

Federal Environmental Assessment and Review Process

Federal Environmental
Assessment Review Office

Report of the Environmental Assessment Panel



Environment Canada

PANEL REPORTS

TO THE MINISTER OF THE ENVIRONMENT
ON PANEL PROJECTS

1. Nuclear Power Station at Point Lepreau, New Brunswick.
(May 1975)
2. Hydro Electric Power Project, Wreck Cove, Cape Breton Island, Nova Scotia. (August 1976)
3. Alaska Highway Gas Pipeline Project, Yukon Territory.
(Interim report, August 1977)

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TABLE OF CONTENTS

I	Letter of Transmittal	
II	Executive Summary	1
1.	<u>The Port Granby Project and the Federal Environmental Assessment Review Process</u>	5
1.1	Pre-Impact Statement Review Phase	6
1.2	Technical and Public Review of Impact Statement Phase	7
1.2.1	Public Information Programs - Pre-hearings	7
1.2.2	Public Hearings and Technical Review	8
2.	<u>Project and Area Perspective</u>	9
2.1	The Company, Its Role and the Need for the Project	12
2.2	Site Selection Process	12
2.3	Project and Refining Process Description	13
2.4	Site Description	15
2.5	Regional Perspective	17
3.	<u>Examination of the Project</u>	19
3.1	Guidelines	20
3.2	Environmental Impact Statement (EIS)	20
3.3	Phase One Review - Identification of Concerns	20
3.4	Deficiencies and Clarifications to the EIS	20
3.5	Phase Two Hearings	21
3.5.1	Need for the Refinery	21
3.5.2	Site and Process Selection	22
3.5.3	Waste Management	22
3.5.4	Impact on Agriculture	23
3.5.5	Impact on Neighbouring Lands	24
3.5.6	Social and Community Impact	25
3.5.7	Monitoring and Control	26
3.5.8	Air and Water Quality	26
3.5.9	Impact on Health	27
4.	<u>Panel Deliberations</u>	29
4.1	Introduction	30
4.2	Major Issues	30
4.2.1	Use of Agricultural Land	30
4.2.2	Waste Management	31
4.2.3	Social Concerns	32

4.2.4	Hydrogen Fluoride Emissions (HF)	33
4.2.5	Monitoring	34
5.	<u>Conclusions</u>	35
5.1	Introduction	36
5.2	Rationale for Recommendations	36
5.2.1	Refinery and Plant Process	36
5.2.2	Waste Management System	37
5.2.3	Refinery Location	38
6.	<u>Supplementary Recommendations and Conclusions</u>	41
6.1	The Eldorado Proposal	42
6.2	The Environmental Assessment Review Process	42
6.3	Funding	42
7.	<u>Appendices</u>	45
I	Appearances Before the Panel and Submissions Received	46
II	Technical Witnesses	48
III	The Members of the Panel	49
IV	Bibliography	53
V	Guidelines for the Preparation of an Environmental Impact Statement	57
VI	Acknowledgements	63



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Ottawa, Ontario
K1A OH3

May 12, 1978

Your file Votre référence

Our file Notre référence

The Honourable Len Marchand, P.C., M.P.,
Minister of State, Environment,
Ottawa, Ontario
K1A OH3

Dear Minister:

On behalf of the members of the Environmental Assessment Panel which has reviewed Eldorado Nuclear Limited's proposal to construct an uranium refinery and waste management facility at Port Granby, Ontario, I am pleased to submit our report on this proposal for your consideration.

Respectfully yours,

J. S. Klenavic,
Chairman.

Executive Summary

The attached report represents the Panel's conclusions on a proposal by Eldorado Nuclear Ltd. (ENL) to construct a uranium hexafluoride refinery and waste management facility at Port Granby, Ontario. ENL spent more than two years in preparing its proposal.

In the course of its review, the Panel issued guidelines for the preparation of an Environmental Impact Statement (EIS), obtained technical and public reviews of that statement and issued a list of deficiencies in the EIS. Two series of public hearings were held, the first to determine the EIS deficiencies and to identify public concerns about the project, and the second to hold more substantive discussions on new major issues.

In the deliberations leading to its recommendations the Panel considered the project in terms of its three components: the refinery and plant processes; the waste management system; and the location chosen by the company for the refinery and waste management facility.

The Panel found the refinery and plant processes to be acceptable if a number of conditions were met. The Panel did not disagree with Eldorado's marketing data nor with their forecasts of uranium supply and demand. The Panel agreed that the project was consistent with existing Canadian policy on the further processing of new materials before export, and that the refinery would represent a net economic benefit to Canada.

The Panel also accepted ENL's claim that modifications to the process currently used at Port Hope represent the best choice for the proposed refinery and that the evaluation of the safety report required as part of the licensing procedure will be carried out in such a way as

to ensure that all discharges will be within currently accepted limits for normal operations. Levels of radio-activity in the plant processes are expected to be very low. Radiation risks to workers and the public were judged to be low. A greater potential risk exists, however, with respect to possible hydrogen fluoride emissions.

In finding the refinery and refinery processes acceptable, the Panel recommended adherence by the company to ten specific conditions outlined in its report.

In the examination of the proposed waste management system, the Panel recognized that ENL had intended the system to be used as a method of permanent waste disposal. The Atomic Energy Control Board advised the Panel however that the system could only be considered as a storage method for a period of about 30 to 50 years. The Panel found the proposed waste management system unsuitable as a means of storage because of unknown reliability, costs, engineering difficulties and the need to retrieve the stored material.

The Panel judged that retrievability was crucial in any storage system. The bentonite covering system proposed by ENL does not lend itself to the retrieval of high volume, low level radioactive and other wastes. The Panel noted that the proposed system had never been tried under controlled conditions for an extended period of time and that little experimentation had been done. The hydrogeology of the Port Granby site is complex and difficult to determine with certainty. The proposed waste management system is therefore not suitable for storage. Because of these difficulties, the Panel

believes that the system would not be readily transferable to any other proposed site.

The Panel has also recommended three conditions that should be applied in the consideration of any other waste management system to be proposed by ENL in the future.

The third component of the project is its location at Port Granby. The Panel concluded that the Port Granby site would not be acceptable for the project. Although the refinery would produce a net economic benefit to Canada, the net effect on the local area would be negative. In its deliberations the Panel could perceive no long term benefit to the local community from ENL locating the project in this area.

Conversely, the area does have high, long-term potential as an agricultural area with substantial productive capacity for specific forms of agriculture such as dairying and cash crops. Moreover, the lake shore belt has a longer growing season, due to the lake effect, than land only a few miles to the north. The agricultural character and viability of the area is confirmed in local and regional plans.

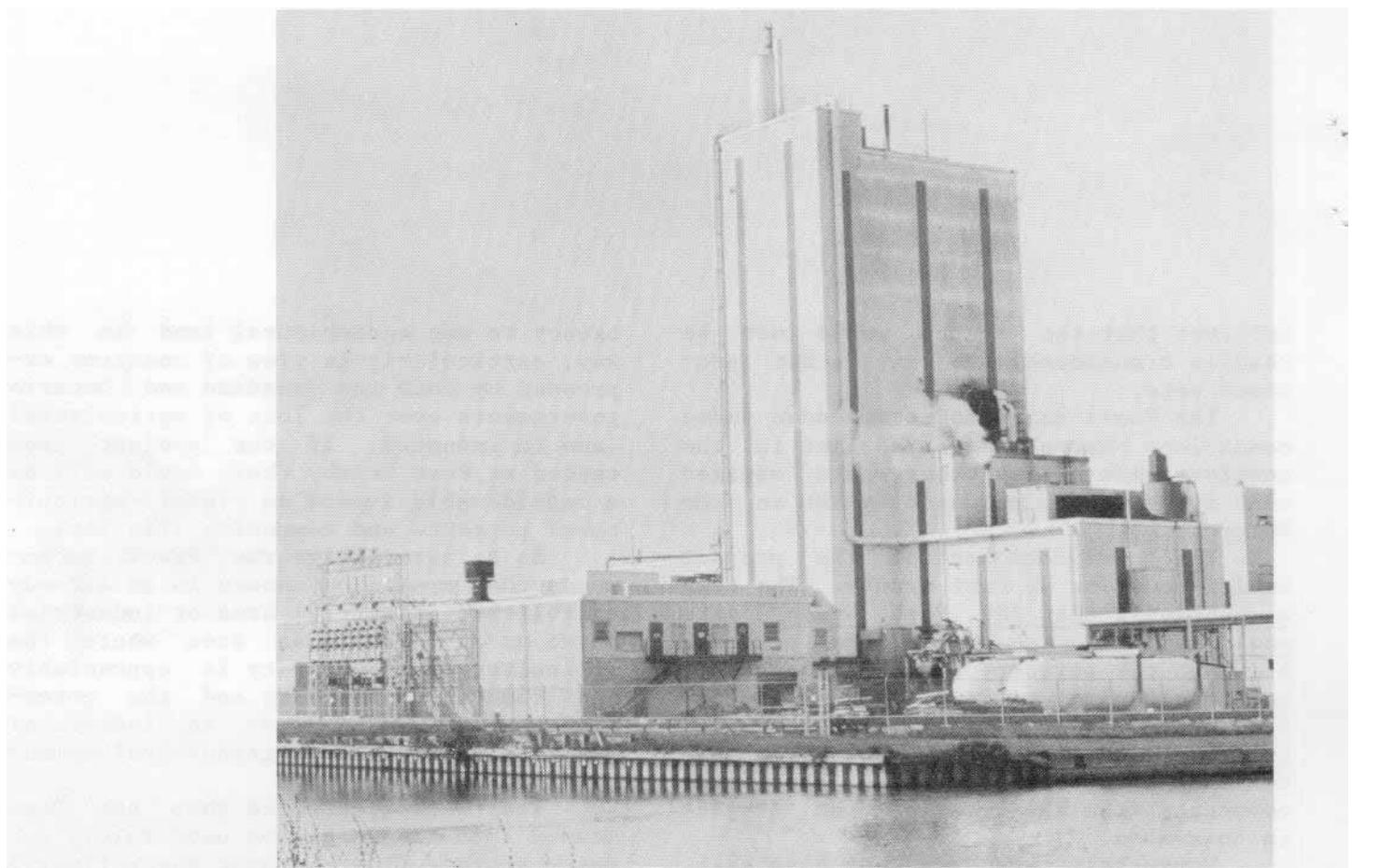
The Panel believes that in the absence of any compelling reason to the contrary, agricultural areas such as Port Granby should be protected from industrial intrusion. The Panel noted that past experience indicates that it takes very little to instigate a trend away from agriculture. The ENL proposal does not conform to regional plans nor does it adhere strictly to provincial policies for agricultural land of this quality and location. Finally the Panel believes it would set a poor example for a federal

agency to use agricultural land in this way, particularly in view of concerns expressed by both the Canadian and Ontario governments over the loss of agricultural land to industry. If the project proceeded at Port Granby there could well be a considerable impact on local agricultural patterns and community life style.

As an alternative the Panel recommends that a site be chosen in an already established industrial area or industrial park; or at least in an area where the agricultural productivity is appreciably less than at Port Granby and the potential problems caused by an industrial intrusion in a viable agricultural community are not repeated.

The Panel also noted that the Port Granby site should not be used solely for waste storage (i.e. without the refinery) for the reasons mentioned above. These are discussed in greater detail in the report. If ENL selects another site for the project, the Panel has recommended, in its report, that specific guidelines be followed.

In the process of examining the ENL proposal, certain issues were raised both by the Panel and the public that did not fall within the framework of the Panel discussions on the project. Some of these matters were considered significant enough, however, to be addressed in the Panel report. The section on supplementary recommendations addresses these issues. Examples include the role of regulatory agencies, refinements to the Federal Environmental Assessment and Review Process, and the importance of local planning priorities in the siting of federal projects.



Eldorado's Port Hope UF_6 Refinery (Courtesy of Eldorado Nuclear Ltd.)

1

The Port Granby
Project and
the Federal
Environmental
Assessment and
Review Process

This report to the Minister of the Environment, on Eldorado Nuclear Ltd's (ENL) proposed uranium refinery at Port Granby has been prepared by an Environmental Assessment Panel, constituted under the Federal Environmental Assessment and Review Process (EARP). This Process was established by Cabinet, December 20, 1973, to ensure that:

- environmental effects are taken into account early in the planning of new federal projects, programs and activities;
- an environmental assessment is conducted for all projects which may have an adverse effect on the environment before commitments or irrevocable decisions are made; and
- the results of these assessments are used in planning, decision making and implementation.

Federal projects are considered to be those initiated by federal departments and agencies; those for which federal funds are solicited; and those involving federal property. Federal departments and agencies are bound by the Cabinet Decision. Proprietary Crown Corporations and regulatory agencies, however, are invited rather than directed to participate in the Process.

1.1 PRE-IMPACT STATEMENT REVIEW PHASE

ENL is a proprietary Crown Corporation and thus entered the Process voluntarily. After determining that its proposed refinery and associated waste management area could have potentially significant environmental effects, and after consultation with the appropriate regulatory agency, the Atomic Energy Control Board (AECB), ENL decided to refer the project

to the Federal Environmental Assessment Review Office for a Panel review.

The referral was received in July 1975 and a Panel was formed.

The Panel's original mandate was to review the potential environmental consequences of the project as proposed and to evaluate the significance of the impacts that would result if it were approved. With the co-operation of the Province of Ontario, agreement was also reached to review the socio-economic and community impacts of the project.

The Province accordingly appointed a member to a Steering Committee charged, on behalf of the Panel, with establishing guidelines for the preparation of an Environmental Impact Statement (EIS). By participating this way, the Province was able to illustrate its interest in Federal-provincial cooperation in the area of environmental assessment and review, as well as to ensure that those aspects (socio-economic and community impacts) of special interest to the province would be considered.

The EIS guidelines were formally issued by the Panel to ENL and made public in June 1976. In June 1977, the EIS was forwarded to the Federal Environmental Assessment Review Office (FEARO) for general distribution.

In 1977, the Cabinet amended the EARP. This allowed non-public servants to serve on Panels. As a result of this change and discussions held with the Province of Ontario, Panel membership was subsequently increased in March 1977 by the addition of two members from outside the public service to ensure that the social and planning aspects of the project could be adequately evaluated.

Three changes in Panel composition occurred prior to and during the early stages of the public hearings. The ENL representative resigned, a new Panel Chairman was appointed and during the first phase of the hearings the representative of AECB also resigned. The Panel that conducted the public hearings and prepared this report was as follows:

Mr. J.S. Klenavic
Federal Environmental Assessment and Review Office - Chairman

Dr. P.M. Bird
Fisheries and Environment Canada - Liaison and Co-ordination Directorate, Planning and Finance Service

Mr. C.W. Cheng
Fisheries and Environment Canada - Canada Centre for Inland Waters

Dr. E.O. Derow
McMaster University - Department of Sociology

Prof. R.S. Lang
York University - Faculty of Environmental Studies

Dr. D.P. Scott
Fisheries and Environment Canada - Fisheries and Marine Service

Mr. K. Shikaze
Fisheries and Environment Canada - Environmental Protection Service

1.2 TECHNICAL AND PUBLIC REVIEW OF IMPACT STATEMENT PHASE

EARP is not solely a method for gathering and evaluating scientific or professional opinion on the potential environmental impact of a particular project. The Process also involves consultation with the public in the vicinity of the proposed project and with other interested parties who may wish to make their opinion known

to a Panel.

When the EIS was received, a public information and participation program was organized to provide the public with adequate opportunity to comment on the project. Technical reviews were also carried out by federal and provincial agencies.

1.2.1 Public Information Programs - Pre-Hearings

In the immediate project area, ENL undertook, of its own volition, a public communications program to acquaint area residents with the project and its implications. In addition to regular media announcements and the distribution of project documentation, two information offices were set up in Port Hope and Bowmanville. A public opinion survey conducted for ENL indicated that approximately 70% of the people living in the survey area (30 km to the west of the site, 20 km to the north, 50 km to the east) were aware of the project. Nearer the proposed site, up to 90% were aware of the project.

FEARO placed copies of the EIS (3 volumes exceeding 900 pages) in appropriate public locations in an area bounded by Cobourg, Peterborough and Toronto. To acquaint people with the conduct of the Panel review and the location of the EIS, a series of advertisements were placed in local and regional newspapers. Contacts with local and national public interest groups and the local media were established, and some 75 additional sets of the EIS were distributed. Panel staff attempted to ensure that the views to be presented to the Panel at the hearings would adequately reflect the range of

interests and concerns of all interested parties.

1.2.2 Public Hearings and Technical Reviews

The public hearings were conducted in two phases, the objectives of which follow:

To permit the Panel to identify

- (a) the data deficiencies in ENL's EIS;
- (b) public concerns about the project;
- (c) major issues that should be scheduled for detailed discussion during the Phase 2 hearings. The purpose of this second round of hearings was to permit the Panel to hear all points of view discussed in detail, especially where substantial differences existed in relation to the identified major issues.

The Phase 1 hearings were held near the proposed site, at Bowmanville and Newcastle, in late September and early October 1977. Procedures were designed to offer the maximum opportunity for all participants to present their views. The Panel made efforts to specifically exclude cross-examination, while permitting the maximum amount of questioning for clarification.

After giving consideration to all submissions made at the Phase 1 hearings, the Panel prepared and forwarded to ENL a comprehensive list of clarifications required and deficiencies in the EIS. This list was also made public and forwarded to all participants in the Phase 1 hearings. ENL responded to this list in December 1977. Copies of their replies were made public by the Panel and forwarded to Phase 1 participants together with a list of the issues to be discussed at the Phase 2 hearings. One month was

allowed for further study of this supplementary information.

The Phase 2 hearings were held in Bowmanville at the end of January and the early part of February 1978. Partly in recognition of the problems experienced by some concerned parties in obtaining expert advice, the Panel arranged for technical witnesses to be present and answer questions during each issue session.

Federal and provincial agencies that had participated in Phase 1 were again present to ask and answer questions and provide information. Some representatives from these agencies participated as technical witnesses.

By the end of Phase 2, the Panel believed it had received an understanding of the range of public and technical opinion concerning this project.

2

Project and Area Perspective

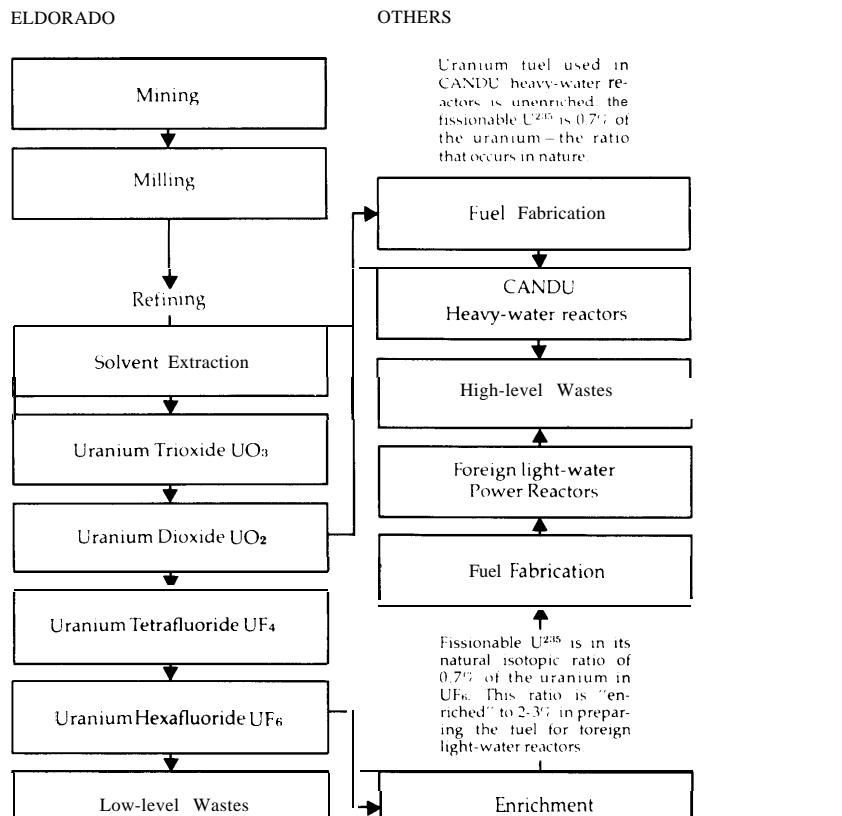


Figure 1: Eldorado's Role in the Nuclear Fuel Cycle

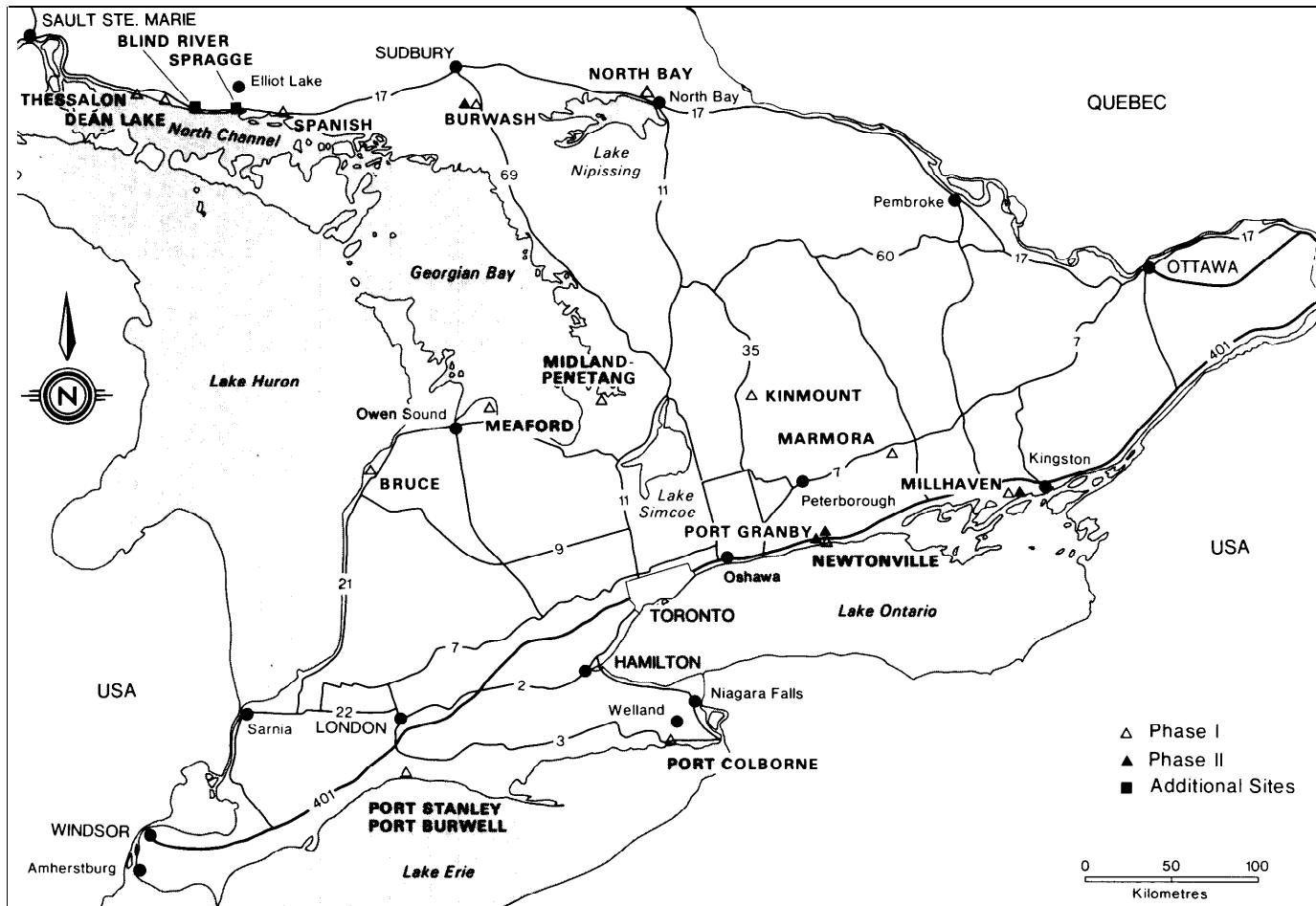


Figure 2: Possible Sites Examined by ENL

2.1 THE COMPANY, ITS ROLE AND THE NEED FOR THE PROJECT

ENL is a federal Crown Corporation engaged in the commercial nuclear fuels industry in Canada and abroad. Its operations include uranium exploration, mining, milling and refining.

Starting as a gold mining company in 1926, Eldorado became a leading producer of radium in the 1930s and 1940s. The company was expropriated in 1944 by the federal government to produce uranium for the Allied war effort at its Port Hope refinery. Expansion of the company continued after the war with the rapid development of nuclear reactors for the generation of electricity. Currently, ENL supplies all uranium dioxide (UO_2) used as fuel in Canada's CANDU reactors. It also supplies some UF_6 as feedstock for foreign (mainly U.S.) uranium enrichment facilities. (See Fig. 1)

ENL's existing Port Hope refinery can produce 4,500 tons of UF_6 per year and the company's ability to expand the production of UF_6 at this location is limited. ENL's assessment of the world demand for enriched uranium has led to the proposed Port Granby project with a projected annual capacity of 9,000 tons of UF_6 . The projected life of the plant is fifteen to thirty years.

2.2 SITE SELECTION PROCESS

In planning for an integrated UF_6 refining and waste management facility, ENL considered a number of sites in Ontario. In January, 1977, ENL announced that after two years of study, it had selected an area near Port Granby, 32 kilometres east of Oshawa.

In 1975, the company retained James F. McLaren Ltd., a consulting engineering firm from Toronto, to examine potential sites (see Fig. 2) for the proposed Ontario facility. Seven major factors were considered in this evaluation:

- environmental and economic factors;
- the availability of rail transport and all weather roads;
- the supply of water and electricity;
- proximity to supplies of chemicals and fuel oil;
- proximity to shipping and border crossing points;
- the availability of sufficient land;
- the need for an adequate buffer zone around the plant.

The initial selection process was outlined in detail in Appendix I, Evaluation of potential sites for a new uranium refinery in Ontario, to the EIS. Fourteen sites were considered, with eleven being rejected on the basis of the criteria mentioned above.

Detailed engineering, environmental and economic studies were begun on the three remaining sites; Milhaven, Newtonville and Burwash, and subsequently, at the request of ENL, on a site adjacent to its existing waste management operations near Port Granby. After completion of these detailed studies, Comparison of four potential sites for a new uranium refinery in Ontario, Appendix II to the EIS, the company was advised that any of the four sites was generally suitable from an environmental point of view.

During these studies ENL was also asked to examine two other sites. The first was an area bordering the north channel of Lake Huron in the Blind River Industrial Park. The second site, Spragge, was in the same general area.

ENL concluded that all other sites were less attractive than Port Granby.

2.3 PROJECT AND REFINING PROCESS DESCRIPTION

Concurrent with site selection, ENL commissioned a comparative evaluation of the environmental, technical and economic aspects of available uranium refining methods. It concluded from this study that the basic method used at Port Hope, suitably modified to reflect latest technological developments and operational experience, would best meet their requirements for the proposed new refinery.

ENL estimated construction could be expected to commence in 1978 and be completed in 1980. At the peak of construction 350 persons would be employed. Plant operations would require a work force of 150.

Plant Process

Eldorado notes that the feedstock for the proposed refinery would come mostly from Ontario mines. The ore is crushed and milled at the mines to produce the concentrate "yellowcake" (U_3O_8) which contains about 70% uranium. The proposed refinery would use approximately 13,000 tons of yellowcake per year to produce 9,000 tons of UF_6 .

For this level of production, the company estimates the refinery would need an annual supply of:

- approximately 7,000 tons of chemicals such as hydrofluoric, nitric, and phosphoric acids;
- about 10 megawatts of electrical power;
- 15.18 million litres of fuel oil per year;

- cooling water from Lake Ontario at the rate of 1,500 cubic metres per hour.

The refinery would operate 24 hours a day, seven days a week, for a total of about 340 days a year. ENL presently expects the plant to be single purpose, producing only UF_6 . However, the design is capable of modification if warranted. (See Figure 3).

Plant Wastes and Management

The primary wastes produced by the proposed Port Granby refinery would be dry solids. It is proposed that these would be buried in a new waste management system.

The proposed waste management system was designed for permanent waste disposal. This system would consist of trenches opened and filled when enough residue had accumulated at the plant. They would be closed immediately afterwards. The wastes would be covered with a bentonite-sand blanket which would absorb water and swell to form an "umbrella" over the trenches, thereby protecting the wastes from becoming wet.

By making use of natural materials, it was proposed that such a system would be adequate, even allowing for the long time required for radioactive decay or for shore erosion to reach the disposal site.

The buried trenches would receive waste from three main sources:

- solid residues from the raffinate treatment system - these include natural uranium, thorium and radium 226;
- similar solid residues from the continuing operations of the Port Hope refinery; and

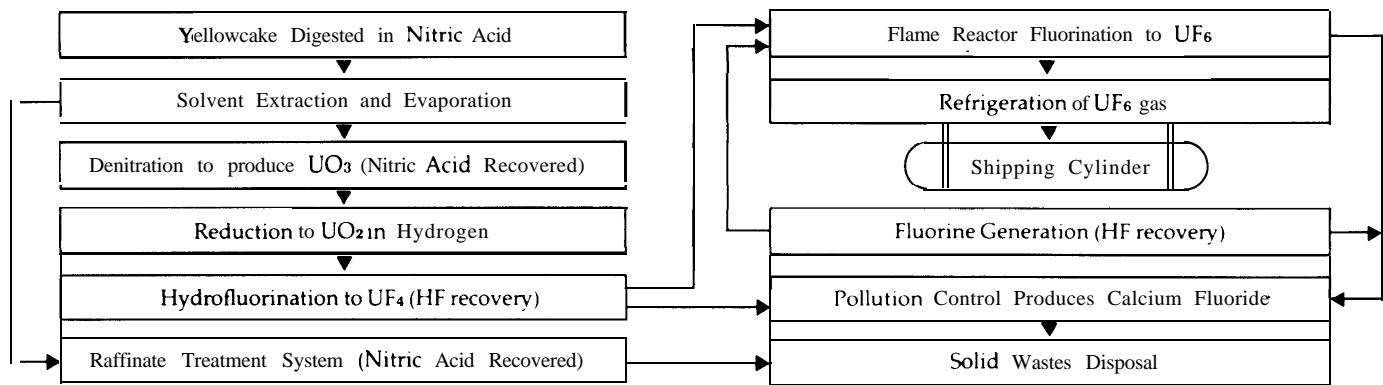


Figure 3: The Refining Process

- residues now buried at the existing Port Granby waste management site.

The volume of liquid wastes generated by the new refinery would be considerably less than that produced by the existing Port Hope refinery. The major portion of the water used would not be for the refinery process, but for equipment cooling.

The new refinery would have three main air emission sources: the absorber stack, exhausting air streams such as that from Yellowcake preparation; the hydrogen stack, discharging waste hydrogen to the atmosphere; and the vent stack, handling air streams from the process of fluoride generation.

To treat the contaminated discharge to Lake Ontario from the existing waste management facility, a lagoon and treatment system has been installed. ENL proposes that this system also could be used to treat run-off from the new refinery, should such action be required.

Both the waste management site and the refinery would be subject to routine monitoring. An outline of the monitoring program is contained in the FIS and in supplementary data provided by ENL.

2.4 SITE DESCRIPTION

Plant Layout

The site consists of 266 hectares (657 acres) (Figure 4). As proposed by ENL, the refinery complex, including all buildings, roads and chemical storage areas, would occupy some 8.5 hectares (21 acres). Approximately 21 hectares (52 acres) would be used to locate a new waste management area. The remaining property would provide a buffer zone in

accordance with AECB requirements.

The proposed site is located within the boundaries of the Town of Newcastle, which is comprised of the former townships of Clark and Darlington, the former Town of Bowmanville and the village of Newcastle. The site and its surroundings are rural in character. Immediately to the west is the small hamlet of Port Granby. The site is adjacent to Hope Township, which is in Northumberland county.

Description of Existing Environment

The terrain of the proposed site consists largely of croplands (56%), pasture (13%), and woodland (20%). It has a high capability for agriculture. The area is representative of the agriculture landscape found to the east of Toronto.

The site is situated at the southern end of a gently undulating glacial till plain with several small ravines on the lake front side. The plain terminates abruptly in steep bluffs at the lake-shore. Bedrock is located some 45-60 metres below the surface. Above the bedrock are three layers of glacial and lacustrine deposits.

There are three distinct watersheds within the buffer zone. The largest, north and west of the site, is drained by Port Granby creek. The watershed to the east drains rapidly to the lake. Two intermittent streams with a combined watershed of 129 hectares drain the existing waste disposal site.

The area's southern Ontario climate is moderated by its proximity to Lake Ontario.

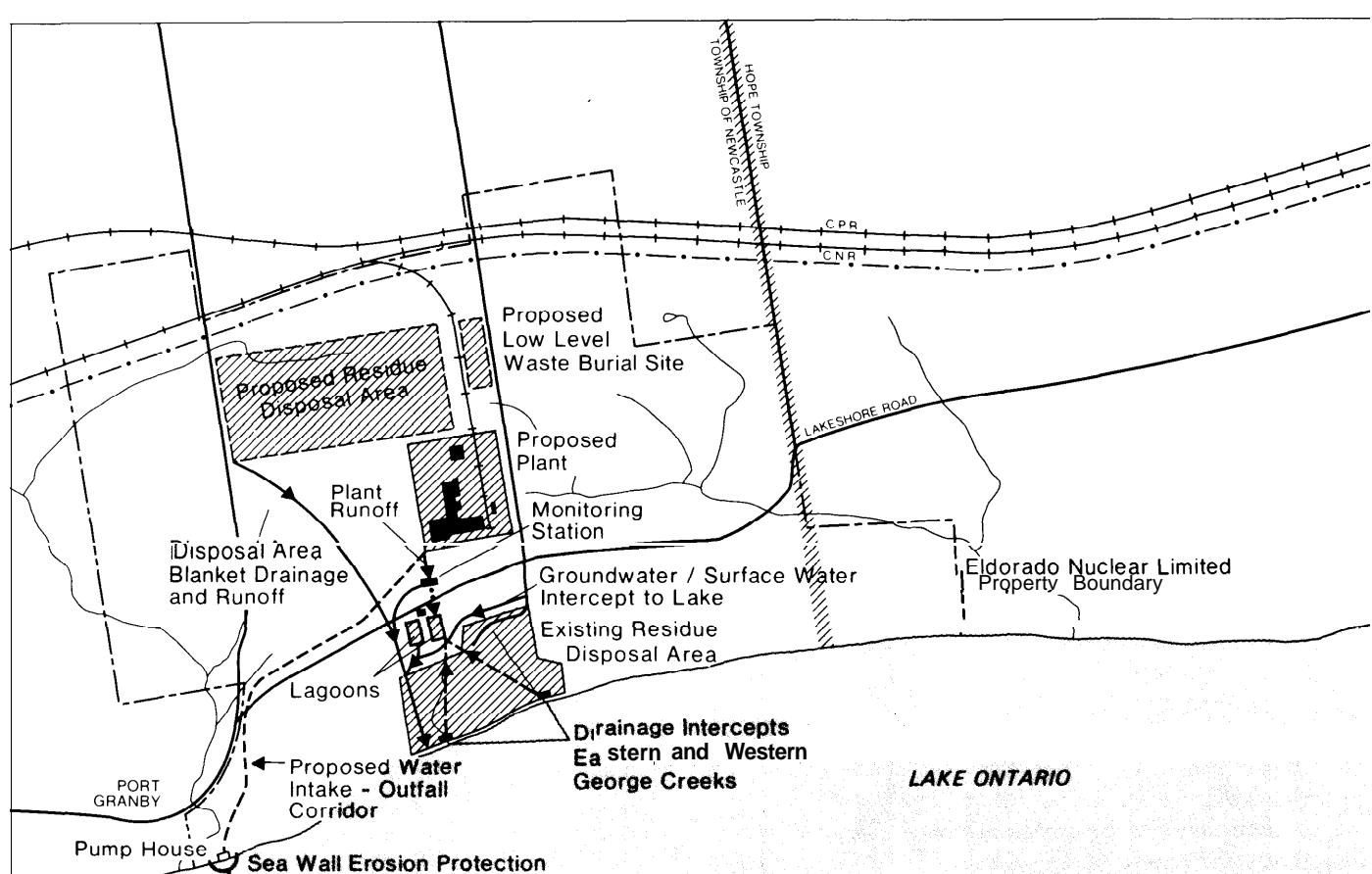


Figure 4: Proposed Site Layout

2.5 REGIONAL PERSPECTIVE

Regional Setting

The Town of Newcastle, within which the proposed refinery site is located, is part of the Regional Municipality of Durham. The nearest urban centres to the site are:

- Port Hope (pop. 9,788), 16km east of the site,
- Oshawa (pop. 107,023), 32km west of the site.
- Bowmanville (pop. 6,800), 18km west of the site.

The village of Newcastle, which is within the Town of Newcastle, is situated some 5km west of the site. Aside from these urban areas, most of the immediate region is rural, although it also contains numerous villages and hamlets.

The growth strategies for both Durham Region and Northumberland county encourage rapid development of the designated urban areas, while restricting the urbanization of rural areas.

Present and Future Land and Water Uses in the Local Area¹

Agriculture is the most significant land use and constitutes a major part of the economic base in this area. At present, approximately 74% of the land is devoted to agricultural production, with the greatest proportion devoted to beef and dairy operations. Although there are few large operations, most farms have between 18 and 50 animals. Seed and silage corn

are grown in large quantities and production is increasing.

The Clark Township Plan designates agriculture as the land use for the site. ENL's proposal is not in conformity with this Plan. In the proposed Durham Regional Plan which will supersede the Clark Township Plan, the site is designated as a "special study area"; areas so designated require further examination before appropriate land uses can be determined. Agriculture is to remain the dominant land use in the vicinity of the site (permanent agricultural reserves and general agricultural areas in the Durham Official Plan). This is intended to encourage the continuation of agriculture and protect it from attrition through the encroachment of non-agricultural uses.

ENL, as a Federal Crown Corporation, is not subject to the statutory authority of the Planning Act of Ontario and therefore does not have to comply with the foregoing official plans. ENL has indicated its willingness, however, to negotiate with the province and municipalities in this regard.

These are the parameters within which the Panel considered the project. The three volume EIS provides more detail.

¹(defined as within an 8km radius of the proposed site)

3

Examination of the Project

3.1 GUIDELINES

Guidelines for the preparation of an environmental impact statement were issued by the Panel in June, 1976. According to those guidelines an EIS was to be prepared under the following headings: rationale for the project, consideration of alternative sites, project description, environmental data requirements, assessment of environmental impact and overview summary. The full guidelines appear in this report as Appendix V.

3.2 ENVIRONMENTAL IMPACT STATEMENT

The EIS was submitted by ENL to the Panel in June 1977 in three volumes as follows:

- Appendix I (Evaluation of potential sites for a new uranium refinery in Ontario) - a broad examination of some 15 sites;
- Appendix II (Comparison of four potential sites for a new uranium refinery in Ontario) - a more detailed examination of four sites;
- Environmental Impact Assessment, the Port Granby project - a comprehensive examination of the Port Granby site which was selected as the preferred site.

The main headings in the EIS were:

- Chapter 1: Project Perspective
- Chapter 2: Alternatives Considered
- Chapter 3: Project Description
- Chapter 4: Environmental Data
- Chapter 5: Environmental Impact of Radioactive Waste Management System
- Chapter 6: Community Factors
- Chapter 7: Guidelines and Abstract

The Panel began its review with this information.

3.3 PHASE ONE REVIEW -- IDENTIFICATION OF CONCERNS

Consistent with the objectives of the Phase 1 public hearings, the Panel identified:

- the data deficiencies in the EIS; and
- the extent of public concerns and, subsequently, the major issues that should be scheduled for detailed discussion in Phase 2.

During the hearings, 52 briefs were submitted to the Panel. These, in turn, stimulated a good deal of interest and discussion involving the public, technical experts and Panel numbers.

The greatest number of questions centred on the proposed waste management system. Among these were: its location on the proposed site; the system in relation to the existing waste facility; potential radiological danger from the site and its perpetual care; the effects of shore erosion.

Other issues of importance identified by both the public and the Panel included the potential adverse effects of an industrial intrusion on an agricultural area and the associated socio-economic impacts of such an intrusion.

Concern was also expressed by various participants about the effectiveness of current regulatory control over ENL, its record in Port Hope, and the adequacy of current monitoring programs.

3.4 DEFICIENCIES AND CLARIFICATIONS TO THE ENVIRONMENTAL IMPACT STATEMENT

The Phase 1 hearings, technical reviews of the EIS by federal and provincial agencies and the Panel review revealed the deficiencies in that document. The

Panel gave ENL a list of these and made them public in November 1977.

ENL's response contained additional information in the following areas: uranium supply and demand; alternative sites; plant process description, wastes and associated impact; plant emissions monitoring; environmental data; community factors; waste management systems and monitoring; and radiological impact of the plant and waste management process. Upon receiving this supplementary information, the Panel scheduled Phase 2 hearings.

3.5 PHASE TWO HEARINGS

The Phase 2 hearings permitted the Panel to hear all points of view, discussed in detail, especially where substantial differences existed in relation to the identified major issues. Arrangements were made by the Panel to have a number of technical experts available for the discussion of most major issues. A summary of the main points presented in relation to each issue discussed follows.

3.5.1 Need for the Refinery

ENL's justification of the need for the refinery was based on 3 factors: national policy, market opportunity and uranium supply.

ENL pointed out that the construction of a UF₆ refinery was consistent with established national policy with respect to uranium exports. This policy is intended to ensure first, that present and future domestic requirements are protected, and second, that whatever uranium is exported be processed to the "most advanced form possible in Canada", consist-

tent with the need to create jobs and improve the balance of payments. Opposition to this stand was based largely on the concern that such a policy was itself inconsistent with the more important question of world peace and security.

ENL's analysis of the world supply and demand situation indicated that there would be a "window" in the market in the 1980's and that if the new refinery was not "on stream" in time to take advantage of that "window", it could lose important long-term contracts to its competitors. Opposition to this analysis was based in part on increasing public concern about nuclear power programs in a number of industrialized countries. Opponents noted that there had been a slow down in construction schedules and, in some countries, sharply reduced estimates of the future size and growth rate of the nuclear power industry. ENL claimed that they had taken such factors into account.

The question of the energy required to manufacture UF₆ was also explored. It was concluded that the energy used to mine, mill and subsequently refine the uranium to UF₆ is less than the energy that will ultimately be obtained from the product, although the energy benefit does not directly accrue to Canada.

Concern was also expressed about the adequacy of Canada's uranium resources to meet both domestic and export markets. Some intervenors felt that an examination of the environmental impact of the refinery must also take account of the environmental impact associated with the uranium mining and milling operations. It was pointed out that unlike gas and oil for which there are relatively finite limits, uranium is a resource very widely distributed in nature and its

availability is really related less to the supply than to the price a buyer is willing to pay and by the feasibility of managing the waste left over. It was also emphasized that, even if the refinery were not to be built, uranium, in yellowcake form, would continue to be exported and, therefore, the environmental impact associated with the mining and milling would occur.

3.5.2 Site and Process Selection

ENL indicated that it wished to locate the waste management system and the refinery on a single site to reduce the costs and hazards of transporting waste material on public roads.

The site selection process was generally felt to be in accord with common practice, but there was an absence of information on the weighting system used and on the relative importance placed on use of agricultural land for industrial purposes. Also, there was criticism by intervenors that the late addition of Port Granby was an irregularity in the screening process.

In the five existing refineries in the western world, two processes are used to manufacture UF₆. Four manufacturers, including ENL at the Port Hope refinery, use a "wet" process. ENL indicated that they had studied the "dry" process (used by one company in the USA), but could not divulge details of this process under the terms of the study agreement.

ENL concluded that, with certain modifications to reflect past experience and the latest technology, the "wet" process currently used at Port Hope would be the most appropriate, taking into account the chemical characteristics of the feed-

stock (ammonium diuranate) and engineering and environmental factors.

In this respect, however, ENL did not provide process details, claiming that this was proprietary information; that the engineering design was still not complete; and that such information would be provided to the appropriate regulatory authorities in the form of a detailed safety report as required for licensing purposes by the Atomic Energy Control Board.

3.5.3 Waste Management

ENL's proposed waste management system was specifically designed as permanent disposal. In support of ENL proposal, reference was made to the fact that authorities have expressed a preference for the use of natural materials over man-made products, as a basis for the ultimate disposal of radioactive materials. During the Phase 2 hearings, AECB officials clearly indicated that the proposed system could only be regarded for licensing purposes as storage from which the waste would have to be retrieved within a time period of 30 to 50 years. The AECB position was determined by the fact that there are as yet no proven techniques for permanent disposal of radioactive wastes.

The wastes to be deposited in the waste management system would include products containing low-level radioactivity. They would also include chemical pollutants such as fluorides and arsenic which are likely to have a deleterious effect on the environment if they were to escape from the proposed storage area.

ENL's proposal involves the temporary storage of the solid process wastes in plastic sheath lined metal tote bins,

until a sufficient quantity accumulates to allow one complete burial operation to be performed. Burial would take place in specially prepared trenches in layers interleaved with compacted soil and finally covered with a bentonite-sand blanket, compacted and contoured to form an umbrella over the residue. The water table would be lowered and maintained at a level below the bottom of the trenches. According to ENL, this plan would virtually eliminate the possibility of the residue becoming saturated with water to the extent that contaminants might be leached into the ground water system and eventually into Lake Ontario. ENL's analysis also took into consideration factors such as bluff erosion, bentonite blanket penetration by roots and burrowing animals and hydrogeological data.

Opposition to ENL's proposal focussed on a number of factors, including the very limited data relating to the effectiveness of the bentonite blanket idea, uncertainty about the hydrogeological data, monitoring requirements, the need for a contingency plan in the event leaching was discovered, and the problem of retrievability that "storage" rather than disposal implies.

A number of intervenors recommended that the proposed system could only be considered as a storage method if a pilot project together with extensive monitoring was carried out to resolve the unknowns associated with the proposal. Under the concept of "storage", bluff erosion was not a matter of major concern.

The waste management proposal was one of the main issues throughout both Phases of the public hearings. This was in part attributable to widespread public apprehension about radioactive wastes

and, in part, to past problems encountered by ENL in managing wastes from the Port Hope refinery. The matter was further complicated by the requirement to suddenly change the classification of the proposal from "disposal" to "storage".

ENL indicated that if the waste management system was to be considered as storage, they would not likely plan to remove the existing Port Granby waste site to the new storage area, as originally proposed. They also indicated that alternative storage methods might be less costly and equally effective. ENL indicated that, should they propose an alternative storage system, they would agree to have public hearings to determine the acceptability of such alternative storage proposals.

3.5.4 Impact on Agriculture

In examining the impact of the project on agriculture, it became clear that there were three separate problems. The broadest problem was the potential impact that the project might have on agriculture in the region generally. Then there was the concern about the impact on the agricultural productivity of neighbouring farms. Finally there was the question of the continuing agricultural use of parts of the land within the buffer zone, with the concurrence of ENL and AECB.

ENL took the position that the land area concerned in their proposal represents less than 0.1% of the farm land available in the Regional Municipality of Durham and Northumberland county and that their proposal was consistent with the Ontario Government's growth policy for the region. Concern was also expressed with ENL's claim that, since all

emissions from the refinery and waste management site would be kept within established limits, there would be no impact on neighbouring farms. In fact, the emissions would be so controlled that ENL would not expect to have difficulty in getting permission to lease agricultural land within the buffer zone.

A more detailed examination of "growth" plans showed that while population growth would probably take place, it would occur in and around urban areas and not at the expense of the rural character and agricultural productivity of the area generally. ENL recognized that the proposed refinery would not only use prime agricultural land on the site but would also represent a trend towards industrialization of agricultural land.

Intervenors pointed out that the Port Granby site has greater potential agricultural productivity than similar land farther north as it has a longer growing season due to the warming effect of the lake.

Concern was also expressed with regard to the consequences of an "upset" condition in the refinery in terms of the speed with which neighbouring farmers would be alerted and what would happen if they could not market their produce.

Evidence was produced, based on the Port Hope refinery, that suggested the need to avoid certain crops in the direction of the prevailing winds out to and even beyond the buffer zone boundary.

The validity of continuing and long-term leases for agricultural land within the buffer zone was also questioned. In addition to the fear of spills, some of the reasons were that such a system would provide for no continuity of ownership and that lessor and lessee would be ■■■■■

luctant to maintain and improve the land.

3.5.5 Impact on Neighbouring Lands

Although there is clearly an overlap between this issue and that of agricultural impact, other aspects of the proposal were of direct interest to neighbouring land owners. These included the size and configuration of the buffer zone, the risks associated with possible contamination of water supplies, traffic patterns, lighting and noise.

ENL contended that there would be minimum impact on neighbouring lands, especially after construction was complete. They pointed out, supported by AECB, that the buffer zone size and configuration was not rigidly fixed - the 1000 metre radius was simply a guideline. In fact, ENL emphasized that emission controls would be designed to meet established limits at the plant fence, well within the buffer zone.

Some neighbouring property owners indicated they were not opposed to the refinery, provided that they could be guaranteed: (a) there would be no ill effects on their farms, or (b) that they would be compensated by enlargement of the buffer zone through purchase by ENL of their farms. Others in the immediate area totally opposed the project.

With respect to ground water movement the evidence produced tended to confirm ENL's analysis that contamination would flow towards the lake rather than towards neighbouring wells. Neighbouring land owners, however, displayed continuing concern on this subject. Some intervenors expressed concern over the effects of increased traffic, generated by the project, on rural roads near the site.

These roads are crossed by cattle and used by farm vehicles and machinery. Two other concerns were raised by intervenors - lighting and noise. ENL indicated that lighting would be kept to the minimum required for safety and security. Although there was limited noise data available, it did not seem to indicate levels greatly different from those associated with the railways running through the property.

There was an evident local lack of confidence in ENL based on the past experience with the current waste management facility.

3.5.6 Social and Community Impact

ENL's overall assessment was that the proposal was consistent with current planning policies, that the project would bring distinct benefits to the community and that adverse social and community impacts would be minimal.

ENL estimated the population growth and the requirements for housing and general services that would be necessary if the project were approved. These estimates included the construction period as well as the operational phase of the refinery, and also considered the combined effect of the ENL refinery and the Wesleyville and Darlington generating stations.

ENL indicated that a firm proposal had not yet been developed concerning traffic routing and that they were prepared to discuss this matter thoroughly with representatives of the appropriate administrations. It was pointed out that the Ontario Ministry of Transportation and Communications would not open a new highway 401 interchange to provide the

shortest route to the site.

While there was some support for ENL's position, the majority of intervenors contradicted ENL's contentions. Questions were raised concerning the predictions of labour force location and distribution. The view was expressed that some local areas simply did not have the capacity to absorb any significant number of workers and that the project would cause price increases for both rental and owner-occupied housing.

There were strong sentiments expressed by intervenors concerned with possible alteration of current rural life styles, character and quality of life in the area. While immediate neighbours would be most affected, similar concerns were expressed by the representatives of the Town of Newcastle and the adjacent Township of Hope. Considerable difficulty was foreseen in the mutual adjustment of the incoming population and local residents due to changes in life styles. Concern was also expressed over the impact of a possible "boom and bust" in the region.

While there was some support for the project, there were also many indications of public fear and anxiety associated with the nuclear industry. This was compounded by ENL's past record with respect to its management of the Port Hope refinery wastes and the radon problems found in the town of Port Hope. A number of concerns were raised about the apparently intimate relationship between ENL and AECB and the difficulties in obtaining monitoring information. These concerns were heightened by the revelation that hydrogen fluoride (HF) emissions at Port Hope have, on occasion, exceeded provincial standards. It was suggested that

certain fluoride sensitive crops should not be grown in certain parts of the buffer zone.

3.5.7 Monitoring and Control

ENL outlined their proposals in general terms since final decisions as to type and frequency of monitoring would be specified by regulatory authorities and related to specific manufacturing process information as provided in the safety report. ENL proposed to start a baseline monitoring program at the site in 1978 to assess contaminant levels in the air, water, biota and soil. ENL also plans an intensive monitoring program during plant commissioning followed by a more modest continuing program based on normal operating experience.

Part of the monitoring program responsibility would rest with ENL, the remainder with regulatory agencies such as the Provincial Departments of Labour and Environment. Since AECB has ultimate licensing responsibility for the facility, monitoring results would be submitted to the Board, which would then conduct audits to ensure that corrective action, if needed, was taken. ENL continually stated that it intended to design the project so that under normal operating conditions all regulatory guidelines and standards would be met. There would also be a contingency plan designed to cope with the worst possible upset conditions that could be foreseen.

Since the proposals were stated in conceptual terms, considerable discussion centred on actual evidence from the Port Hope refinery operations. Frequent reference was made to ENL's past record in waste management and to conflicting in-

formation concerning radiation monitoring results. Numerous intervenors complained that public access to monitoring data was generally subject to such bureaucratic buck-passing between ENL and AECB as to make it virtually inaccessible. Again the general fear of radioactivity was expressed, and a lack of understanding was evident concerning the significance of occasional results higher than prescribed standards.

In response, ENL noted that at the Port Hope refinery there were currently committees which permitted a management-union dialogue on plant working conditions and ensured compliance with AECB requirements. ENL accepted in principle a proposal to establish a new monitoring committee, with public representation, for the new refinery.

3.5.8 Air and Water Quality

Technical witnesses at the hearings generally supported ENL's position that there would be no significant effects on air or water quality from the refinery and no cumulative effects from the combined operations of ENL and the Ontario hydro plants at Darlington and Wesleyville. Hydrogen fluoride emissions, however, have exceeded limits on occasion at the Port Hope refinery. It was indicated that this would restrict the growing of certain crops in close proximity to the proposed plant.

Eldorado's plans include technological improvements to the new refinery to reduce the possibility of accidental emissions in excess of standards.

Some concern was expressed that Port Granby is in an air shed that brings pollutants from Toronto and as far away as

Chicago and Detroit. Any increase in air pollutants from local industrial activity would be compounded by this long range effect. On the other hand, air quality could be degraded through process upsets or accidents resulting in HF emissions, and these could be exacerbated if unusual atmosphere conditions existed at the time.

Some effects on water quality from the proposed waste management system could not be evaluated with certainty. However, with regard to the proposed refinery, water quality effluent controls were found to be generally acceptable.

3.5.9 Impact on Health

Most of this discussion focussed on the risks associated with radioactivity. ENL pointed out that unlike some of the other activities associated with the nuclear fuel cycle, its operations were only concerned with naturally occurring radioactivity, principally uranium, radium and decay products. According to ENL, handling procedures would ensure that the potential radiation exposure of either plant workers or the general public would be well within AECB-specified limits. Reference was made to the fact that all Canadians are exposed naturally to a background level of radiation, probably ranging between 100 and 200 mrem¹ per year. According to the International Commission on Radiological Protection (ICRP), members of the public in the vi-

cinity of a "radiation installation" should not receive, on the average, more than another 500 mrem per year. These standards are derived from a linear dose effect model which implies that there is some biological dosage associated with every incremental amount of radiation dosage no matter how small. Applying the ICRP principle known as the "as low as readily achievable" (ALARA), AECB has adopted 1% of the maximum permissible dose, i.e., 5 mrem per year, as the target figure for planning nuclear operations in Canada.

There was considerable debate over the effects of low level radiation on humans. Studies were reported which indicated that some researchers were discovering identifiable effects at doses much lower than ever previously documented. Pleas were made to use the most stringent standards possible. It was also suggested that an elaborate medical record linkage system needed to be established to be able to contribute, over time, to a better understanding of the dose-effect relationship.

Despite the assurances provided by ENL, there were concerns expressed about the health risk in the plant and surrounding community. With regard to plant workers, ENL pointed out that at Port Hope workers are required to pass a pre-employment medical examination and to submit to periodic examinations for uranium and fluoride exposure. Persons working in radiation areas are monitored

¹ A Rem (roentgen equivalent man) is a unit of measure for the dose of ionizing radiation that gives the same biological effect as one rad of 250 kvp. X-rays. One mrem is 1/1000 of a rem

continually and the plant is segregated into zones to maintain control of radioactive contamination. ENL plans to include a more comprehensive plan for the new refinery.

4

Panel Deliberations

4.1 INTRODUCTION

Through its deliberations following the Phase 2 hearings, the Panel concluded that there are five major issues surrounding the Port Granby proposal. These are discussed below.

With respect to the need for the refinery, the Panel concluded that ENL had made a strong case as to the existence of a "market window" to exploit. The precise timing of market opportunities, however, may be less certain than the ENL projections. While ENL's proposal is consistent with Canada's policy on uranium exports the Panel felt that the government should periodically re-examine this policy, particularly in the light of changing social, political and economic conditions in Canada and world-wide.

The Panel was satisfied that there is an adequate supply of uranium in Canada to meet both domestic requirements and exports as projected by ENL.

4.2 MAJOR ISSUES

4.2.1 Use of Agricultural Land

The Panel concluded that there is no compelling reason why this project should locate in an area which is now predominantly agricultural and which seems likely to remain so in the foreseeable future. Municipal, regional and provincial plans confirm agriculture as the priority use for the larger area of which the site is a part. The Province's development strategy, while promoting economic and population growth in this larger area, orients the growth to designated urban centres and their immediate surroundings. Locating the refinery at Port Granby,

therefore, would constitute a major industrial intrusion into an area substantially committed to agriculture.

On the site itself, Eldorado proposed that 127 ha (318 acres) would be leased for agricultural use. The Panel, however, doubts that this acreage would be so used over the long term. Perceived risks associated with the marketing of agricultural produce from an area so close to an uranium refinery could be one factor in deterring prospective lessees. Moreover, one accidental release of HF from the refinery (or even the suspicion of one) could have repercussions on the surrounding area of sufficient magnitude to seriously dissuade farmers further. Such a release also could result in AECB restricting agriculture on the site. Furthermore, from evidence elsewhere, there is considerable doubt that either the lessor or lessee would maintain the land to ensure maximum agricultural productivity, considering the foregoing and the added uncertainty of tenure.

The project would not simply remove a few acres of prime agricultural land. More significantly, it would establish a trend away from agriculture to industry, thereby endangering the future agricultural use and productivity of a much larger territory. Documented experience clearly demonstrates the vulnerability of agriculture to displacement by other uses, especially where it comes into conflict with industry, urban development and rural non-farm uses (hobby farmers, for example). It takes relatively little to discourage farm operations. The real culprit is the process of land fragmentation that occurs when agricultural land starts to be used for non-agricultural purposes, and when increased trading in

agricultural land raises its price to the point where farming becomes uneconomical. On a purely economic analysis basis, the loss of agricultural productivity of the land in question, over the lifetime of the refinery (and perhaps considerably longer), may well be comparable with the marginal costs of locating and operating the refinery on non-agricultural land.

Industrial activity on the ENL site could lead the Regional Municipality, in its "special study", to conclude that industrial zoning was inevitable for the area. Further industrial pressure could result in the extension of this zone, especially if adjoining lands became less attractive for agriculture. The agricultural community, then, could well disintegrate.

The risk of this occurring seems considerable and unnecessary to incur. Information presented at the hearings indicated no pressing need to locate the refinery on agricultural land. In fact, alternative sites either on non-agricultural land, or on significantly less productive agricultural land, were judged by ENL's consultants to be acceptable. Similarly, the refinery serves no specific local need as its production is solely for export.

The Panel concluded, therefore, that the potential loss of high quality agricultural land would be unnecessary, and even reckless, particularly in light of the growing concern by the Canadian and Ontario governments over this issue. Ontario is already a net importer of food, and this trend will continue. Additionally, locating the project on non-agricultural land would have the advantage of contributing economic benefits to Canada while preserving the agricultural

base and rural character of Port Granby.

Finally, the Panel felt that a federal agency using prime agricultural land for industrial purposes would set a poor example, especially when other options exist.

4.2.2 Waste Management

With respect to ENL's waste management proposal, the Panel decided to evaluate only its adequacy as a storage facility. This was acceptable to ENL and consistent with the position announced by the Atomic Energy Control Board. In fact, ENL indicated that it would want to review carefully its waste management proposal to see if alternative techniques might be available which would meet "storage" requirements more economically. The Panel noted ENL's commitment to submit any significantly different waste management proposal to a public hearing. This could take place under the aegis of the Atomic Energy Control Board.

The problems associated with the uncertainty of predicting bluff erosion and long-term seepage of contaminants into underground water systems become relatively less important when viewed over a time-span of 30-50 years instead of the thousands of years originally envisaged.

Nevertheless, even as a storage system, there remain a large number of unknowns that affect the acceptability of the proposal. Bentonite clay has been known as a sealant for at least ten years but has never been used routinely as a waterproof blanket anywhere in the world. It has been a successful sealant under municipal land fill sites, but it has only been used in this way for a few years. Scientific data on its use is sparse and

pilot experiments have not been carried out. Eldorado proposed to modify the bentonite with the addition of sand. This mixture, it was indicated, would be a better sealant. No long-term test results are available to confirm this.

Eldorado proposed to protect the integrity of the bentonite blanket with an overlay of 1.7 metres of fill to reduce the risk of penetration by roots and by burrowing animals. There was no evidence that this would ensure the integrity of the blanket. Furthermore, the effects of freak weather situations such as prolonged drought, freezing, or wet conditions cannot be determined without extensive field testing. It was indicated by ENL that, eventually, the bentonite blanket probably would break down, but that any resultant escape of pollutants would be insignificant.

The area's complex hydrogeology casts further doubt on the validity of the waste management proposal. Preliminary data collected by ENL's consultants confirmed that the hydrogeology of the area is complex and that more complete information would require detailed and expensive studies. The proposal to lower the water table at the waste site appears feasible, but routine monitoring would be required to ensure that the procedure was working properly. In the event of seepage of pollutants into the groundwater, the flow appears to be generally toward the Lake, rather than toward neighbouring lands.

The Panel felt strongly that an acceptable storage method would necessarily involve continuing accountability by means of comprehensive input records, detailed monitoring, and the development of both contingency and retrieval plans. As

no method of permanent disposal is yet known or in use, accurate records and identification of wastes are essential for any retrieval operation. The Panel does not believe, however, that mixed wastes can be satisfactorily buried in trenches for subsequent retrieval and further processing.

The Panel felt that if ENL had earlier received and accepted the AECB position on the classification of the proposed waste management facility as storage, ENL probably would have proposed an entirely different system.

AECB indicated that the new proposal could only be regarded as storage. ENL, for that reason, noted that there would be little point in moving the existing waste from its current storage site to another storage site. Consequently, the Panel, in its deliberations, considered the proposed waste management system separately from the existing waste management facility at Port Granby.

4.2.3 Social Concerns

The Panel reviewed the many potential social and community effects of the project identified during the hearings and noted that there were three main groupings: the public's perception of the nuclear industry, their perception of ENL's past performance, and the possible effects on the existing quality of life in the area surrounding the project.

A significant portion of the local public apparently regards the nuclear industry with fear and suspicion. This feeling appears to be compounded by the perception that the regulatory agencies are "captive" of the nuclear industry and that, together, they conspire to deny the

public access to data which could be used to reveal unacceptable situations. In addition, problems arising from Eldorado's Port Hope operations have fueled peoples' concern that ENL's operations are unhealthy and that problems will continue to occur with this industry. "Actions of the past speak louder than promises for the future."

Difficulties have arisen with waste management at existing storage sites in the area, which led to polluted streams and the death of cattle. Fill from past Port Hope refinery operations, used around buildings in the town, caused excessive radon gas buildup. These problems have been transposed into concerns about the Port Granby proposal.

Potential adverse changes to the existing quality of life, attributable to the proposal also concerned the Panel. This concern would have been less if community and regional planning called for such changes in any event. As this does not appear to be the intent of the municipal and provincial authorities, the Panel gave close attention to studies of community/social impact and the views of local people and their representatives in this regard.

While the Panel accepted ENL's difficulties associated with attempts to reliably predict traffic patterns, it felt that more could have been done to determine this before the hearings opened. There were also concerns expressed about the pressures for change in existing rural lifestyle, as well as the impact on surrounding communities in terms of pressure for housing and municipal services that would be needed to support the work-force for plant construction and operation.

Opinions of those living outside the area immediately affected by the project were somewhat more favourable to the proposal.

4.2.4 HF Emissions

After examining possible effects of the refinery on the surrounding area, the Panel concluded that a major problem could exist with HF emissions. ENL indicated that it would install new equipment to ensure that normal discharges would be well below prescribed limits and that accidental emissions would be unlikely to occur. HF would be closely monitored both within the plant, by ENL, and in the area, by the Ontario Ministry of the Environment.

In relation to public fears and perceptions of the industry, however, an accidental release of HF, or even the first hint of such a release, would create problems. Crops in the buffer zone would be suspected of contamination as would those in the immediate area. A long and costly effort would be required to prove or disprove the extent and effects of an accidental release on neighbouring agricultural activities. In addition, the possibility exists for HF fumigations to occur at distances up to 60 to 100 km downwind from the proposed site.

Despite the best efforts of Eldorado, it is not possible to guarantee that there would be no accidental release of HF. Problems with HF and its effect on agriculture are known to have developed elsewhere and there appears to be no need to run these risks in the agricultural area proposed for the refinery, when alternative sites on non-agricultural land are available.

4.2.5 Monitoring

In its consideration of the monitoring requirements for the project, the Panel agreed that there were several distinct phases which had to be considered: baseline monitoring, intensive monitoring at the commissioning stage, normal operational monitoring, contingency monitoring in the event of upsets, and residual monitoring on decommissioning. In the view of the Panel, it was unrealistic to expect ENL to provide more details than it possessed at this stage of the plant design. The Panel was, however, concerned about the extent to which the public would be involved when detailed proposals are submitted as part of the AECB licensing procedure. The Panel recognized that there is a legitimate question of proprietary rights with respect to the manufacturing process and that this is intimately tied up with the estimates of emission discharges. Nevertheless, the Panel feels that some method must be found to conduct a public review of the detailed monitoring proposals without compromising legitimate proprietary rights.

Despite the claims by ENL, and by the nuclear industry generally, that nuclear energy is and should be treated like any other industry, it is apparent that there is still widespread apprehension in the public's mind. The Panel feels that one way to help overcome this is to create a much more open communications process. For example, a public review of the detailed monitoring proposals would be one step in the right direction.

Another step would be a more conscientious attempt to provide a readable but authoritative description of how radiation and radioactivity standards are developed

and what the significance is of occasional findings which exceed such standards.

The Panel was disturbed, however, by the apparent reluctance of ENL and AECB to publish monitoring results. The Panel believes that ENL now recognizes this problem. As a means of making monitoring data available and reassuring the public as to the safety of the plant and waste management facility, Eldorado agreed to consider the establishment of a monitoring committee. This idea, presented at the hearings, might be elaborated into a committee with representation from the main parties concerned: ENL, AECB, elected local officials, labour, and the local public. Such a committee, for which there is some precedent elsewhere, would receive and disseminate monitoring data, assist in its interpretation, and provide feedback on corrective measures taken.

The Panel is confident that the combination of a public review of the monitoring proposals at the licensing stage, the publication of the description of the standards-setting process, and public participation in the proposed ENL Monitoring committee, would go a long way to improving public confidence in ENL's operations.

5

Conclusions

5.1 INTRODUCTION

Although the project was submitted as one consolidated proposal (refinery plus waste management site), the Panel, in arriving at its conclusions, considered the components separately, prior to reaching a decision on the project as a whole. The components of the proposal are:

1. refinery and plant process;
2. waste management system, and
3. site of refinery and waste management facility.

This analysis led to the overall recommendation that this project not be allowed to proceed at the Port Granby, Ontario location.

5.2 RATIONALE FOR RECOMMENDATIONS

5.2.1 Refinery and Plant Process

Conclusion: The refinery and plant process are acceptable if certain conditions are met and provided an acceptable site can be found.

Reasons:

- (a) A refinery of this nature would yield a positive economic benefit to Canada.
- (b) Eldorado's proposal is consistent with Canada's current policy that whatever uranium is exported be processed to the most advanced form possible in Canada.
- (c) On the basis of the information supplied, which was examined at the public hearings, the Panel does not disagree with ENL's predictions that indicate a significant future export market for UF₆.

- (d) There appears to be an adequate uranium supply in this country both for Canada's own needs and for export.
- (e) The Panel accepted ENL's statements concerning the preferred manufacturing process.
- (f) The Panel believes that ENL's detailed Safety Report, required by AECB, would have to substantiate its claims concerning discharge limits and operating procedure.
- (g) The levels of radioactivity involved in the plant process are expected to be very low, as are the public and worker risks associated with radioactivity and radiation exposure.

Recommended Conditions:

- (a) Provision should be made by AECB for a public review of the non-proprietary information contained in the Safety Report required prior to licensing.
- (b) Comprehensive baseline monitoring should be conducted prior to such a plant going on-stream. A more extensive monitoring program should be conducted during start-up, followed by normal or routine monitoring during plant operations. A monitoring program for contingencies and a plan for decommissioning monitoring should also be made known. Monitoring programs should include social and community data on such matters as the ongoing effects of the refinery operation on the neighbouring community, requirements for public services and facilities, and associated municipal costs.
- (c) A joint ENL - public monitoring committee with representatives from the

key parties concerned, should be established prior to the start up of monitoring programs as defined in (b) to ensure that data from such monitoring programs is made public on a regular basis, and in a form that is readily understandable and interpretable.

- (d) A comprehensive employee health monitoring system should be introduced and should include provision for post-employment follow-up to aid in the detection of any future health trends. Ultimately, such records should be linked to a country-wide medical records system which includes information on occupational and environmental exposure conditions.
- (e) Well-publicised contingency plans for workers and the public should be produced by ENL. Trial runs should be conducted on a regular basis.
- (f) ENL should produce explicit plans for plant decommissioning as part of its licensing applications.
- (g) Research should be conducted by ENL into the separation and recovery of uranium, thorium and radium from process raffinate to reduce the volume and hazards of waste management products.
- (h) Federal and provincial agency responsibilities for monitoring and enforcement should be clarified.
- (i) Buffer or exclusion zone guidelines/standards for such refineries should be developed by AECB.
- (j) Random, on-site plant inspections by AECB and other regulatory agencies should be carried out.

5.2.2 Waste Management System

Conclusion: As a means of temporary storage (30 to 50 years) the proposed system is unsuitable because of unknown reliability and costs, engineering difficulties and the need to retrieve the stored material.

Reasons:

- (a) Ease of retrievability is crucial in a storage system. This, in turn, implies comprehensive records and detailed monitoring. The proposed burial system does not lend itself to the retrieval of high volume, low level contaminated wastes which may require further processing. The costs of such an operation are especially difficult to quantify but are expected to be unnecessarily high.
- (b) The proposed waste management system has never been used elsewhere for the purpose proposed by Eldorado and little experimentation has been done.
- (c) The hydrogeology of the site is complex and difficult to determine with certainty. Such a situation does not lend itself with ease to a safe waste management system using an untested bentonite blanket proposal.
- (d) Due to the above difficulties the proposed system would not be readily transferable to any other proposed site.

With regard to any other waste management system proposed by ENL, the conditions the Panel would apply include:

- (a) That ENL agrees to hold public hearings.

- (b) That a continuous, comprehensive monitoring program be installed.
- (c) That any untried system that is proposed should be subject to trial periods and adequate experimentation prior to acceptance and operational use.

5.2.3 Refinery Location

Conclusion: the proposed Port Granby location for the refinery is not acceptable and, in the absence of the refinery the site should not be used solely for any new waste management facility.

Reasons:

- (a) The refinery would have an overall negative impact on the local area. While the refinery would produce an overall positive economic benefit to Canada, these benefits would not accrue to the local area. There is no compelling need to locate the refinery in this area or, in fact, on agricultural land.
- (b) The local area has high, long term potential as an agricultural area. The lakeshore belt in which the site is located has a longer growing season than equivalent land only a few miles to the north because of the moderating effect of the lake.
- (c) The proposal represents an intrusion into an area where the present and future character will be rural and favour agriculture. In fact, the proposal does not conform to the regional plan and is in conflict with the provincial policy for agricultural lands of this quality and location.

- (d) The proposal would represent another incremental reduction in Ontario's viable agricultural base, and at a time when projections already show an increasing requirement to import food.
- (e) There is considerable uncertainty about the continued utilization of land within the buffer zone for agricultural purposes.
- (f) Constraints placed upon the types of agricultural crops that can be grown due to the potential release of HF emissions increase the level of public concern about the proposal.
- (g) Once initiated, a trend away from agriculture is like a chain reaction with consequential effects on land costs, lifestyles and the general rural character of the area.
- (h) A federal agency should not be seen as contributing to the development of such a trend.

With regard to any other locations proposed by ENL for such a project conditions the panel would recommend include:

- (a) That agricultural land not be used unless there are exceptionally compelling reasons to the contrary.
- (b) In the ENL proposal the social and community impacts on the local area were not covered adequately. Any new proposal should include a more comprehensive analysis of the anticipated impacts on the local community and evidence that its concerns have been taken into account.
- (c) Any new proposal should be consistent with regional and provincial planning policies as well as with guidelines issued by regulatory agencies.

- (d) The Panel feels a better site would be an existing industrial area or an industrial park on land unsuited to agriculture.

6

Supplementary **Recommendations-** Conclusions

The following additional conclusions and recommendations were reached by the Panel.

6.1 THE ELDORADO PROPOSAL

6.1.1 AECB should issue guidelines for site selection to those industries it licences.

6.1.2 AECB should also issue guidelines for storage of low-level radioactive wastes, as it is difficult for a company to design a waste storage system without such guidelines.

6.1.3 AECB should clarify the roles and responsibilities within the nuclear industry in designing acceptable storage and disposal systems, particularly with regard to care and security of stored waste after an associated nuclear facility is decommissioned.

6.1.4 The existing waste management site at Port Granby should be removed at some future time.

6.2 THE ENVIRONMENTAL ASSESSMENT REVIEW PROCESS

6.2.1 In order to avoid potential conflicts of interest, or the perception by the public of such conflict, neither the proponent, nor representatives of regulatory agencies which have a close relationship to the proponent, should serve as members of Environmental Assessment Panels.

6.2.2 For any project which proceeds and which may have social and environmental impact, coordinated follow-up studies

should be conducted by the proponent, all levels of government, and the regulatory agency to assess the actual impact and recommend mitigative measures, as well as to serve as a guide for future projects.

6.2.3 The Federal Environmental Assessment Review Office should evaluate the usefulness of the Panel's recommendations and the degree to which they are accepted and implemented.

6.2.4 The Panel members each spent over forty man-days on this project. There is concern that the selection of future Panel members will be difficult because of time requirements and the fact that all Panel members have regular jobs that must also receive attention. A process of secondment of Panel members is recommended.

6.2.5 Staff of government agencies act as advisors to the proponent, reviewers of the EIS and technical witnesses. These roles can cause confusion, and some suspicion in the minds of the public. In addition, time and resources required to carry out these roles place an added strain on already limited budgets and manpower. Government agencies should therefore clarify their roles with respect to their involvement in the EAR process.

6.2.6 It is recommended that all future Panels include members who are not public servants.

6.3 FUNDING

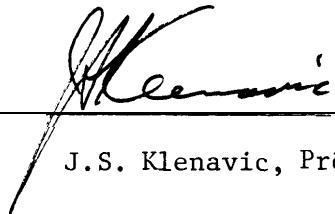
Despite good intentions and much hard work by individuals and interest groups

during the two phases of the hearings, the effectiveness of their participation was inhibited by a lack of financial means to do the job. This was particularly true of those persons and groups at the local and regional level - those most likely to be affected by the project.

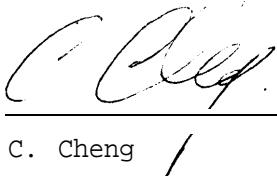
The Panel, therefore, recommends that a proposal be drafted by the Federal Environmental Assessment Review Office to provide funding and other assistance for the public participating in Panel reviews. Such a proposal should define which groups and individuals should be eligible for funding, the most suitable method(s) by which funding can be made available, rationale for such recommendations and the criteria for allocating and auditing such funds.

The objectives of such a proposal should be to:

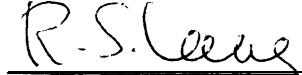
- a> Ensure that interested parties in Panel reviews can competently present their ideas and opinions to panels.
- b) Enable those parties who would not otherwise have adequate resources at their disposal to:
 - i) organize themselves to effectively present their viewpoints;
 - ii) discuss their views with Panels, proponents, and technical experts at the level of expertise normally required in such environmental assessments and reviews.


J.S. Klenavic, Président - Chairman

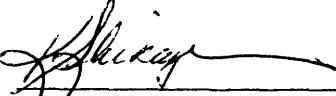

P.M. Bird


C. Cheng /


E. Derow


R.S. Lang


D.P. Scott


K. Shikaze

7

Appendices

Mr. Adair
Canadian Environmental Law Association
Professor D. Andrews
University of Toronto
Marjorie Ashby
Chris Beatty
Gwen Best
Dorothy Boden
Durham Field Naturalists
J. Boersma
B. Boisvert
Bill Borger
People Against Nuclear Development
Anywhere
Dennis Brown
Province of Ontario
Professor Cyril Carter
Trent University
Victoria Clark
D. Cleveland
Ian Connerty
Canadian Coalition for Nuclear
Responsibility
M. Dennis
Robert Dykstra
Shirly Eames
Port Hope Chamber of Commerce
Donna Elliott
P. Falkowski
United Steel Workers of America
(Toronto)
Q. Fletcher
Dr. M. Foster
Member of Parliament for Algoma
Mr. Fry
Mr. Gallagher
J. Gimblett
Gary Glover
Canadian Coalition for Nuclear
Responsibility
J. Goering
Jeff Gold
Save the Environment from Atomic

Pollution
Carl Grant
Counsel for Eldorado Nuclear Limited
Peter Hanaam
Ontario Federation of Agriculture
Joan Hayes
Dr. Henry
University of Toronto
B. Hill
Mr. E. Hoad
Mrs. E. Hoad
I. Hornby
Anna Hughes
Douglas Humphrey
Barbara Humphrey
R. James
Jacob Kordas
Marie Kordas
B. Laird
Counsel for some landowners
Pat Lawson
Elizabeth Leventhal
Dr. Linzon
Province of Ontario
Henry Lise
Warren Lowes
Tony McQuail
Canadian Coalition for Nuclear
Responsibility
Mr. Mann
Township of Hope
Paul Miller
Margaret Myer
Dora Nichols
Professor R. Paehlke
Trent University
Bill Panta
B. Parsons
Roger Paul
Counsel for Save the Environment from
Atomic Pollution
Garfield Payne
Bill Peden

Elizabeth Pereira
Michael Phillips
J.P. Piasetzki
H. Poch
Counsel for the Town of Newcastle
Moncton Pollution Probe
Regional Municipality of Durham
Mr. Remington
Province of Ontario
Carl Rose
Dennis Sadler
Douglas Saunders
Beverley Thorpe
Province of Ontario
Rosemary Tisnovsky
Township of Hope
John Veldhuis
Save the Environment from Atomic
Pollution
G. Wareham
United Steel Workers of America
(Oshawa)
E. Webster
Durham Federation of Agriculture
J. Weibe
Trent University
D. Welsh
John Willms
Counsel for the Town of Newcastle
Professor Horst Wittman
Scarborough College
Michael Wladyka
Mayor of Port Hope
Joan Woods
Roger Yates

On behalf of the Environmental Assessment Panel:

Dr. R. Bertell	Roswell Park Memorial Institute
Dr. David Brooks	Energy Probe
Mr. R. Carleton	Consulting Engineer
Dr. Denhartog	Atmospheric Environment Service (DFE)
Mr. R. Durham	Department of Fisheries and the Environment
Dr. Millan	Atmospheric Environment Service (DFE)
Dr. S. Singh	
Dr. Skinner	Energy, Mines and Resources
Dr. Howieson	Energy, Mines and Resources
Dr. F.A. Prantl	Bureau of Radiation Protection, NHW
Dr. John Weibe	Department of Fisheries and the Environment
Miss Joan Hayes	Middleton and Associates
Mr. J. Didyk	Atomic Energy Control Board
Dr. E. Mueller	Fisheries and Environment
Mr. G. Grizak	Fisheries and Environment

On behalf of Eldorado Nuclear Limited

Mr. R. Dakers	Vice President, Eldorado Nuclear Limited
Mr. G. Colborne	Eldorado Nuclear Limited, Port Hope
Mr. S. Frost	Eldorado Nuclear Limited
Dr. D. Chambers	Consultant
Dr. Nunan	Consultant

CHAIRMAN

JOHN KLENAVIC, (Federal Environmental Assessment Review Office, Department of Fisheries and the Environment).

Mr. Klenavic was born in St. Catharines, Ontario and attended schools in Ontario, British Columbia and Manitoba. He graduated from the Royal Military College, Kingston, and Queen's University with a degree in Chemical Engineering (B.Sc.).

He served in the Canadian and British Armies from 1960 to 1968 and subsequently worked as an industrial engineer and quality control chemist in the food processing industry in Toronto. In 1973 he was appointed Acting Director of the Environmental Emergency Branch, Environmental Protection Service of the Federal Department of the Environment. This Branch is concerned with the prevention of, and response to, spills of pollutants into the environment.

Mr. Klenavic was appointed to his present position of Director, Operations, Federal Environmental Assessment Review Office in mid-1977 and is currently chairman of fifteen Environmental Assessment Panels.

Mr. Klenavic is a member of the Association of Professional Engineers of Ontario.

MEMBERS

PETER M. BIRD, Liaison and Coordination Directorate, Department of Fisheries and the Environment.

After graduation from Queen's University, Kingston (B.Sc. Engineering Physics, 1949, M.Sc. Nuclear Physics, 1950)

he joined the Department of National Health and Welfare to help establish and develop its radiation protection program. He was granted educational leave (1954-57) to obtain his Ph.D. from the Department of Medical Physics at Leeds University, England. He was appointed Chief, Radiation Protection Division in 1961, Director, Environmental Health in 1968, and Senior Assistant Deputy Minister (Health) in 1971. He had a sabbatical year at the National Defence College of Canada (1972-73), and was appointed Director, International Programs Branch, Fisheries and Environment Canada in September 1973, and Director General, Liaison and Coordination Directorate in February 1976. He has served as a member of the World Health Organization's Expert Panel on Radiation and has acted as an advisor to the World Health Organization at meetings in Vienna, Rome and Singapore. He now serves as a member of the World Health Organization's Expert Panel on Environmental Health.

His work assignments have included the development of a national film-badge personal radiation monitoring system, the design and installation of a high sensitivity "whole body" counter for the direct measurement of radioactivity in human beings, the development of the national radioactive fallout monitoring program, and leadership in the preparation of the Radiation Emitting Devices Act and the Clean Air Act. He is particularly interested in the development of techniques to contribute to the rationality of decision-making.

He has assisted in the preparations for and participated at the United Nations Conference on the Human Environment in Stockholm, June 1972. He has also

participated in and frequently led Canadian delegations to meetings of the Senior Advisers to ECE Governments on Environmental Problems, the Governing Council of the United Nations Environment Programme, the International Coordinating Council for the Unesco Programme on Man and the Biosphere, and the OECD Environment Committee.

He has published a number of papers and prepared internal reports on a wide range of radiation and environmental matters.

CLEMENT W. CHENG, Canada Centre for Inland Waters, Department of Fisheries and the Environment.

Clement W. Cheng graduated with a B.Sc. degree in Civil Engineering and subsequently completed two masters degree programs specializing in the areas of hydrology, limnology, and coastal and sanitary engineering. He has worked in the field of engineer consulting prior to his present position as environmental and water quality engineer with the Department of Fisheries and Environment. His work experience covers a wide range of activities in several disciplinary areas. He has undertaken engineering designs and studies in various aspects of environmental protection including waste dispersion in water bodies, thermal pollution control, water quality surveillance, water and wastewater treatment, and shoreline protection. He has considerable experience in conducting environmental assessment of proposed projects related to coastal and power developments and in reviewing environmental assessment reports prepared by the project proponents of these developments. He is responsible

for the management and coordination of several multi-disciplinary and multi-agency projects and programs in Ontario.

ELLAN O. DEROW, Department of Sociology, McMaster University.

Professor Derow is an instructor in sociology at McMaster University. She teaches urban and environmental sociology, the sociology of the family and sociological research methods. In 1976 she conducted research on methodological aspects of social and economic aspects of Environmental Impact Assessment under the sponsorship of the Ontario Ministry of the Environment. This project culminated in the report, "Social Components of Environmental Impact Assessment".

Currently Professor Derow is conducting research on the impact of governmental assistance in neighbourhood improvement schemes, varieties of public participation in Environmental Impact Assessment and reconstruction of population profiles. Professor Derow completed her Ph.D. at the University of Toronto in 1978. Her dissertation was on the impact of female employment on time budgets and use of urban environment of 584 Toronto families.

Recently she has helped prepare a feasibility study for a multi-service centre in the Kirkdale-Strathcona area of Hamilton. She is a member of the Canadian Sociological and Anthropological Association, Environmental Section of the American Sociological Association, International Sociological Association, Canadian Futures Society and International Society for Technological Assessment.

REG LANG, Faculty of Environmental Studies, York University.

Reg Lang, since July 1971, has been an Associate Professor in Environmental Studies at York University where he teaches urban-regional and environmental planning, environmental assessment and related subjects. He has extensive experience as a professional planner, engineer, administrator and consultant at all three government levels in various parts of Canada. From 1965 to 1971, he was Director of Community Planning, Nova Scotia Department of Municipal Affairs, in charge of a 20-25 person multidisciplinary planning group active throughout the province. Before that, he worked as a planner for Central Mortgage and Housing Corporation in Halifax and Ottawa, and as a sewer and water design and construction engineer with the City of Regina Engineer's Department. As a consultant, his recent clients have included Fisheries and Environment Canada (Environmental Assessment Panel), the Royal Commission on Electric Power Planning, the Town of Oakville, the Ontario Planning Act Review Committee and the Regina Rail Relocation Project; he is also active as a voluntary advisor to community groups. His current research activities focus on a major study of environmental planning.

DAVID SCOTT, Fisheries and Marine Service, Department of Fisheries and the Environment.

Doctor Scott graduated from the University of British Columbia with a doctorate in zoology in 1955. Before joining the Department of Fisheries and

the Environment, he worked as an assistant biologist for the Québec Department of Maritime Fisheries and later as an assistant fisheries biologist for the British Columbia Game Commission.

From 1956 to 1964 Dr. Scott was an associate scientist with the Fisheries Research Board of Canada. He later became a senior scientist with the Board before becoming a research scientist with the Fisheries and Marine Service in 1970.

Dr. Scott is a working member on the Federal-Provincial Task Force on Strategic Planning for Ontario Fisheries and has been a senior referee for the Journal of the Fisheries Research Board of Canada since 1966. He is also an associate editor for ichthyology with The Canadian Field-Naturalist.

KIM SHIKAZE, Environmental Protection Service, Department of Fisheries and the Environment.

Mr. Shikaze was born in British Columbia, but grew up in Southwestern Ontario where he attended high school in Learnington. Mr. Shikaze graduated from the University of Toronto with a Degree in Chemical Engineering in 1959 and obtained a Masters Degree in Sanitary Engineering in 1961.

From 1959 to 1971 he was employed with the Ontario Water Resources Commission (now Ministry of the Environment) involved initially in the Research Branch in the evaluation of pollution control equipment and processes and then in the Industrial Waste Branch involved in many facets of industrial pollution control.

In November 1971, he joined the Federal Department of the Environment, Environmental Protection Service in Ottawa.

In January 1974 he transferred to the Department's Ontario Regional Office when it was established and is currently the Director of the Environmental Control Branch in the regional office having a responsibility for all facets of the federal environmental control programs in Ontario.

Documentation submitted to the Panel

Agreement between Ontario Hydro and Corporation of the Town of Newcastle. 3 March, 1977.

Annual Report 1976-77. Atomic Energy Control Board, Ottawa, 1977.

Bentonite as a protective cover for buried radioactive waste. R.H. Hawkins, J.H. Horton, Vol. 13, Health Physics, P. 287-292, Pergamon Press, 1967.

Brief to the Honourable William Newman, Ontario Minister of Agriculture and Food on the document "Planning for Agriculture - Foodland guidelines". Ontario Federation of Agriculture, December, 1977.

Canada-Ontario Accord For the Protection and Enhancement of Environmental Quality.

Causes of Death in Port Hope Residents, 1960-1973.

Collective Bargaining Agreement between Eldorado Nuclear Ltd., Port Hope, Ontario and Local 13173, United Steelworkers of America for period Oct. 1 1976 - Mar. 31, 1978.

Community Impact Study - Darlington Generating Station. James F. MacLaren Ltd. December, 1976. Commissioned by Ontario Hydro.

Community Impact Study - Wesleyville Generating Station, April, 1977. James F. MacLaren Ltd. Commissioned by Ontario Hydro.

The Conduct of Hearings by Federal Admin-

istrative Agencies, June, 1976. The Law Society of Upper Canada.

The Construction Safety Act, 1973. Chapter 47 and Ontario Regulation 419/73.

Eldorado Nuclear Ltd., Annual Report 1976.

An Energy Strategy for Canada: Policies for Self Reliance. Energy, Mines and Resources Canada, Energy Policy Sector, Ottawa, 1976.

The Environmental Assessment Act 1975 (Bill 14). Queens Printer for Ontario, 1975.

The Environmental Protection Act, 1971, Government of Ontario, Chapter 86 and Regulation 15, Ontario Regulation 872/74.

Evaluation of a Potential Site for a New Uranium Refinery Near Spragge, Ontario. Prepared by James F. MacLaren Limited for the Department of Regional Economic Expansion, August, 1976.

Genetic damage from diagnostic radiation. J. Am. Med. Assn. Vol. 237, No. 22, 2399-2401. I. Bross, N. Natarajan.

Green paper on Planning for Agriculture; Foodland guidelines. Prepared by the Ontario Ministry of Agriculture and Food, 1977.

A Guide for Hearings under the Ontario Water Resources Act 1970 and the Environmental Protection Act 1971. Environmental Assessment Board October, 1976, Province of Ontario.

Guidelines and Criteria for Water Quality Management in Ontario. Ontario Ministry of the Environment.

Half Life - Nuclear Power and Future Society. A Research Report prepared under the direction of the Ontario Coalition for Nuclear Responsibility, August, 1977.

The Health Hazards of not Going Nuclear. P. Beckman, Golem Press, Boulder, Colorado. 1976.

Letter and attachment from Professor C. Carter, Trent University, to Mr. J. Klenavic, Chairman, Eldorado Nuclear Environmental Assessment Panel on the subject of uranium demand. February 6, 1978.

Letter and attachment from R.E. Dakers, Vice President, Eldorado Nuclear Ltd., to Mr. J. Klenavic, Chairman, Eldorado Nuclear Environmental Assessment Panel on the subject of uranium demand. February 8, 1978. Attachment is from report entitled: The Worldwide UF₆ Industry; Analysis and discussion of potential problems, November, 1977. Nuclear Assurance Corporation, 1977 NAC T-7706.

Letter from R.G. Dakers, Vice President, Eldorado Nuclear Ltd., on the subject of uranium demand. February 10, 1978.

Letter from Counsel for Eldorado Nuclear Ltd., to lawyer for Township of Hope re agreements between Eldorado and the Township. January 31, 1978.

Letter from K. Morgan to J. Schlesinger, May 25, 1977 re research on effects of low level radiation.

Manual of Practice on Administrative Law and Procedures in Ontario. Prepared by D.W. Mundell, Q.C.

Nuclear Power and the Environment, Royal Commission on Environmental Pollution: Sixth Report, Chairman, Sir Brian Flowers, London, H.M.S.O. Cmmd. 6618, 1976.

Nuclear Power, Issue 15, United Church of Canada, 1977.

The Ontario Water Resources Act, Chapter 332 and Ontario Regulation 54/76, March, 1977.

Proposal for Darlington Generating Station, Ontario Hydro, November, 1976.

Proposal for Wesleyville Generating Station, Ontario Hydro, March, 1974.

Proceedings of a congressional seminar on low level ionizing radiation. A report transmitted by the Subcommittee on Energy and the Environment of the Committee on Interior and Insular Affairs of the U.S. House of Representatives, 94th Congress, Second Session, November, 1976.

Public Attitude Survey, January, 1977. Prepared for Eldorado Nuclear Ltd. by International Surveys Limited. A report on study methodology.

The Public Inquiries Act, 1971, Province of Ontario.

Radiation exposures of Hanford Workers dying from cancer and other causes. T. Moncuso, A. Stewart, G. Kneale. Health Physics, Vol. 33, No. 5, pp. 369-384, Pergamon Press, 1977.

Radon daughter cancer in man: factors in exposure - response relationships. V. Archer, E. Radford, O. Axelson. Unpublished manuscript p. 29, submitted to Radiation Research 1977-78.

The Silent Bomb. Edited by P. Faulkner, Vintage Books, Friends of the Earth International. 1977.

X-Ray exposure and premature ageing. R. Bertell. Journal of Surgical Oncology 9: 379-391 (1977).

Eldorado Environmental Impact Statement. 3 volumes.

Documentation published by the Panel

Cabinet Committee on Government Operations - Adjustments to the Environmental Assessment and Review Process, February 8, 1977.

Cross Index for the EARP Panel list of clarifications and deficiencies and supplement provided by Eldorado in response to Phase I Environmental Hearings, Eldorado Nuclear Ltd., January 25, 1978.

Briefs to Federal Environmental Assessment Panel, Port Granby Project. Federal Environmental Assessment Review Office, Ottawa. 1 volume.

Deficiencies (official) in ENL Environmental Impact Statement, Port Granby Project, Federal Environmental Assessment Review Office, Ottawa. Deficiencies list (official) issued by Panel.

Deficiencies Responses, Federal Environmental Assessment Review Office, Ottawa.

2 volumes.

Eldorado official response to (63). 2 volumes.

Transcripts of the Proceedings of the Federal Environmental Assessment Panel, Port Granby Project, Federal Environmental Assessment Review Office, Ottawa.

Technical Reviews of Environmental Impact Statement, Port Granby Project, Federal Environmental Assessment Review Office, Ottawa.

General Research Material

By-Law No. 1653, Corporation of the Township of Clarke, November, 1969.

Final report on the preferred development strategy for the County of Northumberland - summary.

Northumberland Area Task Force Technical Committee, December, 1975.

Investigation of Lake Ontario Water Quality near Port Granby Radioactive Waste Management Site. R.W. Durham, S.R. Joshi, Unpublished report, Canada Centre for Inland Waters, Environment Canada, August, 1977.

The Management of Canada's Nuclear Wastes, by Aikin, Harrison & Hare. Report EP 77-6, Energy, Mines and Resources Canada, Energy Policy Sector, 1977.

Nuclear Energy, The Unforgiving Technology* F. Knelman, Hurtig, Edmonton 1976.

Nuclear Power and the Environment. The Government's reponse to the 6th report of the Royal Commission on environmental pollution. Presented to Parliament by the Secretary of State for the Environment by command of Her Majesty, May, 1977. (UK)

1976 Assessment of Canada's Uranium Supply and Demand. Report EP. 77-3, Energy, Mines and Resources Canada, Ottawa, June, 1977.

Official Plan of the Regional Municipality of Durham, July, 1976. Regional Municipality of Durham, Department of Planning and Development.

Proposal for a project to monitor social and economic impact of the Huntly Power Station. School of Social Sciences, University of Waikato, N.Z.

Introduction

The guidelines provide an outline for the environmental impact statement to be prepared by Eldorado Nuclear Limited for its proposed plant expansion in Ontario and Saskatchewan. The requirements in these guidelines are presented in a manner that will lead to a totally objective review of the anticipated effects of the project on the recommended site from an environmental standpoint. Basic information on the need for the facilities in the form of details on the plant and its discharges is necessary to establish what will cause possible impacts on the environment. These are the requirements of Sections 1 and 3. Section 2 includes a discussion of the alternative sites considered and the rationale for arriving at the recommended site. Section 4 is an inventory of the environmental features and/or factors that must be considered in detail for the site. Section 5 is the assessment of the environmental impact by applying the basic plant information in Section 3 against the environmental information in Section 4 for the site. Section 6 identifies the basic information which should be included in the Overview Statement.

It is essential that all pertinent data be provided in the statement as a whole, and the proponent is encouraged to apply appropriate alternative methodologies in determining and assessing the environmental impact of the site.

1. Rationale for Project

1.1 Describe purpose and need for project.

1.2 Briefly:

- a> Outline alternatives already considered. (For example, why not expand at present location; were a number of smaller plants considered, etc.?)
- b) Summarize:
 - i) the reasons for elimination of alternatives;
 - ii) the reasons for selecting the proposed alternative over eliminated alternatives.

2. Consideration of Alternative Sites

An environmental review shall be provided of the alternative sites that were considered, the reasons why they have been eliminated from further consideration and/or why the site selected was the preferred alternative. (Note: supporting reports, studies etc. should be referred to or appended.)

3. Project Description

3.1 Describe the type of plant including:

- a) the output products proposed for:
 - i) initial production
 - ii) anticipated or potential future production
- b) a description of the processes proposed for both initial and anticipated future product production including process flow sheets, material inventories, transfer mechanisms, waste management, etc.

3.2 Describe the development schedule including:

- a) details on the initial size of the plant
- b) schedules for development to ultimate size
- c) introduction dates for future new products (if available).

3.3 Identify the personnel requirements including:

- a) number and phasing of work staff required including their qualifications and the expected origin of these staff (e.g. are they local residents?).
- b) any special infrastructure requirements (e.g. social infrastructure - housing, recreation, services such as sewer, water, emergency, etc.).

3.4 Identify the input resources required including quantities and quality of:

- a) raw materials such as yellow cake, (to include its concentrations of radionuclides and variations in its chemical characteristics), the method and location of storage sites.
- b) process chemicals
- c) water supply - cooling, sanitary and other
- d) energy including fuel and electric power
- e) transportation in the form of rail, road, water, etc.

3.5 All output from the plant including plant product and waste materials whether managed or not

- a) shall be identified and quantified including all

- i) liquid effluents such as
 - sanitary wastewater
 - process wastewater
 - plant and surface runoff
 - cooling water
 - etc.
- ii) gaseous emissions from
 - cooling
 - ventilation
 - plant processes
 - from any other source
- iii) solid waste materials
 - from plant processes
 - as a result of treatment
 - from any other source
- iv) noise generation; and
- v) any other discharges
- b) shall be detailed with respect to:
 - i) their source within the plant processes
 - ii) rate of discharge
 - iii) periodicity (i.e. whether it is continuous, intermittent or otherwise)
 - iv) specific resource requirements such as land area, etc.
 - v) monitoring and control measures proposed
 - vi) quality and concentration both before and after controls that are proposed including information on chemical, biological and thermal characteristics
 - vii) radionuclides and their concentrations in solids and liquids, and the associated radioactivity
 - viii) principles of contingency measures proposed for upsets and spills and the consequences of such releases.

3.6 Plant life expectancy shall be outlined with consideration given to:

- a> the impact that disposal of materials on the property might have with respect to future land use capability. (Some indication of the physical, chemical, biological and radiological surveillance proposed in this regard shall be provided.)
- b) abandonment, subsequent or alternative uses.

3.7 Any other factors judged significant.

4. Environmental Data Requirements

This section provides an outline of the requirements for environmental baseline data on resources or conditions that could conceivably be effected by the project. The following requirements are by no means all inclusive and the proponent is encouraged to bring forward any other environmental features and/or factors that he feels may be significant during the course of the study.

4.1 Soil and geology

- a> a physiographic description including:
 - i) topography
 - ii) drainage patterns
 - iii) any unique features
- b) information on local geological features including:
 - i) hydrogeology
 - ii) bedrock depths and types
 - iii) specific properties such as faulting
 - iv) surficial deposits their compo-

sition, characteristics and distribution.

- c) information on local pedological phenomenon including:
 - i) soil structure and stability
 - ii) porosity
 - iii) permeability
 - iv) ion exchange capacity
- d) information on seismic activity.

4.2 Air

Information is required respecting:

- a> baseline meteorological data including:
 - i) climatic information
 - ii) wind speed, direction and frequency
 - iii) mixing heights and inversion probability
 - iv) air mass stability
 - v) predictiveness of climate
 - vi) etc.
- b) air quality data within the area of potential impact
- c) other sources of air pollutants in the area
- d) phytotoxicological information if available.

4.3 Water

- a> surface water
 - i) for flowing streams and small enclosed water bodies the seasonal variations in
 - rate of flow
 - level
 - quality
 - etc.
 - ii) for larger water bodies such as the Great Lakes, littoral

- drift, shoreline erosion and or accretion
- iii) for all surface waters it will be necessary to establish:
- lake or river bottom topography and impact of any proposed alterations
 - sedimentation characteristics
 - the effective mixing that can be accomplished on the effluent in receiving water
 - ice - cover
 - duration
 - thickness
 - movement
 - the influence of other sources of water pollutants in the area
 - any currents and their variation
 - seasonal variations in the thermal regime
 - etc.
- iv) inventory of peripheral surface water
- b) Ground water - Information shall include:
- i) depth of water table, ground water/aquifer locations
 - ii) local and regional ground water uses
 - iii) underground flow in terms of both vertical and lateral movement on a local and regional basis
 - iv) seasonal water level variations
 - v) water quality
 - vi) quantity
 - vii) characteristics of the aquifer in terms of transmissivity, storage and whether it is confined or unconfined
 - viii) identification of recharge and discharge areas.
- #### 4.4 Biota
- a> aquatic life
- i) shall be documented with special emphasis on those areas that would be directly affected by water intakes and/or discharges
 - ii) documentation shall include:
 - species occurrence
 - species abundance
 - the role of the affected region in the life cycle of the species (i.e. spawning areas, wintering areas, migration and staging areas, etc.)
 - information on unique habitat
 - rare and endangered species identification
 - potential biomagnification
 - iii) the temperature requirements including a range of temperature tolerances should be developed based on the level of activity and the life stages of the aquatic life at various times of the year.
- b) Terrestrial
- i) terrestrial ecosystems shall be identified as to their:
 - composition
 - interdependencies
 - requirements
 - degree of sensitivity to the various kinds of discharges to be expected
 - potential for biomagnification
 - ii) unique or sensitive habitat areas such as migration routes,

- corridors etc., shall be identified
- iii) any rare or endangered species shall also be identified.

4.5 Land and Water Uses

This section shall include:

- a> an inventory of present and potential land and water uses
- b) any zoning regulations and/or official plans for the area pertaining to land or water use
- c) potential use conflicts or use restrictions
- d) land uses such as recreational, residential, industrial and agricultural (in production or out of production) both existing and potential
- e) historical and archaeological information on the area
- f) details respecting forestry, mining and reserves etc.
- g) use level and value of the sport and/or commercial fisheries
- h) any other information seen to be of consequence.

4.6 Social and community factors

Information required shall include:

- a> population; regional and local
- b) population distribution
- c) labour availability and type
- d) approximate wage levels in the local community
- e) education
- f) social and recreational resources
- g) transportation routes - including identification of sensitive areas with respect to possible spills of hazardous substances etc., and other environmental effects e.g. noise

- h) town and regional plans
- i) any other information seen to be of consequence.

4.7 Noise

Information shall be provided to the extent possible on background levels in each of the area studies.

5. Assessment of Environmental Impact

5.1 Summarize the effect of the project on the environment as identified above.

5.2 Note the environmental impacts that can be minimized by using good environmental design, and evaluate the anticipated eventual status of the impacts.

5.3 Identify and quantify all residual short and long term impacts, both positive and negative; including those where there is no mitigation proposed or where mitigation may fail or be only partly effective.

5.4 Based on the foregoing, determine the total environmental impact of the project including those impacts which may be cumulative and/or synergistic.

6. Overview Summary

The overview summary should consolidate the important findings of the report and should be written in such a manner as to allow reviewers to focus immediately on items of concern. It should be written in terms understandable to the general public and in a format that allows it to be extracted directly for publication by the media, or for use by senior

executives requiring a quick appraisal of the situation.

The overview summary should briefly describe the project, the probable major environmental impacts, the ameliorating and mitigating measures to be implemented by the assessor, and the significance of the residual unmitigated environmental impacts. Any aspects of the development which might stimulate public concern should be described with particular clarity. The summary should also clearly identify data gaps or knowledge deficiencies, and the limitations they have imposed on the Environmental Impact Statement.

APPENDIX VI - ACKNOWLEDGEMENTS

The Panel wishes to express its thanks to all those who participated in the review of the Port Granby Proposal.

Representatives of the federal Departments of Fisheries and the Environment; Energy, Mines and Resources; and National Health and Welfare gave a great deal for the review both as technical reviewers of the Environmental Impact Statement and as participants in the public hearings.

An interdepartmental group representing the Province of Ontario also contributed greatly in the review and its planning.

The Panel would also like to thank its staff without whom the review could not have been conducted.

Finally, the Panel offers its sincere thanks to the many individuals and groups who took the time to present their views.