15 OCT 2025

Upstream Oil and Gas Site-Specific Risk Assessments: AER Updates

Presented by:
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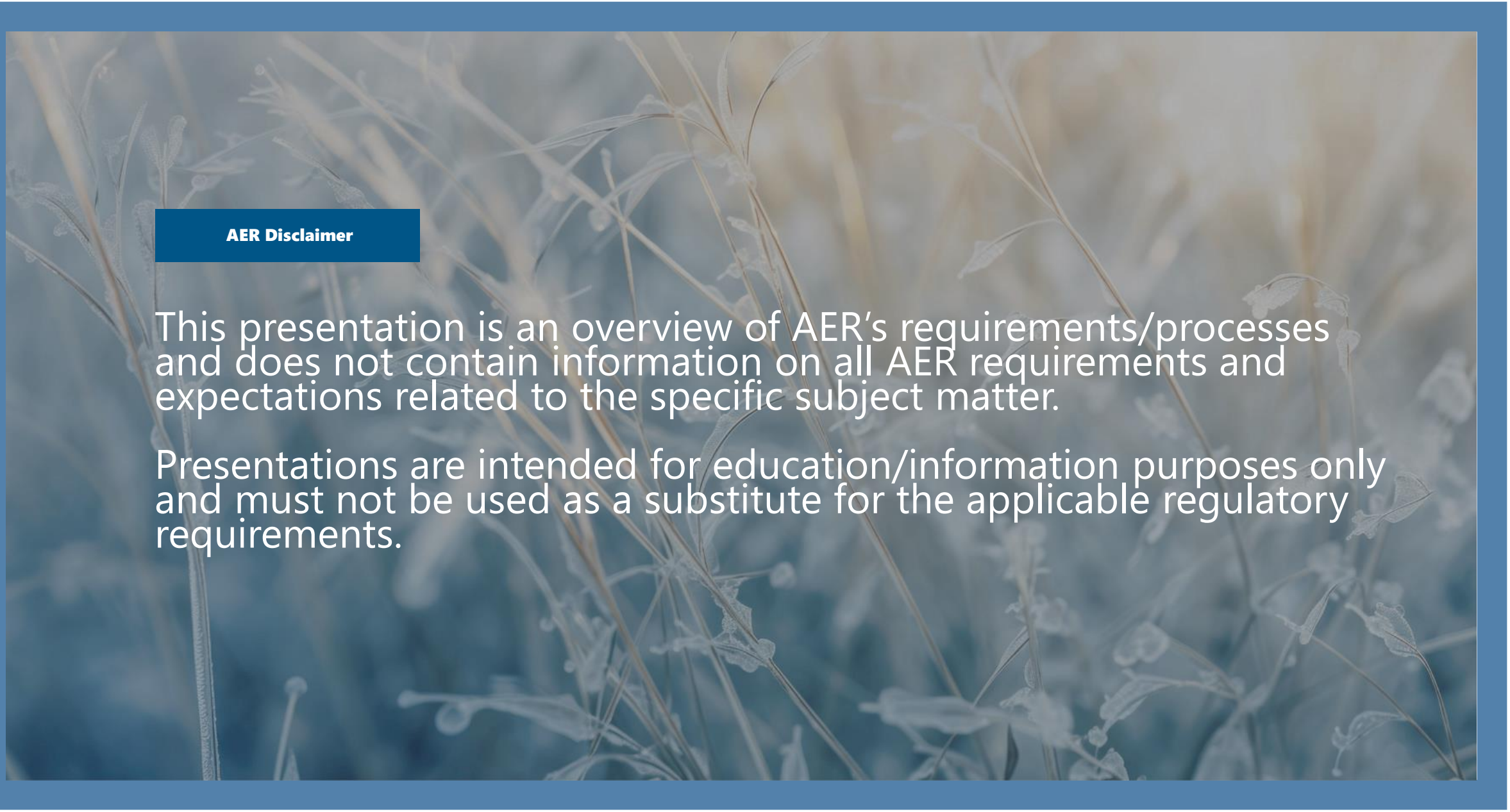
Presented to:
ESAA RemTech Conference 2025

Alberta Energy Regulator



AER Disclaimer

This presentation is an overview of AER's requirements/processes and does not contain information on all AER requirements and expectations related to the specific subject matter.

Presentations are intended for education/information purposes only and must not be used as a substitute for the applicable regulatory requirements.

Overview

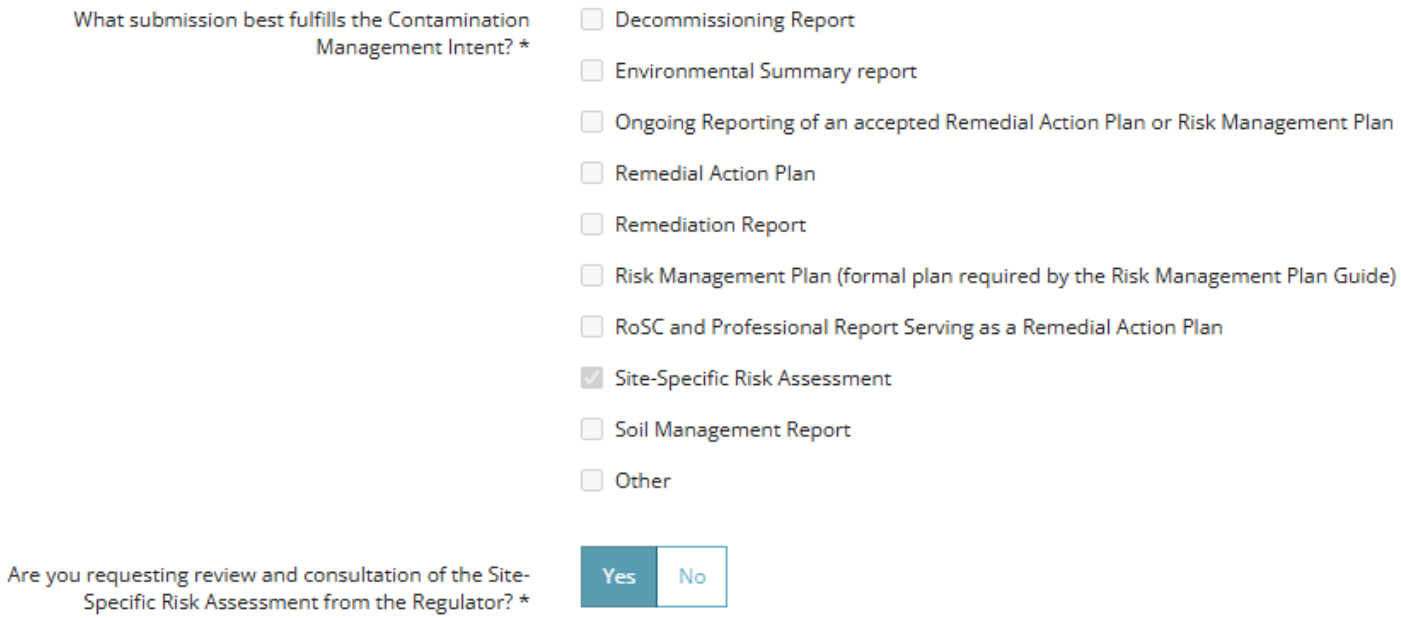
1. **Submitting an SSRA & Regulatory Consultation**
2. **SSRA Submissions : Common Return Items**
3. ***"NEW "* AER SSRA Checklist**
4. **Wrap Up**

SSRA Submissions

Submitting an SSRA: Regulatory Consultation

When submitting with the "Site-Specific Risk Assessment" intent:

- If seeking regulatory consultation, select yes and it will be flagged for upfront review:



Consultation Review:

- Evaluates SSRA against policy requirements
- Evaluation based on information provided
- Evaluation ≠ Closure
- New information can change evaluation

- If **you do not select** "requesting consultation", the SSRA **will not** be flagged for upfront review.

SSRA Submissions

Submitting an SSRA: Other Intents

Phase 2 ESA

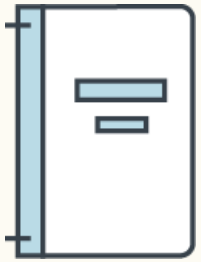
Does **not** involve any upfront review of an SSRA.

Subject to Audit Program which may involve SSRA review.

Remedial Action Plan

Does not involve a review of the SSRA. Review of guidelines or objectives are **out of scope.**

RAP commitments can include plans for SSRA consultation submissions.



Risk Management Plan

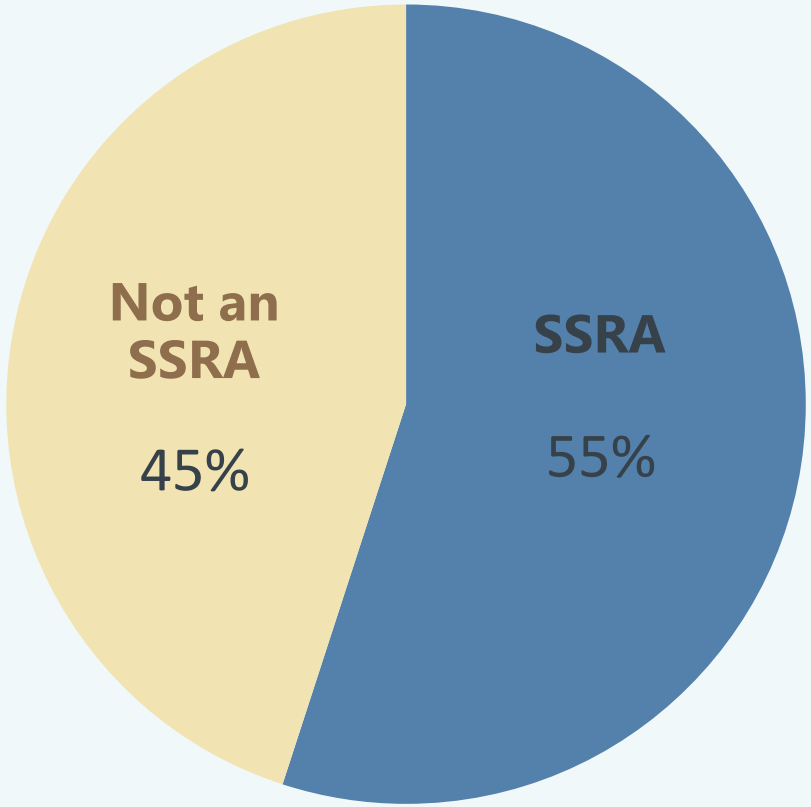
Review of SSRA will occur. If deficiencies identified, review may stop.

Recommend consultation sought prior to RMP submission.

Regulatory or Administrative Closure of Contamination

Review of SSRA will occur. If deficiencies identified, review may stop.

Is it a SSRA?



What isn't an SSRA.

55%

Actual SSRA – Covered earlier ☺

45%

Not an SSRA

Tier 2 Guideline Adjustment – modification

Tier 2 Guideline Adjustment – pathway exclusion,

Tier 2A or 2B SST Assessment

SSRA Consultation

Return Comments

Deficiencies include (but were not limited to):

- Incomplete Report (e.g., missing data)
- Incomplete Conceptual Site Model (e.g., figures and tables)
- Incomplete delineation
- No problem formulation
- Incorrect calculations, No worked example
- Insufficient uncertainty assessment
- No validation

SSRA Checklist

"NEW" SSRA Checklist

- **AER has developed the "Site-Specific Risk Assessment Submission Checklist" (SSRA Checklist)**
- **Outlines the key items looked for during an SSRA review.**
- **Intent – add clarity, reduce SIRs and reduce internal review time.**
- **Similar to the Contamination Review for Reclamation Submission Checklist (CRR Checklist). As with the CRR Checklist, completion is optional.**
- **None of the items in the checklist are new. They are all existing requirements presented in an orderly fashion.**

SSRA Checklist

General Requirements

1.0 General Requirements			
1.1 Site Information			
Legal land description:		CSU or *EPEA* file number:	
Checklist completed by:		Date checklist completed *(mm/dd/yyyy)*:	
Record of site condition (RoSC) OneStop submission ID:			
1.2 SSRA Method (*Select those which apply.*)			
Screening level or preliminary quantitative risk assessment (PQRA) ☐			
Detailed quantitative risk assessment (DQRA) ☐			
Tier 2C Subsoil Salinity Tool (SST) ☐			
Tier 2 model adjustments outside prescribed approaches ☐			
Alternative Fate and transport modelling ☐ - Describe type:			
Other ☐ - Describe:			
1.3 Contaminants Evaluated (*Select those which apply.*)			
Petroleum hydrocarbons ☐	Metals ☐	Salts ☐	
Pesticide/herbicide ☐	Other ☐ Describe (e. g., chlorinated solvents, PAHs, PFAS):		
1.4 Stage of SSRA (*Select which best applies.*)			
Initial ☐	Under development ☐	Final (exposure controls and risk management plan required) ☐	Final (no further remedial measures required) ☐

SSRA Checklist

Professional Sign-off

2.0 Professional Sign-off *(Required for all SSRAs)*				
	Yes	**No**	**N/A**	**Reference location in SSRA reports or comment**
1. SSRA and associated reports signed by a qualified environmental professional with a stamp, seal, or registration number.				

SSRA Checklist

Site Characterization Information

3.0 Site Characterization Information *(Required for all SSRAs)*				
	Yes	**No**	**N/A**	**Reference location in SSRA reports or comment**
1. All necessary documents for review are linked or attached to the submission, including all pertinent professional reports containing all relevant data and information to support the conceptual site model (CSM) and SSRA.				
2. The SSRA report contains all pertinent information, including a summary of applicable site data.				
3. The SSRA report includes a summary of the site history, including all previous site assessments.				
4. The SSRA report contains regional and site characteristics as described in the *Environmental Site Assessment Standard*.				
5. Characterization and delineation (both vertical and lateral) of all contaminants of potential concern are complete.				
6. Detailed site plans and figures showing all relevant CSM data are provided, including the following: ● site location and setting ● sampling points or locations identifying which meet and exceed applicable guidelines ● lateral and vertical delineation of contaminants ● any remediated areas.				
7. Tables of all laboratory analytical results for all sampling locations are provided. Tables highlight values that exceed valid background values and applicable guidelines and identify locations that have been removed or interpreted as no longer representative of current condition of the site.				
8. Laboratory analytical certificates for data used in the SSRA are provided.				

SSRA Checklist

Problem Formulation

4.0 Problem Formulation *(Required for all SSRAs)*				
4.1 Contaminants of Potential Concern (COPC) Screening				
	Yes	**No**	**N/A**	**Reference location in SSRA reports or**
1. All potential contaminants of concern have been considered.				
2. Chemical concentrations are compared to Tier 1 or other appropriate guideline(s) in COPC screening.				
3. Justification is provided for any COPCs screened out. For example, excluding chemicals that exceed applicable guidelines, or cases involving elevated concentrations of naturally occurring substances.				
4.2 Exposure Pathways				
4. All current and potential future land and water uses of the site and surrounding properties are identified and considered in the chemical screening.				
5. Assumptions associated with the current and potential future land use are documented along with the associated rationale.				

SSRA Checklist

Problem Formulation (continued)

6.	All pathways (direct and indirect) are identified and considered, including potential sensitive exposure pathways. See table 1 of the *SSRA Guide*.			
7.	Contaminant, pathway, and receptor combinations requiring further assessment are clearly identified.			
8.	Justification is provided for any contaminant, pathway, and receptor combinations excluded from further assessment.			
4.3 Receptors				
9.	All applicable receptors of potential concern identified based on commonly accepted risk assessment practice (e.g., relevance, exposure potential, contaminant sensitivity, and social importance) are addressed. See table 1 of the *SSRA Guide*.			
10.	The presence of any sensitive receptors, valued ecosystem components (VECs), species at risk/endangered species, or traditional land use (TLUs) are considered, and the relevant information is presented.			
4.4 Problem Formulation Output				
11.	An up-to-date CSM is provided which includes a clear presentation of the relationships between COPC concentrations at the source(s) and the exposure or intake at receptor locations, both direct and indirect.			
12.	All assumptions made in the problem formulation and the CSM are clearly presented.			
13.	The SSRA report presents a clear indication of whether the SSRA is completed at the problem formulation stage, or if further work is needed, such as exposure assessment, toxicity/effects assessment, and risk characterization.			

SSRA Checklist

Exposure Assessment

5.0 Exposure Assessment				
5.1 Exposure Point Concentration(s)				
	Yes	**No**	**N/A**	**Reference location in SSRA reports or comment**
1. If statistics were used, justification for the statistical methods applied is provided.				
2. Supporting information is provided for methods used to estimate exposure point concentrations.				
3. Equations for exposure point concentrations are provided and referenced, including inputs for each exposure route assessed and one worked example.				
4. If a model was used, the SSRA report provides the source of the model. If a proprietary model is used, ensure sufficient information is provided with respect to the underlying processes, mechanisms, and associated algorithms.				
5. If a fate and transport assessment was conducted, the SSRA report clearly identifies which COPCs, pathways, and receptors are modelled.				
6. A summary of model inputs is provided with reference to supporting information.				
7. Any limitations of the model are identified and clearly presented.				
8. Any assumptions used in the model are clearly presented.				
9. The sensitivity analysis completed for the model is provided.				
10. The uncertainty analysis completed on the model is provided, and an appropriate level of conservatism is incorporated to account for uncertainties.				
11. If the model was calibrated, information supporting calibration efforts is provided.				
12. The model has been validated using sufficient site-specific data, and methodology and data used are provided.				

SSRA Checklist

Exposure Assessment (continued)

5.2 Receptor Characterization				
13. All relevant receptor characteristics for all applicable human (e.g., general, public, worker, indigenous) and ecological receptors, including species at risk, are clearly presented.				
14. All relevant exposure factors (e.g., inhalation or ingestion rates, time-activity patterns) are clearly presented.				
15. Chronic exposures are considered, except if the SSRA is limited to the assessment of short-term exposure scenarios (e.g. during remedial operations).				
16. Assessment of acute and sub-chronic exposure factors are provided.				
5.3 Exposure Estimation				
17. Reference sources used are presented and meet the requirements outlined in Section 5 of the *SSRA Guide*.				
18. All relevant chemical- and media-specific factors (e.g., bioavailability, adsorption rates) are clearly presented.				
19. If an exposure model was used, equations and the inputs for each exposure route assessed are provided and referenced, including at least one worked example.				
20. If an exposure model was used, any uncertainty in the model's structure and the data inputs were taken into account when evaluating the results.				
21. If an exposure model was used, all exposure model parameters are defined, and the rationales are provided for all exposure model parameter values (with references where applicable).				

SSRA Checklist

Toxicity/Effects Assessment

6.0 Toxicity/Effects Assessment				
	Yes	No	N/A	Reference location in SSRA reports or comment
1. The toxicity/effects assessment was conducted as described in the *SSRA Guide*.				
2. If toxicity reference values (TRVs) were used, the rationale for selection or development of the TRVs is provided.				
3. If TRVs were used, the source is provided, and the toxicity endpoint associated with each TRV is identified.				
4. If site-specific toxicity testing was conducted, the report includes methods and suite(s) of test organisms used, and compares the approach to that used in the development of Tier 1 Guidelines with justification(s) for any deviation(s).				
5. If biological surveys were conducted to identify site-specific receptors, the report provides documentation including methods used, sampling locations, timing and seasonality.				

SSRA Checklist

Risk Characterization

7.0 Risk Characterization				
	Yes	No	N/A	Reference location in SSRA reports or comment
1. Risk characterization was conducted as described in the *SSRA Guide*.				
2. If equations were used to derive numeric risk guidelines or dose estimates (e.g. exposure ratios), the report provides sufficient detail to determine how the guidelines or estimates were derived. A worked example is also provided for one carcinogen and one non-carcinogen (if applicable) showing a step-by-step method showing the risk calculations and how the results were derived.				
3. Risks for all the operative contaminant, pathway, receptor, and combinations identified in the problem formulation were evaluated and are categorized as acceptable or not within the report.				
4. An uncertainty and variability assessment was conducted and presented within the report as described in the *SSRA Guide*.				
5. Within the uncertainty assessment, clear statements regarding effects on risk conclusions are provided.				
6. If a weight-of-evidence approach was used, details of the approach are provided, including all procedure considerations (e.g. magnitude and extent of effects, uncertainties etc.) to support conclusions made.				

SSRA Checklist

Conclusions

8.0 Conclusions				
	Yes	No	N/A	Reference location in SSRA reports or comment
1. Conclusions regarding risk levels are clearly presented.				
2. Conclusions regarding derived site-specific remedial objects and/or whether further remedial measures are required are clearly presented.				
3. Where the SSRA is in support of an RMP, the SSRA was completed without any risk management assumptions (e.g. exposure controls) in place.				

Closing Remarks

Wrap Up

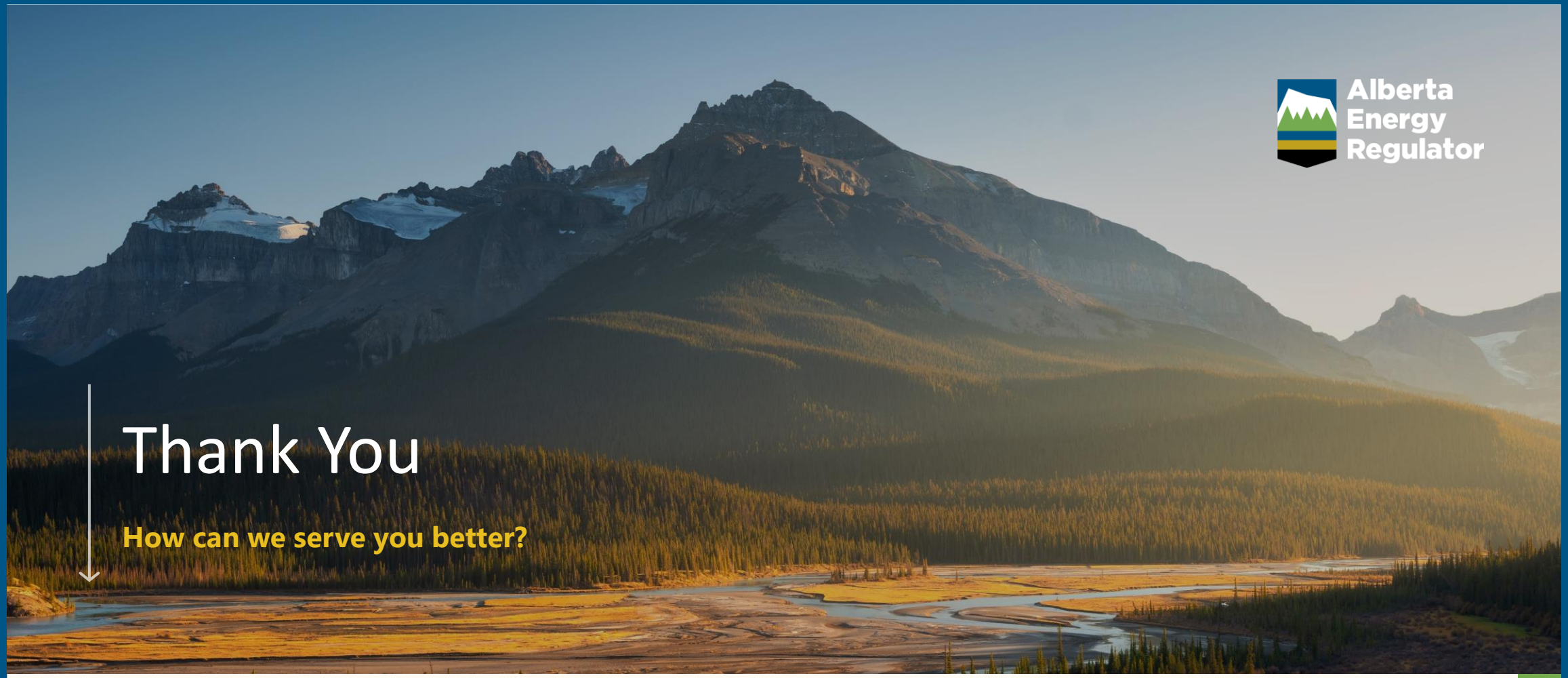
- **GET SSRA CONSULTATION along the way.**

- **Where to find the checklist:**
  - www.aer.ca – Remediation and Reclamation Form page
- **How to submit the checklist:**
  - Attach the completed checklist to the SSRA submission via the record of site condition in OneStop.
- **How to reach us – csusubmissions@aer.ca**

1) Don't wait until the end to show us the SSRA for the first time.

Any Questions?

Additional questions can be sent to csusubmissions@aer.ca



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