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NOTE TO READER

This document was prepared for the Contaminated Sites Approved Professional Society (CSAP) for use by Approved Professionals in their work. The BC Ministry of Environment and Climate Change Strategy (ENV) has not endorsed this document and the information in this document in no way limits the director's exercise of discretion under the *Environmental Management Act.*

CSAP has recommended that Approved Professionals use their professional judgement[1] in applying any guidance, including this document. As the science upon which contaminated sites remediation is based is relatively young and because no two sites that involve the natural environment are the same, the need to exercise professional judgement within the regulatory process is recognized.

Ultimately, submissions for *Environmental Management Act* instruments need to meet regulatory requirements. The onus is on qualified professionals and Approved Professionals to document the evidence upon which their recommendations depend.

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The conclusions and recommendations of this document are based upon applicable legislation and policy existing at the time the document was prepared. Changes to legislation and policy may alter conclusions and recommendations.

[1] https://csapsociety.bc.ca/wp-content/uploads/ATT-3_-CSAP-Professional-Judgement-May2nd.pdf

CSAP GUIDANCE FOR POTENTIAL CONTAMINANTS OF CONCERN

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APPENDICES

1.0 INTRODUCTION

Legacy Environmental Ltd. (LEGACY) and Thurber Engineering Ltd. (Thurber) (collectively known as "LEGACY/Thurber") were commissioned by the Contaminated Sites Approved Professional (CSAP) Society to prepare this CSAP Guidance for Potential Contaminants of Concern (PCOCs). LEGACY/Thurber understands the purpose of this work is to develop a user-friendly guidance document that updates the *June 2018 Potential Contaminants of Concern at Select Commercial and Industrial Land Uses* document completed by PGL Environmental Consultants (PGL) and to include the *2020 Petroleum Hydrocarbon PCOC Data Review, Soil and Groundwater* completed by SLR Consulting Ltd. (SLR), as well as other data and information that has come out since 2018. This document is intended to provide BC practitioners with a basis for identifying relevant PCOCs at a site.

2.0 COMMON SCHEDULE 2 USES

CSAP requested the focus of this document be placed on the most common Contaminated Sites Regulation (CSR) Schedule 2 Uses encountered since November 2017. To determine the most common Schedule 2 Uses, data was extracted from site profile and site disclosure statements obtained from the BC Ministry of Environment and Climate Change Strategy (ENV). The data was organized into a spreadsheet and each Schedule 2 Use was ranked according to its frequency.

The top 10 most common Schedule 2 Uses were selected for inclusion in this document. In order from rank 1 to rank 10, the most listed Schedule 2 Uses include the following:

1. F1. petroleum or natural gas drilling
2. F2. petroleum or natural gas production facilities
3. G2. automotive, truck, bus, subway or other motor vehicle repair, salvage or wrecking
4. F7. petroleum product (other than compressed gas), or produced water storage in non-mobile above ground or underground tanks, except above ground tanks associated with emergency generators or with secondary containment
5. F5. petroleum product, other than compressed gas, dispensing facilities, including service stations and card locks
6. E1. appliance, equipment or engine repair, reconditioning, cleaning or salvage
7. C6. welding or machine shops (repair or fabrication)
8. F6. petroleum, natural gas or sulfur pipeline rights of way excluding rights of way for pipelines used to distribute natural gas to consumers in a community
9. E9. dry cleaning facilities or operations and dry cleaning chemical storage, excluding locations at which clothing is deposited but no dry cleaning process occurs

10. A9. pharmaceutical products, or controlled substances as defined in the Controlled Drugs and Substances Act (Canada), manufacturing or operations[1]

In addition to the top 10, an additional 27 Schedule 2 Uses, as included in PGL's 2018 document, are included herein to create an all-encompassing document that supersedes the PGL (2018) and SLR (2020) documents. The detailed analysis is included in **Appendix A** and shows the 37 included Schedule 2 Uses highlighted in grey. Given there are 87 Schedule 2 Uses listed in the Stage 14 Amendment to the CSR, there are 50 Schedule 2 Uses not included in this document. CSAP also requested LEGACY/Thurber provide guidance on identifying relevant PCOCs for a list of common areas of potential environmental concern (APECs) often encountered by practitioners.

3.0 PCOC GUIDANCE FOR SELECT SCHEDULE 2 USES

CSAP requested a review of the parameters listed in BC CSR Schedule 3.1, 3.2, 3.3, and 3.4 and to list which parameters are "Likely PCOCs" or "Possible PCOCs" for the 37 selected Schedule 2 Uses as identified in **Section 2.0**. Each of the 37 Schedule 2 Uses, plus fill material are listed in the attached **Table 1: PCOC Guidance for Select Schedule 2 Uses**. A list of common areas of potential environmental concern (APECs) and associated Likely and Possible PCOCs are listed in the attached **Table 2: PCOC Guidance for Common APECs**.

PGL's 2018 report references the extensive research they conducted into PCOCs for the various Schedule 2 Uses and it was not part of our scope to re-do this research. Rather, this document revisits and builds upon the research done by PGL, the hydrocarbon data review conducted by SLR in 2020, and the experience of the LEGACY/Thurber team. Where appropriate, we did conduct additional research such as for Schedule 2 Use A9, for which we reviewed various US EPA guidance on drug lab remediation. In addition, we completed research into specific items referenced in CSAP's Request for Proposal:

- Fuel PCOCs (referenced in SLR's 2020 report)
- When tetraethyl lead (TEL)should be included as a PCOC
- Which metals should be a PCOC for the most common Schedule 2 Uses

The Likely PCOCs are meant to be a list of the commonly identified contaminants for any given Schedule 2 Use regardless of the circumstances or specific activities that have occurred or are occurring. We expect that these substances will be tested for in the appropriate medium for a given

[1]A former Schedule 2 Use "E11 – Controlled Substances…" was initially ranked 10th; however, this was repealed as a Schedule 2 activity as part of the CSR Stage 13 Amendment in 2021.

Schedule 2 Use in most circumstances; however, we acknowledge there is always an allowance for the use of professional judgement.

The Possible PCOCs are meant to be a list of PCOCs that may be identified at any given Schedule 2 Use if certain circumstances or activities have occurred. An example of a Possible PCOC would be TEL at an F7 Schedule 2 Use. Since TEL is a gasoline additive only used pre-1986 or in aviation gas, a practitioner may decide to exclude it if the F7 operations commenced post 1986 or do not involve aviation fuel.

The Likely and Possible PCOCs provided in **Table 1** and **Table 2** should not be interpreted as the only PCOCs for each of these Schedule 2 uses. There are 100's of regulated PCOCs that have not been included in this document. Practitioners are encouraged to use this document as a guide to the most common PCOCs, but the full list of PCOCs for any given Schedule 2 use should be identified via a thorough Stage 1 Preliminary Site Investigation. These studies are designed to identify the site-specific operations and activities including the site-specific products and chemicals used over time. For example, at a foundry (C1.), the specific metal PCOCs depend on the metals/alloys being used and produced. For current manufacturing facilities, Safety Data Sheets (SDSs) can be compared against the CSR Schedules to identify the full list of regulated PCOCs.

Within **Table 1** and **Table 2**, several parameters are listed as Parameter Groups instead of individual parameters, an example of which is metals. The individual metal parameters included in the metals Parameter Group are listed in **Table 3** along with all other Parameter Groups.

4.0 REFERENCES

1. Government of Western Australia, Department of Environment. Contaminated Sites Management Series. October 2004. Potentially Contaminating Activities, Industries, and Landuses
2. BC Oil & Gas Commission, June 6, 2022. Site Remediation and Reclamation Manual
3. CSAP Soil Vapour Advice and Practice Guidelines Development Panel, September 30, 2009. Soil Vapour Advice and Practice Guidelines Development - Stage 1
4. Federal Aviation Administration. Website viewed in August 2022. Aviation Gasoline | Federal Aviation Administration
5. Health Canada. 2021. Federal Contaminated Site Risk Assessment in Canada, Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA), Version 3.0
6. Massachusetts Department of Environmental Protection Source Water Assessment Program. February 2017. Land Use/Associated Contaminants Matrix
7. Morales-Caselles, C., Gao, W., Ross, P.S. and Fanning, L. (2016). Emerging Contaminants of Concern in Canadian Harbours: A case study of Halifax Harbour (Marine Affairs Program Technical Report #15). Available at Marine Affairs Program: MAPTechnicalReport15.pdf (dal.ca)
8. Nation Research Council of Canada. June 2017. Transition to Unleaded Fuels for General Aviation
9. New Zealand Ministry for the Environment. Downloaded in November 2022. Hazardous Activities and Industries List (HAIL)
10. Oregon Department of Environmental Quality (DEQ), August 2003. Fact Sheet: Sources of Polychlorinated Biphenyls
11. PGL Environmental Consultants Ltd, 2018. Potential Contaminants of Concern at Select Commercial and Industrial Land Uses
12. SLR Consulting (Canada) Ltd, 2020. Petroleum Hydrocarbon PCOC Data Review, Soil and Groundwater
13. SLR Consulting (Canada) Ltd, May 2019. Guidance for the Assessment and Remediation of Per- and Polyfluoroalkyl Substances in British Columbia
14. Total Petroleum Hydrocarbon Criteria Working Group Series, 1998. Volume 2: Composition of Petroleum Mixtures
15. US EPA, August 2021. Voluntary Guidelines for Methamphetamine and Fentanyl Laboratory Cleanup
16. US EPA, April 28, 2022. Overview of Wood Preservative Chemicals
17. Wisconsin Department of Natural Resources. Remediation and Redevelopment Program. September 2019. Site Investigation Scoping: Identifying Contaminants of Concern
18. Yukon Government Environmental Protection and Assessment. August 2020. General Information on Waste Oil

5.0 ABOUT THE AUTHORS

Karey Dow, P.Ag., PMP

Karey is a senior project manager and contaminated sites specialist at LEGACY with 20 years of experience in contaminated sites consulting in British Columbia. Karey's technical expertise lies as a generalist in the world of contaminated sites and particularly within the land development sector. Karey helps clients navigate the complex and ever-changing Contaminated Sites Regulation to see a Brownfield site revitalized into a new and productive space for the community. Karey has been directly involved with Standard and Risk Assessment Approved Professionals on 30+ Ministry Instruments. Besides Karey's expertise and perspective as a non-CSAP, she is a certified Professional Project Manager.

Lora Paul, P.Eng., CSAP

Lora is a Senior Environmental Engineer at Thurber with 22 years of experience in contaminated sites and has been involved in a wide range of environmental projects throughout British Columbia. Lora has experience on a wide range of Commercial and Industrial sites for clients including federal and provincial governments, land developers, chemical manufactures, auto dealerships, oil and gas companies, municipal landfills and more.

Andrew Sorensen, P.Eng., CSAP

Andrew is a Senior Environmental Engineer at Thurber with over 23 years of experience conducting environmental site assessment and remediation projects and is the technical lead for Thurber's environmental operations in BC. His experience ranges from Preliminary and Detailed Site Investigations to long-term monitoring projects to complex remediation and closure projects. Andrew

is highly active within the CSAP Society and currently serves on the Board of Directors as Vice-President and Treasurer. He previously served on the Board of Directors between 2015 and 2019 as chair of the Professional Development Committee and Treasurer. During his previous tenure on the Board, he and Peter Reid spearheaded the initial PCOC project at the Board level as they recognized the need for a general PCOC reference document that BC practitioners could utilize.

Travis Deeter, P.Ag., CSAP

Travis is a Senior Environmental Scientist at Thurber with 20 years of experience in contaminated sites and has been involved in a wide range of environmental projects throughout British Columbia. His work focuses largely on the development sector, which often means working with the CSAP system for instrument applications. His experience encompasses residential, commercial, and industrial development, remote chemical spill cleanups, environmental monitoring and environmental audits, habitat restoration and bioengineering projects.

6.0 DISCLAIMER

This document was prepared based on the extensive experience of the report authors and feedback received from the CSAP Technical Review Committee. It is meant to be a guide for contaminated sites practitioners in BC. It is not meant to provide an exhaustive list of PCOCs for each Schedule 2 Use. It does not replace any regulatory requirements.

TABLES

Schedule 2 Use	Likely PCOCs	Possible PCOCs	
		Possible Parameter	**Related Activity/Source**
A8. Paint, lacquer or varnish manufacturing, formulation, recycling or bulk storage	Metals, LEPH, VPH, Toluene, Xylenes, Solvent VOC	nonylphenol and nonylphenol ethoxylates	Surfactants
		antifouling agents	Preservation agent
		chlorinated phenols	Preservation agent in antifouling paints
		PCB	Paint ingredient prior to 1979
A9. Pharmaceutical products, or controlled substances as defined in the Controlled Drugs and Substances Act (Canada), manufacturing or operations	BTEX, VPH, Solvent VOC	ammonia, nitrate, nitrite	Fertilizers
		sodium ion	Sodium hydroxide and sodium metal reagents
		lead, lithium, mercury	May be present depending on the method and raw materials used
		pyridine	Reagent
		trichloro-1,2,2-trifluoroethane, 1,1,2-	Solvent
		PAH, dioxins/furans	Burn pits
B2. Facilities using equipment that contains PCBs greater than or equal to 50 ppm	PCB, LEPH, HEPH	-	-
B3. Electrical equipment manufacturing, refurbishing or bulk storage	Zinc, LEPH, HEPH, VPH, BTEX, Solvent VOC	PCB	Liquid dielectrics in transformers (Most common pre-1980, but could be found later at refurbishing operations.)
		trichlorobenzene, 1,2,4-	Additive to liquid dielectrics in transformers
		sodium ion	Caustics like sodium hydroxide
B4. Electrical transmission or distribution substations	PCB, LEPH, HEPH	tetrachlorethylene and its daughter products	Mostly used post-1980
		trichlorobenzene, 1,2,4-	Additive to liquid dielectrics in transformers
		arsenic, copper, lead, zinc	Handling and storage of cable and electrical components, galvanized metal structures
		herbicides	Staining and distressed vegetation
B5. Electronic equipment manufacturing	Solvent VOC, Cadmium, Copper, Lead	chloride ion, fluoride and sodium ion	Electroplating baths, etching solutions
C1. Foundries	Metals, VPH, LEPH, HEPH, BTEX, Solvent VOC	cyanide	Cyanide salts (e.g., sodium cyanide) in hardening baths
		chloride ion, fluoride, sodium ion, and sulfate	Salt bath waste and fluxes
		dioxins/furans	Process wastes and melting plastics on scrap metal
		phenol, methyl phenols, and dimethylphenols	Phenol-formaldehyde resins (binder for sand castings)
		ammonia, nitrate, and nitrite	Urea-formaldehyde resins (binder for sand castings)
C2. Galvanizing	Metals, Solvent VOC, VPH, LEPH, HEPH	ammonia, chloride ion, fluoride, nitrate, nitrite, sodium ion, and sulfate	Caustics, fluxes, and electroplating solutions
		1,1,2-trichloro-1,2,2 trifluoroethane (CFC-113)	If used/processed in high volumes
		cyanide	Stabilizers
		perfluorobutane sulfonate (PFBS), perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA)	Coatings, wetting agent/fume suppressant, cleaners
C3. Metal plating or finishing	Metals, Solvent VOC, VPH, LEPH, HEPH	ammonia, chloride ion, fluoride, nitrate, nitrite, sodium ion, and sulfate	Caustics, fluxes, and electroplating solutions
		1,1,2-trichloro-1,2,2 trifluoroethane (CFC-113)	Solvents
		cyanide	Stabilizers
		PFBS, PFOS, PFOA	Coatings, wetting agent/fume suppressant, cleaners
C4. Metal salvage operations	Metals	-	For equipment cleaning and maintenance - See E1
C5. Metal smelting or refining	Metals, VPH, LEPH, HEPH, BTEX, Solvent VOC	cyanide	Cyanide salts (e.g., sodium cyanide) in hardening baths
		chloride ion, fluoride, sodium ion, and sulfate	Salt bath waste and fluxes
		dioxins/furans	Process wastes and melting plastics on scrap metal
		phenol, methyl phenols, and dimethylphenols	Phenol-formaldehyde resins (binder for sand castings)
		ammonia, nitrate, and nitrite	Urea-formaldehyde resins (binder for sand castings)
C6. Welding or Machine Shops (repair or fabrication)	Metals, LEPH, HEPH	ammonia, chloride, flouride	Welding fluxes
		BTEX, VPH, Solvent VOC	Painting or other solvent related activities
E1. Appliance, equipment or engine maintenance, repair, reconditioning, cleaning or salvage	Waste Oil Metals, LEPH, HEPH, PAH, Solvent VOC	ethylene glycol, propylene glycol	Known glycol spill
		lithium	Improper battery storage
		metals	Sand blasting
		BTEX/VPH	For gas/diesel equipment and engine repair
		-	For fuel storage - See F5
E2. Ash deposit from boilers, incinerators or other thermal facilities	Metals, PAH	dioxins/furans	If incinerator fuel included a chlorine source such as waste from a pulp mill, chlorophenol treated wood, or marine wood waste. Dioxin/furan concentrations are generally higher in fly ash as opposed to bottom ash.
E4. Coal gasification (manufactured gas production)	PAH, BTEX, Metals, Non-chlorinated Phenols	cyanide	Purifier and scrubber wastes, coal tar
		ammonia, nitrate, nitrite, and sulfate	Purifier and scrubber wastes, waste water treatment sludge
E6. Outdoor firearm shooting ranges	Antimony, Arsenic, Cadmium, Copper, Lead, Tin, and Zinc, PAH, Nitrates, Nitrites	Herbicides	Staining and distressed vegetation
E7. Road Salt or Brine Storage	Chloride Ion and Sodium Ion	cyanide	Anticaking compounds - unlikely to be present if salt ion concentrations are not elevated
E9. Dry cleaning facilities or operations and dry cleaning chemical storage, excluding locations	Drycleaning VOC	VPH	Stoddard solvent, primarily before 1970
		LEPH	
F1. Petroleum or Natural Gas Drilling	LEPH, HEPH, PAH, VPH, BTEX, Metals, Sodium Ion and Chloride Ion	Diesel VOC	Diesel storage
		Solvent VOC	Solvents use, produced water storage, drill fuel additives
		ammonia, nitrate, nitrite	Produced water storage and ponds, drill fuel additives
		sulfate	Produced water storage
		ethylene glycol, propylene glycol, triethylene glycol	Antifreeze, workover fluids
		methanol	Workover fluids,solvents
		herbicides	Staining and distressed vegetation
F2. Petroleum or Natural Gas Production Facilities	LEPH, HEPH, PAH, VPH, BTEX, Metals, Sodium Ion and Chloride Ion	Diesel VOC	Diesel storage
		sulfolane, diethanolamine, and diisopropanolamine	Sweetening additives, amine sumps
		Solvent VOC	Solvents use, Produced water storage, drill fuel additives
		ammonia, nitrate, nitrite	Produced water storage and ponds, drill fuel additives and amine breakdowns
		sulfate	Produced water storage
		ethylene glycol, propylene glycol, triethylene glycol	Antifreeze, workover fluids
		methanol	Workover fluids,solvents
		herbicides	Staining and distressed vegetation
		PFBS, PFOS, PFOA	Fire fighting foams
F5. Petroleum Product, other than compressed gas, dispensing facilities, including service stations and card locks	LEPH, HEPH, VPH, BTEX, PAH	Gasoline VOC	Gasoline storage -include 1,2-dibromoethane (EDB) and 1,2-dichloroethane pre-1986 -include MTBE 1988-2001
		Diesel VOC	Diesel storage
		TEL	Additive to gasoline pre-1986 and still being used for aviation fuel
		-	Crude oil storage - see F1/F2
F6. Petroleum, natural gas or sulfur pipeline rights of way excluding rights of way for pipelines used to distribute natural gas to consumers in a community	None identified	LEPH, HEPH, PAH, VPH, BTEX	For petroeum pipelines with a documented release
		sulfur	For a sulfur pipeline in an agricultural area with a documented release
		Gasoline VOC	For gasoline pipelines with a documented release
		Diesel VOC	For diesel pipelines with a documented release
		sulfolane, diethanolamine, and diisopropanolamine	For natural gas pipelines with a documented release
		metals	For suspect poor quality backfill
		Herbicides	Staining and distressed vegetation
F7. Petroleum Product (other than compressed gas), or Produced Water Storage in Non-mobile Aboveground or Underground tanks, except above ground tanks associated with emergency generators or with secondary containment	LEPH, HEPH, VPH, BTEX, PAH	Gasoline VOC	Gasoline storage -include 1,2-dibromoethane (EDB) and 1,2-dichloroethane pre-1986 -include MTBE 1988-2001
		Diesel VOC	Diesel storage
		TEL	Additive to gasoline pre-1986 and still being used for aviation fuel
		sulfolane, diethanolamine, and diisopropanolamine	Upstream Crude Oil Storage
		Solvent VOC	Produced water storage
		metals	Produced water storage
		sodium ion, chloride ion, ammonia, nitrate, nitrite	Produced water storage
		sulfate	Produced water storage
		-	Crude Oil Storage would not include BTEX/VPH and PAH as Likely PCOCs
F8. Petroleum product, other than compressed gas, bulk storage or distribution	LEPH, VPH, HEPH, BTEX, PAH	Gasoline VOC	Gasoline storage -include 1,2-dibromoethane (EDB) and 1,2-dichloroethane pre-1986 -include MTBE 1988-2001
		Diesel VOC	Diesel storage
		TEL	Additive to gasoline pre-1986 and still being used for aviation fuel
		PFBS, PFOS, PFOA	Fire fighting foams

Schedule 2 Use	Likely PCOCs	Possible PCOCs	
		Possible Parameter	**Related Activity/Source**
G2. Automotive, Truck, Bus, Subway or Other Motor Vehicle Maintenance, Repair, Salvage or Wrecking	Waste Oil Metals, LEPH, HEPH, PAH, VPH, BTEX, Solvent VOC	ethylene glycol, propylene glycol	Known glycol spills, salvage or wrecking
		Lithium	Improper battery storage
		PCB	Hydraulic oils were used prior to 1980 and presence of oil detected
		-	Fuel storage - See F5
G3. Dry docks, marinas, shipbuilding or boat repair and maintenance, including paint removal from hulls	HEPH, LEPH, VPH, BTEX, PAH, Solvent VOC, Waste Oil Metals	copper, lead, antimony, tin, arsenic, and mercury	Blasting grit, antifouling paint, engine wear, and oil additives
		Antifouling Agents	Antifouling paint - primarily from 1970 to 2003
		diuron, chlorothalonil, folpet, maneb, thiocyanomethylbenzothiazole (TCMTB), thiram, (cuprous) thiocyanate, and zineb.	Antifouling paint. Mostly in use after 1989 after regulations limiting TBT (Tributyl tin) use.
G5. Rail car or locomotive maintenance, cleaning, salvage or related uses, including railyards	LEPH, HEPH, PAH, BTEX, Solvent VOC, metals	ethylene glycol, propylene glycol	Known glycol spills, salvage
		herbicides	Staining and distressed vegetation
		PCB	Transformers in locomotives and self propelled rail cars
H1. Antifreeze bulk storage, recycling or shipping	Ethylene glycol, propylene glycol	-	-
H11. Industrial woodwaste (log yard waste, hogfuel) disposal	Non-chlorinated phenols	nonylphenol and nonylphenol ethoxylates	Surfactants
		dioxins/furans	Burner ash (If burning marine or chlorophenol treated wood)
		sodium ion and chloride ion	Buried woodwaste for marine water lots
		-	Buried waste is potentially treated - See I4/I6
H20. Municipal or provincial road or yard snow removal dumping	Sodium Ion, Chloride Ion	-	-
H21. Waste oil reprocessing, recycling or bulk storage	Waste Oil Metals, LEPH, HEPH, PAH, VPH, BTEX, Solvent VOC	-	-
I1. Particle or wafer board manufacturing	Non-chlorinated Phenols, Ammonia, Chloride, Nitrate, Nitrite, and Sulfate, Formaldehyde and Acetaldehyde	-	-
I2. Pulp mill operations	LEPH, HEPH, PAH, Chloride Ion, Sodium Ion, Sulfate and Sulfide, Metals	nonylphenol and nonylphenol ethoxylates	Surfactants
		phenols, non-chlorinated	Chip pile, buried wood waste, and liquor effluent
		chlorinated phenols	Produced during some bleaching processes
		dioxins/furans	Burner ash and bleaching processes.
		9,10-anthraquinone	Used in digesters for delignification
I3. Pulp and paper manufacturing	LEPH, HEPH, PAH, Chloride Ion, Sodium Ion, Sulfate and Sulfide, Metals	phenols, non-chlorinated	Chip pile, buried wood waste, and liquor effluent
		chlorinated phenols	Produced during some bleaching processes
		dioxins/furans	Burner ash and bleaching processes.
		9,10-anthraquinone	Used in digesters for delignification
I4. Treated wood storage at the site of treatment	Creosote: LEPH, HEPH, PAH, non-chlorinated phenols Chlorinated Phenolics: chlorinated phenols Copper Chromated Arsenate: arsenic, copper, chromium	LEPH, HEPH, PAH, VPH, BTEX	PCP carrier oil
		boron, and mercury	Alternative Preservatives (borates, and phenylmercury acetate)
		propiconazole	Alternative preservative
		ammonia, nitrate, and nitrite	Preservative breakdown products
		dioxins/furans	Impurities in PCP preservatives. Secondary to PCP (i.e. unlikely to be present if PCP concentrations are not elevated).
I5. Veneer or plywood manufacturing	Non-chlorinated Phenols, Ammonia, Chloride, Nitrate, Nitrite, and Sulfate, Formaldehyde and Acetaldehyde	-	-
I6. Wood treatment (antisapstain or preservation)	Creosote: LEPH, HEPH, PAH, non-chlorinated phenols Chlorinated Phenolics: chlorinated phenols Copper Chromated Arsenate: arsenic, copper, chromium	LEPH, HEPH, PAH, VPH, BTEX	PCP carrier oil
		boron, and mercury	Alternative Preservatives (borates, and phenylmercury acetate)
		propiconazole	Alternative preservative
		ammonia, nitrate, and nitrite	Preservative breakdown products
		dioxins/furans	Impurities in PCP preservatives. Secondary to PCP (i.e. unlikely to be present if PCP concentrations are not elevated).

Acronyms:

PCOC - potential contaminant of concern
BTEX – benzene, toluene, ethylbenzene, xylenes
VOC – volatile organic compounds
VPH – volatile petroleum hydrocarbons
LEPH and HEPH – light and heavy extractable petroleum hydrocarbons
PAH – polycyclic aromatic hydrocarbons
PCP - pentachlorophenol
PCB - polychlorinated biphenyl
PFBS - perfluorobutane sulfonate
PFOS - perfuorooctane sulfonate
PFOA - perfluorooctanoic acid

Notes:

1. Parameter groups are defined in Table 3
2. PCOCs were selected based on the References in Section 4 of the report and our collective industry experience.
3. VPH should only be analyzed when investigating petroleum products. Solvent VOCs will interfere with the VPH result as they are caputured in the VH analysis, but not subtracted from it.

APEC	Likely PCOCs	Possible PCOCs	
		Possible Parameter	**Related Activity/Source**
Suspect Poor Quality Fill	Metals, PAH	LEPH, HEPH	If there is a known hydrocarbon source or if field screening or observations indicates a hydrocarbon source
		BTEX	
		VPH	
Gasoline AST/UST	LEPH, PAH, VPH, BTEX, Gasoline VOC	1,2-dibromoethane (EDB) and 1,2-dichloroethane	Additives pre-1986
		MTBE	Additive to gasoline from 1988 - 2001
		TEL	Additive to gasoline pre-1986
Diesel AST/UST	LEPH, PAH, VPH, BTEX, Diesel VOC	-	-
Waste Oil AST/UST	Waste Oil Metals, LEPH, HEPH, PAH	BTEX, Solvent VOC	If solvents are handled or used at the site
		VPH	If petroleum based solvents are handled or used at the site
Heating Oil AST/UST	LEPH, HEPH, PAH, VPH, BTEX	-	-
Solvent AST/UST	BTEX, Solvent VOC	VPH	If petroleum based solvents are used at the site
Inground Hydaulic Hoists	LEPH, HEPH, PAH	PCB	If hydraulic oils were used prior to 1980 and presence of oil detected
Drycleaner	Drycleaning VOC	VPH, LEPH	If Stoddard solvent was used, primarily before 1970
Welding Slag	metals	-	-
Waste Sandbasting Grit	metals	-	-

Acronyms:

APEC - area of potential environmental concern

PCOC - potential contaminant of concern

BTEX – benzene, toluene, ethylbenzene, xylenes

VOC – volatile organic compounds

VPH – volatile petroleum hydrocarbons

LEPH and HEPH – light and heavy extractable petroleum hydrocarbons

PAH – polycyclic aromatic hydrocarbons

Notes:

1. Parameter groups are defined in Table 3
2. PCOCs were selected based on the References in Section 4 of the report and our collective industry experience.
3. VPH should only be analyzed when investigating petroleum products. Solvent VOCs will interfere with the VPH result as they are caputured in the VH analysis, but not subtracted from it.

PARAMATER GROUP	INDIVIDUAL PARAMETERS
Solvent Volatile Organic Compounds (VOC)	1,1,1-trichloroethane
	1,1,1,2-tetrachloroethane
	1,1,2,2-tetrachloroethane
	1,1,2-trichloroethane
	1,1-dichloroethane
	1,1-dichloroethylene
	1,2,4-trichlorobenzene
	1,2-dichlorobenzene
	1,2-dichloroethane
	1,2-dichloropropane
	2-butanone (MEK)
	2-hexanone (MBK)
	4-Methyl-2-pentanone (MIBK)
	acetone
	bromobenzene
	bromodichloromethane
	carbon disulphide
	carbon tetrachloride
	chlorobenzene
	chloroethane
	chloromethane
	cis-1,2-dichloroethylene
	dichlorodifluoromethane
	dichloromethane
	ethyl acetate
	Tetrachloroethylene
	trans-1,2-dichloroethylene
	Trichloroethylene
	vinyl chloride
Drycleaning VOC	1,1,1-trichloroethane
	1,1-dichloroethane
	1,1-dichloroethylene
	1,2-dichloroethane
	carbon tetrachloride
	chloroethane
	chloroform
	cis-1,2-dichloroethylene
	Methylene Chloride (Dichloromethane)
	Tetrachloroethylene
	trans-1,2-dichloroethylene
	Trichloroethylene
	vinyl chloride
Diesel VOC	1,2,4-trimethylbenzene
	1,3,5-trimethylbenzene
	n-decane

PARAMATER GROUP	INDIVIDUAL PARAMETERS
Gasoline VOC	1,2,4-trimethylbenzene
	1,2-dibromoethane (EDB)
	1,2-dichloroethane
	1,3,5-trimethylbenzene
	1,3-butadiene
	Cumene (Isopropylbenzene)
	methylcyclohexane
	methyl tert-butyl ether (MTBE)
	n-decane
	n-hexane
	cyclohexene
BTEX	benzene
	ethylbenzene
	toluene
	xylene
Chlorinated Fluorocarbons (CFC)	trichlorofluoromethane (CFC-11)
	trichloro-1,1,2-trifluoroethane, 1,2,2- (CFC-113)
Chlorinated Phenols	chlorophenol, 2-
	chlorophenol, 3-
	chlorophenol, 4-
	dichlorophenol, 2,3-
	dichlorophenol, 2,4-
	dichlorophenol, 2,5-
	dichlorophenol, 2,6-
	dichlorophenol, 3,4-
	dichlorophenol, 3,5-
	pentachlorophenol [PCP]
	tetrachlorophenol, 2,3,4,5-
	tetrachlorophenol, 2,3,4,6-
	tetrachlorophenol, 2,3,5,6-
	trichlorophenol, 2,4,6-
	trichlorophenol, 2,3,4-
	trichlorophenol, 2,3,5-
	trichlorophenol, 2,3,6-
	trichlorophenol, 2,4,5-
	trichlorophenol, 3,4,5-

PARAMATER GROUP	INDIVIDUAL PARAMETERS
Phenols, Non-Chlorinated	phenol
	dimethylphenol, 2,4-
	dimethylphenol, 2,6-
	dimethylphenol, 3,4-
	methylphenol, 2-
	methylphenol, 3 & 4-
	2-Nitrophenol
	4-Nitrophenol
	2,4-Dinitrophenol
	2-Methyl-4,6-dinitrophenol
	2,4-Dibromophenol
	2,4,6-Tribromophenol
	Anthracene-d10
Metals	aluminum
	antimony
	arsenic
	barium
	beryllium
	boron
	cadmium
	chromium, total
	chromium, hexavalent
	chromium, trivalent
	cobalt
	copper
	iron
	lead
	lithium
	manganese
	mercury
	molybdenum
	nickel
	selenium
	silver
	strontium
	thallium
	tin
	titanium
	tungsten
	vanadium
	zinc

PARAMATER GROUP	INDIVIDUAL PARAMETERS
Waste Oil Metals	aluminum
	arsenic
	barium
	cadmium
	chromium
	copper
	lead
	mercury
	nickel
	silver
	zinc
Polycyclic Aromatic Hydrocarbons (PAH)	acenaphthene
	anthracene
	benz(a)anthracene
	benzo(a)pyrene
	benzo(b+j)fluoranthene
	benzo(ghi)perylene
	benzo(k)fluoranthene
	chrysene
	dibenz(a,h)anthracene
	fluoranthene
	fluorene
	indeno(1,2,3-cd)pyrene
	methylnaphthalene, 1-
	methylnaphthalene, 2-
	naphthalene
	phenanthrene
	pyrene
	quinoline
Antifouling Agents	dibutlytin
	methyl mercury
	tributyltin
	tricyclohexyltin
	triethyltin
	triphenyltin

PARAMATER GROUP	INDIVIDUAL PARAMETERS
Herbicides	MCPP
	Bromoxynil
	Clopyralid
	Picloram
	2,4,5-T
	Fenoprop
	Chloramben
	Triclopyr
	MCPA
	Dinoseb
	2,4-DB
	Bentazon
	Dichlorprop(2,4-DP)
	MCPB
	Dicamba
	2,4-D
	Dicamba-d3
	Fenoprop-d3
	Bentazon-d7
	Mecoprop-d3
	2,4-D-d3
	MCPA-d3
	Dinoseb-13C6
	2,4-DB-d3
	Triclopyr
	Acifluorfen
	Fenoprop

Notes:

1. Parameter groups were developed based on the References in Section 4 of the report, consultation with accredited BC-based laboratories, and our collective industry experience.
2. Waste oil metals were selected based on References 1, 5, 6, 11, 17, and 18

APPENDIX A

COMMON SCHEDULE 2 USES

Land Use Code	Schedule 2 Land Use	Land Use Code	Schedule 2 Use as listed in CSR Stage 14 Amendments	Number of times Schedule 2 Use listed in Site Profiles/SDS	Proportion of Schedule 2 Uses listed in Site Profiles/SDS
F1	petroleum or natural gas drilling	F1	petroleum or natural gas drilling	798	35.5%
F2	petroleum or natural gas production facilities	F2	petroleum or natural gas production facilities	332	14.7%
G2	automotive, truck, bus, subway or other motor vehicle repair, salvage or wrecking	G2	automotive, truck, bus, subway or other motor vehicle repair, salvage or wrecking	191	8.5%
F7	petroleum product, other than compressed gas, or produced water storage in above ground or underground tanks	F7	petroleum product (other than compressed gas), or produced water storage in non-mobile above ground or underground tanks, except above ground tanks associated with emergency generators or with secondary containment	149	6.6%
F5	petroleum product, other than compressed gas, dispensing facilities, including service stations and card locks	F5	petroleum product, other than compressed gas, dispensing facilities, including service stations and card locks	111	4.9%
E1	appliance, equipment or engine repair, reconditioning, cleaning or salvage	E1	appliance, equipment or engine maintenance, repair, reconditioning, cleaning or salvage	85	3.8%
C6	welding or machine shops (repair or fabrication)	C6	welding or machine shops (repair or fabrication)	65	2.9%
F6	petroleum, natural gas or sulphur pipeline rights of way excluding rights of way for pipelines used to distribute natural gas to consumers in a community	F6	petroleum, natural gas or sulfur pipeline rights of way excluding rights of way for pipelines used to distribute natural gas to consumers in a community	48	2.1%
E9	dry cleaning facilities or operations and dry cleaning chemical storage	E9	dry cleaning facilities or operations and dry cleaning chemical storage, excluding locations at which clothing is deposited but no dry cleaning process occurs	38	1.7%
E11	controlled substances, as defined in the Controlled Drugs and Substances Act (Canada), manufacturing or operations	-	repealed and replaced by A9	29	1.3%
H6	construction demolition material, including without limitation asphalt and concrete, landfilling	H5	landfilling of construction demolition material, including without limitation asphalt and concrete	27	1.2%
E10	sites which have been or likely have been contaminated by substances migrating from other properties	-	repealed	22	1.0%
I9	sawmills	-	repealed	22	1.0%
E7	road salt storage facilities	E7	road salt or brine storage	17	0.8%
H7	contaminated soil storage, treatment or disposal	H6	6. contaminated soil or sediment storage, treatment, deposit or disposal	16	0.7%
F8	8. petroleum product, other than compressed gas, wholesale bulk storage or distribution	F8	petroleum product, other than compressed gas, bulk storage or distribution	15	0.7%
F10	solvent manufacturing or wholesale bulk storage	F10	solvent manufacturing or bulk storage	13	0.6%
E5	medical, chemical, radiological or biological laboratories	E5	medical, chemical, radiological or biological laboratories	12	0.5%
C4	metal salvage operations	C4	metal salvage operations	12	0.5%
G3	bulk commodity storage or shipping (e.g. coal)	D2	coal coke manufacture, bulk storage or shipping	11	0.5%
H13	industrial woodwaste (log yard waste, hogfuel) disposal	H11	industrial woodwaste (log yard waste, hogfuel) disposal	9	0.4%
H5	bulk manure stockpiling and high rate land application or disposal (nonfarm applications only)	H4	bulk manure stockpiling and high rate land application or disposal (nonfarm applications only)	9	0.4%
H17	sandblasting waste disposal	H15	sandblasting operations or sandblasting waste disposal	9	0.4%
G7	truck, rail or marine bulk freight handling	G5	rail car or locomotive maintenance, cleaning, salvage or related uses, including railyards	8	0.4%
H15	municipal waste storage, recycling, composting or landfilling	H13	municipal waste storage, recycling, composting or landfilling	8	0.4%

Land Use Code	Schedule 2 Land Use	Land Use Code	Schedule 2 Use as listed in CSR Stage 14 Amendments	Number of times Schedule 2 Use listed in Site Profiles/SDS	Proportion of Schedule 2 Uses listed in Site Profiles/SDS
A9	pharmaceutical products, or controlled substances as defined in the Controlled Drugs and Substances Act (Canada), manufacturing or operations	A9	pharmaceutical products, or controlled substances as defined in the Controlled Drugs and Substances Act (Canada), manufacturing or operations	8	0.4%
H18	septic tank pumpage storage or disposal	H16	septic tank pumpage storage or disposal	8	0.4%
B4	electrical transmission or distribution substations	B4	electrical transmission or distribution substations	8	0.4%
G4	dry docks, ship building or boat repair and maintenance, including paint removal from hulls	G3	dry docks, marinas, shipbuilding or boat repair and maintenance, including paint removal from hulls	7	0.3%
C1	foundries or scrap metal smelting	C1	foundries	7	0.3%
D3	coal or lignite mining, milling, wholesale bulk storage or shipping	D3	coal or lignite mining, milling, bulk storage or shipping	7	0.3%
H21	sludge drying or composting	H19	sludge drying or composting	6	0.3%
E2	ash deposit from boilers, incinerators, or other thermal facilities	E2	ash deposit from boilers, incinerators or other thermal facilities	6	0.3%
H11	industrial waste lagoons or impoundments	H9	industrial waste lagoons or impoundments	6	0.3%
E3	asphalt tar manufacture, wholesale storage and distribution	E3	asphalt and asphalt tar manufacture, storage and distribution, including stationary asphalt batch plants	6	0.3%
H12	industrial waste storage, recycling or landfilling	H10	industrial waste storage, recycling or landfilling	5	0.2%
H20	hazardous waste storage, treatment or disposal	H18	hazardous waste storage, treatment or disposal	5	0.2%
B1	battery (lead acid or other) manufacturing or wholesale bulk storage	B1	battery manufacturing, recycling or bulk storage	5	0.2%
H23	waste oil reprocessing, recycling or bulk storage	H21	waste oil reprocessing, recycling or bulk storage	5	0.2%
E12	single or cumulative spills to the environment greater than the reportable quantities of substances listed in the Spill Reporting Regulation	repealed	repealed	5	0.2%
B3	electrical equipment manufacturing, refurbishing or wholesale bulk storage	B3	electrical equipment manufacturing, refurbishing or bulk storage	5	0.2%
C3	metal plating or finishing	C3	metal plating or finishing	5	0.2%
A2	chemical manufacturing or wholesale bulk storage	A2	chemical manufacturing or bulk storage	5	0.2%
A3	explosives or ammunition manufacturing or wholesale bulk storage	A3	explosives or ammunition manufacturing or bulk storage	5	0.2%
H14	mine tailings waste disposal	H12	mine tailings waste disposal	4	0.2%
H1	antifreeze bulk storage or recycling	H1	antifreeze bulk storage, recycling or shipping	4	0.2%
B6	transformer oil manufacture, processing or wholesale bulk storage	B6	transformer oil manufacturing, processing or bulk storage	3	0.1%
H10	electrical equipment recycling	H8	electrical equipment recycling	3	0.1%
H3	battery (lead acid or other) recycling	B1	battery manufacturing, recycling or bulk storage	3	0.1%
H19	sewage lagoons or impoundments	H17	sewage lagoons or impoundments	3	0.1%
B2	communications stations using or storing equipment that contains PCBs	B2	facilities using equipment that contains PCBs greater than or equal to 50 ppm	3	0.1%
D2	coal coke manufacture, wholesale bulk storage or shipping	D2	coal coke manufacture, bulk storage or shipping	3	0.1%
H8	dredged waste disposal	H6	6. contaminated soil or sediment storage, treatment, deposit or disposal	3	0.1%
H9	drycleaning waste disposal	H7	dry cleaning waste disposal	3	0.1%
F3	natural gas processing	F3	natural gas processing	3	0.1%
A5	fertilizer manufacturing or wholesale bulk storage	A5	fertilizer manufacturing, bulk storage or shipping	3	0.1%
G1	aircraft maintenance, cleaning or salvage	G1	aircraft maintenance, cleaning or salvage	3	0.1%
F9	petroleum refining wholesale bulk storage or shipping	F9	petroleum refining	2	0.1%

Land Use Code	Schedule 2 Land Use	Land Use Code	Schedule 2 Use as listed in CSR Stage 14 Amendments	Number of times Schedule 2 Use listed in Site Profiles/SDS	Proportion of Schedule 2 Uses listed in Site Profiles/SDS
A8	paint, lacquer or varnish manufacturing, formulation, recycling or wholesale bulk storage	A8	paint, lacquer or varnish manufacturing, formulation, recycling or bulk storage	2	0.1%
I5	veneer or plywood manufacturing	I5	veneer or plywood manufacturing	2	0.1%
A6	ink or dye manufacturing or wholesale bulk storage	A6	ink or dye manufacturing or bulk storage	2	0.1%
H16	organic or petroleum material landspreading (landfarming)	H14	organic or petroleum material landspreading (landfarming)	2	0.1%
D6	nonferrous metal mining or milling	D6	metal ore mining or milling	2	0.1%
I4	treated wood storage at the site of treatment	I4	treated wood storage at the site of treatment	2	0.1%
A13	resin or plastic monomer manufacturing, formulation or wholesale bulk storage	A13	resin or plastic monomer manufacturing, formulation or bulk storage	2	0.1%
I6	wafer board manufacturing	I1	particle or wafer board manufacturing	2	0.1%
F11	sulphur handling, processing or wholesale bulk storage and distribution	F11	sulfur handling, processing, or bulk storage and distribution	2	0.1%
E6	rifle or pistol firing ranges	E6	outdoor firearm shooting ranges	2	0.1%
H4	biomedical waste disposal	H3	biomedical waste disposal	2	0.1%
H24	wire reclaiming operations	H22	wire reclaiming operations	1	0.0%
A4	fire retardant manufacturing or wholesale bulk storage	A4	fire retardant manufacturing, bulk storage or shipping	1	0.0%
I7	wood treatment (antisapstain or preservation)	I6	wood treatment (antisapstain or preservation)	1	0.0%
A11	textile dying	A11	textile dyeing	1	0.0%
C5	nonferrous metal smelting or refining	C5	metal smelting or refining	1	0.0%
A12	pesticide manufacturing, formulation or wholesale bulk storage	A12	pesticide manufacturing, formulation, bulk storage or shipping	1	0.0%
G5	marine equipment salvage	G4	marine equipment salvage	1	0.0%
D5	nonferrous metal concentrate wholesale bulk storage or shipping	D5	metal concentrate bulk storage or shipping	1	0.0%
H2	barrel, drum or tank reconditioning or salvage	H2	barrel, drum or tank reconditioning or salvage	1	0.0%
H22	street or yard snow removal dumping	H20	municipal or provincial road or yard snow removal dumping	1	0.0%
I3	pulp and paper manufacturing	I3	pulp and paper manufacturing	1	0.0%
-	-	B5	electronic equipment manufacturing	0	0.0%
-	-	C2	galvanizing	0	0.0%
-	-	E4	coal gasification (manufactured gas production)	0	0.0%
-	-	I2	pulp mill operations	0	0.0%

Notes:

I3	Schedule 2 Use included in Table 1: PCOC Guidance for Select Schedule 2 Uses