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**MONITORING AND
ENVIRONMENTAL ASSESSMENT IN ONTARIO**

Publication #218
ISBN# 978-1-77189-512-5

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January 1994

VF:
CANADIAN ENVIRONMENTAL LAW
ASSOCIATION.
LINDGREN, RICHARD D.
CELA BRIEF NO.218; Moni...RN8353d

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MONITORING AND ENVIRONMENTAL ASSESSMENT IN ONTARIO

By

Richard D. Lindgren*

PART I - INTRODUCTION

Many descriptions of Ontario's environmental assessment (E.A.) process tend to dismiss the issue of "monitoring"¹ as a matter which simply occurs at the end of the approval process. This lack of upfront emphasis on E.A. monitoring is not surprising since proponents, commenting agencies and intervenors frequently focus their efforts on other issues (i.e. purpose, need, alternatives) raised in earlier stages in the E.A. process (i.e. during pre-submission consultation and other pre-approval phases). Thus, while monitoring issues may incidentally arise from time to time in the E.A. process, the participants' attention and resources are largely focused on the E.A. approval itself rather than what happens in the post-approval period.²

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¹ For the purposes of this paper, "monitoring" refers to a systematic program of follow-up activities and procedures which are undertaken after the approval of a undertaking. As described in Part II of this paper, monitoring programs may be characterized as "compliance monitoring" or "effects/effectiveness monitoring."

² C. Bancroft-Wilson and Alan Buck, "Draft Working Paper #4: Environmental Assessment Monitoring" (EAPIP, 1989), p.1. See also Bob Gibson and Beth Savan, Environmental Assessment in Ontario (CELR, 1986), pp. 270 - 71.

The general absence of comprehensive post-approval programs in Ontario suggests that monitoring is regarded as a relatively unimportant "add-on" component of the E.A. process. This perspective unfortunately fails to recognize the importance of ensuring that the proponent fulfils all conditions of approval and commitments made during the E.A. process. More fundamentally, the lack of rigorous post-approval programs raises serious questions about the utility and ability of the Environmental Assessment Act³ to meet its stated purpose of ensuring the protection, conservation and wise management of Ontario's environment.⁴

More recently, there is a growing recognition that a post-approval program should not be simply tacked onto an approval as an afterthought; instead, the particulars of the program should be developed and discussed from the very outset of project planning and review:

Ideally, the program should evolve during project planning and decision-making, continuing through construction, restoration and operation. The development and implementation of effective monitoring programs are important elements of a complete assessment program and contribute to the overall effectiveness of EA.⁵

³ Environmental Assessment Act, R.S.O. 1990, c.E.18, s.2.

⁴ Bancroft-Wilson and Buck, supra, note 2, p.1.

⁵ Ibid.

The purpose of this paper is threefold: first, to discuss the legal and conceptual framework for E.A. monitoring; second, to generally describe the components of E.A. monitoring; and third, to briefly review some of the current problems and suggested reforms with respect to E.A. monitoring in Ontario. Monitoring conditions of approval imposed in the Halton Landfill Hearing⁶ are appended to this paper for illustrative purposes.

PART II - E.A. MONITORING: THE LEGAL AND CONCEPTUAL FRAMEWORK

This section will review the legislative framework for E.A. monitoring in Ontario, and will discuss the rationale for carrying out E.A. monitoring in Ontario. The distinction between "compliance monitoring" and "effects/effectiveness monitoring" will also be addressed in this section.

(a) The Legislative Framework

The legal authority in relation to E.A. monitoring is found in various sections of the Environmental Assessment Act. For example, s.5(3)(c) of the Act requires proponents to predict the environmental effects of the undertaking and the alternatives, and further requires

⁶ Re Regional Municipality of Halton Landfill Application (CH-86-01), Joint Board, February 24, 1989.

proponents to describe the mitigative measures which are necessary to "prevent, change, mitigate, or remedy" those effects. Where the Minister of the Environment finds that the proponent's E.A. document is inadequate, the Minister may require the proponent to "carry out such research, investigations, studies and monitoring programs related to the undertaking in respect of which the environmental assessment is submitted".⁷ Upon submission of these additional reports by the proponent, the reports shall be incorporated into the E.A. document and the government review thereof.⁸

Similarly, the Environmental Assessment Act provides the Minister and the Environmental Assessment Board ("EAB") with the authority to impose monitoring requirements as conditions of approval.⁹ For example, s.14 provides that the Minister may attach terms and conditions to his or her approval to proceed with an undertaking, and in particular, the Minister may, inter alia, require:

⁷ Environmental Assessment Act, supra, note 3, s.11(1).

⁸ Ibid., s. 11(4).

⁹ Ibid., s.12 and s.14. The Joint Board is similarly empowered to attach terms and conditions (including those related to monitoring) to its approval or to matters deferred to other decision-makers: see Consolidated Hearings Act, R.S.O. 1990, c.C.29, ss.5(2) to (4).

- specified works or actions to prevent, mitigate or remedy the effects of the undertaking on the environment; and

- such research, investigations, studies and monitoring programs related to the undertaking, and reports thereof, as the Minister considers necessary.¹⁰

To ensure compliance with conditions of approval (including those related to monitoring), the Environmental Assessment Act provides that no person shall proceed with an undertaking contrary to any term and condition imposed by the Minister or the EAB as part of the E.A. approval.¹¹ Similarly, the Act permits provincial officers to undertake inspections, tests, surveys, samples, inquiries, and document examinations that are necessary "for the purpose the administration of the Act and the regulations".¹² In addition, proponents have a statutory obligation to immediately report to the Minister if they are unable to proceed with their undertakings in accordance with the terms and

¹⁰ Environmental Assessment Act, supra, note 3, s.14(b)(ii) and (iii).

¹¹ Ibid., s.16. Note that s.20 provides that once the EAB's decision has become final pursuant to s.23, the decision is "deemed to be the decision of the Minister or of the Minister with the approval required by section 14".

¹² Ibid., s.25.

conditions attached to their approvals.¹³

The Environmental Assessment Act further provides that any person who contravenes an order or term and condition of an approval issued under the Act is guilty of an offence and is liable to a maximum fine of \$10,000 for a first conviction and to a maximum fine of \$25,000 on a subsequent conviction for every day or part thereof upon which the offence continues to occur.¹⁴ Similarly, the Act provides that no person shall knowingly submit false information to the Minister, the EAB (including its employees and appointees), provincial officers, or any employee of the Ministry of the Environment in respect of any matter under the Act or the regulations.¹⁵ Injunctive relief is also available to the Minister to enjoin any act to proceed with an undertaking contrary to the Act.¹⁶

¹³ Ibid., s.37.

¹⁴ Ibid., s.38. Interestingly, the first prosecution under the Act was commenced by a private informant (a representative of the Federation of Ontario Naturalists) against the Minister and Deputy Minister of Transportation and Communications for proceeding with highway construction without E.A. approval. The defendants entered guilty pleas and were fined \$3,500 and \$2,800 respectively: see R. v. Snow and Gilbert (1981), 11 C.E.L.R. 13 (Ont. Prov. Off. Ct.).

¹⁵ Ibid., s.34.

¹⁶ Ibid., s.28.

Despite the foregoing sections of the Environmental Assessment Act, it should be noted that the Act does not actually require proponents to conduct monitoring programs or to report to the Ministry to verify that approval conditions have been satisfied.¹⁷ This flows from the fact that the Act's provisions related to monitoring are permissive, not mandatory. It is also noteworthy that nothing in the Act requires the Ministry to develop or implement monitoring programs, guidelines, or other activities.

As described below in Part IV of this paper, this legislative silence is highly unsatisfactory for a number of reasons:

...There are concerns that insufficient attention has been paid to post-approval monitoring, and that the EA Act contains no specific monitoring requirements....

In the absence of any consistent follow-up activity by the Ministry, proponents have shown little interest in monitoring. The current practice of voluntary self-compliance by proponents with minimal reporting is unsatisfactory. And, as noted earlier, the lack of monitoring records and information has contributed to difficulties experienced in trying to determine benefits from the practice of EA.¹⁸

¹⁷ Ministry of the Environment, Toward Improving the Environmental Assessment Program in Ontario (MOE, 1990), pp.39 - 40.

¹⁸ Ibid., p.39.

(b) The Rationale for Monitoring

The general rationale for imposing terms and conditions to E.A. approvals has been canvassed elsewhere,¹⁹ and need not be repeated here in detail. In short, conditions of approval may be viewed as a "necessary adjunct" to E.A. approval powers for a number of reasons, including:

- there are inevitable "gaps" in the evidence submitted by proponents;
- E.A. decisions are based not only on hard scientific data but on societal and communal values which require that approved undertakings be carried out in a manner consistent with the public interest; and
- the EAB does not have in-house resources or staff to carry out independent testing or monitoring, or to develop the final design specifications for many undertakings.²⁰

In the context of monitoring, terms and conditions which require post-approval programs are particularly beneficial for proponents, regulatory agencies, the public, and the environment at large. For example, the information gathered through well-designed monitoring programs can allow the proponent to make necessary adjustments or improvements during the construction, operation, or maintenance phases of a project's life.

¹⁹ See, for example, Michael I. Jeffrey, Environmental Approvals in Canada (Butterworths, 1989), S.5.59-70.

²⁰ Ibid.

Similarly, this information may provide important data for the proponent and others for the purposes of any future planning, design, construction, operation, maintenance, shutdown or decommissioning of the undertaking or similar undertakings. In addition, "proper awareness and surveillance of requirements helps to identify and deal with on-site problems quickly, so as to reduce possible environmental damage, public complaints and delays to the construction schedule".²¹

More specifically, the benefits of E.A. monitoring have been summarized as follows:

- fulfilment of all EA commitments and conditions intended to protect the environment;
- more efficient and cost-effective mitigation measures;
- base-line studies to provide scientific data on actual environmental effects;
- improved effectiveness of impact predictions and assessment techniques;
- increased environmental awareness by engineering and construction personnel;
- public confidence in accountability under the EA process;
- long-term environmental protection and management; and
- streamlining and improving future project

²¹ Ministry of the Environment, supra, note 17, p.39.

administration, approvals and conditions.²²

Accordingly, it is clearly in the public interest (and the proponent's self-interest) for post-approval monitoring programs to be developed and implemented in an efficient and effective manner. This is true for both "compliance monitoring" and "effects/effectiveness monitoring", which are functionally distinct types of monitoring, as described below.

(c) Compliance Monitoring

"Compliance monitoring" refers to activities which may be undertaken at the operational or post-project stages to ensure that regulations have been obeyed and standards have met by the proponent.²³ More specifically, compliance monitoring is undertaken to ensure that the proponent has done everything it was supposed to do in relation to the undertaking:

Compliance monitoring is the use of monitoring to show how well an undertaking has been constructed, implemented, and operated in accordance with the standards, terms and conditions of approval, and commitments contained in the EA document.²⁴

²² Bancroft-Wilson and Buck, supra, note 2, p.2.

²³ David Munro et al., Learning from Experience: A State-of-the-Art Review and Evaluation of Environmental Impact Assessment Audits (CEARC, 1986), p.2.

²⁴ Ministry of the Environment, supra, note 17, p.39.

The main objectives of compliance monitoring have been summarized as follows:

- ensure that terms and conditions of approval are met;
- ensure that commitments made in the EA or at hearings are kept;
- provide for the clearance of conditions with appropriate documentation;
- ensure that acceptable construction and operation practices and standards are applied and responsibility is recognized;
- identify and deal with on-site non-compliance violations quickly so as to minimize environmental damage and delays to the schedule; and
- provide for agreement on any adjustments to the approval conditions, including mitigation, or construction practices without violating approval.²⁵

(d) Effects/Effectiveness Monitoring

"Effects/effectiveness monitoring" refers to activities which may be undertaken in the post-approval period to assess the actual environmental effects of an undertaking, and/or to evaluate the effectiveness of measures intended to prevent, mitigate or remedy those effects.²⁶ In particular, effects/effectiveness monitoring usually involves the comparison of the predicted environmental effects to the actual environmental effects with a view to determining whether the measured environmental changes are attributable to

Bancroft-Wilson and Buck, supra, note 2, p.2.

Ibid., p.4.

the undertaking. Thus, the utility of such monitoring is often contingent on the availability of sound baseline information:

... The term effects monitoring is used to describe periodic measurement of environmental variables to determine changes attributable to the construction and operation of projects; it can be further subdivided into operational monitoring or post-project monitoring. The usefulness of effects monitoring depends to a great extent on the existence of data against which to measure change, usually the product of baseline studies.²⁷

The main objectives of effects/effectiveness monitoring have been summarized as follows:

- determine the actual effects caused by implementation of an undertaking;
- determine the effectiveness of measures to mitigate environmental effects and improve upon them where applicable;
- improve the accuracy of predicting effects and provide data to support them; and
- advance knowledge of biophysical and social impact assessment and interrelationships.²⁸

PART III - THE COMPONENTS OF MONITORING

This section will provide a brief discussion of the elements of successful monitoring, and will focus on the components of compliance monitoring and effects/effectiveness monitoring.

Munro et al., supra, note 23, p.2.

²⁸ Bancroft-Wilson and Buck, supra, note 2, p.4.

(a) General

It has been suggested that successful monitoring consists of three interrelated factors: a monitoring objective; a monitoring plan; and a management process.²⁹

The monitoring objective significantly influences the nature, frequency and the extent of the monitoring activities which are to be undertaken. If, for example, the monitoring objective is to provide data to assist the proponent in managing undesirable environmental effects, then the monitoring program must be highly responsive and user-friendly. Such programs usually involve a continuing series of short-term measurements because the proponent will require immediate and directly useful information to determine whether intervention (i.e. further remedial measures) is necessary. On the other hand, if the monitoring objective is to simply predict environmental effects or to verify earlier predictions, then there is less immediacy to the data gathered since management intervention is not contemplated.³⁰

The monitoring plan should describe the details of the

²⁹ Natalia M. Krawetz et al., A Framework for Effective Monitoring (CEARC, 1987), p.3. While this document focuses on social impact assessment, the monitoring principles discussed therein are generally applicable to environmental assessment at large.

³⁰ Ibid., pp.25-27.

various stages of the monitoring program. The first stage is to identify the terms of reference (i.e. what factor(s) will be measured?); these are generally influenced by the nature of the project and its potential impacts. The second stage involves the collection and analysis of data based on repeated measurement of specified indicators (i.e. is there a measurable change or impact?). The third stage requires interpretation of the relative significance of any measured changes or impacts (i.e. is the change or impact attributable to natural causes or seasonal fluctuations? should something be done about the change or impact?). The final stage involves the feedback of monitoring results to the relevant decision-makers, regulatory officials and/or the public.³¹

The management process should ensure that monitoring results are accessed, analyzed and disseminated in an orderly and systematic fashion. This process should ensure an appropriate level of involvement by regulatory agencies, members of the public and other affected stakeholders with an emphasis on information-sharing and collaborative decision-making. The management process should essentially be an exercise in iterative problem-solving in order to allow proponents (and others) to

³¹ Ibid., pp.7-12.

learn from their experiences.³²

(b) Compliance Monitoring

Effective compliance monitoring requires a means to verify compliance and a system of enforcement with appropriate sanctions for non-compliance.³³

There are three general mechanisms to assess whether compliance has been achieved: supervision; surveillance; and auditing.

Supervision is usually described as a program conducted by the proponent's personnel to ensure that all regulatory requirements and environmental standards have been satisfied:

[Supervision] is carried out by the proponent to ensure that the project is built and operated according to environmental specifications including any terms and conditions of approval. Field inspections are required and usually include the preparation of reports noting any problems encountered and the action taken.³⁴

Under the supervisory approach, "the determination of what constitutes a 'violation', and the nature of

³² Ibid., pp.15-18.

³³ Ministry of the Environment, supra, note 17, p.41.

³⁴ Bancroft-Wilson and Buck, supra, note 2, p.4.

verification and reporting, is left to the discretion of the proponent".³⁵

Surveillance refers to inspections, investigations or other information-gathering activities conducted by regulatory agencies to ensure that conditions of approval are fulfilled and that all applicable statutes and regulations are obeyed. Field work is an important component of surveillance:

A surveillance officer or inspector may undertake field inspections and liaise regularly with the proponent, government agencies and public to resolve problems. Reports filed by the officer would provide the necessary verification of compliance for those conditions and standards under their jurisdiction.³⁶

Auditing may be carried out by either the regulatory agencies or the proponent's personnel (or consultants) to determine the overall effectiveness and performance of the proponent's environmental operations. Auditing requires "a carefully developed methodology and protocol",³⁷ and auditing programs may be used to: measure compliance with regulatory requirements; assess the appropriateness of emergency plans or contingency

³⁵ Ministry of the Environment, supra, note 17, p.41.

³⁶ Ibid., p.42.

³⁷ Bancroft-Wilson and Buck, supra, note 2, p.4.

measures; determine whether facilities are performing in an efficient or optimal manner; and identify opportunities to improve environmental performance.

(c) Effects/Effectiveness Monitoring

Effects/effectiveness monitoring may be conducted by either the regulatory agencies or the proponent's personnel (or consultants) to record and compare "conditions before, during and after project implementation to determine the actual environmental effects and net changes caused by an undertaking".³⁸ This form of monitoring often involves longer-term activity than compliance monitoring, and it generally depends on extensive baseline data collection in the field.³⁹ If implemented properly, effects/effectiveness monitoring can not only improve the effectiveness of EA methodologies, impact prediction models, and mitigation techniques, but it can also advance general knowledge of biophysical effects, ecosystem functions, and socio-economic dynamics.⁴⁰

³⁸ Ministry of the Environment, supra, note 17 p.43.

³⁹ Bancroft-Wilson and Buck, supra, note 2, p.2.

⁴⁰ Ministry of the Environment, supra, note 17, p.43.

PART IV - PROBLEMS AND OPPORTUNITIES FOR REFORM

This section will review some of the problems associated with E.A. monitoring in Ontario, and will discuss some of the reforms which have been proposed to improve E.A. monitoring in the province.

(a) Lack of Legislative Direction/Regulatory Enforcement

There has been extensive concern that Environmental Assessment Act fails to adequately address the pressing need for effective E.A. monitoring:

The EA Act requires the proponent to document impacts and the proposed mitigation. However, it does not require follow-up monitoring to verify the accuracy of predictions or efficiency of mitigation efforts... While monitoring may appear as a commitment in the proponent's EA, or as a condition of project approval, there is presently no government policy or Ministry guideline requiring compliance and effects monitoring under the EA program.⁴¹

Considerable concern has also been expressed about the Ministry's general lack of monitoring programs, guidelines or objectives. For example, in 1985 the Ministry's E.A. Branch conducted an audit of approved undertakings to determine the level of proponent compliance with conditions of approval. Incredibly, the study concluded that the E.A. Branch was unable to verify from its files if terms and conditions have been met.⁴²

⁴¹ Bancroft-Wilson and Buck, supra, note 2, p.2.

⁴² Ibid., p.1.

A similar study by the Ministry's Management Audit Branch found that the E.A. Branch staff had no specific review procedures for ensuring fulfilment of conditions of approval.⁴³

Similar concern has been expressed by the EAB about the lack of formal follow-up procedures:

The Board has expressed concern that certain conditions established on approval are not being monitored for compliance and there is no formal process or procedure in place to monitor compliance. Some recent approvals have included conditions to require compliance monitoring by the proponent but as with most other conditions there is no Ministry program in place or individuals responsible for administration, verification and enforcement. At present, the responsibility of the EA Coordinator ends once the undertaking is approved and no one is assigned responsibility for monitoring a project during implementation.⁴⁴

The governmental response to these concerns has been slow and generally negligible. For example, in 1986 the E.A. Branch released a discussion paper entitled Environmental Assessment Compliance Monitoring Program Proposal, which outlined a proposal which would rely upon the voluntary cooperation of proponents to file compliance documentation with the E.A. Branch. Fortunately, this

⁴³ Ibid., p.2.

⁴⁴ Ministry of the Environment, supra, note 17, p.40.

proposal was never finalized.⁴⁵

Similarly, in 1989 the E.A. Branch released the Interim Guidelines on Environmental Assessment Planning and Approvals;⁴⁶ however, this document fails to include any reference to compliance reporting or monitoring. It was also reported in 1989 that the Ministry was developing preliminary compliance monitoring guidelines;⁴⁷ again, however, these guidelines have not been finalized to date.

In 1990, the Ministry released a discussion paper entitled Toward Improving the Environmental Assessment Program in Ontario, which set out a number of recommendations in respect of compliance monitoring, including:

- amend the Act to require compliance reporting by proponents with respect to E.A. commitments, conditions of individual E.A. approvals, and compliance orders (Recommendation 5.1);

- develop a Ministry program for compliance monitoring and reporting, and develop guidelines covering essential data requirements, reporting schedules, verification, documentation and duration of reporting period (Recommendation 5.2);

⁴⁵ Ibid.

⁴⁶ Ministry of the Environment, Interim Guidelines on Environmental Assessment Planning and Approvals (MOE, 1989).

⁴⁷ Bancroft-Wilson and Buck, supra, note 2, p.3.

- amend the Act to require proponents, within thirty days of individual E.A. approval, to file a list of commitments and conditions of approval for which compliance monitoring and reporting will be undertaken and reported on annually; proponents would also be required to file a final report upon project completion indicating that all commitments and conditions of approval have been met (Recommendation 5.3);

- require all documentation on compliance reporting to be placed in the public record file (Recommendation 5.4);

- specify that while the Ministry is generally responsible for the administration and enforcement of compliance, other agencies which propose conditions are responsible for ensuring compliance (Recommendation 5.5); and

- ensure that commitments and conditions of approval are drafted in a clear and concise manner (Recommendation 5.6).⁴⁸

While these recommendations received public support,⁴⁹ they have not been implemented to date and their current status remains unclear at this time.

In 1991, Ontario's Environmental Assessment Advisory Committee (EAAC) reviewed and generally agreed with the

⁴⁸ Ministry of the Environment, supra, note 17, p.42.

⁴⁹ See, for example, Kathy Cooper et al., "Response of the Canadian Environmental Law Association to the Discussion Paper Toward Improving the Environmental Assessment Program in Ontario" (CELA, 1991), pp.54-55. CELA also recommended that public "monitoring committees" be considered for large or particularly significant undertakings.

Task Force's recommendations respecting monitoring.⁵⁰ EAAC went on to make two key recommendations on the need to amend the Environmental Assessment Act and to make regulations in relation to monitoring:

RECOMMENDATION #17 - The Act should be amended to require the proponent and/or agencies, as specified in the regulations and as directed by the Minister or Board in the approval decision, to monitor and report upon compliance with the approved terms, conditions and commitments, and to monitor and report on environmental effects following approval of the undertaking. Regulations should be made to specify what should be monitored, the frequency of monitoring, and how the results should be reported to the EA Agency, interested agencies, and the public. The regulations should also specify what actions must be taken as a result of problems identified through monitoring.

RECOMMENDATION #18 - The Act should be amended to allow the Minister to issue orders to the proponent to comply with terms and conditions set out in the approval decision, and to address environmental concerns arising from the implementation of the undertaking.⁵¹

In response to the EAAC report, the Minister of the Environment and Energy released a report in mid-1993 on how the Ministry intended to improve the administration of the EA Program.⁵² With respect to monitoring, the Ministry outlined the following initiatives:

⁵⁰ EAAC, Reforms to the Environmental Assessment Program (Report #47) (1991-92), at p.71.

⁵¹ Ibid.

⁵² Ministry of Environment and Energy, Environmental Assessment Reform: A Report on Improvements in Program Administration (1993).

The effectiveness of the EA Process in protecting and enhancing the environment will be monitored and evaluated. This will include monitoring how adequately proponents comply with commitments made in their EA's, and monitoring the effectiveness of their mitigation measures. A guideline will be prepared to assist proponents in these exercises. Ministry staff also will be trained in their role in the monitoring of EA projects.⁵³

It therefore appears as if the Ministry prefers administrative reforms rather than legislative or regulatory amendments in relation to monitoring. Whether such reforms will achieve the necessary level of consistency and enforceability respecting EA monitoring remains to be seen.

(b) Improvement of Impact Prediction/Monitoring

In light of the traditional lack of emphasis on E.A. monitoring, it has been correctly suggested that "effects monitoring under the Environmental Assessment Act in Ontario is still in its infancy".⁵⁴ As a result, impact predictions in many E.A. documents lack scientific rigour or supporting evidence:

... predictions in assessment reports usually have amounted to generalized or vague statements about the possibility of certain conditions occurring. Our critical evaluation of Canadian impact assessment showed that less than one half included recognizable predictions, and the majority of these were generalizations, the accuracy of which could

⁵³ Ibid., p.19.

⁵⁴ Gibson and Savan, supra, note 2, p.281.

not be determined.⁵⁵

These comments also apply to many E.A. documents prepared under the Environmental Assessment Act.⁵⁶ Accordingly there is a general consensus that the rigour and quality of environmental impact prediction and mitigation science must be improved through expanded monitoring of actual environmental effects.

For example, the EAB has expressed concern over the paucity of data on actual environmental effects:

The Board has commented on the lack of information available on actual effects. The fault lies with both proponents and approval bodies. Once approval is obtained the incentives and justification for additional "EA" related work are diminished. The Ministry and the EA Board have not made a practice of requiring factual evidence from similar case studies to substantiate assessment predictions, and proponents have not felt compelled to conduct monitoring studies.⁵⁷

The Ministry's discussion paper entitled Toward Improving the Environmental Assessment Program in Ontario contains several recommendations in relation to effects

⁵⁵ Gordon Beanlands and Peter Duinker, An Ecological Framework for Environmental Impact Assessment in Canada (Dalhousie University, 1983), pp.8-9.

⁵⁶ Gibson and Savan, supra, note 2, p.277.

⁵⁷ Ministry of the Environment, supra, note 17, p.43.

monitoring, including:

- passage of a regulation requiring a list of commitments, conditions of approval, and proposed plans for monitoring compliance and, where necessary, for effects monitoring (Recommendation 5.7);
- development of a Ministry guideline delineating Ministry interests in the area of effects monitoring (Recommendation 5.8); and
- encouragement by the Ministry and EA Board for the use of effects monitoring studies to support planning predictions and assist in the scoping of issues (Recommendation 5.9).⁵⁸

Environmentalists suggested that Recommendation 5.7 should make effects monitoring mandatory rather than optional;⁵⁹ again, however, the status of the discussion paper's recommendations is unclear at this time, particularly in light of the Ministry's apparent preference for administrative improvements rather than regulatory reform.

(c) Cumulative Effects

To date, E.A. documents in Ontario have tended to focus on the immediate site-specific impacts of projects rather than on the overall or cumulative impacts of such projects on larger temporal and spatial scales. The discussion paper Toward Improving the Environmental

⁵⁸ Ministry of the Environment, supra, note 17, p.43.

⁵⁹ Kathy Cooper et al., supra, note 49, p.55.

Assessment Program in Ontario summarizes this situation as follows:

The current proliferation of projects and development in certain areas has brought a growing concern over the issue of cumulative effects. The immediate effects of individual projects may seem insignificant, but when the effects of a number of undertakings are combined over time the results may have undesirable environmental and social consequences. Under the present environmental planning and assessment process, the implications of a project are evaluated and presented solely on the individual effects attributable to that project. Baseline environmental conditions are used that do not take into account of impending changes caused by other projects in various stages of development. Review agencies tend to examine proposals on their individual merits without consideration of their cumulative effect on an area, resource or program.⁶⁰

This narrow approach is problematic since it may:

- ignore the additive or synergetic effects of repeated developments or activities (i.e. the incremental loss of wetlands or the disposal of toxic substances into aquatic ecosystems);
- deal inadequately with precedent-setting developments that may generate or stimulate further development or activity with similar or greater environmental impacts; and
- ignore changes in ecosystem response to ever-increasing levels of stress or disturbance.⁶¹

While different definitions of "cumulative effects" are

⁶⁰ Ministry of the Environment, supra, note 17, p.44.

⁶¹ N.C. Sonntag et al., Cumulative Effects Assessment: A Context for Further Research and Development (CEARC, 1987), p.1.

found in the literature,⁶² it is generally accepted that cumulative effects are those impacts on the environment which:

- occur so closely in time or space that their effects cannot be "assimilated" by the environment; and
- combine or interact with the effects from other activities in an additive or synergistic manner.⁶³

A number of recommendations have been to improve the state of cumulative effect monitoring and prediction in Canada, including: expanded research into ecosystem responses to cumulative effects; development of standardized analytical methodologies and monitoring networks; and clarification of interdepartmental and intergovernmental responsibilities for cumulative impact assessment.⁶⁴ The discussion paper Toward Improving the Environmental Assessment Program in Ontario made two similar recommendations with respect to cumulative effects:

- the Ministry should promote and encourage academic institutions, environmental groups,

⁶² Ibid., p.5

⁶³ Ibid.

⁶⁴ See, for example, Canadian Environmental Assessment Research Council, The Assessment of Cumulative Effects: A Research Prospectus (CEARC, 1988) and E.B. Peterson et al., Cumulative Effects Assessment in Canada: An Agenda for Action and Research (CEARC, 1987).

proponents and review agencies to share information and advance understanding of environmental effects and interrelationships (Recommendation 5.10); and

- the Ministry should promote monitoring and research to support cumulative effects assessment (Recommendation 5.11).⁶⁵

Environmentalists suggested that these recommendations were weak and argued that cumulative effects should always be considered by E.A. decision-makers.⁶⁶ In any event, the current status of these recommendations is unclear at the present time. It is noteworthy that the new federal environmental assessment legislation explicitly requires cumulative environmental impact assessment.⁶⁷

In its report on EA reform, the EAAC properly argued that the Task Force's recommendations respecting cumulative monitoring are time-consuming and insufficient.⁶⁸ Accordingly, the EAAC made two specific recommendations in relation to cumulative effects monitoring:

RECOMMENDATION #41 - The government shall adopt and promote in environmental assessments and other environmental planning and approval processes, the

⁶⁵ Ministry of the Environment, supra, note 17, p.44.

⁶⁶ Kathy Cooper et al., supra, note 49, pp.55-56.

⁶⁷ Canadian Environmental Assessment Act, S.C. 1992, c.37, s.16(1). See also Ecosystems Consulting Inc., "Addressing Cumulative Environmental Effects under the Canadian Environmental Assessment Act: A Reference Guide (Draft)" (FEARO, 1992).

⁶⁸ EAAC, supra, note 50, p.123.

assessment of the cumulative effects of proposed undertakings. This should include the requirement to describe and consider cumulative environmental effects in the EA process as set out in Recommendation #1.

RECOMMENDATION #42 - The EA Agency, in cooperation with other agencies, should institute a program to facilitate an ecosystem approach and the consideration of cumulative effects. This should include at least the following components:

- establishment of policies and guidelines on how an ecosystem approach and cumulative effects assessments should be carried out;
- development of a resource centre for the consideration of ecosystems and methods for assessing cumulative impacts;
- training and professional development on the consideration of ecosystems and how to carry out and review cumulative effects assessments, as part of the comprehensive training program set out in Recommendation #33; and
- monitoring and research on ecosystems and cumulative effects.⁶⁹

In response to the EAAC's report, the Ministry of the Environment and Energy acknowledged the need for guidelines and further research in relation to cumulative effects:

...The ministry will prepare a guideline to respond to the need for workable, practical direction in the assessment of cumulative effects. This guideline will focus on what indicators in the natural, social and economic environment should be used to assess cumulative environmental change. These indicators could be based upon the components of the environment reporting currently underway in a number of Canadian jurisdictions... An approach using indicators is seen only as an initial response to this issue. Ultimately a more

⁶⁹ Ibid., p.125.

comprehensive, ecologically-based approach may emerge from the work being done at universities, research institutes and government agencies.⁷⁰

PART V - CONCLUSIONS

Despite the benefits of monitoring, scant attention has generally been paid to the issue of E.A. monitoring in Ontario, largely because of shortcomings in the current legal and institutional arrangements with respect to monitoring, reporting and enforcement. Recently, however, there has been considerable public and governmental interest in monitoring the environmental effects of approved undertakings and ensuring that all E.A. commitments and conditions of approval have been fulfilled by proponents. In light of proposed reforms respecting E.A. monitoring, it is likely that more extensive monitoring obligations will be placed upon proponents and enforced by regulatory agencies in the future.

⁷⁰ Ministry of Environment and Energy, supra, note 52, pp. 18-19.

**APPENDIX A: Monitoring Conditions of Approval in the Halton
Landfill Decision (Joint Board, February 24, 1989)**

Under the Environmental Assessment Act

CONDITION 1.

For more than a decade the Regional Municipality of Halton searched for a new landfill site to receive the waste of its citizens. A great deal of money was spent in the search, and residents of two communities felt threatened by the impending decision. In 1987 and 1988 a Hearing was held by the Consolidated Hearing Board established by the Environmental Assessment Board and the Ontario Municipal Board. This Board heard that although the Regional Corporation was responsible for disposing of waste it was not alone responsible for waste reduction, reuse and recycling measures. This Board also heard that the waste recycling objectives in the Region were modest, being less than 20%.

The Board orders, therefore, as its first condition of approval for a new landfill site in the Regional Municipality of Halton, that the Regional Corporation enter into agreements with the Municipalities of the Region to establish a Municipal-Regional Waste Management Committee having as its goal the reduction, recycling and reuse of waste so that there will be very little waste remaining to be landfilled. Through public meetings held at least twice a year the Committee should attempt to reach the goal through measures including but not limited to:

- a) paper recycling and denial of landfilling of paper products;
- b) promotion of individual, private and public composting facilities;
- c) provision of glass and metal recycling facilities for residential, apartment and commercial establishment waste, including provision of reception areas for packaging materials at point-of-sale of such materials;
- d) development of measures to encourage retail outlets to reduce to the maximum extent possible "disposable" items and packaging materials, including fast-food packaging materials.

- e) provision of reception areas for household hazardous wastes; and,
- f) consideration and development of mandatory recycling programs which include rewards and penalties for compliance and non-compliance;

Once each year the Regional Municipality shall report on the participation of area Municipalities and the extent of cooperation and progress on the work of this Committee in full-page advertisements in the newspapers having general circulation in each of the Region's constituent Municipalities, under the headline "IT'S OUR OWN GARBAGE", and is to include this condition in full at the beginning of such advertisement.

CONDITION 3.

If 50 percent of the waste generated within the Regional Municipality is not diverted from the landfill site by the end of the eighth year of operation, the Regional Corporation shall immediately commence appropriate waste management studies, taking account of, but not limited to, the opportunities described in Condition 1 above, required for the approval of new waste reduction, reuse, recycling, recovery and disposal programs and facilities.

CONDITION 5.

The Regional Corporation shall establish a Review Committee to monitor waste haulage practices in the Regional Municipality. The Committee shall allow for the participation of at least one member of the public from the vicinity of the landfill and one representative of the waste haulers. Its objective shall be the improvement of general traffic safety in respect to waste haulage practices, by reviewing public concerns, haulage routes and practices, and recommending improvements as appropriate.

CONDITION 6.

The Regional Corporation shall take all reasonable steps to form a Citizen's Advisory Committee to make recommendations for the avoidance or minimization of off-site impacts from the landfill. The Committee shall consist primarily of local residents. The Regional Corporation shall provide a reasonable annual budget for the operation of the Committee.

CONDITION 7.

In light of the high concentration of chemical contaminants in leachate from landfill operations in Halton Region, the Regional Corporation shall enter into agreements with the Municipalities in the Region for the identification of the principal commercial and industrial generators of waste and the nature of their wastes intended to be landfilled in the Region. This information shall be made available to the Committee described in Condition 1 and to the Director of the Central Region of the Ministry of Environment.

CONDITION 8.

- a) Prior to site preparations, the Regional Corporation shall complete the archeological survey of the site.
- b) If Significant archeological sites are found, the Regional Corporation shall take reasonable steps to avoid them or conduct salvage operations if avoidance is not possible because of landfilling operations.

CONDITION 14.

On or before October 1st of each year, the Regional Corporation shall submit a report to the Director of the Environmental Assessment Branch of the Ministry of the Environment for filing on the public record which describes compliance with these conditions of approval. Copies of the report shall be provided to:

- a) the Director, Heritage Branch, Ministry of Citizenship and Culture;
- b) the Manager, Electricity Section, Liaison and Planning Branch,
Ministry of Energy;
- c) the Director, Foodland Preservation Branch, Ministry of Agriculture
and Food;
- d) the Clerk of the Town of Milton;
- e) the Clerk of the City of Burlington;
- f) the Clerk of the Town of Oakville; and,
- g) the Clerk of the Town of Halton Hills

The Regional Corporation shall publish notice of the availability of this report in the principal newspapers in the Region.

Under the Environmental Protection Act

CONDITION 2

The site shall be designed and operated in a way that is in keeping with the conceptual design introduced in evidence to this Board by the proponent: that is, a hydraulic trap and associated pipes, pumps, elevations, support facilities and screening berms. The Board recognizes that in arriving at a final design certain details may be optimized. Such optimization must take place within the range allowed in these conditions. The Regional Corporation shall submit the detailed design, operations and monitoring documents to the Director for approval.

- 2.1 The documents shall be prepared to reflect conditions 3 to 14 of this approval, and the preceding conditions of approval in this Decision to proceed under the Environmental Assessment Act, and shall contain at least the following:
 - 2.1.1 A description of site preparation activities, including borehole sealing and base preparation.
 - 2.1.2 A base contour plan
 - 2.1.3 Plans and a description of the leachate collection system; including a precise definition of the maximum permissible leachate mound required for the operation of the hydraulic trap.
 - 2.1.4 A description of leachate collection system inspection and maintenance activities.
 - 2.1.5 A description of leachate flow measurement locations, facilities and methods.
 - 2.1.6 Plans and descriptions of surface water collection and containment structures.

- 2.1.7 A description of daily, intermediate and final cover activities, including depths, material characteristics, installation procedures, scarification measures for daily cover and storage locations.
- 2.1.8 A description of stockpile activities, including use, timing, locations, erosion protection and temporary vegetation measures.
- 2.1.9 A description of methods and procedures to be used in the construction of berms on the northwest, southwest and southeast edges of each level of waste.
- 2.1.10 Interim and final contour plans.
- 2.1.11 Plans and descriptions of site roads.
- 2.1.12 A landscape plan describing the locations of interim and permanent vegetation, including types, sizes and planting schedules, and earthen, vegetative or other types of barriers for the purpose of providing windbreaks and mitigating visual impacts from the site.
- 2.1.13 A description of daily operating activities.
- 2.1.14 A description of litter control activities on and off the site.
- 2.1.15 Plans and description of site fencing.
- 2.1.16 A description of piped water facilities.
- 2.1.17 Plans and a description of a storage facility for suspect wastes.
- 2.1.18 A description of vermin and gull control activities.
- 2.1.19 A description of gas monitoring activities.
- 2.1.20 A ground water monitoring program.
- 2.1.21 A surface water monitoring program.
- 2.1.22 A leachate monitoring program.
- 2.1.23 A description of contingency plans to mitigate impacts from leachate or gas migration.

2.2 The Regional Corporation shall construct and operate the site and carry out monitoring activities and programs in accordance with the detailed design, operations and monitoring documents as approved by the Approvals Director and with any modifications within the range of modifications allowed under these conditions as may be approved from time to time by the Approvals Director.

2.3 No activity for which the approval of the Approvals Director is required under 2.1 shall be carried out without that approval.

- 3.6** Prior to the commencement of site preparation, the Regional Corporation shall retain a full-time environmental inspector who shall be responsible for,
- 3.6.1** monitoring compliance with these Conditions,
 - 3.6.2** monitoring the installation of all works and ongoing site management and operations throughout the life of the site,
 - 3.6.3** reporting to the Regional Director on all incidents of non-compliance with the regulations, these Conditions, the Conditions of Approval under the Environmental Assessment Act and the approved design, operations and monitoring documents,
 - 3.6.4** reviewing the raw data associated with all groundwater, surface water and gas monitoring and reporting to the Regional Director on any data which indicate actual or potential contaminant movement,
 - 3.6.5** preparing written inspection reports for submission to the Regional Director on a monthly basis, or more frequently as may reasonably be required by the Regional Director,
 - 3.6.6** preparing an annual report for submission to the Regional Director summarizing his or her activities and findings, and
 - 3.6.7** participating on the Citizen's Advisory Committee.
- 3.7** Detailed terms of reference concerning the activities and responsibilities of the Environmental Inspector shall be submitted to the Regional Director for review and approval no later than two months after the date of this approval.
- 3.8** The Regional Corporation shall employ at least one properly trained waste inspector to exclusively monitor the dumping of all waste at the working face.
- 3.9** The Regional Corporation shall employ traffic controllers to supervise the movement of vehicular traffic at both public disposal areas and the working face.
- 3.10** Once in each month during the first year of site operation and annually thereafter until closure, the Regional Corporation shall arrange for an inspection of the site by a pest control contractor. The annual inspection shall be increased to a monthly frequency if pest control problems occur. Records of inspections shall be maintained at the site office.

CONDITION 5

Site preparations shall be undertaken to support the successful operation of the hydraulic trap conceptual design for the complete containment and removal of leachate from the site and shall include at least the following matters.

- 5.1 Schedules for the construction and installation of site facilities shall be provided in advance to the District Officer.
- 5.2 Prior to any excavation at the site, all boreholes and any other conduits for possible leachate movement within areas of landfilling shall be properly sealed to the satisfaction of the Director.
- 5.3 The Regional Corporation shall begin as soon as possible after the date of this approval to construct a series of twelve monitoring wells on the northeast side of First Line beginning with Monitoring Well nest 1 (MW-1) in the vicinity of the environmental assessment investigation well HC1-85. This well nest shall be completed to at least 170 m a.s.l. to intercept any granular units in the lower till and shall be constructed in such a way as to allow for short term pumping tests and long term monitoring of ground water quality, in accordance with Condition 12. The next well nest (MW-2) shall be constructed the same distance from First Line and 100 meters to the south of MW-1, shall be completed to the base of the weathered upper till at about 178 m a.s.l. and shall be constructed so as to allow for the short term monitoring of response, if any, to the pumping of MW-1 and long term monitoring of ground water quality in the weathered upper till. Wells MW-3, MW-5, MW-7, MW-9 and MW-11 shall be 200, 400, 600, 800 and 1,000 meters south of MW-1 respectively, and shall be constructed in a fashion similar to MW-1, taking into account local variations, and wells MW-4, MW-6, MW-8, MW-10 and MW-12 shall be 200, 400, 600, 800 and 1,000 meters south of MW-2 respectively and shall be constructed in a fashion similar to MW-2 taking into account local variations. Wells MW-1, MW-2, MW-3 and MW-4 shall be completed, wells MW-1 and MW-3 pumped and responses at wells MW-2 and MW-4 measured and the data therefrom provided to the Approvals Director before the final detailed designs for the first landfill cell are submitted to the Approvals Director for approval. Wells MW-5 to MW-12 shall be completed in sufficient time for the Approvals Director to consider test results from these wells before approving final detailed designs for subsequent landfill cells.

CONDITION 7

Equipment on site shall be operated and maintained to minimize downtime and noise.

- 7.1 All off-road equipment used at the site shall be operated in such a manner that sound levels from such equipment do not exceed 85 decibels at 15 meters measurement distance.**

- 7.2 All off-road equipment shall be tested annually for sound levels in accordance with the procedures specified in Publication NCP-115 of the Ministry of the Environment's Model Municipal Noise Control By-Law.**

- 7.3 In the event of serious equipment malfunctions which could lead to the failure to apply daily cover materials, the District Officer shall be notified immediately and the Regional Corporation shall implement a contingency plan to either cease waste collection, direct wastes to an alternate site or acquire temporary replacement equipment, so that waste is not deposited without daily cover.**

CONDITION 11

- 11.1 A qualified pedologist and/or agronomist shall supervise all topsoil stripping and operations and the placement of final cover in all areas to be utilized for agricultural after use.
- 11.2 The parts of the fill area to be used for agriculture following closure of the landfill shall be covered with at least one metre of topsoil over and above the final compacted cover.
- 11.3 No agricultural use shall be permitted on any slopes greater than 8:1.

Ground Water Monitoring

CONDITION 12

The ground water monitoring program shall be designed to identify, delineate and characterize any movement of landfill-derived contaminants and, in particular, to identify any impacts on the use of ground water for domestic or agricultural purposes off-site which would trigger implementation of contingency measures. The results of all analyses shall be provided to the Environmental Inspector within one month of each analysis being completed. The results of analyses of each domestic well and a copy of each Annual Report shall be provided to the owners of that well. The program shall be designed in accordance with the following:

- 12.1 New well nests shall be established around the site with particular emphasis on the area adjacent to First Line, as described in condition 5.3. In addition, two new well nests shall be established on each of the northwest and southwest boundaries and four new well nests shall be established on the north east side of the fill area. Exact locations shall be selected to investigate the lateral continuity and hydraulic characteristics of the granular units and to facilitate comprehensive monitoring along major contaminant pathways. Where appropriate, new well nests shall be located and designed for contingency purge well purposes.

- 12.2 Each new well shall be installed in a separate borehole. No multilevel devices shall be employed.
- 12.3 The deepest borehole at each monitoring location shall be continuously sampled during drilling. All boreholes shall be drilled using a technique that minimizes the introduction of foreign water into the substrata and that minimizes borehole smearing.
- 12.4 At each location, wells shall be installed in at least each granular unit encountered at the location and in the weathered till.
- 12.5 The lateral continuity and hydraulic characteristics of each granular unit shall be investigated through the use of environmental isotopes and hydraulic testing methods, including pumping tests.
- 12.6 New wells are to be constructed with best available technology for subsequent detection of volatile organic compounds. In addition, its installation, and the subsequent operation procedures are to be reviewed by a qualified hydrogeologist and approved by the Approvals Director.
- 12.7 A monitoring well network, consisting of new wells, appropriate existing wells and potentially affected domestic wells, shall be established.
- 12.8 Each monitoring well shall be equipped with a dedicated sampling device. Sampling devices and techniques shall be designed to provide representative samples and to ensure sample integrity.
- 12.9 Each well in the monitoring well network shall be sampled over a period of at least one year to characterize baseline water quality.
- 12.10 Sampling and analytical procedures, including quality assurance and quality control activities, shall be documented.
- 12.11 A ground water sampling program shall be developed to ensure early detection of contaminants in the event that such contaminants escape the landfill. Ground water shall be sampled at least twice per year. The analysis shall seek to identify

chloride, nitrate and a suite of organic compounds characteristic of leachate generated at the site. Sampling frequency and parameters for analysis shall be adjusted as ground water and leachate monitoring information becomes available.

- 12.12 Equilibrium water levels shall be measured in all wells in the ground water monitoring network and other existing observation wells at a frequency sufficient to investigate short term and long term fluctuations and their influence on the ground water flow system and potential movement of contaminants in the vicinity of the site.

Surface Water Monitoring

CONDITION 13

The surface water monitoring program shall be designed in accordance with the following:

- 13.1 Permanent surface water monitoring stations shall be established to detect and quantify any impacts originating from the site. Stations shall be located to avoid other sources of contamination to the extent possible.
- 13.2 Surface water at each station shall be monitored monthly over a period of two years to establish background water quality and quantity.
- 13.3 Following the two year period of monthly monitoring, surface water shall be monitored at each station at least four times in each year. Frequency shall be increased in the event that landfill-derived contamination is suspected.

Leachate Monitoring

CONDITION 14

Because the site is based on the relatively new concept of a hydraulic trap for leachate containment and collection, leachate monitoring shall be conducted, to determine both the chemical composition of the leachate and the extent of leachate mounding within the refuse, in the following fashion.

- 14.1 Leachate samples shall be collected from the leachate collection system in order to characterize and monitor the leachate chemistry in each landfill cell during the contaminating lifespan of the site. Leachate shall be sampled at least four times per year to monitor annual trends in leachate chemistry. Leachate shall be analyzed for a full suite of inorganic and organic substances with the objective of establishing, and modifying if necessary, the suite of substances to be sought in the groundwater monitoring analysis. The frequency of sampling and parameters for analysis shall be adjusted as leachate monitoring information becomes available.
- 14.2 The flow of leachate from each cell and the total flow of leachate generated at the site shall be continuously measured where practicable. The information shall be integrated into an annual site water balance and used as part of an annual assessment of the performance of the underdrain system.
- 14.3 Following the completion of each landfill cell, wells shall be completed to the base of the waste. The configuration and construction of these wells shall allow monitoring of leachate levels and the pumping of leachate, if required. Following installation, these wells shall be developed and hydraulic tests undertaken to determine the hydraulic conductivity of the waste.
- 14.4 In the event that the leachate level monitoring suggests a failure of the hydraulic trap, leachate samples from wells indicating such failure shall be collected as frequently, and analyzed for the same parameters, as leachate samples from the leachate collection system.
- 14.5 Equilibrium leachate levels shall be measured in each well installed in the waste prior to sample collection and at the same time as equilibrium water levels are measured in the groundwater monitoring network.
- 14.6 In addition to the wells required by condition 14.3, the hydraulic head at the base of each cell shall be monitored using pressure transducers or other appropriate devices.

CONDITION 15

If, in the opinion of the Regional Director, monitoring or other information identifies an unacceptable impact from leachate or gas migration, the Regional Corporation shall immediately take all necessary steps to implement contingency plans.

Staff Training

CONDITION 17

The Regional Corporation shall implement a regular training program for all landfill staff and, prior to any receipt of waste at the site, shall prepare a manual of practices and procedures for landfill staff use and reference. The manual shall be updated and improved as required. A copy of the manual and any updates shall be provided to the Regional Director.

Annual Report

CONDITION 18

The Regional Corporation shall submit an annual report to the Regional Director covering each calendar year. Each report shall include the following information:

- 18.1 The raw data and an interpretive analysis of all monitoring programs.
- 18.2 A yearly summary of volumes and weights by type of all wastes received at the site including a list of all vehicles refused entry to the site together with reasons for any refusal.

- 18.3 Any environmental and operational problems encountered during the operation of the site and any mitigative actions taken.
- 18.4 A description of the quality and quantity of the leachate collected and discharged to the sanitary sewer system.
- 18.5 An assessment of the operation and performance of all leachate collection facilities.
- 18.6 The results of all routine inspections of the leachate collection facilities.
- 18.7 A statement as to compliance with all conditions of approval and with the inspection and reporting requirements of the conditions.

Closure

CONDITION 19

At least two years before closure of the site, the Regional Corporation shall submit a complete plan for the closure, long term maintenance, long term monitoring and after use of the property to the Regional Director. The plan shall include:

- 19.1 Plans for fencing and access control.
- 19.2 Details of any additional cover.
- 19.3 Details of any additional vegetative cover.
- 19.4 After use plans.
- 19.5 Plans for continued maintenance, operation and monitoring of the leachate collection system.
- 19.6 Plans for the continued monitoring of surface waters, ground waters and gas migration.
- 19.7 Plans and schedules for routine inspection and maintenance of the site after closure.
- 19.8 Updated contingency plans to mitigate impacts from leachate or gas migration.