



Ministry of  
the Environment

Ministère de  
l'Environnement

## Director's Order

Environmental Protection Act, R.S.O. 1990, c.E 19 (EPA)  
Ontario Water Resources Act, R.S.O. 1990, c. O. 40 (OWRA)  
Pesticides Act, R.S.O. 1990, c. P11 (PA)  
Safe Drinking Water Act, S.O. 2002, c.32 (SDWA)  
Nutrient Management Act, 2002, S.O. 2002, c.4 (NMA)

*Order Number*  
5866-8WKU92  
*Incident Report No.*  
8042-8WKTMW

- To:**
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  13. **Thomas E. Connerty**, 4000 W. Fillmore Street, Chicago, Illinois, USA, 60624 (c/o Color Communications Inc.)
  14. Northstar Aerospace (Canada) Inc., c/o BDO Canada Limited in its capacity as Trustee in Bankruptcy of Northstar Aerospace (Canada) Inc., 123 Front Street W., Suite 1200, Toronto, Ontario Canada M5J 2M2  
Attention: Blair Davidson, President, BDO Canada Limited (re: Item 3.12.5 only)

**Site:** 695 Bishop Street North  
Cambridge, Ontario

## Part 1: Definitions

For the purposes of this order, the interpretation of all terms shall be the same as those contained in the legislation and the regulations made thereupon, unless defined below:

- 1.1 “AMEC” means AMEC Environment & Infrastructure, formerly AMEC Earth & Environmental.
- 1.2 “Area Under Investigation” includes the Site; immediately around the Site; hydrogeologically or otherwise downgradient from the Northstar Property to the extent that the Contaminants are detectable in groundwater, surface water, soil, air or soil vapour above the applicable regulatory limits and hydrogeologically or otherwise connected to the Site, including the 610 Bishop Street North property.
- 1.3 “Bishop Street Community” means the area under investigation based on the current extent of groundwater contaminants and trichloroethylene indoor air concentrations as a result of soil vapour intrusion.
- 1.4 “Contaminants” and/or “Contamination” means Trichloroethylene (TCE), 1,1-Trichloroethane (1,1-TCA), Tetrachloroethylene (PCE), 1,1-Dichloroethylene (1,1-DCE), Cis-1,2-Dichloroethylene (cis-1,2-DCE), trans-1,2-Dichloroethylene (trans-1,2-DCE), Vinyl Chloride (VC), 1,1-Dichloroethane (1,1-DCA), hexavalent chromium and any other known associated breakdown products.
- 1.5 “Guelph District Manager” means the District Manager for the Ministry’s Guelph District Office.
- 1.6 “IAMS” means Indoor Air Mitigation System.
- 1.7 “Ministry” and “MOE” means the Ontario Ministry of the Environment.
- 1.8 “Northstar” means Northstar Aerospace, Inc.
- 1.9 “Northstar Canada” means Northstar Aerospace (Canada) Inc.
- 1.10 “Parties” means the former directors and officers of Northstar Aerospace and Northstar Canada named above.
- 1.11 “Public Health” means the Regional Municipality of Waterloo Public Health.
- 1.12 “Remediation Order” means the Director’s Order #6076-8RJRUP issued on March 15, 2012
- 1.13 “Site” or “Northstar Property” means the property which is municipally known as 695 Bishop Street North, Cambridge, Ontario more particularly described as Lots 38 - 39 RCP 1374 Cambridge except Part 3, Plan 67R-3167; Part Block A Plan 1319 Cambridge as in W648730; Part Lot 37 RCP 1374 Cambridge being Part 3,

Plan 67R-3011, except Parts 1 & 2, Plan 67R-3167; Cambridge; Lot 40 RCP 1374  
Cambridge except Part 3, Plan 67R-3167; City of Cambridge, Regional  
Municipality of Waterloo.

- 1.14 "SVES" means soil vapour extraction systems.
- 1.15 "TCE" means Trichloroethylene.
- 1.16 "VOC's" means volatile organic compounds.

## **Part 2: Legal Authority and Reasons**

- 2.1 Pursuant to subsection 1(1) of the Environmental Protection Act, R.S.O. 1990, c. E. 19, as amended ("EPA"), "contaminant" means any solid, liquid gas, odour, heat, sound, vibration, radiation or combination of any of them resulting directly or indirectly from human activities that may cause an adverse effect.
- 2.2 Pursuant to subsection 1(1) of the EPA "source of contaminant" means anything that discharges into the natural environment any contaminant.
- 2.3 Section 17 of the EPA provides that the Director may order a person who causes or permits the discharge of a contaminant into the natural environment, so that land, water, property, animal life, plant life, or human health or safety is injured, damaged or endangered, or is likely to be injured, damaged or endangered, to repair the injury or damage; to prevent the injury or damage; or, where the discharge has damaged or endangered or is likely to damage or endanger existing water supplies, provide temporary or permanent alternate water supplies.
- 2.4 Subsection 18(1) of the EPA provides that the Director may, by order, require a person who owns or owned or who has or had management or control of an undertaking or property to do any one or more of the following:
  - i. To have available at all times, or during such periods of time as are specified in the order, the equipment, material and personnel specified in the order at the locations specified in the order;
  - ii. To obtain, construct and install or modify the devices, equipment and facilities specified in the order at the locations and in the manner specified in the order;
  - iii. To implement the procedures specified in the order;
  - iv. To take all steps necessary so that procedures specified in the order will be implemented in the event that a contaminant is discharged into the natural environment from the undertaking or property;
  - v. To monitor and record the presence or discharge of a contaminant specified in the order and to report thereon to the Director;

- vi. To study and to report to the Director on, (i) the presence or discharge of a contaminant specified in the order; (ii) the effects of the presence or discharge of a contaminant specified in the order; (iii) measures to control the presence or discharge of a contaminant specified in the order, (iv) the natural environment into which a contaminant specified in the order may be discharged.
- vii. To develop and implement plans to, (i) reduce the amount of a contaminant that is discharged into the natural environment, (ii) prevent or reduce the risk of a spill of a pollutant within the meaning of Part X, or, (iii) prevent, decrease or eliminate any adverse effects that result or may result from a spill of a pollutant within the meaning of Part X of the EPA or from any other discharge of a contaminant into the natural environment, including a) plans to notify the Ministry, other public authorities and members of the public who may be affected by a discharge, and b) plans to ensure that appropriate equipment, material and personnel are available to respond to a discharge.
- viii. To amend a plan developed under paragraph vii or section 91.1 in the manner specified in the order.

2.5 Subsection 18(2) of the EPA provides that the Director may make an Order under subsection 18(1) where the Director is of the opinion, based on reasonable and probable grounds, that requirements specified in the order are necessary or advisable so as,

(a) to prevent or reduce the risk of a discharge of a contaminant into the natural environment from the undertaking or property; or

(b) to prevent, decrease or eliminate an adverse effect that may result from,

(i) the discharge of a contaminant from the undertaking, or

(ii) the presence or discharge of a contaminant in, on or under the property.

2.6 Section 93 of the EPA provides that the owner of a pollutant and the person having control of a pollutant that is spilled and that causes or is likely to cause an adverse effect shall forthwith do everything practicable to prevent, eliminate and ameliorate the adverse effect and to restore the natural environment.

2.7 Subsection 196(1) of the EPA specifies that the authority to make an order under the EPA includes the authority to require the person or body to whom the order is directed to take such intermediate action or such procedural steps or both as are related to the action required or prohibited by the order and as are specified in the order.

2.8 Northstar Canada is a wholly owned subsidiary of Northstar. Until recently Northstar was publicly traded on the Toronto Stock Exchange.

- 2.9 Northstar Canada and its predecessor companies operated a manufacturing and processing facility at the Site from about 1981 to about 2010. The processing operations involved the machining and metal plating of aircraft parts, including a chromium plating line. These operations used Trichloroethylene (“TCE”) as a degreaser. These operations also used Chromic Acid which contains Hexavalent Chromium. Both TCE and Hexavalent Chromium are known human carcinogens. TCE, Hexavalent Chromium and other heavy metal contaminants such as nickel and copper have contaminated the soil and groundwater on and under the Site as well as beyond the Site.
- 2.10 In 1995 Northstar Canada notified the MOE Spills Action Centre that, at the Site, it had spilled about 34,000 litres of treated cyanide effluent that had caused the overflow of a pit that contained chromic acid. A mixture of the spilled effluent and chromic acid discharged from the building to the natural environment. At the same time Northstar Canada advised the MOE that it had cleaned up the affected area. This spill triggered the statutory obligation to clean up a spill imposed on Northstar Canada by section 93 of the EPA.
- 2.11 In October 2004 counsel for Northstar Canada notified the MOE that it had identified soil and groundwater contamination on the Site and that it could possibly be moving beyond the Site, Northstar Canada identified the primary contaminants as TCE and Hexavalent Chromium.
- 2.12 In or about 2005 Northstar Canada confirmed that the Contamination had migrated from the Site into the Bishop Street Community. In or about 2005 Northstar Canada commenced a remediation and mitigation plan such as: (1) the installation and operation of a groundwater pump and treat system on the Site as well as an injection well system that involves the injection of potassium permanganate into the contaminated groundwater in order to reduce the concentration of TCE; (2) measures to mitigate the intrusion of TCE vapour into hundreds of homes in the Bishop Street Community including sealing basements, sub slab depressurization systems, soil vapour extraction systems and heat recovery ventilation systems.
- 2.13 Northstar’s publicly released Annual Reports for 2008, 2009 and 2010 estimated that the future cost of the remediation of pollution related to the Site amounted to several million dollars. Nevertheless, the funding of such future work was not secured by Northstar or Northstar Canada through a trust account or other means.
- 2.14 In order to secure the continued performance of the work described above, the Remediation Order was issued on March 15, 2012 to Northstar and Northstar Canada for the reasons set out in that order (copy attached as Schedule “A”).
- 2.15 On June 14, 2012 Northstar, Northstar Canada and two other related companies sought and obtained protection from their creditors under the CCAA. On July 24, 2012 the Ontario Superior Court of Justice (Commercial List) dismissed the

MOE's motion for a declaration that the Remediation Order was not subject to the stay issued by the Court on June 14, 2012.

- 2.16 On July 24, 2012 the Ontario Superior Court of Justice (Commercial List) approved of the sale of substantially all of the operating assets of Northstar and Northstar Canada, other than the Site, leaving no personnel or resources to carry out the remediation strategy. Substantially all of the proceeds of sale were distributed to Northstar's secured lender.
- 2.17 Effective August 24, 2012 Northstar Canada was deemed bankrupt. BDO Canada Limited was appointed the Trustee in Bankruptcy for Northstar Canada. On August 24, 2012 the Trustee disclaimed its interest in the Site and, as a result, the Site is now abandoned as it is owned by Northstar Canada which has no officers, directors or employees. Northstar and Northstar Canada stopped doing the work required by the Remediation Order on or about August 23, 2012. A stay of proceedings under the CCAA was also in effect against the former officers and directors of Northstar and Northstar Canada.
- 2.18 Given the above circumstances, on August 15, 2012 the Minister of the Environment issued a direction under section 146(1) of the EPA that requires some of the work required by the Remediation Order to be done by the Ministry until such time as any other person assumes responsibility for the work required by the Remediation Order, and in particular:
- (a) operate and maintain the existing indoor air mitigation systems that have been installed in the Bishop Street Community;
  - (b) operate, monitor and maintain the soil vapour extraction systems in accordance with Amended Environmental Compliance Approval No. 5018-8KSR9B dated January 5, 2012; and
  - (c) operate, monitor and maintain the groundwater pump and treat system on and in the vicinity of the Site in accordance with Amended Permit to Take Water No. 7007-87HLXW dated August 9, 2010 and Amended Certificate of Approval No. 2388-7KLJ35 dated November 5, 2009.
- 2.19 The stay of proceedings under the CCAA against the former officers and directors of Northstar and Northstar Canada expired on October 31, 2012. A motion brought by certain former officers and directors of Northstar and Northstar Canada on October 31, 2012 to enjoin the issuance of this Order was dismissed by the Ontario Superior Court of Justice (Commercial List) on November 9, 2012. Given that it is now permitted to do so, the Director is proceeding with the issuance of this Order and requires that the Parties undertake the work described below. The Ministry will no longer undertake the work required by the Direction issued by the Minister on August 15, 2012 given that this Order requires the Parties to do that work. The timelines for the completion of the work described in this Order provide for a reasonable transition period.

2.20 The Parties are former directors and/or officers of the companies named in the Remediation Order and as such had management and control of those companies. The Parties were directors or officers during the period from approximately 2005 to 2012 during which the results of indoor air sampling were analyzed and mitigation strategy was developed with respect to the Contamination.

2.21 As no provision has been made for the continuation of the investigations, monitoring, mitigation and remediation of the Contamination, the Parties have failed to carry out their duty and exercise their authority as a director/officer to make adequate provision to ensure implementation of the remediation strategy generally and in accordance with the obligations imposed by section 93 of the EPA as well as the Remediation Order. Further, the Parties have caused or permitted the discharge of a Contaminants so that human health or safety is endangered or is likely to be endangered a result of the failure to make adequate provision to ensure implementation of the remediation strategy and compliance with the Remediation Order.

2.21 Dr. Liana Nolan, the Medical Officer of Health with the Regional Municipality of Waterloo, stated in an affidavit sworn on July 19, 2012 that:

... it is my professional medical opinion as a MOH that the Remediation Plan should continue in order to protect the health of the residents in the Area of Contamination. It is my belief that discontinuing the current pump and treat system will result in increased levels and concentration of TCE contamination. It is also my belief that discontinuing the current residential indoor air mitigation operating and maintenance efforts will result in increased levels of TCE vapours in these affected homes. These potential events would put residents in the Area of Contamination at an undue and increased health risk.

2.22 I am of the opinion, for the reasons set out above, and for the reasons already set out in the Remediation Order (including the Provincial Officer's Report attached thereto) that the requirements specified below are necessary and advisable so as to:

- i. prevent or reduce the risk of the discharge of contaminants into the natural environment from the Site;
- ii. to prevent, decrease or eliminate an adverse effect that may result from such a discharge; or from the presence or discharge of a contaminant in, on or under the Site.

### **Part 3: Work Ordered**

Pursuant to Sections 17, 18 and 196 of the EPA, I hereby order the Parties to take all steps necessary to do the following:

### **Part 3.0 – Site Security**

3.0.1 Within two weeks of the issuance of this Order submit a written plan, with timelines, for the approval of the Director that provides details for securing the Site from trespassers which shall include:

- (a) Fencing and locked gates in order to render the Site secure against access by the public;
- (b) A proposed alarm system for the Site;
- (c) Posting of signs indicating emergency contact information at all access points into the Site;
- (d) Posting of signs prohibiting trespassers at all access points and at regular intervals along the perimeter of the Site;
- (e) Retaining security personnel to monitor activities at the Site.

3.0.2 By November 30, 2012, undertake the work for the security for the Site in accordance with a plan and timelines approved by the Director under Item 3.0.1.

### **Part 3.1 - Retain a Qualified Person and Laboratory**

3.1.1 By November 30, 2012, retain Competent Person (s) and Qualified Person (s) and certified laboratory (ies) ("Laboratory") to prepare and complete, or supervise, the work specified in this order. The Qualified Person shall possess hydrogeological expertise and have expertise in the assessment and remediation of soil and groundwater contamination, in particular the remediation of volatile organic compounds ("VOCs").

3.1.2 The Qualified Person must be a licensed member of the Professional Engineers of Ontario, as required by the *Professional Engineers Act*, R.S.O. 1990 and its regulations and/or the Association of Professional Geoscientists of Ontario, as required by the *Professional Geoscientists Act*, S.O. 2000, c. 13 and its regulations.

3.1.3 The Laboratory must be accredited by a Ministry approved accreditation body and compliant with the International Standard ISO/IEC 17025. The Laboratory's accreditation must include accreditation for the parameters to be assessed under this order.

3.1.4 The Competent Person shall have the education, training, or experience to perform the particular tasks and analysis required within this order that are not to be performed by a Qualified Person.

3.1.5 By November 30, 2012 provide written confirmation to the Ministry's Guelph District Manager that the Competent Person, Qualified Person and Laboratory have been retained.



### **Part 3.2 - Indoor Air Monitoring**

- 3.2.1 A Residential Indoor Air Monitoring Protocol shall be submitted to the Ministry's Guelph District Manager and the Regional Municipality of Waterloo Public Health ("Public Health") for review and approval on an annual basis on or before December 1<sup>st</sup>, 2012 and no later than September 1<sup>st</sup> of each year, thereafter.
- 3.2.2 On or before December 15, 2012 and no later than December 15th of each year, upon written approval from the Ministry's Guelph District Manager and Public Health, the Parties shall begin implementing the Residential Indoor Air Monitoring Protocol identified in Item 3.2.1 of this order.
- 3.2.3 The termination of, or modifications to, the Residential Indoor Air Monitoring Protocol identified in Item 3.2.1 of this order must be requested by the Parties in writing to the Ministry's Guelph District Manager and Public Health on or before December 1 of each year.
- 3.2.4 The termination of, or modifications to, the updated Residential Indoor Air Monitoring Protocol shall only be implemented by the Parties upon the Parties receiving written approval from the Ministry's Guelph District Manager and Public Health.
- 3.2.5 On or before July 1, 2013, and annually thereafter, the Parties shall submit in writing to the Ministry's Guelph District Manager and Public Health a report which details the findings, assessment and interpretation of the Residential Indoor Air Monitoring Program completed in accordance with the Revised Residential Indoor Air Protocol as per Item No. 3.2.1 of this order. This report shall be prepared by the Qualified Person in accordance with acceptable scientific, geoscientific and engineering practices, include sufficient information, data and recommendations for the ultimate purpose of protecting and conserving the natural environment pursuant to Section 3 of the EPA, and shall include at a minimum:
- i. details of the work completed to sample and analyze the indoor air, including all field and analytical data and laboratory certificates of analysis, as required by this order;
  - ii. an evaluation and interpretation of the indoor air monitoring results, including an evaluation of any trends and an assessment with respect to the remedial action benchmarks;
  - iii. an assessment of the adequacy of the Revised Residential Indoor Air Monitoring Protocol and recommendations for any modifications to the program, as appropriate that are to be considered in the updated Residential Indoor Air Monitoring Protocol detailed in Item 3.2.1 of this order;
  - iv. any recommendations for additional work to be completed; and
  - v. in accordance with the protocol accepted by the Ministry and Public Health a proposed mitigation action plan to reduce the indoor air concentration for any residential property found to have indoor air concentrations equal to or above

the accepted action level for TCE in indoor air of  $0.5 \mu\text{g}/\text{m}^3$ . This plan shall include:

- a description of the proposed remedial action to be taken; and
- a schedule for implementation and completion of the mitigation action plan.

3.2.6 The Parties, shall within two weeks of receiving sample results report, in writing to the Ministry's Guelph District Office, the City of Cambridge, and Public Health any detection of TCE in the indoor air of residential homes, including the concentration, which is greater than  $0.5 \mu\text{g}/\text{m}^3$ .

3.2.7 The Parties shall forthwith report in writing to the Ministry's Guelph District Office, the City of Cambridge, and Public Health any new detection of TCE in the indoor air of residential homes, including the concentration, which is greater than  $10 \mu\text{g}/\text{m}^3$ . A new detection means for a home not previously tested or for an existing home where the previous two sample results were less than  $10 \mu\text{g}/\text{m}^3$ .

### **Part 3.3 – Operation and Maintenance of Indoor Air Mitigation Systems (IAMS).**

3.3.1 Commencing November 30, 2012 the Parties shall operate and maintain the existing IAMSs that have been installed in the Bishop Street Community as identified in Schedule "A" attached to the Remediation Order.

3.3.2 Commencing November 30, 2012 the Parties shall install (or cause to be installed), operate and maintain any new IAMS that may be required to be installed in the Bishop Street Community as a result of the findings from the implementation of the Revised Residential Indoor Air Monitoring Protocol, or from the implementation of any future updated annual Residential Indoor Air Monitoring Protocol, identified in Part 3.2 of this order.

3.3.3 On or before July 1st, 2013, , and annually thereafter, the Parties shall submit to the Ministry's Guelph District Manager and to Public Health a report documenting the operation and maintenance of the IAMSs installed in the Bishop Street Community.

3.3.4 Commencing November 30, 2012 the Parties shall operate and maintain any existing IAMSs that have been installed in the Bishop Street Community and any IAMSs that may be required to be installed in the Bishop Street Community as a result of the groundwater Contamination until written approval to discontinue operation and maintenance of these systems is received from the Ministry's Guelph District Manager and Public Health.

### **Part 3.4 – Operation, Monitoring and Maintenance of the SVES**

3.4.1 Commencing November 30, 2012 the Parties shall operate, monitor and maintain the *twenty-one* existing SVESs in the Bishop Street Community and identified in Schedule "B" attached to the Remediation Order, in accordance with Amended

Environmental Compliance Approval No. 5018-8KSR9B dated January 5, 2012 issued by the Ministry.

- 3.4.2 Commencing November 30, 2012 the Parties shall operate, monitor and maintain any new SVESs, upon amendment of the existing Amended Environmental Compliance Approval No. 5018-8KSR9B dated January 5, 2012, that may be required to be installed as a result of the findings from future indoor air and groundwater monitoring programs.
- 3.4.3 On or before December 21, 2012, and annually thereafter, the Parties shall submit to the Ministry's Guelph District Manager and Public Health a report documenting the Record Keeping Requirements in accordance with Condition No. 8.0 of the Amended Environmental Compliance Approval No. 5018-8KSR9B dated January 5, 2012.
- 3.4.4 Commencing November 30, 2012 the Parties shall operate and maintain any existing SVESs that have been installed in the Bishop Street Community and any new SVESs that may be required to be installed in the Bishop Street Community as a result of the groundwater Contamination until written approval to discontinue to operate and maintain these systems is received from the Ministry's Guelph District Manager and Public Health.

### **3.5 – Operation, Monitoring and Maintenance of the Groundwater Pump and Treat System On and In the Vicinity of the Site**

- 3.5.1 Commencing November 30, 2012, to prevent the movement of impacted groundwater identified on and in the vicinity of the Site downgradient into the Bishop Street Community, the Parties shall operate, monitor and maintain the groundwater pump and treat system as detailed in the Interim Remedial Action Plan prepared by AMEC for Northstar Aerospace (Canada) Inc. dated September 2011, in accordance with the Amended Permit to Take Water No. 7007-87HLXW dated August 9, 2010 and Amended Certificate of Approval, Industrial Sewage Works, No. 2388-7KLJ35 dated November 5, 2009 and any other necessary permits or approvals that may be required.
- 3.5.2 On or before December 21, 2012, and semi-annually thereafter, the Parties shall submit to the Ministry's Guelph District Manager a report documenting the effectiveness of the pump and treat system along with the monitoring requirements in accordance with the Amended Permit to Take Water No. 7007-87HLXW dated August 9, 2010, and monitoring requirements identified in any other necessary permits or approvals that may be required. The semi-annual report prepared by or under the supervision of the Qualified Person shall include, at a minimum:
  - i. details of operation, monitoring and maintenance of the pump and treat system including all field and analytical data and laboratory certificates of analysis, as required by this order;

- ii. an evaluation and interpretation of the monitoring results, including an assessment of any evident trends in groundwater quality and quantity;
  - iii. an assessment of the effectiveness of the current pump and treat system in maintaining hydraulic containment of the groundwater Contamination identified on and in the vicinity of the Northstar Property and effectiveness in preventing the migration of groundwater Contamination off Site along with recommendations for any modifications to the pump and treat system and the monitoring program, as appropriate; and
  - iv. any recommendations for additional work to be completed as may be necessary.
- 3.5.3 The Parties shall operate, monitor and maintain the pump and treat system until written approval to discontinue is received from the Ministry's Guelph District Manager.

**3.6 Groundwater Remediation on and in the Vicinity of the Northstar Property ("Groundwater Remediation")**

- 3.6.1 Commencing November 30, 2012 the Parties shall undertake the Groundwater Remediation Program as detailed in Section 3.3 of the Interim Remedial Action Plan prepared by AMEC for Northstar Aerospace (Canada) Inc. dated September 2011, and in accordance with Certificate of Approval - Air No. 4281-7G8NVV dated September 18, 2008.
- 3.6.2 The Parties shall undertake Groundwater Remediation on and in the vicinity of the Site until written approval to discontinue is received from the Ministry's Guelph District Manager.

**3.7 On-going Groundwater and Surface Water Monitoring on and off the Northstar Property:**

- 3.7.1 Commencing November 30, 2012 the Parties shall implement the groundwater and surface water monitoring programs as follows:
- i. The groundwater blanket sampling program shall include, at a minimum, the following:
    - a. semi-annual (June/September) monitoring and sampling of all available groundwater monitoring wells installed in the Area Under Investigation (the groundwater monitoring network) as detailed in the Figure No. 1 Site Plan, Well Locations in the Study Area as of June 2009 attached to the report prepared by AMEC entitled "Ground Water blanket Sampling Event, 695 Bishop Street North and Vicinity, Cambridge, Ontario, October 2009" dated December 2009;
    - b. any new groundwater monitoring wells installed, by the Parties, at and in the Area Under Investigation are required to be included as part of the groundwater monitoring network and incorporated into the semi-annual groundwater monitoring and sampling program;

- c. semi-annual monitoring shall include the measurement of groundwater levels in all available wells in the groundwater monitoring network;
  - d. semi-annual groundwater samples shall be taken from all available wells in the groundwater monitoring network and analyzed for the parameters listed in Schedule “C” of the Remediation Order, and
  - e. the semi-annual groundwater monitoring and sampling program shall be consistent with the methodology for the Field Program and the Quality Assurance Program (Analytical) detailed in the report prepared by AMEC entitled “Ground Water blanket Sampling Event, 695 Bishop Street North and Vicinity, Cambridge, Ontario, October 2009” dated December 2009;
- ii. The surface water sampling program shall include, at a minimum, the following:
- a. surface water samples of the seeps and springs along a section of the Grand River as identified in Figure No. 1 entitled Northstar Aerospace 695 Bishop Street North and Vicinity, Approximate Sample Locations: January 2012 attached to the report prepared by AMEC entitled “Surface Water Sampling Downgradient of Northstar Aerospace (Canada) Inc., Cambridge, Ontario, October 2011” dated February 2012, shall be taken three times a year (Spring, Summer and Fall);
  - b. surface water samples of transects of the Grand River once per year;
  - c. surface water grab samples shall be collected and analysed for the parameters listed in Schedule “C” of the Remediation Order; and
  - d. the surface water sampling program shall be consistent with the methodology for the Field Program and the Quality Assurance Program (Analytical) detailed in the report AMEC entitled “Surface Water Sampling Downgradient of Northstar Aerospace (Canada) Inc., Cambridge, Ontario, October 2011” dated February 2012.
- 3.7.2 On or before December 21, 2012, and annually thereafter, the Parties shall submit to the Ministry’s Guelph District Manager a Groundwater Monitoring Report prepared by the Qualified Person that is consistent with the report prepared by AMEC entitled “Ground Water Blanket Sampling Event, 695 Bishop Street North and Vicinity, Cambridge, Ontario, December 2010” dated December 20, 2010.
- 3.7.3 Within 90 days of completion of each surface water sampling event, the Parties shall submit to the Ministry’s Guelph District Manager a Surface Water Monitoring report prepared by the Qualified Person that is consistent with the report prepared by AMEC entitled “Surface Water Sampling Downgradient of Northstar Aerospace (Canada) Inc., Cambridge, Ontario, October 2011” dated February 2012.
- 3.7.4 The termination of, or modifications to, the groundwater and or surface water monitoring programs detailed in Items 3.7.1, 3.7.2 and 3.7.3 of this order must be requested by the Parties in writing to the Ministry’s Guelph District Manager.

3.7.5 The termination of, or modifications to, the groundwater and or surface water monitoring programs shall only be implemented by the Parties upon the Parties receiving written approval from the Ministry's Guelph District Manager.

**3.8 Delineation of Groundwater Contamination in Bedrock On and in the Vicinity of the Northstar Property:**

3.8.1 Upon written approval from the Ministry's Guelph District Manager, the Parties shall implement the final work plan prepared by AMEC, dated June 15, 2012, for the delineation of the groundwater Contamination in the bedrock groundwater on and in the vicinity of the Northstar Property.

3.8.2 Within 180 days of the completion of the implementation of the final work plan for the delineation of the groundwater Contamination in the bedrock groundwater on and in the vicinity of the Site , the Parties shall submit to the Ministry's Guelph District Manager a report prepared by the Qualified Person that includes, at a minimum, the following:

- i. a complete summary of all work completed by the Parties pursuant to the final work plan referred to in Item 3.8.1;
- ii. detailed interpretation of the geology and hydrogeology of the area investigated, an assessment of the fate and transport of the Contaminants, and an assessment of the likelihood of an adverse effect, as defined in the EPA, arising from the Contaminants in the bedrock groundwater;
- iii. delineation of the lateral and vertical extent, as practicable, of the Contamination in the bedrock groundwater;
- iv. update the conceptual site model as appropriate showing the key elements and interfaces which describe the fate and transport of the Contaminants from the Site to receptors;
- v. results of representative sampling and analysis of the concentrations of Contaminants taken from groundwater monitoring wells, existing or constructed in accordance with this order;
- vi. all field and analytical data, sampling protocols and certificates of analysis, including a summary and interpretation of all field and analytical data, and certificates of analysis in order to evaluate and interpret the distribution of any groundwater Contamination and soil contamination encountered as a result of the bedrock investigation;
- vii. plan view maps showing the property boundaries, all monitoring well/test hole/test pits utilized, the location of any groundwater wells within the Contaminant plume including the location of municipal and private water wells, surface water features, storm and sanitary sewers, and water mains. All maps shall contain an appropriate scale, legend and north arrow;
- viii. bedrock groundwater Contaminant delineation map(s) showing isopleths for each Contaminant based upon the findings obtained in accordance with this order and delineated to the applicable criterion as per the Ministry's Table 2 "Full Depth Generic Site Condition Standards in a Potable Ground Water Condition" as per the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" dated April 15, 2011,

as amended from time to time, showing the Contaminants' groundwater analytical results with all exceedances of the applicable standard being highlighted;

- ix. plan view map(s), based upon the findings obtained in accordance with this order, showing the shallow groundwater elevation contours and groundwater flow directions;
- x. representative cross-sectional drawings in both the direction of groundwater flow and transverse to the direction of groundwater flow. The cross-sectional drawings are to show the stratigraphy; the location and construction details of all monitoring wells that are located along or near the cross-section with exceedances of the Table 2 criteria highlighted; groundwater elevations from locations that are along or near the cross-section; and the location of buried services, storm and sanitary sewers, and any surface water features along or near the cross-section;
- xi. monitoring well/borehole logs, water well records as per Ontario Regulation 903, and laboratory certificates of analysis installed as part of the bedrock investigation;
- xii. quality assurance/quality control assessment of all sampling results; and
- xiii. any recommendations for additional work.

### **3.9 Remediation of Groundwater Contamination that has Migrated Off the Site into the Bishop Street Community:**

3.9.1 By November 30, 2012, the Parties shall submit a final report prepared by the Qualified Person to the Ministry's Guelph District Manager that evaluates the use of in situ chemical oxidation as a viable remedial option pursuant to the work completed in accordance with the Revised Work Plan for Feasibility Assessment of In Situ Chemical Oxidation in the Southern Residential Area dated September 27, 2011, and in accordance with Environmental Compliance Approval No. 0462-87YKVH dated January 19, 2012. If in situ chemical oxidation is not found to be a viable remedial option for the Area Under Investigation, the report shall also include an analysis of alternative remedial options. The remedial options analysis shall include the following:

- i. a description of each remedial approach considered;
- ii. the advantages/disadvantages of each approach considered for use in the southern residential area relative to effectiveness, estimated time for remediation, and existing level of Contamination;
- iii. a recommendation for a preferred remedial option including rationale; and
- iv. a detailed work plan and anticipated timelines for the implementation of the preferred remedial option.

3.9.2 Upon written approval from the Ministry's Guelph District Manager, the Parties shall implement the preferred remedial option to remediate the groundwater Contamination in the Area Under Investigation.

3.9.3 Within 180 days of the implementation of the preferred remedial option, the Parties shall submit to the Ministry's Guelph District Manager semi annual (every

six months) progress reports prepared by or under the supervision of the Qualified Person. The frequency of the submission of progress reports by the Parties can be reduced upon written approval of the Ministry's Guelph District Manager.

### **3.10 Updated Interim Remedial Action Plan ("IRAP")**

- 3.10.1 On or before January 3, 2013, the Parties shall submit to the Ministry's Guelph District Manager, the City of Cambridge and Public Health an updated draft IRAP.
- 3.10.2 Within 60 days of submission to the Ministry Guelph District Manager of the updated draft IRAP, the Parties shall hold two public information sessions, one in the afternoon and one in the evening, in order to update the Bishop Street Community on the progress of remediation of the groundwater Contamination in the Bishop Street Community, present the updated draft IRAP and allow for public consultation.
- 3.10.3 Within 60 days of the public information sessions, the Parties shall finalize and submit the updated draft IRAP by incorporating or addressing comments received from the Ministry, Public Health, or any other stakeholders that may have an interest or be affected by the groundwater Contamination. The finalized IRAP shall cover the 24 month period from April 2, 2013.
- 3.10.4 Upon written approval from the Ministry's Guelph District Manager and Public Health, the Parties shall implement the updated IRAP.
- 3.10.5 Every 24 months from January 3, 2013, the Parties shall update and resubmit a draft IRAP. The updates shall follow the same schedule as 3.10.2 and 3.10.3.
- 3.10.6 The Parties shall update the IRAP every 24 months until written approval to terminate updating the IRAP is received from the Ministry's Guelph District Manager and Public Health.

### **3.11 Communication**

- 3.11.1 Commencing November 30, 2012 the Parties shall provide copies of all final reports submitted to the Ministry's Guelph District Manager to the local public library and make copies of all final reports available for viewing to any stakeholders that may have an interest in or be affected by the groundwater Contamination.
- 3.11.2 Commencing November 30, 2012 the Parties shall prepare and deliver update letters to all the property owners (tenants) within the Area Under Investigation as appropriate. These update letters are to provide the public with an update on the status of the environmental investigation and remediation as well as inform the public of any changes or news relating to the works being undertaken in relation to the groundwater Contamination.



- 3.11.3 Commencing November 30, 2012 the Parties shall routinely meet on a monthly basis, or on a different basis if agreed to in advance, with the Ministry, Region of Waterloo (Public Health and Water Services), the City of Cambridge and the Grand River Conservation Authority to provide progress updates on the work being undertaken in the Area Under Investigation, to discuss future plans and to answer questions.
- 3.11.4 Commencing November 30, 2012 and while this order is in effect, report in writing, to the Guelph District any significant changes of operation, emission, ownership, tenancy or other legal status of the facility or operation.

### **Part 3.12 – Other Requirements**

- 3.12.1 In this order a reference to a licence, permit, approval, plan, protocol or similar document includes any amendments thereto from time to time.
- 3.12.2 The Parties to this order shall in a timely manner share all relevant information within their possession or control with the other named Parties to this order, where the information is relevant to the other named Party doing the things required by this order.
- 3.12.3 The Parties to this order shall in a timely manner share with the other named Parties to this order any submissions made to the Ministry in accordance with this order.
- 3.12.4 A Party to this order shall immediately notify the Guelph District Manager verbally and by written fax follow-up if the Party believes that another Party to this order is not complying with Items 3.12.2 or 3.12.3 of this order. The written fax follow-up shall state what information or submissions have not been shared and the reason why the information or submission should be shared.
- 3.12.5 Pursuant to subsection 196(2) of the Environmental Protection Act (EPA), immediately upon issuance of this order, Northstar Canada and the Parties, where they have ownership or exercise management or control of property, or have ownership or exercise management or control of environmental monitoring equipment or facilities shall permit the Parties, or their agents, access to the property or the environmental monitoring equipment or facilities where access to the property, equipment or facilities is required for doing the things required by this order. The Parties shall be responsible for the proper maintenance of the environmental monitoring equipment, including all monitoring wells, required for doing the things required by this order. In the event of any damage to the monitoring equipment required for doing the things required by this order, the Parties shall ensure that any damage is repaired in accordance with Ontario Regulation 903 and the well casing resurveyed such that the requirements of this order can be met.
- 3.12.6 A Party to this order shall immediately notify the Ministry's Guelph District Manager verbally and by written fax follow-up if access to any property, or

monitoring equipment or facility, where access to the property, equipment or facility is required for doing the things required by this order, is prevented or is otherwise inaccessible. The written fax follow-up shall state why the access is required, and the details and reason why access has been prevented or is otherwise inaccessible.

3.12.7 All written reports and submissions required to be submitted to the Ministry pursuant to this order shall be final and not be labelled as draft nor include any reference to being draft information. All written reports are to be signed by either the Competent or Qualified Person as applicable.

3.12.8 All written reports that require the signature of a Qualified Person, submitted to the Ministry pursuant to this order, shall contain a signed declaration made by the Qualified Person responsible for the written report, as follows:

“I have read the order #5866-8WKU92 (including order #6076-8RJRUP attached thereto) and I have been retained in relation to the work specified in the following sections of the order:

[insert section numbers]

I have not been retained in relation to the work specified in the following sections of the order:

[insert section numbers or "not applicable"]

I have the appropriate expertise and skill to do the work for which I have been retained.”

#### **Part 4: General**

4.1 All orders are issued in the English language and may be translated into the French language. In the event that there should be a conflict between the English original and the French translation, the English original shall prevail.

4.2 The requirements of this order are severable. If any requirement of this order or the application of any requirement to any circumstance is held invalid, the application of such requirement to other circumstances and the remainder of the order shall not be affected thereby.

4.3 Subsection 19(1) of the EPA provides that an order of the Director is binding upon the successor or assignee of the person to whom it is directed.

4.4 Subsection 186(2) of the EPA provides that non-compliance with the requirements of this order constitutes an offence.

- 4.5 Any request to change a requirement in this order shall be made in writing to the Director, with reason for the request, at least 14 days prior to any compliance date for that requirement.
- 4.6 The requirements of this order are minimum requirements only and do not relieve the Parties from:
- i. complying with any other applicable order, statute, regulation, municipal, provincial or federal law, or
  - ii. obtaining any approvals or consents not specified in this order.
- 4.7 Notwithstanding the issuance of this order, further or other orders may be issued in accordance with legislation as circumstances require. In particular, the Director shall issue an order where the approval of the Director is required in respect of a matter under this order and,
- i. the Director does not grant approval; or
  - ii. the Director does not grant approval because the changes which the Director considers necessary for granting approval have not been agreed to by the Parties.
- 4.8 In the event that any party to this order is, in the opinion of the Director, rendered unable to perform or comply with any obligations herein because of:
- i. natural phenomena of an exceptional, inevitable or irresistible nature, or insurrections; or
  - ii. strikes, lockouts or other labour disturbances; or
  - iii. inability to obtain materials or equipment for reasons beyond the control of the party; or
  - iv. any other cause whether similar to or different from the foregoing beyond the reasonable control of the party,
- the obligations hereof, as they are affected by the above shall be adjusted in a manner defined by the Director. To obtain such an adjustment, the party must notify the Director immediately of any of the above occurrences, providing details that demonstrate that no practical alternatives are feasible in order to meet the compliance dates in question.
- 4.9 Failure to comply with a requirement of this order by the date specified does not absolve the Parties from compliance with the requirement. The obligation to complete the requirement shall continue each day thereafter.
- 4.10 This order has no expiry date.

**Part 5: Hearing before the Environmental Review Tribunal**


- 5.1 Under section 140 of the EPA you may require a hearing before the Environmental Review Tribunal, if, within fifteen days after service upon you of this order, you serve written notice upon the Environmental Review Tribunal and the Director.
- 5.2 Section 142 of the EPA provides that the notice requiring the hearing must include a statement of the portions of the order for which the hearing is required and the grounds on which you intend to rely at the hearing. Except by leave of the Environmental Review Tribunal, you are not entitled to appeal a portion of the order or to rely on grounds of appeal that are not stated in the notice requiring the hearing.
- 5.3 Written notice requiring a hearing shall be served personally or by mail on the following:

The Secretary	and	Director
Environmental Review Tribunal		Ministry of the Environment
655 Bay Street, Suite 1500		One Stone Road West, 4 <sup>th</sup> Floor
Toronto, ON		Guelph, ON N1G 4Y2
M5G 1E5		

Where service is made by mail, the service shall be deemed to be made on the fifth day after the day of mailing and the time for requiring a hearing is not extended by choosing service by mail.

Unless stayed by application to the Environment Review Tribunal under Section 143 of the EPA this order is effective from the date of issue.

Issued at Guelph this 14<sup>th</sup> day of November 2012.

  
\_\_\_\_\_  
Director  
Ministry of the Environment

Schedule "A" – Remedial Order



Ministry of the Environment  
Ministère de l'Environnement

## Provincial Officer's Report

**Order Number**  
6076-8RJRUP

**Reference Number**  
3827-8RJSTB

Northstar Aerospace (Canada) Inc.  
180 Market Dr  
Milton, Ontario, L9T 3H5  
Canada

Northstar Aerospace, Inc.  
6006 WEST 73RD St  
Bedford Park, Illinois, 60638  
USA

**Site**

695 Bishop St N  
Cambridge, Regional Municipality of Waterloo

**Introduction**

As a Provincial Officer with the Ministry of the Environment (the Ministry), Guelph District Office, West Central Region I have been involved with the Northstar Aerospace (Canada) Inc. site located at 695 Bishop Street North in Cambridge, ON since 2004. This Provincial Officer's Report has been prepared to summarize the environmental investigations in an area of Cambridge referred to as the Bishop Street Community in support of the attached Director's Order.

**Background**

Northstar Aerospace (Canada) Inc. ("Northstar") is the owner of 695 Bishop Street North ("Site") in Cambridge, Ontario. Northstar's core business involves the manufacturing and processing of flight critical gears for the aerospace industry.

Historically, Northstar operated a manufacturing and processing facility at the Site. The processing operations involved the metal plating of parts and the use of Trichloroethylene (TCE) as a metal degreaser.

TCE is an industrial solvent that has been commonly used as a metal degreaser since the 1930's. It is a volatile organic compound and has recently been identified as a human carcinogen. TCE is a volatile, non-flammable, colourless liquid.

On October 19, 2004, a lawyer for Northstar notified the Ministry that soil and groundwater contamination had been found in the southwest corner of the Site, and that contaminated groundwater could possibly be flowing off-Site. The primary contaminants consisted of TCE and hexavalent chromium.

On June 30, 2005, Northstar notified the Ministry that groundwater sampling results from monitoring wells installed in a residential area southwest of the Site showed elevated TCE concentrations of up to 4,000 parts per billion. At the time the applicable Ministry standard for TCE in groundwater was 50 parts per billion. The main concern based on the TCE groundwater concentration would be for the TCE to evaporate from the groundwater, enter the surrounding soil as vapour and then migrate into the indoor air of the overlying buildings. The phrase "soil vapour intrusion" refers to the process by which volatile substances move from a subsurface source into the indoor air of overlying buildings. The TCE groundwater concentrations prompted Northstar to meet with residents of approximately 12 homes and to arrange for indoor air sampling so Northstar could assess if TCE soil vapour intrusion was occurring.

An initial phase of indoor air sampling was completed by Northstar in ten homes in the first half of July 2005. The results from this sampling showed elevated concentrations of TCE in indoor air. Based on the discovery of the TCE in indoor air and the TCE groundwater concentrations Northstar commenced an extensive groundwater and soil vapour intrusion investigation.

In August 2007, the Ministry completed a review of hydrogeological reports for 610 Bishop Street North. The Ministry's review concluded that 610 Bishop Street North is a source of TCE in the groundwater, that contamination from Northstar is migrating onto the 610 Bishop Street North property and that the western portion of the groundwater plume is a co-mingled plume originating from both 610 Bishop Street North and the Site.

Borg-Warner (Canada) Limited is the last known user of TCE at 610 Bishop Street. GE Canada is the legal successor to Borg-Warner (Canada) Limited. GE Canada has been actively engaged in the groundwater and soil vapour intrusion investigations.

The area under investigation is referred to as the Bishop Street Community and the investigation is currently ongoing.

## Indoor Air Monitoring and Mitigation

In 2005, Northstar prepared and submitted a draft Indoor Air protocol to the Ministry and the Region of Waterloo Public Health (“Public Health”). This protocol proposed the sampling methodology and the actions to be taken should indoor sample results identify concentrations of TCE. The Ministry reviewed the protocol and provided recommendations to Public Health. Based on the protocol, and the recommendations from the Ministry, Public Health published a TCE Fact Sheet including the recommended action levels for indoor air TCE concentrations.

An improved understanding of the human toxicity of TCE resulted in changes to the generic soil and groundwater standards under Regulation 153/04 which were finalized on December 29, 2009. The groundwater standard was lowered from 50 parts per billion to 1.6 parts per billion. The science behind the change to the groundwater standard was also applicable to the understanding of the acceptable TCE indoor air concentrations as a result soil vapour intrusion.

Based on the regulatory changes the ministry lowered the interim indoor air no action level for the Bishop Street Community from 2.3 µg/m<sup>3</sup> to 0.5 µg/m<sup>3</sup> (micrograms per cubic metre) for TCE. The target value of 0.5 ug/m<sup>3</sup> represents a one in million lifetime cancer risk.

To address the regulatory changes Northstar, in cooperation with GE Canada, resubmitted to the Ministry and Public Health a revised Indoor Air Protocol, dated September 1, 2010, for the Bishop Street Community. Public Health subsequently revised their TCE Fact Sheet.

The current version of the indoor air protocol for the Bishop Street Community dated December 14, 2011, requires homes be assessed for mitigation systems when indoor air TCE concentrations are above 5 µg/m<sup>3</sup>. This is consistent with the current version of the TCE Fact Sheet published by Public Health (Schedule “D”). The interim indoor air action levels have been put in place to be protective of human health. The indoor air protocol is to be revised and updated as required on an annual basis.

The below table shows the levels of TCE as of February 2012

Number of Properties with TCE (ug/m <sup>3</sup> ) levels:				Total:
< 0.5	0.5 - 5	5 - 10	>= 10	
410	223	7	8	648



The below table shows the historical levels of TCE

Number of Properties with TCE (ug/m3) levels:				Total:
< 0.5	0.5 - 5	5 - 10	>= 10	
119	221	55	253	648

Indoor air concentrations have been reduced due to the installation of indoor air mitigation systems and because of a reduction in TCE groundwater concentrations.

To date, 212 properties have some form of mitigation system installed. Active mitigation systems which require ongoing operation and maintenance are soil vapour extraction systems (“SVES”), sub-slab depressurizations systems (“SSDS”), heat recovery ventilation systems (“HRVS”), photo-catalytic oxidizers (“PCO”), and portable carbon units.

The continued operation of indoor air mitigation systems is essential in ensuring TCE levels, as a result of soil vapour intrusion, are maintained within the accepted framework.

### **Groundwater Monitoring and Remediation**

An Interim Remedial Action Plan (“IRAP”) to address ground water impacts at the Site and the Study Area was issued in draft on July 05, 2006, as a Conceptual Remedial Action Plan (AMEC, 2006d), issued in revised draft form as an Interim Remedial Action Plan on 30 August 2006 (AMEC, 2006e) and finalized as an Interim Remedial Action Plan on 31 January 2007 (AMEC, 2007). The finalized IRAP was deemed acceptable by the Ministry.

On September 2, 2011, an update to the original IRAP was finalized. The updated IRAP was deemed acceptable to the Ministry. This IRAP Update covers the next 18 months of remediation activity, after which the Ministry expect another performance review will be undertaken and another IRAP Update issued. The groundwater remediation strategy includes:

- In-situ Chemical Oxidation (“ISCO”)
  - Injection of potassium permanganate into the ground water to actively destroy TCE
- Pump and Treat Remediation
  - Groundwater is extracted from a possible six extraction wells located on and off-Site, treated and discharged to the municipal storm sewer. The pump and treat system not only helps remove contaminants from the groundwater but also prevents the further migration of contaminants off-Site. The Ministry has issued Certificate of Approval No. 2388-7KLJ35 to Northstar for the operation of the pump and treat system.
- Soil Vapour Extraction

To date, Northstar has installed approximately 130 groundwater monitoring wells on the Site and to the south and the south-west of the Site. Currently, the highest off-Site TCE groundwater concentration is 43,000 parts per billion. The current groundwater standard under Regulation 153/04 is 1.6 parts per billion.

The continued operation of the pump and treat system is essential to preventing the further migration of contaminants off-Site.

### **Surface Water Monitoring**

Groundwater impacted with TCE and hexavalent chromium extends to the Grand River where there is some groundwater discharge, from springs and seeps, to the river.

Three times per year Northstar collects surface water samples discharging from seeps and springs on the eastern shore of the Grand River, from the river at locations along the eastern shore and from three transects across the river in addition to the collection of ground water samples from nearby monitoring wells.

The results of the sampling is reported to and reviewed by the Ministry.

The most recent surface water sampling was completed in October 2011. Sample results collected from a “spring” flowing to the Grand River had concentrations of TCE and hexavalent chromium above their respective Provincial Water Quality Objectives. However, TCE and hexavalent chromium did not exceed their respective Provincial Water Quality Objective in any samples collected from the Grand River.

The continuation of the surface water sampling program is necessary to evaluate potential adverse effects to the Grand River.

### **Drinking Water**

Groundwater supplies the City of Cambridge with a significant source of drinking water. The nearest Regional well (P6) is located in the Dumfries Conservation area, approximately 750 m south east (and not directly down gradient of) the groundwater contaminant plume. Since August 2005, P6 has been monitored on a monthly basis by the Region of Waterloo. There have been no detections of TCE in P6.

A sentry well has been installed between where groundwater contamination is known and P6. There have been no detections of TCE in the sentry well.

The continued monitoring and remediation of the groundwater is necessary to prevent potential impacts to P6 and the Region of Waterloo drinking water supply.

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## **Communications**

Northstar has been very proactive in communicating with the Public, the Region of Waterloo (Public Health and Water Services), City of Cambridge, the Grand River Conservation Authority, and the Ministry.

Northstar established a Community Information Centre (CIC) located at the Site to serve as the first point of contact for the Public and government agencies, and as the central hub of operations for the environmental programs including indoor air monitoring and groundwater investigations. The CIC is open daily Monday through Thursday.

On a routine basis Northstar prepares and delivers Update letters to all the property owners (tenants) within the current area of investigation. The Update letters provides the public an update on the status of the project and informs them of any changes or news relating to the project.

Northstar also communicates directly with any other stakeholders that may have an interest or be affected by this project. ( e.g. banks, insurance accompanies, real estate agents, family doctors, and potential home buyers)

On a routine basis (generally monthly) Northstar meets with the government agencies to provide an overview of the work being undertaken, the future plans, and to answer questions.

Since 2005, Northstar has attended or hosted approximately ten face to face public meetings. At these meetings Northstar has made presentations to the public describing in detail the work being completed in the Bishop Street Community. These meetings also provided the public with the opportunity to ask questions or voice their concerns.

## **Conclusion**

TCE and hexavalent chromium are both know human carcinogens. Groundwater impacted by TCE or hexavalent chromium poses potential adverse effects to human health and the environment.

While Northstar has undertaken all needed investigation, mitigation and remediation programs on a voluntary basis without the need for a Director's Order, recent financial disclosures made by Northstar have revealed there is significant doubt regarding the Corporation's ability to continue as a going concern which could impact on the environmental remediation programs.

The purpose of the attached Order is to ensure the potential adverse effects from TCE and hexavalent chromium impacted groundwater to human health and the environment continues to be monitored, mitigated and remediated where necessary.

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The requirements of the attached Order, of which this Provincial Officer's Report forms a part, represent the minimum actions to be taken to ensure the protection of human health and the environment, the prevention and mitigation of potential adverse effects associated with the groundwater contamination, and the remediation of the groundwater contamination in the Bishop Street Community.



Provincial Officer: Phil Shewen

Badge Number: 357  
Date: March 15, 2012  
District Office: Guelph



Ministry of  
the Environment

Ministère de  
l'Environnement

## Director's Order

Environmental Protection Act, R.S.O. 1990, c.E 19 (EPA)  
Ontario Water Resources Act, R.S.O. 1990, c. O. 40 (OWRA)  
Pesticides Act, R.S.O. 1990, c. P11 (PA)  
Safe Drinking Water Act, S.O. 2002, c.32 (SDWA)  
Nutrient Management Act, 2002, S.O. 2002, c.4 (NMA)

Order Number  
6076-8RJRUP

Incident Report No.  
8361-8RJRUP

**To:** Northstar Aerospace (Canada) Inc.  
180 Market Drive  
Milton, Ontario  
L9T 3H5

Northstar Aerospace, Inc.  
6006 WEST 73RD St  
Bedford Park, Illinois, 60638  
USA

**Site:** 695 Bishop Street North  
Cambridge, Ontario

### Part 1: Definitions

For the purposes of this Order, the interpretation of all terms shall be the same as those contained in the legislation and the regulations made thereupon, unless defined below:

- 1.1 "AMEC" means AMEC Environment & Infrastructure, formerly AMEC Earth & Environmental.
- 1.2 "Area Under Investigation" includes the Site; immediately around the Site; hydrogeologically or otherwise downgradient from the Northstar Property to the extent that the Contaminants are detectable in groundwater, surface water, soil, air or soil vapour above the applicable regulatory limits and hydrogeologically or otherwise connected to the Site, including the 610 Bishop Street North property.
- 1.3 "Bishop Street Community" means the area under investigation based on the current extent of groundwater contaminants and trichloroethylene indoor air concentrations as a result of soil vapour intrusion.
- 1.4 "Contaminants" and/or "Contamination" means Trichloroethylene (TCE), 1,1-Trichloroethane (1,1-TCA), Tetrachloroethylene (PCE), 1,1-Dichloroethylene (1,1-DCE), Cis-1,2-Dichloroethylene (cis-1,2-DCE), trans-1,2-Dichloroethylene

- (trans-1,2-DCE), Vinyl Chloride (VC), 1,1-Dichloroethane (1,1-DCA), hexavalent chromium and any other known associated breakdown products.
- 1.5 "Guelph District Manager" means the District Manager for the Ministry's Guelph District Office.
- 1.6 "Havlik" means Havlik Technologies Inc.
- 1.7 "IAMS" means Indoor Air Mitigation System.
- 1.8 "Ministry" means the Ontario Ministry of the Environment.
- 1.9 "Northstar Aerospace" means Northstar Aerospace, Inc.
- 1.10 "Northstar Canada" means Northstar Aerospace (Canada) Inc.
- 1.11 "Northstar" means Northstar Aerospace, Inc. and Northstar Aerospace (Canada) Inc.
- 1.12 "Public Health" means the Regional Municipality of Waterloo Public Health.
- 1.13 "Site" or "Northstar Property" means the property which is municipally known as 695 Bishop Street North, Cambridge, Ontario more particularly described as Lt 38-39 RCP 1374 Cambridge Except Pt 3, 67R3167; Pt BLK A P1 1319 Cambridge as in W648730; Pt Lt 37 RCP 1374 Cambridge Pt 3, 67R3011, Except Pts 1 & 2, 67R3167; Cambridge
- 1.14 "SVES" means soil vapour extraction systems.
- 1.15 "TCE" means Trichloroethylene.
- 1.16 "VOC's" means volatile organic compounds.

## **Part 2: Legal Authority and Reasons**

- 2.1 Pursuant to subsection 1(1) of the Environmental Protection Act, R.S.O. 1990, c. E. 19, as amended ("EPA"), "contaminant" means any solid, liquid gas, odour, heat, sound, vibration, radiation or combination of any of them resulting directly or indirectly from human activities that may cause an adverse effect.
- 2.2 Pursuant to subsection 1(1) of the EPA "source of contaminant" means anything that discharges into the natural environment any contaminant.
- 2.3 Section 17 of the EPA provides that the Director may order a person who causes or permits the discharge of a contaminant into the natural environment, so that land, water, property, animal life, plant life, or human health or safety is injured, damaged or endangered, or is likely to be injured, damaged or endangered, to

repair the injury or damage; to prevent the injury or damage; or, where the discharge has damaged or endangered or is likely to damage or endanger existing water supplies, provide alternative water supplies.

- 2.4 Subsection 18(1) of the EPA provides that the Director may, by order, require a person who owns or owned or who has or had management or control of an undertaking or property to do any one or more of the following:
- i. To have available at all times, or during such periods of time as are specified in the order, the equipment, material and personnel specified in the order at the locations specified in the order;
  - ii. To obtain, construct and install or modify the devices, equipment and facilities specified in the order at the locations and in the manner specified in the order;
  - iii. To implement the procedures specified in the order;
  - iv. To take all steps necessary so that procedures specified in the order will be implemented in the event that a contaminant is discharged into the natural environment from the undertaking or property;
  - v. To monitor and record the presence or discharge of a contaminant specified in the order and to report thereon to the Director;
  - vi. To study and to report to the Director on, (i) the presence or discharge of a contaminant specified in the order; (ii) the effects of the presence or discharge of a contaminant specified in the order; (iii) measures to control the presence or discharge of a contaminant specified in the order, (iv) the natural environment into which a contaminant specified in the order may be discharged.
  - vii. To develop and implement plans to, (i) reduce the amount of a contaminant that is discharged into the natural environment, (ii) prevent or reduce the risk of a spill of a pollutant within the meaning of Part X, or, (iii) prevent, decrease or eliminate any adverse effects that result or may result from a spill of a pollutant within the meaning of Part X of the EPA or from any other discharge of a contaminant into the natural environment, including a) plans to notify the Ministry, other public authorities and members of the public who may be affected by a discharge, and b) plans to ensure that appropriate equipment, material and personnel are available to respond to a discharge.
  - viii. To amend a plan developed under paragraph vii or section 91.1 in the manner specified in the order.
- 2.5 Subsection 18(2) of the EPA provides that the Director may make an Order under subsection 18(1) where the Director is of the opinion, based on reasonable and probable grounds, that requirements specified in the order are necessary or advisable so as,

(a) to prevent or reduce the risk of a discharge of a contaminant into the natural environment from the undertaking or property; or

(b) to prevent, decrease or eliminate an adverse effect that may result from,

(i) the discharge of a contaminant from the undertaking, or

(ii) the presence or discharge of a contaminant in, on or under the property.

- 2.6 Subsection 196(1) of the EPA specifies that the authority to make an order under the EPA includes the authority to require the person or body to whom the order is directed to take such intermediate action or such procedural steps or both as are related to the action required or prohibited by the order and as are specified in the order.
- 2.7 Northstar Canada was incorporated under the laws of Ontario and has been the registered owner of the Site since 2008. The Site was previously owned by Havlik from 1986 to 2008.
- 2.8 Northstar Canada is the successor of Havlik as a result of several amalgamations.
- 2.9 On May 1, 1989, Havlik amalgamated with Controlled Machining Inc. to create Derlan Aerospace Canada Limited. On January 1, 1994, Derlan Aerospace Canada Limited amalgamated with Derlan Manufacturing Inc. to create Northstar Canada.
- 2.10 Northstar Canada is a wholly owned subsidiary of Northstar Aerospace. Northstar has manufactured parts for the aerospace industry at the Site since 1959.
- 2.11 Northstar Aerospace is incorporated under the laws of Ontario and its shares are publicly traded on the Toronto Stock Exchange under the symbol "NAS". Northstar Canada and Northstar Aerospace operate as if Northstar Canada is functionally part of Northstar Aerospace. Northstar Aerospace's officers, directors are and have been the officers and directors of Northstar Canada. Both Northstar Aerospace and Northstar Canada manage and control the environmental remediation, assessment and mitigation measures associated to the Site. They have jointly, manufactured and sold components and assemblies to the global aerospace industry. Northstar Aerospace prepares its financial statements on a consolidated basis with Northstar Canada. Northstar Aerospace has taken charge of and paid for all remediation and investigation in the Area under Investigation.



## Groundwater

- 2.12 AMEC (consultant for Northstar) prepared a report entitled "Phase II Environmental Site Assessment, 695 Bishop Street North, Cambridge, Ontario, prepared for Northstar Aerospace (Canada) Inc.," by AMEC, July 9, 2004." Through this investigation, a number of soil and groundwater samples collected were found to exceed Ministry of the Environment guidelines for metals, including hexavalent chromium (Cr (VI)) and volatile organic compounds (mainly TCE), leading to the conclusion that current and historic activities have impacted the groundwater and that there is a potential for off-site adverse effects.
- 2.13 In the fall 2004, a lawyer for Northstar notified the ministry that soil and groundwater contamination had been found in the southwest corner of the Site, and contaminated groundwater could possibly be flowing off-Site.
- 2.14 As a result of these findings, Northstar has been voluntarily carrying out work to:
- assess the extent of off-Site contamination;
  - begin the remediation of contaminated groundwater;
  - assess potential indoor air impacts; and
  - mitigate indoor air impacts.
- 2.15 The groundwater contamination consists principally of TCE and metals (e.g. hexavalent chromium). On-Site concentrations of TCE in groundwater of up to 81,000 µg/L were identified compared to the Ministry's Table 2 "Full Depth Generic Site Condition Standards in a Potable Ground Water Condition" as per the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" dated March 9, 2004, for TCE of 50 µg/L. Concentrations of total chromium of up to 12,000 µg/L compared to the Ministry's Table 2 criteria of 50 µg/L were also found on-site. A number of other parameters also exceeded the Ministry's Table 2 criteria.
- 2.16 TCE is an industrial solvent that has been commonly used as a metal degreaser since the 1930's. It is a volatile organic compound and a known human carcinogen. Its vapours can rise from contaminated groundwater, travel through the subsurface, and potentially enter building spaces.
- 2.17 On February 4, 2005 the Ministry received a letter from AMEC, dated February 1, 2005, that reported off-Site groundwater sampling results in excess of the applicable standards for VOC's and metals.
- 2.18 On June 30, 2005, Northstar notified the Ministry that groundwater sampling results from monitoring wells installed in a residential area southwest of the Site showed elevated TCE concentrations of up to 4,000 µg/L (parts per billion).
- 2.19 Northstar's proposed remediation strategy to address the contamination has multiple phases: the installation of mitigation systems within homes; expansion of existing soil vapour extraction systems and groundwater pump and treat systems; and injection of a chemical oxidant to enhance the destruction of TCE.

- 2.20 In February 2006, Northstar installed a mobile pump and treat system to collect and treat contaminated groundwater at the Site.
- 2.21 Northstar provided the Ministry with a final Interim Remedial Action Plan ("IRAP") on January 31, 2007 to address the TCE groundwater contaminant plume. The IRAP proposed a step wise approach to the groundwater clean up. The clean up would begin on the Site, followed by the industrial/commercial area and then finally in the residential area.
- 2.22 On March 5, 2007, a TCE remediation system was set up on the Northstar Property. This system is injecting potassium permanganate into the subsurface to destroy TCE on and in the vicinity of the Site.
- 2.23 Groundwater sampling results show that the TCE plume extends to the Grand River. Samples of groundwater collected from seeps on the bank of the Grand River showed TCE concentrations greater than the Provincial Water Quality Objective (PWQO) of 20 µg/L. However, TCE detected in samples collected from the Grand River show that levels in the river are less than the PWQO's.
- 2.24 The affected residential area is serviced with municipal water supply. Water testing of municipal wells in Cambridge nearest the contaminant plume has not shown the presence of TCE.
- 2.25 On September 2, 2011, an update to the original IRAP was finalized. The updated IRAP was deemed acceptable to the Ministry. This IRAP Update covers the next 18 months of remediation activity, after which the Ministry expects another performance review will be undertaken and another IRAP Update issued.

#### **Air**

- 2.26 Outdoor (ambient) air samples collected by the Ministry on December 21, 2005, showed background TCE concentrations (under 1 ug/m<sup>3</sup>).
- 2.27 Indoor air sampling has been completed by Northstar's consultant at 648 properties as of February 12, 2012. The number of homes requiring indoor air sampling may increase depending on ongoing groundwater investigation results.
- 2.28 The Ministry randomly audits the indoor air sampling conducted on behalf of Northstar. The audit consists of collecting indoor air samples at a predetermined number of locations at the same time samples are collected for Northstar.

2.29 As of February 10, 2012, the indoor air sampling results indicate levels of TCE:

Number of Properties with TCE (ug/m3) levels:				Total:
< 0.5	0.5 - 5	5 - 10	>= 10	
410	223	7	8	648

2.30 The below table shows the historical indoor air sampling results levels of TCE:

Number of Properties with TCE (ug/m3) levels:				Total:
< 0.5	0.5 - 5	5 - 10	>= 10	
119	221	55	253	648

- 2.31 To date, 212 homes have had IAMSS installed to lower TCE indoor air concentrations.
- 2.32 The indoor air quality of affected residences represents a potential health concern based on a long-term exposure scenario over many years.
- 2.33 The nature of the Contaminants is such that the past or continued discharge of Contaminants from the source sites located at the Site, causes or is likely to cause, among other adverse effects, a threat to the health and safety of any person, and impairment of the quality of the natural environment for any use that can be made of it.
- 2.34 Northstar (or its predecessors) owns or owned the Site, has or had management and control of this property and related activities, and caused or permitted the discharge of Contaminants into the natural environment.
- 2.35 Based on the information detailed above and the Provincial Officer's Report, prepared by, Provincial Officer Phil Shewen badge #357, a copy of which is attached hereto and forms part of this Order, I am of the opinion, based on reasonable and probable grounds, that the requirements specified in this Order are necessary and advisable so as to:
- i. prevent or reduce the risk of the discharge of contaminants into the natural environment from the Site;
  - ii. to prevent, decrease or eliminate an adverse effect that may result from such a discharge; or from the presence or discharge of a contaminant in, on or under the Site.

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### **Part 3: Work Ordered**

Pursuant to Sections 17, 18, and 196 of the EPA, I hereby order Northstar to take all steps necessary to do the following:

#### **Part 3.1 - Retain a Qualified Person and Laboratory**

- 3.1.1 By May 16, 2012, retain, or continue to retain, Competent Person (s) and Qualified Person (s) and certified laboratory (ies) ("Laboratory") to prepare and complete, or supervise, the work specified in this Order. The Qualified Person shall possess hydrogeological expertise and have expertise in the assessment and remediation of soil and groundwater contamination, in particular the remediation of volatile organic compounds ("VOCs").
- 3.1.2 The Qualified Person must be a licensed member of the Professional Engineers of Ontario, as required by the *Professional Engineers Act*, R.S.O. 1990 and its regulations and/or the Association of Professional Geoscientists of Ontario, as required by the *Professional Geoscientists Act*, S.O. 2000, c. 13 and its regulations.
- 3.1.3 The Laboratory must be accredited by a Ministry approved accreditation body and compliant with the International Standard ISO/IEC 17025. The Laboratory's accreditation must include accreditation for the parameters to be assessed under this Order.
- 3.1.4 The Competent Person shall have the education, training, or experience to perform the particular tasks and analysis required within this Order that are not to be performed by a Qualified Person.
- 3.1.5 By May 16, 2012, provide written confirmation to the Ministry's Guelph District Manager that the Competent Person, Qualified Person and Laboratory have been retained, or have continued to be retained.

#### **Part 3.2 - Indoor Air Monitoring**

- 3.2.1 A Residential Indoor Air Monitoring Protocol shall be submitted to the Ministry's Guelph District Manager and the Regional Municipality of Waterloo Public Health ("Public Health") for review and approval on an annual basis on or before September 1<sup>st</sup> of each year.
- 3.2.2 On or before December 15 of each year, upon written approval from the Ministry's Guelph District Manager and Public Health, Northstar shall begin implementing the Residential Indoor Air Monitoring Protocol identified in Item 3.2.1 of this Order.
- 3.2.3 The termination of, or modifications to, the Residential Indoor Air Monitoring Protocol identified in Item 3.2.1 of this Order must be requested by Northstar in

writing to the Ministry's Guelph District Manager and Public Health on or before December 1 of each year.

- 3.2.4 The termination of, or modifications to, the updated Residential Indoor Air Monitoring Protocol shall only be implemented by Northstar upon Northstar receiving written approval from the Ministry's Guelph District Manager and Public Health.
- 3.2.5 On or before July 1, 2013, and annually thereafter, Northstar shall submit in writing to the Ministry's Guelph District Manager and Public Health a report which details the findings, assessment and interpretation of the Residential Indoor Air Monitoring Program completed in accordance with the Revised Residential Indoor Air Protocol as per Item No. 3.2.1 of this Order. This report shall be prepared by the Qualified Person in accordance with acceptable scientific, geoscientific and engineering practices, include sufficient information, data and recommendations for the ultimate purpose of protecting and conserving the natural environment pursuant to Section 3 of the EPA, and shall include at a minimum:
- i. details of the work completed to sample and analyze the indoor air, including all field and analytical data and laboratory certificates of analysis, as required by this Order;
  - ii. an evaluation and interpretation of the indoor air monitoring results, including an evaluation of any trends and an assessment with respect to the remedial action benchmarks;
  - iii. the adequacy of the Revised Residential Indoor Air Monitoring Protocol and recommendations for any modifications to the program, as appropriate that are to be considered in the updated Residential Indoor Air Monitoring Protocol detailed in Item 3.2.1 of this Order;
  - iv. any recommendations for additional work to be completed; and
  - v. in accordance with the protocol accepted by the Ministry and Public Health a proposed mitigation action plan to reduce the indoor air concentration for any residential property found to have indoor air concentrations equal to or above the accepted action level for TCE in indoor air of  $0.5 \mu\text{g}/\text{m}^3$ . This plan shall include:
    - a description of the proposed remedial action to be taken; and
    - a schedule for implementation and completion of the mitigation action plan.
- 3.2.6 Northstar, shall within two weeks of receiving sample results report, in writing to the Ministry's Guelph District Office, the City of Cambridge, and Public Health any detection of TCE in the indoor air of residential homes, including the concentration, which is greater than  $0.5 \mu\text{g}/\text{m}^3$ .
- 3.2.7 Northstar shall forthwith report in writing to the Ministry's Guelph District Office, the City of Cambridge, and Public Health any new detection of TCE in the indoor air of residential homes, including the concentration, which is greater than

10 µg/m<sup>3</sup>. A new detection means for a home not previously tested or for an existing home where the previous two sample results were less than 10 µg/m<sup>3</sup>.

### **Part 3.3 – Operation and Maintenance of Indoor Air Mitigation Systems (IAMS).**

- 3.3.1 Northstar shall continue to operate and maintain the existing IAMSs that have been installed in the Bishop Street Community as identified in Schedule “A” attached to this Order.
- 3.3.2 Northstar shall install (or cause to be installed), operate and maintain any new IAMS that may be required to be installed in the Bishop Street Community as a result of the findings from the implementation of the Revised Residential Indoor Air Monitoring Protocol, or from the implementation of any future updated annual Residential Indoor Air Monitoring Protocol, identified in Part 3.2 of this Order.
- 3.3.3 On or before December 1 2012, and annually thereafter Northstar, shall submit to the Ministry’s Guelph District Manager and to Public Health a report documenting the operation and maintenance of the IAMSs installed in the Bishop Street Community.
- 3.3.4 Northstar shall continue to operate and maintain any existing IAMSs that have been installed in the Bishop Street Community and any IAMSs that may be required to be installed in the Bishop Street Community as a result of the groundwater Contamination until written approval to discontinue operation and maintenance of these systems is received from the Ministry’s Guelph District Manager and Public Health.

### **Part 3.4 – Operation, Monitoring and Maintenance of the SVES**

- 3.4.1 Northstar shall continue to operate, monitor and maintain the *twenty-one* existing SVESs in the Bishop Street Community and identified in Schedule “B” attached to this Order, in accordance with Amended Environmental Compliance Approval No. 5018-8KSR9B dated January 5, 2012 issued to Northstar Canada by the Ministry.
- 3.4.2 Northstar shall operate, monitor and maintain any new SVESs, upon amendment of the existing Amended Environmental Compliance Approval No. 5018-8KSR9B dated January 5, 2012, that may be required to be installed as a result of the findings from future indoor air and groundwater monitoring programs.
- 3.4.3 On or before December 1, 2012, and annually thereafter, Northstar shall submit to the Ministry’s Guelph District Manager and Public Health a report documenting the Record Keeping Requirements in accordance with Condition No. 8.0 of the Amended Environmental Compliance Approval No. 5018-8KSR9B dated January 5, 2012.

- 3.4.4 Northstar shall continue to operate and maintain any existing SVESs that have been installed in the Bishop Street Community and any new SVESs that may be required to be installed in the Bishop Street Community as a result of the groundwater Contamination until written approval to discontinue to operate and maintain these systems is received from the Ministry's Guelph District Manager and Public Health.

### **3.5 – Operation, Monitoring and Maintenance of the Groundwater Pump and Treat System On and In the Vicinity of the Site**

- 3.5.1 To prevent the movement of impacted groundwater identified on and in the vicinity of the Site downgradient into the Bishop Street Community, Northstar shall continue to operate, monitor and maintain the groundwater pump and treat system as detailed in the Interim Remedial Action Plan prepared by AMEC for Northstar Canada dated September 2011, in accordance with the Amended Permit to Take Water No. 7007-87HLXW dated August 9, 2010 and Amended Certificate of Approval, Industrial Sewage Works, No. 2388-7KLJ35 dated November 5, 2009 and any other necessary permits or approvals that may be required.
- 3.5.2 On or before April 30, 2012, and semi-annually thereafter, Northstar shall submit to the Ministry's Guelph District Manager a report documenting the effectiveness of the pump and treat system along with the monitoring requirements in accordance with the Amended Permit to Take Water No. 7007-87HLXW dated August 9, 2010, and monitoring requirements identified in any other necessary permits or approvals that may be required. The semi-annual report prepared by or under the supervision of the Qualified Person shall include, at a minimum:
- i. details of operation, monitoring and maintenance of the pump and treat system including all field and analytical data and laboratory certificates of analysis, as required by this Order;
  - ii. an evaluation and interpretation of the monitoring results, including an assessment of any evident trends in groundwater quality and quantity;
  - iii. an assessment of the effectiveness of the current pump and treat system in maintaining hydraulic containment of the groundwater Contamination identified on and in the vicinity of the Northstar Property and effectiveness in preventing the migration of groundwater Contamination off Site along with recommendations for any modifications to the pump and treat system and the monitoring program, as appropriate; and
  - iv. any recommendations for additional work to be completed as may be necessary.
- 3.5.3 Northstar shall operate, monitor and maintain the pump and treat system until written approval to discontinue is received from the Ministry's Guelph District Manager.

**3.6 Continuation of Groundwater Remediation on and in the Vicinity of the Northstar Property (“Groundwater Remediation”)**

3.6.1 Northstar shall continue undertaking the Groundwater Remediation Program as detailed in Section 3.3 of the Interim Remedial Action Plan prepared by AMEC for Northstar Canada dated September 2011, and in accordance with Certificate of Approval - Air No. 4281-7G8NVV dated September 18, 2008.

3.6.2 Northstar shall continue to undertake Groundwater Remediation on and in the vicinity of the Site until written approval to discontinue is received from the Ministry’s Guelph District Manager.

**3.7 On-going Groundwater and Surface Water Monitoring on and off the Northstar Property:**

3.7.1 Northstar shall continue to implement the groundwater and surface water monitoring programs as follows:

- i. The groundwater blanket sampling program shall include, at a minimum, the following:
  - a. semi-annual (June/September) monitoring and sampling of all available groundwater monitoring wells installed in the Area Under Investigation (the groundwater monitoring network) as detailed in the Figure No. 1 Site Plan, Well Locations in the Study Area as of June 2009 attached to the report prepared by AMEC entitled “Ground Water blanket Sampling Event, 695 Bishop Street North and Vicinity, Cambridge, Ontario, October 2009” dated December 2009;
  - b. any new groundwater monitoring wells installed, by Northstar, at and in the Area Under Investigation are required to be included as part of the groundwater monitoring network and incorporated into the semi-annual groundwater monitoring and sampling program;
  - c. semi-annual monitoring shall include the measurement of groundwater levels in all available wells in the groundwater monitoring network;
  - d. semi-annual groundwater samples shall be taken from all available wells in the groundwater monitoring network and analyzed for the parameters listed in the attached Schedule “C” of this Order, and
  - e. the semi-annual groundwater monitoring and sampling program shall be consistent with the methodology for the Field Program and the Quality Assurance Program (Analytical) detailed in the report prepared by AMEC entitled “Ground Water blanket Sampling Event, 695 Bishop Street North and Vicinity, Cambridge, Ontario, October 2009” dated December 2009;
- ii. The surface water sampling program shall include, at a minimum, the following:
  - a. surface water samples of the seeps and springs along a section of the Grand River as identified in Figure No. 1 entitled Northstar Aerospace 695



Bishop Street North and Vicinity, Approximate Sample Locations:  
January 2012 attached to the report prepared by AMEC entitled "Surface Water Sampling Downgradient of Northstar Aerospace (Canada) Inc., Cambridge, Ontario, October 2011" dated February 2012, shall be taken three times a year (Spring, Summer and Fall);

- b. Surface water samples of transects of the Grand River once per year;
- c. surface water grab samples shall be collected and analysed for the parameters listed in Schedule "C" of this Order; and
- d. the surface water sampling program shall be consistent with the methodology for the Field Program and the Quality Assurance Program (Analytical) detailed in the report AMEC entitled "Surface Water Sampling Downgradient of Northstar Aerospace (Canada) Inc., Cambridge, Ontario, October 2011" dated February 2012.

3.7.2 On or before December 20, 2010, and annually thereafter, Northstar shall submit to the Ministry's Guelph District Manager a Groundwater Monitoring Report prepared by the Qualified Person that is consistent with the report prepared by AMEC entitled "Ground Water Blanket Sampling Event, 695 Bishop Street North and Vicinity, Cambridge, Ontario, December 2010" dated December 20, 2010.

3.7.3 Within 90 days of completion of each surface water sampling event, Northstar shall submit to the Ministry's Guelph District Manager a Surface Water Monitoring report prepared by the Qualified Person that is consistent with the report prepared by AMEC entitled "Surface Water Sampling Downgradient of Northstar Aerospace (Canada) Inc., Cambridge, Ontario, October 2011" dated February 2012.

3.7.4 The termination of, or modifications to, the groundwater and or surface water monitoring programs detailed in Items 3.7.1, 3.7.2 and 3.7.3 of this Order must be requested by Northstar in writing to the Ministry's Guelph District Manager.

3.7.5 The termination of, or modifications to, the groundwater and or surface water monitoring programs shall only be implemented by Northstar upon Northstar receiving written approval from the Ministry's Guelph District Manager.

**3.8 Delineation of Groundwater Contamination in Bedrock On and in the Vicinity of the Northstar Property:**

3.8.1 Within 90 days of receipt of this Order, Northstar shall submit a detailed final work plan with timelines for the implementation of the delineation of groundwater Contamination in the bedrock groundwater on and in the vicinity of the Northstar Property.

3.8.2 This final work plan shall be consistent with the proposed work plan entitled "Proposed Work Plan, Initial Phase of Delineation of Chlorinated Solvents in Bedrock, 695 Bishop Street North and Vicinity, Cambridge, Ontario (DRAFT)", prepared by AMEC for Northstar dated May 6, 2010.

- 3.8.3 This final work plan shall incorporate the comments on the proposed work plan detailed in a letter provided to Northstar Canada by Senior Environmental Officer Mr. Phil Shewen dated December 13, 2010.
- 3.8.4 Upon written approval from the Ministry's Guelph District Manager, Northstar shall implement the final work plan for the delineation of the groundwater Contamination in the bedrock groundwater on and in the vicinity of the Northstar Property.
- 3.8.5 Within 180 days of the completion of the implementation of the final work plan for the delineation of the groundwater Contamination in the bedrock groundwater on and in the vicinity of the Site, Northstar shall submit to the Ministry's Guelph District Manager a report prepared by the Qualified Person that includes, at a minimum, the following:
- i. a complete summary of all work completed by Northstar pursuant to the final work plan referred to in Item 3.8.4;
  - ii. detailed interpretation of the geology and hydrogeology of the area investigated, an assessment of the fate and transport of the Contaminants, and an assessment of the likelihood of an adverse effect, as defined in the EPA, arising from the Contaminants in the bedrock groundwater;
  - iii. delineation of the lateral and vertical extent, as practicable, of the Contamination in the bedrock groundwater;
  - iv. update the conceptual site model as appropriate showing the key elements and interfaces which describe the fate and transport of the Contaminants from the Site to receptors;
  - v. results of representative sampling and analysis of the concentrations of Contaminants taken from groundwater monitoring wells, existing or constructed in accordance with this Order;
  - vi. all field and analytical data, sampling protocols and certificates of analysis, including a summary and interpretation of all field and analytical data, and certificates of analysis in order to evaluate and interpret the distribution of any groundwater Contamination and soil contamination encountered as a result of the bedrock investigation;
  - vii. plan view maps showing the property boundaries, all monitoring well/test hole/test pits utilized, the location of any groundwater wells within the Contaminant plume including the location of municipal and private water wells, surface water features, storm and sanitary sewers, and water mains. All maps shall contain an appropriate scale, legend and north arrow;
  - viii. bedrock groundwater Contaminant delineation map(s) showing isopleths for each Contaminant based upon the findings obtained in accordance with this order and delineated to the applicable criterion as per the Ministry's Table 2 "Full Depth Generic Site Condition Standards in a Potable Ground Water Condition" as per the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" dated April 15, 2011, as amended from time to time, showing the Contaminants' groundwater analytical results with all exceedances of the applicable standard being highlighted;

- ix. plan view map(s), based upon the findings obtained in accordance with this Order, showing the shallow groundwater elevation contours and groundwater flow directions;
- x. representative cross-sectional drawings in both the direction of groundwater flow and transverse to the direction of groundwater flow. The cross-sectional drawings are to show the stratigraphy; the location and construction details of all monitoring wells that are located along or near the cross-section with exceedances of the Table 2 criteria highlighted; groundwater elevations from locations that are along or near the cross-section; and the location of buried services, storm and sanitary sewers, and any surface water features along or near the cross-section;
- xi. monitoring well/borehole logs, water well records as per Ontario Regulation 903, and laboratory certificates of analysis installed as part of the bedrock investigation;
- xii. quality assurance/quality control assessment of all sampling results; and
- xiii. any recommendations for additional work.

**3.9 Remediation of Groundwater Contamination that has Migrated Off the Site into the Bishop Street Community:**

- 3.9.1 Forthwith, Northstar shall continue to implement the work detailed in the Memo prepared by AMEC to Northstar regarding the Revised Work Plan for Feasibility Assessment of *In Situ* Chemical Oxidation in the Southern Residential Area dated September 27, 2011, and in accordance with Environmental Compliance Approval No. 0462-87YKVH dated January 19, 2012.
- 3.9.2 Within thirty-days of receipt, Northstar shall submit to the Ministry's Guelph District Manager copies of all field and analytical data collected, along with laboratory certificates of analysis, as part of the completion of this work ordered as well as all summary progress update letter reports/memorandums as they become available and as detailed in Section 9.0 of the Revised Work Plan for Feasibility Assessment of *In Situ* Chemical Oxidation in the Southern Residential Area prepared by AMEC dated September 27, 2011
- 3.9.3 Pursuant to section 3.9.1 of this Order, Northstar shall upon completion of the required work submit a final report prepared by the Qualified Person to the Ministry's Guelph District Manager that evaluates the use of in situ chemical oxidation as a viable remedial option for the Area Under Investigation. If in situ chemical oxidation is not found to be a viable remedial option for the Area Under Investigation, the report shall also include an analysis of alternative remedial options. The remedial options analysis shall include the following:
  - i. a description of each remedial approach considered;
  - ii. the advantages/disadvantages of each approach considered for use in the southern residential area relative to effectiveness, estimated time for remediation, and existing level of Contamination;
  - iii. a recommendation for a preferred remedial option including rationale; and

iv. a detailed work plan and anticipated timelines for the implementation of the preferred remedial option.

3.9.4 Upon written approval from the Ministry's Guelph District Manager, Northstar shall implement the preferred remedial option to remediate the groundwater Contamination in the Area Under Investigation.

3.9.5 Within 180 days of the implementation of the preferred remedial option, Northstar shall submit to the Ministry's Guelph District Manager semi annual (every six months) progress reports prepared by or under the supervision of the Qualified Person. The frequency of the submission of progress reports by Northstar can be reduced upon written approval of the Ministry's Guelph District Manager.

### **3.10 Updated Interim Remedial Action Plan ("IRAP")**

3.10.1 On or before November 2, 2012, Northstar shall submit to the Ministry's Guelph District Manager, the City of Cambridge and Public Health an updated draft IRAP.

3.10.2 Within 60 days of submission to the Ministry Guelph District Manager of the updated draft IRAP, Northstar shall hold two public information sessions, one in the afternoon and one in the evening, in order to update the Bishop Street Community on the progress of remediation of the groundwater Contamination in the Bishop Street Community, present the updated draft IRAP and allow for public consultation.

3.10.3 Within 60 days of the public information sessions Northstar shall finalize and submit the updated draft IRAP by incorporating or addressing comments received from the Ministry, Public Health, or any other stakeholders that may have an interest or be affected by the groundwater Contamination. The finalized IRAP shall cover the 24 month period from March 2, 2013.

3.10.4 Upon written approval from the Ministry's Guelph District Manager and Public Health, Northstar shall implement the updated IRAP.

3.10.5 Every 24 months from November 2, 2012, Northstar shall update and resubmit a draft IRAP. The updates shall follow the same schedule as 3.10.2 and 3.10.3.

3.10.6 Northstar shall update the IRAP every 24 months until written approval to terminate updating the IRAP is received from the Ministry's Guelph District Manager and Public Health.

### **3.11 Communication**

3.11.1 Northstar shall continue to provide copies of all final reports submitted to the Ministry's Guelph District Manager to the local public library and make copies of

all final reports available for viewing to any stakeholders that may have an interest in or be affected by the groundwater Contamination.

- 3.11.2 Northstar shall continue to prepare and deliver update letters to all the property owners (tenants) within the Area Under Investigation as appropriate. These update letters are to provide the public with an update on the status of the environmental investigation and remediation as well as inform the public of any changes or news relating to the works being undertaken in relation to the groundwater Contamination.
- 3.11.3 Northstar shall continue to routinely meet on a monthly basis, or on a different basis if agreed to in advance, with the Ministry, Region of Waterloo (Public Health and Water Services), the City of Cambridge and the Grand River Conservation Authority to provide progress updates on the work being undertaken in the Area Under Investigation, to discuss future plans and to answer questions.
- 3.11.4 While this Order is in effect, report in writing, to the Guelph District any significant changes of operation, emission, ownership, tenancy or other legal status of the facility or operation.

#### **Part 3.12 – Other Requirements**

- 3.12.1 In this Order a reference to a licence, permit, approval, plan, protocol or similar document includes any amendments thereto from time to time.
- 3.12.2 The Parties to this Order shall in a timely manner share all relevant information within their possession or control with the other named Parties to this Order, where the information is relevant to the other named Party doing the things required by this Order.
- 3.12.3 The Parties to this Order shall in a timely manner share with the other named Parties to this Order any submissions made to the Ministry in accordance with this Order.
- 3.12.4 A Party to this Order shall immediately notify the Guelph District Manager verbally and by written fax follow-up if the Party believes that another Party to this Order is not complying with Items 3.12.2 or 3.12.3 of this Order. The written fax follow-up shall state what information or submissions have not been shared and the reason why the information or submission should be shared.
- 3.12.5 Pursuant to subsection 196(2) of the Environmental Protection Act (EPA), immediately upon issuance of this Order, the Parties to this Order, where they have ownership or exercise management or control of property, or have ownership or exercise management or control of environmental monitoring equipment or facilities shall permit the other named Parties to this Order, or their agents, access to the property or the environmental monitoring equipment or facilities where access to the property, equipment or facilities is required for

doing the things required by this Order. All of the Parties to this Order shall be responsible for the proper maintenance of the environmental monitoring equipment, including all monitoring wells, on their property. In the event of any damage to the monitoring equipment required for doing the things required by this Order, the Party who owns the property on which the monitoring equipment is located shall ensure that any damage is repaired in accordance with Ontario Regulation 903 and the well casing resurveyed such that the requirements of this Order can be met.

- 3.12.6 A Party to this Order shall immediately notify the Ministry's Guelph District Manager verbally and by written fax follow-up if access to any property, or monitoring equipment or facility, where access to the property, equipment or facility is required for doing the things required by this Order, is prevented or is otherwise inaccessible. The written fax follow-up shall state why the access is required, and the details and reason why access has been prevented or is otherwise inaccessible.
- 3.12.7 All written reports and submissions required to be submitted to the Ministry pursuant to this Order shall be final and not be labelled as draft nor include any reference to being draft information. All written reports are to be signed by either the Competent or Qualified Person as applicable.
- 3.12.8 All written reports that require the signature of a Qualified Person, submitted to the Ministry pursuant to this Order, shall contain a signed declaration made by the Qualified Person responsible for the written report, as follows:

"I have read the Order No. 6076-8RJRUP and I have been retained in relation to the work specified in the following sections of the Order:

[insert section numbers]

I have not been retained in relation to the work specified in the following sections of the Order:

[insert section numbers or "not applicable"]

I have the appropriate expertise and skill to do the work for which I have been retained."

### **3.13 Certificate of Requirement**

- 3.13.1 Pursuant to the authority vested to me under subsection 197 (1) of the EPA, I hereby order you and any other person with an interest in the Site, before dealing with the Site in anyway, to give a copy of this Order, including any amendments

thereto, to every person who will acquire an interest in the Site as a result of the dealing.

- 3.13.2 Within fifteen (15) days from the date of receipt of a Certificate of Requirement, issued under subsection 197(2) of the Act, register the Certificate of Requirement on title to the Property in the appropriate Land Registry Office.
- 3.13.3 Immediately after registration of the Certificate of Requirement, provide to the Director written verification that the certificate of requirement has been registered on title to the Northstar Property.

### **3.14 Financial Assurance**

Pursuant to the authority vested in me under sections 132 and 196 of the EPA, I hereby order Northstar as follows:

- 3.14.1 Within 60 days of issuance of this Order, prepare and submit to the Ministry's Guelph District Manager cost estimates with respect to compliance with the work requirements of this Order (including implementation of the current IRAP) estimated to March 2, 2013.
- 3.14.2 The cost estimates shall include the following:
- (a) capital and other one-time costs;
  - (b) recurring or annual costs;
  - (c) administrative and or other cost related to compliance with this Order;
  - (d) a break down of the costs of compliance for each section of this Order, namely, Items 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11;
  - (e) an explanation of all sources of data and assumptions used in making such estimates;
  - (f) all supporting documentation or information used in making such estimates; and
  - (g) any other documentation or information of any kind in your possession or control that is relevant to estimating the cost of compliance with this Order.
- 3.14.3 Commencing on March 2, 2013 and on a bi-annual basis thereafter, submit revised cost estimates for the next 24 months.
- 3.14.4 The revised cost estimates submitted on March 2, 2013 and all subsequent bi-annual revised cost estimates submitted in accordance with section 3.14.3 shall include the information specified in section 3.14.2 for the forthcoming 2 year period.

#### **Part 4: General**

- 4.1 All orders are issued in the English language and may be translated into the French language. In the event that there should be a conflict between the English original and the French translation, the English original shall prevail.
- 4.2 The requirements of this Order are severable. If any requirement of this order or the application of any requirement to any circumstance is held invalid, the application of such requirement to other circumstances and the remainder of the Order shall not be affected thereby.
- 4.3 Subsection 19(1) of the EPA provides that an order of the Director is binding upon the successor or assignee of the person to whom it is directed.
- 4.4 Subsection 186(2) of the EPA provides that non-compliance with the requirements of this Order constitutes an offence.
- 4.5 Any request to change a requirement in this Order shall be made in writing to the Director, with reason for the request, at least 14 days prior to any compliance date for that requirement.
- 4.6 The requirements of this Order are minimum requirements only and do not relieve you from:
- i. complying with any other applicable order, statute, regulation, municipal, provincial or federal law, or
  - ii. obtaining any approvals or consents not specified in this Order;
- 4.7 Notwithstanding the issuance of this Order, further or other orders may be issued in accordance with legislation as circumstances require. In particular, the Director shall issue an order where the approval of the Director is required in respect of a matter under this Order and,
- i. the Director does not grant approval; or
  - ii. the Director does not grant approval because the changes which the Director considers necessary for granting approval have not been agreed to by the persons to whom this Order is issued.



4.8 In the event that any party to this Order is, in the opinion of the Director, rendered unable to perform or comply with any obligations herein because of:

- i. natural phenomena of an exceptional, inevitable or irresistible nature, or insurrections; or
- ii. strikes, lockouts or other labour disturbances; or
- iii. inability to obtain materials or equipment for reasons beyond the control of the company; or
- iv. any other cause whether similar to or different from the foregoing beyond the reasonable control of the parties,

the obligations hereof, as they are affected by the above shall be adjusted in a manner defined by the Director. To obtain such an adjustment, the party must notify the Director immediately of any of the above occurrences, providing details that demonstrate that no practical alternatives are feasible in order to meet the compliance dates in question.

4.9 Failure to comply with a requirement of this Order by the date specified does not absolve Northstar from compliance with the requirement. The obligation to complete the requirement shall continue each day thereafter.

4.10 This Order has no expiry date.

#### **Part 5: Hearing Before The Environmental Review Tribunal**

5.1 Under section 140 of the EPA you may require a hearing before the Environmental Review Tribunal, if, within fifteen days after service upon you of this Order, you serve written notice upon the Environmental Review Tribunal and the Director.

5.2 Section 142 of the EPA provides that the notice requiring the hearing must include a statement of the portions of the Order for which the hearing is required and the grounds on which you intend to rely at the hearing. Except by leave of the Environmental Review Tribunal, you are not entitled to appeal a portion of the Order or to rely on grounds of appeal that are not stated in the notice requiring the hearing.

5.3 Written notice requiring a hearing shall be served personally or by mail on the following:

The Secretary  
Environmental Review Tribunal  
655 Bay Street, Suite 1500  
Toronto, ON  
M5G 1E5

and Director  
Ministry of the Environment  
One Stone Road West, 4<sup>th</sup> Floor  
Guelph, ON N1G 4Y2

Where service is made by mail, the service shall be deemed to be made on the fifth day after the day of mailing and the time for requiring a hearing is not extended by choosing service by mail.

Unless stayed by application to the Environment Review Tribunal under Section 143 of the EPA this order is effective from the date of issue.

Issued at Guelph this 15 day of MARCH, 2012.



Director

Ministry of the Environment

**SCHEDULE "A"**

	<b><u>ADDRESS</u></b>	<b><u>HRV/PCO or some combination</u></b>	<b><u>SSDs</u></b>	<b><u>Basement seal</u></b>	<b><u>Portable</u></b>	<b><u>Comments</u></b>
306	Bishop St.		x			
308	Bishop St.		x		x	
314	Bishop St.		x		x	
340	Bishop St.		x			
350	Bishop St.		x		x	
460	Bishop St.	x		x		HRV no longer needed December 2010
498	Bishop St.	x		x		HRV no longer needed December 2010
504	Bishop St.	x				
653	Bishop St.	x				HRV no longer needed December 2010, half of house on SVE, other half on SSDS
102	Blue Heron Ridge	x	x			
139	Blue Heron Ridge					
194	Blue Heron Ridge		x	x		
201	Blue Heron Ridge		x			
145	Brower Apt #1				x	
1410	Concession Rd.		x	x		
1430	Concession Rd.		x			
1499	Concession Rd.	x	x			
1505	Concession Rd.	x		x		HRV no longer needed December 2010
1516	Concession Rd.	x		x		
1517	Concession Rd.	x				HRV removed Oct 6/10
1519	Concession Rd.	x		x		
1520	Concession Rd.	x		x		HRV no longer needed December 2010
1521	Concession Rd.	x		x		Partial Seal HRV Removed Oct 20/2010
1542	Concession Rd.	x				
1549	Concession Rd.	x		x		
1550	Concession Rd.	x		x		HRV removed Oct 27/2010
1554	Concession Rd.	x		x	x	HRV removed Oct 22/2010
1561	Concession Rd.	x		x		
1562	Concession Rd.	x				
1571	Concession Rd.	x		x		
1607	Concession Rd.	x		x	x	HRV no longer needed December 2010
1608	Concession Rd.	x				
1615	Concession Rd.					
1620	Concession Rd.	x		x		

1628A	Concession Rd.		x				HRV Removed Oct.6/210
1639	Concession Rd.	x		x			HRV No longer needed December 2010
1649	Concession Rd.					x	HRV No longer needed December 2010
1665	Concession Rd.	x				x	HRV No longer needed December 2010
1675	Concession Rd.	x		x			
1709	Concession Rd.	x		x		x	
1710	Concession Rd.	x	x	x			
1723	Concession Rd.	x		x			HRV No longer needed December 2010
1733	Concession Rd.	x		x			HRV No longer needed December 2010
1745	Concession Rd.	x		x			HRV No longer needed December 2010
1755	Concession Rd.	x		x			HRV No longer needed December 2010
1808	Coronation Blvd.		x				
1844	Coronation Blvd.			x		x	
1847	Coronation Blvd.		x			x	
1848	Coronation Blvd.		x				
1850	Coronation Blvd.		x				
1857	Coronation Blvd.		x			x	
1871	Coronation Blvd.	x				x	
135	Dunbar Rd. (back)	x		x			HRV no longer needed December 2010
135	Dunbar Rd. (front)	x		x			HRV no longer needed December 2010
115	Dunbar Rd.	x		x			
125	Dunbar Rd.	x		x			HRV no longer needed December 2010
145	Dunbar Rd.	x		x			
155	Dunbar Rd.	x		x			HRV no longer needed December 2010
165	Dunbar Rd.	x		x			
247	Dunbar Rd.	x		x			HRV no longer needed December 2010
311	Dunbar Rd.	x		x			
387	Dunbar Rd.	x		x			
389	Dunbar Rd.	x		x			
491	Dunbar Rd.		x			x	
493	Dunbar Rd.	x		x			
503	Dunbar Rd.	x					
505	Dunbar Rd.	x					
509	Dunbar Rd.	x	x				
523	Dunbar Rd.	x					
535	Dunbar Rd.	x	x	x			
555	Dunbar Rd.		x				
1507	Fairview Rd.	x		x			HRV no longer needed December 2010
1512	Fairview Rd.	x					HRV Removed Ocr.20/2010

1540	Fairview Rd.	x		x	x	HRV Removed Oct.27/2010
1600	Fairview Rd.	x		x		HRV no longer needed December 2010
1622	Fairview Rd.	x				HRV no longer needed December 2010
1623	Fairview Rd.	x	x		x	
1633	Fairview Rd.	x		x		
1634	Fairview Rd.	x		x		HRV no longer needed December 2010
1641	Fairview Rd.	x				
1648	Fairview Rd.	x		x		
1651	Fairview Rd.	x				
1662	Fairview Rd.	x	x			HRV Removed Oct.27/2010, ssd install Apr 6/11
1663	Fairview Rd.	x				
1672	Fairview Rd.	x		x		
1692	Fairview Rd.	x				
1700	Fairview Rd.	x		x		
1708	Fairview Rd.	x		x		HRV no longer needed December 2010
1716	Fairview Rd.	x				
1722	Fairview Rd.	x		x		HRV no longer needed December 2010
1724	Fairview Rd.	x		x		HRV no longer needed December 2010
465	Grand Valley Drive	x		x		HRV no longer needed December 2010
467	Grand Valley Drive	x		x		HRV no longer needed December 2010
469	Grand Valley Drive	x		x		HRV no longer needed December 2010
470	Grand Valley Drive					
471	Grand Valley Drive	x				HRV no longer needed December 2010
472	Grand Valley Drive					
473	Grand Valley Drive	x		x		HRV no longer needed December 2010
474	Grand Valley Drive					
475	Grand Valley Drive	x		x		HRV no longer needed December 2010
476	Grand Valley Drive				x	
478	Grand Valley Drive				x	
480	Grand Valley Drive					
503	Grand Valley Drive	x		x		HRV no longer needed December 2010
507	Grand Valley Drive	x		x		HRV no longer needed December 2010
510	Grand Valley Drive	x		x		HRV no longer needed December 2010
513	Grand Valley Drive	x				HRV no longer needed December 2010
514	Grand Valley Drive	x		x		

519	Grand Valley Drive					
520	Grand Valley Drive	x		x		
						HRV no longer needed December 2010
523	Grand Valley Drive	x		x		
						HRV no longer needed December 2010
524	Grand Valley Drive	x		x		
529	Grand Valley Drive				x	
						HRV no longer needed December 2010
530	Grand Valley Drive	x		x		
						HRV no longer needed December 2010
539	Grand Valley Drive	x		x		
						HRV no longer needed December 2010
540	Grand Valley Drive	x		x		
						HRV Removed Oct.13/2010
547	Grand Valley Drive	x		x		
						HRV no longer needed December 2010
559	Grand Valley Drive	x		x		
						HRV no longer needed December 2010
562	Grand Valley Drive	x		x		
						HRV no longer needed December 2010
574	Grand Valley Drive	x		x		
						HRV no longer needed December 2010
581	Grand Valley Drive	x		x		
						HRV no longer needed December 2010
582	Grand Valley Drive	x	x	x		
						HRV no longer needed December 2010
593	Grand Valley Drive	x		x		
						HRV no longer needed December 2010
594	Grand Valley Drive	x		x		
						HRV no longer needed December 2010
613	Grand Valley Drive	x		x		
						HRV no longer needed December 2010
621	Grand Valley Drive	x		x		
						HRV no longer needed December 2010
622	Grand Valley Drive			x		
627	Grand Valley Drive	x				
636	Grand Valley Drive	x	x		x	
520	Hopewell Rd.	x		x		
528	Hopewell Rd.	x		x		
532	Hopewell Rd.	x				
						HRV no longer needed December 2010
538	Hopewell Rd.	x		x		
						HRV no longer needed December 2010
544	Hopewell Rd.			x		
						HRV no longer needed December 2010
554	Hopewell Rd.	x				
						HRV no longer needed December 2010
566	Hopewell Rd.	x				
						HRV no longer needed December 2010
616	Hopewell Rd.	x		x		
						HRV no longer needed December 2010
624	Hopewell Rd.	x		x		
						HRV no longer needed December 2010
636	Hopewell Rd.	x		x		
						HRV no longer needed December 2010
642	Hopewell Rd.	x		x		
						HRV no longer needed December 2010
652	Hopewell Rd.	x	x	x	x	
						HRV no longer needed December 2010
662	Hopewell Rd.	x	x	x	x	
						HRV no longer needed December 2010
1622	King St.	x	x	x		
						HRV no longer needed December 2010
1677	King St.	x	x			
						HRV no longer needed December 2010
1727	King St.		x		x	

1790	King St.	x	x	x	x	HRV no longer needed December 2010, SSD install April 21/11
1792	King St.	x		x		
1798	King St.	x		x		
433	Montrose Ave.		x			
106	Oriole Ave.		x			
120	Oriole Ave.		x	x	x	
134	Oriole Ave.	x		x		
144	Oriole Ave.		x	x		
115	Pheasant Ave.		x			
501	Philip Cres.	x		x		HRV no longer needed December 2010 HRV Removed Nov.30/2010
503	Philip Cres.	x		x		
507	Philip Cres.	x		x		
531	Philip Cres.			x		
532	Philip Cres.	x		x		
535	Philip Cres.	x	x			
539	Philip Cres.		x			
542	Philip Cres.	x		x		
512	Pine St.	x		x		HRV no longer needed December 2010 HRV no longer needed December 2010
517	Pine St.	x		x		
518	Pine St.	x		x		
520	Pine St.	x				
525	Pine St.	x		x	x	HRV no longer needed December 2010
526	Pine St.	x				
528	Pine St.		x	x	x	
529	Pine St.	x		x		HRV no longer needed December 2010
532	Pine St.	x		x	x	
535	Pine St.	x		x		HRV no longer needed December 2010
538	Pine St.	x	x	x		
539	Pine St.	x		x		HRV no longer needed December 2010
546	Pine St.	x	x	x		
560	Pine St.	x	x			ssd install Mar.15, 2011 HRV no longer needed December 2010
563	Pine St.	x		x		
575	Pine St.	x	x	x		
578	Pine St.		x			
615	Pine St.	x	x	x		
635	Pine St.		x	x		
1390	Pineview Ave.		x	x	x	
1493	Pineview Ave.				x	
1497	Pineview Ave.		x		x	
1410	Pineview Crt.		x	x	x	
1416	Pineview Crt.		x			

1418	Pineview Crt.		x		
1424	Pineview Crt.				x.
1446	Pineview Crt.				
1454	Pineview Crt.			x	x
1631	Queenston Rd.	x	x	x	
1648	Queenston Rd.			x	
1732	Queenston Rd.		x	x	
1735	Queenston Rd.	x		x	
1747	Queenston Rd.	x	x	x	
1769	Queenston Rd.	x		x	
1771	Queenston Rd.	x		x	
1783	Queenston Rd.	x		x	
1800	Queenston Rd.			x	x
1808	Queenston Rd.	x	x	x	
1814	Queenston Rd.	x	x		
563	Severn Ave	x		x	
605	Severn Ave	x	x	x	
615	Severn Ave	x		x	
629	Severn Ave	x		x	
635	Severn Ave	x		x	
641	Severn Ave	x		x	
647	Severn Ave	x		x	
653	Severn Ave				
659	Severn Ave	x		x	
671	Severn Ave	x		x	
695	Severn Ave				x

HRV no longer needed  
December 2010  
HRV no longer needed  
December 2010

HRV no longer needed  
December 2010  
HRV Removed  
Oct.13/2010

HRV Removed  
Nov.3/2010

**Total # of homes with  
some type of  
mitigation**



**SCHEDULE "B"**

**Locations of Current 21 SVE Systems in Bishop Street Community**

<b>System</b>	<b>Location</b>	<b>System</b>	<b>Location</b>
1	562 Grand Valley Drive	9	503 Grand Valley Drive
2A	465 Grand Valley Drive	10	1783 Queenston Road
2B	1724 Fairview Road	12	1507 Fairview Road
3A	155 Dunbar Road	13	1665 Concession Road
3B	155 Dunbar Road	14	1622 Fairview Road
3C	470 Grand Valley Drive	15	1542 Concession Road
4	559 Grand Valley Drive	16	1454 Pineview Crescent
5	621 Grand Valley Drive	17	1540 Fairview Road
6	538 Hopewell Road	18	1505 Concession Road
7	635 Severn Avenue	19	664 Bishop Street North
8	540 Grand Valley Drive		

**SCHEDULE "C"**

**GROUNDWATER and SURFACE WATER ANALYTICAL PARAMETERS**

**Volatile Organic Compounds ("VOCs"):**

1,1,1-TRICHLOROETHANE  
1,1,2-TRICHLOROETHANE  
1,1-DICHLOROETHANE  
1,1-DICHLOROETHYLENE  
1,2-DICHLOROETHANE  
CHLOROETHANE  
CIS-1,2-DICHLOROETHYLENE  
TETRACHLOROETHYLENE  
TRANS-1,2-DICHLOROETHYLENE  
TRICHLOROETHYLENE  
VINYL CHLORIDE

**Metals:**

Chromium  
Chromium VI

## SCHEDULE "D"

### Region of Waterloo TCE Fact Sheet

# Trichloroethylene (TCE)

## For the Bishop Street Community



Region of Waterloo  
PUBLIC HEALTH

### **What is trichloroethylene (TCE)?**

TCE is a clear colourless liquid used mainly for degreasing of metal parts in the automotive and metal industries. It can also be found in some household products, such as glues, adhesives, paint removers, spot removers, rug cleaning fluids, paints, metal cleaners and typewriter correction fluid.

### **How does TCE get into the environment?**

The largest source of TCE in the environment is through air emissions from factories that use it to remove grease from metals. TCE can also enter air and groundwater if it is improperly disposed of or leaks into the ground. It evaporates easily but can stay in the soil and in groundwater for an extended period of time.

### **How can I be exposed to TCE?**

Aside from workers with occupational exposure, the most common sources of exposure to TCE for the general population are through air and drinking water.

The route of exposure of residents to TCE in the Bishop Street Community is not through the outdoor air (which does not have elevated levels of TCE), but rather through the indoor air. **This is due to the presence of TCE in the groundwater underneath the homes.** TCE evaporates from the contaminated groundwater, enters the soil vapor (air spaces between soil particles), and migrates through building foundations into the building's indoor air. This process is called "soil vapor intrusion."

The municipal drinking water supplied by the Region of Waterloo to area residents continues to be monitored and is safe and unaffected by the contamination.

### **What are the health risks associated with TCE exposure?**

As with exposure to any chemical, a person's health risk depends on a number of factors, including:

- How much TCE an individual was exposed to (the dose);
- How long the exposure lasted (the duration);
- How the person was exposed (breathing, drinking, eating or skin contact);
- Other factors associated with the individual (such as age, health, lifestyle choices, family traits, and other chemicals the person is exposed to).

Health risks can be categorized into acute effects and chronic/sub-chronic effects. Acute effects are those that occur after short-term exposure (e.g. minutes, a few days) to very high concentrations of TCE (e.g. concentrations in the hundreds of thousands of micrograms per cubic meters ( $\mu\text{g}/\text{m}^3$ ) or greater). Symptoms of acute exposure can include drowsiness, decreased memory and perception, visual effects and anesthesia. Indoor air concentrations of TCE in the Bishop Street Community are much lower than those that give rise to acute effects.

Chronic effects are those that occur after long-term exposure (e.g. years). Sub-chronic effects are those that occur after intermediate-term exposure (e.g. months). These effects include cancer (from chronic exposure) and non-cancer effects (from sub-chronic or chronic exposure). The main concern with TCE exposure is the risk of cancer. Overall, studies in humans and animals are highly suggestive of an increased risk for cancer in people who are exposed to elevated levels of TCE over long periods of time (e.g. workers exposed to levels 20,000  $\mu\text{g}/\text{m}^3$ ). Cancers that have been associated with TCE include kidney, liver and lymphoid tissue cancers.

next page ►

The risks of cancer associated with chronic exposures to low levels of TCE are as follows: An air level of TCE at 0.5 µg/m<sup>3</sup> corresponds to a 1 in one million risk of cancer over a lifetime (70-year exposure). An air level of TCE at 5 µg/m<sup>3</sup> corresponds to a 1 in one hundred thousand risk of cancer over a lifetime (70-year exposure). An air level of TCE at 50 µg/m<sup>3</sup> corresponds to a 1 in ten thousand risk of cancer over a lifetime (70-year exposure).

Chronic and sub-chronic effects, other than cancer, are less understood and research is ongoing. Potential effects include those to the central nervous system, kidney, liver, respiratory, developmental and reproductive systems. However, it is generally recognized that cancer is the most sensitive health outcome.

### **What is the level of risk in the Bishop Street Community?**

Although there are many health effects described for TCE, especially for acute exposures to high concentrations, the levels of TCE in the Bishop Street Community are not expected to result in the acute effects described for TCE. While health risks associated with sub-chronic and chronic TCE exposure, in particular cancer, are possible the risk is very low given the low concentrations of indoor TCE in the Bishop Street Community.

### **What are the recommended action levels?**

Recommended action levels are many times lower than the levels that have caused health effects in human and animal studies that have been used to set action levels or standards. The recommended action levels are based on the assumption that people are continuously exposed to TCE in air all day, every day for as long as a lifetime (70 years). This is rarely true for most people who, if exposed, are likely to be exposed for only part of the day and part of their lifetime. These action levels are for the general population, including infants, children, the elderly and those with preexisting health conditions.

The recommended action levels are as follows:

- **Less than 0.5 µg/m<sup>3</sup>**
  - No further action is required.
- **Between 0.5 µg/m<sup>3</sup> and 5 µg/m<sup>3</sup>**
  - Annual indoor air monitoring recommended, while groundwater remediation (i.e. remediation of the source contamination in the groundwater) is ongoing.
- **Above 5 µg/m<sup>3</sup>**
  - Homes recommended to be assessed for indoor air remediation (i.e. active TCE removal from indoor air) while groundwater remediation (i.e. remediation of the source contamination in the groundwater) is ongoing.

### **For more information, contact:**

Region of Waterloo Public Health at 519-883-2008 ext. 3418.

This fact sheet was created using materials and information from the Ontario Ministry of the Environment, Standards Branch (consultation), New York State Department of Health (<http://nyhealth.gov/environmental/indoors/air/contaminants/>), the U.S. Department of Health and Human Services' Agency for Toxic Substances and Disease Registry (ATSDR) (<http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=30>), and the U.S. Environmental Protection Agency (EPA) (<http://cfpub.epa.gov/ncea/CFM/reordisplay.cfm?deid=215006>).

### **Region of Waterloo Public Health**

Health Protection and Investigation  
519-883-2008

[www.regionofwaterloo.ca/ph](http://www.regionofwaterloo.ca/ph) • 519-883-2000 • TTY 519-883-2427 • Fax 519-883-2241