FINAL REPORT

EVALUATION PROTOCOL FOR SITE TOXICITY

Prepared for:

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EXECUTIVE SUMMARY

The purpose of the study was to evaluate Phase 1 environmental site investigation procedures in use in Canada and the United States, and to define a model Phase 1 site investigation procedure that could be used by CMHC during their mortgage insurance, development, and purchasing activities.

Norecol, with support from the Canadian Environmental Industry Association (CEIA) collected more than 80 Phase 1 documents from organizations across Canada who offer Phase 1 site assessment services. Preliminary sorting and review was used to select a final subset of 12 documents for a detailed comparative analysis and ranking. Based on this ranking, a set of four documents was selected for a final review and preparation of the model Phase 1 environmental site investigation procedure. This process is described in Section 2.0 of the report. The final four site investigation procedures are in Appendix H.

Section 3.0 of the report reviews Phase 2 environmental site investigation procedures including intrusive and non-intrusive investigation methods. A brief environmental consultant profile and summary of Phase 2 costs are also provided.

Factors influencing the use of Phase 1 environmental site investigation procedures are presented in Section 4.0. These include regulatory, land use or development, and environmental industry factors.

The proposed model Phase 1 environmental procedure is presented in Section 5.0. The procedure has been broken down into its three major components, site history and records review, site reconnaissance and interviews, and report content.

Included in the Appendices are a database of Canadian companies providing Phase 1 environmental site investigation services; contact information for the CEIA and other industry and professional associations in Canada and the United States; a summary of average costs provided by the industry of Phase 1 site investigations; a summary of Phase 2 environmental site investigation techniques; a review of the need for CMHC to conduct environmental audits; the detailed rationale for the scoring system used to compare the Phase 1 investigation documents; a listing of recent Canadian environmental directories; the four Phase 1 documents considered in the final review process; and an example of a typical Phase 1 statement of limitations.

RÉSUMÉ

L'étude a pour but d'évaluer les procédures pour la phase 1 de l'étude environnementale d'un site employées au Canada et aux États-Unis et de définir un modèle de procédure pour ce type d'étude que la SCHL pourrait utiliser dans ses activités d'assurance hypothécaire, d'aménagement et d'achat.

Norecol, avec l'aide de l'Association canadienne des industries de l'environnement, a recueilli plus de 80 documents de phase 1 auprès d'entreprises canadiennes qui exécutent ce genre d'évaluation. Un premier tri a permis de sélectionner une série de douze documents aux fins d'analyse comparative détaillée et de catégorisation. À partir de cette catégorisation, quatre documents ont été retenus en vue d'un examen final et de la préparation d'un modèle de procédure pour la phase 1 de l'étude environnementale d'un site. Ce processus est décrit à la section 2.0 du rapport. Les quatre procédures d'étude retenues se trouvent à l'annexe H.

La section 3.0 du rapport traite des procédures pour la phase 2 de l'étude environnementale d'un site, incluant les méthodes d'étude envahissantes et non envahissantes. On y présente également un bref profil du consultant et un aperçu des coûts de la phase 2.

Les facteurs qui déterminent le recours aux procédures de la phase 1 de l'étude environnementale d'un site sont présentés à la section 4.0. Ils concernent la réglementation, l'utilisation des sols, l'aménagement des terrains et l'environnement.

Le modèle de procédure proposé pour la phase 1 de l'étude environnementale est décrit à la section 5.0. Cette procédure a été subdivisée en trois composantes principales, à savoir l'historique du site et l'examen de la documentation, la reconnaissance du site et les entrevues, de même que la teneur du rapport.

Les annexes renferment une base de données des entreprises canadiennes qui offrent des services pour la phase 1 de l'étude environnementale d'un site; indiquent des personnes-ressources au sein de l'Association canadienne des industries de l'environnement et autres associations professionnelles et industrielles du Canada et des États-Unis; donnent un aperçu des coûts moyens demandés par l'industrie pour la réalisation de la phase 1 de l'étude environnementale d'un site; résument les techniques relatives à la phase 2 de l'étude environnementale d'un site; passent en revue le besoin qu'a la SCHL de procéder à des vérifications environnementales; expliquent en détail le système de notation utilisé pour comparer les documents de la phase 1 des études; dressent une liste de répertoires récents dans le domaine de l'environnement au Canada; présentent les quatre documents de la phase 1 analysés lors de l'examen final; donnent un exemple typique d'énoncé des restrictions de la phase 1.

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1.0 INTRODUCTION

This report has been prepared for Canada Mortgage and Housing Corporation (CMHC) by Norecol Environmental Management Ltd. (Norecol) to fulfil the requirements of the contract awarded to Norecol to evaluate site toxicity protocols on behalf of CMHC. The terms of reference for the project were supplied to CMHC in Norecol's proposal of March 12, 1992.

This introductory section of the report includes a discussion of nomenclature used for site toxicity protocols; a statement of the purpose of the study; an outline of the scope of work and methodology for the project; some background to the need for CMHC to complete Phase 1 environmental site investigations; and a brief outline of the report format.

1.1 Nomenclature

The nomenclature for these types of environmental site assessments or investigations has still to be agreed upon by the parties involved. In the United States they are referred to as property transfer assessments, prepurchase/presale reviews, Innocent Landowner Defense documentation, site inspections, predisposition assessments, real estate evaluations, site reconnaissance, environmental site assessments, or Phase 1 or Tier 1 reviews (Kuhre 1991).

The United States Association of Engineering Firms Practising in the Geosciences (ASFE) has called them preacquisition site assessments, or preliminary site assessments (PSAs) for many years (ASFE 1990). In their review (ASFE 1990) of the state of the practice in PSAs, ASFE found that approximately 80% of the 184 respondents to their survey used the term "assessment", as opposed to "audit", "study", "survey", or "evaluation". "Preliminary" was found to be the most popular modifier (approximately 54%) rather than "Phase 1" (approximately 23%). The United States Association of Groundwater Scientists and Engineers (AGWSE) uses the term "environmental site assessment" when discussing this service (AGWSE 1992).

In Canada, the most widely accepted terms used for these activities appear to be "Phase 1 environmental site assessment" or "Phase 1 environmental site investigation". The modifier "preliminary" is also used to some extent. For the purpose of this report, the term Phase 1 environmental site investigation, or environmental site investigation will be used.

1.2 Purpose of Study

The purpose of this study is to provide CMHC with an evaluation of environmental site investigation procedures, and through this evaluation to propose a model Phase 1 environmental site investigation procedure that CMHC can use to assess the potential risks associated with properties being considered for mortgage insurance, purchase or development. The study will be published initially as an internal publication of the Research Division of CMHC. In a subsequent project, the report may be produced as a manuscript for publication and distribution by CMHC.

Canada Mortgage and Housing Corporation requires a Phase 1 environmental site investigation procedure for use by its personnel during their mortgage insurance, development and purchasing activities. This will provide for a more effective means of managing environmental risks throughout the range of CMHC's business activities.

1.3 Scope of Work and Methodology

This final draft report includes the results of the four tasks of the Norecol work program agreed to by CMHC. Task 1 of the project work comprised a comparative analysis of the various components and subcomponents of Phase 1 environmental site investigations used in Canada and the United States. A review of suppliers of Phase 1 environmental site investigations in Canada was completed by the Canadian Environment Industry Association (CEIA) and Norecol and a copy of the database is included as Appendix A. Additional information on the CEIA is included as Appendix B. Information regarding typical costs for completion of Phase 1 environmental site investigations was collected by the CEIA and is summarized in Appendix C.

Task 2 comprised a discussion of the types of techniques, and typical costs for Phase 2 investigations. Factors influencing the initiation of Phase 2 studies were also reviewed. This task included a review of internal Norecol documentation on Phase 2 environmental site investigation procedures, and a review of literature in technical journals and other publications covering this topic. The different types of methodologies and equipment used in Phase 2 environmental site investigations are provided in Appendix D.

This review of Phase 1 environmental site investigations does not include insurance or corporate compliance audits. Insurance audits are a specialized form of environmental audit, typically completed

in conjunction with the issuance of an environmental liability insurance policy to cover either sudden, catastrophic pollution events, or more gradual environmental impairment events.

Several insurance carriers that offer pollution or environmental impairment liability insurance require an environmental audit to be completed to assist them in their underwriting decision. These insurance audits differ both in the nature of the audit procedures and the level of effort that is expended. Insurance audits often take a less detailed look than many corporate compliance audits and tend to focus on short and long term liabilities associated with current operations of a facility, for example.

Corporate compliance, or performance, audits are a more thorough review of a company's operating facility or property. Compliance audits aim to identify procedures that are non-compliant with current environmental legislation and regulations, or have the potential to increase the risk of non-compliance. A corporate compliance audit typically involves two main activities:

- assessment of the environmental management system and its controls; and

- verification of performance/compliance against either internal goals or external regulations.

The corporate compliance audit identifies appropriate corporate policies, reporting structures, and contingency measures, and evaluates their effectiveness in maintaining compliance. The corporate compliance audit should also provide guidance in the form of a review of proposed changes in environmental legislation that may impact the operations of the facility being audited. The report produced as a result of a corporate compliance audit should include recommendations for adoption of new procedures aimed at returning the operation into compliance by eliminating or reducing wastes produced, decreasing resources consumed, or resolving environmental concerns.

Task 3 identified and discussed factors that may cause changes or variations in the needs for Phase 1 environmental site investigations. The needs particular to residential sites were reviewed by the project team's advisory council at a workshop held in Vancouver in August 1992. An assessment of recent legal cases setting precedent, including a review of the question of "ownership in receivership" and the need for CMHC to complete environmental audits, was also completed and is fully documented in Appendix E. Possible future directions regarding professional standards in the industry and certification/registration were analyzed by the CEIA.

The final task of the project was to synthesis the information collected and reviewed in Tasks 1 to 3 into a model Phase 1 procedure that could be used by CMHC.

1.4 Need for CMHC to Complete Phase 1 Environmental Site Investigations

The environmental framework within which CMHC operates is becoming increasingly complex. The extent of environmental legislation and regulations is changing on an almost daily basis, and regulatory enforcement is becoming more stringent in many provinces. Operations that are in compliance now need to maintain this diligence or they may not be in compliance in six months time. Many organizations have traditionally considered environmental issues somewhat of a nuisance factor that would eventually disappear. This approach has often placed these companies, their operations, and the environment at significant risk. Environmental issues continue to remain uppermost in people's minds despite the current recessionary climate, and are here to stay for the foreseeable future.

Environmental risks can turn from latent concerns to those that are front page news. The costs associated with the clean up of contaminated sites, from the Sydney Tar Ponds in Atlantic Canada, to the St Basille le Grand PCB fire in Quebec, the Hagersville tire fire in Ontario, the DEW line sites in the North, the Domtar site in Alberta, to the EXPO lands in B.C., are staggering. Poor environmental risk management can destroy years of expensive corporate image development, cause major operational delays, and alienate employee loyalties. In addition, it can be very expensive to deal with site remediation.

In the 1990s organizations will need to take more of a pro-active approach to environmental risk management to avoid these costly environmental headaches. The environmental department should not be considered a costly add-on to being in business, but should be looked on as an essential component of the overall corporate management system. Corporate environmental risk management can be defined as a process to identify, understand, anticipate, and control key issues or facts related to the operations of an organization. Knowledge of the nature and level of environmental risks is becoming increasingly important in even the smallest of business transactions, for example, a $200K property acquisition.

1.5 Report Format

Section 2.0 of the draft final report consists of a review of existing Phase 1 environmental site investigation procedures using a numerical evaluation procedure developed specifically for this project. The evaluation procedure is described more fully in Appendix F.

Section 3.0 includes a brief introduction to Phase 2 site investigation procedures, a discussion of the possible triggers for Phase 2 investigations, and a brief review of possible costs for Phase 2 studies.

Section 4.0 looks at the factors that may cause changes or variations in the needs for Phase 1 environmental site investigations, including trends towards increasing urban intensification and rezoning of industrial land for residential use. Recent changes in environmental legislation and a review of recent precedent-setting cases is included in Section 4.0. Directions that industry and professional associations are taking with development or certification or registration of environmental professionals who provide environmental site assessment services are also discussed in Section 4.0.

Section 5.0 presents the model Phase 1 environmental site investigation procedure which Norecol recommends for use by CMHC.

2.0 REVIEW OF EXISTING PHASE 1 ENVIRONMENTAL SITE INVESTIGATION PROCEDURES

This section of the report includes descriptions of the methods used to complete a preliminary sorting of the more than 80 Phase 1 environmental site investigation documents that were reviewed as part of this study. After the preliminary sorting to remove insurance and compliance audits was accomplished, the remaining 40 Phase 1 documents were then reviewed to select a smaller subset of Phase 1 assessment documents. Three evaluation factors were the focus of the preliminary review. These included:

- Phase 1 format;
- scope of the information collected; and
- scope of the information sources referenced.

After the preliminary review, the remaining 12 samples were broken down into their major components with varying numbers of minor subcomponents. These components and subcomponents were evaluated and assigned a numerical score by comparison with a scoring system developed by Norecol. The site assessments were then ranked in terms of their numerical scores using this system, which is included as Appendix F to this report.

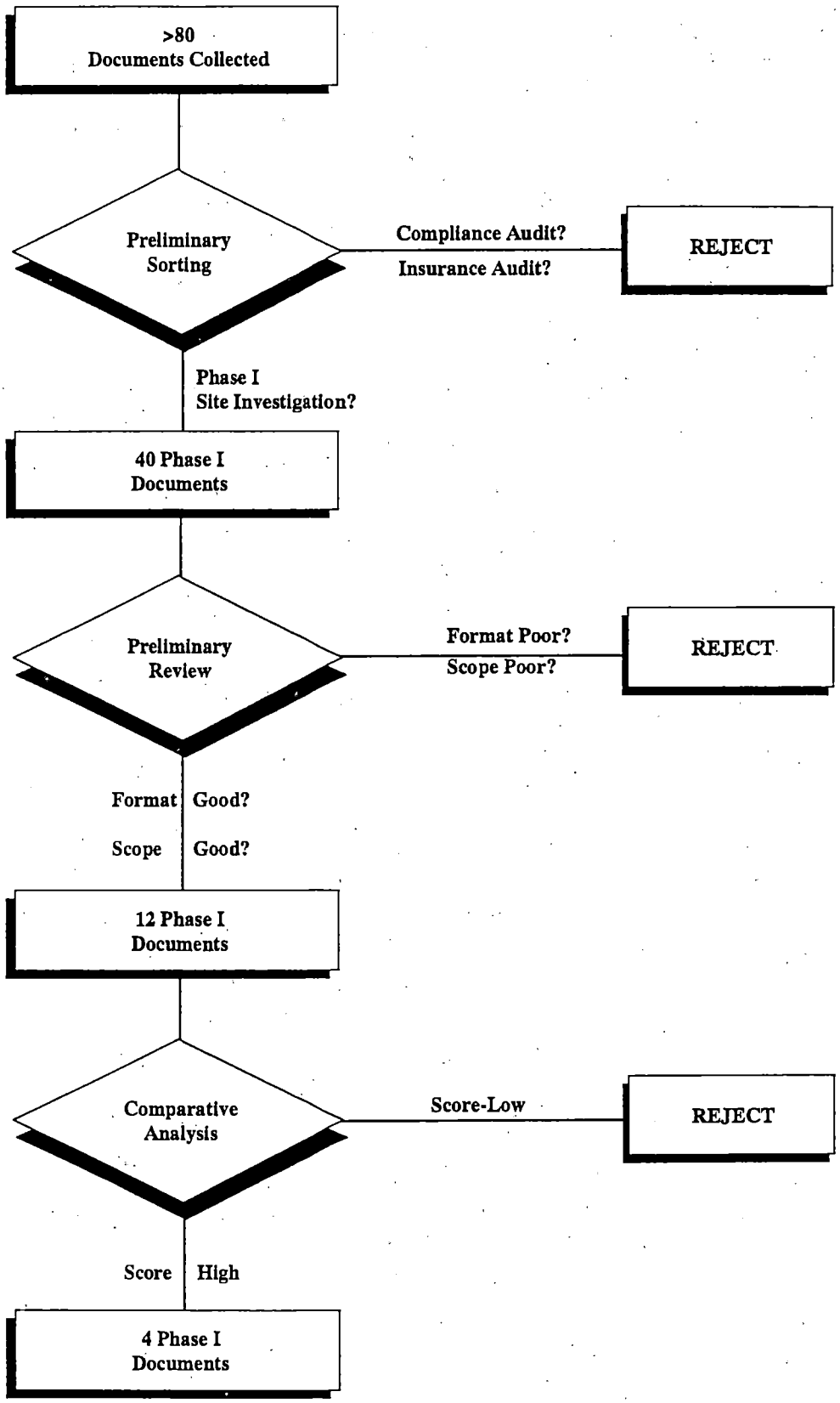
Those 12 Phase 1 procedures that were described in sufficient detail to allow them to be ranked were then further divided into an upper grouping (one third of the total) and a lower grouping (the remaining two thirds), based on their numerical scores. The upper third of the Phase 1 documents, four in total, were then subjected to a final detailed review to examine their common features and any variations that CMHC could utilise in their model Phase 1 environmental site investigation procedure. The overall evaluation scheme for this part of the project is shown schematically in Figure 2.1.

2.1 Introduction

The B.C. Chapter of the Canadian Environment Industry Association (CEIA) has developed a list of Canadian companies who have indicated they have experience with Phase 1 environmental site investigations. The database generated by the CEIA contains the names of more than 100 companies (in more than 200 geographic locations) that provide this type of environmental management service.

CMHC

EVALUATION SCHEME FOR REVIEW OF PHASE I DOCUMENTS



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The list was compiled through an interview process with companies listed as providing site assessment work in various environmental industry directories, with additional companies identified during the interview process as doing Phase 1 environmental site investigations. Information sources included in the interview process are included as Appendix G.

In the interview process, current information was collected on the company name, address, telephone and fax number, and contact person, and whether or not the company was actively undertaking Phase 1 site investigations. More than 350 environmental companies were contacted initially, making the resulting list the most comprehensive and accurate data set available on companies carrying out Phase 1 work in Canada.

To be included in the list, a company had to be able to perform a complete Phase 1 environmental site investigation. The CEIA felt that it was important not to subjectively eliminate companies based on any other criteria. Approximately 80 organizations, contacted by the CEIA and Norecol, submitted information regarding their protocols and/or charges for doing Phase 1 site assessment work. There was a significant amount of concern about the confidentiality of the information shared. Consequently, some of the information on protocols submitted may reflect a reluctance to tell all, rather than the fact that a given organization's site assessment has no depth.

Although it is important for a company to be able to follow through with a Phase 2 investigation, this was not a criterion for inclusion in this list. It is generally felt by the leading companies in the environmental assessment field that to properly assess the environmental risks associated with a piece of property, one needs to also have the expertise to do sub-surface, or Phase 2, assessments. As would be expected, those who do not have Phase 2 capabilities, and beyond, would beg to differ.

2.2 Preliminary Sorting

While all the sample Phase 1 documents collected by the CEIA and Norecol were referred to as preliminary environmental site assessments, their objectives varied greatly. The original sample set broke down quite readily into three major groupings.

One group of Phase 1 documents evaluated the risks associated only with building hazards or current industrial operations of a facility. These audits bore more resemblance to corporate compliance audits than Phase 1 environmental site investigations, in the strictest sense. A second group of Phase 1

documents either assessed the risks associated with a specific issue, for example, insurance audits, or they addressed specific environmental risks associated with a known former use such as, for example, pesticide usage.

The original samples were sorted so that only those sharing the CMHC's objectives would be used in the subsequent preliminary review and final ranking. This final group of approximately 40 Phase 1 documents that addressed the concerns of past and present land use, including buildings, was then subjected to a preliminary review.

2.3 Preliminary Review

A preliminary review was completed of the remaining approximately 40 Phase 1 documents using the three evaluation factors of the suitability of the sample format, the scope of the information collected, and the scope of the information sources referenced.

The Phase 1 format of some of the remaining Phase 1 documents was not suited to the final detailed comparative analysis. For example, some samples were reports in which a list of reference sources consulted for the site history/records review component was not included. Other samples were brief itemized lists of Phase 1 methodologies, presented in insufficient detail for further analysis.

There was a marked variation in the quantity of information collected and evaluated by each Phase 1 method. Some studies limited the assessment of adjacent properties to a visual inspection only, while others required historical research into the location of adjacent water wells, a review of prior land use on adjacent properties, and consultation with regulatory agencies. Preference was given to the protocols that included the widest scope of information.

A second variable in the remaining samples was the quantity of information sources consulted for information on current and past land use. For example, some protocols required little cross-referencing of information sources. Other assessments of current or past waste handling practices were based on visual inspection and interviews only, with little reference to impartial third party sources such as municipal or provincial files. Preference was given to those Phase 1 documents that required reference to disparate sources of information.

Based on these three evaluation factors, a final grouping of 12 Phase 1 documents was chosen for the detailed comparative analysis.

2.4 Comparative Analysis

The comparative analysis was completed using a scoring system devised by Norecol. The system was based on professional judgement and experience of several of Norecol's senior technical staff who have completed more than 300 Phase 1 environmental site investigations in the past five years.

The scoring system (see Appendix F) was divided into three main components:

- site history/records review;
- site reconnaissance and interviews; and
- report content.

Each of the components was ranked approximately equal in importance and assigned a total of 33 (site history/records review and report content) or 34 (site reconnaissance and interviews) points. These totals were then assigned to the subcomponents as described in Appendix F. Based on the results of using this system, four of the Phase 1 documents were selected for a final review (Appendix H).

The most comprehensive of the Phase 1 environmental site investigation procedures was the Interim Final Report on Guidance to Environmental Site Assessments issued by the National Ground Water Association in the United States in March 1992 (AGWSE 1992).

The AGWSE has developed this draft report on a volunteer basis with input from more than 160 of its members. In August 1991, at the 2nd Annual Environmental Site Assessment Conference, the Association of Ground Water Engineers and Scientists (AGWSE), a division of the NGWA, presented the first draft of the report with an invitation for NGWA members to submit comments on the draft report by May 15, 1992. The final report from the NGWA was scheduled for release in August 1992 at the 3rd Annual Environmental Site Assessment Conference.

The AGWSE interim report identifies the three main components of a Phase 1 environmental site investigation as:

- information review:
- site walkover; and
- Phase 1 report.

The AGWSE interim report included all the major components and minor subcomponents included in the screening template for both the information review and the site walkover. The AGWSE report also rated highly in terms of the amount of detail provided on the type of information to be included in the Phase 1 report. The section of the AGWSE report on the Phase 1 report format did not include a discussion of the methodology used in the Phase 1 investigation. With this exception, the AGWSE report section was essentially complete when compared with the scoring system. In addition, the AGWSE report also included a section on the use of a statement of purpose for the Phase 1 report. This was considered to be an important component for the model CMHC Phase 1 procedure.

The Public Works Canada (PWC 1989) procedure was also included in the upper third of the final group of assessments. The information review and site reconnaissance sections of the procedure both scored close to the maximum with the evaluation system used. The section on the content of the Phase 1 report was not as detailed as others and did not score as highly as others. Specifically, information was lacking on inclusion of the following report components: an executive summary; the scope of work; methodology; topography of the site; the geologic and hydrogeologic setting; and standard limitations.

The remaining two Phase 1 assessment procedures both rated highly in terms of the site history/records review components and only had their ratings reduced by lack of information regarding the content of the Phase 1 report. Of these two samples, one was based on the summary document produced by the Association of Engineering Firms Practising in the Geosciences (ASFE 1990). The ASFE completed a review of submissions from more than 170 of their members in producing their 1990 report. The content of the ASFE document is similar to the AGWSE (1992) report (AGWE 1992).

Following the detailed comparative analysis and final review, the four remaining Phase 1 documents were used to generate the model Phase 1 procedure, which is presented in Section 5.0 of this report.

3.0 REVIEW OF PHASE 2 ENVIRONMENTAL SITE INVESTIGATION PROCEDURES

This section of the report provides an introduction to the use of Phase 2 environmental site investigation techniques and their objectives. The decision-making process for implementation of Phase 2 programs is then discussed and a brief introduction to the types of Phase 2 techniques is provided. The section concludes with a profile of environmental consultants that provide Phase 1 and Phase 2 site assessment services.

3.1 Introduction

Phase 2 environmental site investigations are designed to assess environmental risks in areas identified as potentially-contaminated during the Phase 1 effort. These supplemental studies typically entail subsurface exploration by intrusive means such as excavation by hand-auger, backhoe, or drill rig; and installation of piezometers, or observation wells. Subsurface exploration can also be achieved by non-intrusive means such as geophysical or soil gas surveys, and indoor/outdoor air quality testing. Chemical analysis of the samples can be carried out in the field or in the project laboratory.

The objectives of typical Phase 2 investigations are:

- to ascertain whether potential contaminants identified during the Phase 1 effort are present on site; and

- to identify, characterize, and assess the concentrations of any contaminants

Supplemental Phase 2 studies may be required to better define the areal and vertical extent of contaminated, soils and groundwater, and to facilitate planning and implementation of remediation efforts. Remedial activities are often referred to as Phase 3 investigations.

3.2 Implementation of Phase 2 Site Investigations - The Decision-Making Process

Phase 2 investigations are initiated if the Phase 1 investigation suggests soils or groundwater on-site are contaminated or if a potential contamination source remains on-site. Typically, they are suggested based on the consultant's findings in the Phase 1 report and on the consultant's recommendation.

Phase 2 studies are most often implemented when one of the following environmental hazards is identified in the Phase 1 investigation:

- underground storage tanks present on the property;
- asbestos within building materials, or leakage of PCBs from light ballasts/transformers;
- evidence of landfilling on the property;
- long history of industrial use;
- evidence of less than desirable industrial "house-keeping" practices;
- hazardous chemical use on property;
- visual olfactory evidence of soil/groundwater contamination;
- evidence of upgradient, off-site sources; and
- significant industrial activities within 1000 m of the subject property.

Even if potential for contamination is not identified during Phase 1, a Phase 2 investigation may be required to convince government regulatory agencies to grant approvals required to proceed with site development. This is not unreasonable since information available from the Phase 1 investigation may be incomplete.

A limited number of decision-making mechanisms were found in the literate review completed for this study. The positive identification of potential or existing contamination as a result of the Phase 1 assessment has been described as the trigger to initiate Phase 2 studies to collect and analyze samples of environmental media (Funderburk 1990). Public Works Canada (PWC 1989) has used the presence of one of the following as triggers for Phase 2 investigations:

- USTs;
- asbestos;
- hazardous materials;
- transformers;
- landfills; and
- soil contamination.

3.3 Phase 2 Environmental Site Investigation Techniques

Techniques that reveal the greatest amount of useful information with the least time and expense are most commonly employed in Phase 2 studies. An overview of these typical, cost-effective techniques follows.

Techniques employed in Phase 2 investigations depend on such things as the geological and hydrogeological characteristics of the site, and on potential contaminants and their characteristics, such as mobility in the environment. Soil gas surveys, for example, are useful only for detecting volatile contaminants in permeable soils. Similarly, groundwater monitoring would be indicated at a site where there is highly permeable soil, especially if the groundwater is used for domestic consumption. A useful source of more detailed information on Phase 2 techniques is "A Compendium of Superfund Field Operations Methods" (EPA 1987). A summary of Phase 2 environmental site investigation techniques is shown in Table 3.1.

Costs of Phase 2 environmental site investigations depend on the number of surface or subsurface investigation points, the number of soil and groundwater samples collected, and the types of analyses. Costs for Phase 2 work can range from $5,000 to $100,000 or greater. Our experience has been that typical Phase 2 costs are in the range of $10,000 to $50,000 with an average cost close to $30,000.

3.4 Environmental Consultant Profile

As two of the key factors influencing the decision to proceed to Phase 2 are the conclusions and recommendations of the environmental consultant, a brief consultant profile is included here.

The environmental consultant selected to provide environmental site assessment services essentially will be representing your organization and seeking to protect your interests in dealings with regulatory authorities, adjacent land owners, and other parties involved in the site assessment procedure. Reputable and experienced site assessment groups use the phased approach to this type of work. A typical Phase 1 environmental site investigation is conducted as part of the due diligence process and should be considered as a preliminary risk survey for actual or potential site contamination. A thorough Phase 1 assessment, and any subsequent Phase 2 studies, require the input of many specialists with experience of similar types of site assessments.

TABLE 3-1

PHASE 2 ENVIRONMENTAL SITE INVESTIGATION TECHNIQUES AND TOOLS

1.0	INTRUSIVE TESTING	TECHNIQUES AND TOOLS
1.1	Manual Sampling	Trowel, shovel, corer, hand augers, Niskin samplers, etc.
1.2	Test Pit Excavations	Rubber-tired backhoe
1.3	Drilling	Auger, sonic drilling, rotary drilling, Becker hammer, cable tool, Vibracore
1.4	Groundwater Monitoring	Piezometers, bailers, pumps
2.0	NON-INTRUSIVE TESTING	TECHNIQUES AND TOOLS
2.1	Soil Gas	Probes, absorbent tubes
2.2	Geophysics	Electromagnetics, ground penetrating radar, seismic refraction
2.3	Ambient Air	Explosimeter, FID, PID, GC, indicator tubes, oxygen meter, CO_2 meter
3.0	OTHERS	TECHNIQUES AND TOOLS
3.1	Asbestos	Microscopic identification of fibres
3.2	PCBs	GC-ECD
3.3	Radon	Radiation detector
3.4	Urea Formaldehyde Foam Insulation	Gas detector

Companies offering Phase 1 and Phase 2 site investigation services should have expertise in the following disciplines:

- information research and retrieval;
- environmental science;
- environmental legislation;
- chemistry and geochemistry;
- geology and hydrogeology; and
- engineering (civil/chemical/mechanical).

Many companies with traditional roots in other fields, for example, real estate evaluation, geotechnical engineering, building contractors, etc., have attempted to enter this rapidly-expanding field, with mixed results, including several well-publicised legal actions. Widespread demand for environmental site assessment services has resulted in a broad spectrum of companies with varying levels of experience, qualifications, capabilities, and quality control/quality assurance (QA/QC) protocols.

For a useful Phase 1 site assessment, an experienced environmental services group should be retained. This means a company with a solid track record in the site assessment business. Due to the short history of this business, this means a group with about four to five years experience, preferably unblemished by the stain of legal actions. Active environmental consultants with long track records will have dealt with hundreds of different site assessments, perhaps even one adjacent or close to the current subject property.

Experienced environmental site assessors are more capable of providing clear statements of the actual and potential environmental risks associated with a site. Vague statements about environmental risks make any Phase 1 report virtually worthless. Experienced site assessment groups will support statements in their reports with documented reference materials such as air photographs, directories, archive materials, conversation records, etc.

The use of environmental site investigations for property transactions is well established in the United States. Particularly important to mortgage insurers and other financial institutions is the "deep-pocket" concept prevalent in the United States that was brought about by CERCLA legislation. The same forces that created this situation in the United States have been present in Canada for the past three

or four years; increasing public concern with environmental issues, and increasing regulatory involvement and fines, even prison terms, for poor environmental management practices.

The federal regulatory framework for managing contaminated sites is incomplete. Environmental Canada has the mandate to enforce the Canadian Environmental Protection Act (CEPA). Under Section 37 of CEPA, Environment Canada may recommend that certain regulations be enacted with respect to the manner and conditions of the release to the environment of a "toxic substance" (as defined in CEPA).

In response to growing public concerns with contaminated site management throughout Canada, the Canadian Council of Ministries of the Environment (CCME) has initiated the National Contaminated Sites Remediation Program (NCSRP) to identify and remediate high priority contaminated sites in Canada. The CCME has developed Interim Environmental Quality Criteria for Contaminated Sites using environmental quality criteria adopted directly from several Canadian jurisdictions.

Virtually all the environmental consultants in Canada will have performed environmental sites investigations for less than five years. In Canada, as in the United States, there is no nationally recognized certification or registration procedure for environmental sites assessment professionals. The State of California has operated a certification program for site assessors since 1988. Several national associations in the United States are in the process of developing more formal certification or registration programs. With the recent boom in demand for environmental site investigation services, many companies have jumped on the environmental bandwagon and are using marginally-qualified people to complete site evaluations (Frentz and Matheson 192).

Until recently, environmental errors and omissions insurance for environmental site assessments has been prohibitively expensive and limited in its application. With increasing awareness of the risks associated with this type of professional service, insurance companies are now offering more competitive products designed to cover environmental liabilities associated with site assessment projects.

4.0 FACTORS INFLUENCING THE USE OF PHASE 1 ENVIRONMENTAL SITE INVESTIGATIONS

There are many factors influencing the use of Phase 1 investigations and possible changes or variations in Phase 1 procedures. They can be grouped into the following major categories:

- regulatory factors;
- land use or development factors; and
- environmental industry factors.

These three main categories are reviewed in the following section of the report. A review of some of the regulatory factors influencing the use of Phase 1 investigations is included as Appendix E.

4.1 Regulatory Factors

There are no current legislative requirements in Canada to complete Phase 1 environmental site investigations, or audits, nor are there any indications that this legislation may be introduced in the near future. Mortgage guarantors, such as CMHC, should now be requesting Phase 1 investigations as part of the due diligence activities associated with reducing their level of business risk.

Environmental risk management is becoming increasingly important in the property transfer process in Canada, following a more well-established process in the United States. The same forces that created the widespread use of Phase 1 investigations in the United States are now present in Canada; heightened public concern with environmental issues related to contaminated sites, coupled with increasing regulatory involvement, fines, and even prison terms for poor environmental management practices.

The "polluter-pays principle" has become the touchstone for the development of present-day environmental legislation and regulations in such provinces as Ontario, British Columbia, Alberta, and others. However, as many organizations are coming to realize, the "non-polluter" can also be required to pay for the environmental pollution which they may have only been indirectly responsible for. If the search for a guilty party is fruitless, then the deepest pockets may be accessed to pay for environmental remediation of a contaminated site.

Due diligence is considered to be the single most important defensive approach for legal protection against allegations of most environmental offenses (Saxe 1992). As defined by the Supreme Court of Canada, due diligence entitles a person to acquittal if he proves on a balance of probabilities that he has done everything reasonable to prevent the offence from occurring, or if he reasonably believed in a mistaken set of facts which, if true, would have made his act or omission innocent (Saxe 1992).

Due diligence should be an integral part of the environmental management system of any corporation exposed to substantial environmental risks as part of its routine operations. To demonstrate due diligence, an effective environmental management system must be in place (and it must be shown to be in place) to prevent offenses from occurring, to monitor ongoing performance, and to improve the effectiveness of the system.

Due diligence, in part, is a reflection of industry standards, that is, a measure of what equivalent industry groups are doing. Standards of environmental due diligence with most industry leaders are high and are rising rapidly in response to the increasing use of fines by regulators. The reasonable standard of care to be taken by CMHC can be gauged (Saxe 1992) by reference to a few key issues:

- risk predictability;
- statutory requirements;
- the custom in the industry; and
- the alternatives.

Due diligence requires that CMHC prepare for risks that are objectively foreseeable by a reasonably thoughtful person. The higher the degree of hazard the greater the level of care and risk minimization that should be applied. Avoidance of statutory requirements is a clear-cut indication of a severe lack of due diligence. Violations of non-legislative documents such as codes of practice, and even internal policies and procedures, may also constitute a lack of due diligence.

Complying with generally accepted customs of the industry is often cited as strong evidence for due diligence. This is often a minimum standard of care. However, a greater standard of care may be warranted in certain situations. For CMHC, this could require comparison with the customs of other federal government agencies, such as the Federal Business Development Bank, or private sector institutions such as commercial banks and larger insurance companies. Comparison with reasonable alternatives which might be available is often a good measure of the level of due diligence. Lack of

knowledge of reasonable alternative courses of action is considered a lack of due diligence (Saxe 1992).

The standard of care within an industry can be raised by reacting promptly to notice of a problem from any source, either internal or external; by maintaining a high level of internal technical knowledge and expertise; and by avoiding or minimizing hazardous activities in certain locations. It is important to note that the application of due diligence is limited to taking all reasonable care, not all possible care.

Legal risks associated with property acquisition or divestiture, or land development will change significantly in the next five years. However, losses of lenders will probably continue to increase as regulations become more stringent and the levels of fines increase. Environmental site investigations will be used more widely as a means of demonstrating a defence of due diligence. The techniques of environmental risk management will become as crucial to continuing corporate success in the 1990s as sound fiscal management has been in the past.

4.2 Land Use or Development Factors

Land use and development factors that may influence the need for Phase 1 environmental site investigations were developed and discussed during an informal two hour workshop meeting held on August 26, 1992 in Vancouver.

The following people attended the meeting:

- Ms. Shelley O'Callaghan, Bull, Housser, Tupper, Barristers and Solicitors
- Dr. John Wiens, Ministry of Environment, Lands and Parks, Government of British Columbia
- Mr. Lyall Armstrong, General Manager, Genstar Development Corporation
- Mr. Bob Laurie, Vice President, Intrawest Development Corporation
- Mr. Don Rodney, First City Trust
- Mr. Gary Letcher, Edwards Kenny & Bray, Barristers and Solicitors
- Dr. Jim Malick, President, Norecol Environmental Management Ltd.
- Dr. Andrew Gillam, Vice President, Operations, Norecol Environmental Management Ltd.
- Mr. David Smail, Director, Marketing, Norecol Environmental Management Ltd.

Factors influencing Phase 1 environmental site investigations were evaluated at the workshop using a technique known as FAIR (Factor, Assumption, Impact, Response) analysis. In the FAIR approach, each influencing factor is considered with respect to the assumptions about possible future changes. The impact of those changes on each of the factors is then determined and, finally, the responses to address the possible impact are determined.

A summary of the FAIR analysis discussed at the meeting is provided in Table 4.1.

Other notes that came out of the meeting and that you may wish to consider were:

- Private sector companies are offering new real estate insurance coverage that may be of benefit in reducing CMHC's environmental exposure. CMHC could also examine the possibility of establishing their own internal insurance coverage to self-insure against these types of risks. Costs of coverage would be passed to the borrowers; and

- CMHC, if confronted with an order to remediate a contaminated site, could explore the possibility of challenging the legal basis of the order. This may help to set some precedent in the current climate of legal uncertainty.

4.3 Environmental Industry Factors

One of the major factors influencing the nature and extent of the use of Phase 1 investigations is the standard of care in the environmental industry itself. At the present time there are no widely accepted professional standards or designations for individuals or companies providing environmental site assessment services in either Canada or the United States.

Within Canada, there are two major industry associations who are currently involved in the review of standards in the environmental service industry; the Canadian Environment Industry Association (CEIA), and the Canadian Environmental Auditing Association (CEAA). Other activities in progress in this area in Canada include a human resources study by Employment and Immigration Canada (Ernst and Young 1992) and a codes of practice study by Western Economic Diversification.

In the United States, the American Society for Testing and Materials (ASTM), the Air and Waste Management Association (AWMA), and the National Ground Water Association (NGWA) are all

TABLE 4.1

FAIR ANALYSIS
LAND USE AND DEVELOPMENT FACTORS

FACTOR	ASSUMPTIONS	IMPACT	POSSIBLE RESPONSES
1. Intensification or change of land use.	• Demographics show that people are moving to urban and suburban areas. • Trends in US cities in this regard are felt to be occurring in Canada • Mothballing of old industrial. operations accompanied with tighter financial conditions, and increased demand for land along waterways, the natural transportation corridor for industrial movement, has made this an attractive alternative for sunset industries facing tighter financial situations. • Likely higher risk (contaminated) sites are involved with this redevelopment. • Suburban areas under increasing development pressure as urban areas are too congested and unaffordable. • Increasing demand for land which could be ecologically sensitive.	• High density development in urban centres calls for a close look at in-fill developments when they occur. • Generally higher risk sites will be used for development. Number of controversial sites increases. • CMHC lending on sites historically deemed marginal, such as peat filled or water bogs, can now be developed with new construction technologies. These sites may be the location of illegal dumping practices. • Cost to end user of the development may increase, which increases lending ratio in turn increasing CMHC's risks. • Higher risk land coming to fore more often, forces the issue of due diligence and makes it more necessary.	• Coordination with lenders needed to ensure that they are also working to minimize their risks. Creation of common triggers for site investigations. • Due diligence should be equivalent to other large corporations. • Need to recognize increases in operating costs.
2. Federal Government's Code of Environmental Stewardship may require CMHC to reduce its overall environmental risks. (A variable to this may be that changing political direction could influence this factor.)	• Federal Government's move towards environmental stewardship, as presented in the Green Plan, may require CMHC to provide clearer indication of existing risk in their real estate insurance portfolio. • Political needs may change and CMHC may be required to take action.	• EARP guidelines apply to all large projects. CMHC's development group may find their need for site investigations increases as EARP reviews are increased. (Note that EARP reviews are not Phase 1 site assessments.) • Maintain balance - response possible now, may not be possible in future.	• CMHC may wish to consider development of an environmental policy statement.
3. Increasing litigation over environmental issues. (This may be a perceived issue, but does not yet appear to be happening.)	• Litigation in the US is increasing and may increase here, although Canadians are not so litigious. • Establishment of legislation at earlier stages may keep parties from litigating issues.	• Increasing costs and delays. • Greatly increasing uncertainties to insurer, lender, owner, etc. • Could lead to environmental litigation paranoia.	• CMHC may wish to develop relationships with national and local legal firms specializing in environmental law and due diligence. • CMHC may wish to develop internal environmental risk management process.
4. Increasing fines, in numbers and $ value, for infractions.	• Regulatory bodies continue to receive broad legislative powers. • Whistle-blower protection for employees may help inspectors in their search for non-compliant operations. • Aware neighbours and other interest groups may alert inspectors to operations out of compliance.	• During excavation a CMHC funded or insured project may come upon some contamination or buried drums. This may trigger fines and project delays.	• Further information on history of site and likelihood of buried contaminants is necessary, prior to field excavations.
5. Aging Canadian population.	• Demographics show this as fact.	• Location of sites near old environmentally contaminated areas, or contaminants in building materials (old or new) may cause reactions and ill health due to sensitivities. • Types of developments and their locations may also impact viability of project.	• CMHC may wish to examine this issue as part of other internal reviews on aging.
6. Development, in the accountants handbook, to establish a contingent liability for environmental risks, may drive CMHC to identify their risks more accurately.	• Discussion of the development of this accounting practice has been on-going for a few years.	• Establishment of this contingent liability will require a full disclosure of environmental risks by CMHC.	• CMHC may wish to create an on-line data base to begin amassing this information.

active in the area of professional standards development for companies providing Phase 1 environmental assessment services.

Recent activities of all these associations are reviewed in the following sections.

4.3.1 Canadian Environment Industry Association (CEIA)

The CEIA is a national federation of provincial environment industry associations whose members represent the interests of private sector companies whose primary business is the identification and solving of environmental problems. The environmental industry is defined by CEIA as those companies that provide environmental services, technologies, and equipment, analytical services, remediation, consulting, and engineering. Membership in the CEIA and its provincial chapters is open to any environmental company. Membership does not indicate the company has met any standards of professional conduct or qualification(s). Additional contact information for CEIA is included in Appendix B.

Environmental industry associations in several Canadian provinces have recognised the lack of clearly defined training and educational requirements for professionals practising in the environmental consulting sector is one of the major challenges facing the industry. These provincial associations are currently participating in a human resource study commissioned by Employment and Immigration Canada. The outcome of this work will likely be a movement to establish a permanent human resources council which will develop national standards for environmental professionals (Ernst and Young 1992).

Because the environmental industry association in Alberta has been active for several years, they are more advanced in addressing certification issues than other jurisdictions. Two initiatives have been undertaken; one was the development of industry specific training requirements through the Air and Waste Management Association (AWMA) in Alberta. The second initiative is a project funded through Western Economic Diversification to establish codes of practice for environmental consultants. This project has recently received funding and is in progress. A report on the project is expected within the next six to nine months.

4.3.2 Canadian Environmental Auditing Association (CEAA)

The scope of the CEAA was developed from a meeting in November 1991 of approximately 70 professionals interested in the field of environmental auditing. The impetus to forming the CEAA was the lack of current standards defining or controlling what is or is not an environmental audit. The mission statement for the CEAA is to "encourage the development of the profession of environmental auditing and the improvement of environmental management of Canadian private and public organizations through the creation and application of generally accepted environmental auditing principles and standards."

A general membership meeting of the CEAA was held in September 1992 in Toronto to update the CEAA membership on the Environmental Audit Principles and Practices Guideline CEAA is developing in conjunction with the Canadian Standards Association (CSA).

The CSA and CEIA are presently cooperating on the development of a set of voluntary environmental guidelines in conjunction with Environment Canada, and it is anticipated that CEAA will participate in CSA's technical committee should it be decided to develop the documents into national guidelines through the consensus process.

4.3.3 American Society for Testing and Materials (ASTM)

The American Society for Testing and Materials (ASTM), a non-profit corporation organized in 1898, is a Management System for the development of voluntary consensus standards for materials, products, systems, and services. The membership of ASTM is 33,000, with more than 4,000 international, including Canadian, members. ASTM includes more than 130 technical committees made up of main committees, subcommittees, and task groups. The task groups initiate draft standards, which are balloted through subcommittees and the main committees.

ASTM Committee E50 on Environmental Assessment has as its scope of activities the promotion of knowledge, stimulation of research, and the development of standard guides, specifications, practices, test methods, classifications, and definitions relating to environmental assessment. Subcommittee E50.02 on commercial real estate transactions has proposed a draft guide for Phase 1 environmental property assessment. Subcommittee E50.04 on performance standards related to environmental regulatory programs will be developing standards (classifications, guides, practices, and terminologies)

related to U.S. environmental regulatory programs such as CERCLA and RCRA (Resource Conservation and Recovery Act). The first organizational meeting of ASTM Subcommittee E50.04 was held in May 1992. The issue of professional standards for environmental site assessments, if addressed by ASTM, will likely be dealt with by this subcommittee.

4.3.4 Air and Waste Management Association (AWMA)

The AWMA has recently surveyed 450 environmental professionals regarding the need for professional certification (AWMA 1992). Of those surveyed, 94% indicated the need for some type of certification, with a total of 67% expressing a need for a broad-based credential. Goals of the AWMA Environmental Certification Program include, amongst others:

- to define a competency profile for environmental professionals;
- to elevate the standards of the profession; and
- to characterize a standard knowledge base for the profession.

The broad-based structure proposed is modelled on the Professional Engineer (PE) registration in the United States and consists of two parts, one based on a general knowledge of the environment, and a second based on a speciality such as air, waste, water, or environmental health.

4.3.5 National Ground Water Association (NGWA)

The Association of Ground Water Scientists and Engineers (AGWSE) is a division of the NGWA and, in turn, is a member of the Geoenvironmental Forum, an association of organizations practising in the geoenvironmental sciences. The Geoenvironmental Forum was established in 1990 to identify applicable standards of care in the geoenvironmental field , and to establish the qualifications needed to perform the services involved. In March 1992, at a meeting in Washington, D.C., the Forum unanimously adopted a resolution expressing strong opposition to cross-discipline certification or registration of environmental professionals. The Geoenvironmental Forum considered that such programs would not provide the public with assurance that those registered or certified would perform their services in a manner that would protect public health, safety, welfare, and the environment (NGWA 1992).

In August 1991 the NGWA circulated a draft of proposed "Guidance for the Standardization of Environmental Site Assessments". Comments were received by the NGWA up until May 15, 1992 and they were scheduled to issue the final report in August 1992.

5.0 PROPOSED MODEL FOR CMHC PHASE 1 ENVIRONMENTAL SITE INVESTIGATION PROCEDURE

This section of the report describes the three major components of a proposed model Phase 1 environmental site investigation procedure that can be used by CMHC. A brief introduction to the phased approach to environmental site investigation is followed by a detailed breakdown and discussion of the three major components of the model Phase 1 procedure (site history and records review, site reconnaissance and interviews, and report content).

5.1 Background

The phased approach to environmental site investigations is widely accepted throughout Canada. Phase 1 environmental site investigations include a review of former site uses, which is combined with a site reconnaissance, to produce a preliminary evaluation, or Phase 1 report, of the environmental risks associated with a property. Phase 1 investigations are often completed as part of the due diligence process in property transfer and they provide an indication of the potential existence of contaminants on subject properties and, thereby, a summary of the environmental risks associated with the property.

Phase 1 investigations all consist of the same three main elements (site history, site reconnaissance and report), but the purpose, scope of work, and amount of detail will vary depending on the size of the property and its history. A site with a history of industrial activity dating back more than 100 years will be a larger potential source of environmental contamination than formerly vacant land that has only recently been developed for residential use.

The model Phase 1 procedure described below and in the accompanying tables in this section of the report has been prepared for use by CMHC in conjunction with environmental site investigations of property in which they have an interest.

5.2 Site History and Records Review

Research into the chronology of ownership and site use is completed prior to any site inspection of the subject property. Information gained from the site review of former uses can assist with the site inspection by providing direction on areas of a large site that were used for storage, production or

disposal of potentially hazardous materials. Historical research can also help to identify the presence/absence of asbestos- or PCB-containing materials, for example.

Perhaps the most important reason for completing a thorough Phase 1 study is that, if the investigation is extended into a Phase 2 sampling and testing program, a more focused and cost-efficient program can be designed from the solid footing of a Phase 1 study.

The importance of a thorough review of available records cannot be overemphasized. Out of sight is not out of mind when it comes to underground storage tanks (USTs), for example. Although there may be no direct visual evidence of a UST, such as a filler cap or vent pipe, fire insurance records often show the locations of tanks that may have been installed up to 40 years ago.

The review areas for the site history/records review section of the model Phase 1 procedure are shown in Table 5.1 and are discussed in the following sections.

5.2.1 Maps and Photographs

Information regarding geologic units and features such as faults, folds, and formational contacts can be of use when interpreting groundwater flow patterns beneath a site. A narrative description that will assist with the interpretation of the geological history of an area is often provided with geological maps.

Hydrologic maps may be another informational resource to show areas of discharge and recharge, depth to groundwater, and direction of groundwater flow. Hydrologic maps that depict groundwater quality may also be available. The scale of these maps varies considerably by province, with Ontario and Saskatchewan, for example, having quite detailed provincial coverage. British Columbia, by comparison, has not developed detailed hydrologic maps of the province.

Federal or provincial soil maps should also be referred to, if available. Again, the amount of detail in certain areas of the provinces is likely to be greater than in other more remote areas.

Fire insurance records can provide information on the locations of USTs. In some cities these can date back more than 40 years. Until the late 1960s, insurance companies relied on the Canadian Underwriter's Association (CUA) for detailed maps of urban Canada to help establish the risk of a

TABLE 5.1

MODEL PHASE 1 ENVIRONMENTAL SITE INVESTIGATION
SITE HISTORY RECORDS REVIEW

Information Source	Type of Information
1. Maps and Photographs	
1.1 Geological Survey of Canada	• soil maps • regional geology
1.2 Provincial Ministry of Environment	• provincial soil maps
1.3 Fire Insurance Records	• site plans showing UST locations
1.4 Aerial Photographs	• photographs dating back >50 years
2. Local Information Sources	• neighbours and long time residents
2.1 Libraries	• city directories
2.2 Archives	• books, photographs, newspapers
3. Company Records	• site plans • building plans • permits • production and maintenance records • contingency plans • spill plans
4. Regional and Municipal Records	
4.1 Regional District	• air permits • sewer discharge permits
4.2 Municipality/Township	• permits and licences department • landfill locations • subdivision/rezoning applications
4.3 Engineering Departments	• building plans • surveys
4.4 Health Departments	• public health records • landfill locations
4.5 Fire Departments	• inspections • violations
5. Title Search Companies	• title transfer documents
6. Federal and Provincial Records	• federal and provincial Ministries of Environment, branches dealing with waste management • lists of contaminated sites • permits issued
7. Previous Geotechnical or Environmental Reports	• engineering studies • geotechnical soil studies • environmental testing

policy when they were unable to send their own inspectors to a site (The Globe and Mail 1992). At scales of 200 feet to the foot or less, the maps show the location of fire hydrants, USTs, and even where coal or barrels were stored. Twenty volumes were required for Toronto alone. The maps fell out of use and were not updated as insurance companies established branch offices, but today they hold valuable information for property buyers and mortgage holders. A private company, the Insurers Advisory Organization, has continued the work of the CUA and provides additional fire insurance maps for specific properties to assist companies with underwriting fire insurance.

Aerial photographs may often be borrowed or purchased from a local university library, city library, an agency such as the provincial Ministry of Environment, or from private companies. Local photogrammetry companies also maintain collections of large scale photogrammetric projects. These photographs are very useful when evaluating the historic usage of land. Photographic coverage dating back at least 50 years should be obtained, if available. Information on general site usage, structures and improvements, tank farms, pits and sumps, poor drainage areas, access by paths or roadways, and adjacent land use can be obtained from aerial photographs by an experienced researcher.

5.2.2 Regional and Municipal Records

Air and sewer discharge permit information may be obtained from either regional district authorities or municipalities. The Engineering and Permits and Licences Departments at city hall may also be useful sources of information for Phase 1 investigations. Information on rezoning, subdivision, and building permits can provide useful information on the history of a site.

Local municipalities are also a useful source of information on local landfills that may be adjacent to the subject site.

Local public health departments can be a good source of information on public health concerns related to possible contaminated sites. Fire departments are a good source of information on the age, location, and inspection records of USTs.

5.2.3 Company Records

Corporate or company records for a site can be a useful source of information for the historical component of a Phase 1 investigation. Documents such as site plans, building plans, permit records,

production and maintenance records, emergency response or contingency plans, and spill reporting plans can all provide information of benefit to the Phase 1 investigation.

5.2.4 Local Information Sources

Generally, city archives and public libraries are good sources of historical information on previous activities at a site. Historical maps and photographs can be reviewed at most public libraries or archives. Newspaper clippings are also a useful source, if available.

5.2.5 Title Search

A record of previous ownership of the subject property can be obtained by completing a title search for the subject property; this can also be completed by an organization specialising in this type of research. A title search may provide some clues about the types of industrial activities carried out by previous owners of a property.

5.2.6 Federal and Provincial Records

The presence of any hazardous materials storage; hazardous waste treatment, storage, or disposal; municipal landfills; private landfills; or other adjacent sources of contamination may be determined by information obtained from Environment Canada or provincial Ministries of Environment. As the majority of Phase 1 investigations are short term in nature, often lasting only one to two weeks, information requests to federal and provincial governments for written information may not be able to accommodate the deadline for a Phase 1 report, as the process may take several weeks. Verbal information regarding files can often be obtained in two to three days.

5.2.7 Previous Geotechnical or Environmental Reports

Any previous geotechnical reports on subsurface soils conditions should be obtained from the current owner of the site and reviewed. These reports are prepared during the course of foundation preparation for buildings or improvements on the site. Previous environmental site assessments of subject properties may have included a geophysical survey, soil gas testing, test pit excavation, or borehole drilling. These reports are often one of the best sources of information on which to base an opinion of the current environmental conditions at a property.

5.3 Site Reconnaissance and Interviews

Site inspections, as part of a Phase 1 environmental site investigation consist of two main types of activity: observation of existing environmental conditions at the subject property; and interviews with site personnel or the property owner. The site inspection allows a comparison with documented historical information and previous activities at the site with current conditions. Site visit questionnaires are often used to ensure uniformity in site inspections by different individuals within an organization carrying out this type of work. As third parties rely heavily on the findings of a Phase 1 environmental site investigation, we recommend that CMHC consider developing a site inspection questionnaire to ensure consistency when using different site assessment groups.

The following sections describe the main subcomponents of the site reconnaissance and site interview activities. A list of the main components of site reconnaissance and interview portion of the model Phase 1 procedure is included as Table 5.2. Each item is discussed in some detail in the following sections of this report.

5.3.1 Visual Inspection

Specific conditions to assess during the site reconnaissance vary greatly from one site to another. A checklist is often used to ensure a uniform approach to the site inspection.

Surface topography should be considered during the site reconnaissance. Surface geology can often provide direct evidence of subsurface conditions and filled areas may sometimes be identified in this way. Groundwater flow can often be inferred from review of surface conditions.

The presence of surface water at or adjacent to the property should be noted. Recharge or discharge areas should be identified to assess whether the site may be a source of groundwater contamination.

Areas of fill can often be identified by their unusual surface formations or unnatural topography. Fill material from construction or demolition activities often differs in colour, texture, and drainage properties from natural soils. During the site inspection, areas identified from historical air photographs as being disturbed should be checked and photographed. Old, backfilled building excavations and filled depressions can be identified by areas of unusual surface land forms or unnatural topography. Fill materials may include such things as construction debris, municipal solid waste (refuse or garbage), or industrial waste products such as slag, cinders or ash.

TABLE 5.2

MODEL PHASE 1 ENVIRONMENTAL SITE INVESTIGATION
SITE RECONNAISSANCE AND INTERVIEWS

1.	Visual Inspection
	1.1 Topography
	1.2 Surface Water/Drainage
	1.3 Fill/Debris
	1.4 Surface Staining/Soil Conditions
	1.5 Vegetation
	1.6 USTs and Vent Pipes
	1.7 Storage Areas (solvents/chemicals)
	1.8 Asbestos
	1.9 Transformers and Ballasts
	1.10 Wells
	1.11 Utilities
	1.12 General Housekeeping
2.	Personnel Interviews
	2.1 Waste Handling Methods
	2.2 Underground and Above Ground Tanks
	2.3 Asbestos/PCBs/Radon/UFFI/Lead Paint
	2.4 Spills
	2.5 Monitor Wells on Property
3.	Reconnaissance of Adjacent Sites
4.	Photographic Documentation
5.	Geologic and Hydrogeologic Setting
	5.1 Water Supply
	5.2 Wells

Surface staining is an excellent indicator of possible discharge of waste materials, as is olfactory evidence. Dumping of waste materials often will discolour soil directly or through precipitation of chemicals in the soil. Runoff or discharge of chemical contaminants across pavement or concrete will often stain these surfaces.

Changes in the type or condition of vegetation should be noted, especially when these changes occur in a linear or markedly distinct fashion. Stressed, dying, or dead vegetation may indicate the presence of toxic substances in the underlying soil.

One of the most critical components of the site reconnaissance is a thorough search for the presence of current or former UST locations. Sites on which USTs were used may have significant environmental risks associated with them. Typical indicators of former UST locations are building footings or surface pads, gravel areas suggestive of dispenser locations, filler pipes, manholes or vents, and asphalt degradation indicative of poor filling practices.

Storage areas can be located either inside or outside buildings; they may be situated within bermed or concreted areas, or on bare ground; and the storage area may be fenced or open. If wastes are removed by a commercial removal company, handling and disposal are usually well documented. Waste management practices handled by the operator of a site should be investigated in some detail. Visual inspection of waste bins can often provide useful pointers to the presence of hazardous materials.

Asbestos-containing material (ACM) should be screened for during the site inspection. Materials such as floor, wall, or ceiling tiles can contain asbestos. However, there is no method to positively identify asbestos simply by a visual inspection. If any material is suspected of containing asbestos during the site inspection, the suspect materials should be tested. Asbestos testing and removal of ACM is a specialized area of environmental management and should be conducted by suitably-qualified environmental specialists.

The leakage or spillage of oil from pole-mounted or wall-mounted transformers is often the primary source of PCB contamination in surface soils. Identification of PCB-containing transformers can be accomplished by reviewing the series of numbers and letters on the side of the unit. Serial numbers

can often be used to identify the date of manufacture and presence/absence of PCBs in the dielectric fluid.

Old light ballasts dating from approximately pre-1980 are another source of PCBs. The capacitor contained in the ballast for two four-feet fluorescent lamps contains approximately 24 g of PCBs (Environment Canada 1986). Outdoor metal halide lamps may have multiple capacitors that could contain over 450 mL of PCBs. Each manufacturer of ballasts and capacitors uses a distinct code for identifying the product, its dielectric fluid, and date of manufacture.

General housekeeping details for the site are also a useful indicator of possible environmental risks associated with the property. Items to consider here would be the overall visual appearance of the site, condition of the buildings or surface of the site, tidiness of storage areas, and the condition of waste disposal areas.

5.3.2 Personnel Interviews

An on-site interview with an owner of the property, or a long time employee of a company occupying the site, can often reveal details about a site that would not otherwise be obtainable from a review of historical records. During the interview questions about the nature of the operation at a site; the length of time of occupation; waste handling practices; the presence, condition, and testing of any USTs on the property; the presence of transformers or old light ballasts; asbestos abatement programs; insulation materials; the presence of flaking paint that may contain lead or mercury; knowledge of past spills at the site; and the presence of any monitoring installations on the property, for example, for groundwater, methane, radon, UFFI, etc., should be asked.

5.3.3 Reconnaissance of Adjacent Sites

Site inspections should include a reconnaissance of adjacent properties and photographic documentation of current conditions on adjacent properties. If access is not available, or requires permission not immediately available, then a visual inspection from public roads or rights-of-way should be completed. Disturbed, low-lying land adjacent to the subject property may be the source of potentially-contaminated fill on the subject property. Adjacent areas that are visibly disturbed may help explain reasons for inadequate surface runoff or drainage on the subject property.

The reconnaissance of adjacent properties should make use of information developed during the historical review, for example, aerial photographs, fire insurance maps, and site plans, which may cover surrounding areas in addition to the subject property.

5.3.4 Photographic Documentation

Photographic documentation is an essential part of a Phase 1 environmental site investigation. The most important features to photograph are those that suggest possible sources of on-site contamination and of contamination from adjacent sites. This would include features such as above ground tanks and evidence of USTs, such as filler or vent pipes protruding from the ground, drums and barrels in storage areas, disconnected transformers or ballasts, unusual pits or sumps, and wells.

Temporary conditions which may change in the near future should be an area of attention. A wide cross section of the site should be photographed to illustrate any critical spatial relationships, for example, the proximity of a storage area to any surface water bodies.

A photographic log should be included in project files that includes the dates of photographs, locations, directions of the photographs, and subject matter. Approval for collection of photographic documentation should be obtained from the current owner of the property, prior to the site reconnaissance.

5.3.5 Geologic and Hydrogeologic Setting

The water supply for the subject property should also be assessed. Does the site contain a well or a municipal water supply? The area of influence for the well and distances from storage areas for chemicals, solvents, or wastes should be determined. Any sumps, dry wells or rock drains should also be checked.

If wells are identified at the subject property, attempts should be made to identify the type of well and its depth. Drilling logs and well completion details are often available through provincial Ministries of Environment. Utilities running through the site should also be checked to assess any role they may play in the migration of contaminants.

5.4 Report Content

Upon completion of the site history and records review, and the site reconnaissance and interview activities, a Phase 1 report for the subject property is prepared. The critical sections of the report are a summary of the findings of the site history and records review and site reconnaissance, and the conclusions and recommendations provided.

The following sections of this report and Table 5.3 describe the main sections of the proposed format for the model Phase 1 report. This is discussed in the order in which they would appear in the report, not in order of critical importance.

5.4.1 Executive Summary

The executive summary should be an abstract of the Phase 1 report describing who performed the Phase 1 investigation, a summary of the purpose of the study, who commissioned the study, where the subject property is located, the date of the assessment, the scope of work and methodology, the significant findings of the work, and conclusions and recommendations for further work.

5.4.2 Statement of Purpose

The purpose of a Phase 1 environmental site investigation is usually to provide a professional opinion regarding the potential for environmental contamination of the subject site. It is important to remember that a Phase 1 investigation will only identify potential environmental concerns so that action can be taken to minimize their impacts. A professional opinion does not guarantee that a site is clean, free of contamination, etc. However, a Phase 1 report does constitute part of the due diligence that should take place during any property transfer.

The study purpose should be clearly identified in the Phase 1 report to minimize any confusion with the parties involved as to the type of information that can be obtained from this type of report or study. A statement of limitations (see Section 5.4.8) will also help to eliminate any confusion as to the purpose of the study.

TABLE 5.3

MODEL PHASE 1 ENVIRONMENTAL SITE INVESTIGATION REPORT CONTENT

1.	Executive Summary
2.	Purpose of Study
3.	Scope of Work
4.	Methodology
5.	Site History and Records Review: Findings
6.	Current Site Conditions and Interviews: Findings
7.	Conclusions and Recommendations
8.	Standard Limitations
9.	References
10.	Figures and Tables
11.	Appendices 11.1 Photographs 11.2 Copies of Previous Reports 11.3 Regulatory Information 11.4 Interview Records

5.4.3 Scope of Work

Each Phase 1 environmental site investigation is tailored to the specific needs of the client and the type of site that is the subject of the Phase 1. The needs of the client and the scope of the investigation activities need to be identified clearly before the investigation is initiated and the report prepared.

5.4.4 Methodology

This section of the report should include a description of the individual tasks completed and how these tasks were completed. Again, this will help clarify the extent of the work and the type of information that has been collected and interpreted.

5.4.5 Site History and Records Review: Findings

This section will include the findings of the review of the history of site usage and the records review activities. This would include a discussion of information obtained from the sources listed in Table 5.1. The source of each piece of information should be referenced in the report. In addition, the report should state if certain sources were reviewed and revealed no concerns, so the reader is aware of the sources that were accessed.

5.4.6 Current Site Conditions and Interviews: Findings

This section of the report focuses on the findings of the site reconnaissance and visual observations of the subject property and adjacent lands. Topography, site drainage, and the geologic and hydrogeologic setting of the site should be discussed. Other key components of the site inspection that should be discussed include the presence of water bodies both on and off site, types and condition of vegetation, the presence of any surface staining, and any areas of localized soil disturbance.

Adjacent land use should also be reviewed and its potential impact on the subject property should be discussed. Factors to be considered in the site reconnaissance and interview portion of the model Phase 1 procedure are included in Table 5.2.

5.4.7 Conclusions and Recommendations

Conclusions on the level of environmental risk associated with the subject property are multi-facetted and should be based on the interpretation of the site history/records review; the findings of the site reconnaissance; assessment of the current or potential impact of any concerns raised; regulatory requirements for the location of the site; and risk management profile of the client, amongst others. Rationale for the interpretations should be included, including reference to any documents cited in the report or the appendices. Citation of environmental legislation or regulations should be supported by references to the original documentation. The conclusions will not draw any positive correlations between the findings of the Phase 1 assessment and environmental impairment. Potential impacts will be discussed as support, or justification, for interpretation of the findings. The conclusions should focus not on what the findings mean, rather they should discuss what they mean in the context of the client's current requirements.

The recommendations section is often viewed as the "bottom line" by the reader of the Phase 1 report. Recommendations should be provided based on the findings and conclusions drawn from those findings, and should take into account any limitations of the investigation. The recommendations section should include a discussion of the possible courses of action to be taken as a result of the Phase 1 investigation.

Recommendations typically are of two kinds: first, the potential for environmental contamination of the site is low or negligible and no further actions are warranted; or, second, that some potential or level of risk is indicated and that additional investigation, or sampling and testing, is required within a certain time frame (immediately, or in the near future). The recommendations should appear reasonable on the basis of the conclusions of the Phase 1 investigation.

The overall quality of the report could be evaluated as follows (Frentz and Matheson 1992):

- did the writer understand the report and its use?
- is the report clearly organized?
- are there ambiguities?
- are statements in the report documented or referenced?
- are there photographs included of the site and adjacent sites?
- has the report been reviewed by a senior professional prior to release?

If there is anything in the report that is unclear, call the consultant that prepared the report and request additional clarification.

5.4.8 Statement of Limitations

A Statement of Limitations is often included in a Phase 1 report so that the reader will understand the limitations either for access to the site or adjacent properties during the Phase 1 investigation, or to the scope and conclusions of the study.

Conclusions regarding the current environmental conditions at a property are based solely on the extent of observations and information gathered during the study. Thus, it is important to know what the limitations to the extent of the study were. An example of a Statement of Limitations is provided as Appendix I.

5.4.9 References

The references section should include relevant sources of information used in the Phase 1 investigation and any regulatory documents that are used for comparison purposes.

5.4.10 Figures and Tables

A minimum of one figure illustrating the current site layout and adjacent property uses should be included in the Phase 1 report. For more complex, or larger sites with a complex history of previous use, more figures could be included. Tables of information regarding previous site activities might also be used to summarize lengthy histories of previous site uses.

5.4.11 Appendices

These should be used to include photographs of the site; copies of previous geotechnical or environmental site investigations; information collected from federal or provincial regulatory agencies; and copies of records of any interviews conducted during the Phase 1 investigation.

REFERENCES

AGWSE. 1992. Guidance to Environmental Site Assessments. Interim Final Report from the Association of Ground Water Scientists and Engineers (AGWSE). AGWSE, Dublin, OH, U.S. pp. 1-115.

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Environment Canada. 1986. Identification of Fluorescent Light Ballasts Containing PCBs. Report prepared by Commercial Chemicals Branch, Environment Canada. EPS2/CC/2. pp. 14. April 1986.

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Saxe, D. 1992. Why Do Mortgage Guarantors Need Environmental Audits? Discussion paper prepared for CMHC. Included here in full as Appendix E.

The Globe and Mail. 1992. Environmentally Sensitive Sites - Urban Maps. The Globe and Mail. July 25, 1992. Toronto, Ontario.

APPENDIX B

ADDITIONAL CONTACT INFORMATION FOR INDUSTRY AND PROFESSIONAL ASSOCIATIONS

- Canadian Environmental Industry Association
- National Ground Water Association
- Association of Engineering Firms Practicing in the Geosciences
- Air and Waste Management Association
- American Society for Testing and Materials
- Canadian Environmental Auditing Association
- Environmental Assessment Association

CEIA
Canadian Environment Industry Association

Association Canadienne des Industries de l'Environnement

WHAT IS CEIA?

CEIA is a national federation of provincial environment industry associations. CEIA's members represent the interests of private sector companies whose primary business is the identification and solving of environmental problems. The industry includes Canadian companies which provide environmental services, technologies and equipment, analytical services, remediation, consulting and engineering.

The CEIA Board is made up of appointees from each of its member associations. The following individuals were named as officers and directors on April 7, 1992.

Hans Gruenwald, President
Rod Leland, Vice President
Michael Van Walleghem, Secretary
Robert Hawes, Treasurer
Nazrat Hijazi
Bevin Ledrew
Tim MacMillan

Communications with CEIA should be directed to the AESEQ office in Montreal.:

Canadian Environment Industry Association
1400, rue Sauvé Ouest, bureau 232
Centre d'Achats l'Acadie-Sauvé
Montréal, Québec H4N 1C5
Tel (514) 745-3580, fax (514) 745-3582

A list of CEIA's member associations is attached.

CEIA MEMBER ASSOCIATIONS

L'Association des Entrepreneurs de Services en Environnement du Québec (AESEQ)
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Jean-Guy Laberge - Directeur général
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Manitoba Environment Industry Association (MEIA)
Michael Van Walleghem - President
c/o Waste Stream Management
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(204) 488-4996, fax (204) 786-2834

Newfoundland Environmental Industry Association (NEIA)
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Saskatchewan Special Waste Services Association (SSWSA)
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ADDITIONAL CONTACT INFORMATION FOR INDUSTRY AND PROFESSIONAL ASSOCIATIONS

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Canadian Environmental Auditing Association
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Toronto, Ontario
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Association of Engineering Firms Practicing in the Geosciences
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Environmental Assessment Association
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Air and Waste Management Association
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US 15230

Tel: (412) 232-3444
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APPENDIX C

AVERAGE COSTS FOR PHASE 1 ENVIRONMENTAL SITE INVESTIGATIONS

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AVERAGE COSTS FOR PHASE 1 ENVIRONMENTAL SITE INVESTIGATIONS

One of the noticeable trends with Phase 1 environmental site investigations is the decrease in their cost. In 1989-90, the typical cost for a Phase 1 site assessment in Vancouver was $3,000 to $3,500. Today a typical cost would be in the range of $2,000 to $2,500. Demand has increased, but the supply of companies offering Phase 1 services has more than matched the increased demand. Many companies offering Phase 1 services are small, have low overheads, may experience a high turnover of staff, and may only exist for two or three years. These companies offer an inexpensive product, but associated with the low price tag is a noticeable lack of technical quality, depth of in-house experience, track record, and financial stability.

Factors which influence the cost of a Phase 1 investigation include the size of the property, history of previous industrial activities, distance of property from consultant's office, specific requests from client for certain additional investigations, and details of waste management permits and records for the property, amongst others.

To establish a solid case for good due diligence in a property transfer, it is important that a technically-qualified, experience site assessment group prepare the Phase 1 report for the subject property. No matter how small the property, it is almost impossible to complete a thorough Phase 1 assessment for less than $1,500. Effective due diligence requires a thorough, complete, and referenced Phase 1 report be completed. To ensure this requires a thorough review of available records and site history, a thorough site reconnaissance conducted by a qualified environmental professional, and review of the Phase 1 report by a senior principal of the company.

APPENDIX D

PHASE 2 ENVIRONMENTAL SITE INVESTIGATION TECHNIQUES

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PHASE 2 ENVIRONMENTAL SITE INVESTIGATION TECHNIQUES

D.1 Intrusive Investigative Techniques and Sample Collection Methods

Intrusive investigation methods are normally a significant part of Phase 2 investigations, and are most useful for the direct evaluation of subsurface conditions. Intrusive techniques are used to collect samples of subsurface soils, sediments, or groundwater, for example. The samples can then be analyzed for contaminants of concern.

Samples collected for environmental investigations should be as undisturbed as possible so that they realistically represent subsurface conditions. Sampling with contaminated equipment can introduce contaminants into subsurface materials, or distribute contaminants between depth intervals. All sampling equipment should be thoroughly cleaned between sample collection events.

The intrusive techniques that are discussed in the following sections o the report include manual sampling, test pit excavation and soil sampling, drilling and soil or sediment sampling, and groundwater monitoring.

D.1.1 Manual Sampling

Samples of soil, sediment, and surface waters can be obtained using manual sampling methods. These methods generally involve the use of simple and portable sampling devices, which is an asset in less accessible sites. They result in minimal disturbance to a site. However, samples are small in size, and can only be obtained from relatively shallow depths in loose materials of small grain size, that is, topsoil, sands, silts, and clay. Rock and coarse-grained sediments can not be penetrated.

D.1.1.1 Surface Soils

Hand Auger

A hand auger is a tool consisting of a shank with a crosswise handle for turning a centre tapered feed screw with a cutting head which is essentially a small-scale, hand-operated version of the solid stem auger. The hand auger is screwed into the material until the auger flights are full. The auger is then withdrawn, cleaned, and reinserted into the original hole for further auguring.

Samples on auger flights are altered from their in-situ physical conditions, and may be mixed with material from shallower depths.

Hand-driven Coring Device

A hand-driven coring device consists of a shank with a crosswise handle for turning or pushing, and a hollow tube at the bottom. The device is screwed or pushed into the sediment until the sampler is full. The device is then withdrawn, emptied into a container, cleaned, and reinserted into the original hole for the next sample. Some corers have a slot cut into the side of the probe to view the sample before it is extruded. This method is best-suited for less compacted subsurface materials. Samples are less disturbed prior to extrusion than those obtained using an auger.

A variation on this equipment has a cutting edge along the side of the core barrel which shaves material from the sides of the hole during rotation. Counter rotation closes a gate to hold the sample within the barrel. This variation may be more successful than the standard method in non-cohesive sediment, but results in greater disturbance.

D.1.1.2 Sediment Sampling

Foreshore sediment samples can be collected using grab samplers that consist of metal jaws that descend by gravity through the water. The jaws of the sampler are forced closed upon contacting the sediment, and the sampler is then raised.
Cores can be taken with piston gravity corers. A corer is lowered and penetrates the sediment by gravity.

D.1.1.3 Surface Waters

Surface waters can be sampled using a Kemmerer or Niskin water sampler, for example, an open container that is lowered to the desired depth, and then closed via a messenger line. This ensures that as the sampler is raised, only the water from the desired depth is retained.

D.1.2 Test Pit Excavation and Soil Sampling

Test pit sampling is an expedient and cost-effective means of examining subsurface materials. Deeper subsurface materials can be sampled than is possible using manual methods. Test pit excavations result in a greater disturbance to a site than manual sampling methods. Test pits are excavated using a rubber-tired backhoe and allow visual observation, and sampling, of in-situ subsurface materials to a maximum depth of approximately 5 m. After removal of disturbed materials from the walls, physical parameters such as stratification, continuity, and structure can be examined.

A description of the materials and stratigraphy in each test pit is compiled by a field technician. This includes descriptions of the soil colour, texture, moisture content, and descriptions of any unusual odours or other observations.

Samples can be collected from the excavation walls and bottoms using a stainless steel trowel in test pits that can be safely entered (usually less than 1 m deep). Soil samples from depths greater than 1 m are collected in a similar manner from the backhoe bucket.

Prior to collecting the samples, some soil in the sampling area should be scraped away from the test pit walls to help ensure that sampled material has not been cross-contaminated during the excavation effort. To further minimize cross-contamination, the sampling trowel should be cleaned. Cleaning can be done by scrubbing the trowel in a solution of detergent and water and then rinsing with distilled water between samples.

D.1.3 Drilling and Soil or Sediment Sampling

Drilling enables access to deeper soil or sediment than is possible with a backhoe or with hand-driven devices.

Truck-mounted drilling units are used to drill boreholes on land. A variety of land drilling methods are available. To obtain representative samples, it is best if no fluids, other than air, are used while drilling. To collect depth-specific samples, drilling is temporarily stopped, and split spoon or Shelby tubes mounted on drill rods are pushed into the bottom of the borehole.

During drilling, a field log is compiled for each borehole by the field technician. Information recorded with corresponding depths include descriptions of the soil colour, texture, moisture content, and descriptions of any unusual odours or other observations. In an effort to minimize the possibility of transfer of contamination from one borehole to another, augers and peripheral equipment are washed between boreholes with pressurized hot water.

D.1.3.1 Auger Drilling

With the auger drilling method, an auger stem penetrates the subsurface sediments through a combination of stem rotation and downward force on the stem, provided by the auger rig. As rotation occurs, cuttings are brought to the surface on the auger flights. Auger drilling provides relatively fast penetration of fine-grained sediments, and samples are easily obtained from auger flights. Samples brought to the surface on the auger flights may be mixed with material at shallower depths. Penetration of rock and coarse-grained sediments is difficult, if not impossible, with auger drilling, and drilling depth is limited to approximately 60 m by frictional resistance in the drill stem and the torque provided by the truck-mounted rig.

Augers are either solid or hollow stem. The centre plug on the hollow stem auger can be removed from the auger stem and a sampling device, such as a split spoon, can be used inside the stem to obtain depth-specific samples of the solid. The hollow stem acts as a temporary casing. If other sampling methods are to be used when drilling with a solid stem auger, the stem must be removed from the borehole.

D.1.3.2 Sonic Drilling

Sonic drilling uses high frequency mechanical oscillations to achieve exceptional penetration rates. During drilling, the vibratory action causes the surrounding soil particles to fluidize at the tip of the drill bit and along the sides of the drill pipe, thus allowing for rapid penetration. With this method the hole is simultaneously cored and cased, thus ensuring that there is no sample contamination from up-hole material. Plastic pipe for monitoring wells can easily be installed through the cased hole before withdrawing the casing.

Advantages of sonic drilling over auger drilling for environmental studies include the following:

- the unit easily drills through coarse gravels, cobbles, boulders, and bedrock which auger drills are commonly unable to penetrate;
- the unit recovers a 0.15 m (6 inch) diameter continuous core as opposed to the 0.05 m (2 inch) diameter intermittent core usually produced by auger drilling units. This offers a better opportunity to examine, identify, and sample potentially contaminated soils for analysis;

- unconsolidated sediments and soils near the drill stem are less disturbed, rendering any subsequent hydrogeologic studies more representative of actual conditions; and
- installation of observation wells is simplified as the sand pack placed around the well casing is less likely to bridge and cause problems while extracting the drill stem.

D.1.3.3 Rotary Drilling

The rotary drill penetrates the subsurface materials by using a rotating drill bit and circulating fluids to advance the borehole. The downward force on the stem is provided by the rig. Fluid is pumped into the borehole to stabilize and seal the borehole, carry cuttings to the surface, and lubricate and cool the bit. Drilling fluids are composed primarily of air (air, foam) or water (water, or water with clay and/or polymer).

In loose, cohesive materials, water or drilling muds must be used to maintain a stable borehole. Alternatively, casing can be driven during drilling to stabilize the borehole. Air rotary methods are recommended in highly fractured or cavernous rock, due to unavoidable loss of drilling fluids and circulation.

Sediment or rock chips from rotary boreholes represent the solid-phase samples provided by this method. At any selected depth, the rotary drill can be removed and another sampling method can be used inside the borehole to obtain depth-specific samples of the solid phases.

Forward Circulation: Forward circulation rotary drilling involves pumping fluid down the drill stem, out the drilling bit, and up the annulus of the borehole to the surface. It is the conventional rotary drilling method.

Reverse Circulation: Reverse circulation involves pumping the fluid down the annulus between the inner and outer wall (dual wall pipe) and then upward within the inner drill pipe. This method is particularly well-suited to drilling large diameter holes in soft, unconsolidated formations.

Rotary drilling provides relatively fast penetration of rock and fine-grained sediments. Solid samples are easily obtained from borehole cuttings; and depth restriction is determined by the power of the rig and is normally greater than hundreds of metres.

D.1.3.4 Hammer Drive (Becker Hammer)

With this method, a double-walled steel pipe is driven into the ground with a repetitive power-driven hammer. Air is forced down the annulus between the pipes and returned upward through the central pipe carrying the cuttings. The method is similar in concept to dual-wall reverse rotary drilling but does not involve stem rotation, and is most successful in loose unconsolidated materials.

D.1.3.5 Cable Tool or Percussion

Cable tools drill by lifting and dropping a string of tools suspended on a cable. The bit at the bottom of the tool string rotates a few degrees between each stroke so that the cutting face of the bit strikes a different area of the hole bottom with each stroke.

This method can be used to drill domestic and high yield water wells. As the drill rigs are small, they can be used in remote areas.

D.1.3.6 Sediment - Vibracore

In some Phase 2 environmental site investigations, drilling may be required to collect consolidated sediment samples, for example, in foreshore areas.

The Vibracore is an acoustic drill, which works by vibration rather than rotation or percussion. High frequency vibrations, produced at a rate of approximately 12,000 per minute, are transferred from the drill head to the drill rods. The vibrations and equipment weight together act to cut through unconsolidated materials. No drilling fluids, which could contaminate samples, are used in this technique. The Vibracore drill can also be placed on a surface platform, such as a floating barge, or floating finger docks.

Cores are recovered intact in a plastic casing tube and frozen. Once frozen, a section of the plastic casing can be cut open, folded back, and the surface sediments scraped with a chisel to reveal a cross-sectional view of the sediments. Each distinct layer of the strata can be measured and described in a log compiled by the project technician and selected core intervals can be sampled for analysis.

D.1.4 Groundwater Monitoring

D.1.4.1 Observation Wells and Piezometers

Observation wells, or piezometers, provide access to groundwater. They are installed in selected boreholes following drilling and soil sampling. Observation wells consist of a pipe or tube (casing) that is typically between 3.8 cm to 10.2 cm in diameter, installed in a borehole. Observation wells are open to water flow at the bottom, and open to the atmosphere at the top. Infiltration of surface contaminants along the well casing is prevented by sealing the space between the outer casing and the borehole. The intake (screen) consists of a section of slotted pipe or screen that allows groundwater to enter the well but does not allow sand grains or clay particles that make up the geologic formation to enter. The well screen is positioned to span the anticipated range of groundwater fluctuation to facilitate representative sampling of groundwater throughout the year. A concrete plug can be installed at the surface to help stabilize the upper section of the well. A flush-mounted protective device can be installed over the well head.

D.1.4.2 Groundwater Sampling

Water should be removed from the well following drilling (well development) to remove material created by drilling the well. Water should also be removed prior to sampling (purging) to remove stagnant water from the well which may not be representative of formation water. Over-pumping can cause mixing of water masses of different quality and can draw groundwater from considerable distances, particularly in

low-storage aquifers. Well flushing thus requires a compromise between removal of standing water and overpumping to obtain samples that represent ambient groundwater conditions. Standard field procedures commonly specify the removal of three to six borehole volumes. The borehole volume is defined as the volume of water standing in the well above the top of the well screen.

Water can be removed from the well using grab mechanisms (including bailers and syringe devices), suction-lift mechanisms (including centrifugal and peristaltic pumps), and positive displacement mechanisms (including gas-drive devices, gas-operated bladder pumps, electric submersible pumps, and gas-driven piston pumps).

The mechanism best-suited to sampling will be determined by characteristics such as the depth from which the sample is to be collected, pumping rate required, expense, power source available, degree of aeration that can be tolerated, etc.

D.1.4.3 Characterization of Physical Flow

The direction and velocity of groundwater flow can be assessed as part of a Phase 2 study so that the direction and velocity of dissolved contaminants can be predicted. To determine the direction of groundwater flow, the depth to the water table in at least three piezometers/monitoring wells needs to be measured.

Hydraulic conductivity is an expression of the readiness with which water flows through the subsurface in response to a given potential gradient. In-situ hydraulic conductivity can be determined using single-well or slug tests and multiple-well or pumping tests.

Slug testing consists of causing an instantaneous change in the water level through the sudden introduction of a known volume and observing the recovery of the water level with time.

At least two wells are required for a pump test: a pumping well and at least one observation well with an intake in the same hydrogeologic unit as the pumping well. The pumping well is operated to produce a hydraulic head change within the aquifer. The rate of change of hydraulic head observed in the pumping well and observation wells is then measured.

D.2 Non-Intrusive Investigative Techniques

D.2.1 Soil Gas Survey

Soil gas surveys can often be used to quickly delineate areas contaminated by volatile organic compounds (VOCs), such as industrial solvents, cleaning fluids, and petroleum products. The presence of VOCs in soil gas indicates they are present in the soil and possibly also in the groundwater below the soil. This information can be used to locate leaking USTs, pipes, or sewer lines; to direct in-field site cleanups; to optimize the location and reduce the number of soil boreholes and/or monitoring wells; and to select and reduce the number of samples sent to the laboratory for confirmatory analyses.

To identify contaminated groundwater with this technique, volatilized organic chemicals from the groundwater must be able to move up through the overlying soil. Any limitation of this transport such

as from decreased soil porosity due to wet conditions, low soil temperatures, attenuation due to adsorption, or low Henry's Law constant for the pollutant will limit the usefulness of this technique.

Sampling equipment is portable and simple. For example, an indication of VOCs in the soil gas can be obtained by placing an adsorbent (usually an activated charcoal rod) in the soil for a period of days to weeks. Analysis is by gas chromatography-mass spectrometry (GC-MS) of the solvent eluate from the absorbent.

Soil gas is most frequently sampled using soil probes that consist of a hollow tube screened at the bottom. A drive tip attached at the bottom allows the probes to be pushed or hammered into the ground. The probe is placed in the ground to the desired sampling depth. Openings in the tube near the leading edge allow soil gases to enter the tube. The upper end of the tube contains a port to allow gas to be extracted. Gas samples are drawn up through the tube using a pump or syringe. The sample can be analyzed on-site by portable analytical instruments such as portable gas analyzers or gas chromatographs.

D.2.2 Geophysics

Geophysical methods can provide a means of rapid reconnaissance over large areas of land. Geophysical techniques can be divided into two main categories of profiling and sounding techniques. Profiling is used to define the lateral extent of a feature, such as the area of a waste site, with little or no data on depth. The output is typically a simple contour map. Sounding is used to determine the depth at specific locations. These two techniques can be combined to produce a detailed three dimensional profile of the site.

D.2.2.1 Electromagnetic Techniques

At shallow depths (less than 40 m), the location of anomalously high or low conductivity zones can be conveniently mapped using surface electromagnetic (EM) geophysical techniques. Conductive fluid wastes such as salt solutions, acids, alkalies, leachate from decaying refuse, etc., can cause increases in ground conductivity when present in sufficient quantities. Resistive liquid wastes such as petroleum hydrocarbons can cause ground conductivity to decrease when present in sufficient quantities. When conductive and resistive liquid wastes are present together, the conductive wastes usually dominate the ground conductivity response as measured by EM systems.

Electromagnetic techniques are very useful in mapping groundwater contamination plumes and in locating buried metallic objects such as old drums and barrels, USTs, pipes, and utilities. However, it should be noted that natural variations in soil types can also affect ground conductivity measurements. The EM method is well suited for conductivity mapping, since no direct electrical contact with the ground is required. Good lateral resolution can be obtained since the depth of exploration is comparable to the transmitter-receiver separation.

The effective exploration depth of the EM equipment can be varied by changing loop spacing, loop orientation (vertical or horizontal), or the height above the ground.

D.2.2.2 Ground Penetrating Radar

Ground penetrating radar (GPR) can provide a shallow cross-sectioned soil profile that can assist with location of groundwater and buried metallic objects such as drums and barrels, USTs, pipes, and utilities. Penetration of GPR in dry sandy soil can be up to 12 to 15 m, but is limited to the upper 1 to 1.5 m in clays or soils containing conductive wastes. The operational capabilities of GPR are limited by the terrain and extent of surface vegetation, as the survey vehicle or field technician requires a clear access path of about 1 m.

D.2.2.3 Seismic Refraction

Although seismic refraction is effective in large scale geological mapping, it has very limited applications in Phase 2 site assessments. Peripheral information concerning bedrock surfaces or water tables and location of bedrock channels can be obtained from seismic surveys, if required.

D.2.2.4 Data Presentation

Geological and geophysical data can be plotted in both two and three dimensional formats. Examples of two dimensional representations of geophysical data are shown in Figures D-1 and D-2. Several sophisticated computer modelling systems are now available for the three dimensional representation of geological data generated from Phase 2 studies. The LYNX Geoscience Modelling System (GMS), for example, is a computer software system for management, evaluation, and visualization of geological data. The LYNX GMS stores geological information such as soil characteristics, porosity, contaminant concentrations, and groundwater levels obtained from a Phase 2 site investigation. Interpretative capabilities of the LNYX GMS include 3-D visualization in any orientation, statistical analysis, surface modelling, and interactive geological interpretation. Examples are shown in Figures D-3 and D-4.

D.2.3 Ambient Air Surveys

Several different techniques can be used to measure ambient air quality. These are summarized in Table D-1. Included in Table D-1 are the type of equipment used, the parameters it measures, if it can be used for volatile organic compounds (VOCs) or methane measurements, a brief description of its principle of operation, and some of the limitations of the technique.

D.3 Other Phase 2 Investigative Techniques

Other potential contaminants are often included in Phase 2 environmental site investigations. These include asbestos, polychlorinated biphenyls (PCBs), radon, and, less frequently urea formaldehyde foam insulation (UFFI), and flaking paints.

D.3.1 Asbestos

The term asbestos is used to describe a group of naturally occurring fibrous, inorganic hydrated mineral silicates. The group includes actinolite, amosite, anthophylite, chrysotile, crocidolite, and tremolite. Asbestos began to be used as an industrial product at the end of the 1800s. Large deposits of chrysotile asbestos were discovered at about this time in the Eastern Townships region of Quebec. Following the

Second World war, asbestos-containing materials (ACMs) were used widely as fireproofing, insulation, and soundproofing. In the United States, the Environmental Protection Agency (EPA) defines ACM as any material containing more than 1 % asbestos. Friable asbestos is considered to be material hazardous to human health.

Applications of ACM generally fall into one of the following categories:

- sprayed onto surfaces: insulation for pipes, tanks, ducts, etc:
- insulation for pipes, tanks, ducts, etc.;
- ceiling or floor tiles and wall insulation; and
- articles such as cloth, cord, wicks, tape, twine rope, etc.

Samples of suspected ACM should be collected using specific sampling techniques designed to reduce exposure to inhalation of asbestos fibres. Confirmation of the content and type of asbestos fibres should be assigned to a specialist testing laboratory, preferably one accredited for this type of analysis.

D.3.2 Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) are a group of 209 organic compounds that are based on the biphenyl structure. They were produced up until the mid 1970s for use as nonflammable cooling oils in electrical transformers, hydraulic equipment, capacitors, and other electrical applications. Polychlorinated biphenyls also have numerous other uses such as hydraulic fluids, sealants, and caulking materials, in printing inks and as pesticide extenders. Canada imported most of its PCBs from the United States until July 1980 when their use was totally prohibited as a constituent of any product, machinery, or equipment imported into Canada.

Transformers and light ballasts are the two most common sources of PCBs likely to be encountered during an environmental site investigation. Materials suspected of containing PCBs should be tested by an environmental analytical laboratory experienced in this type of analysis. Isomer specific GC-ECD analysis should be requested.

D.3.3 Radon

Radon is a heavy, colourless, odourless radioactive gas produced by the decay of radium. Radon occurs naturally in geological formations containing uranium, granite, shale, phosphate, or pitchblende and was used commercially in luminescent products. Radon decay products are known human carcinogens and may cause genetic damage. Exposure to radon gas typically occurs in confined areas in public, commercial, or residential buildings.

All radiation survey instruments to detect radon work on the principle that radiation causes ionization in the detecting media. The ions produced are counted electronically and a relationship established between the number of ionizing events and the quantity of radiation present.

D.3.4 Urea Formaldehyde Foam Insulation

Urea foam formaldehyde insulation (UFFI) was used extensively in the 1970s in Canada. UFFI has been known to emit significant amounts of formaldehyde gas during, and for periods of time following, installation. However, UFFI is no longer used in Canada, and current formaldehyde levels in structures with UFFI have been found to be insignificant in most cases.

D.3.5 Flaking Paints

In a Phase 1 site investigation, indications may be found of flaking paint materials from certain areas of a building. A more detailed survey should be included in the Phase 2 investigation if these materials are thought to include either lead or mercury. It is possible to use potable analyzers, for example, x-ray fluorescence (XRF) detectors, to inspect painted surfaces. However, confirmation of the lead or mercury content of suspected paint materials should involve metal-specific analysis by a qualified environmental testing laboratory.

TABLE D-1

SUMMARY OF MONITORING EQUIPMENT COMMONLY USED IN AMBIENT AIR SURVEYS

Type of Equipment	Measurement	VOCs Investigation	Methane Investigation	Principle of Operation	Limitations
Combustible Gas Meter (Explosimeter)	ppm, %LEL, %GAS, (±40%)	*	*	Combustible gases change electrical resistance of a Wheatstone bridge	• cannot be used in presence of silicones, fuming acids, leaded gasoline vapours, silanes, or sulphur compounds • not accurate in low oxygen or high CO_2 environment • relative humidity 10 to 90% • zero shift problem in ppm range • non selective
Flame Ionization Detector (FID)	0 to 10, 0 to 100, 0 to 1000 ppm	*	*	Vapours are burned and ionization occurs, ions are measured electronically	• different response to volatile compounds • when used in GC mode, there is no temperature control • non-selective in survey mode
Photoionization Detector (PID)	Typically 0 to 2000 ppm	*		Electrons are ionized by UV light and measured electronically	• high humidity will affect results • non selective • response not necessarily linear • radio frequency interference
Portable Gas Chromatograph (GC)	ppb, ppm	*	*	Column with FID, PID or ECD (electron capture detector)	• for accurate ppb measurement calibration gas required
Indicator Tubes	ppm, %GAS, (±5% to 40%)	*		Chemical reaction to produce a colour change	• difficult to assess unknown atmospheres • high humidity can affect results • interferences
Oxygen Meter	0 to 25% GAS	*	*	Atmospheric O_2 measured on a galvanic cell	• corrosive environments may damage some cells • barometric pressure will affect readings • relative humidity 10 to 90%
Carbon Dioxide Meter	0 to 5000 ppm, 0 to 10% GAS, 0 to 100% GAS		*	Infrared adsorption	• different instruments may be required for both indoor and outdoor applications

APPENDIX E

"WHY DO MORTGAGE GUARANTORS REQUIRE ENVIRONMENTAL AUDITS?"

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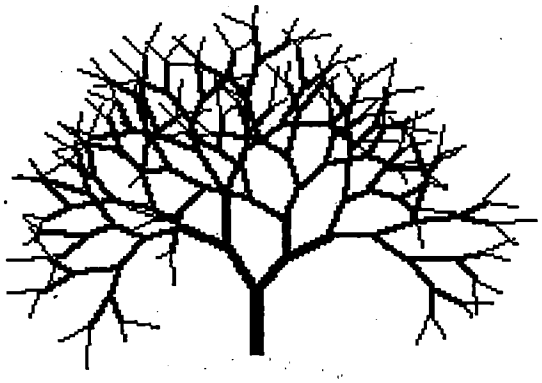

WHY DO MORTGAGE GUARANTORS NEED ENVIRONMENTAL AUDITS?

Why Do Mortgage Guarantors Need Environmental Audits?

1. Introduction

There is no law which states that those who give or guarantee mortgagees must commission environmental audits. Nor is there likely to be such a law in the near future. Mortgagees and mortgage guarantors require environmental audits because this is how they protect themselves and their investments. This report explains why they need this protection.

2. The Non-Polluter Pays

All across Canada, business people know that they face increasing liabilities for the environmental problems which they create. The "polluter pays" principle has become a commonplace, a burden which well-run businesses must prepare themselves to bear. Far fewer of them realize, however, that the "non-polluter also pays"; those who do not create environmental problems can often be made to clean them up.

What kinds of land can be contaminated? One obvious area of concern is industrial land, particularly mine tailings, waste disposal sites, coal gasification sites, metal refineries, coking plants, hydro-carbon refineries, bulk plants, scrap yards, chemical companies, electroplating companies, and those using paints and wood preservatives. A study of two hundred contaminated Dutch sites revealed the following previous uses:1

chemicals	6%
metal finishing	5%
gasworks	21%
non ferrous metal	5%
oil contamination	9%
waste disposal sites	32%
other	22%

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1 R.C. Haines and F.E. Joyce, *Land Recycling and Renewal: a Prospective analysis of Industrial Land Contamination and Remedial Treatment.* (Ecotech Ltd.) "Final Report" FAST paper No. 192, June 1987 at 96.

Why does CHMC Need Environmental Audits?

Commercial properties may also pose problems. In Truro, Nova Scotia, each of two nearby dry cleaners contaminated the soil of their own properties. One closed up business and the owners moved away. Years later, the municipality discovered that its water supply was contaminated by dry-cleaning solvents. It was not possible to determine whether the solvent came from one dry cleaner, the other, or both.[2]

Other obvious potential sources of contamination are electrical contractors who may handle and store electrical equipment containing P.C.B.s,[3] print shops, and gasoline stations.[4]

Agricultural properties, despite their bucolic air, may also be problematic. As shown during the lengthy Canadian controversy over the use of the pesticide Alachlor, pesticide contamination of agricultural property is a matter of serious concern. Most modern farms use an amazing range and quantity of chemicals, especially fertilizers, herbicides and insecticides.[5]

A second source of concern for agricultural land is the use of sewage sludge as fertilizer. Many municipalities dispose of the sludge from their sewage treatment plants by providing it as free fertilizer to interested farms. This is a socially important and valuable way of using such wastes. Unfortunately, should the sludge become contaminated with toxic chemicals, heavy metals, or radioactivity, the land in turn may become contaminated.

Not even residential property is immune. Some homes have been built on properties already contaminated.[6] Some have become contaminated from toxic materials in the home,[7] or pesticides.[8] Residential properties may also become contaminated if they find

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2 Personal communication, Janice Forsyth, Ministry of the Environment, Nova Scotia.

3 *R.* v. *J.B. Carroll*, February 20, 1987, Hamilton Provincial Court [hereinafter *Carroll*].

4 *R.* v. *Mac's Convenience Stores*, 14 C.E.L.R. (Ont. Prov. Ct) [hereinafter *Mac's-R.*].

5 The question of chemical residues in agricultural land can be extremely complex. The use of certain chemicals on the land may mean that the land may continue to be used for that purpose, but that it is unsuitable for any other purpose. Furthermore, the use of chemicals by one land owner can affect the agricultural pursuits or drinking water of a neighbouring landowner. On the other hand, the failure of a landowner to control stock or plant diseases, or to carry out proper weed control, can also adversely affect neighbouring farms.

6 For example the Canada Homes and Malvern subdivisions near Toronto, contaminated with lead and P.C.B.s, and radioactivity, respectively.

7 For example, there has been much public concern about urea formaldehyde and asbestos insulation.

8 In one celebrated case, a pesticide company applied 4 gallons of pesticides to the basement, kitchen and pantry of a home, to combat a supposed infestation of beetles that had actually died out many years before. The home and everything in it became contaminated; one of the owners became ill.

themselves downwind, downstream, or down gradient from a source of a contaminant such as an industrial property or a waste disposal site.[9]

Finally, there are spill sites. Some provinces and the federal government now require certain types of spills to be reported. Thousands of such reports are filed each year, including spills of a wide variety of chemicals and in an infinite variety of locations. There is no ready means by which to determine whether any particular place has been the location of a spill.

During the past few years, environmental cleanups have become steadily more demanding and consequently more expensive. Many more sites have been identified as contaminated. The cost of disposing of contaminated soils and other wastes has skyrocketed; in some municipalities, disposal costs for even the most innocuous wastes have risen from under $10/ton to more than $100/ton. Hazardous wastes are many times more expensive and difficult to dispose of than ordinary wastes; in some cases (notably PCBs) they cannot be disposed of at all in many provinces. In addition, regulators now worry about many contaminants which formerly caused no concern, and they worry about them at incredibly tiny concentrations. Equipment to detect the presence of contaminants has become more and more sensitive, permitting regulators to detect, and to demand, cleanups of contaminants present only in parts per *trillion.* For purposes of comparison, one part per billion is like a quarter lying on the TransCanada Highway somewhere between the Atlantic and Pacific Oceans; one part per trillion is a thousand times smaller than that.

Governments across the country are therefore casting their net ever wider in the search for deep pockets to pay for environmental cleanups. Potential deep pockets who have begun to receive particular attention are preferred creditors, especially mortgagees. Investors in land are therefore gambling with their money if they take no prior precautions to determine the presence of contamination.

3. Kinds of Liability

There are four principal kinds of environmental liabilities which should be of concern to mortgagees:

3.1. The security may be worthless.

The most obvious pitfall is that land which was taken as security may be worth little or nothing if it is contaminated. In some provinces, land which has been used (legally or illegally) for waste disposal cannot be used for anything else for 25 years without government permission. In addition, strict decommissioning guidelines may prevent

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The homeowners had to flee the home; decontamination took more than four years. *R.* v. *Burton's Sanitation Limited* (20 July 1987), Brockville (Ont. Dist. Ct) [hereinafter *Burton's*].

9 It is for this reason that millions of dollars are being spent by provincial governments and private companies to remove lead from residential neighbourhoods in the vicinity of lead refiners in the Toronto area.

redevelopment of contaminated land until most of the contaminants have been removed, or otherwise rendered harmless. This may cost as much or more than the land is worth.

It is becoming increasingly difficult to dispose of contaminated land. Buyers are becoming increasingly wary; more and more conduct environmental audits, and require stringent terms in the agreement of purchase and sale. Vendors also face growing obligations to disclose environmental problems. For example, environmental Orders of the Ontario government may now prohibit "dealing with" any interest in the property unless the Order is disclosed to the purchaser, lender or tenant. The government may also require the Orders to be registered against the title of the land.

The only way to avoid this pitfall is to ensure that the land is free from contamination which could affect its market value. This can only be done through appropriate enquiries, such as an environmental audit of the property.

3.2. Prosecution of mortgagee or mortgagor for environmental offences

Environmental statutes create a considerable number of offences. The maximum penalties include very large fines and jail sentences, including personal liability for corporate officers and directors. (The first corporate directors have already been sentenced to jail.) The most serious offences are those of actual pollution. For example, it is generally an offence to discharge or cause or **permit** the discharge of a contaminant into the natural environment, especially if the discharge will cause or is likely to cause an adverse effect. Adverse effects include:

a) impairment of the quality of the natural environment for any use that can be made of it;

b) injury or damage to property or to plant or animal life;

c) harm or material discomfort to any person;

d) an adverse effect on the health of any person;

e) impairment of the safety of any person;

f) rendering any property or plant or animal life unfit for use by people;

g) loss of enjoyment of normal use of property; and

h) interference with the normal conduct of business.

Other important environmental offences include: failing to report unlawful discharges or spills; failing to promptly clean-up spills; failure to comply with administrative orders; and failure to properly dispose of waste.

Liability for "**permitting**" the discharge of a contaminant, and other offences, is based upon control:

> Liability [for environmental offences] rests upon control and the opportunity to prevent, i.e., that the accused could have and should have prevented the pollution ... This control may be exercised by "supervision or inspection", by improvement of his business methods or by exhorting those whom he may be expected to influence or control.[10]

Actual control is certainly sufficient to trigger liability; potential control (i.e. the power to exercise control) may also give rise to liability. In R. v. Sault Ste. Marie, the actual pollution was caused by an independent contractor retained by the corporation of the city of Sault Ste. Marie to haul away the garbage of its citizens. The municipality was held liable for the pollution because it could have done more to prevent the contractor from polluting, particularly through the terms of the garbage disposal contract, and through its powers as a municipality.

In recent years, the maximum fines available for environmental offences have increased substantially. From an average maximum of $2,000-$5,000, 10 years ago, the maximum penalties now range up to $5 million per day.[11] The actual fines imposed are also increasing substantially; fines of five and six figures are becoming common.[12]

There are a number of activities related to the construction and operation of a housing complex that can give rise to environmental offences. Common offences related to construction include failing to obey and to comply with sewage and water works approvals, excessive noise, blowing sand or dirt, and soil run-off. Common offences related to operation include improper operation and maintenance of boilers and incinerators, and improper sewage and waste disposal. However, the mere presence of pre-existing contamination is not likely to lead to prosecution.

Mortgagors who are prosecuted for environmental offences may face substantial fines and high legal costs, which may impair their ability to repay the mortgage. Mortgagees may also face prosecution, but probably only if they go into possession of the property.

3.3. Administrative Orders

The third major type of environmental liability is **liability to administrative orders.** Liability to these orders frequently turns on "charge, management or **control**" of a contaminant or contaminated site. This often means that the government can order anyone who now has control of a property or business to clean it up, whether or not they caused the contamination which is found there. Compliance with such orders can be extremely expensive, sometimes in the millions of dollars.

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10 Regina v. Sault Ste. Marie (1978), 40 C.C.C. (2d) 353; [1985] S.C.R. 1299,

11 *Canadian Environmental Protection Act.*

12 D. Saxe, "Fines Are Going Up Dramatically In Environmental Cases" (1989) 3 *C.E.L.R.* (N.S.) 104.

Why does CHMC Need Environmental Audits?

There are four main classes of administrative orders: stop orders, control orders, preventative orders and clean-up orders.

Stop orders are generally issued in situations of imminent danger to humans and require immediate cessation of discharges into the natural environment. Stop orders can be issued to the owner of the property and/or to the "person responsible", i.e., the person who occupies property or who has charge, management or control of it.

Control orders require reductions in discharges of pollutants which infringe standards or which cause or are likely to cause adverse effects. Like stop orders, they can be issued to the owner of property or to "persons responsible" whether or not they originally caused the problem.

Preventative orders can be issued even when there has been no pollution, if a contaminant on property which, if discharged, might cause environmental damage. Preventative orders can be issued to those persons who own or control property or undertakings. They can require that precautions be taken to prevent discharges and/or to minimize the effect of discharges which may occur.

Clean-up orders require the clean-up of land or water which has been damaged by the discharge of contaminants, whether from a recent spill or from damage long ago. These are the orders most likely to be of direct concern to a mortgagee. It is possible that such orders can be made retrospectively, that is, even if the damage occurred long ago, before the environmental damage became illegal.

In most of the country, these orders have a logical structure. Some of the orders are based upon fault, (such as control orders, stop orders and cleanup orders); others are based upon current possession and control (such as preventative orders). The fault-based orders can require anyone who caused pollution to clean it up, even years after the event. The orders based upon possession and control can require cleanups by the current owners or occupiers of environmental problems. Both types of orders put a premium upon environmentally responsible behaviour .

Unfortunately, this is less true in Ontario. June, 1990 amendments to the *Environmental Protection Act*[13] and *Ontario Water Resources Act*[14] have dramatically expanded the potential targets of administrative orders. Now, neither possession nor fault are necessary before a business or individual in Ontario can be ordered to spend millions on something the government wants. If an environmental problem exists on any property, anyone who owned or occupied that property at any time, present or past, can be ordered to clean it up, whether or not they had anything to do with creating the problem, and even if the problem was created after they left the property. This part of the law does not recognize a due diligence defence.

The Ontario Ministry of the Environment argues that these provisions apply retroactively. If they are right, creditors who were ever in possession of any property, no matter for how short a time, can be required to pay for its cleanup. This defies logic,

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13 R.S.O. 1980, c. 141

14 R.S.O. 1980, c. 361

fairness and commercial reality. To add insult to the injury, the government has created an administrative nightmare. For example, on most properties, there will be numerous parties who could potentially be ordered to do a cleanup. There is nothing in the Act to require the government to allocate the cost of the work among these many parties. Thus, the government may be able to pick any deep pocket and put the entire burden on them. For example, if the government chooses to go after a bank which once foreclosed on the property, the bank must pay the whole cost and is then left to its own devices to try to recover from those who caused the pollution.

The only defence to these administrative orders is due diligence to avoid acquiring or creating problems. **A business or individual who uses due diligence, i.e. by conducting environmental audits prior to acquiring land, can reasonably expect to minimize their liability.**

3.4. Spills

The fourth major kind of liability is **liability to clean-up spills.** Liability to clean-up a spill rests both on the owner of the pollutant spilled and on anyone who had charge, management or **control** of the pollutant immediately before the spill. In Ontario, and under some federal statutes, liability to pay the actual costs of clean-up is absolute, that is, it does not matter whether the person required to pay was at fault in any way. Even when the spill is a result of sabotage or terrorism, the owner or the person with charge, management and control of the pollutant must pay the full cost of clean-up.

In addition to the cost of clean-up, spills frequently cause damage to third parties, such as business losses, adverse health effects, or damage to property. The owner of the contaminant, and the persons who had charge, management or control of it, must also pay these damages, unless they establish that they had used all due diligence to prevent the spill.

A mortgagee out of possession would not be liable to cleanup the mortgagor's spills. However, spill cleanup costs could be an important liability should the mortgagee ever wish to foreclose or sell property on which a spill had occurred.

3.5. Torts

Contaminated land can also be very expensive when it adversely affects a neighbour. A person adversely affected by his neighbour's contaminated property may have a right to sue under any of five principles: trespass, negligence, nuisance, strict liability (*Rylands* v. *Fletcher*), and civil suit for breach of statute.

Trespass protects one's interest in exclusive possession of property free from physical intrusion by others. A deposit of a contaminant on another's property is a trespass.[15] Similarly, any flow of a physical contaminant from one property to another is a trespass, whether deliberate or accidental, and whether it occurs above ground or below.[16]

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15 *Athwal* v. *Pania Estates Ltd* (1981), 11 C.E.L.R. 17 (B.C.S.C.).

16 *Mann* v. *Saulnier* (1959), 19 D.L.R. (2d) 130 (N.B.C.A); *Martin* v. *Reynolds Metals Co.* (1959), 342 P.2d 790, 792, cert. denied, 362 U.S. 918.

Trespass continues as long as the invasion of the property continues. Each day that an offending contaminant continues to be present upon a neighbour's property is a continuing trespass, regardless of the length of time since the original influx of the contaminant. Both the original owner of the affected property and any subsequent owners may sue.[17] If the wrongdoer fails to remove the contaminant on request, the affected landowner may do so and sue the trespasser for the cost.

Purchasers of land become the "owners" of all buried contaminants present, just as they acquire ownership of valuable minerals in the land. They are therefore responsible for subsequent trespasses by those contaminants. However, subsequent purchasers of property from which a contaminant had earlier escaped would not themselves become responsible for the trespass by that contaminant.[18]

Nuisance is the common law doctrine most often used regarding contaminated land.

> "In general, a nuisance is an unreasonable interference with the use and enjoyment of land by its occupier or with the use and enjoyment of a public right to use and enjoy a public right of way. For the most part, whether the intrusion resulted from intentional, negligent or non-faulty conduct is of no consequence, as long as the harm can be categorized as a nuisance."[19]

There are two types of nuisance, public nuisance and private nuisance. **Public nuisance** is an unreasonable interference with public amenities, that is, the reasonable comfort and convenience of life of a class of persons.[20] Pollution with widespread impact, such as oil spills[21] or noise,[22] can create public nuisances. Contaminated land may do the same if it affects a public amenity, for example by poisoning a watercourse formerly used for fishing.[23] Public nuisances must generally be enforced by the Attorneys General. It is also possible for private citizens to bring a tort suit for public

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17 *Hudson* v. *Nicholson*, (1839) 5 M. & W. 437.

18 For example, the new owners of a former service station site would "own" any gasoline left in the ground of their new property, but would not acquire gasoline which had escaped in earlier years into adjacent land.

19 Linden, *supra*, at 493.

20 *Ibid.*, p.495.

21 *R.* v. *The Sun Diamond*, (1983), 25 C.C.L.T. 19 (Fed. T.D.).

22 *A.G. Manitoba* v. *Adventure Flight Centres*, (1983) 25 C.C.L.T. 295 (Man. Q.B.); *A.G. of Ontario* v. *Orange Productions*, (1971) 21 D.L.R. (3d) 257 (Ont. H.C.).

23 *State of New York* v. *Shore Realty* 759 F.2d 1032, 22 E.R.C. 1625 (1985, N.Y.).

nuisance, if the claimant has suffered special damage different from that suffered by the public generally.[24]

> "**Private Nuisance** may be defined as an unreasonable interference with the use and enjoyment of land. This may come about by physical damage to the land, interference with the exercise of an easement ... or other similar right, or injury to the health, comfort or convenience of the occupier. The use of the term "unreasonable" indicates that the interference must be such as would not be tolerated by the ordinary occupier..

Fault is not a necessary element in nuisance. The most common environmental nuisance is contamination of ground water, which interferes with its use for drinking, for agriculture or for similar human purposes.[25] Nuisance may also be committed by the deposit of wastes,[26] or by the emission of odours,[27] of airborne particles[28] or of noxious gases.[29]

Both public and private bodies may be liable for nuisance. Municipalities have been held liable for nuisance when methane gas from a land fill site exploded in an adjoining garage,[30] and when water from a sewage lagoon seeped underground contaminating

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24 Linden, *supra*, at 495.

25 *Roberts* v. *City of Portage La Prairie*, [1971] S.C.R. 481, 17 D.L.R. (3d) 96; *Velsicol, supra,*; *Jackson* v. *Drury Construction Company Limited* (1974), 4 O.R. 735, 49 D.L.R. (3d) 183 (Ont. C.A.) [hereinafter *Jackson*]; *O'Brien* v. *Nfld Light & Power Co.* (1984), 51 Nfld. & P.E.I.R. 30, 150 A.P.R. 30 (Nfld. Dist. Ct.); *N.Y.-Schenectady, supra, Brewer* v. *Kayes*, [1973] 2 O.R. 284 (Dist. Ct.); *Corkum* v. *Lohnes* (1981), 43 N.S.R. 4771, 121 D.L.R. (3d) 761 (C.A.).

26 *Soleiko* v. *R.* , 13 A.C.W.S. (3D) 15 [hereinafter *Soleiko*].

27 *Plater* v. *Town of Collingwood*, [1968] 1 O.R. 81 (H.C.).

28 *Le Procureur Général de la Province de Québec* v. *Industrial Granules Limited and C.N.R.* (1974), 5 C.E.L.N. 85 (Que. Sup. Ct).

29 *Gertsen* v. *Metropolitan Toronto et al.*; emissions of smoke, sawdust, fly ash and objectionable sounds which caused substantial interference with the operation of a hotel and with use and enjoyment of its property were held to be a nuisance. *Kerr* v. *Revelstoke Building Materials Limited* (1976), 71 D.L.R.(3d) 134 (Alta. S.C. T.D.); damages were awarded for business loss; additional damages of $30,000 were awarded where the smoke, sawdust, fly ash and noise caused the neighbour such concern, anxiety, and discomfort that she became nervous, preoccupied, humourless, and irritable.

30 *Gertsen et al.* v. *Municipality of Metropolitan Toronto et al.* (1973) 2 O.R. (2d) 1 (H.C.).

wells.[31] The Crown has been held liable for dumping dredging soils which destroyed a mussel cultivation site.[32]

Nuisance is a continuing tort. Every day on which a pollutant seeps from one property to another creates a new nuisance, which starts the statute of limitations running anew.[33]

The measure of damages for nuisance is all loss which flows directly from the nuisance, including loss in value of property, business loss, and personal injury. In addition to recovering damages, nuisance is one of the few areas in the law of tort where courts may issue injunctions.

Nuisance also lies against one who inherited the situation from the primary culprit.[34] A purchaser of contaminated land will be liable for nuisances caused by the contamination whether or not the purchaser caused the contamination. The purchaser is probably not liable for nuisances which occur without his knowledge, but he will be liable if the nuisance comes to his attention and he fails to promptly abate it.[35] In some cases, liability in nuisance has been imposed upon subsequent owners only if they have engaged in some affirmative act which amounted to adoption of the nuisance, for example, paying a lower price for the property because of its contamination.[36]

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31 *Robert* v. *City of Portage La Prairie.*

32 *Soleiko, supra,* .

33 *Roberts* v. *City of Portage La Prairie* ; *Pynn* v. *Harbour Grace* (1979), 9 C.E.L.R. 16 (Nfld Dist Ct); *N.Y.-Schenectady, supra.*

34 Linden, *supra,* at 511.

35 *Gertsen* v. *Municipality of Metropolitan Toronto* (1973), 2 O.R. (2d) 1 at 24 (H.C.); *Carmel Holdings Ltd v. Atkins et al.* (1977), 6 C.E.L.N. 148 (B.C.S.C.); *Sampson* v. *Hodson-Pressinger,* [1981] 3 All E.R. 710 (C.A.); *Fedleigh-Denfield* v. *O'Callaghan* (1940), A.C. 880 at 897; *New York* v. *Shore Realty Corporation,* 22 E.R.C. 1625 at 1639 (1985, N.Y.).

"Liability [in nuisance] [of a possessor of land] is not based upon responsibility for the creation of the harmful condition, but upon the fact that he has exclusive control over the land and the things done upon it and should have the responsibility of taking reasonable measures to remedy conditions on it that are a source of harm to others. Thus, a vendee [purchaser] ... of land upon which a harmful physical condition exists may be liable for failing to abate it after he takes possession, even though it was created by his vendor, lessor or other person and even though he had no part in its creation."

The Restatement (Second) of Torts at 839, quoted in *New York* v. *Shore Realty Corporation,* 22 E.R.C. 1625 (1985, N.Y.).

36 *Philadelphia Chewing Gum Corporation* v. *Commonwealth* 35 Pa. Commw. Ct. 443, 387 A. 2d 142 (1978); aff'd *sub nom. National Wood Preservers* v. *Commonwealth* 489 Pa. 221, 414 A. 2d. (1980); appeal dismissed 449 U.S. 803 (1980).

Landlords are liable for nuisances committed by their tenants, if the nuisance is the natural and necessary result of what the landlord authorized the tenant to do.[37] A landlord may also be liable if a nuisance existed at the commencement of the tenancy and was known to or ought to have been known to the landlord. Liability is particularly likely if the nuisance is such as to render the property dangerous.[38]

Where nuisances are permitted by corporations, individual employees, officers and directors may also be held liable.[39]

4. American Precedents

There have been very few Canadian cases concerning the liability of mortgagees for a debtor's environmental problems. However, the issue has been discussed in a series of American cases which would be likely to be of persuasive value to Canadian courts. Many of these cases were decided under the American *Comprehensive Environmental Response, Compensation and Liability Act* ("CERCLA") (commonly known as Superfund) which imposes liability for the clean up of contaminated land.

Superfund holds the owners and operators of a contaminated site liable to pay for clean up if they owned and operated it (a) when clean up became necessary, or (b) when the contamination occurred. A special provision protects creditors from liability as "owners" if they held indicia of title (e.g. a mortgage) primarily to protect their security interest and did not participate in the management of the facility. American cases have therefore focused on whether creditors exercise so much control as to be "operators" of the contaminated site or whether mortgagees "participated in the management" so as to lose the secured creditor protection from liability as owners.

The first American case in this area occurred in Re T.P. Long Chemical Inc.[40]. In that case, the BancOhio National Bank held a perfected security interest in the accounts receivable, equipment, fixtures, inventory and other personal property of the debtor. (A second bank held a mortgage on the land.) Unknown to the bank, this personal property included 90 drums of hazardous waste buried in the yard. When the debtor

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37 *State of New York et al.* v. *Monarch Chemicals Inc.* 456 N.Y.S. 2d 867 (A.D. 1982). Where a landowner let property for use as a racing track, knowing that the track might cause excessive noise, the landlord was held jointly liable in nuisance for all damages caused by the noise. *Banfai, supra,*.

38 Linden, *supra,* at 511-512.

39 *Cormier* v. *Blanchard* (1980), 10 C.E.L.R. 137 (N.B.C.A.); *Desrosiers et al.* v. *Sullivan* (1985), 14 C.E.L.R. 135 (N.B.Q.B.). "The officers of a corporation who carry on its business and maintain a nuisance are personally liable in damages for such nuisance. A director or officer of a corporation may be held liable for a nuisance created or maintained by the servants or employees of the corporation, if he had knowledge of the existence or continuance of a nuisance, or if by exercising ordinary diligence in his official position he should have known of it." 46 C.J. at 748, quoted with approval, in *Cormier et al.* v. *Blanchard* (1980), 112 D.L.R. (3d) 667 at 669, 30 N.B.R. (2d) 198; (N.B.C.A.) *Banfai, supra,*.

40 45 BANKR. 278 (BANKR.N.D. Ohio 1985)

became bankrupt, the trustee for the bankrupt's estate auctioned off all the personal property except the drums; the proceeds were subject to BancOhio's security interest. Contamination of the ground was subsequently discovered. The trustee in bankruptcy having refused to clean up the site, the government did so and attempted to recoup its expenses by seizing the proceeds of the auction.

BancOhio's security applied only to the personal property, and not to the contaminated land; it was therefore not a "owner" of the contaminated land. There was also no grounds to hold BancOhio liable as an "operator" as it had clearly not engaged in any management or control of the business. The case therefore turned on whether the costs of cleaning up the contamination were administrative expenses of the bankrupt estate which should have priority over the claims of the secured creditor. The bankruptcy court reasoned that BancOhio had received no benefit as a result of the hazardous waste clean up. First, the bank's collateral had been sold before the hazardous waste was discovered, so the government's expenses could not be considered a cost incidental to the sale of the collateral. Second, the government's expenses incurred in removing the hazardous waste were not a cost preserving BancOhio's collateral because the drums had no value as collateral.[41] BancOhio was therefore entitled to the proceeds of the sale of the personal property in priority to the claim of the State for the clean up.

Since that case, the scope of activity permitted to American creditors without exposing themselves to environmental liability has steadily narrowed. In United States v. Mirabile[42]. the government sued to recover costs incurred to remove hazardous wastes from the facilities of a former paint manufacturer. The paint manufacturer had had an operating loan from the American Bank, secured in part by a mortgage on the site, and a second mortgage from the Small Business Administration. A second bank had advanced working capital in return for a security interest in the inventory and assets. The business failed. The American Bank foreclosed on the site in 1981 and purchased the property at the foreclosure sale. The American Bank held the property for four months and then assigned the right to purchase the property to an independent third party, a couple named Mirabile.

In this case, the American Bank was clearly a "owner" of the contaminated property, not only because of its mortgage but also because it had placed the high bid at the foreclosure sale. Nevertheless, the court held that the American Bank was protected from being a "owner" by the secured creditor exemption, because the bank's actions were undertaken to protect its security interest in the property. The court held that changing the locks and securing the windows, showing the property to interested buyers, and making preliminary inquiries into the cost of cleaning up the site were merely "prudent and routine steps to secure the property against further depreciation". Summary judgment was therefore granted releasing the American Bank from liability. The second mortgagee was also released.

The third bank, the Mellon, had taken a more direct role in the paint manufacturer's operations. A bank loan officer joined an advisory board to oversee the company's

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41 Patricia Quentel, *The Liability of Financial Institutions for Hazardous Waste Clean Up Costs Under CERCLA*, 1988, Wisconsin Law Review 139.

42 15 Envtl.L.Rep. (Envtl.L.Inst.) 20994 (E.D.Pa., Sept. 4)

operation. After the paint manufacturer went into bankruptcy, the Mellon Bank increased its monitoring and control. Bank staff monitored the accounts, established a reporting system between the company and the bank, made weekly visits to the site, and asserted some control over manufacturing changes, reassignment of personnel, and the priority in which orders were filled. Upon the cessation of operations, the bank took over the remaining inventory. The court held that these facts could be sufficient to hold the Mellon Bank liable.

The favourable treatment extended to the American Bank in Mirabile came to an end in United States v. Maryland Bank and Trust Company[43],. In that case, like Mirabile, the mortgagee bank foreclosed on a contaminated site and purchased it at the foreclosure sale. The bank remained the owner of the site for four years, during which the environmental clean up occurred. The court held that by purchasing the property at the foreclosure sale, the bank became a true owner and lost the secured creditor exemption.

In Guidice v. B.F.G. Electroplating & Manufacturing Company Inc.[44]. the Court agreed that any bank which purchased property at a foreclosure sale became an owner liable to pay for a clean up. However, the Court also held that the bank was not liable prior to foreclosure, even though the bank: held a mortgage on the property; obtained extensive briefings from company personnel concerning accounts, personnel changes, and raw materials; assisted the company in communications with government concerning government loan assistance and waste water discharge compliance; sent a bank agent to visit the property; and referred a potential lessee to shareholders of the debtor. The Court concluded that none of these activities indicated control of operational, production or waste disposal activities at the site and therefore did not expose the bank to liability. U.S. v. Nicolet Inc.[45]. confirmed that creditors were not liable to pay for site clean up unless they actually participated in the managerial and operational aspects of the facility.

One American court has gone much further, holding that a creditor can be liable even without exercising operational control, if the creditor could have exercised such control. In U.S. v. Fleet Factors Corporation[46], Fleet Factors was held liable for the cost of cleaning up a contaminated site although it had never foreclosed on its mortgage on the land and buildings. Instead, Fleet Factors had foreclosed on some of the inventory and equipment, and had it sold by auction. In addition, Fleet Factors had contracted with a third party to remove the unsold equipment from the premises and to leave the building "broom clean".

The court held that Fleet's acts in auctioning off the equipment and in hiring a contractor to leave the premises "broom clean" were sufficient to make it a "operator" of the facility. As a mortgagee, it was also an "owner" unless it qualified for the secured

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43 632 F.Supp. 573 (D.Md., 1986)

44 732 F.Supp. 556 (W.D.Pa., 1989)

45 712 F.Supp. 1193 (E.D.Pa., 1989)

46 901 F 2nd 1550 (11th Circuit, 1990); re-hearing denied, 911 F.2d 742 (11th Circuit, 1990)

creditor exemption, that is, unless Fleet could show that it had not "participated in the management" of the plant. The court held that Fleet had "participated in the management of the facility" by: requiring the debtor to seek its approval before shipping goods to its customers; establishing the price for excess inventory; dictating when and to whom the finished goods should be shipped; determining when employees should be laid off; supervising the activity of the office administrator; receiving and processing the employment and tax forms; and by controlling access to the facility after operations ceased.

This very broad approach to creditor liability has been much criticized by American commentators, and it is not yet clear whether it will be followed by other courts. A second federal appeal court returned to the standard established by the earlier cases, namely that creditors will have to pay for cleanups only where they have actually exercised control over the management of a contaminated facility. In re: Bergsoe Metal Corp.[47], a municipal corporation which had lent money to a recycling industry on the security of a mortgage was excused from liability for cleaning up the mess it left behind. The Court held that the right to foreclose was not equivalent to an actual foreclosure, and that a mortgagee does not become liable merely by encouraging a debtor to carry on business, nor by permitting its debtor to try a workout of its problems.

However, it is clear that American mortgagees can acquire unlimited environmental liabilities if they actually go into possession of contaminated property, and cannot escape that liability by the traditional bankruptcy approach of abandoning undesirable "assets". In the matter of Quanta Resources[48], the trustee in bankruptcy obtained court approval to abandon premises heavily contaminated with PCBs. This ended both security and fire protection services at the sites, notwithstanding state orders to the contrary. Both sites were in heavily populated areas, where fires or spills of PCBs could have devastating consequences. On appeal, the U.S. Supreme Court held that the trustee should not have been allowed to abandon the sites. Because of the danger to the public which could flow from non-compliance with the state orders, the trustee should have put compliance with the orders ahead of the interests of the creditors. Creditors are better able to protect themselves than are the innocent victims of pollution. The court specifically held that an administrative order under valid state law which requires positive action necessary in the public interest is not a "claim" in the bankruptcy sense, and is not analogous to a mere demand for money.

These cases indicate that mortgagees may be held liable for on-site environmental problems when the mortgagor has become insolvent, and the creditor begins to exercise significant control over the debtor's assets and operations. Liability is particularly likely if the creditor forecloses on the property, or otherwise goes into possession.

5. Recent Canadian Cases

Recent Canadian cases have also confirmed that mortgagees need to be concerned about the environmental status of the land they accept as security. In addition to the simple loss

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47 1990 U.S.App. LEXIS 13541 (9th Cir., August 9, 1990)

48 474 U.S. 494 (1986)

in value of the security, discussed above, the mortgagee may become liable for the entire cost of cleanup (which may far exceed the value of the estate) if it goes into possession of the mortgaged property.

5.1. The creditor who goes into possession of mortgaged property

5.1.1. Environmental protection orders where the debtor is not bankrupt

The leading Canadian case on the relationship between environmental protection orders and insolvency outside a bankruptcy is Canada Trust v. Bulora.[49] The Ontario Court of Appeal held that a receiver-manager was obliged to comply with an provincial administrative order necessary in the public interest, prior to paying the claim of the secured creditor who had appointed him. In that case, the assets of the debtor (who was not bankrupt) included a residential subdivision. The fire marshal ordered the debtor to tear down certain of the homes, because they were fire hazards to nearby residents. As the secured creditor's claim exceeded the value of the estate, there were no funds available to pay for the demolition except those owed to the secured creditor. The creditor had a prior, perfected, legitimate claim to the funds. On the other hand, failure to demolish the houses could endanger the lives and property of all other residents of the subdivision. The Court held that the urgent need to protect public safety took priority over the rights of the creditor. The receiver-manager was required to comply with the Order prior to paying the secured creditor.

However, it was not clear whether the same result would follow in a bankruptcy. There is no doubt that provincial environmental statutes are constitutionally valid within the province, but when they conflict with federal laws such as the Bankruptcy Act, the federal laws prevail. What priority would a provincial environmental protection order have in a bankruptcy?

5.1.2. Environmental protection orders in a bankruptcy

This question was addressed by a Canadian court for the first time in **Panamericana de Bienes y Servicos, e.a. v. Northern Badger Oil and Gas Limited.**[50] This case established that environmental obligations under provincial laws can take precedence over the rights of a secured creditor.

Northern Badger Oil and Gas Limited was an oil and gas producer. It operated a number of valuable wells. However, it was also the named operator of seven old, disused wells, which could cause significant contamination unless properly decommissioned, as required by provincial law. Northern Badger Oil and Gas Limited became insolvent without decommissioning the old wells. Creditors began making their claims. A receiver-manager was appointed by the principal secured creditor, followed shortly by a trustee in bankruptcy.

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49 39 C.B.R. N.S. 152

50 Alberta Queen's Bench December 20, 1989

The receiver manager operated the business while arranging to realize the assets. However, it did not decommission the wells, despite a formal order to do so issued by the provincial Energy Resources Conservation Board. Instead, the receiver deliberately arranged a complicated sale of the assets of the estate, designed to ensure that all of the valuable assets were realized for the benefit of the secured creditor, leaving for the trustee in bankruptcy only the burdensome "assets" such as the disused wells. It worked by "selling" all of the assets, but on condition that the purchaser could refuse to accept any asset. This arrangement was made without notice to the Energy Resources Conversation Board, despite its express request and clear interest, and without drawing the fact to the attention of the court which approved the sale. On the day of closing, the purchaser declined to accept the seven old wells, thus leaving them in the estate.

Most of the funds realized (over one million dollars) were promptly paid to the secured creditors, leaving enough to complete the administration of the estate but not enough to decommission the wells. When all other matters had been completed, the receiver applied to the Court for permission to pay remaining funds to the secured creditor, to turn over the unrealized property, including the seven old wells, to the trustee, and to be discharged. The ERCB moved for an order requiring the receiver to first decommission the wells.

The ERCB objected. Mr. Justice MacPherson, of the Alberta Queen's Bench, agreed with the necessity of proper abandonment. However, he considered the ERCB's abandonment order to be a "claim", as defined by s. 121 of the *Bankruptcy Act*:

> "All debts and liabilities present or future to which the bankrupt is subject."

He therefore characterized the ERCB as no more than a creditor seeking to use provincial law to evade the scheme of priorities set out in the Bankruptcy Act.

"The ERCB Orders in Council in form relate to a constitutionally valid objective, that is, abandonment of gas wells. The genuine purpose is to do something beyond the province's constitutional powers. It is to take money directed by the Bankruptcy Act to be paid to a secured creditor and apply it to another purpose." (page 6).

The Justice pointed out that the ERCB had the power to abandon the wells properly at public expense and to file a claim in the bankruptcy to seek to recover its costs. He held that there was no distinction between a claim to recover costs and an order to do the work. He therefore declined to follow Quanta Resources, dismissed the motion of the ERCB, and discharged the receiver, leaving the seven wells to be abandoned at public expense or to be left in their hazardous condition.

On appeal, Justice MacPherson's decision was reversed.[51] The unanimous decision of the Court of Appeal adopted the same analysis as in the U.S. case, Quanta Resources. They held that an obligation to comply with the law, whether a statute or an administrative order, is a "liability", but it is not a "claim" as defined by the *Bankruptcy Act*. Nor was the Energy Resources Conversation Board a "creditor" of the bankrupt estate when it ordered the Receiver to properly seal the abandoned wells.

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51 Alberta Court of Appeal, June 12th, 1991, leave to appeal to the SCC refused Jan 16 92

The court held that it did not matter that the debtor, Northern Badger, owned only a 10% ownership interest in the wells. The receiver, as manager of the wells, had operating control of them, and was therefore bound to obey the provincial law which governed those wells and which required the abandonment. The obligation to properly abandon wells is not a liability owed to the particular government agency which enforces the law; it is a duty owed by all citizens to all of their fellow citizens. A public authority which enforces the law does not thereby become a creditor of those persons bound to obey the law. Accordingly, the E.R.C.B.'s order took priority over the rights of the secured creditor; the receiver was obliged to do whatever was necessary to obey the law before disbursing funds to the bank which had appointed it.

The Appeal Court also stressed that a court-appointed receiver is a fiduciary on behalf of all parties with an interest in the debtor's property. As such, he is held to the highest standards of propriety and of respect of for the law. The receiver's conduct in deliberately diverting all valuable assets for the benefit of the secured creditor, thus ensuring that no funds would be left to decommission the wells, while concealing these facts from the ERCB, did not meet these standards. For this reason, the receiver was ordered to perform the abandonment, (at an estimated cost of more than $250,000) notwithstanding the fact that there were no longer sufficient assets in the debtor's estate.

It is important to note that the debtor, Northern Badger, was the operator of the wells but owned only a 10% interest. It appears that the receiver was unsuccessful in attempting to obtain any contribution towards the cost of abandonment from the owners of the other 90%. Accordingly, the entire cost of the abandonment had to be paid by the Receiver.

The British Columbia Supreme Court in Bankruptcy followed this decision in **Re Lamford Forest Products Limited**[52]. They held that the cost of compliance with a provincial environmental protection order has priority over the claims of all secured and unsecured creditors, except for the fee of the trustee. The court made an exception for the trustee because otherwise it would not be possible to appoint trustees in cases involving serious contamination. The court also held that a trustee in bankruptcy is not *personally* liable for cost of complying with an environmental protection order which was issued to the bankrupt before the trustee was appointed. However, the court refused to decide whether and in what circumstances the trustee would have personal liability for breaches of environmental laws committed during administration of the estate.

The compromise approach pioneered in Lamford Forest Products has now become part of the new Bankruptcy Act, which recently received third reading and is expected to be proclaimed in the fall of 1992. The new Act provides that a trustee in bankruptcy is not *personally* liable for contamination which occurred prior to his/her appointment, except to the extent that the trustee worsens the situation through a failure to exercise due diligence.

In **Bank of Montreal v. Lundrigans Ltd.,** June 8, 1992, Newfoundland Supreme Court Trial Division, the Chief Judge of the Trial Division took a different approach. In that case, the secured creditor of a large diversified company sought a court order

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52 December 16, 1991

appointing a receiver. The receiver refused to be appointed unless the bank agreed to indemnify it against all claims arising out of the proper performance of its duties as receiver and manager. Due to the open ended nature of environmental obligations, the bank was not prepared to provide an unlimited indemnification agreement. The bank was prepared to agree to indemnify the receiver and manager against any liability arising under environmental laws with respect to any particular property over which the receiver and manager assumed control, up to the net proceeds realized by the receiver and manager from that particular property. The receiver was prepared to accept this limited indemnification agreement, provided that its own liability be similarly limited by the court order appointing it as receiver. Notice of the proposed order was given to both the Provincial and Federal governments. Both objected to the limitation of liability.

The chief justice held that he had jurisdiction to appoint the receiver on conditions which limited its liability, due to general statutes which authorize superior courts to make orders on whatever terms they consider just. He then reviewed the environmental provisions of a number of statutes, including the federal Fisheries Act and the Canadian Environmental Protection Act and three Newfoundland statutes. Each of these statutes imposed important environmental liabilities on the "occupant" or the person who "owns" or "has the charge, management and control" of contaminants or contaminated property. The judge agreed that the appointment of a receiver put him or her in a position to take possession and control of a debtor's property, and that the receiver frequently chooses to acquire such control.

The government defendants argued that once a person is in control of contaminated property their liability is unlimited. Under most environmental statutes, anyone in control of contaminated property can be required to clean up that property, regardless of how they came into possession and whether or not they were at fault in causing the contamination.[53] Mr. Justice Hickman ruled, however, that the rules are different for receivers, at least in respect of environmental damage caused prior to the Receiver's appointment:

"In my view, the principles of vicarious liability for prior environmental damage or offences cannot be extended to a receiver and manager who is charged with the responsibility of controlling and realizing on all of some of the assets of what is, in essence, a bankrupt company. ...None of the relevant legislation clearly provides that a receiver and manager shall be personally liable for any environmental contaminant found upon the property that comes into its or his hands. There is nothing in environmental legislation which defines "charge and control", "authority or having control" or "charge, management or control" over land and assets, particularly as it relates to the peculiar responsibilities of a Receiver and Manager who, upon his appointment, becomes an officer of the Court.

In my view, the appointment of a Receiver and Manager by the Court, and his subsequent assumption of control of all or some of a debtor's assets, does not, under existing legislation, render him liable to pay money or perform work ordered by environmental authorities in excess of the value of or monies received from **the sale of the individual asset which caused the environmental damage.** Legislation

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53 The application of this doctrine to a largely innocent party is demonstrated in the case of *R. v. Canadian National and Northern Wood Preservers*

intended to impose unlimited liability on a Receiver and Manager would have to say so in clear and unmistakable language which is not the case with existing environmental legislation. "(emphasis added).

Accordingly, Justice Hickman appointed the receiver on terms that the receiver had no liability for environmental costs relating to any asset which exceeded the proceeds of sale of that asset. He held that such an order was consistent with the environmental legislation of the Federal government and the Province as he interpreted them.

This decision, if followed in other jurisdictions, would have important consequences for the handling of environmental costs in a receivership or bankruptcy, and would be much more favorable to secured creditors than the current practice. For example, under the typical agreements now negotiated by the Ontario Ministry of Environment with secured creditors who are contemplating going into possession of the property of a company with environmental liabilities, the ministry typically demands that the receiver establish an environmental reserve. The reserve normally includes a large proportion of the value of the contaminated property, such as 50%. In addition, the ministry demands a significant portion of the value of other assets, such as inventory and equipment, whose sale value may far exceed the value of the contaminated site. Under the Lundrigan approach, creditors would be entitled to keep the entire value of all valuable personal assets, such as inventory, work in progress, machinery and equipment and accounts receivable, and offer the ministry only the value (which will often be nothing) of the contaminated land itself.

Unfortunately for creditors, it is not at all certain that the Lundrigan case will withstand further judicial scrutiny. The policy considerations which motivated Justice Hickman are clearly set out in his judgment:

"If a receiver and manager is appointed under the terms proposed, then some of the operations of Lundrigans will continue, at least for a time, with the resultant employment of those on the payroll of such enterprises. If, on the other hand, a receiver and manager is not appointed at this time, the bank, understandably, is not prepared to continue financing the operation of Lundrigans with the result that the entire operations will immediately shutdown, all employees will be laid off and the assets and enterprises abandoned subject only to the bank's continuing security. As a result, there would be no one responsible for any environmental cleanup required as a result of the operations of the various businesses by Lundrigans. This would not be in the public interest. ...

In my view, it is very much in the public interest that as many of the operations of Lundrigans continue as going concerns in the hope that they may be sold at realistic prices and, hopefully, continue in operation in the future. It is also in the public interest that there be someone to whom Governmental authorities may look to for compliance with existing environmental legislation."

While these are undoubtedly worthy motives, the legal reasoning which Justice Hickman used to achieve this result is very weak. Its weakest point is Justice Hickman's assertion that the imposition of liability on the receiver manager is a type of vicarious liability. This is wrong. The liability of a person in control of premises to clean up those premises is not a form of vicarious liability. Vicarious liabiilty is "the imposition of liability on one person for the actionable conduct of another, based solely on a

relationship between the two persons."[54] Attempts to impose vicarious liability are not entirely unknown in environmental law.[55] However, the liability to clean up contaminated land imposed upon a person with charge, management and control of that land is not a vicarious one. It does not depend upon any real or imagined relationship between the person now in possession and the person who caused the problem (which would be the hallmark of vicarious liability). Instead, liability is based squarely on the present direct relationship of control between the person and the contaminated site. Nor does it depend, directly or indirectly, on fault. Fault based liability is provided for in different provisions.

Justice Hickman was therefore wrong in concluding that his order was consistent with existing environmental laws. Nevertheless, it is possible that Justice Hickmans' decision could be upheld, or followed, on the more direct grounds that the court has jurisdiction to limit a receiver's liability, because this is a term which is just.

5.2. The mortgagee out of possession

Under current law, a mortgagee out of possession is not personally liable to clean up that property. In *Re Northern Wood Preservers Inc.*[56], the present and past owners and tenants of contaminated land, the parent company of the owner, and a mortgagee were ordered by the Ontario Ministry of the Environment to prepare a study and clean up plan for the site. They all appealed, first to the Environmental Appeal Board, and then to the courts. Both the Board and the courts agreed that the mortgagee was not liable.

The current tenant, Northern Wood Preservers Inc., operates a wood treatment business on land owned by a subsidiary of the Canadian National Railways Company, C.N. Transactions Inc.. The landlord owns the land only; the building belongs to the tenant. The business has been operated by a series of tenants on the same site for more than 40 years. The original tenant was Northern Wood Preservers Limited, which became a subsidiary of the Abitibi Paper Company in 1974. In 1979, Northern Wood Preservers Limited was wound up and transferred all its assets, including the lease of the land and the ownership of the factory, to Abitibi. In 1982, Abitibi sold the business and the building and assigned the lease to the present tenant. Abitibi retained a mortgage of the lease. During this long history of events, the site of the business and surrounding harbour became seriously contaminated.

A control order was issued in 1987, directed to Northern Wood Preservers Inc., Abitibi, and Canadian National, requiring them to study and report on the contamination. An amended order issued the next year also included C. N. Transactions. Each of the parties appealed, arguing that responsibility should fall on the others.

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54 Blacks Law Dictionary, sixth edition

55 E.g. section 192 of the Ontario Environmental Protection Act

56 Ontario Environmental Appeal Board, October 31, 1990

The Environmental Appeal Board held that the Ministry could not hold the mortgagee liable. The mortgagor, Northern Wood Preserves Inc., had always kept the mortgage in good standing; Abitibi had never foreclosed or entered on the property or exercised any other control. The Board noted that all mortgagees have substantial economic control over the mortgagor, whether or not the mortgage is in default. The Board noted wistfully "if the mortgagee decided to require the mortgagor to observe the Environmental Protection Act in the same way as it obliges him or her to purchase insurance or to pay the property taxes, this would greatly improve the level of compliance with the *Environmental Protection Act* ". Nevertheless, the Board distinguished between control of the mortgagor and control of the mortgagor's assets, namely the source of contaminant. The Board held that a mortgagee who has not re-entered the property due to the default of the mortgagor is not a "person responsible" for the source of contaminant and cannot be held liable for its clean up.

The Board therefore upheld the order as against C. N., C. N. Transactions and Northern Wood Preservers Inc., but released Abitibi from further liability. Interestingly, the Board went on to castigate the Ministry of the Environment for its inaction and ordered the unsuccessful appellants to clean up the site immediately. All parties (except Abitibi) appealed.

The Divisional Court agreed with the Board that a mortgagee who has taken no active steps to obtain control of property neither "owns" it nor has charge, management and control of it. This decision was upheld by the Ontario Court of Appeal on February 21, 1992. They specifically confirmed that a mortgagee out of possession could not be required to clean up the land:

> We are also of the view that Abitibi's position as a holder of security not in possession did not bring it within section 6, as a person having "charge, management or control of a source of contaminant" within the definition of "person responsible" in s. 1(1)(m), or within section 17, as a person having "management or control of an undertaking or property", and that it was not brought within those statutory provisions by reason of its knowledge of and prior connection with the operations conducted at the site.

In a result, the unfortunate current tenant had to bear the entire cost of the studies and cleanup. This decision confirms that mortgagees out of possession cannot lose more than everything they have invested in contaminated property. However, it also underscores the risk of going into possession without an environmental audit, since the current occupier may have to bear the entire cost of cleanup alone.

Another noteworthy feature of this case was that the Court held that provincial government orders such as cleanup orders can be issued to and enforced against a federal Crown agent, even in respect of contamination on federally regulated lands (in this case railway lands and harbours). The Court emphasized that federal lands are not "enclaves" immune from Provincial laws. This means that CHMC does have to concern itself with provincial environmental requirements.

This is consistent with earlier cases which held that provincial environmental legislation can be applied to federally regulated undertakings, where:

> the provincial statute relates to a valid provincial purpose, generally the regulation of property and civil rights within the province;
>
> the provincial statute does not sterilize the federally regulated undertaking, or interfere unduly with any of its essential activities; and
>
> there is no direct conflict between the provincial statute and any competent federal legislation.[57]

The same result occurred in *Ontario (Attorney General) v. Tyre King Tyre Recycling Limited*. On May 15, 1992, the Ontario Court General Division ruled that a mortgagee not in possession of or otherwise directing, controlling or managing mortgaged property owed no common law duty of care or statutory responsibility to the Crown for environmental damage due to a fire on the property. In this case, the Crown sued the mortgagee of the site of the famous Hagerville tire fire. The mortgage included standard provisions giving the mortgagee the right to enter the property and make repairs, and to demand payment of the mortgage in full if the property was not kept in repair. The Crown argued unsuccessfully that this amounted to a degree of "control" over the repair of the property. The Court ruled that the mortgagee could not be liable, because it was not in control of the property prior to the fire. The rights reserved by the mortgagee to enter the property only gave it the right to acquire control, and not such control itself. For the same reason, but even more strongly, he held that the mortgagee did not have charge, management or control of the tires stacked on the premises, and therefore had no liability for "spills" from the fires. Nor was the mortgagee unjustly enriched when the province bore the cost of extinguishing and cleaning up the fire, since the mortgagee had no duty to do so. The Crowns' suit was therefore dismissed with costs.

6. Due Diligence: A Moving Target

6.1. What is the defence of due diligence?

This report has referred several times to the concept of due diligence. Due diligence is the single most important defence available to any person charged with most environmental offences. As defined by the Supreme Court of Canada in the celebrated decision of R. v. Sault St Marie, due diligence entitles a person to acquittal if he proves on a balance of probabilities[58] that he had done everything reasonable to prevent the

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5757 *R. v. T.N.T. Canada Inc.* (1987), 58 O.R. (2d) 410 (Ont. H.C.), leave to appeal to S.C.C. refused, 61 O.R. (2d) 280 (C.A.) [hereinafter *T.N.T.*]; *Notre-Dame-de-Bonsecours* v. *C.P.* [hereinafter *Bonsecours*]; *Multiple Access Ltd.* v. *McCutcheon* (1982), 138 D.L.R. (3d) 1 (S.C.C.); *A.G. Ontario* v. *Winner*; *Winner* v. *S.M.T. (Eastern) Ltd*, [1951] S.C.R. 887, [1951] 4 D.L.R. 529; varied [1954] A.C. 541, 13 W.W.R. 657, 71 C.R.T.C. 225 (P.C.).

58 This onus of proof was recently upheld by the Supreme Court of Canada in *R. v. Wholesale Travel Group* October 24, 1991

offence from occurring, or if he reasonably believed in a mistaken set of facts which, if true, would have made his act or omission innocent.

The standard of due diligence is high and has been rising steadily during the past few years. To show due diligence, one must establish an effective system to prevent offences, monitor the results of the system, and improve the system if problems recur. The greater the likelihood that an problem may occur and the more serious the possible problem, the more stringent must be the system and the less tolerance there is for error. In addition, the standard is rising with time. One of the key questions which a court asks is: what do other reasonable people do in such cases? In other words, due diligence depends, at least in part, upon doing at least as much as the industry average. As average industry behaviour improves, the standard of due diligence rises. Improvements in scientific and technological knowledge also fuel increases in the standard of care.

6.2. Reasonable belief in a mistaken set of facts

Belief in a mistaken set of facts must be reasonable, and must be based on reasonable precautions. A mistake which is due to willful blindness, to totally unfounded optimism, to estimates without measurement, or to reliance on equipment which is known to be prone to error, is generally insufficient to avoid liability. Purchase of or investment in a property without an environment audit, in the hope that it was free from contamination, is not likely to be found to be reasonable, especially where a moderate degree of effort would have revealed the occurrence of problems.

The belief must not only be reasonable, but it must be a belief in a mistaken set of facts. It is essential to distinguish between belief in the *existence of facts* and belief in the *consequences of known facts*. For example, if a company knows that it is discharging ore tailings into a lake, but (erroneously) believes that the tailings are falling directly to the bottom and causing no ill effects, its error is an error as to the consequences of a known fact (the discharge). Therefore, the company cannot rely on the defence of reasonable belief in a mistaken set of facts.

The mistaken belief must be a *mistake of fact* and not *a mistake of law*. It is therefore no defence to:

(a) be unaware of the existence of the law;

(b) be unaware of the extent of a law;

(c) believe that one was not required to comply with a law; or

(d) believe that a law was not being enforced.

For example, it is no defence to a charge of operating without a licence to show that one believed that no licence was required. The only exception occurs when the mistake of law was induced by the officials responsible for enforcing the law.

6.3. The standard of care

There are no simple answers as to how much care is required to avoid environmental offences, particularly in the prevention of accidents. The most definite thing that can be said about it is that it depends upon the circumstances.

The care warranted in each case is principally governed by the gravity of potential harm, the available alternatives, the likelihood of harm, the skill required, and the extent the accused could control the causal elements of the offence.[59]

"Reasonable care" implies a scale of caring. The more important the interests which are threatened, the greater the risk to those interests and the more likely the risk is to occur, the higher the standard of care must be.[60] The concept of a scale of caring is no more than common sense: most of us want higher standards of environmental protection in a plant handling radioactive wastes or dioxins than we would expect (or would want to pay for) in a barn of rotting rutabagas or in our backyard compost.

For the ordinary risks of everyday life, those comparable to the risks encountered by any individual in their day to day activities, the standard of care is normally based closely on the ordinary custom of the trade. It is therefore possible to look for guidance in government and industry reports, applicable legislative standards. The every day practice of one's competitors is also of some use, but it is important to emulate those competitors with the highest standards of care, rather than those of only average or lower quality.

The standard of reasonable diligence is not merely a community average. Every ordinary person forgets and makes mistakes from time to time; the Murphy of Murphy's law visits every home and business. Only the "reasonable man" is exempt from Murphy's attentions: The reasonable man does not forget.[61] Due diligence does not include inadvertence or carelessness.[62] However, due diligence does not require one to take every possible measure to protect against merely speculative dangers; there are an infinite number of such dangers and the resources to guard against them are limited.

6.3.1. Foreseeability

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59 *R. v.. Placer Developments Ltd,, supra*, at p. 51; *R. v. Gonder, supra.*

60 *R. v. Gonder* (198 1), 62 C.C.C. (2d) 326 (Yuk. Terr. Ct.); *R. v. Placer Developments Ltd.* (1983), 13 C.E.L.R. 42 (Yuk. Terr. Ct.); *R. v. MacMillan Bloedel (Alberni) Ltd* (1979), 47 C.C.C. (2d) 118, [1979] 4 W.W.R. 654 (B.C.C.A.); *R. v. Panarctic Oils Ltd.*, [1983], N.W.T.R. 47, 12 C.E.L.R. 29 (Terr. Ct.). The available alternatives, the skill required to use them, and the extent to which the defendant had influence and control over the occurrence of the offence affect the conduct required to meet that standard.

61 *R. v. Penney* (1988), 74 Nfld. & P.E.I.R. 320 (Nfld. S.C.).

62 *A.-G. Sask v. Cook* (1983), 23 Sask. R. 236 (Q.B.) (fisherman convicted of improperly marking nets; he had inadvertently written his fisherman number instead of his licence number on his nets).

Due diligence requires one to prepare for risks which are objectively foreseeable, that is, those risks which a reasonably thoughtful person could have foreseen might flow from the company's operations. It is not necessary that anyone foresaw the exact event which occurred; it is enough if one could have foreseen the general type of danger.

The graver the potential harm, the more one must guard against events which are improbable.[63]

6.3.2. Breach of Statute

Statutes, regulations and by-laws establish minimum standards of acceptable conduct for the activities which they regulate.[64] Breach of such statutes, regulations and by-laws is strong evidence of negligence,[65] and therefore of lack of due diligence. Where minimum standards for proper conduct have been established in other ways, such as through the reports of government, industry task forces and research institutes, failure to comply

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63 W. Keeton, *Prosser and Keeton on the Law of Torts*, 5th ed. (St. Paul, West Publishing, 1984), at pp. 171 and 208.

64 There is extensive caselaw on the interesting question of whether breach of a statute or regulation is civilly actionable, i.e. gives rise to a cause of action for which an aggrieved person can sue. The Quebec *Environmental Quality Act* expressly makes breaches of environmental law actionable; the proposed Ontario *Environmental Bill of Rights* may do the same (see next chapter) When the statute does not expressly provide a cause of action, the courts have been inconsistent in allowing civil causes of action based upon statutory breach. Linden argues persuasively that the inconsistency is based upon the degree of sympathy which individual judges have for the regulatory aims of the statute in question. If they wish to advance those aims, they impose civil liability; if they are unsympathetic or indifferent to the regulatory aims, they refuse to impose civil liability. A.M. Linden, *Canadian Tort Law*, 4th ed. (Toronto, Butterworths, 1988), at p. 279. As courts are increasingly sympathetic to environmental protection, it seems reasonable to expect them to react favourably to attempts to sue based upon breach of environmental statutes and regulations.

65 *City of North York v. Kert Chemical Inc.* (1985), 33 C.C.L.T. 184 (Ont. H.C.J) (breach of municipal sewage by-law evidence of negligence in discharging corrosive sewage into sewer); *The Queen in Right of Canada v. Saskatchewan Wheat Pool* (1983), 143 D.L.R. (3d) 9, [1983] 1 S.C.R. 205 (breach of *Canada Grain Act Regulation* forbidding delivery of infested grain was evidence of negligence but plaintiff successful after proving that it took all possible care to prevent infestation); *Sterling Trusts Corp. v. Postma* (1964), 48 D.L.R. (2d) 423, [1965] S.C.R. 324 (breach of highway traffic regulation concerning rear lights evidence of negligence contributing to accident); *R. v. Mac's Convenience Stores Inc.* (1985), 14 C.E.L.R. 120 (Ont. Prov. Ct.) (breach of Gasoline Handling Code evidence of lack of due diligence in preventing escape of gasoline from underground tank); *R. v. City of Merritt* (1986), 4 F.P.R. 311 (B.C. Co. Ct.) (breach of mechanical refrigeration plant regulations evidence of lack of due diligence in handling coolant); *c.f, R. v. National Capital Commission and Pugliese* (1979), 97 D.L.R. (3d) 631, [1979] 2 S.C.R. 104 (breach of *Ontario Water Resources Act* evidence of unreasonableness in withdrawing water).

It is also strong evidence of nuisance. In *340909 Ontario Ltd. v. Huron Products (Windsor) Ltd.* (1990), 73 O.R. (2d) 641 (H.C.J.) breach of environmental noise standards was held to be a useful standard to assess whether noise was a nuisance.

with the recommendations of such reports is also evidence of lack of diligence.[66] The same is true of failures to comply with one's own reports, policies and procedures.[67]

The adoption of an Environmental Bill of Rights[68] is expected to create a new statutory standard, a human right to a healthy environment. If breach of this right is considered to show evidence of negligence, a Bill of Rights may increase the standard of due diligence.

6.3.3. Custom

It is strong evidence of due diligence to comply with the custom of the trade.[69] This is usually a minimum standard of care. A defendant who was not at least as careful as was customary in the trade will be hard pressed to show that he did everything reasonable,[70] although departures from custom are not necessarily negligent if there was good reason for doing so.[71] However due diligence is not satisfied by complying with statutes and regulations, or with informal standards in the field, or by following custom, where the circumstances require greater care.[72]

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66 *R. v. Dupont* (unreported, January 23, 1986, Ont. Dist. Ct.); *R. v. Hodgson* (1985), 4 F.P.R. 251 (N.S. Prov. Ct.); J. Fleming, *The Law of Torts*, 7th ed. (Toronto, Carswell, 1987), at p. 111; A. Dugdale and K. Stanton, *Professional Negligence* (London, Butterworths, 1989), at p.254.

67 *Lowry v. Canadian Mountain Holidays Ltd.* (1985), 33 C.C.L.T. 261 (B.C.S.C.) (company negligent where departing from safety procedure in its operating handbook): *Heeny v. Best* (1979), 108 D.L.R. (3d) 366, 28 O.R. (2d) 71 (C.A.) (farmer partly liable when neglected to operate low oxygen alarm he had installed, although there was no established custom to have such an alarm).

68 Discussed in the next chapter.

69 *R. v. Consumer's Distributing Co. Ltd.* (1980), 57 C.C.C. (2d) 317, 54 C.P.R. (2d) 50 (Ont. C.A.); Morris, "Custom and Negligence" (1942), 42 Columbia L. Rev. 1147; *Monkman v. Singh* (1989), 62 Man. R. (2d) 277 (Q.B.); *Koerber v. Kitchener Waterloo Hospital* (1987), 62 O.R. (2d) 613 (H.C.J.); A. Linden, *Canadian Tort Law*, 4th ed. (Toronto, Butterworths, 1988), at pp. 165-70; Fleming, *The Law of Torts, supra,* at p. 109; Keeton, *Prosser and Keeton on the Law of Torts, supra,* at p. 193; Dugdale and Stanton, *Professional Negligence, supra,* at p. 241.

70 *Coughlin v. Kante,* [1987] F.L.W. 728 (B.C.S.C.).

71 *Funk Estate v. Clapp* (1988), 54 D.L.R. (4th) 512 (B.C.C.A.); Dugdale and Stanton, *Professional Negligence, supra,* at p. 253.

72 *Acadia Coal Co. Ltd. v. MacNeil*, [1927] 3 D.L.R. 871, [1927] S.C.R. 497; *James v. River East School Division No. 9* (1975), 64 D.L.R. (3d) 338, [1976] 2 W.W.R. 577 (Man. C.A.); *Cavanagh v. Ulster Weaving Co.*, [1960] A.C. 145 (H.L.); *Mercer v. Commissioner for Road Transport and Tramsways* (1937), 56 C.L.R. 580 (Aust. H.C.); *R. v. Hall's Refrigeration Ltd.* (1987), 4 F.P.R. 247 (Nfld. Prov. Ct.); *R. v. District of North Vancouver* (1984), 13 C.E.L.R. 60 (B.C.C.A.); *R. v. Placer Developments Ltd.* (1983), 13 C.E.L.R. 42 (Yuk. Terr. Ct.); *R. v. Gonder* (1981), 62 C.C.C. (2d) 326 (Yuk. Terr. Ct.); A. Linden, *Canadian Tort Law, supra,* at p. 171; *Lloyd's Bank Ltd v. E.B. Savory & Co.*, [1933] A.C. 201 (H.L.), at p. 235:

CHMC can expect to be measured against the custom of other lenders, notably the commercial banks, which now increasingly demand environmental audits from a wide variety of borrowers. CHMC would probably also find itself measured against the degree of environmental knowledge expected of government agencies, which is quite high.

6.3.4. Alternatives

Reasonableness of care for ordinary activities is often best measured by comparing what was done against what could have been done. The reasonable alternatives the defendant knew or ought to have known were available provide a primary measure of due diligence.

It is no lack of diligence to have acted in a certain way unless there were feasible alternatives which would have avoided or minimized the harm.[73] The alternatives which must be considered are those which are feasible or practicable:

The courts have, for the most part, required a defendant to show that he exercised a high degree of care, but they have not required so high a standard that no enterprise could reasonably comply with it.[74]

6.4. Factors which Increase the Standard of Care

6.4.1. Notice

A key element of due diligence is reacting promptly and appropriately to notice of a problem, whether the notice comes from personal observation,[75] from failure of

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> "The practice, on its very face, is inconsistent with provident precautions against a known risk, and the mere fact that it is usual and long-established is not a sufficient justification. It cannot be justified as an excuse simply because in the past [40 years] by good fortune no harm seems to have happened."

See also W. Keeton, *Prosser and Keeton on the Law of Torts*, 5th ed. (St. Paul, West Publishing, 1984), at p. 194.

73 *R. v. Placer Developments Ltd.* (1983), 13 C.E.L.R. 42 (Yuk. Terr. Ct.), at p. 51.

74 L. Leigh, *Strict and Vicarious Liability — A Study in Administrative Criminal Law* (Toronto, Carswell, 1982).

75 *R. v. Bucinca*, [1985] N.W.T.R. 134 (Terr. Ct.) (taxi driver hearing clinking in baggage of intoxicated passengers; inquiring about presence of liquor, receiving denial and driving to area where liquor prohibited, not having shown due diligence).

equipment to operate properly,[76] from a government inspector,[77] from internal audits or inspection reports,[78] from others in the field,[79] from neighbourhood complaints,[80] or in any other way. A mortgagee who ignores such warnings does so at its peril.

6.4.2. Knowledge and Expertise

One who has expertise in an area can reasonably be required to apply that expertise to avoiding breaches of the law. A large, sophisticated corporation such as the CHMC would be expected to demonstrate a high degree of sophistication in dealing with properties and investments.

6.4.3. Unusual Hazard

Special considerations apply to property on which environmentally hazardous activities took place, such as chemical manufacturing or waste management.[81] The greater the risk which one's activities imposes upon one's neighbour, and the more likely it is that the risk will be realized, the higher must be one's standard of care.[82]

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76 *R. v. Gringrich* (unreported, June 2, 1988, Ont. Dist. Ct.) (truck sliding through stop sign gave notice that truck brakes could not be relied upon; continuing to drive being criminal negligence).

77 *R. v. Monteforte* (1987), 79 N.S.R. (2d) 91 (C.A.); *R. v. Epsilon Building Products Ltd.* (1986), 4 F.P.R. 213 (B.C. Prov. Ct.); *U.S. v. Park*, 421 U.S. 658 (1975); *U.S. v. Starr*, 535 F.2d 512 (9th Cir. 1976).

78 Disappearance of gasoline or fuel oil from underground tanks puts the custodian of the tanks on notice that a problem exists: *R. v. Metropolitan Stores (MTS) Ltd.* (1987), 66 Nfld. & P.E.I.R. 241 (P.E.I. Prov. Ct.); *R. v. Mac's Convenience Stores* (1985), 14 C.E.L.R. 120 (Ont. Prov. Ct.). In *R. v. Texaco* (unreported, March 3, 1988, Ont. Prov. Ct.), Texaco had a leaking containment area around a tank of highly corrosive liquid. The leak was mentioned in work orders and in the minutes of the plant health and safety committee which were circulated to senior staff. No action was taken until after a spill.

79 *Roy v. École D'Escalade la Haute Perchée Inc.*, [1988] R.J.Q. 663 (Que. C.A.), leave to appeal to S.C.C. refused [1988] 1 S.C.R. viii.

80 In *R. v. B. & M. Carriers Ltd.* (unreported, January 12, 1989, Ont. Prov. Off. Ct.), it waslack of due diligence for the president of company to fail to make direct personal inquiry into neighbour's complaints; the problem was being caused by deliberate employee disobedience to instructions and would have been discovered upon inquiry. The president also lacked due diligence because he failed to exercise his authority to immediately terminate improper behaviour once he had notice of the problem.

81 The sheer scale of corporate activity may often be enough to make their activities unusually hazardous. The risks which might follow a spill of a glass of orange juice are insignificant, and can readily be dealt with by the ordinary standard of care, but one cannot necessarily say the same of a tank-car of orange juice concentrate.

82 The identity between the standard of care required to avoid tort liability and that required to show due diligence ought to lend strength to those who argue that statutory breach should be considered to create an implied right of action.

This is not just a question of the nature of the activity; it is also a question of where the activity takes place. Some activities present an unusual hazard because of the particular part of the environment which may be affected. A spill of silt on a parking lot or farmer's field may be trivial; the same spill in a salmon spawning area may devastate its ability to support fish.

More than the care expected of an ordinary citizen is demanded of those engaged in hazardous activities.[83] At the very least, the standard of care must reflect the diligence of a reasonable professional possessing the expertise suitable to the activity in issue.[84] Persons who choose to engage in operations which inherently pose greater dangers to the public welfare must accept responsibility for protecting the public from the risks they create or to which they expose the public.[85] They must take precautions which are not required of persons engaged in the ordinary routine of life.[86]

They are not excused from this responsibility merely because the precautions are costly:[87]

No matter what the cost to the person carrying on the commercial endeavour, they are not, under any circumstances, by law, permitted to deposit deleterious substances in water frequented by fish.[88]

Requiring businesses to take costly precautions to control pollution is one of the major purposes of environmental regulation: requiring business to internalize the costs of

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83 *Adams v. Beutler* (unreported, November 18, 1985, Ont. H.C.J.).

84 *R. v. Giftwares Wholesale Co. Ltd.* (1977), 36 C.C.C. (2d) 330, [1977] 4 W.W.R. 326 (Man. Co. Ct.); *R. v. Placer Developments Ltd.* (1983), 13 C.E.L.R. 42 (Yuk. Terr. Ct.), at p. 51. Note that this is a higher standard than the business judgement rule because all must meet the standard of a professional possessing appropriate expertise. Under the business judgement rule, no expertise is required and the director is not expected to be a professional.

85 *Roy v. École D'Escalade la Haute Perchée Inc.*, [1988] R.J.Q. 663 (Que. C.A.), leave to appeal to S.C.C. refused [1988] 1 S.C.R. viii; *Mehta v. Union of India*, [1987] A.I.R. 1086 (S.C.).

86 *R. v. Standard Oil Co. of British Columbia Ltd.* (unreported, January 20, 1975, B.C. Prov. Ct.); *Sweet v. Parsley*, [1970] A.C. 132 (H.L.); *R.* v. *Canada Tungsten Mining Corp. Ltd.* [1976] W.W.R. 104, 1 F.P.R. 75 (N.W.T. S.C.).

Statutes also so provide. For example, those who handle gasoline in bulk have an obligation to take every possible precaution to prevent its entry into public sewers: *Gasoline Handling Code*, R.R.O. 1980, Reg. 439, ss. 9(3) and 10(7).

87 *R. v. Placer Developments Ltd.* (1983), 13 C.E.L.R. 42 (Yuk. Terr Ct.), at p. 52; *R. v. McCain Foods Ltd.* (1984), 4 F.P.R. 300 (N.B. Prov. Ct.). See discussion under the heading "Impecuniosity" in this chapter.

88 *R. v. Canadian Forest Products Ltd.* (1980), 3 F.P.R. 63 (B.C. Prov. Ct.), at p. 69.

pollution which would otherwise be mere "negative externalities" subsidized by the public.

6.5. Limits of due diligence

Due diligence requires one to take "all reasonable care". This is not the same as "all possible care". Due diligence does not require one to maximize pollution control at the expense of all other social interests.

6.5.1. Act of God

One of the more common arguments is that due diligence does not require one to prevent or control "acts of God". This is a defence often claimed but rarely successful. An "Act of God" is an extraordinary event of nature which could not be foreseen, or if it could be foreseen, could not be guarded against by any reasonable amount of foresight, pains and care.89 It is an overwhelming natural disaster which no person had the power and authority to prevent, and to which no human act contributed.90 It is therefore rarely made out.

6.5.2. Latent Defect

Due diligence does not require a defendant to discover and remedy latent defects that are not apparent from a reasonable inspection.[91] On the other hand, this exception underlines how essential it is to conduct a "reasonable inspection", because a defendant is usually deemed to know the things a reasonable inspection would reveal.

7. Looking ahead

There is no reason to expect that the legal risks described above will change significantly during the next few years. However, the actual losses of lenders will probably continue to increase as regulators of all provinces follow Ontario's lead and use their powers more and more aggressively. Market tolerance for contaminated land is already very

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89 *Pandorf & Co. v. Hamilton, Fraser & Co.* (1886), 17 Q.B.D. 670 (C.A.); *McQuillan v. Ryan* (1921), 64 D.L.R. 482, 50 O.L.R. 337 (C.A.); *Nugent v. Smith* (1876), 1 C.P.D. 423 (C.A.); *Nitrophosphate and Odam's Chemical Manure Co. v. London and St. Katherine Docks Co.* (1878), 9 Ch. D. 503 (C.A.).

90 *Pleet v. Canadian Northern Quebec R. Co.* (1921), 64 D.L.R. 316, 50 O.L.R. 223 (C.A.), affd [1923] 4 D.L.R. 1112, 26 C.R.C. 238 (S.C.C.); *R. v. North Canadian Enterprises Ltd* (1974), 20 C.C.C. (2d) 242 (Ont. Prov. Ct.).

91 *Wire Rope Industries of Canada (1966) Ltd v. B.C Marine Shipbuilders Ltd* (1981), 121 D.L.R. (3d) 517, [1981] 1 S.C.R. 363; *R. v. the M.V.Allunga*, [1974] 4 W.W.R. 435 (B.C.Prov.Ct.); *The Dilkara v. R.*, [1974] 1 W.W.R. 258 (B.C.C.A.)

low and shows no sign of increasing. Cleanup and waste disposal costs are high and still rising in most areas of the country.

As the implications of the Panamericana case continue to spread through the banking industry, both commercial and institutional lenders will continue to be increasingly stringent in demanding environmental audits from those applying for loans.

8. Conclusion

The result of these cases is that mortgagees can no longer afford to be complacent about the environmental exposure of their debtors. No matter how carefully a loan has been secured, registered and protected, the security may be valueless or worse if it is contaminated or a public danger. How, then, can a lender protect itself?

Only a limited amount can be done once a debtor is already insolvent. It is far more cost effective for lenders to focus on prevention. Prudent commercial lenders give little value to land offered as security, unless its environmental acceptability has been demonstrated by a proper audit. They also insist increasingly that their major debtors demonstrate that they have incorporated environmental responsibility into their central system of management. Environmental control is becoming as important, and as routine, as financial control.

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APPENDIX F

RATIONALE FOR SCORING SYSTEM FOR DETAILED COMPARATIVE ANALYSIS

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RATIONALE FOR SCORING SYSTEM FOR DETAILED COMPARATIVE ANALYSIS

The scoring system for the Phase 1 investigations procedures that were reviewed was devised to evaluate all three major sections of a Phase 1, that is, the site history and records review, site reconnaissance and interviews, and report. Each of these three sections was weighted equally and assigned a total of 33 (site history and records review, and report) or 34 (site reconnaissance and interviews) points. These three major sections were then further subdivided and scores allocated on the following basis.

F.1 Site History/Records Review

Of the eight subsections in the site history/records review section, five were considered to be of more relevance to the preparation of a thorough Phase 1 assessment than the others. These were: existing maps and photographs; local information; corporate records; regional and municipal records; and adjacent land use. All these subsections were assigned five points.

Air photographs and fire insurance records are two of the most useful sources of information for Phase 1 work. In conjunction with a review of local pedological (soil) maps and regional geological maps they can provide the basis for an effective Phase 1 review.

City directories and local archival sources are another major source of information for a Phase 1 study. Information on previous industrial activities at a site can often be readily obtained from city directories or by a short review of historical photographs, books, newspaper clippings, etc.

Corporate records would include such information as site plans, building permits for extensions, waste management or pollution discharge permits, production and maintenance records, etc. These were also considered one of the major information sources that should be reviewed in a thorough Phase 1.

Regional and municipal records would include such information as air or sewer discharge permits, landfill locations, public health concerns or public complaints registered, inspections by the local fire department, etc.

Adjacent land use was considered the final major subsection that should be included in a model Phase 1 procedure. Upgradient potential contaminant sources such as underground storage tanks (USTs), landfills, industrial facilities are possible major risks to a downgradient property. Access to adjacent properties is sometimes limited, but all reasonable efforts should be made by the site reconnaissance specialist to access information on adjacent land use.

Closely following the five most important subsections is an historical title search for previous owners of the property. This should always be included in any thorough Phase 1 site investigation. This subsection was assigned four points.

The two remaining subsections were both assigned two points. Federal and provincial records, for example, a list or inventory of contaminated sites, are not well established to date. Useful information is somewhat limited although it appears that several provinces may be moving to establish lists of contaminated sites, in conjunction with Environment Canada. Geotechnical reports and environmental reports are available for some but not all properties that may be subject to a Phase 1 investigation. As

more properties are subjected to more detailed scrutiny from an environmental perspective, it is likely that more geotechnical and environmental reports will become available for review as part of a Phase 1 study.

F.2 Site Reconnaissance and Interviews

Visual inspection and personnel interviews were considered to be the most important subsections in the site reconnaissance and interviews section. Both were assigned ten points each. Visual inspection is the groundtruthing component of a Phase 1 and allows the site assessment group to verify information that may have been brought to light during the site history and records review component. For example, are there USTs still on the property, how were waste materials stored, what is the current condition of the solvent storage area, is there a PCB storage facility on the property ?, etc.

Interviews with current and former employees at an operational facility or with current neighbours adjacent to a piece of vacant land can provide much useful information for a Phase 1 investigation. These interviews should be well documented for any future verification that may be required. Structural changes to the property that may not be readily discernible in the time available to the site investigator can often be provided by knowledgeable individuals. Telephone interviews with regulatory personnel can also prove a useful source of additional information on previous activities at a particular site.

The three remaining subsections were all considered approximately equal in importance and were scored accordingly. Photographic documentation is often most useful when discussing the site with those involved in the buy/sell decision. Features such as suspected UST fill pipes, possible asbestos-containing material (ACM), possible rock drains or dry wells, etc should be photographed. As discussed previously, adjacent properties should be subjected to as detailed a site reconnaissance as the subject property, if access allows. Information from water well installations can help in the appraisal of subsurface geological conditions.

F.3 Report

From the perspective of the group requesting the Phase 1 assessment, the most important subsections in the Phase 1 report are the findings of the investigation, and the conclusions and recommendations. Lenders, for example, often have little interest in the subsurface geological conditions at a property, they need to know what the potential financial liabilities are if they advance on the property purchase. The findings and conclusions/recommendations sections were therefore assigned 50% (17) of the total points for the report section, with a slightly higher weight for the conclusions and recommendations than the findings subsections.

Of the remaining subsections, the purpose of the work, topographic conditions, geological and hydrogeological setting, references, and appendices (including photographs) were considered more important than the others and were assigned two points. The executive summary, scope of work, methodology, statement of limitations, figures, and tables were each assigned one point.

TEMPLATE FOR DETAILED COMPARATIVE ANALYSIS

A:	SITE HISTORY AND RECORDS REVIEW	SCORE
A.1	EXISTING MAPS AND PHOTOGRAPHS	
a)	Geological Survey of Canada (soils maps; regional geology maps)	(1)
b)	Fire Insurance Maps	(1)
c)	Aerial Photographs (historical air photographs)	(3)
A.2	LOCAL INFORMATION SOURCES	
a)	Libraries (city directories)	(4)
b)	Archives (historical books; pamphlets; newsclippings; photos)	(1)
A.3	CORPORATE RECORDS (site plans; building plans; expired permits; production and maintenance records; safety plans)	(5)
A.4	REGIONAL AND MUNICIPAL RECORDS	
a)	Regional District (air permits; sewer discharge permits)	(1)
b)	Municipality (permits; subdivisions; landfill locations)	(1)
c)	Engineering Department (building plans; surveys)	(1)
d)	Health Department (public health research; landfill locations)	(1)
e)	Fire Department (inspections; violations)	(1)

A.5	ADJACENT LAND USE	(5)
A.6	HISTORICAL TITLE SEARCH (current registered owner; title transfers)	(4)
A.7	FEDERAL AND PROVINCIAL RECORDS	
a)	Environment Canada or Provincial Ministry of Environment (federal or provincial lists of contaminated sites; records of remediation programs)	(2)
A.8	PREVIOUS GEOTECHNICAL AND ENVIRONMENTAL REPORTS (engineering studies; soil or groundwater studies; asbestos inventory)	(2)
B:	**SITE RECONNAISSANCE AND INTERVIEWS**	
B.1	VISUAL INSPECTION OF SITE	
a)	Topography	(1)
b)	Surface Water/Drainage	(1)
c)	Fill/Debris	(1)
d)	Surface Staining/Soil Conditions	(0.5)
e)	Vegetation	(1)
f)	Underground Storage Tanks and Vent Pipes	(1)
g)	Storage Areas (including drums and chemicals)	(1)
h)	Asbestos	(1)
i)	Transformers/Ballasts	(1)
j)	Wells	(0.5)
k)	Utilities	(0.5)
l)	General Housekeeping	(0.5)

B.2	PERSONNEL INTERVIEWS	
a)	Handling of Wastes	(2)
b)	Underground Storage Tanks	(2)
c)	Asbestos	(2)
d)	PCBs	(2)
e)	Spills	(1)
f)	Monitor Wells	(1)
B.3	RECONNAISSANCE OF ADJACENT SITES	(5)
B.4	PHOTOGRAPHIC DOCUMENTATION OF SITE AT TIME OF VISIT	(5)
B.5	GEOLOGIC AND HYDROGEOLOGIC SETTING	
a)	Water Supply	(2)
b)	Wells and Reservoirs	(2)

C: REPORT CONTENT (suggested format, not in order of importance)

C.1	EXECUTIVE SUMMARY	(1)
C.2	PURPOSE	(2)
C.3	SCOPE OF WORK	(1)
C.4	METHODOLOGY	(1)
C.5	SITE HISTORY/RECORDS REVIEW: FINDINGS	(5)
C.6	TOPOGRAPHY	(2)
C.7	CURRENT SITE CONDITIONS: FINDINGS	(5)
C.8	GEOLOGY/HYDROGEOLOGY OF SITE	(2)
C.9	CONCLUSIONS AND RECOMMENDATIONS	(7)
C.10	STANDARD LIMITATIONS	(1)

C.11	REFERENCES	(2)
C.12	FIGURES	(1)
C.13	TABLES	(1)
C.14	APPENDICES (Photographs; Previous Reports; Regulatory Information; Interview Record)	(2)

APPENDIX G

LISTING OF ENVIRONMENTAL DIRECTORIES

APPENDIX G

LISTING OF ENVIRONMENTAL DIRECTORIES

The Canadian Environmental Enterprise Directory 1992. (Canada East and Canada West). Published by The Environmental Enterprise Centre 208 - 1110 Government Street, Victoria, B.C. V8W 1Y2.

Industry and the Environment 1992 - Directory of Canadian Environmental Services Firms. Published by Industry Science and Technology Canada, Consulting and Engineering Services Industries Directorate, Service and Construction Industries Branch, 235 Queen Street, Ottawa, Ontario. K1A 0H5.

The Environmental Directory 1992. Published by Stewart's Green Line, 189 East 28th Avenue, Vancouver, B.C., V5V 3R1.

Canadian Environmental Capability Assessment 1992. Report Prepared for Canada - ASEAN Centre, Singapore. By Norecol Environmental Consultants Ltd., 700 - 1090 West Pender Street, Vancouver, B.C. V6E 2N7.

APPENDIX H

PHASE 1 ENVIRONMENTAL SITE INVESTIGATION PROCEDURES CONSIDERED FOR FINAL REVIEW

- NGWA (1992)
- PWC (1989)
- SENTAR (1992)
- EBA (1992)

Guidance for Environmental Site Assessments

Presented by Association of Ground Water Scientists and Engineers

Information Review

I. Vacant Land

I. Maps/Atlases
- A. Topographical – USGS
- B. Geological/hydrologic
  - Wetlands
  - Glacial Deposits
  - Bedrock type and depth
  - Watershed
  - Flood
  - Aquifer classifications
  - Water Table/Potentiometric Surface Elevation
  - Mineral Resources
  - Oil and Gas Information
  - Seismic
  - Critical Wildlife Habitat
  - Endangered Species
- C. Aerial photos – at least 50 years old
- D. Sanborn/City Atlases
- E. Fire Insurance Plan
- F. Soil Conservation Survey
- G. Natural Hazards
- H. Federal Flood Hazards
- I. Zoning
- J. Airshed

II. Regulatory
- A. Nearby Storage/Disposal Sites
- B. SARA Title III Reports

III. Public Records
- A. Polk records, County, City, and State City Directories
- B. City Engineering Plans, Gas, Water, and Electric Utility Maps
- C. Surface Data
  - Soil Borings, Test Pits, or Excavations
  - RCRIS
  - CERCIS
  - Blasting or Borrow Pit Areas
  - Backfill around Site
- D. Utility/Conduit Maps
  - Water, Sewer, Storm Drains
  - Electrical Conduits
  - Gas Lines
- E. Water Supply/Water Quality Data
  - Surface Water Reservoirs
  - Ground water Use (Supply, Irrigation)
  - Proximities

IV. Phone Surveys/Interviews (Prior to Site Inspection)
- A. Local/County Officials
  - Registry of Deeds
  - Tax Collector/Assessor
  - Board of Health
  - Fire Department
  - Planning/Zoning Board
  - Building Inspector
  - County Commissioner
  - Engineering Department
  - Department of Public Works
  - Water/Sewer Department
  - Emergency Response Personnel
  - Zoning and Planned Use Issues

II. Agriculture

(Include Section I)

I. Crop History
- A. Fruits and Vegetables
- B. Field Crops

II. Facility History

III. Commercial Land with Improvements

(Include Section I & II)

I. Radon Assessment

II. PCB Assessment

III. Asbestos Records

IV. Buildings
- A. Improvements
- B. Plans and Specifications
- C. Directories for Prior Owner/Tenant

V. Geotechnical Reports

VI. Soil Boring Information

VII. Waste Disposal Records/ Manifests

VIII. Owner/Tenant Inventory
- A. Current
- B. Historical

IX. Facility Maintenance Records/NSDS Records

X. Waste disposal Records/Manifests

XI. Water Supply Data, Water Information

XII. Enforcement Orders/Agency Inspections

XIII. USTs Site Records

IV. Industrial Land with Improvements

(Include Section I, II, & III)

I. Permits
- A. U.S. Army Corps of Engineers (COE)
- B. Standard Industrial Code (SIC)
- C. Storm Water Runoff
- D. RCRA
- E. Clean Air Act (CAA)
- F. Publically Owned Treatment Works (POTW)
- G. National Pollutant Discharge Elimination System (NPDES)

II. Process Flow Charts

III. Raw Material Inventory

IV. Drilling Logs, Monitoring Wells

V. Spill Prevention Control and Contamination (SPCC)

VI. Occupational Safety and Health Administration (OSHA) Right-to-Know

VII. Security Exchange Commission (SEC)

VIII. FINDS Index

Site Walkover

I. Vacant Land

I. Geology
- A. Exposed Subsurface Materials
  - Soil Type
  - Soil Permeability Estimates
  - Soil Variability (across site and Area, and with Depth)
  - Local Evidence of Anomalies
    - Breaks in Slope/Scarps
    - Bedrock Outcrops
    - Vegetative Changes
    - Orientations, Aperture
- B. Evidence of Wells or Drilling nearby
  - Access Drilling Logs or Owner Information

II. Hydrology
- A. Recharge Areas
- B. Discharge Areas
- C. Wetlands
- D. Estimated Depth to Water

III. Receptor Data
- Proximity of Residential Areas
- Schools, Parks, Playgrounds
- Surface Water Bodies
- Wetland
- Food Chain Receptors
- Local Well
- Houses, Agricultural Areas, Gradients for Surface Runoff to Neighbors and Nearby Basements

IV. Interview
- A. Name, Address, Phone, Position, Dates of Involvement at or Nearby Site
- B. History of Site (Occupants, Reworkings, Special Events)
- C. History of Potential Environmental Problems (Disposal, Spills, Leaks)
- D. Abutters Info (same as B & C)
- E. Other People/Referrals to Contact
- F. Presence of USTs

V. Visual Disturbances
- A. Vegetation Stress/Surface Staining
- B. Subsidence
- C. Discharge
- D. Fill Materials
- E. Adjacent property observation
- E. Stained Soils
- "SPECIAL," Unusual Biota
- Wildlife Presence or Absence

VI. Photo Documentation
- A. On-Site all Points of Interest
- B. Off-Site Abutter's Position to Site
- C. Any Special Shots for Scale
- D. Potential Pathway Receptor Map
- E. Potential Monitoring/Sampling Location Map
- F. Others (previous topography, if Disturbed, Area Water Wells, etc.

II. Agriculture

(Include Section I)

I. Chemical Use, Storage, Treatment & Disposal Areas

II. Facility Observation
- A. Waste Handling
- B. Volume Storage Location
- C. Evidence of Spill
- D. Container Leaks

III. Commercial Land with Improvements

(Include Section I & II)

I. Structures
- A. Floor drain, Sumps
- B. Catch Basins
- C. Lead paint
- D. Drinking Water Source
- E. Urea Formaldehyde Foam Insulation

II. Interviews
- A. Construction
- B. Past/Present Tenant/Owners and Management

III. Verification
- A. Septic/Sewer
- B. Disposal

IV. Inspections
- A. Asbestos Inspection
- B. Transformers
- C. Dry Wells

New Paint/Recent Changes

IV. Industrial Land with Improvements

(Include Section I, II, & III)

I. Chemical Use
- A. Storage
- B. Treatment
- C. Disposal

II. Spill Containment

III. Evidence of Violations

IV. Verify Operations/Processes

V. Sensitive Receptors Within ½ Mile

VI. Monitoring Equipment
- A. Air
- B. Water

Guidance for Environmental Site Assessments

Presented by Association of Ground Water Scientists and Engineers

Report Content

I. Vacant Land	II. Agriculture	III. Commercial Land with Improvements	IV. Industrial Land with Improvements
I. Executive Summary	(Include Section I & II)	(Include Section I & II)	(Include Section I, II, & III)
II. Purpose	Note if Access Denied	Note if Access Denied	Additional Investigation Work
III. Scope of Service	Recommendation, if Required	Recommendation, if required	
IV. Body (site conditions and observations)	Note if Sampling not Requested	Note if Sampling Not Requested	
V. Summary of Findings			
VI. Conclusions/Discussion			
VII. Recommendations			
VIII. Limitations (disclaimer)			
IX. References			
X. Appendices			
A. Photos			
B. Agency Information			
C. Past Reports			
D. Questionnaire			
E. Interview Records			
F. Summary of Source Characterization Data (as table/"either/or")			
G. Summary of Pathway/ Receptor Characterization (as table)			
XI. List of Figures			
A. Topo Map with Scale, North Arrow, Contour Interval, and Site Location			
B. Site Layout with Abutters and Surficial Features			
C. Potential Source Location/ Area Map			
XII. List of Tables			
A. Points-of-Contact (Offices, Agencies, Interview, Addresses, Dates)			
B. Source of Table (Type, Volume, Location, Dates)			
C. Pathway Table (media, relative pathway priorities)			
D. Receptor Table (Human health, proximity, route of exposure)			
E. Recommended Analyses for any Eventual Monitoring			

Elements of a Phase I Property Transfer Assessment

In Section 1.5, the three phases of a property transfer assessment were discussed. Phase I involves historical research and site reconnaissance, Phase II is contaminant assessment, and Phase III is remedial action. Some assessments may end at the completion of the first phase while others will continue through Phase III. In this chapter, we will describe the specific elements of the Phase I assessment.

Phase I assessments contain the same elements, but the level of detail and scope of each assessment will vary depending on the type of property being assessed. Site visit personnel assessing a site with a long history of industrial activity should be looking for more potential sources of contamination than there would at a site where the only use has been residential. Examples level of detail and scope will be provided for each element as it is described below.

2.1 SITE HISTORY RESEARCH

Research into historical land uses is conducted for several major reasons. One reason is that information gained through the research will help the site visit personnel know what to look for during the walk-through. For example, if historical research reveals that an underground storage tank was installed on the site in the past, the site visit personnel will look for vent pipes or fill pipes that may be associated with that suspected underground tank. Historical information is often useful in evaluating the potential for asbestos-containing materials in a building. If the presence of asbestos-containing materials is determined to be likely, the site visit team can be prepared to collect samples for analysis.

Another reason to conduct careful historical research regarding site uses is that if the assessment continues into Phase II, a more specific sampling and analysis program can be developed. Historical information may help determine the most likely locations for contamination to occur, and may help define potential constituents. This can save both money and time during the Phase II assessment as it aids in the design of a logical and efficient approach to problem definition.

Finally, sometimes recommendations regarding phase II activities are made based solely on historical information. For example if historical records indicate that an underground storage tank was installed on the site in the past, but the site visit team could find no evidence of the tank during the walk-through, a recommendation may be that further assessment should be conducted using remote sensing techniques such as metal detection to determine if a tank is present or not.

2.1.1 Documentation

Appropriate documentation is a key component of any adequate Phase I assessment. Throughout this section of the manual examples of research documentation forms and checklists have been provided. As necessary, these forms and lists should be revised to fully address specific properties. Forms and checklists should be fully completed, dated, and signed by the individual collecting the information. During site visits, photographs should be taken to further document current site conditions. If possible, historical photographs should be obtained to document past site conditions.

2.1.2 Sources of Historical Information

Specific sources of historical information will vary depending on the property location and current ownership. For example, records regarding Federal or Provincial land may be kept in different repositories than records for privately owned land. Location can be an important factor because local and provincial agencies may have different responsibilities in different locations. Figure 2 is an example of a historical information review checklist. It should be used as a guide when completing a Phase I assessment.

Generally, public libraries, historical societies, regulatory agencies, and city or regional district offices are good sources of historical information. Historical maps and photographs are often found at public libraries. Aerial photographs may be found at the library or at an agency such as the Surveys and Mapping Department of the Ministry of Environment. Typically, copies of these types of historical records can be ordered for a small fee. However, two to three weeks should be allowed for delivery. Whenever information is obtained from any of these sources, a reference form such as Figure 3 should be completed.

Records of hazardous material usage on site are generally available through regulatory agencies such as the Ministry of Environment or Environment Canada. Local Fire Departments may also have records on hazardous materials and spills. Both the Ministry of Environment and the Fire Department may be good sources of information regarding installation or removal of underground storage tanks. Figure 4 presents examples of the types of information that should be obtained pertaining to underground storage tanks.

Interviews with personnel knowledgeable on previous site operations are also a good source of information. Retired employees of the company currently operating on site, or employees of companies previously located on site can be excellent sources of information. To facilitate consistency in this effort, Figure 5 has been prepared to provide examples of the type of information which should be obtained from an individual who is knowledgeable about the site. If an individual is interviewed with only limited familiarity with the site, a form such as Figure 6 may be appropriate for the purpose of documentation.

Ideally, the site historical research should be conducted prior to the site visit. Because property transfer assessments are often conducted in a short time frame, this is not always possible. When the historical research must be conducted in conjunction with the site visit, it is important to make any significant historical information available to the site visit personnel as soon as possible.

2.2 SITE WALK-THROUGH

Site visits conducted during property transfer assessments consist of two main components, on-site interviews, and the personal observations of the site visit team. The site visit provides an opportunity to interview site occupants regarding current operations and their knowledge of previous operations. The site visit also provides the opportunity to compare documented site history with current site conditions. A site visit questionnaire similar to the example included as Figure 7 should be completed during the actual site visit to document observed site conditions.

2.2.1 Occupant Interview

On-site discussions with site occupants often reveal details about the site which would not otherwise be obtainable. During the interview process the tenants are questioned concerning the nature of their operations, length of time on the premises, and knowledge of past operations. They are also asked about the presence, condition, and contents of underground tanks, presence of transformers, knowledge of past spills, utility service to the property; use and management of hazardous materials on the site, handling of waste materials (liquid,

solid, air emissions, and hazardous), known spills of chemicals on site, known or suspected asbestos-containing materials, and type of heat supply for the building. Documentation should be made using the appropriate forms previously presented.

Accurate and consistent documentation of conditions observed at the time of the site visit is an important part of the Phase I assessment. A site visit form is a useful way to keep field notes consistent and concise.

2.2.2 Site Observations

The purpose of the site visit is to assess the current conditions on the property. A thorough walk-through of the property is conducted, including buildings and site grounds. A checklist should be prepared by the site visit team prior to arriving on site. The checklist will include potential sources of environmental concern and will serve as a guide during the walk-through. The checklist will vary depending on the type of property being assessed (i.e., industrial versus residential). A generic checklist for commercial and light industrial properties is included as Figure 8. In addition, photographs of the site should be taken to further document site conditions. These should be included in the Phase I Report.

Specific conditions to look for during the site walk-through vary depending on the type of property to be assessed. The nature of the site operations should be determined along with any mechanical or chemical processes utilized. Waste streams should be documented including treatment, storage and disposal. Data regarding the composition of wastes should be requested.

Supplies of chemicals observed on site should be inventoried. The use of each chemical should be confirmed along with its final disposition. Copies of Material Safety Data Sheets (MSDSs) should be obtained, if possible. These should be included in an appendix of the Phase I report to provide additional documentation.

The condition of the floors inside buildings should be noted. A crack in a concrete floor can provide a pathway for chemicals to reach the environment. Floor drains inside buildings should be noted, along with the types of wastes that may enter each drain, and the final destination of each drain (i.e., city treatment plant).

If an assessment of potential asbestos-containing materials is included in the Phase I scope, floors, walls, and ceilings should be observed for the presence of these materials. Samples of suspected materials should be collected and analyzed for the presence of asbestos fibers. This assessment should be completed by an individual who has appropriate training in asbestos assessment.

Conditions on the site grounds that should be noted include the presence of a fill pipe or vent pipe that may be associated with an underground storage tank. Soil, concrete, or asphalt staining should also be noted. Any stored drums or other containers that may contain hazardous materials should be inventoried, and any leaks or spills should be noted. Storm drains around the site grounds should be noted, along with any pole-mounted or pad-mounted transformers.

The location of on-site surface water, such as ponds, creeks, or ditches should be noted, along with any significant color, odor or other characteristics. Also, a soil discoloration or vegetative stress should be recorded.

In addition to conditions on site, the site visit team should observe and note surrounding land uses. The names and addresses of nearby businesses should be written down. The general topography of the land in the vicinity of the site should also be noted.

Figure 9 has been prepared to summarize the flow of information and the development of specific recommendations that may result from completion of a Phase I property assessment. For example, if underground storage tanks are suspected or noted during either the historical record review or the site visit recommendations pertaining to either testing, removal, or upgrade of the tanks will be part of the recommendations provided for Phase II activities.

2.3 ASSESSMENT REPORT

After the completion of the historical research and site walk-through, a Phase I site assessment report is prepared. The report should contain a chronology of the site history and a description of the interviews and observations made during the site visit. The report should also present conclusions regarding the potential risk associated with chemical contamination or asbestos-containing materials on site. It should also present recommendations for further assessment, if appropriate.

Forms documenting historical research, site observations, and interviews should be included as an appendix to the report. Photographs and material safety data sheets, if available, should also be included in an appendix.

At a minimum, two figures should be included with the report. The first figure should show the overall location of the site. The second figure should show the layout of the property including all buildings and other items of significance. Additional figures can be added as appropriate.

An example of a sample report that was prepared for a piece of property in Victoria, B.C. is included in Appendix A to this manual.

CLIENT QUESTIONNAIRE

HISTORICAL AND SITE REVIEW

PROPERTY/FACILITY _____

A. Owner of property/facility

Name _____ Tel. No. _____

Address _____ City _____

Postal Code _____ Province _____

B. Date Current Owner Took Title

Total Acreage of Property _____

No. of Buildings on Property _____

No. of Employees _____

C. Date of Construction of Present Buildings on the Property

_____

_____

_____

D. Any Environmental Assessments of the Property Carried out in the last five years

_____

_____

_____

E. Current Use(s) of Property (Describe)

Commercial _____

Industrial _____

Residential _____

Recreational _____

Agricultural _____

Vacant/Open _____

Other _____

F. Borrower's Intended Use of Property, If Different from E. (Describe)

Commercial _____

Industrial _____

Residential _____

Recreational _____

Agricultural _____

Vacant/Open _____

Other _____

G. Current Zoning of Property

Commercial _____

Industrial _____

Residential _____

Recreational _____

Agricultural _____

Other _____

H. Past Use(s) of Property Prior to Current Occupants (Describe)

Commercial _____

Industrial _____

Residential _____

Recreational _____

Agricultural _____

Vacant/Open _____

Other _____

I. Past Zoning(s) of Property

Commercial _____

Industrial _____

Residential _____

Recreational _____

Agricultural _____

Vacant/Open _____

Other _____

J. Any Special Permits issued

K. Products Manufactured or Processed

L. Principal Raw Materials Used

M. By-Products or Wastes Produced

N. Catalysts Used (i.e. substances that aid a chemical reaction while themselves remaining unchanged)

O. Hazardous Maintenance Supplies used for Machinery and Equipment

P. **Did/does any past or present use of the property involve any of the following:**

- metal foundries _____
- metal plating industries _____
- leather tanneries _____
- coal gasification works _____
- wood preservation facilities _____
- scrap yards _____
- petroleum refining, blending, storage or distribution facilities _____
- chemical producers _____
- pesticide/fungicide/herbicide manufacturing or formulating _____
- paint and ink manufacturing _____
- smelters or incinerators _____

Q. **All other properties owned or occupied at present or during the past 50 years by the borrower.**

HAZARDOUS MATERIALS AND WASTES

1. **Is the property free of any sources of infectious waste (medical pathological waste)?**

   Yes No N/A (i.e. not applicable)

2. **Does the property manifest its hazardous waste and ship it off-site to an approval hazardous waste disposal facility?**

   Yes No N/A

3. **Has the property ever received a notice of violation or other similar claim from a regulatory agency for improper hazardous materials/waste storage or disposal on site? If yes, please supply supporting documentation.**

   Yes No N/A

4. **If the property has received such a notice, have all issues related to the notice been satisfactorily corrected? If yes, please supply supporting documentation.**

   Yes No N/A

5. **Has the property ever received a notification letter or other communication about involvement, or potential involvement, in a site clean-up at an off-site location? If yes, please supply supporting documentation.**

Yes No N/A

6. **Is the property free of any current or pending legal action or any kind related to hazardous material/waste storage or disposal?**

Yes No N/A

POLYCHLORINATED BIPHENYLS (PCBS)

1. **Does the property contain any equipment, such as transformers or capacitors, that may contain PCB's?**

   Yes No N/A

   _____

   _____

2. **If PCB-containing electrical equipment is present at the property, is it marked with Environment Canada labels (black and white, or green and white for contaminated property)?**

   Yes No N/A

   _____

   _____

3. **If PCB-containing electrical equipment is present at the property, is registered with the local fire department? If yes, please provide a copy of such registration.**

   Yes No N/A

   _____

   _____

RADIOACTIVE MATERIAL

1. **Does the property have any materials containing radioactive sources (low level or otherwise)?**

Yes No N/A

_____

_____

EASEMENTS

1. **Are there cross-property easements (roadways, pipelines, etc.)?**

Yes No N/A

_____

_____

DUMPING AREA

1. **Does the property have any pits, ponds, lagoons, or other dumping areas on site (other than normal water retention ponds required by some jurisdictions)?**

Yes No N/A

_____

_____

2. **Does the property have any landfills, junkyards, incinerators or other waste disposal facilities or buried wastes?**

Yes No N/A

_____

_____

ASBESTOS

1. **Has an asbestos survey of the property been conducted? If yes, please supply copies of supporting documentation.**

Yes No N/A

2. **Did the survey find the buildings to be free of asbestos-containing materials? If yes, please supply copies of supporting documentation.**

Yes No N/A

UREA FORMALDEHYDE (UFFI)

1. **Does the property contain urea formaldehyde foam insulation (UFFI)?**

Yes No N/A

RADON

1. **Have any radon tests been performed at the property?**

Yes No N/A

_____

_____

2. **If radon tests have been conducted, were the results below 800 PQ/M_a, Health & Welfare Canada's guideline? Please supply supporting documentation.**

Yes No N/A

_____

_____

3. **If elevated radon levels have been discovered at the property, have ventilation systems or similar remedial measures been implemented?**

Yes No N/A

_____

_____

UNDERGROUND STORAGE TANKS

1. **Does the property have any underground storage tanks or underground pipelines (USTs)?**

   Yes No N/A

   _____

   _____

2. **If USTs exist at the property, have the proper registration forms been submitted to the designated provincial regulatory agency? If you, please supply supporting documentation.**

   Yes No N/A

   _____

   _____

3. **If USTs exist at the property, are leak detection equipment or secondary containment systems installed on the tanks?**

   Yes No N/A

   _____

   _____

4. **If USTs exist at the property, have they ever been tested for leaks? If yes, please supply supporting documentation.**

   Yes No N/A

   _____

   _____

5. **If USTs exist at the property, has there ever been a leak, spill or discharge?**

Yes No N/A

_____

_____

ABOVE GROUND STORAGE TANKS

1. **Does the property have any above ground storage tanks or pipelines? If yes, please indicate the contents.**

Yes No N/A

_____

_____

2. **If yes, has there ever been a spill, leak or discharge?**

Yes No N/A

_____

_____

BULK GASES

1. **Are there any bulk gases (e.g. propane, butane, carbon dioxide, nitrogen, ammonia) stored on-site?**

Yes No N/A

_____

_____

INDOOR POLLUTION

1. **Have there been any complaints or claims filed by any workers at the property for any environmental health reasons?**

Yes No N/A

_____

_____

2. **Has drinking water at the property always complied with provincial requirements?**

Yes No N/A

_____

_____

ENVIRONMENTAL HAZARDS ON ADJACENT PROPERTIES

1. **Are there any pits, ponds, lagoons, landfills, dumps, junkyards, incinerators or other waste disposal or treatment facilities or buried wastes adjacent to the subject property?**

Yes No N/A

_____

_____

_____

INSURANCE

1. **Does the borrower's insurance require annual environmental reviews or assessments of the property or business to determine environmental liabilities?**

Yes No N/A

_____

_____

2. **If yes, are there policy limits?**

Yes No N/A

_____

_____

POLICIES AND PROCEDURES

1. **Are there any environmental policies in place concerning the property?**

Yes No N/A

_____

_____

2. **Are there any spill and accident prevention/clean-up/reporting plans in effect for the property (including who is responsible for implementation thereof)?**

Yes No N/A

_____

_____

GENERAL

1. **Is the property located in an area with a history of environmental problems?**

   Yes No N/A

2. **Is the property located on or close to any ecologically sensitive area (e.g. wetlands, flood plain, endangered species habitat, scenic areas)?**

   Yes No N/A

3. **Does this facility discharge effluents directly to surface waters (streams, creeks, rivers, lakes)?**

   Yes No N/A

4. **Does this facility discharge effluent to a municipal sewer?**

   Yes No N/A

5. **Does this facility have storm sewers to handle surface drainage or does it rely upon surface run-off?**

Storm Sewers Surface Run-off Both

6. **Have soil samples ever been taken from this property and analyzed for hazardous materials?**

Yes No N/A

GENERAL COMMENTS

In addition, please provide copies of the following documentation where available:

- all environmental certificates of approval, environmental authorizations, licences and permits that relate to the facility and property.
- an inventory of hazardous materials existing on the property (in Canada, this should be a copy of the WHMIS (Workplace Hazardous Materials Information System) inventory where the facility falls under these federal regulations. The equivalent should be provided in other jurisdictions.
- waste registration or generation reports covering each of the hazardous wastes registered for and/or transported from the facility.

PROTOCOL FOR PRELIMINARY SITE ASSESSMENTS

A INITIAL INTERVIEW WITH OWNER/CLIENT

1. Identify third parties (e.g., financing entity)
2. Nature of surrounding area and land use
3. Nature of specific site; age of existing buildings, known underground tanks (and coverings); known asbestos (if included in scope)
4. History of the site
5. Permits, applications, notifications, inspections
6. Citations for violations
7. Size and specific location of site
8. Ownership and access
9. Chronology of ownership; title review
10. Site utilities. Storm water drainage, sewer systems, gas lines, power lines, etc.
11. Wells; water supply
12. Proposed use of property; intended excavation
13. Copies of reports relating to any prior site sampling and analysis
14. Site plans; show specific site boundaries; define limits of study area
15. Confidentiality
16. Ultimate recipient of report and any special requirements concerning content and/or preparation; request for certification; clarify purpose of report
17. Contact person(s); written entry permission
18. Liability Waiver (if applicable)
19. Schedule
20. Additional areas of concern

B REVIEW OF PUBLIC AND OTHER HISTORICAL RECORDS

1. Federal and Provincial concerns
   a) Environment Canada
   b) Alberta Environment

2. Local concerns
   a) Planning boards, city/county engineer
   b) Local Health Unit
   c) Fire and police departments
   d) Previous owners, occupants, workers, or residents

3. Evidence of past activities
   a) Newspapers
   b) Libraries
   c) Local historical societies

4. Legal record of past ownership
   a) Title review
   b) Tax records

5. Review existing maps and similar data
   a) Historical aerial photos
   b) Historical maps
   c) Soils maps

6. Review company records

7. Review geologic/hydrogeologic setting
   a) Alberta Research Council
   b) Local wells, reservoirs

8. During review, note sites within a selected radius that are:
   a) Suspected contaminated sites
   b) Operating or inactive landfills
   c) Hazardous waste facilities
   d) Industrial or wastewater discharge to surface waters that run through or near the site
   e) Underground tank records

C SITE RECONNAISSANCE AND INTERVIEWS

1. Development of a safety plan prior to site visitation

2. Visual reconnaissance
   a) Topography/fill areas
   b) Surface conditions
   c) Drainage
   d) Ponds or ponded water, streams, rivers, wetlands
   e) Wells
   f) Utility lines

g) General housekeeping
h) Soil
i) Odour
j) Vegetation
k) Debris
l) Vent pipes
m) Tanks
n) Storage buildings and storage areas
o) Drums and miscellaneous chemical containers
p) Transformers
q) Potential need for asbestos study

3. Photographic documentation

4. Interview with site personnel
a) Handling of hazardous materials
b) Spills
c) Underground storage tanks
d) Monitoring wells
e) Environmental monitoring
f) Asbestos

5. Use of adjacent properties

6. Sampling and analyses (need for if Phase II study is warranted)
a) Surficial soil/sediment samples
b) Test pits/soil borings (sampling)
c) Surface water/monitoring wells
d) Sampling
e) Analyses

D ENVIRONMENTAL EVALUATION REPORT

1. Introduction

2. Topography

3. Existing site conditions

4. Historical records review

5. Geology, hydrogeology

6. Public record review

7. On-site reconnaissance

8. Analytical results
9. Findings and recommendations; need for additional work
10. Limitations
11. Closure

APPENDIX I

EXAMPLE OF STATEMENT OF LIMITATIONS FOR PHASE 1 ENVIRONMENTAL SITE INVESTIGATION REPORT

APPENDIX I

EXAMPLE OF STATEMENT OF LIMITATIONS FOR PHASE 1 ENVIRONMENTAL SITE INVESTIGATION REPORT

This Phase 1 environmental site assessment report has been prepared exclusively for (the client) and their agents. The purpose of this report is to provide (the client) with an assessment of the potential for the presence of contamination at (site). This report is neither an endorsement nor a condemnation of the subject property.

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with that level of care and skill normally exercised by qualified professionals currently practising in this area of environmental assessment and are in accordance with the terms and conditions set forth in our proposal of (date). No other warranty, expressed or implied, is made.

The findings presented in this report are based upon the condition of the site during a single site visit by (consultant) personnel. As we conducted no subsurface explorations or testing on this site, a potential remains for the presence of unknown, unidentified, or unforeseen surface or subsurface contamination. Further evidence against such potential site contamination would require appropriate exploration and testing.

If new information is developed in future work (which may include excavations, boreholes, or other studies), (consultant) should be contacted to reevaluate the conclusions of this report, and to provide amendments as required.

(LEGAL NAME OF CONSULTING COMPANY)

Per:

Signature Block
Senior Review

Signature Block
Project Manager