUS REPORTS

Council Reports

There are no reports on file that specifically pertain to risk assessments. However, in 1977 the Director of Fire Services submitted two Council reports on *Fire/Security Protection Standards Involving Oil Refineries in Burnaby* (Item 11, Report No. 71 dated 1977 October 17 and Item 14, Report No. 79 dated 1977 November 14). The Municipal Manager also submitted a report which clarified the recommendations that were being submitted to Council for consideration (Item 15, Supplementary Report No. 71 dated 1977 October 17). Adoption of the following recommendations concluded Council's deliberations on this matter at that time:

1. " THAT the Director of Fire Services periodically confer with the major oil companies and industries that use or store hazardous products for the purpose of arranging on site inspections of physical security, and that these be carried out in collaboration with the Provincial Fire Marshall's office (if possible) and the RCMP, with the understanding that these inspections will be made to ensure that security conforms with the standards as specified in

the Provincial Fire Marshall's Act; and

- *2. THAT with reference to the subject matter of fire/security protection standards involving oil refineries in Burnaby, His Worship, the Mayor, strike an Ad Hoc Committee of Council to obtain the initial information and to determine the methods by which we can give the citizens a good deal more assurance that all avenues are being properly pursued; and
3. THAT Burnaby Council be requested to ask the Attorney General to enact the necessary legislation to bring into effect the current edition of the National Fire Code of Canada; and
4. THAT Council endorse and submit to all major oil companies in the form of a strong recommendation that they execute a mutual aid agreement to include, among other forms of assistance, the use of company vessels so adapted as to provide an effective fire suppression response in case of emergency; and
5. THAT the Fire Department and the RCMP meet every six months with all major oil companies and industries that use or store explosives or toxic materials to review and evaluate their fire/security arrangements; and
6. THAT a copy of this report be sent to:
 - a. Senior officials of all oil refineries and tank farms in Burnaby.
 - b. The North Slope Ratepayers Association.
 - c. The person initiating the petition which appears as an item of correspondence in the Director's report.
 - d. Shirley Ince whose letter appeared on the agenda for the September 26, 1977 meeting of Council (Item 3h)."

Copies of these three Council Reports are available in the Clerk's Department.

Geotechnical Reports

Over the years the City has received geotechnical reports for areas throughout Burnaby. These specialized studies have been taken typically in areas of known poor ground conditions or where slope stability is of concern. These particular reports were not directly related to refinery operations.

6. IMPROVEMENTS THAT HAVE BEEN MADE SINCE 1977

The reports submitted to Council in 1977 identified the need for several improvements to emergency preparedness and response. These improvements and many others have been made over the intervening years to the present time. Following are those that are listed in the attached submission from the companies:

- Emergency response plans are regularly updated and filed with the Burnaby Fire Department.
- Mutual aid agreements.
- Upgrading of security.
- Extensive training of employees.
- Regular drills and exercises, some of which involve the Burnaby Fire Department and other government agencies.
- Community awareness programs.
- Reduction in the overall size of refinery facilities and related operations which created a corresponding reduction in risk potential.
- Introduction of new technologies, procedures and standards.
- Expansion of Burrard Clean, an organization that significantly increased the petroleum industry's capacity to respond to spills.
- Upgrading of marine facilities.
- Formation of Emergency Response Teams which are highly trained to provide specialized expertise to fire fighters and other responders at the scene of an emergency.
- Upgrading of training, procedures, labelling and emergency preparedness as required by the federal Workplace Hazardous Management Information System (WHMIS).

- Adoption of the Incident Command system approach to emergency response.
- Participation by Trans Mountain in the B.C. One Call program which efficiently provides information on underground facilities to contractors.

The following additional improvements have been made by the City:

- A structured procedure for the evacuation of citizens from areas that are declared dangerous as the result of an emergency.
- Implementation of rapid response fire boats.
- Significant upgrades to the Emergency Operations Centre and the acquisition of a well-equipped emergency Mobile Command Vehicle that can quickly be set up as a centralized communications and command post at a disaster site.
- Development of the Emergency Social Services Plan which when activated provides evacuees with shelter, food, clothing and other forms of care and comfort immediately following an emergency.

Cooperation between the companies and the City has evolved into a close working relationship where the respective staffs interact quite frequently on a wide variety of mutual interests and concerns. All parties are of the opinion that this has resulted in a continually improving level of preparation for, and responses to, emergencies that can potentially occur.

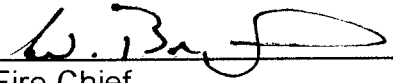
7. CONCLUSION

There appears to be a highly motivated and conscientious effort by Petroleum Companies in Burnaby to have risk assessments professionally conducted and audited on an on-going basis. These technical evaluations of operations are considered to have contributed to the excellent safety record that these companies have achieved over a period of many years. Discussions with companies' senior management and their comments in the attached submission indicate that

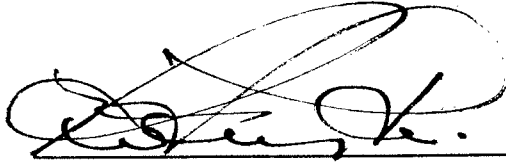
operational safety is of utmost importance to them, and that matters pertaining to safety and health will remain a high priority.

Staff feel that the Companies are making reasonable efforts to establish, promote and maintain good safety practices. Staff will continue to liaise closely with company officials, and to be appropriately involved with their operations so that the mutual desire for a high level of safety at plant sites will be continued.

As noted in this report, the City has taken a proactive approach to the seismic protection of its facilities and infrastructure. This practice will be continued as appropriate measures of a similar nature are identified in the future.




Fire Chief



Officer in Charge RCMP



Director Engineering



Emergency Program Coordinator



Director Planning & Building

**GENERAL OVERVIEW OF THE
RISK MANAGEMENT PRINCIPLES AND SYSTEMS
FOR PETROLEUM FACILITIES AND OPERATIONS IN BURNABY**

Submitted by:

Chevron Canada Limited
Imperial Oil - Products and Chemicals Division
Petro-Canada
Shell Canada Products Limited
Trans Mountain Pipe Line Company Ltd.

June 11, 1996

EXECUTIVE SUMMARY

This report has been prepared by the five major petroleum industry companies (the companies) located in the City of Burnaby: Chevron Canada Limited, Imperial Oil - Products and Chemicals Division, Petro-Canada, Shell Canada Products Limited and Trans Mountain Pipe Line Company Ltd. The report responds to a request from City of Burnaby staff for assistance in preparing a report on emergency preparedness and risk assessment for Council.

The purpose of this report is threefold. Firstly, it is to provide a brief overview of petroleum industry facilities in the City of Burnaby. Secondly, it is to provide a general overview of the principles and systems, particularly risk management, followed by the companies to ensure safe and reliable business operations. Thirdly, it is to provide general information regarding changes and improvements since the 1977 report to City Council by the City of Burnaby's Director of Fire Services.

The report outlines the principles and approaches to risk assessment and emergency response programs of the companies. The report does not address the details of risk assessment and emergency response programs for specific industry facilities. Some of the elements presented in the report may not be applicable to all of the companies. Further detailed information about specific company policies, programs and procedures may be obtained from the company contacts listed in Appendix A. Emergency Response Plans containing detailed information that have been filed with the Burnaby Fire Department are listed in Appendix B.

Incident prevention and emergency preparedness are top priorities of the companies. Each of the companies is committed to the identification, assessment and management of risks associated with its operations in order to protect the safety of company employees, the public and the environment. Accordingly, each has developed extensive and varied programs and procedures which comply with applicable regulations specific to their facilities and operations.

The companies monitor and improve both incident prevention and emergency preparedness activities in order to manage risks. Appropriate commitments of time and resources are devoted on an ongoing basis to these tasks as is evidenced by the changes and improvements since 1977 which are listed in Section 5.

Lastly, the companies invite the City of Burnaby's Mayor, Council and staff to tour their facilities to view and discuss their operations, safety and integrity programs, and procedures.

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1.0 INTRODUCTION

This report has been prepared by the five major petroleum industry companies (the companies) located in the City of Burnaby: Chevron Canada Limited (Chevron), Imperial Oil - Products and Chemicals Division (Imperial Oil), Petro-Canada, Shell Canada Products Limited (Shell) and Trans Mountain Pipe Line Company Ltd. (Trans Mountain). The report responds to a request from City of Burnaby staff for assistance in preparing a report on risk assessment for Council.

The purpose of this report is threefold. Firstly, it is to provide an overview of the petroleum industry in the City of Burnaby. Secondly, it is to provide a general overview of the principles and systems, particularly risk management, followed by the companies to ensure safe and reliable business operations. Thirdly, it is to provide information regarding changes and improvements since the 1977 report to City Council by the City of Burnaby's Director of Fire Services.

2.0 INDUSTRY FACILITIES OVERVIEW

The following five major companies operate petroleum facilities within the City of Burnaby:

- ⇒ Chevron;
- ⇒ Imperial Oil;
- ⇒ Petro-Canada;
- ⇒ Shell; and
- ⇒ Trans Mountain.

The type of facilities operated by each company is described below.

2.1 CHEVRON CANADA LIMITED

Chevron owns and operates a pipeline and fuels refinery in Burnaby, BC. Products manufactured or received and shipped by marine, rail, pipeline and truck include gasoline, methyl tertiary butyl ether (MTBE), jet fuel, diesel fuel, fuel oil, liquefied petroleum gas (LPG) and asphalt.

2.2 IMPERIAL OIL - PRODUCTS AND CHEMICALS DIVISION

Imperial Oil operates Lougheed Terminal which is a bulk refined petroleum products truck distribution terminal within the City of Burnaby.

2.3 PETRO-CANADA

Petro-Canada receives several finished petroleum products from refineries in Edmonton via Trans Mountain Pipe Line into tankage on their former refinery site in Port Moody. These products are then subjected to a cold gasoline treater system or redistillation prior to being shipped to customers by:

- ⇒ barges and tankers from the Petro-Canada dock in Burnaby; and
- ⇒ pipeline to the Imperial Oil Lougheed Terminal.

2.4 SHELL CANADA PRODUCTS LIMITED

Shell operates two major terminals in the City of Burnaby. Shellburn receives a petroleum product mix from its Edmonton refinery via the Trans Mountain pipeline system and redistills this mix into several products that are stored on site and shipped to customers by:

- => pipeline to Shell Burmount (Lake City) Terminal;
- => trucks from Shellburn; and
- => barges and tankers from Shellburn's dock.

Burmout receives and stores refined petroleum products from Trans Mountain's system and from the pipeline from Shellburn. These products are shipped to customers by truck or by pipeline to Vancouver International Airport.

2.5 TRANS MOUNTAIN PIPE LINE COMPANY LTD.

Trans Mountain operates pipeline, terminal and dock facilities within the City of Burnaby for the transportation, handling and storage of crude oil, condensates, semi-refined petroleum, refined petroleum (gasoline, diesel, and jet fuel) and methyl tertiary butyl ether (an octane enhancer for gasoline).

The major facilities include:

- => Burnaby Terminal (on the south slope of Burnaby Mountain);
- => Westridge Marine Terminal (on Burrard Inlet); and
- => receiving and distribution pipelines (including a jet fuel pipeline to Vancouver International Airport where Trans Mountain operates a Jet Fuel Terminal).

3.0 GUIDING PRINCIPLES - PROTECTING PEOPLE, PROPERTY AND THE ENVIRONMENT

The companies are committed to protecting people, property and the environment through the following common guiding principles:

- ⇒ compliance with laws and regulations;
- ⇒ safety and reliability of operations (incident prevention);
- ⇒ emergency preparedness and response;
- ⇒ community awareness and outreach;
- ⇒ monitoring and assessment; and
- ⇒ continuous improvement.

Each of these principles is discussed separately below. Further detailed information about specific company policies, programs and procedures may be obtained from the company contacts listed in Appendix A.

3.1 COMPLIANCE WITH LAWS AND REGULATIONS

Each of the companies complies with all applicable laws and regulations. Operations are subject to federal, provincial and/or local laws which prescribe standards and requirements for many activities. These may include one or more of the following:

- ⇒ building permits;
- ⇒ testing and standards for pressure vessels and boilers;
- ⇒ design and construction standards (eg. national/BC building codes);
- ⇒ oil handling and storage requirements;
- ⇒ waste storage, transportation and disposal;
- ⇒ fire services;
- ⇒ environmental permits; and
- ⇒ safety and employment standards and requirements.

The companies are active in industry/government associations which develop codes of practice.

In order to monitor compliance with laws and regulations, the companies have implemented performance tracking systems. These include management and quality control systems such as environment and safety committees, management sign-off, routine testing and incident investigations. In addition, government permits frequently require testing and reporting on a regular basis.

As a final step, the performance tracking systems and testing programs are reviewed on a periodic basis, as appropriate, to assess compliance with laws and internal standards.

3.2 SAFETY AND RELIABILITY OF OPERATIONS

The safety and reliability of operations are top priorities of the companies. Policies and programs have been implemented to prevent or minimize the impact of incidents and to ensure continued safe operations.

Key programs include:

- ⇒ management of change;
- ⇒ preventive/predictive maintenance;
- ⇒ performance based training;
- ⇒ personnel roles, responsibilities, and accountabilities;
- ⇒ risk management using Hazard and Operability (HAZOP), Failure Modes and Effects Analysis (FMEA) and "what if" risk analyses tailored to the complexity of the facility (eg. risk management processes are more rigorous for a refinery than for a truck distribution terminal);
- ⇒ equipment replacement and upgrading;
- ⇒ incident investigations;
- ⇒ contractor safety orientations; and
- ⇒ continuous improvement.

3.3 EMERGENCY PREPAREDNESS AND RESPONSE

Emergency preparedness and response is also a top priority of the companies. This program includes:

- ⇒ emergency response plans (specific to the type of operation);
- ⇒ emergency response equipment (fire and spill);

- ⇒ training of emergency response team personnel; and
- ⇒ coordination of emergency response with community first responders and planners.

All companies have filed detailed emergency and/or fire response plans with the City of Burnaby Fire Department as listed in Appendix B of this report. The emergency response plans include comprehensive information on policies, procedures and information relevant to the types of emergencies and types of operations. The plans are updated on a regular basis and provided to the City of Burnaby.

The emergency response plans are proprietary and confidential and for the sole use of the City of Burnaby Fire Department and other government agencies. The plans contain sensitive information about plant layout and processes. Public distribution of these plans could pose a potential hazard to security and safe operations should the information they contain be used improperly.

The companies each own or have access to appropriate emergency response equipment suitable for the petroleum products handled and type of operation. The companies have established mutual aid agreements and are members of the Western Canada Marine Response Corporation (Burrard Clean Operations), headquartered in North Vancouver.

The companies provide extensive training to emergency response team personnel on their emergency response plans and conduct regular drills and exercises to test their state of readiness. Exercises are documented and lists of participants are maintained to evaluate training requirements. Other companies, the City of Burnaby Fire department and other government agencies have been invited to participate in many drills including joint exercises to evaluate the coordination of response efforts. Training has been provided to community first responders on company facilities, products handled and emergency response plans. Some of the companies fund training for the Burnaby Fire Department at the Pacific Marine Training Institute and other fire training schools in Canada and the United States.

3.4 COMMUNITY AWARENESS

Community awareness programs address public safety and awareness issues relevant to the community and key stakeholders which may include:

- ⇒ consultation for major projects;
- ⇒ notification for minor projects;
- ⇒ participation in appropriate community projects;
- ⇒ presentations and displays/exhibits for key audiences;
- ⇒ contractor notification and awareness programs; and
- ⇒ open houses and facilities tours.

3.5 MONITORING AND ASSESSMENT

Reviews of each company's programs are conducted on an ongoing basis by qualified personnel to ensure continued acceptable performance relative to all applicable laws, regulations, codes, standards and company policies and procedures.

To ensure their management systems are appropriate and effective, the companies audit and assess them. Audits are carried out by an internal group at arms length to the operation being assessed. This process has three major components:

- ⇒ the assessment of system design to evaluate the completeness of the management system's documentation;
- ⇒ the assessment of system implementation to evaluate the degree of implementation compliance or conformance to the system documentation; and
- ⇒ the assessment of system effectiveness to evaluate how well the managing system is working and whether it is appropriate for the risks.

3.6 CONTINUOUS IMPROVEMENT

Through on-going assessment and review processes, the implementation and performance of each company's operations integrity and risk management programs is constantly improved to accommodate changes in regulations, industry standards and advances in technology.

4.0 RISK MANAGEMENT

The companies treat risk management as the complete process of risk assessment (see 4.1) and risk control (see 4.2) as specified by the Canadian Standards Association - Risk Analysis Requirements and Guidelines - CAN/CSA-Q634-91. The process is cyclical in nature and subject to continuous improvement.

Risk is defined as a measure of the probability and severity of an adverse effect to health, property or the environment. Two of the guiding principles discussed in Section 2.0 (safety and reliability of operations and emergency preparedness) are founded on the management of risk.

Risk management is an integral component of the safety and reliability of operations and emergency preparedness and forms an inherent part of the companies' day-to-day management of facilities and operations. The process of identification, assessment and management of risk allows for structured decision making in business operations to ensure safe, reliable and economic operations.

4.1 RISK ASSESSMENT

Risk assessment involves both risk analysis and risk evaluation. Risk analysis involves the use of available information to estimate the risk from hazards to individuals or populations, property or the environment.

The analysis generally includes the following steps:

- ⇒ scope definition;
- ⇒ hazard identification; and
- ⇒ risk evaluation.

Risk evaluation is the stage at which values and judgments enter the decision making process. Evaluation requires consideration of the importance of the estimated risks and the associated societal, environmental and economic consequences, in order to identify a range of alternatives for managing the risks.

The companies use one or more of the following for risk assessment:

- ⇒ comparison with similar systems or types of plants;
(comparative methods are based on the application of historical experience)
- ⇒ Hazard and Operability Studies (HAZOP), Failure Modes and Effects Analysis (FMEA) and "What If" analysis; and
 - HAZOP is a technique used widely in process industries for the systematic consideration of deviations from the design intent
 - FMEA is a qualitative technique for systematically studying the causes of failure and their possible effects
 - "what if" analyses examine cause and effect
- ⇒ event tree logic diagrams.
 - these diagrams employ inductive reasoning to translate different initiating events into possible outcomes

4.2 RISK CONTROL

The companies risk control methodology involves decision making, implementing and monitoring of measures to prevent or minimize the risk. Decisions are made based on the findings of the risk assessment. Monitoring is required to ensure that the decisions are implemented and corrections made where required.

4.3 RISK MANAGEMENT PROGRAMS

The companies' risk management programs are tailored to their specific operations and may include one or more of the following elements as appropriate:

- ⇒ identification of hazards, assessment of consequences and probabilities, and evaluation of prevention and mitigation measures;
- ⇒ the assessment of operations, projects, and products to identify and address hazards to personnel, facilities, the public, and the environment;
- ⇒ the implementation of risk management programs and mitigation measures;
- ⇒ the use of qualified experts to conduct periodic risk assessments;
- ⇒ the evaluation of risk assessments when significant change occurs;

- ⇒ the use of HAZOP, FMEA, "what if" analysis, and management of change techniques tailored to the complexity and level of risk assessment required in the specific circumstances; and
- ⇒ the implementation of review processes to ensure risk management decisions/recommendations are implemented.

5.0 INDUSTRY CHANGES SINCE THE BURNABY FIRE DEPARTMENT 1977 REPORT ON PETROLEUM FACILITIES

In October of 1977, Burnaby's Director of Fire Services submitted a report to Council "regarding fire and security matters involving oil companies in Burnaby." This comprehensive report addressed the following Terms of Reference:

1. To examine and report on the current fire/security arrangements in major oil industries and industries utilizing or storing explosives or other hazardous substances.
2. To solicit input from representatives of the major industries, RCMP and concerned taxpayer associations within the Corporation of Burnaby.
3. To evaluate the preparedness of the Emergency Measures Organization in the event of a major fire requiring the evacuation of civilian personnel.
4. To review the present relationship between fire, police, and industry for the purpose of evaluating fire/security arrangements.

The report concluded that "the utmost consideration has been given to those factors having a vital bearing on the prevention and suppression of a major outbreak of fire within a petro/chemical depot or hazardous industry, the results of which, and as amplified in my review, leads me to believe that the Burnaby Fire Department, supplemented where necessary by our Mutual Aid Agreement, has the ability to respond and effectively control a major fire within the fuel depots located in Burnaby. It is further envisaged that this response, supplemented by the fixed installations located in the property at risk, will provide effective protection to the exposure hazards."

Since 1977, significant changes and improvements have occurred within the companies Burnaby based facilities. These include:

- ⇒ facilities consolidation and rationalization which includes the downsizing and closure of refineries with a corresponding reduction in risk potential;
- ⇒ facilities upgrades to incorporate new technologies, procedures, and standard;
 - risk assessments have been undertaken
 - the internal inspection of pipelines

- ⇒ expansion of Burrard Clean (an oil spill cooperative established in 1976 by the Burrard Inlet oil refineries and Trans Mountain) into the Western Canada Marine Response Corporation with the capability of responding to a 10,000 tonne oil spill anywhere off the B.C. coast, as mandated by the recent revisions to the Canada Shipping Act and coincident with the downsizing of the Canadian Coast Guard. To meet this challenge, the capital funding provided by the original members has taken Burrard Clean from an asset base of \$3 million to \$20 million;
- ⇒ upgrading of each company's marine facilities and emergency response plans consistent with the Canadian Coast Guard's Marine Environment Protection Program mandated under the recent revisions to the Canada Shipping Act;
- ⇒ establishment of several company and industry emergency response/mutual aid agreements covering: fire, oil spills, liquefied petroleum gas (LPG), chemicals, and petroleum products facilities and transportation incidents;
- ⇒ under the federal Transportation of Dangerous Goods Act (TDGA) requirements, the establishment of several local industry Emergency Response Teams trained and equipped to assist local emergency responders at all transportation incidents involving the companies' TDGA schedule XII products;
- ⇒ under the federal Workplace Hazardous Management Information System (WHMIS) requirements, significant upgrading has occurred in the areas of facilities equipment labelling, Material Safety Data Sheets preparation, personnel training, spill prevention, and emergency response procedures, etc;
- ⇒ cooperation with the Greater Vancouver Regional District, the Vancouver Port Corporation, and local Fire Departments in the design, location and storage of boats and equipment, and training of fire department personnel associated with the new Burrard Inlet Fire Boat System;
- ⇒ regular review of Emergency Response Plans by each company and the implementation of joint training sessions with the Burnaby Fire Department. To ensure the maximum effectiveness of company/Burnaby Fire Department emergency responses, the companies have funded joint training sessions involving Burnaby Fire Department personnel at the Pacific Marine Training Institute, and other fire training schools in Canada and the United States;

- ⇒ participation by Trans Mountain in BC One Call which was created in 1995. This service was founded and funded by companies with buried facilities. It consolidates information about the location of these facilities and provides information to any caller intending to dig in a specific location. The service also notifies those companies potentially affected;
- ⇒ security upgrades to facilities include security guards and the installation of fences, cameras and computerized control systems; and
- ⇒ the adoption and exercise of the Incident Command System approach to emergency response, thereby ensuring the maximum effectiveness of a joint company/Burnaby Fire Department response.

6.0 CONCLUSION

The petroleum industry continues to be a responsible leader in striving to improve both incident prevention and emergency preparedness in order to manage risk. The protection of the public, property and the environment are top priorities for each of the companies. Experienced staff incorporate risk assessment and management techniques, both formal and informal, into all aspects of the companies day-to-day operations and decision making. In addition, there already exists extensive and comprehensive regulation of the design, construction and operating standards for each of the companies facilities and operations.

The City of Burnaby's Mayor, Councillors and staff are invited to tour industry facilities to view each companies' operations and discuss the safety and emergency response programs in effect.

This report is submitted and endorsed by senior local representatives of the respective companies:

Mr. Bill Haslam
Vice President, Manufacturing
Chevron Canada Limited

Mr. Kevin Gardner
Area Manager, Pacific Distribution
Imperial Oil - Products and Chemicals Division

Mr. Horace Armoogum
Terminal Manager
Burrard Products Terminal
Petro-Canada

Mr. Greg Willms
Superintendent
Shellburn Refinery
Shell Canada Products Limited

Mr. Bob Vergette
Vice President, Operations
Trans Mountain Pipe Line Company Ltd.

June 11, 1996

APPENDIX A

LIST OF COMPANY CONTACTS FOR FURTHER INFORMATION

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APPENDIX B

LIST OF EMERGENCY RESPONSE PLANS

The following petroleum company emergency response plans have been filed with the City of Burnaby Fire Department.

Chevron Canada Limited

- ⇒ Chevron Canada Limited, Burnaby Refinery Oil Spill Plan - updated 96.05.14

Imperial Oil - Products Division

- ⇒ Imperial Oil - Fire, Safety and Evacuation Plan - Lougheed Terminal. Reviewed 96.05.14 by P.A. MacNeil, Assistant Fire Chief, Burnaby Fire Prevention Division.

Petro-Canada

- ⇒ Burrard Products Terminal Marine Oil Spill Contingency Plan - updated 96.01
- ⇒ Burrard Products Terminal Emergency Response Plan - updated 95.03

Shell Canada Products Limited

- ⇒ Shellburn Emergency Response Plan - updated 96.06
- ⇒ Shellburn Marine Environmental Protection Plan - as approved by the Canadian Coast Guard 96.03
- ⇒ Burmount Tank Farm and Terminal Emergency Response Plan - updated 96.05

Trans Mountain Pipe Line Company Ltd.

- ⇒ Westridge Marine Terminal Emergency Response Plan (Plan #49) - updated 96.03.2 (covers only Westridge Marine Terminal)
- ⇒ Jet Fuel Pipeline System Emergency Response Plan (Plan #46) - updated 95.04.04
- ⇒ Western Division Emergency Response Plan (Plan # 42) - updated 95.10.20

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