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APPENDIX II-1

**LIST OF OCCUPATIONAL HEALTH, SAFETY AND RELATED
ENVIRONMENTAL LEGISLATION**

APPENDIX II-1 LIST OF OCCUPATIONAL HEALTH, SAFETY AND RELATED ENVIRONMENTAL LEGISLATION

FEDERAL

Canada Labour Code
 Canadian Centre for Occupational Health and Safety Act
 Environmental Contaminants Act
 Federal Workers' Compensation Legislation

PROVINCIAL

Alberta

Hazardous Chemicals Act
 Occupational Health and Safety Act
 Transportation of Dangerous Goods Control Act
 Workers' Compensation Act

British Columbia

First Aid (Industrial) Regulations	Waste Management Act
Health and Safety Divisions from the Factories Act	Environment Management Act
Industrial Health and Safety Regulations	Emergency Program Act
Labour Regulation Act	
Mines Act	
Workers' Compensation Act	

Manitoba

Environmental Accident (Spills) Provisions from Clean Environment Act
 Transportation of Dangerous Goods Act
 Workers' Compensation Act
 Workplace Safety and Health Act

New Brunswick

Occupational Health and Safety Act
 Occupational Health and Safety Commission Act
 Workmen's Compensation Act

Newfoundland

Asbestos Exposure Code
 Employers' Liability Act
 Occupational Health and Safety Act
 Transportation of Dangerous Goods Act
 Workers' Compensation Act

Nova Scotia

Industrial Safety Act
Occupational Health Regulations
Transportation of Dangerous Goods Act
Workers' Compensation Legislation

Ontario

Dangerous Goods Transportation Act
Guidelines for Response to Environmental Health Emergencies
Guidelines on Occupational Health Hazards
Occupational Health and Safety Act
Spill Provisions from Environmental Protection Act
Workers' Compensation Act

Quebec

Industrial and Commercial Establishments Regulations
Occupational Health and Safety Act
Workmen's Compensation Act

Saskatchewan

Environmental Spill Control Regulations
Occupational Health and Safety Act, 1977
Workers' Compensation Act

APPENDIX II-2

PERSONNEL SAFETY TRAINING CRITERIA

APPENDIX II-2 PERSONNEL SAFETY TRAINING CRITERIA

Employees in the Chemical and Petroleum Industries are given extensive training before they are assigned to work in plant operations. Particular emphasis is given to training of new employees, but upgrading and refresher courses for trained supervisors and operators is also part of industry practice. The following tables provide a typical training matrix used by companies to identify training requirements for various job levels.

PERSONNEL SAFETY TRAINING CRITERIA BY JOB CATEGORIES

TRAINING CRITERIA TOPICS		OPERATORS	MAINTENANCE	MATERIAL HANDLERS & DISTRIBUTION	LAB. PERSONNEL	STORES/RECEIVING	OFFICE/AUXILIARY STAFF	SUPERVISORS			TECHNICAL STAFF	DEPARTMENT HEAD	PLANT MANAGEMENT	SELECTIVE GROUP	FREQUENCY
New Employee Safety Indoctrination		M	M	M	M	M	M	M	M	M	M	M	M		A
Safety for Supervisors								M	M	M	R	R	R		A
Department Safety Training Program		R	R	R	R	R	R	R	R	R	R	R	R		A (1) D
Incident/Accident Reporting & Investigation	5-7	M	M	M	M	M	M	M	M	M	M	M	M		A (2) C*
Facility/Operation Change Review	5-25							M	M	M	M	M	M		A (3) C
Basic Safety Rules	5-1	M	M	M	M	M	M(P)	M	M	M	M	M	M		A (2) C
Safe Work Permit	5-21	M	M	M	M	M		M	M	M	M	M	M		A (2) C
Confined Space Entry	5-23	M	M	M	M ¹			M	M	M	M	M	M		A (2) C
Master Card	5-19	M	M	M	M			M	M	M	M	M	M		A (2) C
Radiation Control Proc.	5-10													M ²	A (2) C
Plant Emergency	5-15	M	M	M	M	M	M(P)	M	M	M	M	M	M		A (2) C
Basic First Aid														M	A (3) B ⁵
Scott Air Pak	5-23	M	M	M	M	M		M	M	M	M	M	M		A (2) B
Respiratory Protection	5-47	M	M	M	M			M	M	M	M	M	M		A (1) C
Hearing Protection		M	M	M	M			M	M	M	M	M	M		A (2) C*
Safety Shower/Eye Bath		M	M	M	M	M	M	M	M	M	M	M	M		A
Fire Extinguishers		M	M	M	M	M	M	M	M	M	M	M	M		A (4) B
Combustible Gas Analysers	5-46	M		M	M			M		M	M	M			A (3) B
Interlock By-Pass		M						M	M	M	M	M	M		A (3) C
Colorimetric Tube Tester		M		M	M			M		M				M ³	A (3) B
Stop Program		M	M	M	M	M	M	M	M	M	M	M	M		A
Disaster Plan								M	M	M	M	M	M		A (1) ⁴
Fertile Women Protection											M		M		A (3) B
Specific Unit Training															6

* To be covered
in safety rules

1. Gas Lab Only
2. Poly Ops. & Tec. Staff
T&I & Instr. Tech.
3. Operators: Olefins,
Chemicals, Gas Lab.
4. Emergency Drill
5. Members of
Emergency Squads
Stand by attendant
Plant Guards
6. See Unit Program

A - Initial Training
B - Compulsory Retraining
C - Written Test Every (No.)

Years Perform
Corrective Training

M - Mandatory
R - Recommended
P - Partial

PERSONNEL SAFETY TRAINING CRITERIA BY JOB CATEGORIES

TRAINING CRITERIA TOPICS							SUPERVISORS			TECHNICAL STAFF	DEPARTMENT HEAD	PLANT MANAGEMENT	SELECTIVE GROUP	FREQUENCY
	OPERATORS	MAINTENANCE	MATERIAL HANDLERS & DISTRIBUTION	LAB. PERSONNEL	STORES/RECEIVING	OFFICE/AUXILIARY STAFF	OPERATION	MAINTENANCE	DISTRIBUTION					
Standby Attendant													M ⁷	A (2) B
Liquefied Petroleum Gas	M ⁸	M ⁸	M ⁸	M ⁸			M ⁸	M ⁸	M ⁸	M ⁸	M ⁸			A
Anhydrous Ammonia	M ⁹	M ⁹	M ⁹	M ⁹			M ⁹	M ⁹	M ⁹	M ⁹	M ⁹			A
Fork Lift Trucks	M ¹⁰		M ¹⁰		M		M ¹¹						M ¹²	A (3) B
Cranes													M ¹³	A (3) B
Benzene	M ¹⁴	M ¹⁴	M ¹⁴	M			M ¹⁴	M ¹⁴	M	M ¹⁴	M ¹⁴	M ¹⁴		A (1) C
Drip A & B	M ¹⁴	M ¹⁴		M ¹⁴			M ¹⁴	M ¹⁴		M ¹⁴	M ¹⁴	M ¹⁴		A (1) C
Ethylene Oxide	M ¹⁵	M ¹⁵	M ¹⁵	M ¹⁵			M ¹⁵	M ¹⁵	M	M ¹⁵	M ¹⁵	M ¹⁵		A (1) C
Cellosoives	M ¹⁶	M ¹⁶	M ¹⁶	M ¹⁶			M ¹⁶	M ¹⁶	M	M ¹⁶	M ¹⁶	M ¹⁶		A (1) C
Electrical		M ¹⁷						M ¹⁷		M ¹⁷	M ¹⁷			A (3) C
Electrical Hot Work		M ¹⁷						M ¹⁷		M ¹⁷	M ¹⁷			A (3) C
Elevated Work	M	M	M				M	M	M	M	M	M		A (3) C
Hot Tapping		M ¹⁸						M ¹⁸			M	M		A
Cranes Under Power Lines													M ¹³	A (3) C
Hand Abrasive Blasting		M ¹⁹						M ¹⁹						A (1) C
Asbestos		M ²⁰						M ²⁰						A (3) C
Oxygen Detectors				M										A (1) B
Trenching & Excavation		R ²¹					R	R	R	R	R	R		A (3) C
Hazards Communication							M	M	M	M	M	M		A
Applicable Haz Material														6
Portable Ladders	R	R	R	R	R		R	R	R	R	R	R		A
Lifting Methods	M	M	M	M	M	M	M	M	M	M	M	M		A (3) C
Hand Safety	M	M	M	M	M	M	M	M	M	M	M	M		A
Applicable Pers. Prot Equip.	M	M	M	M	M	M	M	M	M	M	M	M		6 A (3) C
Hose Handling	M	M	M	M	M		M	M	M	M	M	M		A
Vapour Cloud	M	M	M	M	M	M	M	M	M	M	M	M		A (2) C

7. Members of Maintenance and Operation
8. Personnel from the Olefins Department
9. Personnel from Oxide Derivative
10. Personnel From Compounding
11. Sup. Comp. & Stores
12. Maintenance Mechanic Working on Fork Lift Truck
13. Specific Group From Maintenance

14. Personnel in Contact with Product
15. Personnel From Chemical Area
16. Personnel From ODU, PCU & ASS. Maintenance
17. Electrical Dept.
18. Selective Welders, Pipefitters & Maintenance Supervisors
19. Selective Maintenance Individuals
20. Pipefitter, Insulators, Riggers Laborers
21. Laborers, Pipefitters, Riggers

FIRE SAFETY TRAINING CRITERIA BY JOB CATEGORIES

TRAINING CRITERIA TOPICS	SELECTED GROUPS	EMERGENCY SQUAD	EMERGENCY COORD. & BACK UP	OPERATORS	MATERIAL HANDLERS & DISTR. PERSONNEL	MAINTENANCE	LAB. PERSONNEL	SHIFT SUPERVISORS	TECHNICAL STAFF/ DEPARTMENT HEADS	PLANT MANAGEMENT	OFFICE PERSONNEL	FREQUENCY
Fundamental of Fire & Inerting		M	M	M ^P	M ^P	M ^P	M ^P	M ^P	M ^P	M ^P	M ^P	A (5) C
Extinguishers	M ¹	M	M									A (2) B
Fire Alarm System & Action		M	M	M ^P	M ^P	M ^P	M ^P	M ^P	M ^P	M ^P	M ^P	A (2) C
Fire Water Supply	M ^{P1}	M	M	M ^P	M ^P			M ^P	M ^P			A (3) C
Water Spray, Sprinklers & Others		M	M	M ^P	M ^P			M ^P	M ^P			A (3) C
Fixed Monitors & Hydrants		M	M	M ^P	M ^P	M ^P		M ^P	M ^P	M ^P		A (3) C
Hose Handling & Storage	M ^{P1}	M	M									A (2) B
Emergency Equipment Truck		M	M									A (2) B
Foam Equipment		M	M									A (2) B
Fire Protective Clothing	M ^P	M	M									A (2) B
Vapour Cloud Procedure	M	M	M	M ^P	M ^P	M ^P	M ^P	M ^P	M ^P	M ^P	M ^P	A (2) C
Fire Fighting Guidelines		M	M									A (2) B
Close Roof Tank Fires		M	M									A (2) B
Pressure Fires		M	M	R ^P	R ^P			R ^P	R ^P			A (3) C
Spill Fires		M	M	R ^P	R ^P			R ^P	R ^P			A (3) C
Runaway Reaction		M	M	R ^P	R ^P			R ^P	R ^P			A (3) C
Electrical Fires	R ^P	M	M	R ^P	R ^P			R ^P	R ^P			A (3) C
Fire Water Demand - Hydraulic	M	M	R ^P	R ^P			R ^P					A (2) B
Emergency Communications	M	M	M					M	M	M		A (2) B
Back Up & Emergency Ass.			M									A (2) B
Emergency Director Training ²			M									A
Supplies & Stores			M									A
Hazardous Materials		M	M									A (2) B
Radioactive Materials			M									A
Gas Detection Systems		M ^P	M ^P	M ^P	M ^P			M ^P				A

TRAINING TYPE CODE:

M - Mandatory
R - Recommended
P - Partial

FREQUENCY CODE:

A - Initial
B - Compulsory Every (No.) years
C - Check Proficiency Every (No.) years

1. Entry attendant, welders.

2. In accordance with C & P Emergency Director Training Program.

APPENDIX II-3

**CANADIAN CHEMICAL PRODUCERS' ASSOCIATION SAFETY
ASSESSMENT SYSTEM**

Note: Only the first few pages of the "Assessment System" are included in this Appendix.

**APPENDIX II-3 CANADIAN CHEMICAL PRODUCERS' ASSOCIATION SAFETY
ASSESSMENT SYSTEM**

ESSENTIAL COMPONENTS OF SAFETY AUDIT SYSTEMS

Introduction

The board of directors of the CCPA determined at its 1984 December meeting to have a document prepared outlining the Essential Components of Safety Audit Systems, consistent with CCPA's Statement of Policy on Responsible Care.

A task group was formed with the following members:

R. Burrell	C-I-L Inc.
T. Christie	Cyanamid Canada Inc.
J. Cowan	Hercules Canada Inc.
R. Egedahl	Dow Chemical Canada Inc.
D. Ford	Dow Chemical Canada Inc.
D. Goffin	CCPA
F. Hager	UNIROYAL Limited
F. Hovland	Du Pont Canada Inc.
K. James	ERCO, A Division of Tenneco
S. O'Shea	Du Pont Canada Inc.

The group concluded that the best approach was to prepare a Guiding Statement for each major topic, with a listing of key considerations against which an assessment could be made by each member firm with respect to definition, communications, training and auditing of the issue.

The document is intended as an aid to self-assessment by each member firm to determine its emergency preparedness and adequacy of safety programs.

It is recommended that feedback to the CCPA be provided to facilitate an overview of the state of safety programs in the Canadian chemical industry, and to indicate areas where further assistance from the CCPA to its membership may be appropriate. A suggested report sheet for providing this feedback is included in this report.

A reference list for the assistance of member companies in developing or upgrading safety programs is also provided.

F. Hovland
Chairman

Index

Part I INTERNAL PROGRAMS

- The Role of Management in the Safety, Health and Loss Control Program.
- The Design and Construction of Chemical Manufacturing Plants.
- Modifications to Plant or Process.
- Safe Plant Operations.
- Maintenance Programs.
- Safety, Health and Loss Control Programs.
- Environmental Programs.
- Security.
- In-plant Emergency Control.

Part II EXTERNAL PROGRAMS

- Identifying the Potential Impact of Emergencies.
- Development of the Emergency Plan Framework.
- The Community Emergency Plan.
- Communications with the Community.
- Legal Aspects of Emergency Planning.

Part III SAFETY AUDIT SYSTEMS REPORT SHEET

Part IV REFERENCE LIST

For Illustration Purposes "PART-I INTERNAL PROGRAMS" is included.

To Obtain Copies of the Complete Document, Please Contact:

The Canadian Chemical Producers' Association
 Suite 805, 350 Sparks Street
 Ottawa, Ontario
 K1R 7S8
 Tel: (613) 237-6215

PART I - INTERNAL PROGRAMS

Part I consists of sets of questions covering nine major topics on internal operations. The questions are intended for use by CCPA member companies in conducting self-assessments to determine whether present programs are adequate.

Each set of questions is presented in the format of a check sheet having three check boxes for individual questions. The first check box asks whether the company has something in the way of a defined program or procedure covering the questions posed. The second box asks whether the key elements referred to by the question have been communicated to relevant audiences and/or whether appropriate personnel have been trained in the key element. The final box addresses whether an audit has been performed to test how effectively the key elements have been defined and trained or communicated.

THE ROLE OF MANAGEMENT IN THE SAFETY, HEALTH AND LOSS CONTROL PROGRAM

Guiding Statement

The directors and management at all levels of the company are committed to the preservation of the safety and health of its employees and the protection of the environment and the community. They have clearly stated policies and active programs to continuously manage risks and compliance with government regulations, to allocate corporate resources for necessary prevention and precautionary systems, to regularly audit and test the effectiveness of these measures and to obtain the commitment of all employees to the policies and programs themselves.

Key Considerations

	DEFINED ?	TRAIN/ COMMUNICATE ?	AUDIT ?
1) Does the company comply with the CCPA "Responsible Care Statement"?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) Does the company have a statement of policy signed by the Chief Executive Officer and communicated to all employees?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) Does management at all levels exhibit leadership in establishing safety, health and loss control goals and does management provide the necessary resources and demand accountability?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) Are regular reviews of safety, health and loss control programs carried out at senior management levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) Does the company have written safety, health and loss control guidelines for all locations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Does the company make safety, health and loss control a part of every employee's job responsibility?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- | | | | | |
|-----|---|--------------------------|--------------------------|--------------------------|
| 7) | Are programs are in place for initial training and retraining of all employees? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8) | Are thorough audits and tests conducted periodically to monitor compliance with requirements and to provide the basis for specific management action? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9) | Are lines of communication in place so that safety, health and loss control programs are brought to the attention of management having the authority to implement the corrective action required? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10) | Does the company maintain emergency plans which define specific responsibilities for all personnel and does it coordinate the plans with the local community? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

APPENDIX II-4

**INTERNATIONAL SAFETY RATING SYSTEM
FIVE STAR PROGRAM**

APPENDIX II-4 INTERNATIONAL SAFETY RATING SYSTEM FIVE STAR PROGRAM

The International Safety Rating System is a copyrighted safety audit program offered by the Industrial Accident Prevention Association of Ontario. It is essentially a diagnostic tool designed to highlight the strengths and weaknesses of an organization's safety management system. As such, it evaluates the effectiveness of the system in preventing work injuries and occupational illness in the workplace. It is based on the employer's responsibilities and expects more than compliance with government regulations. It verifies the existence of management programs which have been developed to ensure that the enterprise is properly managing health and safety in the workplace. Such programs aim to eliminate or control all work hazards and minimize risk to workers.

It consists of 579 scored standards in question form, grouped into 20 elements to cover a complete health and safety review. It is a progressive system that can be implemented at ten levels of attainment, comprising of basic core questions to which further questions can be added to achieve higher levels of sophistication.

The key to the success of the "Five Star Program" lies in its non-traditional view of what constitutes an accident. An accident had been previously defined as the result of an unsafe condition in combination with unsafe act. This definition led to a reactive system of accident correction. Under the "Five Star Program" an accident is viewed as a breakdown of the management system. With this approach, when an accident occurs, the resulting changes are directed toward improving the management system to prevent such future losses from taking place.

In the "Five Star Audit Program" 20 elements may be addressed. These include:

1. Leadership and Administration,
2. Management Training,
3. Planned Inspections,
4. Job Analysis and Procedures,
5. Accident/Incident Investigation,
6. Planned Job Observation,
7. Emergency Preparedness,
8. Organizational Rules and Regulations,
9. Accident/Incident Analysis,

10. Employee Training,
11. Personal Protective Equipment,
12. Health Control and Services,
13. Program Evaluation System,
14. Purchasing and Engineering Controls,
15. Personal Communications,
16. Group Meetings,
17. General Promotion,
18. Hiring and Placement,
19. Records and Reports, and
20. Off-the-Job Safety.

In many cases the program requires the answers to questions to be supported by documentation. In other cases an observation of the physical facilities or interviews with management and workers will provide answers to the **actual** working of a program compared to the program as perceived.

Value factors have been assigned to each of the questions, enabling an organization to measure its activities in quantifiable terms.

APPENDIX II-5

**EXAMPLES OF INDUSTRY ACCIDENT PREVENTION MEASURES
DURING ENGINEERING DESIGN AND CONSTRUCTION**

APPENDIX II-5 EXAMPLES OF INDUSTRY ACCIDENT PREVENTION MEASURES DURING ENGINEERING DESIGN AND CONSTRUCTION

By way of example, to illustrate industry activities in the identification and management of hazards, both actual and potential, two Petro-Canada projects, one involving a new commercial process and the other replacing an existing unit, were reviewed. At the time of drafting this report, both projects were in the final stages of construction and commissioning.

In each case from design to operation, great emphasis was placed on the development of proper procedures and personnel training so that work is properly carried out.

At each stage, audits were performed by appropriate teams. These audits will continue through the life of the plant.

As a result of technology developed by Energy, Mines and Resources (EMR) Canada, a new process called CANMET hydrocracking has emerged. The first commercial plant has been constructed in Point-aux-Trembles, Quebec, and is in the process of commissioning at this time.

The second case concerns the replacement of a catalytic cracking process unit, in which a completely new reactor/regenerator system was constructed alongside the existing on-line system without incident.

THE CANMET DEMONSTRATION PLANT

Conceptual design and scale up from pilot plant operation commenced in May 1981, the contractor selected has experience in the design of high pressure, high temperature plants.

Engineering Procurement and Construction Management (EPCM) was contracted to a Canadian based contractor with worldwide EPCM experience. The following groups from the host company become actively involved with the EPCM: Projects, New Technology, Control Systems, Refinery Operations, Process Engineering, Technical Services and Refinery Engineering.

During the course of the project cycle the following actions were taken:

- 1) EPCM contractor and the Petro-Canada project group developed the necessary engineering standards and specifications using as a base the existing refinery standards.

- 2) A materials Review Group was formed to review the metallurgy recommended by the contractor. This specialist group was supported by the refinery inspection staff. Technical Services and EMR (CANMET), New Technology provided the design criteria to monitor corrosion.
- 3) Early in 1981, a consultant in Safety and Loss Control was engaged with experience in high pressure hydrogen process and catalytic cracking and coal liquefaction to fill in needed knowledge gaps.
- 4) A Hazard and Operability Review Committee was formed and met regularly from October, 1983. This group involved the EPCM contractor and Petro-Canada personnel from the Refinery Technical Services, Engineering and Projects groups and, Industrial Hygiene and Safety.
- 5) An independent risk analysis was performed by Canadian Industrial Risk Insurers who reviewed plant layout from the design to field installation.
- 6) Environmental Permits - all the necessary permits for the project from the Montreal Urban Community and the Province of Quebec were obtained by the refinery management without delay.
- 7) A start-up task force comprising people from Refining, Engineering (New Technology), and the EPCM contractor was formed to develop detailed start-up, operating and emergency procedures.
- 8) A partial list of the documents developed follows to illustrate more fully the work of this task force.
- 9) Risk analysis was carried out - to determine problem potential (a part of HAZOPS reviews) in the form of - if, what if, so what, operating philosophy.
- 10) Operating manuals were written by refinery personnel supported by the task force for start-up, shutdown and emergency procedures. In addition, a consultant specializing in the commissioning of high pressure process plants was engaged to assist in this work.
- 11) A process simulator was purchased to assist in operator training and the development of start-up, normal operations and emergency shutdown procedures using a variety of feed rates and types, and product disposal routes.

- 12) An Atomic Energy Control Board (AECB) approved nuclear densitometer forms a part of the instrumentation. The refinery inspectors are qualified and licenced by the AECB to operate this device.
- 13) The CANMET process includes an additive preparation section which is not part of conventional refinery operations and particular care has been taken in the design and operation of this section.
- 14) During the construction phase, the EPCM contractor, refinery, and contracted inspectors monitored all phases of construction.
- 15) The insurers witnessed and/or reviewed test certificates of tests, including all fire equipment and tests of the deluge system.

Regular reviews were made to ensure that proper engineering and construction practices were followed in addition to statutory inspections of relief valves, welding and vessel testing to comply with Department of Labour requirements.

THE CATALYTIC CRACKING PROCESS UPGRADING

In early 1983, it was decided to replace the existing Houdry catalytic cracking unit which was nearing the end of its useful life and was not able to meet the environmental air and emission standards.

An Engineering and Development and Refinery Engineering department task force was created to review existing fluid catalytic cracking technology. As a result of this review, a process developed by Total Petroleum was selected.

This process, which uses two-stage regeneration, is relatively new, with only two similar units in operation. It represents a first time use for Canada.

A licence to build the unit was obtained from Total Petroleum, and an experienced contractor was engaged to design the new unit and to modify the existing fractionation and gas recovery sections.

Funding for this project was approved in February 1984 for scheduled completion in the autumn of 1985.

At the time of writing of this report the plant was in the later stages of construction and each activity used to control the CANMET construction and operation was duplicated for the "Total" process. These included engineering standards and

specifications, materials review, safety and loss control, hazardous operations review, risk analysis and start-up task force.

The most significant thing to consider in any upgrading process is that the work site is within the boundaries of an operating plant. Nothing can be done without considering the operation. No work can be started unless the appropriate permits are prepared and constant monitoring at each work site is required. This means literally that every piece of work, including all cold work, hot work such as welding, safe entry into confined spaces, is checked and the appropriate permits issued specifying the applicable conditions.

The engineering review process revealed the need for major changes in areas such as hot slurry piping catalyst handling, and the quench oil systems.

To assist both the refining and engineering groups in resolving problems of operability, safety and construction, a model was built and used extensively by all groups.

The Canadian Underwriters reviewed plant layout, fireproofing and fire equipment and prepared a risk analysis. Operating procedures for start-up, shutdown and emergencies have been prepared along with operator training programs.

Loss control is a requirement which can only be achieved through team work and cooperation.