

R E P O R T
ON THE REVIEW OF THE PLAN
FOR THE REHABILITATION
OF THE SITE
OF THE DOMTAR INC.
FORMER WOOD PRESERVING PLANT,
TRANSCONA, MANITOBA

Manitoba

The Clean Environment Commission
December, 1984.

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SUMMARY

1. Domtar operated a wood preservative plant on a sixty-two hectare site in Transcona for sixty-five years beginning in 1911.
2. The preservative employed until the early 1950's was creosote, a coal tar compound used most often in combination with petroleum oil, and thereafter both creosote and pentachlorophenol were used until the plant closed in 1976.
3. Both creosote and pentachlorophenol, PCP, are toxic substances. The pentachlorophenol also contains impurities the most important of which are a number of dioxins that are also toxic; however, the most toxic dioxin, 2,3,7,8-tetrachlorodibenzo-p-dioxin, (2,3,7,8-T₄CDD), is reported not to be present. Both creosote and pentachlorophenol are registered as wood preservatives under the Pest Control Products Act.
4. Over the years, as a result of the plant operation, waste disposal practices, chemical spills and contaminated storm water run-off, the soil in the area became polluted with chemicals, as did some of the large quantity of wood chips and peelings on the site that were a by-product of the operation.
5. Following the closing of the operation in 1976, the property was purchased by development companies for anticipated residential development.
6. Domtar hired consultants in 1976 to develop a rehabilitation plan for the plant site. Soil was sampled to depths of six metres. Composite soil samples were analyzed for oil, phenol, chlorophenols, and dioxins. The sampling and analysis program defined to a large extent the area of soil contamination. This work was done in co-operation with the provincial Environmental Management Division and the City of Winnipeg. Most of the contaminants were found near the ground surface although test holes at the former operations site showed contaminants at a depth of six metres.

7. Studies showed that the in situ clays adsorbed the contaminants reducing their mobility. There is an estimated fifteen to twenty-five metres of this clay above the bedrock. These studies indicated that the depth of clay, together with its relatively impervious nature, and the affinity of the clay for the contaminants should provide excellent protection for the groundwater underlying the site.
8. The proposed rehabilitation plan involved the removal of equipment, structures and stock from the site. An area of approximately six hectares with the heaviest contamination of soil and wood chips was to be capped and sealed with clay. Clay-filled cut-off trenches were to be placed around the perimeter of this site. Also included was a leachate collection and gas venting system. Registration of caveats would prevent development of the capped area in perpetuity. Much of the site clean-up, apart from capping, has been completed.
9. The capping program was expected to take place in 1979 at the time of anticipated residential site development but this development has not taken place. Renewed interest in the site in 1981 resulted in site reassessment. The results of this study supported the earlier study. The Domtar rehabilitation plan proposes that the capping of the area would coincide with actual residential development of the property, primarily so that clay, which would be excavated for a residential storm water drainage basin, could be utilized for the capping.
10. The contaminants were examined from the viewpoint of their toxic properties. Domtar stated that, because the contaminants were adsorbed to the soil or absorbed by wood chips, a person would have to remain on the Domtar site and ingest large quantities of soil at one interval, or smaller concentrations over a prolonged time period, before experiencing any type of toxic effects. As noted, certain dioxins are present as impurities in pentachlorophenol. The dioxin found in the highest concentration is the octachlorodibenzo-p-dioxin (O₈CDD) which is the least toxic dioxin. The most toxic dioxin present is hexachlorodibenzo-p-dioxin (H₆CDD) but the concentrations found were likely too small to have toxicological significance.

11. Because of the chemical contaminants on the site and because capping had not yet taken place, there was concern about site security. A snow fence was placed around the area of the most highly contaminated soils and the site of a pond formerly used to collect contaminated runoff water. Signs advising of the chemical concern and prohibiting admittance were placed at the likely access points. Over the years, both the signs and fence have been badly damaged and the fence does not now effectively restrict access to the property.
12. Both the City of Winnipeg and the Environmental Management Division co-operated with Domtar with respect to the rehabilitation program.

City officials contended that the matter of soil pollution is a provincial responsibility. The City has some concerns about odour impacts from the residual wood preservatives. They believed that further studies are needed to confirm that methane production from the decomposition of wood in the capped site may not be a problem.

City representatives stated that development of the site could not be a precondition of the rehabilitation plan and that rehabilitation of the site should begin immediately. The City would not accept responsibility for approval of engineering works and acceptance of the capping system and subsequent monitoring; however, they intend to participate in the review of the capping plans, the subsequent monitoring program and the results therefrom.

Development bordering on the Domtar site in the nearby Lakeside Meadows subdivision was frozen in 1981 but the freeze was lifted following a reassessment of the site. Both City and provincial health agencies felt that with the completion of the rehabilitation program, the risks to humans would be reduced to an acceptable level.

A provincial Water Resources hydrogeologist felt that, as long as there was not a direct connection between the surface contaminants and the groundwater aquifer contained in the bedrock, the groundwater quality

would not be endangered; however, some concern was expressed that one of the former wells utilized for disposal of surface water had not been located and properly sealed.

Environmental Control Services twice approved the rehabilitation plan as proposed, in 1977 and 1983, and also recommended that the Commission approve the plan, with some reservations. The main reservation was that, prior to the development of the site and subsequent capping, the site should be continuously secured from public entry. It was also recommended that a monitoring program should be established after the cap is in place and that the City of Winnipeg should register a caveat against the capped area of land declaring the area recreation/park land in perpetuity.

A basic disagreement between the City of Winnipeg and provincial officials was that the City believed that capping should proceed immediately while the provincial Environmental Control Programs recommended that this phase of the rehabilitation program should logically be keyed to the initiation of site development plans, as proposed by Domtar:

13. There was agreement that hauling the contaminants to another site such as the Brady Road sanitary site landfill would not only be prohibitively expensive but would be likely to present similar or worse environmental problems.
14. Few residents were in attendance from the nearby housing developments; however, those present wanted assurance that adequate environmental measures would be taken in both the near future and long-term.

CONCLUSIONS AND RECOMMENDATIONS

SAMPLING, ANALYSIS AND STUDIES

1. The Commission believes that the method of compositing samples within the top 0.3 metres of soil depth would be likely to result in lower concentrations of contaminants than actually exist near the ground surface.

The Commission recommends that, in the area of highest concentration of contaminants (Area A), additional samples should be collected within one to two centimetres of the ground surface and analyzed for oils, phenols, pentachlorophenols and dioxins associated with pentachlorophenol.

2. A main thesis of the rehabilitation plan was that the natural clay soils when sufficiently moist (plastic) are impervious and also have an affinity for the contaminants of concern. However, measurable concentrations of contaminants were found in bore holes at the maximum depth utilized in the survey (six metres).

The Commission recommends samples from several deeper holes should be taken in Area A and analyzed for oils, phenols, dioxins, and pentachlorophenol.

3. With regard to the possible generation of methane from both contaminated and uncontaminated wood chips, Domtar undertook a number of methane studies of relatively short duration. The City of Winnipeg has considerable expertise and experience in the area of methane generation from former sanitary landfill sites. City officials appeared satisfied that methane generation would not be great; however, they believe that the studies that were undertaken were of too short duration.

The Commission concurs that additional studies of longer duration, satisfactory to the City of Winnipeg and the Environmental Management Division, should be undertaken on the matter of methane generation in the wood chips and peelings.

4. The return of natural vegetation to the site would be an aesthetic enhancement. A survey over the interval of the rehabilitation study, 1977 to 1983, showed that revegetation had occurred in a large part of the land area. Also, plant life was occurring in some of the ponded water on site. Since the contaminants of concern are toxic to plants, revegetation can be an indicator of improvement to the environment.

It is recommended that studies of vegetation on the site be continued.

5. Ponded water remains on the site at the former waste water disposal pond and in poorly drained areas. The water is or has been in contact with the contaminated ground. There has been limited sampling for oils, phenols and pentachlorophenols in this water. The contaminant concentrations could be expected to change in response to a number of factors such as continued contact with contaminated soil and wood chips, hydrology and meteorology.

It is recommended that further samples should be collected, analyzed for the contaminants, and compared with earlier samples. This sampling, to determine any changes in the water quality, should continue until such time as the proposed capping takes place.

CLEAN UP

6. The rehabilitation program has been on-going since 1977. The aerial photographs included in the text of this report indicate the considerable amount of clean up that has taken place. Small quantities of debris such as wood, wire strapping, plastic and paper still remain on site.

For reasons of aesthetics and to discourage additional indiscriminate refuse dumping, the remaining debris should be removed without further delay.

7. The carbonate groundwater aquifer underlying the former Domtar plant site, has both existing and potential future use and is a significant natural resource to serve this area of the Province. Fortunately, the aquifer is overlain by fifteen to twenty-five metres of highly impervious clay. However, it has been established that four wells were located on the Domtar property, two for water supply purposes and two for draining surface water from the property.

Surface drainage disposal wells were an accepted practice in earlier times but not today, especially when polluted water may, by this means, enter a useable aquifer. While there was no evidence that contaminants have entered the aquifer and impaired its use, part of the rehabilitation plan was to locate and properly seal these wells. Only two of the four wells were located and sealed during the site rehabilitation, including only one of the drainage wells. The consultant reported that, in his opinion, based on the rehabilitation of the two located wells, any other drainage well on site would have been sealed by the suspended matter carried into the well from surface drainage over the years.

The Commission recommends that, in view of the importance of preventing contamination of the groundwater, extraordinary measures should be taken to locate and adequately seal any remaining unsealed wells on the site to prevent possible groundwater contamination.

8. Over the years of operation of the Domtar plant, a large quantity of wood chips and wood peel from the plant operation accumulated on the property. Some of the chips were used to dyke wastewater treatment ponds during the latter years of the operation and were subsequently contaminated with oil, phenol and pentachlorophenol. Other portions of the chips remained uncontaminated.

Rather than combine clean wood chips with contaminated wood chips and soil, the proposal to spread such chips in the area designated C, which would be subsequently cultivated and seeded to grass, is recommended by the Commission as being a sound practice.

CONTROL OF CONTAMINANTS ON SITE

9. The Commission believes that there may be a risk to human health from the exposure to surface contamination of the soil and wood chips.

The most obvious control would be to remove the contaminated soil and chips to a secure landfill site. This was not dealt with in the rehabilitation plan although discussion of this proposal occurred at the hearing. The City of Winnipeg did not discredit the possibility that the contaminated material could be placed at the Brady Road landfill site in south Winnipeg.

Domtar did not favour removal of the contaminated material from the site but proposed that it should be handled in an environmentally acceptable manner on site. The main basis of the Domtar rehabilitation plan is to move contaminated clay and wood chips to the area of highest contamination (Areas A and B) and place a clean clay cap one metre thick over this area.

The cap design would include a clay-filled cut-off trench to prevent lateral movement of contaminants, a leachate collection system which could also be used for monitoring contaminants, and a gas venting system. The capped site would be covered with topsoil and grass.

A caveat would be registered against the site to prevent its use for all but park and recreational land use in perpetuity.

Domtar, with agreement from the Environmental Management Division, believed that capping should occur in conjunction with residential

development of the site. In that way, clean soil could be obtained from a basin required for storm water management on the site (Area D). A development plan was started in 1977 but never came to fruition.

The City of Winnipeg, however, felt that capping should be undertaken immediately and not necessarily as a precondition of a land development plan. Despite proposed zoning of the land as "residential" under Plan Winnipeg, the City would not approve or guarantee its residential development use prior to the actual submission to the City of a development proposal.

Development of the area may be some years distant. The Commission believes that there may be a risk to human health from the site in its present condition and recommends that capping should take place as quickly as possible without waiting for site development. The Commission also recommends that a caveat be registered immediately against the area proposed to be capped, reserving this land for use only as park/recreation purposes, in perpetuity.

10. The clay cap is the most important feature of the plan in terms of protecting both human health and the environment.

The Commission recommends that the cap should be both designed and approved by suitably qualified experts. The design should be completed within six months and this design, complete with plans and specifications, submitted to the Environmental Management Division for approval. The Environmental Management Division should consult with suitable technical experts, including the University of Manitoba Government University Liaison Program (G.U.L.P.) Committee.

The Commission further recommends that the design should make adequate provision to maintain the integrity of the clay cap by keeping the cap in a moist condition to prevent possible drying and subsequent cracking of the clay.

11. The proposed leachate collection system would serve not only that purpose but would also be an essential part of monitoring and surveillance of the site.

It is recommended that monitoring continue for at least three years. The results of this monitoring program should be used to establish the safety and stability of the capped site and determine any long-term monitoring requirements.

12. The Commission is concerned that there may be a risk to human health from the contaminants until such time as the proposed capping is completed.

The Commission recommends that those portions of Areas A and B that contain significant concentrations of contaminants should be secured from public entry immediately by means of a ten foot high chain link fence. The actual area to be fenced should be established in consultation with the Environmental Management Division and the City of Winnipeg.

It is further recommended that signs should be placed at appropriate locations along the fenced property directing that there be no admittance for reasons of chemical contaminants. Access by means of a locked gate should be restricted to the west side of the site adjacent to Devonshire Drive. The enclosure should be inspected biweekly to ensure that the fence has not been breached or otherwise damaged.

AUTHORIZATION

On January 26, 1984, The Honourable Gerard Lecuyer, Minister of the Department of Environment and Workplace Safety and Health, wrote to The Clean Environment Commission respecting rehabilitation of the site of the former Domtar Inc. wood preserving plant in Transcona (Appendix A). He advised that his Department had received a final report outlining a rehabilitation program for the site. He requested that the Commission hold a public hearing to consider the Domtar report and provide him with a report and recommendations on the adequacy of the rehabilitation program. He requested that citizens of the area should be given an opportunity to comment on the report and to express any concerns that they might have with regard to the existing situation and the proposed rehabilitation program.

The hearing was convened under Section 13(1) of The Clean Environment Act which states, "The commission may, unless otherwise directed by the Minister, for the purposes of carrying out its duties and functions under the Act, investigate any matter respecting the environment and for that purpose hold such hearings as it deems advisable."

PREPARATION AND CONDUCT OF HEARING

Prior to the hearing, the Minister issued a news release through Manitoba Information Services on April 26, 1984, to publicize the hearing (Appendix B). The news release summarized the events that had taken place at the Domtar Transcona site, the rehabilitation program that had been prepared for Domtar, noted the availability of the report for examination at either the Transcona Public Library or the Commission office, and welcomed the participation at the hearing of all nearby residents and others interested in the site's rehabilitation.

At the same time, the Commission Chairman forwarded letters to approximately 500 residents living adjacent to the Domtar site in the Lakeside Meadows subdivision on the west side and North Transcona residents

living on the south side of the Domtar site (Appendix C). The information contained in the letter was similar to the news release noted above.

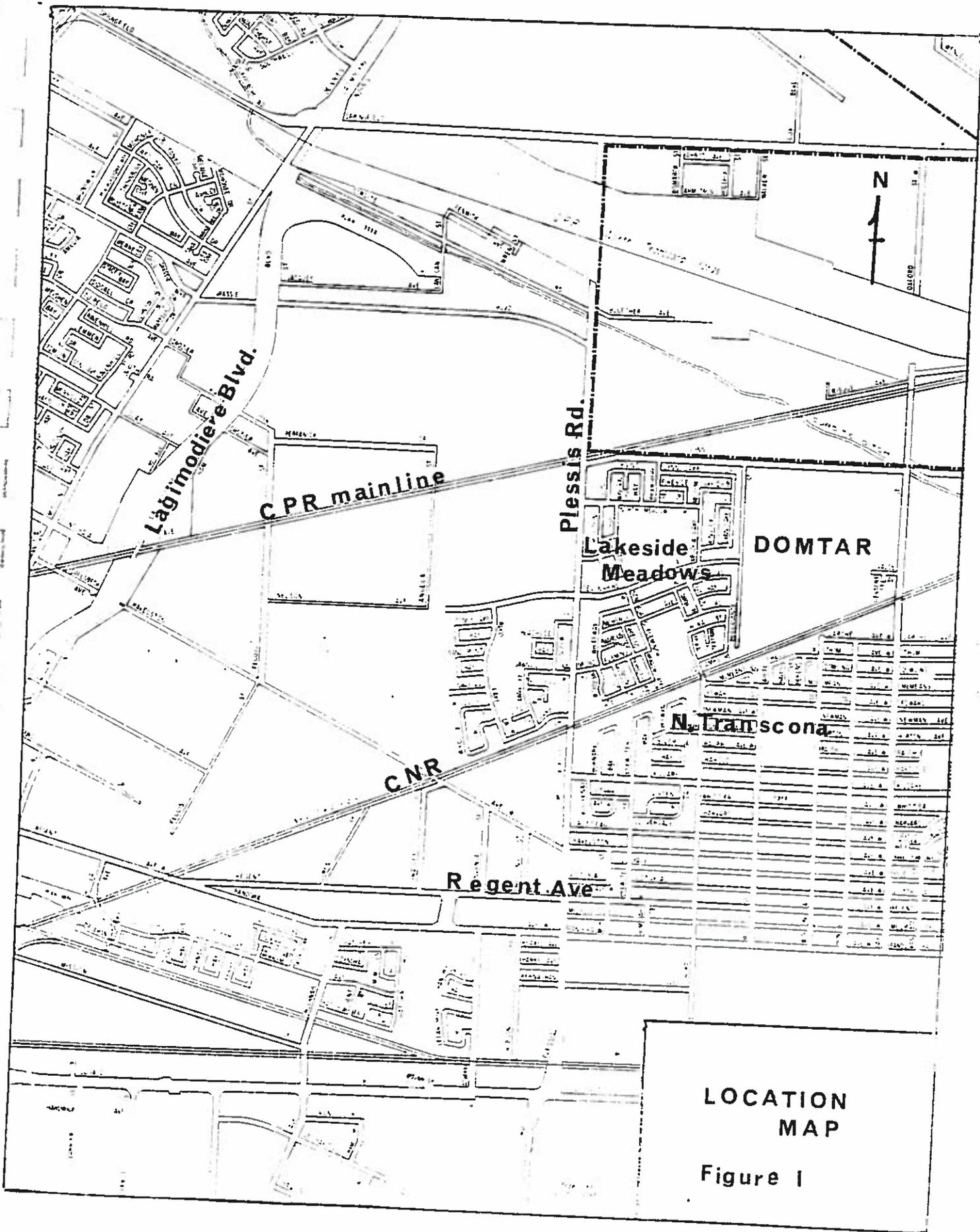
The Clean Environment Commission advertised the hearing in the May 23, 1984, edition of the Winnipeg Free Press giving details similar to those contained in the news release (Appendix D). This notice gave the time, date and location of the hearing being 7:30 p.m., May 23, 1984, continuing as necessary at 9:30 a.m., May 24, 1984, at the Regent Park Banquet Hall at Regent Avenue and Brewster Street, Transcona, a location approximately two kilometres distant from the residents living adjacent to the Domtar site.

Attending the hearing were representatives of Domtar, their legal counsel and consultants, the official government agencies responding to some aspect of the program, the City of Winnipeg officials and legal counsel for the developers involved with the Domtar site subsequent to its closing in 1976. Also attending were seven citizens residing in North Transcona and Lakeside Meadows (Appendix E). In addition, one nonresident citizen who made a presentation was a scientist with expert knowledge of organic chemicals, particularly dioxins. The hearings adjourned near 11:00 p.m. at the evening session and at 4:00 p.m., the following day. A list of the exhibits presented at the hearing can be found in Appendix F.

Subsequent to the hearing, legal counsel on behalf of Domtar, forwarded a summary brief to the Commission.

BACKGROUND

Domtar Chemicals Ltd. operated a wood preserving plant on a sixty-two hectare site in Transcona (Figure 1) from 1911 to 1976, when the operation was discontinued. The property was sold and subsequently resold for development purposes. As a matter of note, Imperial Developments (Canada) Ltd. were the registered owners of the property at the time of the hearing.



LOCATION
MAP

Figure 1

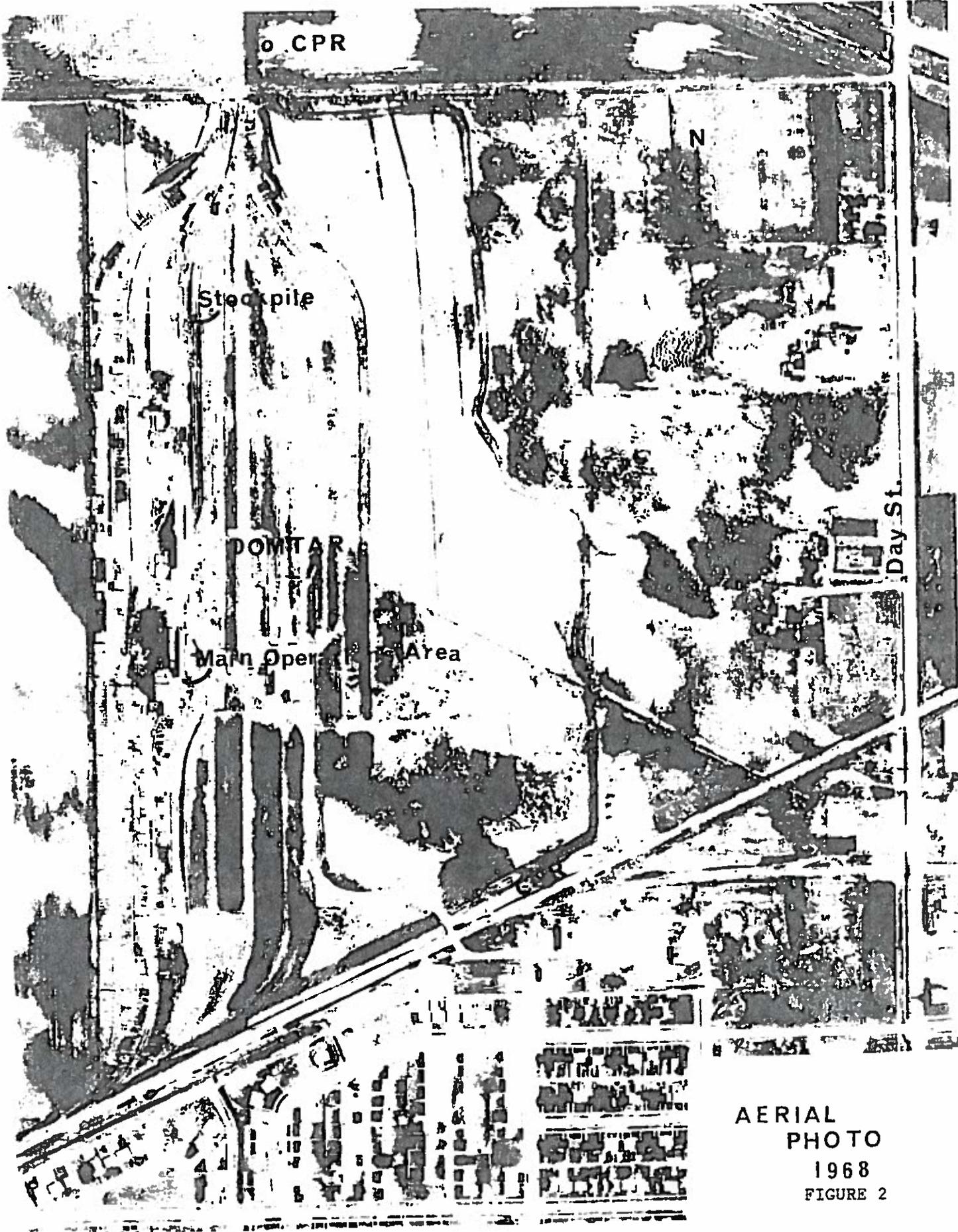
For the first forty years of operation, the Transcona plant, which was one of the first large pressure treating plants in Canada, used creosote and creosote solutions for the treatment of railroad ties and heavy timbers. In 1952, facilities for treating with pentachlorophenol were installed. An aerial photograph of the operation taken in 1968 while the plant was still functioning shows both the site and neighbouring developments at that time (Figure 2).

Creosote, a dark brown, oily liquid, is a by-product of the high temperature carbonization of bituminous coal. In terms of its toxicity, based on available accident record information in the wood preserving industry, creosote applicator exposure does not appear generally to have caused severe health problems. Although little is apparently known about the degradation of creosote in soil, there is considerable evidence that aromatic hydrocarbons, a fraction of creosote, are degraded fairly readily by soil microorganisms.

Pentachlorophenol has been produced and used for over forty years. As far as can be determined, workers handling pentachlorophenol treated products have not suffered health problems when recommended safety and hygiene practices were observed. A communication with a European scientist¹ disclosed that 2,3,7,8-tetrachlorodibenzo-p-dioxin, the most toxic dioxin, has not been detected in pentachlorophenol at levels greater than 0.0002 parts per million (ppm). The dioxin usually present in the highest concentration in pentachlorophenol (as high as 1380 parts per million, Jones,² 1981) is octachlorodibenzo-p-dioxin, the least toxic chlorinated dioxin. The two isomers of heptachlorodibenzo-p-dioxin (H₇CDD) and those of ten possible hexachlorodibenzo-p-dioxins have also

¹Verbal communication with Dr. H. R. Buser of the Swiss Federal Research Station, Waedenswil, Switzerland.

²Jones, P.A., 1981, p.31, "Chlorophenols and their impurities in the Canadian Environment". Economic and Technical Review by Environmental Protection Services of Environment Canada.



CPR

Stockpile

DOMTAR

Main Operating Area

Day St.

AERIAL
PHOTO
1968
FIGURE 2

been shown to be present in commercial pentachlorophenol. In view of the quantities of these latter dioxins present in pentachlorophenol (viz., 520 and 8 parts per million, respectively, Jones, 1981) and their toxicities, the presence of significant concentrations in the soil at the Domtar site may pose toxicological problems. Their levels in surface soils therefore need to be comprehensively determined.

In addition, a number of chlorinated dibenzofurans, close chemical relatives of the dioxins, have been shown to be present in commercial pentachlorophenol. Smaller amounts of other chlorinated contaminants have also been reported (Jones, 1981). It was also suggested that both the dioxins and the furans may volatilize from wet soils.

During the initial operation of the plant, contaminated effluent was discharged, after the separation and recovery of free oil, via a local ditch to the Cordite Ditch north of the plant. This ditch in turn discharged to Bunn Creek and thence to the Red River. In 1969, this discharge route was discontinued and thereafter until the plant was closed, the effluent was contained on the plant site in an evaporation pond constructed for that purpose. Due to the quantity of effluent and influx of local surface run-off, wood peeler wastes were used to contain the effluent within this pond system. Also, in the late 1930's, two drainage wells were drilled into the bedrock aquifer to allow the drainage of storm water from the operating areas of the plant site.

Soils on the site became contaminated from chemical spills and process wastes throughout the sixty-five year history of the operation. In terms of the groundwater aquifer, aside perhaps from the two drainage wells, groundwater contamination was not viewed as a problem due to the presence of fifteen to twenty-five metres of low permeability clay soil separating the ground surface from the underlying water bearing rock.

Following the closing of the Domtar wood preserving plant in October 1976, a detailed study of the condition of the site was carried out by Domtar and their consultant. Figure 3 identifies the general study area and its relationship to the nearby neighbourhood.

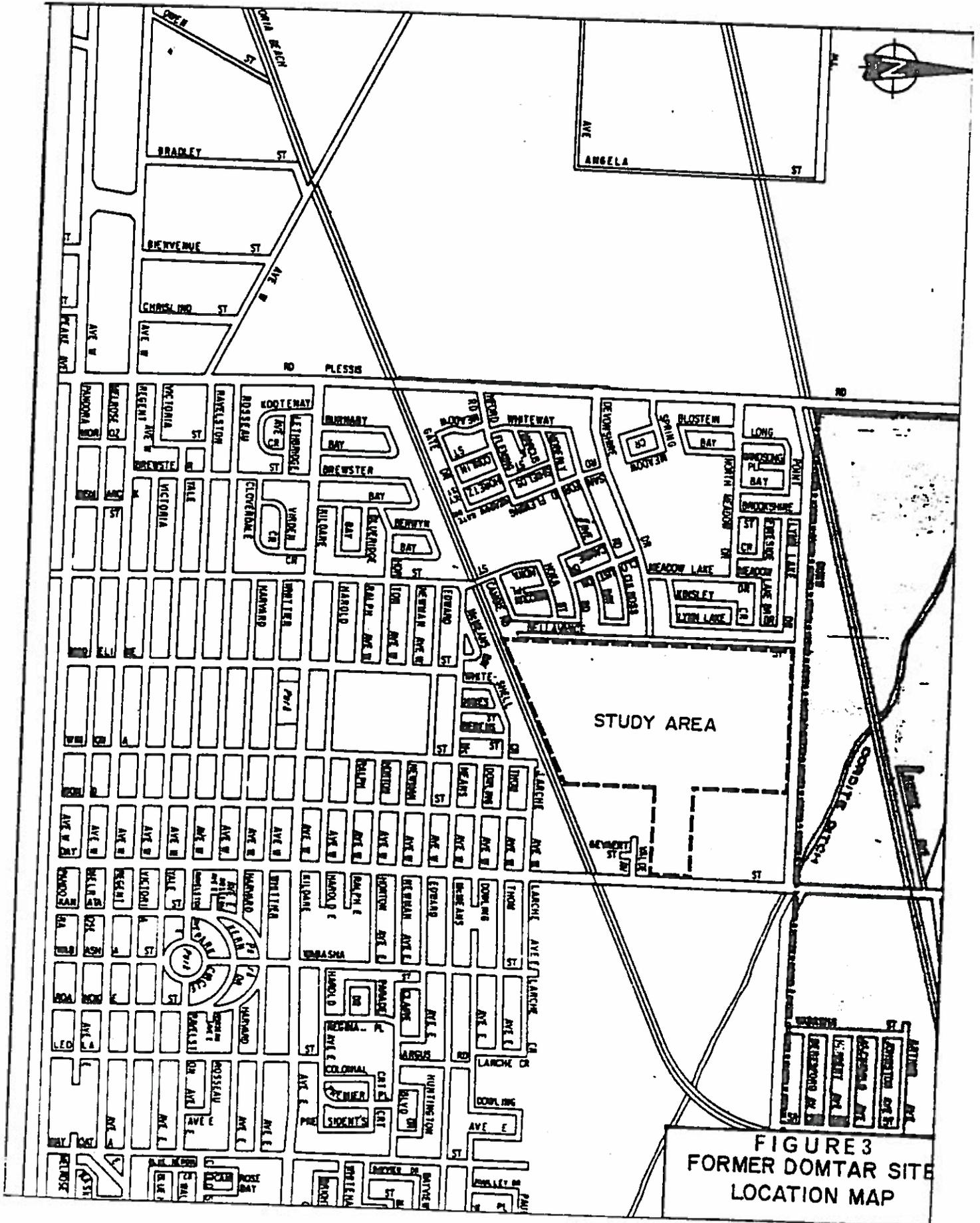


FIGURE 3
FORMER DOMTAR SITE
LOCATION MAP

Based on the findings of this study, a rehabilitation plan was developed and was approved by the provincial Environmental Management Division in 1977-78. The plan basically involved the removal of equipment, structures and stock from the site, followed by the capping and sealing of the former process area with clay³ and registration of caveats preventing development of the capped area other than as a park, in perpetuity.

At the time of the hearing, most of the site clean-up had been completed; however, the capping program, originally expected to take place in 1979 at the time of anticipated residential site development, had not as yet been done, as the residential development has not been undertaken.

Renewed interest in the site in 1981 triggered reassessment of the site. Further sampling and analyses were done with the results of this study supporting the earlier conclusions and the appropriateness of the original rehabilitation program.

Site security was important because of the chemical contamination on the site. A snow fence was erected surrounding the defined area of contamination with signs, designed to discourage entrance, placed at a number of access points; however, the fence was badly vandalized and was extensively breached, thereby enabling easy public access at several locations.

³One member of the Commission has consulted with a soil physicist at the University of Manitoba (Dr. C. F. Shaykewich, Department of Soil Science) who has advised him that there are several risks in the proposed plan:

1. The native clay is a montmorillonite clay which expands when wet and contracts when dry - causing cracking. The "sealing" of any area with this clay when it may undergo wetting and drying is not feasible.
2. The proposed location of the clay capped area above grade will promote the wetting/drying phenomenon. It is difficult to remedy this with irrigation because of the low permeability of the dry clay to water. Cracking is necessary to let the water in.
3. Location of the cap below grade or at-grade would possibly prevent this condition from developing. Excavation of a disposal site followed by disposal in the excavated pit and covering with native clay would be the best available method for containment of Domtar wastes on the site.

ACCOUNT OF THE PUBLIC HEARING

Clean Environment Commission members present at the hearing were Mr. Stan Eagleton, Chairman, Mr. Peter Ducheck, Mrs. Jeanette Goertzen, Mrs. Mamie Hendren and Dr. Barrie Webster, as well as Mr. Dirk Blevins, legal counsel to the Commission.

In his opening remarks, the Chairman noted that the Minister had requested that the Commission hold a hearing to consider the Domtar site rehabilitation program and to report to him with recommendations on the adequacy of the rehabilitation program outlined in the report.

In addition to the report of the rehabilitation plan, the rehabilitation work and security measures already undertaken by Domtar and their consultants, MacLaren Plansearch Inc., (in co-operation with the Environmental Management Division and various departments of the City of Winnipeg), were also reviewed.

DOMTAR SUBMISSION

Introduction

Mr. A. MacInnes, a Winnipeg lawyer acting on behalf of Domtar, made an introductory statement dealing with events after the closure of the Domtar facility in 1976.

In late 1976, provincial authorities requested that there be rehabilitation of the former wood preserving site. Domtar engaged J. F. MacLaren Ltd. in October 1976 to study site restoration requirements. In co-operation with the Environmental Management Division and the City of Winnipeg, MacLaren Ltd., in August 1977, produced a report of a rehabilitation program of the Transcona wood preserving site. This plan was approved by the Environmental Management Division in January 1978 (Appendix G).

Prior to the completion of the rehabilitation plan, the property was purchased by Sunny Hills Investments Ltd. on October 19, 1976, and an agreement for resale of the property was made to Imperial Developments (Canada) Ltd. on November 23, 1976. Imperial subsequently took title to the property and is apparently the present owner. The Commission was advised that there was litigation underway between Imperial and Sunny Hills, with Domtar as a third party, regarding ownership of the property.

There was a condition attached to the transaction between Domtar and Sunny Hills that Domtar would be responsible for cleaning and restoring the lands to the satisfaction of the Environmental Management Division. This was not an express condition attached to the transaction between Sunny Hills and Imperial except to the extent that Sunny Hills made an undertaking to cause Domtar to carry out the obligations.

Domtar engaged MacLaren Ltd. who subsequently produced a report and a recommended plan for rehabilitation. This plan was approved by the Environmental Management Division in January 1978.

The property remained in an undeveloped state and in 1981, as a result of renewed interest in the condition of the site by both the City of Winnipeg and the Environmental Management Division, a further site assessment was undertaken by MacLaren Ltd. on behalf of Domtar to address the problems then raised.

The Transcona Wood Preservative Plant Operation

Mr. R. L. Watson, Pollution Control Supervisor of Domtar, presented an overview of the basic operations formerly conducted at the Transcona plant.

The main raw material of the plant was wood which was treated chemically to prevent biological attack, principally by fungi. The process carried on at the plant consisted of shaping the wood and then impregnating

the wood with preservative at a pressure of 1034 kilopascals (150 pounds per square inch) until the required amount of preservative entered the wood. The wood was then vacuum dried.

The first effective wood preservative used was creosote which is a coal tar containing solid/liquid aromatic hydrocarbons, a complex mixture of many organic compounds. In order to gain full protection, the product was fully impregnated into wood. Creosote is highly toxic to fungi. The Transcona operation utilized creosote concentrate as well as a fifty percent solution of creosote and petroleum oil.

The other wood preservative that came into use in the early 1950's at the Transcona operation was pentachlorophenol. Pentachlorophenol was formulated as a five percent solution in petroleum oil. This material, which is crystalline, was manufactured by the chlorination of phenol. Pentachlorophenol has a low water solubility but is soluble in organic solvents.

There are approximately forty wood preserving plants in Canada with three being located in Manitoba. Most of the wood treatment plants are located in Ontario and the western provinces.

The Transcona Domtar site, with an area of sixty-two hectares, was chosen due to its strategic location close to both Canadian National and Canadian Pacific Railways. The operation began in 1911 with production levels often reaching one million railroad ties per year, representing a requirement of approximately 1.6 million decalitres of creosote-petroleum preservative.

Creosote treatment continued during the life of the plant, particularly for railroad ties; however, pentachlorophenol was added in the 1950's, for poles, posts and various lumber products. By the 1960's, the year-round operation had been reduced to a seasonal operation with a decision to close being made in 1976.

Toxicology of Contaminants at Domtar Site

Dr. N. Richardson, Group Leader in Wood Technology with Domtar, discussed the toxicity of the creosote and pentachlorophenol utilized at the Transcona wood preserving site.

Analyses performed principally upon soils and wood chips from the Domtar site included oil and grease, phenol, pentachlorophenol, and dioxin determinations. The oil and grease determination was undertaken to reflect the residues associated with the use of creosote and creosote/oil solutions in wood preservation. Traces of certain dioxins occur as contaminants in pentachlorophenol.

Dr. Richardson stated that there are seventy-five chlorinated dioxins, but that there has never been a report of 2,3,7,8-tetrachlorodibenzo-p-dioxin, the most toxic dioxin, being found in pentachlorophenol⁴. This dioxin is a million times more acutely toxic than octachlorodibenzo-p-dioxin and 100 to 1000 times more toxic on a weight for weight basis than the hexachlorodibenzo-p-dioxins or heptachlorodibenzo-p-dioxins. Hexachlorodibenzo-p-dioxin, the most toxic major dioxin contaminant in pentachlorophenol, occurs at a level of 10 parts per million compared to 370 parts per million for octachlorodibenzo-p-dioxin. Dr. Richardson stated also that dioxins are ubiquitous in the environment, being associated with combustion processes such as incinerators⁵.

As a basis for computing toxic levels of the contaminants in soil, a study undertaken by the Communicable Disease Control Centre in Atlanta,

⁴In a verbal conversation, Dr. H. B. Buser of the Swiss Federal Research Station reported levels of 2,3,7,8-tetrachlorodibenzo-p-dioxin in some German pentachlorophenol at levels near 0.0002 parts per million.

⁵Although there are background levels of the chlorinated dioxins present in the environment, anthropogenic processes have in some cases added substantially to the ubiquitous levels.

Georgia, (1982) was utilized. The assumption made for the purpose of that study was that, throughout a lifetime, a person might possibly consume 0.4 grams of soil every day. Also, in terms of skin contact, that the age weighted average of soil exposure would approximate 0.5 grams per person per day with a 10 percent absorption rate. In considering contaminated soil, the inhalation route was thought to be of no major significance compared to the oral and dermal routes⁶. The basis for the calculations and the criteria citations are given in Appendix H.

Table 1 is a hypothetical illustration of the quantity of soil and the particular concentration of contaminant that would be required to provoke a toxic response. In the case of fetotoxicity, a safety factor of 1000 is employed; in the case of cancer, the safety factor is 3000.

Dr. Richardson stated that a subsequent presentation would show that the levels of these contaminants on the Transcona site were so low as to provide ample margins of safety in terms of any form of exposure to toxicity. Also, that humans have been exposed to high levels of dioxins in soils for up to ten years without experiencing predicted levels of health effects⁷. Industrial exposure to pentachlorophenols for over four decades had demonstrated no evidence of adverse effects on health as long as adequate precautions were taken⁸.

⁶With respect to the inhalation route, the Ministers' Expert Advisory Committee on Dioxins (HWC & EC) rated airborne fly ash contaminated with dioxins as a major vector for toxicological risk associated with dioxins. The risk associated with airborne soil at the Domtar site may be considerably less.

⁷The Commission believes that the evidence which is available is equivocal and incomplete.

⁸Jones, 1981, reports on many cases of industrial poisoning world wide including fatalities when proper precautions with pentachlorophenols were not taken.

TABLE 1: Quantity of Soil, Contaminated at Stated Concentrations having the Toxic Responses Indicated. ^{hypothetical}

<u>Contaminant</u>	<u>Type of *</u> <u>Toxic Response</u>	<u>Quantity of</u> <u>Soil Ingested</u> <u>(grams/per day)</u>	^{hypothetical} <u>Concentration of</u> <u>Contaminant in the Soil</u> <u>(parts per million)</u>
Creosote	Acute	119,000 ✓	1000 ✓
	Chronic	0.45 ✓	5333
Phenol	Acute	100,000 ✓	100 ✓
	Chronic	0.45 ✓	15,555 ✓
PCP	Acute	170,000 ✓	10 ✓
	Chronic	0.45	13,300 ✓
	Feto Toxic	0.11 ✓	1636 ✓
O ₈ CDD	Feto Toxic	0.11	54,500
H ₇ CDD	Acute	432,000	1 ✓
H ₆ CDD	Acute	40,000	0.10 ✓
	Feto Toxic ✓	0.031	0.19 ✓
	No effect level.	0.11	0.057 ✓
	for Cancer	0.4	

There are two heptachlorodibenzo-p-dioxins: one is more toxic than the other. However, the more toxic one was not identified. There are ten hexachlorodibenzo-p-dioxins with toxicities varying by orders of magnitude. The hexachlorodibenzo-p-dioxin referred to is an undefined mixture of these congeners.

* Data for other than acute toxicity allow safety factors of 24 1000-3000 (see appendix)

MacLaren Plansearch Inc. Involvement - Rehabilitation Plan

Mr. M. McKernan of MacLaren Plansearch Inc., consultants to Domtar, reviewed the rehabilitation program of the Domtar site.

The site consists of sixty-two hectares bounded on the south side by the CNR Victoria Beach branch line, on the east by Day Street, on the west by the Lakeside Meadows subdivision, and on the north by Gunn Road (Figure 4). The site is underlain with fifteen to twenty-five metres of highly impervious clay above the bedrock aquifer.

Mr. McKernan noted that both wood preservatives, creosote and pentachlorophenol, have been approved for wood preserving by the Government of Canada under the Pest Control Products Act.

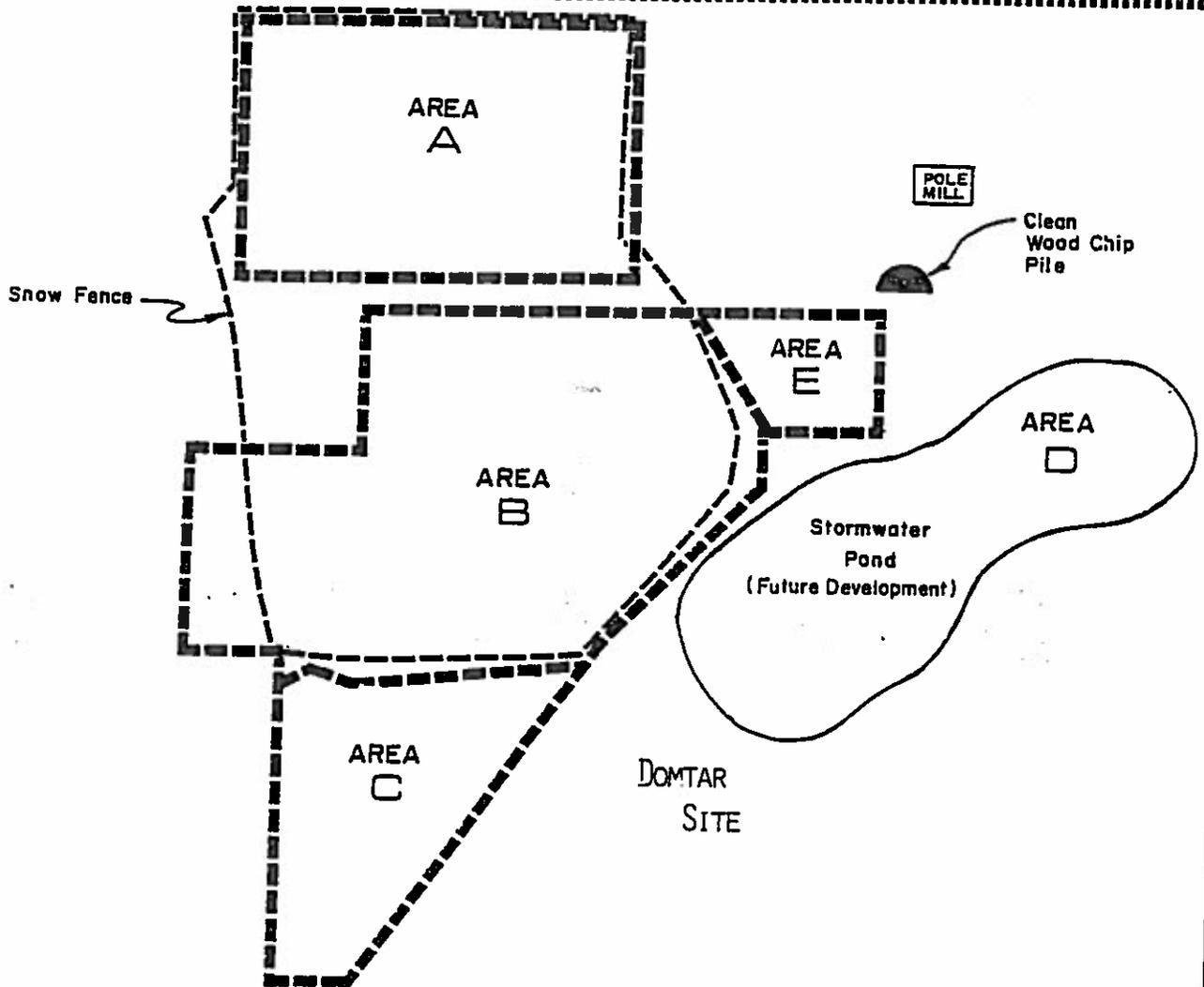
In August 1977, MacLaren submitted a report on the rehabilitation program of the Transcona site to Domtar. The principal component of the report was a program of sampling and analysis to define the area of contamination. Analyses for oils, phenols, pentachlorophenols, and dioxins were done on wood chips and soil samples from test holes on the plant site. This program was done in co-operation with the Environmental Management Division and the City of Winnipeg.

Four areas with different degrees of contamination were described within the Domtar site (Figures 4 & 5). Area A, consisting of 2.2 hectares at the location of the former plant site, contained the highest residue of preservatives. Area B includes some 3.5 hectares at the location of the former evaporation pond which was used for process waste disposal during the last seven years of operation, where wood chips were used to augment the dykes and soak up the wastes. Area C, 1.6 hectares, is an area of slightly contaminated wood chips and minimal soil contamination. Area E, approximately one hectare, had the highest degree of contamination of wood chips with minimal soil contamination.

In 1976 and on subsequent occasions, a number of bore holes were drilled throughout the Domtar site and samples, ranging from the surface to

LAKESIDE
MEADOWS
DEVELOPMENT

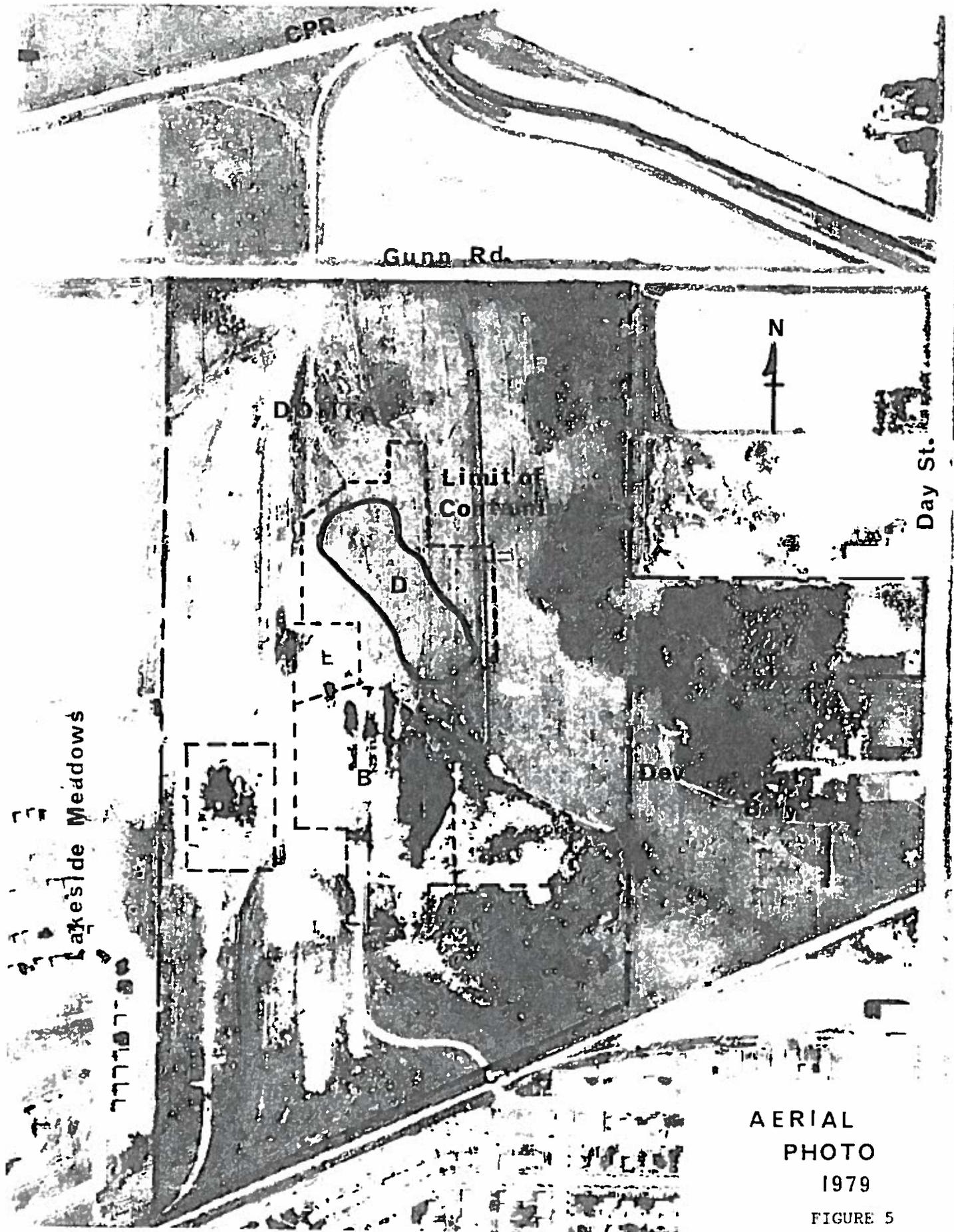
BELLAVANCE STREET



CNR - VICTORIA REACH BRANCH

DAY STREET

FIGURE 4



AERIAL
PHOTO

1979

FIGURE 5

a depth of six metres, were analyzed for oil, phenol, pentachlorophenol and dioxins.

About half of the area sampled, principally in Area A, contained oil in concentrations exceeding 1000 parts per million. It was believed that the oil is not mobile but bound by its affinity to the clay.

Mr. McKernan continued by noting that, with some exceptions, the highest oil concentrations were found within the top three metres. There are one or two locations where oil was found at the six metre level. These samples were located at the former main operations area (Area A) and the depth of penetration could be due to the presence of granular fill used to support the plant structures.

Approximately two-thirds of the sampling sites had phenol values of less than one part per million. Twenty percent of the samples were greater than ten parts per million and, like the higher oil values, were found at the site of the former operations area (Area A) and within three metres of the surface. Approximately half of the samples contained less than one part per million pentachlorophenol with twenty percent of the samples having levels greater than five parts per million. Again, the material was found near the soil surface and principally near the former operations area (Area A). The concentration of phenol and chlorophenols, close to the ground surface, is due to the adsorption properties of the soil and the characteristic of these contaminants to become closely associated with soil particles and not to migrate or seep laterally or downwards.

Three classes of dioxins were found on the site, those being the octachlorodibenzo-p-dioxin, at levels less than 2 parts per million, and heptachlorodibenzo-p-dioxin, at less than 0.2 parts per million. Hexachlorodibenzo-p-dioxin, the most toxic dioxin found in pentachlorophenol was present in lower concentrations. There was no 2,3,7,8-tetrachlorodibenzo-p-dioxin detected.

Mr. McKernan suggested that, upon comparison with the acute toxicity values in Table 1, it was apparent that a human would, in most cases, have to ingest several times his body weight of contaminated soil to receive a lethal dose. At those few sites, near the former operations area, having very high concentrations of oil/creosote mixture, 5 to 10 kilograms of soil would have to be ingested to be lethal. A creosote/oil mixture at a concentration of 5000 parts per million would be required to produce a chronic toxic effect in a person having a lifetime of exposure on the site, ingesting, breathing and contacting the soil. Concentrations of oil greater than 5000 parts per million were found in a few bore holes near the main operations area (Area A). With respect to the phenol, pentachlorophenol and dioxins found, the concentrations were such that an inordinantly high, if not physiologically impossible, amount of soil would have to be consumed to have lethal effects and even a lifetime exposure on the site would not show chronic toxicity effects⁹.

In summary, Mr. McKernan noted the concentrations of contaminants are extremely low relative to the toxic reference points as developed in Table 1.

As previously noted, the clay soil has an affinity for the contaminants, making them relatively immobile. The bedrock groundwater aquifer is also protected by a substantial layer of these clays which range in thickness from fifteen to twenty-five metres.

The rehabilitation plan, developed on the basis of the analytical program, recommended the following measures.

⁹The Commission believes that acute toxicity is not the major issue here. Chronic effects are more important in this situation. The Commission believes that the statements made with respect to risk are insufficiently substantiated. The additional analytical work, as contained in the recommendations to this report may help to resolve this.

At the outset, all residual wood preservative material was to be disposed of either to the City of Winnipeg incinerator or to the City's North End sewage treatment plant.

Wells on the site which had been used for process and drinking water and for drainage were to be capped; however, it was noted that only two of a reported four wells were located and sealed. The speculation was that the two other wells had filled with debris and soil and were thus also sealed.

The plant infrastructure, including buildings, trackage and tanks, was to be removed.

Wood chips and contaminated soil from Areas C and E were to be removed to Areas A and B for subsequent capping with clay including, if required, the construction of a clay filled barrier trench surrounding the capped site.

The proposal was to cap the area with one metre of compacted clay which would be overlain by 0.67 metres of topsoil.

The capped area was proposed to be zoned as parkland and protected by a caveat to ensure that no activity would occur that would compromise the integrity of the cap.

The rehabilitation plan was accepted by the Environmental Management Division in January 1978, with acceptance linked to the development of the site for residential purposes. The clean clay required for capping would originate from Area D, a storm water management pond required to service the development. This was one of the principal reasons why the proposed capping was scheduled to coincide with residential land development. Since the subdivision did not occur, capping has not taken place.

Aside from the clay capping, the program as outlined, including the transport of some contaminated wood chips from Area E to Areas A and B and grading of Area A, was for the most part completed in the Fall of 1977.

In 1981, since land development had not proceeded, there were additional issues raised by the agencies related to the thoroughness of the general clean-up, the adequacy of the site characterization, the possibility of methane generation associated with the wood chips, leachate generation, and the matter of site security. In response to questions about the characterization of the site, Domtar, in consultation with the Province and City of Winnipeg, undertook further sampling and analysis of soil and wood chips from the site. A more sophisticated analytical technology was used than previously.

Briefly, the results confirmed the original delineation of the zone of contamination. Samples for dioxin analysis from a number of areas of high contamination were submitted to the Agriculture Canada Laboratory in Ottawa. The presence of octachlorodibenzo-p-dioxin and heptachlorodibenzo-p-dioxin was confirmed at levels of 0 to 412 parts per billion for octachlorodibenzo-p-dioxin and 0 to 83 parts per billion for heptachlorodibenzo-p-dioxin. One sample contained hexachlorodibenzo-p-dioxin at four parts per billion, much below the no effect health level¹⁰. The results of the 1981 sampling survey indicated that there was no need to alter the 1977 rehabilitation plan.

A number of separate studies on methane generation of wood chips demonstrated that neither contaminated nor noncontaminated chips will generate methane in an anaerobic environment. The clay cap would ensure anaerobic conditions¹¹. Because of the research related to the decay of

¹⁰The Commission believes that the "no observable effect level" for hexachlorodibenzo-p-dioxin is not yet determined.

¹¹Because of the shrink/swell characteristics of montmorillonite clay, the Commission is of the opinion that the clay cap as proposed would not ensure completely anaerobic conditions.

wood chips, a change to the rehabilitation plan was proposed whereby clean wood chips in Area C would be left exposed to promote decomposition rather than moved to Area A and Area B for ultimate capping. In addition, a venting system was proposed for the capped area as well as clay filled perimeter cut-off trenches. Since the clay had such a high affinity for the contaminants, it was also proposed to mix the clay and chips to preclude the movement of contaminants out of the wood chips.

A leachate collection system was seen as a useful back-up system and would also facilitate monitoring of the capped area.

Further clean-up of debris and scrap metal was recommended. This was still ongoing at the time of the hearing. Security of Areas A and B, using snow fences and signs, warning of the risk to trespassers, met with very limited success. Both fence and signs have been vandalized and damaged and the site continues to be used by off-road recreational vehicle operators and others.

The revised rehabilitation plan was accepted by the Province with the condition that capping be tied to development. Over the period since abandonment, natural restoration has been going on as exhibited by the decay of clean wood chips, revegetation of the site and a reduction in the water ponded areas.

A number of other activities are continuing. On site, methane testing has been started. A quantity of material estimated at twenty-five cubic metres of unknown origin but containing compounds of toxicological concern has been removed from the site by the Province. Further analyses have shown that the phenolic and oil concentration of ponded water is very low. The water, in fact, supports insects and algae.

Some contaminated chips remain to be moved from Area E to Area B for ultimate capping. In addition, some clean chips remain to be moved to Area C and the area then tilled and seeded. There also remain pieces of scrap metal and lumber to be removed.

In terms of an ongoing program, it was proposed to continue with in situ methane testing for verification; to follow up on the vegetation survey to evaluate natural restoration; and to confirm ponded water chemistry.

It was proposed that, at the time of eventual site development, additional chip and soil sampling would be done to confirm the boundaries of the contaminated area. A clay capped system to cover the contaminated area, graded to prevent the entry of surface water, with perimeter clay barrier trenches, and a leachate collection and gas venting system, would be designed in conjunction with the City of Winnipeg. The City would be requested to designate this area as recreational/park land with a caveat to restrict the future use. It was also proposed that follow-up monitoring be the responsibility of the City of Winnipeg.

The plan was approved a second time by the Province in November 1983.

At the hearing, concerns were raised about the possible swelling or shrinking and resultant cracking of the clay cap with varying moisture content. If this occurred, subsequent entry of surface water would result in leachate formation. In that event, the leachate collection system would act as a back-up and barrier trenches would prevent lateral movement of leachate.

In terms of groundwater concerns, the groundwater gradient or direction of flow was southward with the principal users in that area and direction being Canada Packers and Dominion Malting Ltd. at a considerable distance from the site. If the particular contaminants, oils and phenolics, had entered the aquifer, it seems logical that these water users would have detected the problem.

In response to a question regarding the possible result of taking a composite soil sample from 0 to .3 metres rather than sampling the surface at a depth of only one to two centimetres, Mr. McKernan agreed that the concentration of contaminants could possibly have been of a higher order at

the ground surface; however, he felt that the plan proposed provided protection notwithstanding the possible presence of higher values than those determined¹².

Subsequent to the hearing, a final written submission was received from Domtar, summarizing the written and verbal evidence presented at the hearing.

CITY OF WINNIPEG PRESENTATION

Deputy Mayor J. Ernst, representing the City of Winnipeg, stated that the City's position with respect to the Domtar site was adopted by City Council on May 2, 1984. The City position was that the question of soil contamination was a matter of provincial jurisdiction under The Clean Environment Act. The City had been aware of soil contamination since 1976 and had co-operated with Domtar and the Province during the initial cleaning of the site.

About that time, the City was dealing with an application for development of the site by Nelson Square Developments for proposed residential use. During the development of "Plan Winnipeg" in 1981, the Domtar site became an issue. Plan Winnipeg contains a note as follows with respect to the Domtar site, "Development subject to management of environmental concerns to satisfaction of City of Winnipeg and Province of Manitoba".

City staff were satisfied that the contaminants are bound by affinity to the soil particles and are relatively immobile; however, they felt that more information is needed. A major concern with respect to the

¹²As reflected in the recommendations, the Commission believes that additional analyses of the surface soils in the operations area (Area A) need to be done.

contaminants is their odour. The report addressing methane generation from wood chips was not sufficiently detailed to make conclusions with respect to methane gas production although it was conceded that such gas production would be low. City officials believe that a study should take place over a period of several years rather than a thirteen week period.

The City of Winnipeg would have to review engineering drawings of the capping to verify the effectiveness of the system.

In response to a question, the City of Winnipeg indicated that they would be prepared to discuss use of the Brady Road landfill site for deposit of the contaminated material.

A major assumption of the Domtar plan is that of a substantial residential development on the site, which would result from a subdivision approval process. Since the 1976 subdivision application was commenced, Plan Winnipeg, which is a replacement of the Greater Winnipeg Development Plan, is before Council for third reading, albeit the general principles of the plan are currently being followed for new land development proposals. Plan Winnipeg notes the Domtar site as a matter of environmental concern and also would change the zoning along the west side of Day Street in that area to industrial. The Domtar site itself was still designated residential, with the environmental qualifier, as noted earlier. Any zoning change would require a change to Plan Winnipeg.

The City of Winnipeg also noted a number of other concerns relative to the approval of a residential subdivision on the Domtar site, such as the availability of lots in the area far exceeding demand, the density of housing that had been originally conceived being too high, the location and configuration of parks and the impact of contaminated soil on vegetation in the public lands sector.

The City of Winnipeg had co-operated with Domtar and the Province and concurred with the rehabilitation plan. The City's position was that it would not be responsible for approval of engineering works and

acceptance of the capping system - its involvement being limited to the approval of connections to the sewer system and final grade elevation. Also, the development of the site could not be a precondition of the rehabilitation plan and therefore rehabilitation of the site should begin immediately.

The City would not agree to accept responsibility for long-term monitoring.

If the capping proceeded immediately, results of monitoring could be used to influence the nature of the development. Future remedial works would have to be the responsibility of Domtar, based on provincial jurisdiction.

Dr. D. G. Luckhurst, Deputy Medical Health Officer of the City of Winnipeg, noted that the matter of health jurisdiction was a provincial responsibility in the Transcona district of the City. City health officials had been involved with health concerns on the Domtar site as a function of Winnipeg fire fighters extinguishing brush and grass fires in the area. In their view, there was a finite risk and therefore they would like to see the site rehabilitated.

The City planner was questioned as to why the nearby development, Lakeside Meadows, was approved immediately adjacent to the most heavily contaminated section of the Domtar site. Lakeside Meadows had been approved in the early 1970's before the Domtar site was identified as having an environmental impact. Lakeside Meadows was examined in terms of environmental concerns originating from Domtar in 1981. Building permits were withheld adjacent to the former Domtar operation. The outcome was that further sampling was done with results indicating that the freeze that was imposed could be lifted. Other mitigating factors included the separation of the two sites by a street allowance and the higher elevation of the residential development. The Domtar site was secured with a fence at about that time although it was conceded that, due to vandalism, the fence did not prevent entry to the site.

PROVINCIAL GOVERNMENT SUBMISSIONS

A memo from Dr. P. Warner, Director, Environmental Health Services to C. Orcutt, Director, Environmental Control Services, dated March 3, 1983, was read into the record. Reference was made to the Agriculture Canada dioxin data analyzed in February 1983. On the Domtar site, values for octachlorodibenzo-p-dioxin ranged from 3 to 412 parts per billion, whereas in a study carried out in the Atlantic Provinces by Environment Canada, it was stated that levels from 280 to 1500 parts per billion were elevated but, on their own, should not pose a concern. In that same study, heptachlorodibenzo-p-dioxin and hexachlorodibenzo-p-dioxin ranged from 10 to 1000 parts per billion. At the Domtar site, heptachlorodibenzo-p-dioxin ranged from not detectable to 83 parts per billion and hexachlorodibenzo-p-dioxin had one value above the detection limit at four parts per billion. Dr. Warner noted that the daily limit for 2,3,7,8-tetrachlorodibenzo-p-dioxin, the most toxic dioxin, ranged from one nanogram to thirty femtograms per kilogram per day for a lifetime cancer risk of one in a million. Although 2,3,7,8-tetrachlorodibenzo-p-dioxin was not detected at the Domtar site, other dioxins were. These were not without toxicity but were less so than 2,3,7,8-tetrachlorodibenzo-p-dioxin. The letter expressed the opinion that one should err on the side of caution and the use to which the Domtar site is put should be carefully considered.

Dr. N. S. Rihal, Chief Epidemiologist with the Environmental Health Services of the Department of Health, stated that, if all the recommendations were carried out according to the MacLaren Report, the program should be satisfactory. The program should include appropriate monitoring for several years.

Mr. M. Rutulis, Hydrogeologist with the Water Resources Branch, confirmed that a layer of clay with a hydraulic conductivity of 1×10^{-9} centimetres per second overlies the bedrock aquifer. The potentiometric surface of the aquifer is above the rock surface which consequently retards

downward seepage. This surface is approximately ten metres below grade. Even if some of the contaminants reach the aquifer, dilution would reduce these concentrations to negligible values. In the event that the aquifer became contaminated with dilute concentrations of the contaminants, there is little that could be done to clean up the aquifer. The capping program, complete with the leachate collection system, would reduce infiltration of contaminants. There was some concern that only two of the four wells on site were located and sealed. All possible measures should be taken to locate and seal any remaining wells since they would remain as a direct opening to the groundwater if they are not sealed. Lateral movement of groundwater through the clays is very slow and, in the event that there is no hydraulic gradient - that being the case when the ground is saturated by precipitation events - then there would be no lateral movement. In answer to a question about fissuring of the clay soil, Mr. Rutulis cited experiences where he had seen fractures at the five to six metre depth; however, there should be no fractures below the potentiometric surface. An opinion was given that fractures in the clay might be prevented by an irrigation system that would maintain the soil moisture content.

Mr. Larry Strachan, Chief of Environmental Control Programs, presented a brief on behalf of Environmental Control Programs of the Environment Department of the Province of Manitoba. He noted at the outset that the views he expressed may not be those of the Department of Environment and Workplace Safety and Health or the Province of Manitoba. The Environmental Control Programs Section has been working closely with Domtar and their consultants in the development and implementation of the rehabilitation plan. This was reflected in letters of approval of 1977 and 1983 from Environmental Control Services. The clay cap and zoning approach, with caveat, was the most environmentally effective measure that could be taken with the qualification that public entry to the site should be restricted until the final rehabilitation is complete. Environmental Control Services did not feel that methane generation from the capped area would be serious; moreover, any hazard was obviated by constraints imposed on land use. As a matter of note, the toxic material that had been

deposited on the site by persons unknown since the plant was closed, had been removed by the Province to the Brady Road landfill site.

Environmental Control Services introduced a series of recommendations as follows.

1. The rehabilitation proposal and action plan as outlined in the report entitled "Rehabilitation Program Former Wood Preserving Site Transcona, Manitoba" should be approved.

2. The Clean Environment Commission should issue an order to Domtar pursuant to Section 14(11) of The Clean Environment Act to implement the rehabilitation proposal and action plan in 1 above, as well as the additional recommendations made.

3. Placement of contaminated wood chips in Area B should be such that all leachate will drain into existing ponds on site.

4. Public access to Areas A and B should be restricted. General warning signs on the site should remain until the rehabilitation plan is complete and development occurs.

5. The last phase of the rehabilitation - the capping, leachate and methane collection systems and draining of contaminated ponds on site - should commence within 60 days of the filing and approval by the City of Winnipeg of a development plan for the site. This phase should be completed within 3 months of commencement. An alternate time frame should be approved by The Clean Environment Commission.

6. Commencing with the completion of the capping of the contaminated wood chips and soils on Areas A and B, Domtar should undertake a monitoring program, as approved by The Clean Environment Commission, to determine the extent of methane gas and leachate generation from the capped area and to determine the integrity of the capped area. The monitoring program duration should be a minimum of three years.

7. The Clean Environment Commission should review the requirements for any long-term monitoring and maintenance of the capped area based on results of the three year monitoring program in 6 above.

8. On filing of any development scheme for the site, the City of Winnipeg should register a caveat against the block of land capped declaring the area recreation/park land in perpetuity.

In response to a question about the adequacy of the sampling program, it was reported that Domtar conferred with the City and the Province. The Province in turn was in touch with appropriate authorities at Environment Canada, Ottawa. Many of the sampling sites were targetted at known or suspected contaminated areas such as the plant, pond and drains. Environmental Control Services felt certain that, if the proposed rehabilitation plan goes forward and with adequate monitoring, it should be compatible with residential development in the area. Both the Province and Domtar believe that the capping should await the land development. The Province had certain additional qualifications, especially securing the site from public entry. The City was not in favour of delaying the rehabilitation of the site.

OTHER SUBMISSIONS

Mr. W. Gange representing Imperial Development read a letter which noted that Imperial was involved in a dispute in the courts with parties from whom Imperial purchased the property. Imperial took the position that they did not own the land and did not have any plans for land development until such time as the lawsuit was resolved.

Mr. R. Good, representing Sunny Hills Investments Ltd., noted that his client purchased the site from Domtar in October 1976 and a month later sold the property to Imperial Developments Ltd. In that Sunny Hills holds a second mortgage on the property and to enhance their mortgage security, they

desired to have the contamination problem cleaned up as quickly as possible. This might also have the effect of resolving the litigation.

Mr. G. Miller, an area resident, expressed concern that the long-term effects of the chemical contaminants in question were not known. A company representative responded that despite the four decades of use of pentachlorophenols, there was no evidence of adverse health effects from their use in industry.

Mr. Miller wanted assurances that a rehabilitation plan would be approved and acted upon. If the approval by the Province was tied in with land development and the question of land ownership was the subject of a protracted court case, then nothing would happen soon. Mr. MacInnes pointed out that Domtar had, at all times, attempted to be sensitive and responsible - witness the program of the previous seven years; also that decay of the contaminants continued to take place. Further, the experts had pointed out that the contaminants on the site fall within approved or safe levels. This was not to say that Domtar would not proceed with capping apart from land development, but they felt that there was good reason to hold off until development takes place.

Dr. D. Muir, a scientist with the Federal Government with a background in the environmental behaviour of pesticides and dioxins, presented a brief on his own behalf. He indicated concern about sampling for the contaminants in the soil column. He expressed the view that, where the compounds being sampled are hydrophobic, a more standard sampling practice was to look at one to two centimetre fractions rather than a thirty centimetre fraction because the results would be diluted by ten to twenty fold. The composite sample would understate the risk of exposure to humans.

Another concern was the absence of analyses for the polychlorinated dibenzofurans which are known contaminants of pentachlorophenols and behave much like dioxins.

Dr. Muir was also curious about the findings that showed dioxins at depths of five to six metres. This was in contradiction to the imperviousness of the soil and the affinity of the soil for the contaminants. A possible explanation was that dissolved organic matter in water increased the solubility of dioxins and thus their transport. He reiterated the importance of the leachate collection system as a back up collection system and for monitoring purposes.

The fact that the site was not capped could be a benefit since dioxins, particularly those that were most insoluble in water, could volatilize from soil.

In summary, Dr. Muir felt that, since the concentration of dioxins at the surface of the soil column could be considerably higher than identified as a consequence of the sampling regime, he would favour immediate covering of the area with clean soil to reduce the risk of exposure.

A P P E N D I C E S

A P P E N D I X A



MANITOBA
MINISTER OF ENVIRONMENT AND
WORKPLACE SAFETY AND HEALTH
WINNIPEG
R3N 0H6

January 26, 1984

Mr. O. Stanley Eagleton,
Chairman,
The Clean Environment Commission,
Box 4, Building 2,
139 Tuxedo Avenue,
Winnipeg, Manitoba.
R3N 0H6

Dear Mr. Eagleton:

RE: DOMTAR SITE REHABILITATION

My Department has now received a final report outlining a Rehabilitation Program for the former Transcona Wood Preserving Site which was operated by Domtar Inc. Chemicals Group. A copy of the report is attached and further copies are available from the Environmental Management Division.

I would request that the Clean Environment Commission hold a public hearing as soon as possible to consider the report and provide me with a report and recommendations on the adequacy of the rehabilitation program outlined in the report. Concerned citizens of the area should be given an opportunity to comment on the report.

Staff of the Environmental Management Division will be available to provide technical support to the Commission as is required.

I look forward to your report and recommendations.

Fraternally,


Gerard Lecuyer,
Minister.

Attachment.

A P P E N D I X B



Information Services
Phone: (204) 944-3746

Room 29
Legislative Building
Winnipeg, Manitoba, CANADA
R3C 0V8

News Service

Date: April 27, 1984

ENVIRONMENT HEARING ON DOMTAR SITE SCHEDULED

- - -
Public Input Encouraged
On Rehabilitation Plan

The Manitoba Clean Environment Commission will hold a public hearing into a proposed rehabilitation program for the site of the former Dometar wood preserving plant in Transcona, Environment and Workplace Safety and Health Minister Gerard Lecuyer has announced.

The hearing will be held 7.30 p.m. Wednesday, May 23, 1984, in the Regent Park Banquet Centre, Regent Avenue and Brewster Street. It will continue if necessary at 9.30 a.m. Thursday, May 24.

Mr. Lecuyer said the commission has been asked to focus on the most recent of several plans for rehabilitating the site. The report, entitled "Rehabilitation Program, Former Wood Preserving Site, Transcona," was prepared by MacLaren Plansearch Inc. for Dometar. Copies of the report may be borrowed from the Transcona Public Library or the Clean Environment Commission.

The minister said he welcomes participation in the hearing of all nearby residents and others interested in the site's rehabilitation.

Mr. Lecuyer said the proposed rehabilitation plan involves removal of equipment, structures and stock from the site, followed by capping and sealing of the former processing areas with a layer of clay. In addition, a caveat would be placed against any future development of the capped area and this area would remain as parkland, he said.

Dometar operated a wood-preserving plant on the 62-hectare site, located between Day and Bellavance Streets and Gunn Road and the CNR line, for 65 years. After closing the plant in 1976, the area was found to be contaminated by wood chips and shavings as well as by oil and wood preservative chemicals including pentachlorophenol (PCP). Trace amounts of dioxin were also discovered on the processing area of the site but they were not the highly toxic form.

The company sold the land to a development company in 1976. However, a condition of the sale was that Dometar was to restore the land to the department's requirements. The plan is a result of that condition, Mr. Lecuyer said.

The minister said the report states that detailed analysis of the site has shown that underlying clay has prevented the migration of chemicals.

Mr. Lecuyer said the commission will consider all submissions in making its final report. He added that anyone wishing to make a submission is encouraged to submit a copy to the commission prior to the hearing date.

For further information on the hearing, contact the Manitoba Clean Environment Commission, Building 2 - 139 Tuxedo Avenue, Winnipeg, Manitoba, R3N 0H6; phone 944-7120.

A P P E N D I X C



Clean Environment
Commission
April 25, 1984

Chairman

Box 4
139 Tuxedo Avenue
Winnipeg, Manitoba, CANADA
R3N 0H6

(204) 945-7120

Re: Domtar Inc. - Report Concerning Rehabilitation of Former Wood Preservative
Plant Site, Transcona

For sixty-five years, from 1911 to 1976, Domtar Limited operated a wood preservative plant on a site in Transcona bounded on the north by Gunn Road, on the west by Bellavance Street, on the south by the CNR Victoria Beach line, and lying some distance to the west of Day Street. Following closure of the plant in 1976, the area was found to be contaminated by wood chips and shavings and also by oil and wood preservative chemicals including pentachlorophenol (PCP).

Over the years, a number of plans have been developed for restoring this site to suitable condition for other uses - the most recent of which is a report entitled "Rehabilitation Program Former Wood Preserving Site Transcona, Manitoba for Domtar Inc. Chemicals Group", November 1983, by McLaren Plansearch Inc., an engineering consultant to Domtar.

In accordance with a recent request from The Honourable Gerard Lecuyer, Minister of Environment and Workplace Safety and Health, The Clean Environment Commission will hold a public hearing for the purpose of reviewing the proposed rehabilitation program and submitting its report and recommendations on this matter to the Minister. The hearing will provide an opportunity for interested citizens of the area to be informed about the report and rehabilitation plan and to make comment to the Commission.

Copies of the report, including the rehabilitation plan, are available for review and lending at the Winnipeg Public Library, Transcona Branch, 111 Victoria Avenue, West, or at the Commission's office.

The public hearing will be held at 7:30 p.m., May 23, 1984, in the Regent Park Banquet Hall, Regent Avenue & Brewster Street, Transcona, continuing as necessary at 9:30 a.m., May 24, 1984.

Yours sincerely,

Stan Eggleton,
Chairman.

A P P E N D I X D

10 Winnipeg Free Press, Thursday, May 3, 1984

Clean Environment Commission

NOTICE OF PUBLIC HEARING

7:30 P.M., Wednesday, May 23, Continuing as necessary at
9:30 a.m., Thursday, May 24, 1984, Regent Park Banquet Hall,
Regent Park Shopping Centre, Regent Avenue and Brewster
Street, Transcona Community, Winnipeg, Manitoba.

The Commission will hold a public hearing under Section 13(1) of The Clean Environment Act, at the request of the Minister responsible, for the purpose of reviewing the following report.

Domtar Inc. Site Rehabilitation Report 1660.0

A report prepared by MacLaren Plansearch Inc., acting for Domtar Inc., REHABILITATION PROGRAM, FORMER WOOD PRESERVING SITE, November 1983.

The rehabilitation program outlined in the report concerns a site in Transcona bounded on the North by Gunn Road, on the West by the Bellavance Street road allowance and the Lakeside Meadows subdivision, on the South by the CNR Victoria Beach Line, and lying to the West of Day Street. Domtar Limited operated a wood preservative plant on this site for 65 years from 1911 to 1976. Soils on the site are contaminated with traces of wood preservatives, wood shavings with a potential for methane generation, traces of oil, pentachlorophenol (PCP), phenol and dioxins. The rehabilitation plan describes measures to assemble and bury the contaminated materials with provisions for methane and leachate control and site monitoring. The plan also addresses the regulation and zoning of the area to prevent future development problems.

The Commission will receive evidence concerning the rehabilitation measures taken to date, the nature of any contaminants remaining on the site and the time frame and measures necessary for completion of the rehabilitation plan. Submissions will be welcomed from persons who are concerned or who are likely to be affected by the matter under review. Any person proposing to make a representation should advise the Commission office in advance.

Copies of the above report can be examined at the public library branch at 111 Victoria Avenue, West, in Transcona and at the Commission's office. For further information, contact The Clean Environment Commission, Building 2, 139 Tuxedo Avenue, Winnipeg, Manitoba, R3N 0H6, Telephone 944-7120.



Manitoba

A P P E N D I X E

A P P E N D I X F

LIST OF EXHIBITS

1. Letter from The Honourable Gerard Lecuyer, Minister, Environment and Workplace Safety and Health, dated January 26, 1984.
2. Slide presentation by Dr. Richardson on behalf of Domtar Inc.
3. Presentation by Mr. McKernan, MacLaren Plansearch Inc. on behalf of Domtar Inc.
4. Letter dated May 10, 1984, from W. S. Gange, Twaddle, Dawson, on behalf of Imperial Developments,.
5. Letter dated May 23, 1984, from Richard I. Good, Fillmore & Riley, on behalf of Commodore Enterprises, the Glacier Group, and Sunny Hills Investments Ltd.
6. Brief by Councillor Jim Ernst, Deputy Mayor, on behalf of the City of Winnipeg.

No. 6A - Subdivision Development Approval Process - Chart.
7. Letter dated September 22, 1981, from C. B. Orcutt, Chief, Environmental Control Programs, to Fred Nicholson, P. Eng., City of Winnipeg, Building Inspections Division.
8. Report prepared by MacLaren Plansearch Inc. on behalf of Domtar Inc. entitled "Rehabilitation Program Former Wood Preserving Site Transcona, Manitoba" dated November 1983.
9. Blueprint Plan Winnipeg Policy Areas, October 19, 1983.
10. Representation of Mr. D. Muir, letter with comments addressed to MacLaren Plansearch Inc., dated May 10, 1984.
11. Memo dated May 17, 1984, from Dr. N. S. Rihal, Chief Epidemiologist, Environmental Health Services.
12. Memo dated May 22, 1984, from M. Rutulis, P. Eng., Groundwater Inventory Geologist, addressed to L. Gray.
13. Memo dated May 14, 1984, from L. Strachan, Chief, Environmental Control Programs, with attached Recommendations with respect to the MacLaren Report.
14. Memo dated March 31, 1983, from Dr. P. Warner, Subject: Domtar Site - Winnipeg.

No. 14A - Letter dated February 4, 1983, from J. P. Barrette, Ph.D., to Dr. W. G. Bowen, Assistant, Deputy Minister, Environmental Management Division.

A P P E N D I X G

APPENDIX G

MANIT^{BA}

DEPARTMENT OF MINES, RESOURCES
& ENVIRONMENTAL MANAGEMENT

Environmental Management Division
Box 7, Building 2
139 Tuxedo Avenue
Winnipeg, Manitoba
R3C 0V8

File: c-b-1660

1978 January 10

Mr. R. W. Stephens
Technical Manager
Wood Preserving Division
Domtar Chemicals Limited
395 de Maisonneuve Boulevard West
P.O. Box 7212
MONTREAL, Quebec
H3C 3M3

Dear Mr. Stephens:

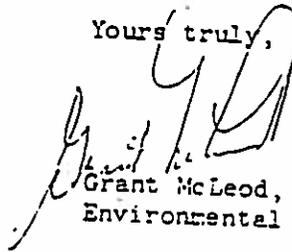
Reference is made to your letter dated September 26, 1977 with attached report prepared by James F. MacLaren Limited related to the rehabilitation program of the Transcona Wood Preserving Site.

The proposal has been reviewed by the Environmental Control Branch and has been discussed with representatives of the City of Winnipeg. The Environmental Control Branch is satisfied with the completeness of the report and agree with the proposal to incorporate on site disposal of contaminated soil. As development is planned in the area, it is, of course, essential that development plans are formulated with consideration to the areas of contamination.

Please consider this letter as our concurrence with the proposals contained in your consultant's report.

We appreciate the manner in which this problem is being handled by Domtar Chemicals Limited and trust this level of cooperation will continue.

Yours truly,


Grant McLeod, Director
Environmental Control Branch

c.c.: Mr. W. D. Carroll, Chief Chemist
City of Winnipeg

c.c.: James F. MacLaren Limited, Winnipeg

A P P E N D I X H

CRITERIA FOR CALCULATION FOR TOXICITY OF CONTAMINANTS

Compiled by Dr. Neil Richardson

CENTRE FOR DISEASE CONTROL ESTIMATES OF SOIL EXPOSURE

*[1] Age-weighted average for ingestion	0.4 g of soil/person/day
*[1] Age-weighted average for skin contact	0.5 g of soil/person/day
(Average air borne dust level in Winnipeg area is 63 µg/m) So inhalation rate is	0.0009 g/person/day

CREOSOTE - ACUTE

Acute Toxic Dose is 1700 mg/kg*[2] = 119 g for human
Equivalent to 119 kg of soil at 1000 ppm

CREOSOTE - CHRONIC

TLV for coal tar pitch volatiles (Benzene-soluble fraction) listed as 0.2 mg/m³ *[3]

Amount inhaled in 8 hr, breathing 1.5 m³/hr = 2.4 mg

To obtain 2.4 mg from 0.4 g of soil ingested and 10% of 0.5 g of soil on skin, soil must contain 5,333 ppm of material similar to coal tar pitch volatiles.

N.B. About half of "oil" in samples analysed is petroleum oil.

PHENOLS - ACUTE

Acute toxic dose of Phenol is 10 g for Human*[4]

Cresols and Xylenols less Toxic*[4]

Equivalent to 100 kg of soil at 100 ppm

PHENOLS - CHRONIC

EPA lists criterion level for phenols in drinking water as 3.5 ppm*[5]

Drinking 2 litres/day, amount ingested would be 7 mg

To obtain 7 mg from 0.45 g of soil, soil would have to contain 15,555 ppm

PENTACHLOROPHENOL - ACUTE

Acute dose listed as 1.7 g for human*[4]

Equivalent to 170 kg of soil at 10 ppm

PENTACHLOROPHENOL - CHRONIC

TLV for Penta is 0.5 mg/m^3 *[3]

Therefore amount ingested in 8 hr is 6 mg

To obtain 6 mg from 0.45 g of soil, soil would have to contain 13,300 ppm

PENTACHLOROPHENOL - FETOTOXICITY

No effect at 3 mg/kg/day *[6] = 0.18 g/day for human

Using Safety Factor of 1000 gives 0.18 mg/day

CDC estimates adults ingest 100 mg of soil (assume 100% absorption)*[1]

Soil ingested is effectively 0.11 g/day

To obtain 0.18 mg from 0.11 g of soil, soil would have to contain 1636 ppm

*CDC est. adults ingest 100 mg of soil
100% of soil
absorption*

H₇CDD - ACUTE

Acute dose - 7.2 mg/kg *[7] = 432 mg for human

Equivalent to 432 kg of soil at 11 ppm

H₆CDD - ACUTE

Acute dose = $60 \text{ } \mu\text{g/kg}$ *[8] = 4.2 mg for human

Equivalent to 40 kg of soil at 100 ppb

- *[1] Based on Kimbrough, R. D. et al., "Health Implications of 2,3,7,8,-TCDD Contamination of Residential Soil", Centres for Disease Control, Atlanta, Georgia (1982).
- *[2] From "Range-Finding Toxicity Tests on Creosote", a report prepared by Industrial Health Foundations of Pittsburgh for Koppers Company Inc. Referenced in industry submission to EPA on RPAR, 1977.
- *[3] U.S. Occupational Safety and Health Administration.
- *[4] Registry of Toxic Effects of Chemical Substances, U.S. Department of Health, Education and Welfare, NIOSH (1978).
- *[5] U.S. EPA, Federal Register, Vol. 45, No. 231, 79338, Nov. 28, 1980.
- *[6] Schwetz, B.A. et al. in "Pentachlorophenol: Chemistry, Pharmacology, and Environmental Toxicology", edited by K. R. Rao, Plenum Press, 301 (1978).
- *[7] U.S. EPA -RPAR on Pentachlorophenol, Federal Register, 43 (202): 48454 (1978).
- *[8] McConnell, E. E. et al., Toxicol. Appl. Pharmacol., 44, 335 (1978).
- *[9] Schwetz, D.A., et al., Environ. Health Perspect., 5, 87 (1973).
- *[10] U.S. Dept. of Health and Human Services, National Cancer Institute, DHHS Publ. No. (NIH) 80-1754 (1980).
- *[11] Safety factor approach, with safety factor of $100 \overset{0}{\wedge} 5000$, discussed in "Report of Minister's Expert Advisory Committee on Dioxins", Health and Welfare Canada, Environment Canada, 1983.
- *[12] Based on Kimbrough et al., Centres for Disease Control, Atlanta, Georgia (1982).
- *[13] Relevant isomers constitute about 30% of H₆CDD fraction in Penta (Report of EPA Ad Hoc Study Group on Pentachlorophenol Contaminants, Science Advisory Board, EPA, 1978).
- *[14] Kociab, R. J. et al., Toxicol Appl. Pharmacol 46, 279 (1978).