

Protocol 13 Screening Level Risk Assessment

May 2018

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<p>The SLRA process occupies a current niche mode in the contaminated sites system and can be issued under numeric instruments. The use of SLRA in many cases requires a specific skill set normally defined by those who have obtained advanced education in Hydrogeology. Moving forward it may be beneficial to separate the standards in the instruments into Numeric, SLRA and Risk based standards to make the process more readily understandable by those using and/or contributing to the instruments.</p>	<p>This comment will be retained for future consideration as it is not possible to address this comment as part of current document updating.</p>
<p>It may be useful to state here that if certain questions are answered in the negative, subsequent questions do not warrant a response (this has always been the case but it is not transparent). This should also be made more clear in the notes to the questionnaire.</p>	<p>This is specified in the final paragraph of section 4.3. For clarity, this has been added to the questionnaire notes, as recommended.</p>
<p>A section titled “minimum requirements” has been added indicating when the completion of a DSI is required. We understand that this was not previously a requirement for upstream sites. The 2008 P13 document indicated doing PSI & DSI work, but stated that “a site investigation information must be sufficient to characterize site conditions and to identify and delineate all areas of contamination both on and offsite”. Remove requirement to complete a DSI for upstream sites.</p>	<p>The requirement for completion of a DSI, as the basis for use of screening level risk assessment at contaminated sites, did not change from the previous protocol version. The BC Oil and Gas Commission should be consulted regarding any differential application of the protocol at upstream sites.</p>
<p>Considering the frequent occurrence of sites with soil pH <5 and/or groundwater in northeastern BC/boreal forest environment, will approval from a Director still be required if considered background concentration?</p>	<p>Screening of soil contamination with soil pH values less than 5 is not currently allowed in the protocol. If the soil “contamination” is due to elevated natural background concentrations, then screening level risk assessment of this contamination would not be necessary as “contamination” is not present, i.e., soil concentrations are less than applicable generic/matrix numerical soil standards, background concentrations, or site-specific numerical soil standards (see section 4.1 response in this document). Also, Director approval is only required under sections 3.2 and 7 (previously 6) of the protocol.</p>
<p>A clarification with respect to possible interpretations indicated below would be beneficial. Is it that:</p> <ul style="list-style-type: none"> • If the beneficial use exemption applies, a SLRA can be completed for the contaminated sediment or surface 	<p>The beneficial use exemption only applies to the contamination deemed associated with the beneficial use. Therefore, the 2nd bullet is the correct interpretation.</p>

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<p>water on a site; or</p> <ul style="list-style-type: none"> If the beneficial use exemption applies, contaminated sediment or surface water within the defined zone (such as 3 m from the edge of the beneficial use) can be considered as an acceptable risk? 	
<p>I would like to see a qualifier here such as “except in instances where existing deep-rooting plants/trees are thriving with no indication of contaminant-related stress.” I suggest this qualifier because some sites warrant SLRA when it is obvious that mature trees are quite happy with the contaminant conditions and there is no justification to remediate and remove the trees.</p>	<p>The ecological aspects in Protocol 13 will be reviewed in a future revision of the protocol.</p>
<p>Require clarification why the associated exposure pathways are precluded for deep-rooting plants or trees in areas of soil or groundwater contamination when Wildland land use applies.</p>	<p>This requirement has not changed from the previous protocol version. The preclusion is to provide for ecological protection of plants/trees as habitat and via root uptake of contaminants and associated potential exposure to wildlife.</p>
<p>No off site contamination allowed... SLRA is probably most useful for roadways etc. What is the rationale for this?</p>	<p>The preclusion has been modified in the protocol to only apply where a plume has migrated beyond the source parcel boundary and plume stability is not demonstrated.</p>
<p>Why AW? What if it can be shown that the groundwater plume is decreasing or stable regardless of off-site migration for AW purposes?</p>	<p>Yes, following from above, where a plume is demonstrated to be stable or decreasing, irrespective of whether present within or beyond a source parcel boundary, then the transport assessment component of SLRA (Appendix A) is not required to be completed. See section 6 of the revised protocol. This approach is now consistent with other ministry risk assessment policy.</p>
<p>One of the primary uses of SLRA is to determine if potential aquatic receptor can be impacted by substances on the Site. The exclusion of using SLRA where AW standards are exceeded beyond the property boundaries will severely limit the use of the SLRA process. The restriction on AW should be removed from the document.</p>	<p>As per above response, where a plume is demonstrated to be stable or decreasing, then transport assessment is not necessary.</p>
<p>GW that migrates off site and will attenuate before reaching aquatic habitat (based on the screening equation) should be</p>	<p>As per above response, where a plume is demonstrated to be stable or decreasing, then transport assessment is not necessary. However, where</p>

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included...as well as if no DW (now or in the future) is to be a condition. These precluding conditions also undermine the Questionnaire later on. Why include the questions on water if the SLRA is precluded?	<p>the plume is present within a parcel boundary, and stability is not demonstrated, then the transport assessment component of SLRA (Appendix A) must be applied. This is to minimize the potential for future contamination of adjacent properties, and by association, minimize the potential of adjacent parcel owners having to address contamination sourced from other properties in the future. This policy is also consistent with Protocol 2.</p> <p>The water use pathway questions in the questionnaire remain valid as water wells or receiving environments may also be present on site.</p>
On many upstream sites where SLRA is opted for it may not matter if you could prove that no SW body would be affected after doing an aquatic waterbody survey of the area. This change makes it difficult to use SLRA even when we know the GW concerns won't affect an offsite receptor.	As per above response, where a plume is demonstrated to be stable or decreasing, then transport assessment is not necessary.
We support the proposed practical approach that recognizes an exemption for beneficial use, if there is no risk to receptors.	The comment is noted.
Is 3 m the cut off or is it an example distance? If the cut off, should just indicate ...contamination that does not extend more than 3 m laterally from an eligible...	This is a maximum allowable distance under the protocol.
Is a Director's approval required for beneficial use exemption?	No, director approval is only required under sections 3.2 and 7 (previously 6) of the protocol.
Can we apply beneficial use exemption for sites that are not presently in such use (any longer), but have the potential for it (again) in the future?	The beneficial use exemption may be utilized at the time of completion of the screening level risk assessment. Obtaining certification of a site at the same time as retaining the option for potential future use of a beneficial use exemption is beyond the intent of the protocol.
Re: polycyclic aromatic hydrocarbons - What about asphalt sidewalks, driveways, parking lots and roadways with PAHs in soil associated with asphalt particles < 2 mm that happen to be entrained into the soil sample.	<p>The ministry is not aware that this is a common occurrence or that contaminant transport is common for this scenario.</p> <p>The ministry would consider more detailed supporting information on this matter.</p>
Re: road salting - What about unpaved roads that may be salted?	This comment has been incorporated into the protocol as a distance of 3 m as measured from the travelled portion of unpaved roads.
Road salt is defined as a beneficial use within 3m of the edge of the road. Utility lines are often buried within or in close	Contamination within utility lines associated with road salting would qualify for the exemption to the distance prescribed in the protocol.

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vicinity of the road and they sometimes create preferential pathways for transporting salt. A clarification whether the contamination along the utility lines related to road salt would also be considered as a beneficial land use would strengthen this Protocol.	
Re: "identifying any risk management measures implemented if SLRA is conducted post-remediation of the site" - Why only post remediation?	The provision has been modified to incorporate pre-remediation as well.
Re: "For purposes of this protocol, contaminant source areas in soil are areas where substance concentrations in soil exceed the applicable soil standards" - What about background conditions?	The definition has been modified in the protocol to include scheduled soil standards, background concentrations or site-specific numerical soil standards.
Re: conceptual model development - What about seasonal effects, long-term trends, plume stability, etc.?	This comment has been incorporated into the protocol.
Re: water use pathways assessment - Under the expanded preclusions, these questions become obsolete...so we need MOE to lessen the preclusions.	Water uses/ receptors may be present at the site therefore the pathway assessment remains valid.
Include reference to risk controls, a performance verification plan, and Administrative Guidance 14, as necessary.	These are currently prescribed in section 5 of the protocol.
Re: "a modeling report including digital simulation files" - I don't see why this would be viewed as a minimum mandatory element for all SLRAs? Is this to be a GW migration check?	A modeling report is required where a model other than the ministry's Groundwater Protection Model is used. This has been clarified in the document.
Re: "a modeling report including digital simulation files" - A statement confirming that the contamination at the site is at a minimum stable? This requirement should apply across all RAs, including SLRA. And where it can be demonstrated that the plume is stable, groundwater fate and transport modeling should not be required.	Yes, this has been incorporated into the protocol. Where a plume is demonstrated to be stable or decreasing, then transport assessment is not necessary.
Re: "conclusions regarding whether contamination at a site poses acceptable or unacceptable risks..." - I don't see that an SLRA would be submitted to verify unacceptable risk. I think if unacceptable risk was intuitive, independent remediation would just proceed. SLRA will be used to conclude acceptable risk and/or to indicate which pathways are precluded and then	Specification of unacceptable risks is useful to identify those pathways/scenarios that are addressed by remediation/detailed risk assessment outside of screening level risk assessment.

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<p>accompanied the quantitative RA.</p>	
<p>Re: “conclusions regarding whether contamination at a site poses acceptable or unacceptable risks...” - For any particular contaminant in the group being assessed under SLRA? Otherwise, there would be no need to submit a report for a contaminant that failed the SLRA would there be?</p>	<p>See response above.</p>
<p>This needs to be discussed earlier in the document. Should it not be a requirement to demonstrate plume stability prior to undertaking an SLRA (with the exception of flow through sites?). And if so, the requirement for groundwater contaminant transport should be removed. If the plume is stable or decreasing, why is modeling required? Proving plume stability should be left to site investigators; this is done all the time with DRA, and the RA refers back to the DSI.</p>	<p>Yes, this has been incorporated into the protocol. Where a plume is demonstrated to be stable or decreasing, then transport assessment is not necessary. Flow through sites are evaluated using Administrative Guidance 15.</p>
<p>This requirement for an approval by the MOE removes this from professional judgement which in my opinion is a step backwards as qualified practitioner should be able to determine if this condition it met.</p>	<p>This has been modified in the protocol - Where a plume is demonstrated to be stable, approval by a Director is no longer necessary.</p>
<p>Re: “The technical report must include documentation demonstrating plume stability at the site and that contaminant migration beyond the property boundary has not and will not occur...” - In my opinion this is not warranted as a mandatory element. SLRA should be able to handle off-site migrations in certain instances such as: No DW use of GW; no exceedance of AW prior to 500m set back, etc.</p>	<p>This has been modified in the protocol - where a plume is demonstrated to be stable or decreasing, then transport assessment is not necessary.</p>
<p>Any reason why we cannot seek Director’s approval if we have offsite groundwater impact that is stable/shrinking and is addressed otherwise?</p>	<p>This has been modified in the protocol - where a plume is demonstrated to be stable or decreasing, then transport assessment is not necessary.</p>
<p>Re: “The technical report must include documentation demonstrating plume stability at the site and that contaminant migration beyond the property boundary has not and will not occur...” - Not sure I understand this. What about a scenario in which the plume did migrate beyond the property line but at the</p>	<p>This scenario is best evaluated when/if it should arise. Where a plume is demonstrated to be stable or decreasing, then transport assessment is not necessary..</p>

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time of the SLRA the plume has decreased and no longer extends beyond the PL?	
Re: "A minimum of 2 years of groundwater monitoring and geochemical data demonstrating stable groundwater conditions and concentrations is necessary." – Would also be a requirement for Detailed Risk Assessments as well? It's not discussed in Technical Guidance 7.	Detailed risk assessment allows for greater flexibility in transport assessment. This comment will be considered for inclusion as part of future updates to TG7.
<p>What about providing supporting rationale that gw is not a pathway and also why it wasn't investigated? i.e., there is no GW data to assess in P13 because of:</p> <ul style="list-style-type: none"> • Depth to groundwater/thickness of vadose zone • Contaminant type and limited mobility • Limited infiltration migration of contaminants to the water table • Type of source – solid or liquid • Contaminant source is shallow/vertically delineated • Soil is fine grained and/or • Leachate results don't exceed gw pathways • Leachate results with dilution factors applied don't exceed gw pathways etc? <p>Basically, is it required in P13 that groundwater needs to be investigated, especially based on many of the factors listed above?</p>	Groundwater investigation is required in the protocol as it is based on a DSI. In addition, the protocol was developed as a simple screening tool that any approved professional may apply. The concepts raised require considerable professional judgement and are thus inconsistent with the intent of the protocol. The concepts are best addressed under Administrative Guidance 15 or detailed risk assessment.
Wouldn't it make more sense to allow for TCLP/SPLP to be on the allowed methods list as well?	The BC Soil Leachate Test is preferred to the TCLP or SPLP for inorganic substances due to better control of potential soil buffering. Accordingly, TCLP or SPLP are not prescribed as alternate leaching test methods in the protocol.
Its unclear if the GPM is required to assess pathways or can equations be set up in a spreadsheet for calculation instead?	The GPM should be used.
Re: "determination of substance concentrations in leachate...in the contaminant source area..." - This should be eliminated in cases where sufficient data has been collected to show the plume is stable.	This is provided for in section 6 of the protocol.
What number of additional soil samples are required for	Professional judgement should be applied in this case. Director approval

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leachate testing? Is it subject to approval?	is only required under sections 3.2 and 7 (previously 6) of the protocol.
The reference to their total concentrations is confusing. Does it imply that this approach applies only to organic substances that have congeners? Is it a total concentration of each substance in each sample or a total concentration of the 3 samples? It would be beneficial if the Ministry considered rewording for the purpose of clarification.	The protocol wording has been revised to refer to substance concentrations.
Experience in the contaminated sites field in BC and numerous studies conducted by professionals around the world have shown that under typical subsurface conditions and excluding exotic conditions such as fractured bedrock typical hydrocarbon plumes migrate not further than 200 m's. It is noted that the chemical/physical parameters prepared by Axiom seem overly conservative, particularly when compared with the prior published SLRA tables. In particular a plume of LEPHw of 5000 ug/l which would attenuate to under the 500 ug/l standards in 22 m's would now require a flow length of some 530 m's and well beyond the 200-m range which is generally considered to seen in the field. Insufficient time was allowed to review other parameter's but the Axiom numbers required additional review, particularly for LEPHw.	The protocol has been modified to allow use of site-specific model parameter values either outside the parameter ranges or instead of the default values. This is consistent with Protocol 2.
The transport equations have changed which will likely make the outcome more conservative. Specifically, please clarify why a minimum value of 5 m/yr. linear GW velocity must be used. This means that a site specific value would default to 5m/yr. if site specific data indicated a less conservative value. This is arguably high and will definitely make most sites fail if applied.	The groundwater transport equation and minimum velocity requirement have not changed from the previous protocol version. The minimum velocity requirement is to protect for the potential for subsurface variability/heterogeneity and associated implications on contaminant transport prediction.
Re: "Where a saturated zone biodegradation half-life is not specified, a default value of 0 days must be used" - Should state for which parameter this value of 0 should be assumed...biodegradation half-life would not be zero as the half-life can be infinitely long, so should it be for Kd?	A default value of 0 for biodegradation half-life has the same net effect on predicted groundwater concentrations as a long half-life although, technically, the latter is more correct. Accordingly, the requirement has been changed to a long half-life, as recommended.
UDI is generally supportive of the alterations to the Screening Level Risk Assessment Protocol which would allow for more sites to follow the screening level process to obtain a CofC.	The comment is noted.

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<p>Why is valuation of risk being considered only for a depth to 1 m (e.g., precluded for rooting depths extending beyond 1 m, as noted in page 3[4 of pdf], 1st line).</p>	<p>This requirement has not changed from the previous protocol version. The preclusion is to provide for ecological protection of plants/trees as habitat and via root uptake of contaminants and associated potential exposure to wildlife.</p>
<p>How is migration to within 1 m of ground surface determined, or need to be determined?</p>	<p>Professional judgement should be applied in consideration of subsurface conditions and substance fate and transport.</p>
<p>In combination with section 3.2 and Appendix 5, it appears that for upstream sites SLRA will be challenging to use as only sites would pass which have no soil/GW above standard currently outside the property boundary, and after modeling using 5m/yr. linear GW transport. Based on source locations (often near lease edges), hydrocarbon movement in GW, and standard natural attenuation for many of the specific parameters on our sites, the GW will almost always wind up with a "potential" to be outside the lease boundary.</p>	<p>The protocol was developed as a simple screening tool that any approved professional may apply. Based on the protocol changes identified above, for groundwater contamination within a parcel, only groundwater contamination that is not stable and that is predicted to migrate beyond a parcel boundary needs to be addressed outside of the protocol.</p>
<p>Any provision for considering Point of Exposure from a risk standpoint under this Protocol as opposed to Point of Compliance?</p>	<p>The protocol was developed as a simple screening tool that any approved professional may apply. Assessment based on point of exposure is best addressed under detailed risk assessment.</p>
<p>Addition of "beyond property boundary" HW-3, AW-3, IW-3, LW-3 means any site that isn't delineated on-site would get a "yes", but what if delineated nearby off-site (i.e. delineated towards receptor?) what is the difference in terms of protection to receptor?</p>	<p>Based on the protocol changes identified above, if a plume has migrated beyond a parcel boundary and is stable, then transport assessment under the protocol is not necessary. However, if a plume has migrated beyond a parcel boundary and is not stable, then this is precluded from assessment in the protocol as the protocol was developed as a simple screening tool and this scenario is not suitable for assessment under the protocol. This latter scenario is best addressed under detailed risk assessment with more detailed assessment of contaminant transport and potential impact on receptors.</p>