

Aggregate Operators Best Management Practices Handbook

PART II

Chapter 5 - 6: Planning Modules

BY-PRODUCT & WASTE MODULE - BWM

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BY-PRODUCT & WASTE MODULE - BWM

Common Concerns: Aggregate By-products & Waste

Most aggregate operations generate by-products and waste that, if not managed expediently, can cause space control problems, add to costs and potentially be detrimental to the environment.

Aggregate by-products are overburden that is moved in order to access resources, screenings and settling-pond fines. These by-product materials are generally of low unit value, and extra handling to dispose of them represents added costs. Where markets can be found for by-products, cost recovery is often the best that an operator can anticipate. Finding timely and effective uses or applications for aggregate by-products can be a challenge for many operators.

Waste generated at aggregate sites generally includes garbage, used petroleum products and other non-mineral materials. Effectively managing waste means reducing its production, planning for the space and containment to adequately handle the material, and arranging for cost-effective and appropriate disposal in accordance with applicable regulations. Planning to handle waste properly and promptly may prevent subsequent time-consuming and costly remedial action.

Sand and gravel pits are often located in areas of high permeability, sometimes even in groundwater recharge areas. Waste management at these sites should recognize and account for the greater risk associated with high permeability areas. Furthermore, aggregate operations should handle waste in a manner that will not negatively impact subsequent land uses.

Planning for by-products and waste management includes identifying the types and volumes of produced materials, developing procedures for handling these materials, and finding applications or depots for their disposition. Minimizing handling will benefit both the producer and the end user.

This module recommends four basic strategies of by-product and waste management:

- minimizing their production,
- planning for space to handle/store them,
- finding uses or destination sites, and
- minimizing handling.

What Are Aggregate By-products

By-products at aggregate operations are any materials that are not sold as a primary product. Table BWM - 1 lists and describes some by-products. Note that topsoil is not generally considered to be either a by-product or a marketable product, and often has to be saved on the site for reclamation.

Table BWM - 1: Potential by-products generated at aggregate operations

Aggregate By-products	
Overburden	material below topsoil and above salable gravel and rock
Oversized/ Coarse Rock	boulders, cobbles, etc. that are removed by screening
Clay	layers sometimes found within the mining sequence
Wash Plant Fines	silt, sand and clay
Sediment Pond Fines	silt, sand and clay
Screenings/ Undersized Material	natural sands, dirty sands, undersized material
Baghouse Fines	silt, sand and clay
Grubbing Material	stumps, woody debris, slash

By-products Are Not Waste

Aggregate by-products do not generally fall under the definition of waste as defined in the [Waste Management Act](#). There are a few circumstances where the chemical properties of naturally occurring rock, when exposed to air and water, produce effluent (i.e., substance capable of damaging the environment). This material may be classified as waste and fall under *Waste Management Act* regulations for handling and disposal.

By-Product Storage Options

Aggregate by-product storage options include stockpiles, pre-cast locking concrete block corrals, and bags (from a bag house).

Table BWM - 2, outlines types of aggregate by-products, their production, significance, storage options, potential uses and BMPs.

Table BWM - 2: Aggregate by-products significance, storage and application options

By-product	Production	Significance	Storage	Possible Uses and Applications	Suggested BMPs & Other Measures
Overburden	Periodic - only during stripping	Overburden depths vary throughout the province. May be clay rich, leading to erosion concerns.	<ul style="list-style-type: none"> • stockpile • berms 	<ul style="list-style-type: none"> • used for reclamation fill • sold as fill • used to make berms 	<ul style="list-style-type: none"> • Berm • progressive reclamation
Oversized Rock	Continuous - during normal extraction	Not all sand and gravel deposits have a significant coarse component, and it may vary throughout the deposit.	<ul style="list-style-type: none"> • stockpile • berms 	<ul style="list-style-type: none"> • stockpiled and crushed • sold as rip rap • sold as fill • used as reclamation fill • sold as landscaping material • used in stream rehabilitation programs • used for on-site erosion control 	<ul style="list-style-type: none"> • Berm • progressive reclamation • habitat enhancement
Clay	Periodic - only when present and during extraction	Not all sand and gravel deposits have a significant clay content, and it may vary throughout the deposit.	<ul style="list-style-type: none"> • stockpile • berms • cover to minimize erosion (plastic, geotextiles, soil, vegetation) 	<ul style="list-style-type: none"> • used for reclamation • made into perimeter berms and vegetated • sold as fill • sold as landfill liner & cover material • sold as a soil supplement for agricultural applications 	<ul style="list-style-type: none"> • Berm • progressive reclamation
Wash Plant Fines	Continuous - during normal processing activity	Not all operations wash aggregate. Also depends on fine content of deposit, washing equipment and process efficiencies	<ul style="list-style-type: none"> • in situ ponds • holding cells 	<ul style="list-style-type: none"> • sold as agricultural supplement • used for reclamation fill • used for growth medium during reclamation 	<ul style="list-style-type: none"> • growth medium supplement • progressive reclamation
Sediment Pond Fines	Variable - during normal processing activity and during the storm season	Depends on rainfall and fine content of deposit.	<ul style="list-style-type: none"> • in situ • holding pen 	<ul style="list-style-type: none"> • sold as agricultural supplement 	<ul style="list-style-type: none"> • growth medium supplement • progressive reclamation
Baghouse Fines	Continuous - during normal processing activity	Baghouses are large vacuum systems used to extract dust from enclosed processing operations. They are not commonly used in BC.	<ul style="list-style-type: none"> • bags 	<ul style="list-style-type: none"> • used for asphalt mineral filler • sold as a soil supplement for agricultural applications • used for reclamation fill • used for growth medium during reclamation 	<ul style="list-style-type: none"> • growth medium • progressive reclamation
Grubbing Materials	Periodic - only during stripping	Not generally a significant amount of material.	<ul style="list-style-type: none"> • stockpile (not chipped material) 	<ul style="list-style-type: none"> • harvest of merchantable timber • burned • chipped • chipped and blended with soil • buried (with permission) • hauled off-site • spread off-site on right-of-way • composted • mixed in berm material 	<ul style="list-style-type: none"> • compost • engineered wildlife trees • growth medium • habitat enhancement • progressive reclamation

What Are Aggregate Wastes

The [Waste Management Act](#) defines waste to include air contaminants, litter, effluent, refuse, biomedical waste, special wastes, and anything else designated by the Lieutenant Governor in Council. More precise definitions of air contaminant and effluent are provided in Table BWM - 4. Table BWM - 3 lists common aggregate operational wastes with a brief explanation of each.

Table BWM - 3: Potential types of general wastes at an aggregate operation

Common Aggregate Wastes	
Used Oil	used engine oil and hydraulic fluids
Site garbage	garbage from office building, vehicle maintenance, lunch room, etc.
Septic Effluent	sewage
Decommissioned Equipment	major equipment and attachments
Used Barrels	oil, lubricants, surface treatments

For the most part, litter and refuse at aggregate operations can be collected and disposed of through conventional means. There may be some circumstances where local litter and refuse disposal sites are not available and where a general waste disposal permit for litter and refuse may be required.

For discharges into air and water, the regulations of the *Waste Management Act* set allowable discharge limits. If discharges into air or water exceed those levels, a waste permit may be required.

Table BWM - 4: Definition of "air contaminant" and "effluent"

"air contaminant" means a substance that is emitted into the air and which	"effluent" means a substance that is discharged into water or onto land and which
<ul style="list-style-type: none"> (a) injures or is capable of injuring the health or safety of a person, (b) injures or is capable of injuring property or any life form, (c) interferes or is capable of interfering with visibility, (d) interferes or is capable of interfering with the normal conduct of business, (e) causes or is capable of causing material physical discomfort to a person, or (f) damages or is capable of damaging the environment; 	<ul style="list-style-type: none"> (a) injures or is capable of injuring the health or safety of a person, (b) injures or is capable of injuring property or any life form, (c) interferes or is capable of interfering with visibility, (d) interferes or is capable of interfering with the normal conduct of business, (e) causes or is capable of causing material physical discomfort to a person, or (f) damages or is capable of damaging the environment;

Province of British Columbia, [Waste Management Act](#), section (1)

Special wastes are defined in the Special Waste Regulation (http://www.qp.gov.bc.ca/statreg/reg/W/WasteMgmt/WasteMgmt63_88Special/63_88.htm). Two common special wastes that may be found at aggregate sites are used oil and surplus pest control products and their containers. Common aggregate operation materials that are not considered

special wastes are asphalts and tars, and wood products treated with preservatives or wood protection products registered under the [Pest Control Products Act](#) (Canada).

Managing Aggregate By-products

If a use, application or destination for materials can be found ahead of time, primary handling during extraction or processing can move that material directly to its final destination, avoiding double handling.

Image RWM - 5: Spreading muck for an agricultural application



Minimizing Production of Aggregate By-products

Options for minimizing by-product production include:

1. Only strip areas of overburden where extraction will immediately take place
2. Avoid extraction of particularly clay-rich materials if site conditions permit selective mining
3. Tune processing plant for maximum recovery of salable fines to avoid including them with wash plant fines

Planning for Sufficient Handling and Storage Space

Refer to the [Stockpiling Module](#) for advice on space allocation for storage and handling requirements for all materials on an aggregate production site.

Finding Uses for Aggregate By-products

1. Immediate On-Site Uses/Applications

Options and locations for usage/applications of aggregate by-products should first be sought at the aggregate production site. Progressive reclamation is an ideal application for overburden and by-product rock that can be immediately directed to the reclamation area as part of the extraction or processing operations. Other options include berm construction, soil treatments and progressive reclamation grading.

2. Immediate Off-Site Uses/Applications

A second option for managing aggregate by-products is immediate off-site application. If an off-site use/application is pre-arranged, by-product material can be taken to that site as it is produced. This approach reduces the need to stockpile and double handle by-product material at the aggregate operation. Off-site application may also be viable for limited wastes, such as used equipment and scrap iron.

Options for use or disposal of aggregate by-products are only limited by time, effort and resourcefulness. A potential resource for locating uses for by-product materials is the [Recycling Council of British Columbia \(RCBC\)](#). One of their programs, the [BC Materials Exchange \(MEX\)](#), provides a way for suppliers and users of low-valued materials to find each other. MEX's motto is "one company's garbage is another's gold." Contact information is in Figure BWM-6.

Figure BWM - 6: Recycling Council of British Columbia contact information

Recycling Council of British Columbia (RCBC)	
Greater Vancouver:	R-E-C-Y-C-L-E (732-9253)
Anywhere in BC:	1-800-667-4321
Hours:	Monday to Friday, 9:00 AM to 4:00 PM.
Web Address:	www.rcbc.bc.ca

3. *On-Site Storage with Delayed Uses/Applications*

A third option for managing by-product materials is to store the materials on site until a use/application can be found. Table BWM - 2 outlines storage options for various types of aggregate by-product. The main drawbacks of this option are the space requirements and the costs of storage and double handling of the material. There is also the risk that a use may never be found.

Managing Aggregate Wastes

Key advice for managing aggregate wastes is,

- reduce waste production
- plan for handling space and adequate containment
- recycle or dispose
- minimize handling

With the proliferation of recycling options and restrictions, locating facilities to accept wastes can become time-consuming. Table BWM - 7 outlines handling options for various types of aggregate wastes.

Table BWM - 7: Aggregate wastes and handling options

Waste	Production	Notes	Storage	Disposal Options
Used Oil	Continuous - product of regular maintenance	<ul style="list-style-type: none"> recycling of used oil is required by law and is a well established practice in BC 	<ul style="list-style-type: none"> barrels 	<ul style="list-style-type: none"> return to seller¹ collected by recycler
Site Garbage	Continuous - product of regular business	<ul style="list-style-type: none"> recycle office paper, plastic containers and glass bottles 	<ul style="list-style-type: none"> dumpster recycling bins 	<ul style="list-style-type: none"> dumpster pickup burning recycling
Septic Effluent	Continuous - if municipal sewer system is not available	<ul style="list-style-type: none"> portable and permanent septic solutions are readily available 	<ul style="list-style-type: none"> septic field holding tank 	<ul style="list-style-type: none"> septic field -- ref. Ministry of Health pumped out
Decommissioned Equipment	Periodic - decommissioning of major equipment is relatively rare	<ul style="list-style-type: none"> dependent upon local market for used equipment or scrap metal recycling facilities 	<ul style="list-style-type: none"> yard 	<ul style="list-style-type: none"> sell as used equipment sell as scrap sell for parts remove to appropriate waste disposal site.
Double Walled Enviro-Tanks	Periodic - only as bulk-supplied products are used			<ul style="list-style-type: none"> return for deposit give to barrel dealer

Waste management planning for aggregate operations can include the planning of “how to reduce,” “whether to recycle or dispose,” and “how to handle waste.” For garbage, a pickup service may be hired where available. Otherwise, delivery to a collection point or disposal site may be required, and in some jurisdictions burning is still an option. For human sanitary facilities, a permanent “park-type” outhouse facility with tank, portable toilets, or conventional flush toilets can be used. B.C. Parks has standard drawings for the construction of proper outhouse facilities. The petroleum products supplier may offer a pickup service for used oil, or the used oil may carefully be stored in drums on site until sufficient volume accumulates for delivery to a recycling depot.

¹ Note: see ["Return of Used Lubricating Oil Regulation,"](#) 1992.