



February 8, 2018

Hounsfield Heights – Briar Hill Community Association

1922 14 Ave NW
Calgary, AB T2N 1M5

Re: SEARS Plume

ARO Environmental Solutions Ltd. (ARO Enviro) was retained by the Hounsfield Heights – Briar Hill Community Association (HHBH CA) to complete a peer review of previously written environmental reports concerning the current status beneath North Hill mall and the HHBH community.

As part of this peer review, ARO Enviro has summarized previous environmental reports completed to date and available for review on Alberta Environment and Parks Environmental Site Assessment Repository (ESAR). More than 230 documents are available for review on ESAR. An overview and summary of work completed to date is outlined below.

Date	Report	Details
1958 - 1984		Site developed as Sears and gas station. Operated until 1984, when original tanks were replaced. These tanks were considered the main source of the contamination, although the gas station continued to operate (with new tanks) until 1995.
1995		Gas station is decommissioned.
1995 - 1997	Environmental Activities Synthesis Report by Seacor Environmental Engineering Inc. (Seacor), issued in 1997	Phase I and II Environmental Site Assessment (ESA), includes 1996 and 1997 drilling events. Thirty boreholes (BHs) drilled at Sears and North Hill mall parking lot, seven BHs drilled along 14 th Ave. Contamination present in soil and groundwater on and off-Site.
1998	Offsite Delineation Drilling Summary Report by Seacor, issued as Draft in March 1998	Twelve BHs drilled in North Hill Mall parking lot in order to delineate contamination.
1998	Offsite Delineation Drilling Summary Report by Seacor, issued as Draft in May 1998	Six boreholes drilled in Lions Park, four of which were completed as monitoring wells. Contamination considered present in soil.
1999	Human Health Risk Assessment by Clifton Associates Inc. (Clifton), issued as Draft in February 1999	Site-specific human health risk assessment targeted towards the southeast corner of the North Hill Mall. Human health risks were determined to be present and remediation objectives were developed for soil and groundwater.



1999	Supplementary Environmental Site Assessment by Clifton, issued as Draft in May 1999	Groundwater sampling identified liquid petroleum hydrocarbons (LPH), followed by installation of 38 new monitoring wells at North Hill Mall and throughout Hounsfield Heights.
1999	Subsurface Air and Groundwater Sampling by Clifton, issued as Draft in May 1999	Sampled air and groundwater in vicinity of three buildings associated with North Hill Mall (Liquor Store, Shopping Center, Sears Building).
1999	Site Monitoring Reports by Clifton, issued in Draft in June 1999	Groundwater monitoring and sampling, and LPH removal.
1999	Risk Management Plan by Clifton, issued as Draft in July 1999	Excavation of impacted material recommended.
1999	Site Verification Testing for Insitu Bioremediation, issued by Hobbs Miller Matt Inc. (HMM), issued December 1999	Drilled 11 boreholes, three completed as monitoring wells.
2000 - 2002	Several (at least seven) Monitoring, Sampling, and LPH Recovery reports by Clifton	
2000	HMM installs and operates an insitu bioremediation system – report not reviewed	Insitu bioremediation system installed in North Hill Mall parking area.
2003	Supplementary Environmental Site Investigation by Clifton, issued in March 2003	Ten BHs, completed as monitoring wells, were installed on City of Calgary property in Hounsfield Heights. Soil and groundwater contamination present.
2003	Environmental Site Assessment at 1306 15 Street NW by Clifton, issued August 2003	Three boreholes, completed as monitoring wells were installed at 1306 15 Street NW. Soil and groundwater results met guidelines applicable at that time.
2003	Remediation of Source Area of Site Contamination and Hot Spot by HMM, issued October 2003	HMM supervised the excavation and treatment of approximately 600 m ³ of impacted soil associated with the former fuel tanks. Treated soil was used as backfill.
2003	2003 Supplemental Environmental Site Investigation Hounsfield Heights by Clifton, issued December 2003	Forty-four BHs, completed as monitoring wells, were installed on City of Calgary property in Hounsfield Heights. Soil and groundwater contamination (including LPH) present.
2004	2004 Confirmatory Drilling Program by Clifton, issued May 2004	Installed 15 monitoring wells at North Hill Mall. Soil and groundwater contamination was present.
2004	Community-Wide Assessment of Potential Health Impacts from Hydrocarbons in Hounsfield Heights by Cantox Environmental Inc. (Cantox), issued in July 2004	Cantox indicates that hydrocarbons beneath Hounsfield Heights present no obvious threat to human health or the environment.



2004	Development of Modified Tier 2 Criteria for Hydrocarbons in Hounsfeld Heights by Cantox, issued on August 2004	A review of the modified Tier 2 criteria for soil and groundwater quality at Hounsfeld Heights.
2004	Site Management Plan by Clifton, issued June 2004	Clifton has developed a Site Management Plan that relies on work completed by Cantox.
2004	On-Site ex-situ soil remediations completed by HMM, issued Aug and Dec 2004	HMM supervised the excavation and treatment of approximately 1150 m ³ of impacted soil associated with the former fuel tanks. Treated soil was used as backfill.
2005	Dual-Phase Vapour Extraction (DPVE) pilot test by Clifton in February 2005 – report not reviewed	Clifton completed a DPVE pilot test in Hounsfeld Heights. This information was mentioned in another report.
2005	Work Plan for Remediation by Clifton, issued June 2005	Proposed plan for excavation and allu of impacted soil at North Hill Mall.
2006	Community-Wide Assessment of Potential Health Impacts Associated with Hydrocarbons in Hounsfeld Heights by Cantox, issued May 2006	Cantox found no significant evidence of potential for human health or environmental impacts from hydrocarbons in Hounsfeld Heights.
2006 - 2007	Remediation of Hydrocarbons by Clifton, issued December 2008	Clifton excavated and treated approximately 69,000 m ³ of impacted soil, using Allu buckets, at North Hill Mall. Treated soil was used as backfill.
2008	Monitoring Well Decommissioning and Installation of Replacement Wells by Clifton, issued August 2008	Clifton decommissioned 56 monitoring wells and installed 11 replacement wells in Hounsfeld Heights.
2010	Confirmatory Drilling Program by Clifton, issued April 2010	Clifton installed 10 monitoring wells into the previously remediated area. Soil and groundwater concentrations above Tier 1 guidelines were present at that time.
2011	Pre-Commissioning Site Monitoring Report by Clifton, issued January 2011	Multi-Phase Vapour Extraction (MPVE) system was installed in Hounsfeld Heights. Cantox Tier 3 guidelines were accepted by AENV, with stipulations regarding zones 1, 2, and 3.
2011	First Quarter Site Monitoring Report (Hounsfeld Heights) by Clifton, issued June 2011	MPVE system became fully operational in February 2011.
2012	Site Monitoring Report (Hounsfeld Heights) by Clifton, issued December 2012	MPVE system has removed 1601 L of LPH since initialization.
2013	Site Monitoring Report at North Hill Mall by Clifton, issued January 2013	Groundwater concentrations on hydrocarbons above Tier 1 guidelines were present at time of report.



2014	Updated Site Management Plan Hounsfield Heights by Clifton, issued July 2014	In 2012, AESRD requested updated SMP, based on implementation of 2010 Guidelines. Eight specific data gap items were identified by AESRD to be addressed by Clifton.
2015	Groundwater Monitoring Well Abandonments Report in Hounsfield Heights by Clifton, issued March 2015	Clifton abandoned 50 monitoring wells in Hounsfield Heights.
2016	2015 Second Quarter Monitoring and Sampling Report Hounsfield Heights by Clifton, issued January 2016	Results of the monitoring and sampling indicated that the hydrocarbon plume at Hounsfield Heights is not vertically or horizontally delineated.
2016	Subsurface Investigation North Hill Mall and Hounsfield Heights by Clifton, issued January 2016	Clifton abandoned 61 monitoring wells, advanced 48 BHs, and installed 86 monitoring wells.
2016	Remedial Action Plan by Clifton, issued March 2016	During MPVE shutdown, LPH returned to a monitoring well in Hounsfield Heights. Clifton proposed chemical injections at select locations to enhance bioremediation.
2016	Development of Soil Vapour Quality Guidelines by Intrinsik, issued April 2016	Site-specific vapour quality guidelines were developed.
2016	Soil Vapour Monitoring Program by Clifton, issued June 2016	This report details the proposed soil vapour monitoring program. Also, indoor air sampling was completed at five residences.
2016	2016 Supplementary Drilling Report by Clifton, issued July 2016	Installed 12 monitoring wells and concluded that hydrocarbon plume at Hounsfield Heights is not vertically or horizontally delineated.
2016	Soil Vapour Monitoring Points Installation Report by Clifton, issued October 2016	Forty-one soil vapour monitoring probes were installed at select locations throughout North Hill Mall parking areas and Hounsfield Heights.
2016	Soil Vapour Monitoring Report for Spring 2016 by Clifton, issued December 2016	Forty-four vapour samples were collected and it was concluded that vapour migration from hydrocarbons in soil and groundwater was not an active exposure pathway of concern.
2017	Human Health and Ecological Risk Assessment for Hounsfield Heights Community and North Hill Mall Areas by Intrinsik Environmental Services Inc. (Intrinsik), issued April 2017	Human health risks were concluded to be low, although further assessment and remediation was recommended.



Should you have any questions regarding the information outlined in this letter, please contact me directly at 403 998-4610.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Mayson Abraham', is positioned below the word 'Sincerely,'.

Mayson Abraham, P.Chem.
ARO Environmental Solutions