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CATCH BASIN WASTE REVIEW OF ASSESSMENT, TREATMENT AND DISPOSAL PRACTICES

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EXECUTIVE SUMMARY

SNC-Lavalin Morrow Environmental (Morrow) as requested by the Capital Regional District (CRD), reviewed the current practises for assessment, treatment, and disposal of catch basin wastes in the CRD. The purpose of the review was to provide advice to the owner (generators) on how to deal with their catch basin wastes, to provide advice to service providers (haulers) on how to approach servicing catch basins and to determine what are acceptable treatment and disposal practices for catch basin wastes.

The CRD, through commitments in the Core Area Liquid Waste Management Plan (LWMP), wants to ensure that trucked liquid waste (TLW) generated in the core area of the CRD is handled and disposed of in an appropriate and responsible manner to protect public health and the environment. This review specifically assessed wastes collected in catch basins. The term *"catch basin"* has been defined as a vehicle wash interceptor (as defined in the CRD Sanitary Sewer Use Bylaw) and devices, including stormwater rehabilitation units (as defined in the CRD Model Stormwater Bylaw) that are used to separate and retain settleable solids and floatable materials from runoff or wastewater from outdoor site operations.

The types and amounts of contaminants in catch basin wastes can be extremely variable, which vary depending on land use, illicit discharges, accidental spills, and frequency of cleaning. Catch basin wastes can contain oil and petroleum products, pesticides, fertilizers, fecal matter, metals, and other substances that present a potential threat to human health and the environment. This document outlines recommendations for assessing catch basins wastes and the testing, use and disposal of solids and liquids collected during the maintenance of catch basins.

It should be noted that the owner (generator) of the business or property where the catch basin(s) is (are) located is ultimately responsible for the waste as the generator. This document provides tools for the generator to assist them in reducing liability risk.

Catch basin waste should be first evaluated based on a visual inspection and site evaluation for obvious contaminants and if historical information/data is available it should be reviewed. Subsequent sampling and analyses for PCOC (potential contaminants of concern) should be

conducted in accordance with Appendix II – Flow Chart Catch Basin Sampling Evaluation to provide certainty to those receiving wastes.

Prior to disposal, if the wastes can be de-watered to reduce the liquid content, the remaining solid portion becomes easier to handle. During the catch basin cleaning process the liquid portion should not be returned to the catch basin. Dewatering should occur at a location where the water is treated prior to discharge to the sanitary sewer under CRD permit.

Disposal options and testing requirements for catch basin solids depend on the needs and requirements of the final receiver of the solids. Disposal of catch basin solids that are not hazardous wastes are generally at a permitted landfill. Reuse of the solids is limited. If the solids do not exceed the CSR[1] SRA Schedule 7 standards, there is the possibility that the solids could be used as fill material on non agricultural land. If the analytical results indicate the solids exceed the CL standards there are limited recycling options, two possibilities are the use of the solids in the manufacture of asphalt and Portland cement. However, the process to screen the solids to remove the garbage component tends to increase the recycling cost thus often not making it economically feasible. Disposal at a permitted facility is often the simplest, least expensive, and most environmental protective method for disposal of catch basin. Catch basin liquids (including liquids generated from cleaning of the catch basins) should be disposed of at a liquid decant facility, if available which should have technology able to settle solids and remove other contaminants to meet liquid disposal requirements.

Companies involved in assessing, sampling, handling, treatment and disposal of catch basin waste should receive appropriate training. Generators of catch basin wastes should understand what catch basin wastes are, what the liabilities are associated with them, and what standards apply so they can stay in compliance with the regulations.

[1] *Contaminated Site Regulation (CSR),* B.C. Reg. 375/96, including amendments up to B.C. Reg. 239/2007.

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1. BACKGROUND

SNC-Lavalin Morrow Environmental (Morrow) as requested by the Capital Regional District (CRD), reviewed the current practises for assessment, treatment, and disposal of catch basin wastes in the CRD. The purpose of the review was to provide advice to the owner (generators) on how to deal with their catch basin wastes, to provide advice to service providers (haulers) on how to approach servicing catch basins and to determine what are acceptable treatment and disposal practices for catch basin wastes.

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For the purpose of this review the term *"catch basin"* has been defined as a vehicle wash interceptor (as defined in the CRD Sanitary Sewer Use Bylaw) and devices, including stormwater rehabilitation units (as defined in the CRD Model Stormwater Bylaw) that are used to separate and retain settleable solids and floatable materials from runoff or wastewater from outdoor site operations.

1.1. Report Structure

Part 1 Generator Responsibility: this section discusses information important to the generator outlining why catch basins should be cleaned the materials typically found in catch basin wastes, what regulations apply and how to evaluate catch basin wastes.

Part 2 Sampling Program: this section reviews the evaluation techniques for catch basin wastes for prior to disposal.

Part 3 Pick Up/Disposal: this section discusses catch basin waste pickup and disposal options

2. SUMMARY OF GOALS AND OBJECTIVES

The CRD in cooperation with municipalities, business and institutions is working to reduce the amount of contaminants entering the municipal stormwater and sanitary sewer systems and ultimately the environment. For catch basin waste, removal of sediment is critical due to contaminants adhering to sediments and potentially causing environmental damage in the receiving waters if discharged. The CRD's Stormwater, Harbours and Watersheds program has created a model Stormwater Bylaw, including six model stormwater Codes of Practices (COP) for adoption by municipalities[2] including a model COP for Automotive and Parking Lot Operations. One of the requirements under this model code is the installation of stormwater rehabilitation units to remove contaminants from storm water prior to it discharging to the municipal storm water system. The CRD's Regional Source Control Program has developed eleven codes of practice for commercial operations discharging to sanitary sewer, including a Code of Practice for Vehicle Wash Operations, which requires the installation of vehicle wash interceptors to remove contaminants from vehicle wash operations prior to discharing to the sanitary sewer system.

Under the Model Automotive and Parking Lot Operations Code of Practice (storm water), regular maintenance and record keeping is required for stormwater rehabilitation units which includes a visual inspection, at least once a year to check levels of settled solids and floating oil and grease and sets the maximum allowable level at 75% of designed capacity for either. Once the levels have been reached, maintenance is required. Records of this maintenance must be kept on site.

Under the Code of Practice for Vehicle Wash Operations (sanitary sewer), monthly inspections of the Vehicle Wash Interceptor are required with a minimum of annual clean out. The maximum oil and grease accumulation allowed is one inch or 5% of the wetted height. For solids the maximum accumulation is 50% of the wetted height. Record keeping is required.

The recent regulation of catch basin maintenance at the local government level has prompted a need to ensure generators and haulers are aware of their responsibilities. This project aims to provide guidance to generators and haulers on catch basin maintenance and, options for treatment and disposal of these catch basin wastes.

[2] A model code of practice becomes enforceable by law once adopted at the municipal level.

3. PART ONE: GENERATOR RESPONSIBILITY

3.1. Why Clean Catch Basins?

Catch basin cleaning should be done as part of regular maintenance to reduce discharge of pollutants to the receiving environment via the storm water and sanitary sewer systems. This maintenance may be required by regulations or as a result of implementing best management practices (BMP). Often, cleaning is done in response to blocked pipes, and spill cleanup. Reported catch basin cleaning frequency tends to vary from once or twice a year to only in response to flooding.

Materials transported through the storm water system include deposited leaves, soil and particulates, which adsorb oils and greases, nutrients and heavy metals. Many municipalities have leaf collection programs to prevent leaf matter from clogging the storm drains. Urban runoff will also enter the storm water system, and may be contaminated with incompletely combusted petroleum, greases and oils, tire and brake dust, heavy metals, detergents, de-icing sand and salt, antifreeze etc. Additional sources of pollutants may enter the storm water system from roof drainage including decomposing roof materials, zinc, and copper. Litter composed of plastic, paper, glass and, metal components also make it into the catch basins. Catch basins can also contain high concentration of chemicals if they are located in the vicinity of a spill or leak.

Potential Chemicals of Concern (PCOC) in catch basins will physically settle out or be adsorbed onto fine silt and clay particles that settle out in the catch basin. These contaminants do not readily degrade due to the lack of sunlight and oxygen. A literature review found that the concentration of PCOC was lower in catch basins that were cleaned more frequently, as this prevented an accumulation of fine silt and clay. With more debris in the catch basin, trapped solids and polluted water can be flushed out during periods of high storm flow as they become re-suspended in the catch basin as a result of excessive stormwater flow and volume. The best time to clean catch basins is late summer or early fall before the winter rains flush the accumulated sediment in the receiving environment and to prevent flooding from fallen leaves clogging the storm drains.

The PCOC in catch basin waste differs somewhat between the solid portion of the waste and the decant water. Contamination characteristics appear to be influenced by the surrounding land uses (residential, industrial, commercial, agriculture, open space), traffic patterns, property owner habitats, illicit connections, and frequency of cleaning.

3.2. Regulations

The owner of the catch basin is considered the waste generator and is responsible for determining the waste characteristics and to ensure that the waste is disposed of appropriately. This is usually determined through sampling and analytical testing. Since classification can be complex, generators often rely on service providers to supply advice, assistance and services for waste disposal. The waste disposal facility receiving the catch basin wastes may also have specific concentrations that the waste needs to meet. In most cases, these concentrations are based on the regulations indicated below, but this should be confirmed with the disposal facility. It is important to note that failure to properly characterize and dispose of waste appropriately exposes the generator and service provider to potential liability issues.

The disposal of liquid and solid catch basin wastes is primarily affected by the following regulatory documents:

- *Transportation of Dangerous Goods Regulations* (TDG) (Canada), SOR/DORS/2001-286, August 15, 2002;
- *Environmental Management Act* (EMA), S.B.C. 2003, c. 53, as am. by S.B.C. 2004, c. 18;
- *Contaminated Site Regulation (CSR), B.C. Reg. 375/96, including amendments up to B.C. Reg. 239/2007.*
- The CSR, which is a regulation under the EMA, defines soil as “unconsolidated mineral or organic material, rock, fill and sediment deposited on land”. Therefore catch basin solids would be considered soil under the CSR.
- *Hazardous Waste Regulation* (HWR), B.C. Reg. 63/88, including amendments up to B.C. Reg. 261/2006.

- CRD Bylaw No 2922, *Capital Regional District Sewer Use Bylaw No. 5, 2001,* December 10, 2003;
- CRD Model Bylaw, *Capital Regional District Model Storm Sewer Bylaw Version 12,* DRAFT July 21, 2004;
- CRD Model Code of Practice for Automotive and Parking Lot Operations; and
- City of Victoria Storm Water Bylaw and Code of Practice for Parking Lots.

Other regulations may be applicable in the case of inappropriate disposal, for example the Federal Fisheries Act, which regulates discharges to freshwater, marine and estuarine environments;

3.3. Typical Catch Basin Waste Contaminants

In order to determine the specific contaminants in a catch basin, some testing is needed. This section lists contaminants typically found in solids and liquids from catch basins.

3.3.1. Contaminants in Catch Basin Wastes - Solids

The available literature in British Columbia, Washington State, and Oregon suggested that the primary PCOC found in the solid portion of urban catch basin waste, regardless of land use, are heavy metals (particularly arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc), petroleum hydrocarbons, and polycyclic aromatic hydrocarbons (PAHs) (particularly benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo (a,h) anthracene, indeno(1,2,3-c,d)pyrene, and phenanthene).

PAHs are mainly the product of incomplete combustion of petroleum hydrocarbons. As they are virtually insoluble; human exposure is mainly through physical contact. PAHs do not readily degrade, and concentrations in catch basin wastes vary greatly; therefore, testing is important, as reuse decisions are based on the baseline waste characterization.

Heavy metals are an issue, since do not readily biodegrade. Heavy metals are considered a risk to human health through direct contact and when they leach into the groundwater (the mobility of heavy metals is dependent on various conditions; i.e., soil porosity, presence of water in the soil system, pH).

Uncommon contaminants may include pesticides, industrial solvents, bacteria or human or animal wastes. These contaminants may be present due to migration from an adjacent property, result from a one time event/spill or illicit dumping. Unless these contaminants are physically obvious, they may not appear to be present. By routinely inspecting the area surrounding the catch basin for signs of hazardous wastes, being aware of local activities that could generate pollutants and completing analytical testing, significant pollutants could be identified. The following table summarizes some sources of contaminants identified in catch basin wastes.

TABLE A: SOURCES OF URBAN RUNOFF POLLUTANTS[3]

SOURCE	POLLUTANTS OF CONCERN
Erosion/Runoff from impervious surfaces	Sediment and attached soil nutrients, organic matter, and other adsorbed pollutants
Atmospheric deposition	Hydrocarbons emitted from automobiles, dust, aromatic hydrocarbons, metals, and other chemicals released from industrial and commercial activities
Construction materials	Metals from flashing and shingles, gutters and downspouts, galvanized pipes and metal plating, paint, and wood
Manufactured products	Heavy metals, halogenated aliphatics, phthalate esters, PAHs other volatiles, and pesticide and phenols from automobile use, pesticide use, industrial use, and other uses
Plants and animals	Plant debris and animal excrement
Non-stormwater connections	Inadvertent or deliberate discharge of sanitary sewage and industrial wastewater to storm drainage systems.
Onsite disposal systems	Nutrients and pathogens from failing or improperly sited systems

Heavy metals can not be visually seen thus are not generally considered when assessing catch basin wastes. Table B below identifies 8 heavy metals and how they relate to vehicles.

[3] Environmental Protection Agency, "Sources of Pollutants in Runoff" <http://www.epa.gov/owow/nps/MMGI/Chapter4/table402.gif

TABLE B: SOURCES OF HEAVY METALS FROM TRANSPORTATION[4]:

	Heavy Metal								
Source	Cd	Co	Cr	Cu	Fe	Mn	Ni	Pb	Zn
Gasoline	▲			▲				▲	▲
Exhaust							▲	▲	
Motor Oil & Grease		▲			▲		▲	▲	▲
Antifreeze					▲				▲
Undercoatings								▲	▲
Brake Linings				▲	▲		▲	▲	▲
Rubber	▲			▲				▲	▲
Asphalt				▲			▲		▲
Concrete				▲			▲		▲
Diesel Oil	▲								
Engine Wear					▲	▲	▲	▲	▲

Most of the literature reviewed suggested that the concentration and type of contaminants in catch basin waste depends partly on land use (residential, commercial, industrial, agricultural) and traffic patterns (with catch basins on roads having a higher traffic count expected to have higher contaminant concentrations). There is limited analytical data available for catch basin wastes within the CRD, however, sampling programs which have been conducted have found similar results. The CRD commissioned Carley Environmental Inc to assess catch basin wastes in the CRD ("Street Waste Investigation" January 1998 and "CRD Street Waste Investigation Additional Sampling – 1998"). The analytical results indicated that the street waste solids were not hazardous wastes, however, were contaminated above the CSR CL standards for heavy metals and some PAH parameters. Carley concluded, "in general, the quality of catch basin solids does not appear to differ significantly between the residential, commercial, and industrial land uses. The contaminant levels for industrial and commercial areas are slightly higher; however, traffic volume is likely to be the main factor rather than land use." Carley also concluded that, in general, catch basin solids do not appear to be a HW under the BC HWR. However, spills at an individual catch basin could result in waste being classified as HW. Earth

[4] Natural Resources Defense Council, "Stormwater Strategies: Community Responses to Runoff Pollution" Natural Resources Defense Council Web site < http://www.nrdc.org/water/pollution/storm/stoinx.asp

Tech[5] reviewed analytical results of four samples collected by the CRD from catch basins from a commercial area. The samples were analyzed for metals, PAH, VOCs and leachability. All of the four samples exceeded the CL standards for at least one parameter analyzed, and one sample exceeded the HW standard for oil and grease and xylenes.

Table C shows the range of analytical results collected from 92 samples of catch basin solids from residential, commercial, and industrial areas in Washington State. For comparison, these results are compared to the CSR standards triggering soil relocation agreements – waste disposal prohibited without authorization standards.

TABLE C: CATCH BASIN SOLIDS, CONTAMINANT CHARACTERISTICS RANGE[6]

Parameter	Range (mg/kg)	Median (mg/kg)	BC CSR Stds. triggering soil relocation agreements – waste disposal prohibited without authorization (mg/kg)
Arsenic	4-56	3.5	15
Cadmium	0.5-5	0.5	1.5
Chromium	13-241	25.8	60
Copper	12-730	29	90
Lead	4-850	80	100
Nickel	14-86	23	500
Zinc	50-2000	130	150
Total PAHs	0.36-417	10.6	no standard

With the exception of Nickel, the above data indicates the contaminants are above the soil relocation standard for all parameters.

3.3.2. Contaminants in Catch Basin Wastes - Liquids

Catch basin liquids are generally characterized as an aqueous suspension of fine sediments, sometimes with a visible sheen of oils and greases. The ratio of catch basin liquids to the catch basin solids varies with the amount of recent rainfall, frequency of catch basin cleaning and how much water the hauler uses to remove the solids from the catch basin. Specifically the liquid waste portion of the catch basin wastes is made up of the standing liquid in the catch basin (from rainfall, i.e. stormwater runoff), and the liquid generated through the catch basin cleaning process, the decant water from the vactor truck. The chemical composition of the liquid portion

[5] Earth Tech Inc. Review of Management Practices for Catch Basin and Oil-Water Separator Wastes. Prepared for Capital Regional District Environmental Services. October 23, 2002.
[6] Washington State Department of Ecology

of catch basin wastes is similar to the solid portion in that it is highly variable and dependent on the source and length of time between catch basin cleaning. The liquids should be decanted from the solids, pre-treated by extended settling, and then disposed to the sanitary sewer system under permit. With sufficient settling time, there generally was not a problem in the post treatment decant water meeting the discharge standards. PCOC in decanted catch basin liquids are similar to those for catch basin waste solids: heavy metals (particularly arsenic, chromium, copper, iron, lead, manganese, nickel, and zinc), Total Suspended Solids (TSS), Oil and Grease, and PAHs. The liquid generated during catch basin cleaning should not be decanted/returned to the catch basin following removal of the solids.

The 1998 Carley study concluded that the quality of the liquid wastes from municipal catch basins does not vary significantly between the residential, commercial, and industrial land uses in the CRD, and that the liquid wastes from all three types of land uses had concentrations of several metals, COD, TSS, and PAHs in exceedence of the CRD Sewer Use Bylaw. In 2002 Earth Tech reviewed the analytical results of three samples of liquid wastes collected by the CRD from catch basins of automotive repair operations. All three samples exceeded at least one of the CRD Sewer Use standards. Analysis of samples of liquid wastes collected from municipalities across the CRD indicated that all samples failed to meet the CRD Sewer Use Bylaw standards for discharge to the sanitary sewer. Consequently treatment is required prior to discharge.

4. PART TWO – EVALUATION OF WASTE

4.1. Evaluation of Waste

The first step in the evaluation of the catch basin wastes is a visual inspection with obviously contaminated material being identified and not mixed with the wastes which do not appear as impacted. This will reduce the volume of material, which potentially have high concentrations of contaminants, which equate to higher disposal costs. Catch basin wastes should be sampled and tested for PCOC in accordance with the flow chart provided at Appendix II. If sampling is deemed necessary, it should be conducted by an environmental consultant, environmental technician, or a hauler that has received proper training in sample collection. All sampling should be conducted in accordance with Appendix IV – Sampling Protocols.

4.1.1. Site Evaluation – Potential Risks and Maintenance

Prior to catch basin waste collection, a site evaluation should be conducted to avoid mixing potentially more contaminated catch basin waste with cleaner (i.e. less contaminated) catch basin waste. A detailed breakdown of the information required for a site evaluation is attached in Appendix I. A site evaluation can be conducted in three steps:

1. Historical review of land use in area (i.e., spills, previous contamination, nearby HW and materials storage facilities; this should be conducted prior to waste collection);

2. Area visual inspection for potential contaminant sources such as nearby fire, leaking tanks and electrical transformers, and surface staining (to be done prior to waste collection); and

3. Catch basin inspection during the collection of the waste. Of the three steps, this is the most important because potential hazardous wastes can be identified through any unusual colour, odour, obvious staining, sheens or oily film/residue.

4.1.2. Receiving Facility Sampling Requirements

If the catch basins wastes are being taken directly to a permitted facility (either a sanitary landfill such as Hartland landfill, a private facility or a private or public dewatering facility) analytical data may be requested by the facility prior to acceptance (see Appendix II). In the case of wastes being taken to a dewatering facility, the sampling would be conducted after the waste has been placed in the dewatering bin.

In the event that analytical data has been requested by the receiving facility there are two options that could be presented to the facility for consideration:

Option 1: Complete analysis of all PCOCs, including pH, BETX, VPH, LEPH, HEPH, PAH, metals, oil and grease and suspended solids (for liquids only). This option may be requested by the receiving facility if there is no baseline data for the waste arriving at the facility and/or if the receiving facility is not comfortable with receiving the load due to suspected contamination.

Option 2: Partial analysis based on former exceedances. This option may be acceptable to the receiving facility if there is baseline sampling data available for the waste, and would consist of obtaining analytical data only for the parameters that formerly exceeded the standards.

A receiving facility's acceptance of catch basin wastes relies on the level of information known about the waste being received. Generators who are able to provide baseline sampling data for their wastes, are on a regular catch basin cleaning schedule and whose catch basins do not have any obvious signs of contamination are more likely to have additional sampling requirements waived, especially if the baseline data shows results consistently below the standards.

If the generator does not have analytical data for the catch basin wastes, the hauler will need to complete a catch basin Site Evaluation Form (see Appendix I) and/or may request.

4.2. Training Program

Hauling companies should provide training programs for their staff to give them an understanding of the pollutant sources, impacts to the environment, and current regulations. The program could consist of the following components:

- Site Evaluation Form (Appendix I);
- Catch Basin Sampling Evaluation Flow Chart (Appendix II);
- Source separation program; if the hauler thinks a load may be “hazardous waste”, then they should keep it separate from other materials. The “hazardous waste” load should be separated to minimize disposal costs;
- Techniques in the field for identification of suspect hazardous waste based on odour, sheen, colour and consistency of the waste;
- Training in sanitation practices, including personal sanitation and vehicle washing; and
- Source detection – private and public sources. If haulers can identify the source of the pollutant, they should have a mechanism to report it either to the generator or to a regulatory agency.

Generators also need training in source detection, source separation, PCOCs and why there is a potential environmental concern with the disposal of catch basin wastes. Through the use of professionals (i.e. environmental consultants, disposal companies), the generator can have confidence that their catch basin wastes will be disposed of properly and not potentially become a liability to the generator.

5. PART 3 – PICK UP / DISPOSAL

5.1. Transportation and Disposal Documentation

To transport and dispose of the catch basin wastes, the following documentation may be required:

- Manifest form (example sample Appendix III) to be completed by generator or hauler – form retained on site when completed; and
- a copy of analytical data or source information to be given to the Receiver (disposal facility) to allow them to dispose of the wastes.

To transport *HW*, the hauler must have a License to Transport from the BC Ministry of Environment. Hazardous Waste manifest forms must be completed by the Generator or Hauler if the material is greater than *HWR* standards. These completed forms are distributed to BC Ministry of Environment, the Generator, the Hauler and the Receiver as per the instructions on the form.

5.2. Disposal Options

The most common disposal method of catch wastes in British Columbia and North America is the disposal at a permitted landfill, which diminishes the potential of environmental impacts and therefore reduces liability. Recycling can be an alternative to tipping fees, however, in many situations it is not economically feasible. To be reused, the catch basin wastes have to be sorted (garbage removed which is then disposed of at landfill), and sampled and analyzed to confirm it meets applicable standards for re use, as commercial fill, road base, aggregate for concrete or asphalt. Complex regulations, costly analytical methods, limited contaminant data, liability and risk consideration and cost restraints makes disposal a real issue.

Disposal sites must be permitted to accept this type of material, and it should not be disposed of at an unauthorized landfill or disposal site unless analytical data is less than CSR-SRA criteria due to the potential future environmental liability and costs for subsequent removal and/or cleanup. The following general guidelines should be followed when selecting appropriate disposal options. Thus catch basin wastes should be sampled and tested for suspected contaminants prior to disposal.

- Hazardous Waste material must be disposed of at a treatment facility or a landfill permitted to accept hazardous waste;
- Wastes which exceed the commercial land use standards must be disposed of at an appropriate permitted facility; and
- Catch basin solids which meet the SRA can be used for fill material but can not be used on agricultural land.'

Ideally liquids from catch basin wastes should be treated and discharged (under permit) to the CRD sanitary sewer system.

Table D below identifies the CSR *SRA, CL* and *HW* standards for select contaminants of concern often encountered in catch basin wastes. Comparison of analytical results to the CSR standards is required to confirm disposal options:

TABLE D: HYDROCARBON & METAL STANDARDS

PARAMETER	SRA Schedule 7 µg/g	CL Standards µg/g	HW µg/g
HYDROCARBONS			
Benzene	0.04	2.5	N/a
Ethylbenzene	1	20	100
Toluene	1.5	25	100
Xylenes	5	50	100
VPH	200	200	N/a
LEPH	1,000	2,000	N/a
HEPH	1,000	5,000	N/a
Waste Oil	N/a	N/a	30,000
PAH	-	-	-
Benz(a)anthracene	1	10	N/a
Benzo(b)fluoranthene	1	10	N/a
Benzo(k)fluoranthene	1	10	N/a
Benzo(a)pyrene	1	10	N/a
Dibenzo(a,h)anthracene	1	10	N/a
Indeno(1,2,3-cd)pyrene	1	10	N/a
Naphthalene	5	50	100
Phenanthrene	5	50	N/a
Pyrene	10	100	N/a
METALS			
Antimony	20	40	N/a
Arsenic	15	25	100
Barium	500	2,000	N/a
Beryllium	4	8	100
Cadmium	1.5	2	100
Chromium	60	60	N/a
Cobalt	50	300	N/a
Copper	90	90	N/a
Lead	100	150	N/a
Mercury	15	40	100
Molybdenum	10	40	N/a
Nickel	100	500	N/a
Selenium	3	10	N/a
Silver	20	40	N/a
Tin	50	300	N/a
Vanadium	200	N/a	N/a
Zinc	150	150	N/a

N/a – denotes no applicable standard
If the analytical results are > HWR, then the material is considered Hazardous Waste

5.3. Recycle Options

There are not a lot of options for the reuse of the catch basin solids. If they meet regulatory standards (less than the SRA Schedule 7 standards) they can be reused for fill except for on non-agricultural land. If the soil exceeds the Schedule 7 standards and are less than the HWR then it could be used in the manufacture of asphalt or Portland cement.

5.4. Decant Stations

Various municipalities were contacted and it was determined that there currently are not a large number of decant stations operating. The Cities of Vancouver, West Vancouver, Parksville, Comox-Strathcona indicated that the water was decanted prior to disposal of the solids at a landfill. However, no sample collection or analysis program have been performed on the wastes, so there is no reasonable understanding of the PCOC and their concentrations.

If a dewatering facility is available, catch basin waste may be dewatered on a structure such as a concrete dewatering pad. The water that drains from the solid waste should be collected, filtered (carbon and bag filters) and sampled for pH, suspended solids, PAH, total metals, and oil and grease at a frequency of one sample per week of discharge (to be representative, this should be a composite of discrete samples collected during the week). If the sample results comply with the CRD Sewer Use Bylaw Restricted Waste Criteria, the waste can be discharged to the sanitary sewer system, under permit. The permit will define discharge conditions.

A decant station would provide the opportunity to dewater the catch basin wastes. Prior to disposal, de-watering to reduce the liquid content and thus the weight of waste facilitates the handling and reduces the disposal cost of the solid component. Decant stations used to properly separate catch basin liquids, and solids provide an environmentally sound system for disposing of waste generated from cleaning of stormwater drainage systems. The decant station provides pre-treatment to decant liquids for discharge to the sanitary sewer system and allows recycling or disposal of de-watered solids.

- Catch basin wastes should be stored on a concrete bermed covered facility where the water can drain off. All decanted water should go through a series of filters prior to disposal into the CRD sanitary sewer system.

- The decant facility would also have a plan of operation which would identify the procedure used to characterize the waste (i.e., sampling plan), the appropriate disposal options and all record keeping and reporting requirements;

Testing frequency, number of samples and parameters to be analyzed would likely be directed by the receiving facility. Where at all possible samples should be collected once the catch basin wastes have dried out and are not saturated.

6. CONCLUSIONS AND RECOMMENDATIONS

The Generator (i.e. the owner of the catch basin) is responsible for determining whether or not the catch basin waste is contaminated. It is also the responsibility of the generator (though the hauler) to provide the end receiver (disposal facility) with any analytical data available for their catch basin wastes. Catch basin wastes potentially contain a variety of contaminants (hydrocarbons/metals), which could negatively impact the environment, therefore it is important to clean out catch basins on a regular basis and dispose of the wastes appropriately. Baseline sampling will provide chemical characterization of the wastes so that they are disposed of at the correct facility.

It is recommended that generators:

- Maintain their catch basins (stormwater rehabilitation units) that discharge to the stormwater drainage system as outlined in the CRD's Model codes of practice (storm sewer) or as per specific municipal regulations where codes have been adopted;
- Maintain their vehicle wash interceptors that discharge to the sanitary sewer system as outlined in the CRD's Code of Practice for Vehicle Wash Operations (Schedule 'N' of Bylaw 2922)
- Conduct baseline sampling to determine contaminant concentrations;
- Hire qualified individuals to collect and analyze catch basin wastes;
- Hire a qualified hauler who knows how to assess and transport catch basins wastes;
- Keep records and documentation (manifests) on site from the hauler including name and location of disposal facility; and
- Maintain records (site evaluation forms, analytical results, manifests).

It is recommended that the haulers:

- Conduct a site evaluation prior to the collection of catch basin waste materials. This will help to determine if the catch basin wastes should be handled as hazardous wastes;
- Do not collect and mix catch basin wastes that may be contaminated with other catch basin wastes. Contaminated catch basin wastes should be handled by individuals experienced in handling hazardous wastes, and should be stored separately and tested to determine the appropriate disposal location or disposed directly as hazardous waste;
- Ensure employees have appropriate training;
- Request analytical data from generator so that any liabilities associated with the wastes are understood; and
- Dispose of catch basin wastes at appropriate facility and retain documentation.

Under a controlled secure environment decant stations would allow segregation of catch basins solids and potentially would allow for a recycling opportunity (based on analytical results). Generally except for municipalities, individual generators will not generate enough waste to make it cost effective to assess and potentially reuse the catch basin wastes. Operation of a decant facility likely would be cost effective.

7. DEFINED TECHNICAL TERMS

Adsorption	The selective collection and concentration of a liquid or gas onto the surface of a solid. Indicates that a chemical adheres to the surface of the solid.
Agricultural Land Use (AL)	The use of land for the primary purpose of producing agricultural products for human or animal consumption including, without limitation, livestock raising operations, croplands, orchards, pastures, greenhouses, plant nurseries, and farms. *(Defined by the CSR)*
Aquatic Life Water Use (AW)	The use of water as habitat for any component of the freshwater or marine aquatic ecosystem, including phytoplankton, zooplankton, benthos, macrophytes, and fish. *(Defined by the CSR)*
AWCWQ	Approved and Working Criteria for Water Quality - 1995 (AWCWQ), BC ELP, April 1995. Replaced by the BC Water Quality Guidelines (1998) and A Compendium of Working Water Quality Guidelines for BC: 1998 Edition.
BMP	Best Management Practices – educational/suggested practices, voluntary
BCWQG	Water Management Branch, MWLAP, British Columbia Approved Water Quality Guidelines (Criteria), 1998 Edition (Bca regulatory document under a bylaw hasWQG), updated August 24, 2001.
BETX	Benzene, ethylbenzene, toluene, and xylenes.
CCME	Canadian Council of Ministers of the Environment.
CRD	Capital Regional District
COC	Contaminant of Concern
COP	A regulatory document containing legal requirements as adopted by a regional district or municipality
CL	Commercial Land Use **-** The use of land for the primary purpose of buying, selling, or trading of merchandise or services including, without limitation, shopping malls, office complexes, restaurants, hotels, motels, grocery stores, automobile service stations, petroleum distribution operations, dry cleaning operations, municipal yards, warehouses, law courts, museums, churches, golf courses, government offices, air and sea terminals, bus and railway stations, and storage associated with these uses. *(Defined by the CSR)*
CSR	*Contaminated Site Regulation (CSR),* B.C. Reg. 375/96, including amendments up to B.C. Reg. 239/2007.
DW	Drinking Water Use - The use of water for the purpose of consumption by humans. *(Defined by the CSR)*
EPH	Extractable Petroleum Hydrocarbons - Gross screening test. Includes light (C_{10} to C_{19}) and heavy (C_{19} to C_{32}) fractions. Reported EPH results have not been corrected for PAH concentrations. (see HEPH and LEPH)
HW	Hazardous Waste - Waste containing concentrations of compounds as defined in the HWR. Section 13 of the CSR allows for an exemption from the HWR management responsibilities for specific classes of hazardous waste. If the section 13 exemption applies at a site, details will be provided in the Regulatory Framework section of the report.

HEPHs	Heavy Extractable Petroleum Hydrocarbons - Includes petroleum hydrocarbons in soil with carbon lengths ranging from C_{19} to C_{32}, with the exception of the following PAHs: benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene. *(Defined by the CSR)*
HWR	*Hazardous Waste Regulation* (HWR), B.C. Reg. 63/88, including amendments up to B.C. Reg. 261/2006.
IL	Industrial Land Use **-** The use of land for the primary purpose of conducting industrial manufacturing and assembling processes and their ancillary uses including, without limitation, factories, metal foundries, wood treatment facilities, mines, refineries, hydroelectric dams, metal smelters, automotive assembly plants, rail car or locomotive maintenance facilities, railyards, non-retail breweries and bakeries, roads and highways, wastewater and sewage treatment plants, electrical transformer stations and salvage yards. *(Defined by the CSR)*
EHw_{10-19}	Includes light extractable petroleum hydrocarbons in water, carbon ranges C_{10}-C_{19}. The EHw_{10-19} standard is solubility based and is intended to assess the presence/absence of light non-aqueous phase liquids (NAPL). *(Defined by the CSR)*
LEPHs	Light extractable petroleum hydrocarbons - Includes petroleum hydrocarbons in soil with carbon lengths ranging from C_{10} to C_{19}, with the exception of the following PAHs: benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene and pyrene. *(Defined by the CSR)*
LEPHw	Includes light petroleum hydrocarbons in water with carbon lengths ranging from C_{10} to C_{19} with the exception of the following PAHs acenapthene, acridine, anthracene, fluorene, naphthalene and phenanthrene. Term references a specified analytical methodology which became mandatory on October 15, 1999. LEPHw standards are toxicologically based and are intended to protect aquatic life water uses. *(Defined by the CSR)*
Model Bylaw or Code of Practice	A document prepared by the CRD for adoption by municipalities
MoE	Ministry of Environment (MoE), formerly known as the Ministry of Water, Land and Air Protection (MWLAP).
MOG	Mineral oil and grease
OWS	Oil-water separator
PAH	Polycyclic Aromatic Hydrocarbons. Compounds with more than one benzene-ring structure. PAHs regulated under the CSR include: **Soil** - benz(a)anthracene; benzo(b)fluoranthene; benzo(k)fluoranthene; dibenz(a,h)anthracene; indeno(1,2,3-c,d)pyrene; naphthalene; phenanthrene; pyrene. **Water** - acenaphthene; acridine; anthracene; benz(a)anthracene; benzo(a)pyrene; fluoranthene; fluorene; naphthalene; pyrene.
PCOC	Potential Contaminant of Concern.

RL	Residential Land Use - The use of land for the primary purpose of: (a) a residence by persons on a permanent, temporary, or seasonal basis, including single family dwellings, cabins, apartments, condominiums, or townhouses, or (b) institutional facilities, including schools, hospitals, daycare operations, prisons, correctional centres, and community centres. *(Defined by the CSR)*
SWOG	Special Waste oil and grease. Oil and grease analyzed as per the HWR.
TSS	Total suspended solids.
TCLP	Toxicity Characteristic Leaching Procedure - This procedure is described in Part 2 of Schedule 4 of the Environmental Management Act, *Hazardous Waste Regulation* (HWR), B.C. Reg. 63/88, including amendments up to B.C. Reg 454/2004. It is intended to simulate the leaching effects of acid rain.
TDG CLR	*Transportation of Dangerous Goods Clear Language Regulations* (TDG CLR) (Canada), SOR/DORS/2001-286, August 15, 2002.
UL	Urban Park Land Use - The use of urban land for the primary purpose of outdoor recreation including, without limitation, municipal parks, fairgrounds, sports fields, rifle ranges, captive wildlife parks, biking and hiking areas, community beaches and picnic areas, but does not mean wildlands such as ecological reserves, national or provincial parks, protected wetlands or woodlands, native forests, tundra and alpine meadows. *(Defined by the CSR)*
VHw_{6-10}	Includes volatile petroleum hydrocarbons in water, carbon range C_6-C_{10}. The VHw_{6-10} standard is solubility based and is intended to assess the presence/absence of light non-aqueous phase liquids (NAPL). *(Defined by the CSR)*
VOCs	Volatile Organic Compounds. Specific compounds that partition strongly into the air phase rather than water phase based upon vapour pressures.
VPHs	Includes petroleum hydrocarbons in soil with carbon lengths ranging from C_6 to C_{10}, with the exception of benzene, ethylbenzene, toluene, and xylenes. *(Defined by the CSR)*
VPHw	Includes volatile petroleum hydrocarbons in water with carbon lengths ranging from C_6 to C_{10}, with the exception of benzene, ethylbenzene, toluene, xylenes. Term references a specified analytical methodology which became mandatory on October 15, 1999. VPHw standards are toxicologically based and are intended to protect aquatic life water uses. *(Defined by the CSR)*

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APPENDIX I

Site Evaluation

SITE EVALUATION / INSPECTION

A record of all inspection and maintenance activities, with regards to catch basins, should be maintained by the generator and kept on site. A site evaluation will aid in determining if waste should be handled as Hazardous Waste (HW) and what to test for.

Three steps to a site evaluation/inspection:

1. Historical review of land use in area (i.e., spills, previous contamination, nearby HW and materials storage facilities). Complete this prior to waste collection;

2. Area visual inspection for potential contaminant sources such as nearby fire, vehicle service stations, industrial sites, electrical transformers, surface staining (done prior to collection of the waste) etc.; and

3. Inspection of catch basin during the collection of the waste (most critical) identify if catch basin waste has unusual colour, odour, obvious staining.

HISTORICAL REVIEW

Conduct a historical review of the site for spills, and previous contamination. Probably best done on a wide area basis prior to scheduling waste collection. The historical review should be thorough for haulers who have never collected waste at the site before. At a minimum, it should include the hauler's knowledge of the area's collection history or records kept from previous collections.

AREA VISUAL INSPECTION

The following information would be documented during the Area Visual Inspection:

1. The name(s) of the person who conducted the inspection/maintenance;

2. Name, address and contact at the hauling company collecting/handling the material;

3. Name, address and contact at the disposal facility;

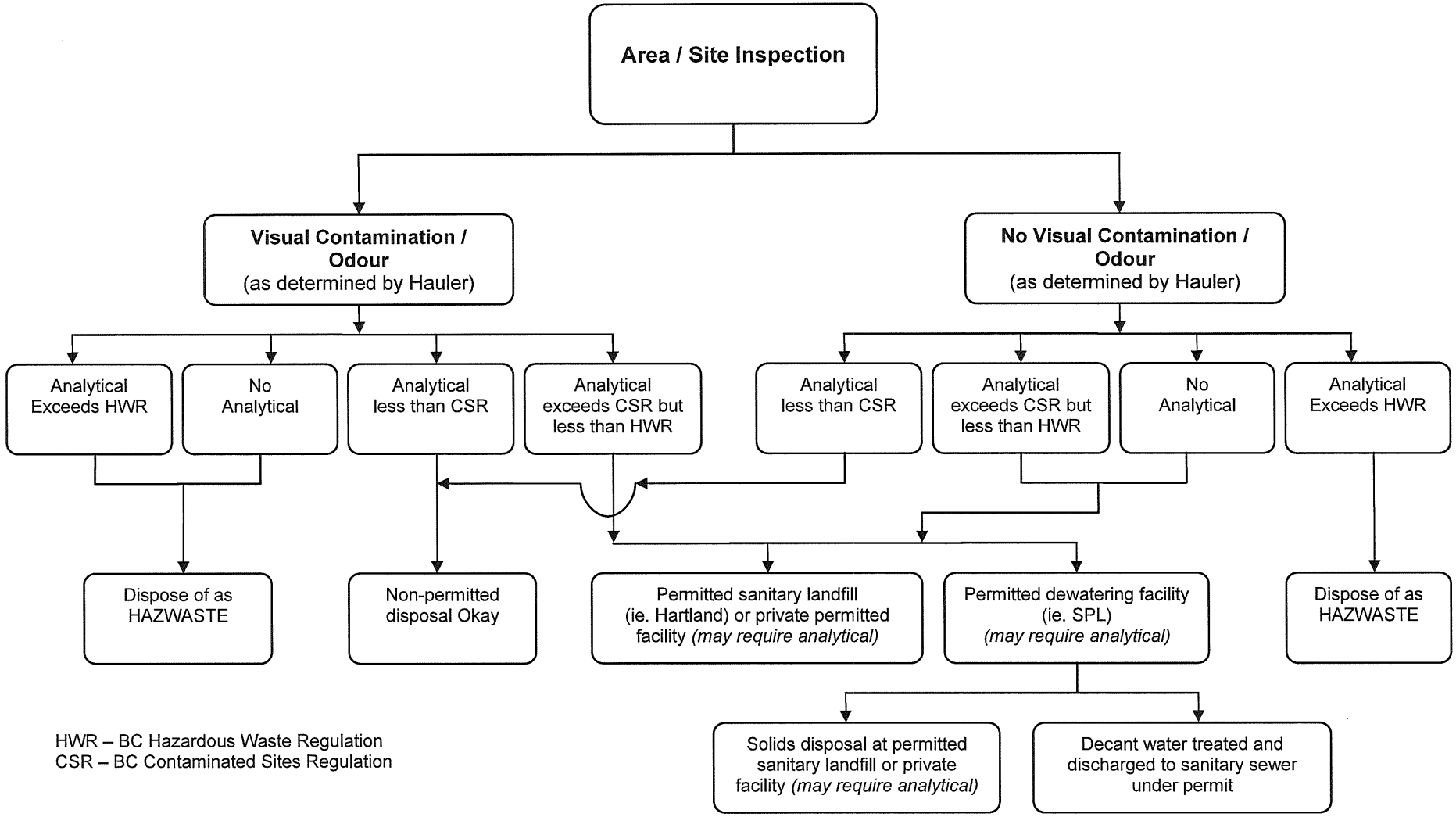
4. Location of catch basin(s) / vehicle wash interceptor(s);

5. The date(s) of the inspection/maintenance;

APPENDIX II

Flow Chart
Catch Basin Sampling Evaluation

Catch Basin Waste Visual Inspection
Flow Chart



HWR – BC Hazardous Waste Regulation
CSR – BC Contaminated Sites Regulation

CATCH BASIN INSPECTION

1. A description of maintenance conducted;

2. Major observations relating to the performance of the catch basin / vehicle wash interceptor(s);

3. A description of any suspect contamination:
   - the presence of floating materials;
   - suspended solids;
   - oil and grease;
   - discoloration;
   - turbidity and odour;
   - fumes;
   - unusual odours; and
   - surfacing staining around the catch basin(s) / vehicle wash interceptor(s).

4. Description of nearby pollutant sources:
   - fuel retailing stations/cardlock facilities;
   - vehicle servicing facilities;
   - industrial areas;
   - recyclers and scrap yards;
   - past fire; and
   - electrical transformers.

5. Description of any analysis that was performed, including the parameters analyzed, the analytical results and the reasoning for the analysis:
   - routine sampling; and
   - suspect hazardous material.

6. There should be three copies of the documentation: one to stay at the site for a period of two years available for inspection, one for the hauler and one for disposal facility.

APPENDIX III

Example Waste Manifest

MOVEMENT DOCUMENT / MANIFEST

REFERENCE NO.:

GENERATOR

Generator Name: _____ Shipping Site Location: _____

Generator Address: _____ Site Address: _____

Generator Phone No: _____ Site Phone No: _____

Generator's Representative Name _____ Signature _____ Shipment Date

CARRIER

Carrier Name: _____ Site Location: _____

Carrier Address: _____ Site Address: _____

Carrier Phone No: _____ Site Phone No: _____

Truck No / License: _____ LT # (for HW only): _____

Driver's Name _____ Signature _____ Shipment Date

INTENDED RECEIVER

Receiver Name: _____ Registration No.: _____

Receiver Address: _____

Receiver Phone No: _____

Receiver's Representative Name _____ Signature _____ Shipment Date

SHIPMENT INFORMATION

Source of waste: _____

Classification of waste: _____

Classification based on: _____ analytical/source information _____

HW Manifest No. _____ if applicable

I hereby certify that to the best of my knowledge the above is true and accurate

Name of Authorized Agent _____ Signature _____ Date

APPENDIX IV

Sampling Protocols

Sampling Protocols

Suggested sampling protocols for liquid and solid waste sampling are as follows:

Field Sampling Equipment

The following equipment and supplies are required when conducting sampling:

- disposable nitrile gloves
- a shovel, or trowel (corrosion free) for solid samples
- appropriate laboratory supplied sample collection bottles
  - 125 ml glass jars for solids
  - 250 ml plastic for pH
  - 1L plastic for suspended solids
  - 2 – 40 ml clear glass vials with preservative – VPH
  - 1L amber glass – LEPH, PAH
  - 1L clear glass with preservative – oil and grease
  - 250 ml plastic with preservative – total, dissolved metals
- disposable bailers or pail with new disposable polyethylene bag liner
- cooler, ice and packing material
- detergent (e.g Alconox®) and water solution
- dilute (10%) nitric acid solution;
- de-ionized and/or distilled water in squeeze bottle
- labels and pens

Sampling Procedure

1. Prior to start of work, decontaminant the sampling trowel by scrubbing in a mild detergent (e.g. Alconox) water solution, rising with potable or distilled water, rinsing with dilute (10%) nitric acid solution and rinsing with de-ionized or distilled water.

2. Remove any covers needed to gain access to the catch basin (if applicable).

3. Label jars on the side label with the location and date (each jar for one specific sample should have the same label).

4. Put on new disposable nitrile gloves.

5. Solid Samples

   - Representative soil samples should be collected from the approximate centre of catch basins using a stainless steel shovel or trowel and put directly into duplicate sample jars with Teflon® - lined lids. To minimize the potential for cross contamination, sampling tools should be cleaned as identified in step 1 above and by using a new pair of disposable nitrile gloves between sample locations;

- For solid samples from a stockpile, collect sample from five locations (a small portion from each location) within the stockpile using a shovel or trowel and transfer the soil or sediment into the sample jars without letting it touch anything else (e.g., ground); and
- Soil jars must be filled to the top and compacted to minimize headspace (necessary for hydrocarbon analysis).

6. Liquid Samples

   - For liquid samples from a catch basin, wear a new pair of clean nitrile gloves at each location;
   - Collect sample from the approximate centre of the catch basin using a clear polyethylene bag liner in a pail on a rope where the surface of the water cannot be directly accessed or use a bailer and transfer the liquid into applicable sampling jars. It is important to refer to laboratory for specifics when colleting liquid samples as different analysis require different sample jars and preservations. For example VPH analysis require 40 ml vials which come with preservative and must be filled to the top have no air bubbles (have a positive meniscus);
   - Use care not to disturb any sediment or introduce any foreign or undesirable materials into the sample site; and
   - Obtain the sample from just below the surface of the liquid to avoid capturing floating solids or non-representative debris or materials.

7. All samples should be placed in a sealed plastic bag inside the cooler to protect them from melting ice.

8. Remove nitrile gloves and discard. New nitrile gloves must be used for each sample.

9. Record notes regarding observations of sample (any observable impacts) and location where sample was collected.

10. Fill out a laboratory supplied Chain-of-Custody form indicating mailing address, sampler's name, sample name, date sampled, sample matrix (e.g. soil, sediment, water), requested analysis (e.g., PAH, metals), turn-around-time (TAT) (regular is five days, a surcharge for

faster TAT will be applied by the lab (e.g. 100% for 24 TAT and 50% for 3 day TAT), date and time the samples were sent, sampler's signature. Tear off and retain the back copy of the chain-of-custody for your records. Place the remaining copies of the chain of custody in a plastic bag and into the cooler with the samples.

11. Add packing material to protect samples, seal cooler and ship samples to laboratory overnight with sufficient ice to keep samples below 4°C.

APPENDIX V

Decant Facility

Decant Facility

Facility

Prior to disposal or recycling, all catch basin wastes should be stockpiled such that they do not pose any environmental liability. They should be protected from wind and rain as necessary to prevent dust, erosion and off-site migration. Surface water runoff from the pile should be controlled and managed as to prevent a negative impact to surface and groundwater. This can be accomplished through the construction of a facility complete with a roof and drainage collection system to assist in the dewatering of the catch basin material. Until a facility is constructed all stockpiled material should be placed on a concrete pad covered with tarps (which can be weighted down with either sand bags or tires) to cover the material to prevent runoff and control dust.

Segregation of Materials

Suspect contaminated material should be stockpiled separately and sampled to determine concentrations of contaminants prior to disposal. It is important that the material is not mixed with other wastes, so that a larger volume of material does not become contaminated and then have to be disposed of as hazardous wastes at a higher tipping fee.

Sampling Catch Basin Treatment Residuals

As part of the disposal facility operation plan, it is the facility operator's responsibility to know the contaminant concentrations of the material they received. The operation plan should include procedures for waste characterization. Testing frequency, number of samples, parameters to be analyzed, and contaminant limit criteria would be outlined in the operating plan. Sampling requirements could be modified over time based on the accumulation of data. It is suggested that operators of disposal facilities should restrict the use of their facilities to certified and/or licensed waste haulers for liability requirements.

Suggested Sampling Frequency

Non-hazardous catch basin solids that have been stockpiled should be sampled for the following parameters pH, BETX, VPH, LEPH, HEPH, PAH, metals, and oil and grease. Stockpiles should be segregated based on classifications (residential, commercial, industrial, automotive) and should remain as small as possible (<100 m^3 if possible) to reduce the impact

of a negative analytical result. Samples should be collected at least one to two weeks before disposal. If hydrocarbon impacts are observed (staining, odour), samples should be collected at a frequency of 1 per 50 m^3. Sampling should be conducted with the following frequency per stockpile:

- Residential complexes and streets – 1 sample per 250 m^3
- Commercial complexes and streets – 1 sample per 100 m^3
- Industrial complexes and streets – 1 sample per 50 m^3
- Automotive facilities (fuelling, repair) – 1 sample per 50 m^3

If varying analytical results are obtained for different sub samples in a stockpile, the stockpile should be classified based on the highest analytical results.

Once dewatered, the solids can be stockpiled until the volume reaches a predetermined volume suitable for testing and transporting. When considering recycling options for catch basin wastes, contaminant levels must be evaluated to ensure that the final end use does not compromise the environment or human health. It is important that the material be relatively dry when it is picked up by the hauler as moisture/liquid can result in handling problems, may pose environmental problems, adds costs to transportation and weight-based tipping fees. To mitigate any environmental impacts and liability a storage location should be constructed to dewater the materials prior to disposal. The facility should be constructed such that it is covered and has separate bays for segregation of materials. All the runoff water should empty into a sump that will allow the sediments to sink and have baffles to prevent the discharge of oily water. A sampling point would be required prior to the discharge point to confirm that the discharged water meets the CRD permit requirements

Documentation

A record of the volume of all material and the disposal location and or the reuse opportunity should be maintained. Records of all analytical result of all material should also be recorded.

Technical Issues to Address

Treatment practices vary from a convenient disposal site to a facility were solids and liquids are separated prior to disposal. Field decanting to the sanitary sewer system often occurs when the vactor truck is mostly full with liquids. There is a concern, however, with the liquid as it often

has high TSS and oil, BOD etc. It is best to decant to a settling vault to remove the solids, oil and greases.

Most existing decant facilities consist of a dewatering pad which includes a flat or sloped concrete floor. The contents of the vactor truck are dumped on to the pad surface with the premise that the fluids will run to a collection drain, leaving the solids behind. Problems often noted with these facilities include:

- Area required to run a dewatering facility where individual land uses (residential, commercial etc) can be stockpiled separately requires a substantial amount of space that often is not available;
- The pads are too small to effectively de-water the waste;
- The solids take too long to de-water; frequently, many weeks are needed to reduce the moisture content to a level the solids can be disposed. Disposal costs are based on the weight of the solids therefore it is desirable to minimize moisture content. There may be a need to be able to be able to decant the free liquids prior to dumping on the dewatering pad;
- Construction costs for facilities with roofs and complex concrete slabs are more costly than simple open air dewater pads;
- A roof is typically needed to keep rain from wetting the solids and delaying the drying process. However, the roof height needs to be high to accommodate dumping of the loads which then allows wind blown rain to enter the facility;
- Access by a loader to work the material is needed;
- The material in the facility needs to be managed. Practices of source separation, multistage de-watering process, and different disposal options are all needed for a successful program; and
- The decant facilities often have a difficult time determining the best type of solid barrier as the system often becomes plugged with fines.

The decant liquids at these facilities are directed to a subsurface structure for settling. It has been documented that standard oil/water separators utilizing multiple chambers and baffles

provide sufficient pre-treatment prior to discharge, however if hydrocarbon concentrations still exceed the standards the water can be put through a carbon filter prior to discharge. If TSS is an issue, then the use of flocculants appears to solve the problem.