BRITISH COLUMBIA | Ministry of Environment

Technical Guidance 3

Environmental Management Act

Developing a Mining Erosion And Sediment Control Plan

Version 1.0

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Environmental Protection Division

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Preface

This document has been prepared to help mining companies develop sound practices for erosion and sediment control so that when they are implemented, they will contribute to compliance with the *Environmental Management Act* and protection of the environment. This document does not replace the *Environmental Management Act* or its regulations.

Recommendations in this document are not mandatory requirements, but are recommended practice, and may become legally enforceable if they are included in an authorization issued under the *Environmental Management Act*. Documents like this one are not intended to provide a legal interpretation of the Act, regulations and/or codes of practice. In general they describe procedures, practices and results that are consistent with legislated requirements.

The information provided in this document is intended to help users exercise their professional judgment in developing site-specific management strategies. The reader is encouraged to consult the various erosion and sediment control guidelines that are available for specific erosion and sediment control methods to use when preparing the site specific mine permit application.

Where specifics are not provided, flexibility in the application of guideline recommendations may be required to adequately achieve environmental protection. A recommended practice may be modified when an alternative could provide better results. Those requiring information on the process of attaining a discharge permit are strongly advised to contact the Ministry of Environment, Environmental Protection Mining Team representative (see contact information in Appendix C).

Table of Contents

1. Introduction

This document was developed by the Ministry of Environment (MoE), the Ministry of Forests Lands and Natural Resource Operations (FLNRO) and the Ministry of Energy and Mines (MEM) to provide guidance to exploration and mining companies on the topics which should be included in Erosion and Sediment Control Plans (ESCP). This document is intended to assist the erosion control professional when writing an ESCP by describing "what to" include in the plan, rather than a "how to" for erosion control. This document provides a consistent approach across the province and when the ESCP is implemented, it will assist in enhancing environmental protection by minimizing soil loss.

Careful planning and action to mitigate erosion and sediment runoff is crucial to ensuring environmental protection when mining operations are contemplated and constructed in British Columbia. Both federal and provincial legislation apply to all mines in British Columbia. This document outlines to mining proponents what MoE expects when developing erosion and sediment control plans.

This document provides:

- Mining companies with a clear understanding of the information needed to develop a site specific ESCP for mine effluent permit applications, the supporting Technical Assessment Reports and MEM permit requirements.

- Regulators with a consistent provincial framework for information to be requested from mining companies for ESCPs, and the ability to assess more consistently and efficiently the adequacy of ESCPs submitted to them.

- Qualified Professionals with clarity for what to include in ESCPs.

- Clarity of the roles and responsibilities for MEM and MoE.

- An implementation strategy to ensure that ESCPs are refined and improved for all phases of mine development.

- Information for achieving the applicable receiving water guidelines for total suspended solids concentration (as TSS mg/L) and turbidity (as Nephelometric Turbidity Units or NTU).

- Guidance for the content of management plans, which may be developed for environmental assessment and the permitting process, including advanced exploration, construction, operation and closure.

It is important to note that ESCPs are to be developed by a Qualified Professional who in relation to duty or function:

> (a) is registered in British Columbia with a professional organization, is acting under that organization's code of ethics and is subject to disciplinary action by that organization, and
>
> (b) through suitable education, experience, accreditation and knowledge, may reasonably be relied on to provide advice within his or her area of expertise, which is applicable to developing ESCPs.

The specific details of best management practices (BMP's), and how such BMPs should be applied at a specific mine site, are considered to be in the realm of the Qualified Professional who is an erosion control specialist.

2. Importance of Erosion and Sediment Control

Soil is a valuable and non-renewable resource. When erosion results in significant "sediment yield" (i.e. sediment discharging into a watercourse) the inorganic portion becomes a lost resource, triggering additional adverse consequences, both on land and particularly in watercourses. Mining activities present an environmental risk during exploration, construction, operation and post mining phases by generating a total suspended solids concentration (TSS) in runoff (effluent) entering receiving waters at soil erosion rates which may be significantly above "natural" erosion rates (Goldman et al., 1986).

It is recognised that sediment is essential to stream structural integrity and stream health; but when received in concentration and/or duration beyond natural regimes, it becomes a pollutant (Nordin, et al, 2009).

The main factors influencing erosion include:

- the soil type and texture,
- the volume and velocity of runoff from precipitation events,
- the rate of precipitation infiltration downward through the soil,
- the amount of vegetative cover,
- the slope length or the distance from the point of origin of overland flow to the point where deposition begins,
- and operational erosion control structures.

Adhering to ESCPs is vital for protecting water quality and for minimizing soil loss, both across the landscape and into watercourses for the various phases of mining activity. Because of the intensive disturbance and the large quantities of earthen materials exposed at mine sites, erosion can be a major concern at mines. Even during exploration activities, small scale disturbances can affect sensitive environments and contribute to cumulative effects. Consequently, erosion and

sediment control must be considered from exploration to the beginning of operations and continuing into the reclamation and decommissioning phase.

Erosion control and larger engineered sediment ponds are equally vital for minimizing sediment discharged into watercourses. For mine construction, mining companies must rely on erosion and sediment control until the sediment ponds are in place. The Ministry of Environment regards sediment ponds as the "default" requirement for mine sites, if the location allows. Mining companies should not solely rely on a sediment pond for erosion and sediment control. Other erosion and sediment control methods are important to be installed and maintained after the sediment pond is installed. Erosion and sediment control reduces sediment entry into large sediment ponds and are considered beneficial to improving pond discharge quality.

Erosion may cause significant loading of sediments (and any entrained chemical pollutants) to nearby waterbodies, especially during severe storm events and snow melt periods. This document will standardize the content of ESCPs for mining activities that are regulated under the *Environmental Management Act*. It is critical that an ESCP is developed by qualified professionals. Qualified professionals are also expected to supervise implementation to ensure that requirements of the plan are followed. The qualified professional should also monitor the effectiveness of the ESCP, and adapt the plan as necessary. The object and measure of effectiveness of the ESCP will be compliance with the mine effluent permit and protection of the environment.

3. Regulatory Authority

Mining in the Province of BC is regulated by the Ministry of Energy and Mines (MEM), the Ministry of Environment (MoE) and the federal government.

Under the *Mines Act* and *Health, Safety and Reclamation Code for Mines in British Columbia*, MEM is responsible for permitting mineral exploration, mine construction and operation, and reclamation activities. A guidance document relative to some of MEM's exploration requirements is found in the MEM document: "Handbook for Mineral and Coal Exploration in British Columbia".

MoE's Environmental Protection Division (EPD), through the *Environmental Management Act* (EMA), the Waste Discharge Regulation (WDR), and various other statutes (e.g., Placer Mining Waste Control Regulation, Hazardous Waste Regulation, and Municipal Wastewater Regulation) is responsible for authorizing the quantity and quality of any discharge to the environment from activities relating to mining of:

- metals (e.g., gold, copper etc.);
- non-metals (fertilizers);
- coal;
- gemstones;
- industrial mineral ores (diamonds); and
- beneficiating mineral ores (including custom milling).

An authorization from MoE is *not* required for activities associated with the mining/exploration of:

- aggregate (i.e., gravel, sand, crushed rock) and
- dimensional stone (i.e., quarries).

Despite the lack of a requirement for a MoE authorization for aggregate and dimensional stone mining, a general prohibition from introducing waste into the environment in such an amount to cause pollution is applicable to all mining-related activities.

EPD uses the Ambient Water Quality Guidelines (Criteria) for Turbidity, Suspended and Benthic Sediments to protect receiving water, and authorizes the concentration of sediment in effluents from mining activity based on (a) 50 mg/L TSS (coal mines) and (b) 30 mg/L TSS (metal mines) to reflect Environmental Protection Division's (EPD's) Best Achievable Technology (BAT) policy.

Discharges from placer mines (defined in the *Mineral Tenure Act*) are regulated by the Placer Mining Waste Control Regulation. For all other operations a sediment discharge (non-point discharge, or a definable discharge point(s)) from mine site runoff, and mining-related activities, requires a site specific authorization (permit/approval) under EMA. This requirement also captures large amounts of soil movement across land (i.e. land that is still under the category of the "environment", and not part of authorized "works"); a mass wasting event which does not immediately cause sediment to enter a watercourse may be considered pollution of the land, and may subsequently become a sediment source entering a watercourse.

The MoE authorizes the discharge to the environment through a site specific permit or approval for four distinct mine phases as indicated below.

Figure 1 Erosion and Sediment Control Plan Development and Application

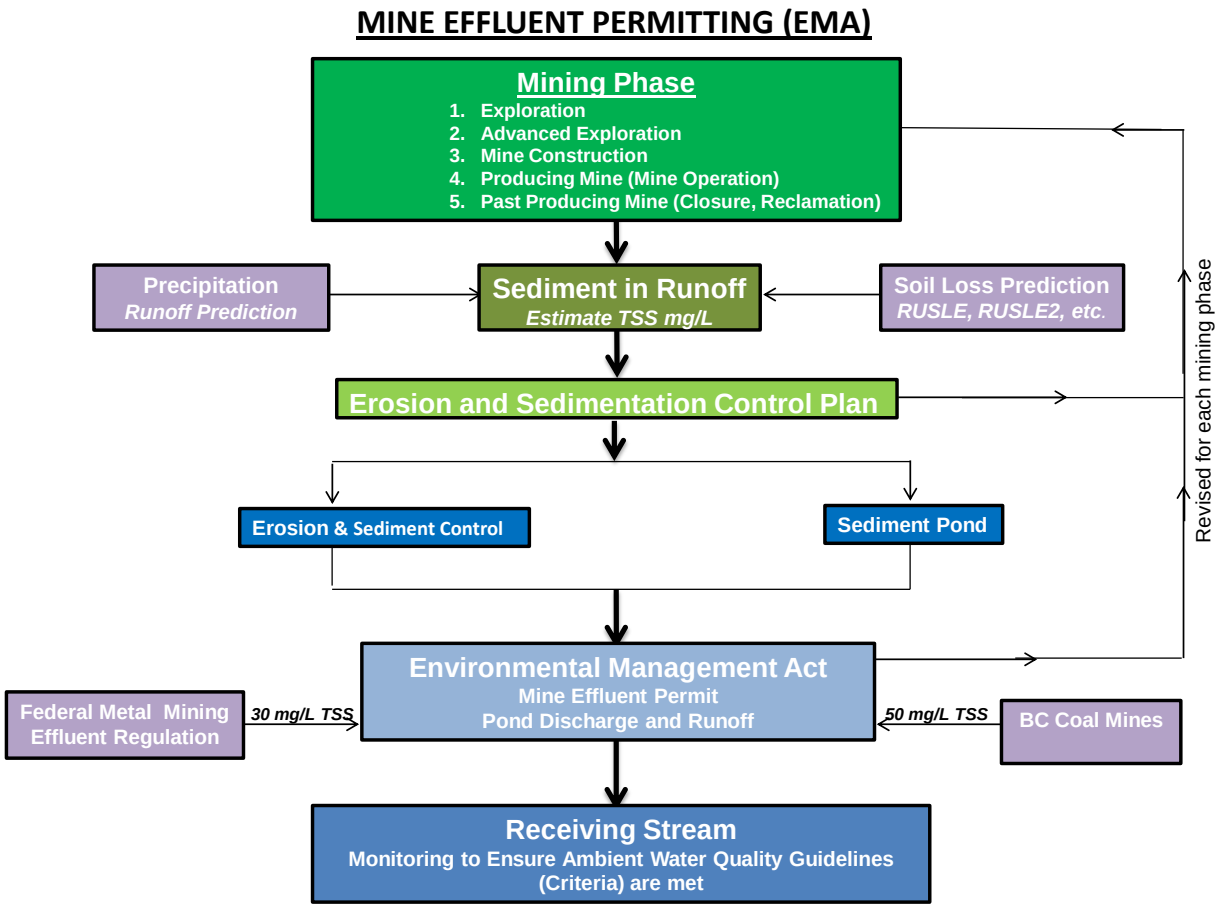

Figure 1 provides the methodology that the Qualified Professional should apply when developing and applying an Erosion and Sediment Control Plan. Note that each phase of mine development beyond exploration requires an *Environmental Management Act* permit.

1. Exploration

Exploration methods include, but are not limited to, various methods of drilling, surveys such as induced polarization, electro-magnetic, geophysical or other. Most of these methods are non-intrusive (i.e. do not disturb the ground) and do not generate wastes. As such **an *authorization from MoE is not required for exploration activities.***

However, the mining company should make a proactive decision on reducing the risk of "pollution" by having an ESCP based on the judgement of the exploration company; or alternatively, MEM may elect to have a requirement in the Notice of Work permit for an ESCP.

2. Advanced Exploration

Advanced exploration is where:

a) Bedrock has been excavated for the purpose of underground development, removed as bulk samples, removed for trial cargos, or removed for test shipments in an amount **less** than or equal to 1,000 tonnes; or,
b) Coal has been mined, removed as bulk samples, or removed for trial cargos or removed for test shipments in an amount **less** than or equal to:
    a. 50,000 tonnes of coal; or
    b. 200,000 tonnes of total material disturbed, including coal.

An authorization from MoE is required for waste being introduced into the environment from advanced exploration activities.

3. Mine Construction

Construction activities associated with mine development include, but are not limited to:

a) Road building;
b) Logging;
c) Land clearing to expose soils;
d) Constructing building and infrastructure (e.g., including water management features); and
e) Other activities that could potentially generate sediment.

An authorization from MoE is required for waste being introduced into the environment from mine construction.

4 & 5. Producing Mine (Mine Operation) and Past Producing Mine (Closure, Reclamation)

A producing or past producing mine is where:

1. A valid and subsisting permit exists under the *Mines Act*;
2. Minerals or coal are currently being produced or have been produced; and
3. Either one of the following:
    a. bedrock has been excavated for the purpose of underground development, removed as bulk samples, removed for trial cargos or removed for test shipments in an amount **greater** than 1 000 tonnes; or
    b. coal has been mined, removed as bulk samples, removed for trial cargos or removed for test shipments in an amount **greater** than:
        i. 50,000 tonnes of coal; or
        ii. 200,000 tonnes of total material disturbed, including coal.

An authorization from MoE is required for waste being introduced into the environment from producing and past producing mines.

4. Provincial Water Quality Standards and BAT Approach

The Ministry has both Ambient Water Quality Guidelines and a Best Achievable Technology (BAT) policy. These are applicable at all mine sites. Ambient Water Quality Guidelines are the safe levels of substances for the protection of a given water use, including drinking water, aquatic life, recreation, wildlife and agriculture. Whereas BAT, is a process used to set the best waste discharge standards based on a technology that has been shown to be economically and practically feasible.

The table in Figure 2 below is MoE's Ambient Water Quality Guidelines (Criteria) for Turbidity, Suspended and Benthic Sediments. In addition to meeting BC's Ambient Water Quality Guidelines (Criteria) in downstream watercourses, attaining required discharge quality in runoff and other discharges from mining related activities requires the application of BAT. Meeting BAT standards for total suspended solids (TSS) and turbidity associated with mining related activities requires a well-designed ESCP.

Figure 2 - Provincial Ambient Water Quality Guidelines

Water Use	Turbidity	Non-filterable residue (total suspended solids)	Streambed Substrate Composition
Aquatic Life	Change from background of 8 NTU at any one time for a duration of 24 h in all waters during clear flows or in clear waters	Change from background of 25 mg/L at any one time for a duration of 24 h in all waters during clear flows or in clear waters	% fines not to exceed: • 10% <2 mm • 19% <3 mm • 28% <6.35 mm at salmonid spawning sites
Aquatic Life	Change from background of 2 NTU at any one time for a duration of 30 d in all waters during clear flows or in clear waters	Change from background of 5 mg/L at any one time for a duration of 30 d in all waters during clear flows or in clear waters	Geometric mean diameter not less than 12 mm (minimum 30-d intragravel DO of 6 mg/L)
Aquatic Life	Change from background of 5 NTU at any time when background is 8 – 50 NTU during high flows or in turbid waters	Change from background of 10 mg/L at any time when background is 25 – 100 mg/L during high flows or in turbid waters	Fredle number not less than 5 mm (minimum 30-d intragravel DO of 8 mg/L)
Aquatic Life	Change from background of 10% when background is >50 NTU at any time during high flows or in turbid waters	Change from background of 10% when background is >100 mg/L at any time during high flows or in turbid waters	
Industrial Water Supplies	Change from background of 10% when background is>50 NTU	Change from background of 10% when background is >100 mg/L	
Industrial Water Supplies	Change from background of 20% when background >50 NTU	Change from background of 20% when background >100 mg/L	

In addition to meeting the requirements in Figure 2, MoE's effluent permit and the Federal *Metal Mining Effluent Regulation* will require an Aquatics Effects Monitoring Plan (AEMP) to ensure there are no effects to the downstream watercourses.

For more complete details see Reference section, Water Quality Guidelines internet link.

5. Ponds Versus Erosion Control

Effective erosion control is the best method to prevent water pollution and soil loss. However, simply applying best management practices to a mine construction/mine site without addressing challenging site specific factors such as a high percent of fines in the soils, coupled with additional site conditions such as high rainfall and steep terrain may present an unacceptably high risk to the environment. There may be locations on a mine site where ponds physically cannot be installed, and therefore the erosion control BMP approach, in conjunction with regular maintenance practices, becomes of paramount importance to ensure environmental protection. This is why the ESCP should contain a methodology to identify challenging site conditions, which may require a "designed" sediment pond, and the use of settling aids such as flocculants.

Erosion control measures may be ineffective due to improper installation, insufficient maintenance or extreme events. Erosion control BMPs may also be seriously damaged during high rainfall events and may then subsequently fail to control erosion and adequately protect receiving streams. Therefore, when sufficient area exists to construct sediment ponds to address the high risk locations on a mine site, erosion and sedimentation control within the watershed provides a sound augmentation strategy for lowering the risk of exceeding sediment pond discharge limits (TSS and Turbidity). Sediment ponds engineered for appropriate rainfall event return periods are less likely to fail during high rainfall intensity, and therefore present a lower environmental risk when they are part of the ESCP strategy. The best approach is a combination of erosion control measures and sediment ponds.

Problems arise when there is:

a) total dependence on erosion control when there is physically no space to install a sediment pond, or no available strategy to convey the sediment-containing runoff into a sediment pond further away from the sediment source; and

b) absence of erosion control upstream in the "watershed" of the sediment pond (i.e. the pond alone controls sediment releases to the environment).

This document supports the use of Revised Universal Soil Loss Equation (RUSLE, RUSLE2 and RUSLE adaptation to mined lands) to quantify erosion potential in order to assist in designing the ESCP and supports the collection and use of fine particle size analyses to provide a lower risk strategy relative to environmental protection. Erosion and sedimentation control manuals provide details on appropriate particle size analysis and RUSLE applications.

Since the erosion potential of soils increases as the finer particle size fraction increases, particle size analyses of representative soil samples collected at a mine site should be determined, along with settling analysis required for effective sediment pond design. These particle size analyses should define the fraction of minus 2 and minus 10 micron particles in the various soil samples. The erosion control specialist and the qualified professional designing the sediment ponds should collaborate to:

(a) determine whether erosion control alone will be adequate to provide a low risk strategy to provide adequate environmental protection based on site specific characteristics and activities;

(b) determine the need for sediment ponds as part of the ESCP; and

(c) determine the need for erosion control upslope of the sediment pond(s).

The MoE considers the building of a sediment pond to be an essential component to protect downstream water quality. The MoE recommends sediment ponds to be designed and sized to capture a 10 micron soil particle for the 10-year, 24-hour rainfall event. It must be recognized, however, that such a design may not, on its own, achieve the discharge quality required by MOE permits if a significant amount of minus 10 micron particles is present. The finer particles, particularly the minus 2 size fraction, may act as a colloid and not settle in the pond. By defining the minus 2 and minus 10 fractions, a mining company will be able to determine the need for flocculants that can augment the effectiveness of the settling pond. Also, performing the analysis early on in the project can help in the development of strategies that prevent a lot of erosion, and its associated costs.

Additional information is available on the MoE's internet site. See Guidance for Assessing the Design, Size and Operation of Sedimentation Ponds Used in Mining when designing the sediment pond.

6. Flocculant Management

The use of flocculants must be specifically authorized before they are applied on site. Some flocculants may cause a significant toxicity risk and therefore require a more complex system of controlling the addition of the flocculant into a sediment pond. There are other (non-sediment pond) application methods to apply flocculants, which will also require approval prior to their use at a site.

Any proposal to use flocculants at a mine site needs to be evaluated based on the risk of generating a discharge which, may not pass a 96 Hour LC_{50} bioassay test using Rainbow Trout (i.e., the risk of causing a toxic discharge into the environment).

Detailed sources of information on using flocculants may be found in the Reference section.

7. Recommended Table of Contents for Erosion and Sediment Control Plan

An ESCP should be developed in the context of the broader planning framework of erosion and sediment control and sediment pond design at a mine site for the various stages of mining activity. This planning should be initiated prior to, or when the environmental impact assessment report preparation is undertaken (and similarly for sub-EA projects). The costs of erosion and sediment control and sediment pond design and operation, and the importance of demonstrating robust environmental protection for a proposed mining project, are significant enough to warrant inclusion in the *preliminary economic assessment* phase to allow the management plans to be created and entered into the environmental assessment documents. As a mine progresses through the various development phases, the ESCP will need to be updated accordingly. The ESCP should be a site specific document that answers what will be done, when it will be done, how it will be done and why it will be done. A generic document that describes what the proponent can do, or could do is not sufficient. The document should be as specific as possible. Updates should be made as the project develops to ensure that erosion and sediment control prescriptions provide optimal effectiveness. The following is a suggested Table of Contents for an ESCP document. Additional information on suggested content of Table of Contents can be found in Appendix A.

TABLE OF CONTENTS

1. DESCRIPTION OF THE PROJECT

a. Project History.

b. Site Mapping.
   i. Location of project;
   ii. Typical cross section;
   iii. Watercourses;
   iv. Proposed erosion and sediment control structure locations (including discharge locations into surface water);
   v. Camp location;
   vi. Drill pad location;
   vii. Mine or future mine site location;
   viii. Road Access; and
   ix. Monitoring locations.

c. Surface Preparation Activities
   i. Access Road to Mine Site;
   ii. Logging;
   iii. Camp Construction;
   iv. Grubbing;

v. Top Soil Removal and Storage;
vi. Site Roads, Haul Roads;
vii. Waste Rock Removal and Placement; and
viii. Tailings Impoundment Construction.

d. Existing Site Conditions
   i. Topography;
   ii. Geologic Setting;
   iii. Soils;
   iv. Climate;
   v. Hydrology;
   vi. Vegetation; and
   vii. Land Use.

e. Proposed Mine Site
   i. Extent of area to be affected;
   ii. Type of Mining Operation;
   iii. Meteorological Conditions (rainfall intensity and frequency, flows); and
   iv. Trails.

f. Updated Plan to reflect current mine status

2. <u>RISK ASSESSMENT (SOIL LOSS ESTIMATION)</u>

a. Conduct soil loss estimation for the mine area using Revised Universal Soil Loss Equation (RUSLE) or acceptable alternative methodology.

b. Collect representative samples of soils that will potentially be eroded.

c. Perform particle size analyses down to 2 microns on soil samples.

d. Analyze relevant data and perform a risk assessment.

3. <u>ENVIRONMENTAL MONITORING AND REPORTING</u>

a. Sampling,
   i. Point source testing as per the EMA effluent permit (follow the BC Field Sampling Manual);
   ii. Runoff and receiving water sampling (follow BC Field Sampling Manual);
   iii. Visual/Turbidmeter Sampling of runoff within the disturbed footprint; and
   iv. QA/QC controls.

b. Reporting.
    i. Annual Report:
        1. Sampling results (including receiving water results) compared to Criteria and Guidelines;
        2. Quantity and quality of the discharge (includes, frequency, concentrations, loading, flows) compared to legal limits or criteria which should be specified;
        3. Maintenance activities;
        4. Inspection results; and
        5. Assessment of the effectiveness of the BMPs based on the sampling results.
    ii. Discharges using Flocculants – Where flocculants are used, effluent should be tested for toxicity and reported.
    iii. Unauthorized Discharge (Spill or Emergency).

4. EVALUATION OF SITE INFORMATION

a. Evaluate all sampling and monitoring data.
b. Evaluate all maintenance and inspection reports.

5. BMP'S TO BE APPLIED AT THE SITE

a. Use of Qualified Professionals
b. Control Strategy
c. Erosion Control – where, when, what, why
d. Sediment Control – where, when, what, why
e. Road Construction/Maintenance
f. Site Runoff
g. Description of contingency strategies
h. Spring freshet
i. Severe Weather Shutdown
j. Maintenance
k. Technology controls/review
l. QAQC measures
m. Monitoring program evaluation

6. IMPLEMENTATION

a. Construction Scheduling

b. Responsibilities

c. Onsite Plan Review

d. Onsite Inspection

e. Contingency Response (eg. Emergency events, spills, severe rains, leak detection, flooding, culvert blocks, etc.)

f. Guides for Inspection and Evaluation of Erosion and Sediment Control Measures

g. Communication/training strategy for all contractors and mining operations staff to ensure their knowledge of the ESCP, particularly their roles in its successful implementation.

Appendix A – Additional Information on Table of Contents

Site Map and Drawings: A drawing, sketch or map of the work site showing work phases and mitigation measures. Important elements to include are:

- local topography and drainage directions and patterns,
- location and design specifications of all of specific erosion and sediment control structures,
- location and specifications of drainage control structures (e.g. cross drains, ditches, sediment trap, etc.),
- Locations of discharges to surface waters, and
- location of particular critical areas/ fish habitat values.

The site map should be at a scale of about 1:1,000 compared to a watershed map which will be at a scale of about 1:20,000. These sites should be identified by the Qualified Professional making the plan, or a regulatory agency that has identified a significant, specific concern.

Project Description: Include a brief description of the project and the plan objectives along with items such as the context for the project, reasons for needing the ESCP, specific concerns identified, who identified the concerns, whether it is part of a watershed plan or a stand-alone plan..

The project description should include a terrain stability assessment, a description of sensitive soils, a description of other developments in the watershed, and analysis of the water quality at the site.

Site Conditions: Brief description of existing topography, soils types, site drainage patterns, stream characteristics such as bed material, stream width, stream depth, stream velocity, anticipated erosion and sediment transport and deposition problems.

Critical Areas: Description of downstream values that could be adversely affected by serious erosion or sediment problems (including the distance from the disturbance site), potential problematic erosion sites and sediment delivery pathways, potential erosion and sediment control sites.

Administration: Administrative measures to ensure satisfactory plan implementation; for example, timing of construction during window of least disturbance, in stream work restrictions, licences, agency approvals, frequency and schedule of site inspection by EM or other mutually agreed upon inspector, training of workers/contractor, logging contractor input to the plan, schedule of on-site inspections with regulatory agencies, development of specific shutdown guidelines for the particular project.

Construction Operations: Description of each construction operation in chronological sequence (i.e. scheduling), pathways of sediment movement, occasions when sediment will enter water, and the measures that will be taken at each step to control erosion and sediment:

- proposed construction time frame and sequence of construction
- pre-disturbance control measures (e.g. silt fences, coffer dams, temporary stream diversions, isolation of flow techniques)
- provisions to limit disturbance, and minimize erosion
- clearing and preparation of work areas
- water flow management during construction
- surface water flowing towards creek
- stream flow management during construction (e.g. stream diversions, pumping etc.)
- access to the far shore
- fill placement in floodplain (type, method)
- specific short and long term erosion and sediment control measures (where, when, how, maintenance schedule etc.)
- structural details of each critical erosion and sediment control structure (e.g. sediment basin, dike, silt fence etc.)

Ongoing Operations: Description of the proper operation of the Erosion and Sediment Control works, and the staff education and training of the operations of the works.

Contingency Plans: What materials and expertise will be available in case of failure of sediment control measures. Action plans to deal with emergencies (e.g. severe rain, flood flows, culvert blockage, avulsions). Location and access of any stockpiles of erosion and sediment control materials.

Accountability: The names, positions and phone numbers for those responsible for plan implementation and emergency response. At a minimum, this should include the on-site construction supervisor, inspector and environmental monitor.

Inspection and Maintenance: An inspection schedule and expected long and short term maintenance and monitoring requirements for erosion and sediment control measures.

Appendix B – References

Stormwater Monitoring and Sampling

Industrial Stormwater Monitoring and Sampling Guide, March 2009, EPA. Link:
http://www.epa.gov/npdes/pubs/msgp_monitoring_guide.pdf

How to do Stormwater Sampling: A guide for industrial facilities, Washington State, Department of Ecology, December, 2002 (rev. March 2010), Publication 02-10-071. Link:
https://fortress.wa.gov/ecy/publications/publications/0210071.pdf

Guidance Manual for the Monitoring, and Reporting Requirements of the NPDES Multi-Sector Storm Water General Permit, EPA. Link:
http://www.epa.gov/npdes/pubs/dmr-fin.pdf

British Columbia Field Sampling Manual, Link:
http://www.env.gov.bc.ca/wsd/data_searches/field_sampling_manual/field_man_pdfs/fld_man_03.pdf

Erosion Control Manuals

Manual of Control of Erosion and Shallow Slope Movement, BC Ministry of Transportation and Highways, August 2, 1997.Link:
http://www.th.gov.bc.ca/publications/eng_publications/environment/references/Man_Control_Erosion.pdf

Erosion and Sediment Control – Surface Mining in the Eastern US, Volume 1: Planning, October 1976. Link:
http://nepis.epa.gov/Exe/ZyNET.exe/300046YR.txt?ZyActionD=ZyDocument&Client=EPA&Index=1976%20Thru%201980%7CPrior%20to%201976%7CHardcopy%20Publications&Docs=&Query=Erosion%20Sediment%20Control&Time=&EndTime=&SearchMethod=2&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C76THRU80%5CTXT%5C00000000%5C300046YR.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=15&FuzzyDegree=0&ImageQuality=r85g16/r85g16/x150y150g16/i500&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x

Erosion and Sediment Control – Surface Mining in the Eastern US, Volume 2: Design, October 1976. Link:
http://nepis.epa.gov/Exe/ZyNET.exe/3000471V.txt?ZyActionD=ZyDocument&Client=EPA&Index=1976%20Thru%201980%7CPrior%20to%201976%7CHardcopy%20Publications&Docs=&Query=Erosion%20Sediment%20Control%20Surface%20Mining%20Eastern%20Volume%202%20Design%20October%201976&Time=&EndTime=&SearchMethod=2&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C76THRU80%5CTXT%5C00000000%5C3000471V.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-

&MaximumDocuments=15&FuzzyDegree=0&ImageQuality=r85g16/r85g16/x150y150g16/i500&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionE&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x

Best Management Practices for Reclaiming Surface Mines in Washington and Oregon, December 1997. Link: http://www.mcet.org/mining/environment/Toolkit/Additional%20Resources/Aggregates%20Information/BMPs%20Reclaiming%20Surface%20Mines.pdf

Goldman S.J., Jackson K., Bursztynsky T.A. McGraw-Hill Book Company, 1986. Erosion and Sediment Control Handbook.

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