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January 19, 2026
XO1-26-005

ATTN: Document Control Desk
US Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Presentation Slides - Acceptability of Historical Information - Geotechnical (Project #99902130)

This letter transmits Energy Northwest New Nuclear LLC's (ENNN) presentation slides relating to the acceptability of historical geotechnical information for the Cascade Advanced Energy Facility (Enclosure 1). These slides are provided in preparation for a public meeting on January 29, 2026.

ENNN intends to submit a Construction Permit Application (CPA) for up to twelve Xe-100 small modular reactors at a site adjacent to Columbia Generating Station (Columbia). The project will be known as the Cascade Advanced Energy Facility or Cascade. ENNN assessed the acceptability of historical geotechnical information applicable to Cascade to satisfy the requirements for evaluating geotechnical hazards, including those due to vibratory ground motion, for the CPA. This presentation outlines the key historical evaluations applicable to Cascade, including geotechnical evaluations for Columbia, Washington Nuclear Plants 1 and 4 (WNP-1/4), and the Hanford Site.

This letter contains no commitments. If you have any questions or need any additional information, please contact Nathan Clark at ndclark@energy-northwest.com or 509-377-6069.

Sincerely,

Signed by:



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Lisa Williams

Operations, Licensing, Environmental Manager, New Nuclear Development

XO1-26-005

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Enclosures

1. Presentation Slides - "Acceptability of Historical Information – Geotechnical", ENNN, January 2026.

cc:

Greg Cullen

Ken Langdon

EN Legal Services

Ms. Denise McGovern, NRR/DANU/UAL2

Ms. Madelyn Nagel, NMSS/REFS/EPMB3

Acceptability of Historical Information - Geotechnical

White Paper Review

January 29, 2026
Rockville, MD

Energy Northwest
New Nuclear (ENNN)

Outline

- **Purpose of Meeting and Introduction**
- **Cascade Advanced Energy Facility Background and Plans**
- **Columbia Generating Station and WNP-1/4 Geotechnical Evaluations**
- **ENNN Evaluation Process**
- **Ground Motion Response Spectrum Acceptability Evaluation**
- **Geotechnical Acceptability Evaluation**
- **Summary and Conclusions**
- **Questions and Comments**

Purpose of Meeting and Introduction

An aerial photograph of an industrial facility, possibly a water treatment plant or refinery, set against a backdrop of a large reservoir and rolling hills. The facility consists of several large, interconnected buildings with flat roofs, some featuring corrugated metal siding. There are numerous storage tanks and pipes visible on the roofs. A parking lot with several cars is located to the left of the main building complex. In the foreground, there is a large, shallow, rectangular pond or reservoir. The background shows a vast, green landscape with a large body of water and distant hills under a blue sky with scattered white clouds.

Purpose of Meeting

- Engage early with NRC staff on ENNN's approach to using geotechnical information from Columbia Generating Station (Columbia) and the DOE Hanford Site.
- Identify technical or policy issues that might affect this approach.
- Ensure predictability in the NRC's response to ENNN's future Construction Permit Application (CPA) related to geotechnical site characterization and hazard analyses for the Cascade Advanced Energy Facility (Cascade).

Executive Summary

1. Geotechnical characteristics are substantially similar between Cascade, Columbia, and WNP-1/4 due to consistent lithology and stratigraphy.
2. Post-Fukushima and initial site permitting evaluations for Columbia and WNP-1/4 remain applicable.
3. Confirmatory site-specific evaluations are planned:
 - CPA: Literature review, epistemic uncertainty, non-invasive MAM/MASW surveys, sensitivity studies, control point
 - Operating License Application (OLA): invasive geotechnical investigations (e.g., borings)
4. Ground motion Response Spectrum (GMRS) with any significant updates will be used for preliminary design and CPA along with historical geotechnical properties

Cascade Facility Background and Plans



Introduction

- ENNN proposes to build 12 SMRs, known as the Cascade facility, next to Columbia, a licensed operating facility.
- ADVANCE Act Section 505(c) requires licensing basis for existing utilization facilities at the site to be used to the extent practicable.
- Columbia's seismic hazard (GMRS) was reevaluated post-Fukushima.
- ENNN plans to utilize the Columbia and WNP-1/4 geotechnical hazard inputs and analyses.

History of Energy Northwest Nuclear Projects

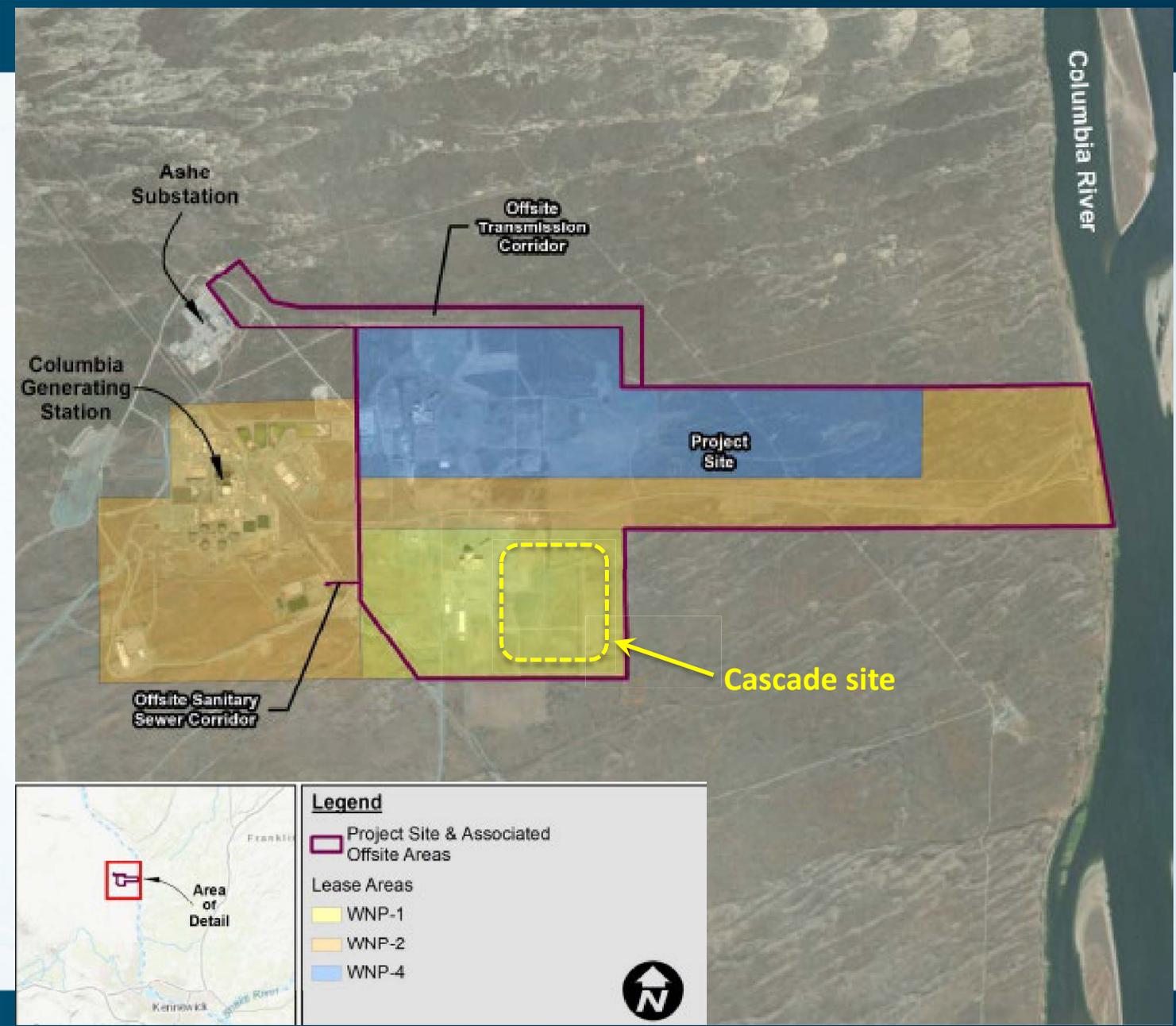
- Columbia Generating Station (formerly WNP-2)
 - Licensed in 1984, license extension granted 2012
- Washington Nuclear Projects (WNP) 1 & 4
 - Construction Permits issued in 1975 and 1978
 - Construction halted in 1982

Cascade Advanced Energy Facility Background

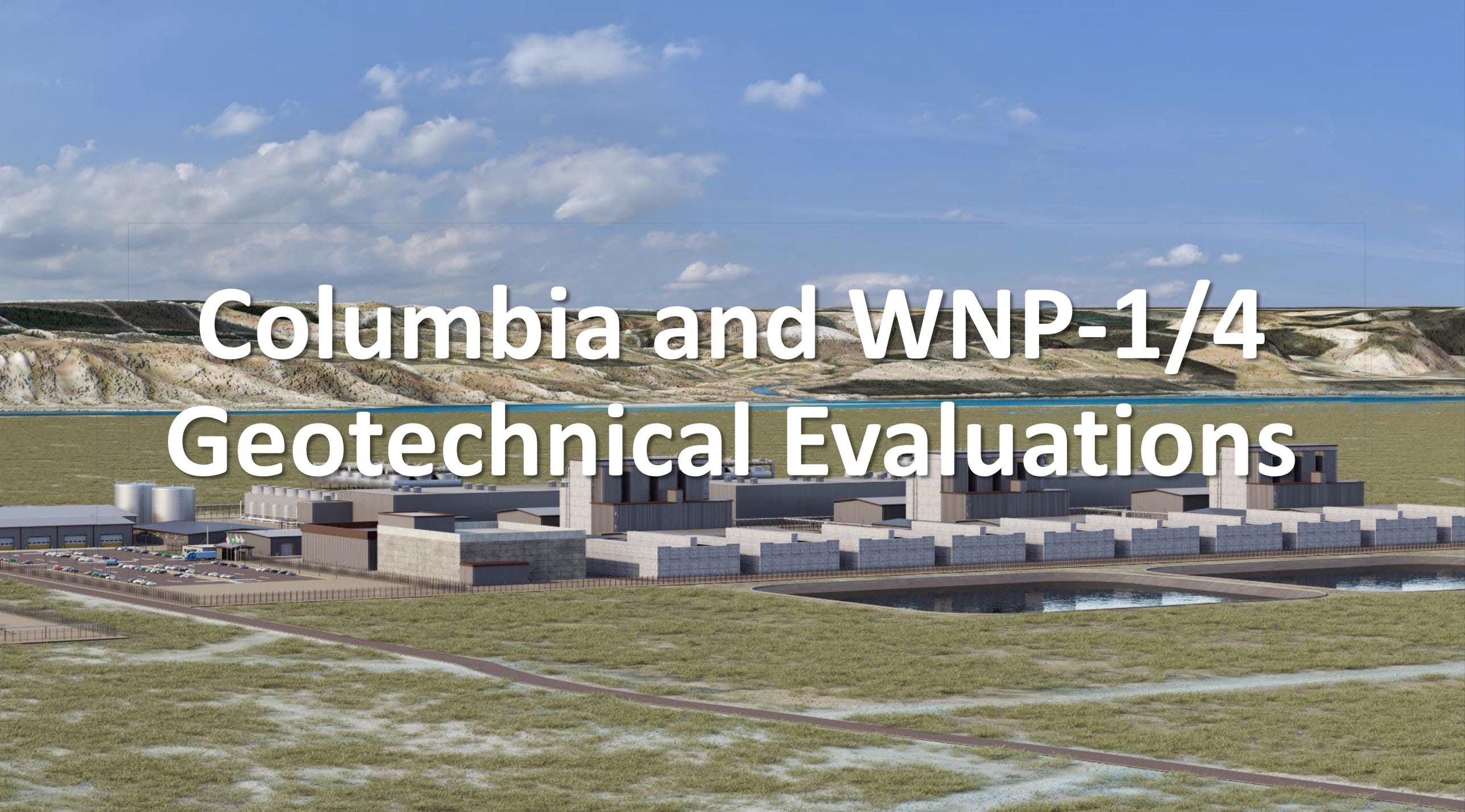
- Up to 12 Xe-100 high temperature helium gas-cooled reactors on former WNP-1 & 4 site
- Total of 960 MWe
- Cascade Site
 - One mile east of Columbia
 - Two miles west of Columbia River

Proposed Cascade Site

(conceptual)



Columbia and WNP-1/4 Geotechnical Evaluations

An aerial rendering of a nuclear power plant facility. The foreground shows a large, rectangular containment structure with a dark, possibly water-filled interior. To the left, there are several industrial buildings and a parking lot filled with cars. In the background, a large body of water is visible, with a small island or structure in the middle. The sky is blue with scattered white clouds. The overall scene is a detailed architectural visualization of the plant's layout and surrounding environment.

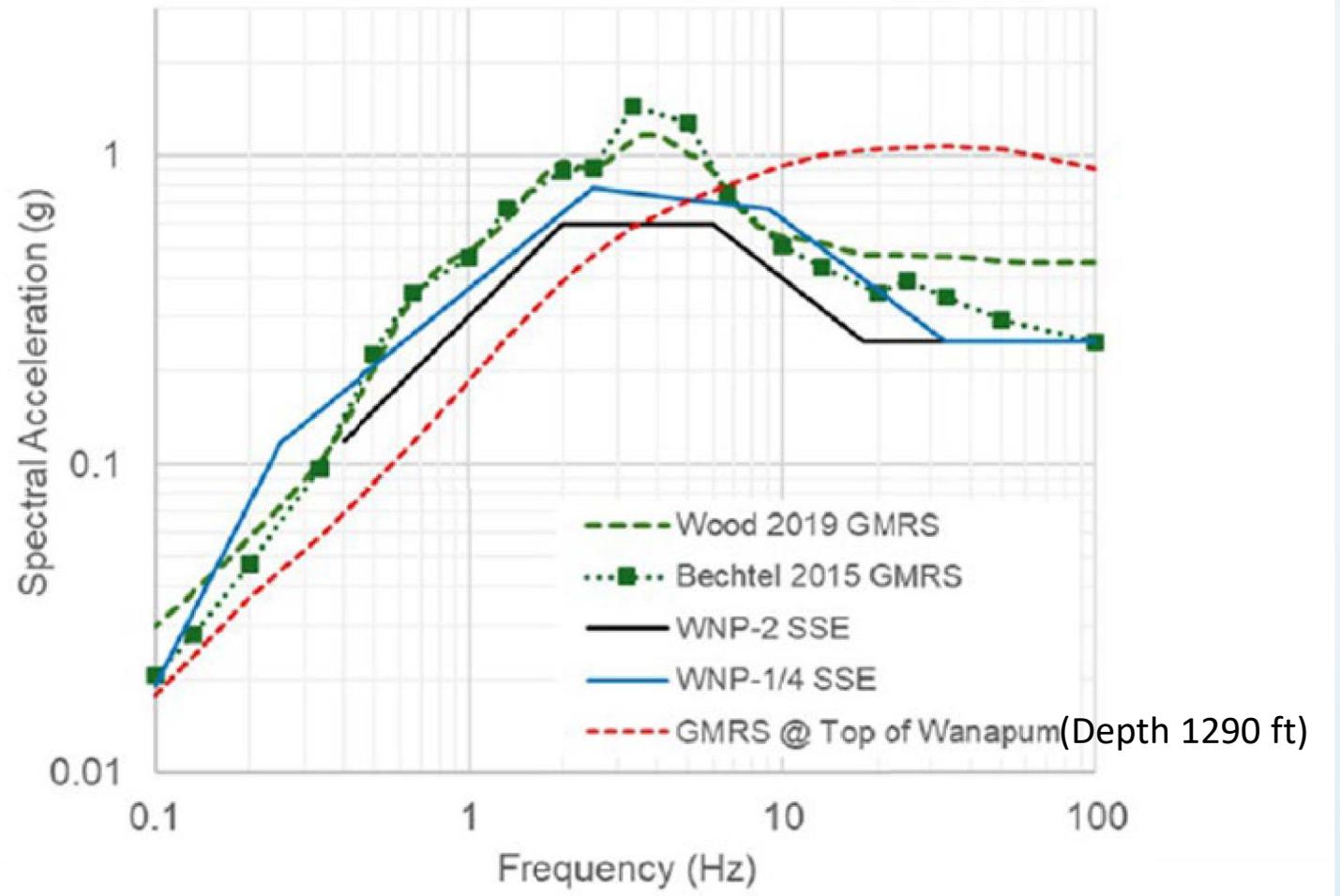
Original Licensing Evaluations - Columbia and WNP-1/4

- WNP-2 (Columbia) PSAR (~1971), FSAR (1984)
- WNP-1/4 PSAR (1973/1974), FSAR submitted (construction halted)

Columbia Post-Fukushima Hazard Reevaluation

- March 2012 NRC issued 10 CFR 50.54(f) request for information
 - Reevaluate seismic hazards using “present-day regulatory guidance and methodologies and, if necessary, perform a risk evaluation”
- November 2014 PNNL issued Hanford L3 SSHAC
- March 2015 Columbia submitted seismic hazard reevaluation results
 - Bechtel 2015 GMRS curve
- 2015-2020: SPRA, peer reviews, F&Os resolved
 - Result: Wood 2019 GMRS curve
 - April 2020 NRC accepted EN response

Wood GMRS Curve – Basis for Cascade CPA GMRS



ENNN Evaluation Process



Methodology for Determining Applicability of Historical Information

1. Regulatory Changes – same regulations?
2. Analysis Methodology – same methods?
3. Scope of Analysis – same scope of analysis?
4. Site Changes – site unchanged?
5. Quality Assurance (QA) – done under App. B Program?
6. Copy of Record – copy of record exists?

GMRS Acceptability Evaluation

An aerial rendering of a large industrial facility, likely a gas processing plant, situated in a vast, flat landscape. The facility consists of numerous large, rectangular buildings with flat roofs, some with corrugated metal siding, and several tall, cylindrical storage tanks. A large, paved parking lot filled with many cars is visible on the left side of the complex. In the foreground, there is a large, rectangular reservoir or pond. The background features rolling hills under a bright blue sky with scattered white clouds. The overall scene is presented in a clean, digital style.

GMRs: Question 1, Same Regulations?

- No, because:
 - Principal Design Criteria (PDC) apply to Cascade per RG 1.232 while General Design Criteria (GDC) apply to Columbia per 10 CFR 50 Appendix A
 - 10 CFR 100 Subpart B applies to Cascade, not 10 CFR 100 Appendix A
- However, acceptable because:
 - X-energy's PDC-2 for Cascade replaces GDC 2
 - No changes to 10 CFR 50 Appendix A, GDC 2
 - No changes to 10 CFR 100 Subpart B
 - Post-Fukushima analyses followed 10 CFR 100 Subpart B
 - Supporting Columbia and WNP-1/4 analyses consistent with current methods

GMRs: Question 1, Same Regulations? (cont.)

GDC 2	X-energy PDC-2
<p>Structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions. The design bases for these structures, systems, and components shall reflect:</p> <ul style="list-style-type: none"> (1) Appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated, (2) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena and (3) the importance of the safety functions to be performed. 	<p>Safety-significant structures, systems, and components shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions. The design bases for these structures, systems, and components shall reflect:</p> <ul style="list-style-type: none"> (1) Appropriate consideration of the severity of the natural phenomena that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated, (2) appropriate combinations of the effects of normal, anticipated operational occurrence, design basis event, and design basis accident conditions with the effects of the natural phenomena, (3) the safety-significance of the functions to be performed.

➔ RESULT: No changes needed to historical analyses based on this criteria.

GMRS: Question 2, Same Analysis Methodology?

- No. Guidance updated as highlighted:

Evaluation	Eval Date	Guidance Used for Historical Analyses	Rev Used	Current Guidance	Current Rev
Geotech - Geology, Seismology, and Geotechnical Engineering	2015	NTTF letter (NRC, 2012a)	3/12/2012	DANU-ISG-2022-02	3/2024
Vibratory Ground Motion	2015	RG 1.208	R0, 3/2007	RG 1.208	R0, 3/2007
SSHAC L3 –Reference Rock	Nov 2014	NUREG/CR-6372	4/1997	NUREG/CR-6372	4/1997
		NUREG-2117	R1, 4/2012	NUREG-2117 NUREG-2213	R1 4/2012 8/2018
PSHA, SRA – Probabilistic Seismic Hazard Analysis	2019	NUREG/CR-6728	10/2001		
		NUREG/CR-6372	4/1997	NUREG/CR-6372	4/1997
		NUREG-2117	2012	NUREG-2117	2012
SPRA Peer Review	2019	RG 1.200	R2, 3/2009	RG 1.200	R3, 12/2020

GMRS: Question 2, Same Analysis Methodology? (cont.)

- No. DANU-ISG-2022-02 replaced Post-Fukushima NTTTF guidance: changed RG 1.200 R3, NUREG-2213, FIRS
 - However, acceptable because:
 - SPRA peer review guidance, used for Wood GMRS, remains endorsed
 - Hanford L3 SSHAC remains valid
 - CPA will include FIRS-foundation input response spectra
- No. Literature and research from 2014 SSHAC to present not reviewed:
 - However, acceptable because:
 - Reviews, including Cascadia Subduction Zone, are planned for CPA

GMRS: Question 2, Same Analysis Methodology? (cont.)

- No. Control point definition has changed
 - However, acceptable because: Will be evaluated in CPA
 - No. RIL 2021-15 minimum epistemic uncertainty not included
 - However, acceptable because: Will be evaluated in CPA
 - No. New and modified data collection methods available
 - However, acceptable because:
 - MAM/MASW to provide site-specific Vs data in CPA
 - Site-specific borings planned for safety structures and foundation design (OLA)
- ➔ RESULT:** Guidance is still current. No changes to historical analyses expected. Any identified non-conservatisms in GMRS will be addressed.

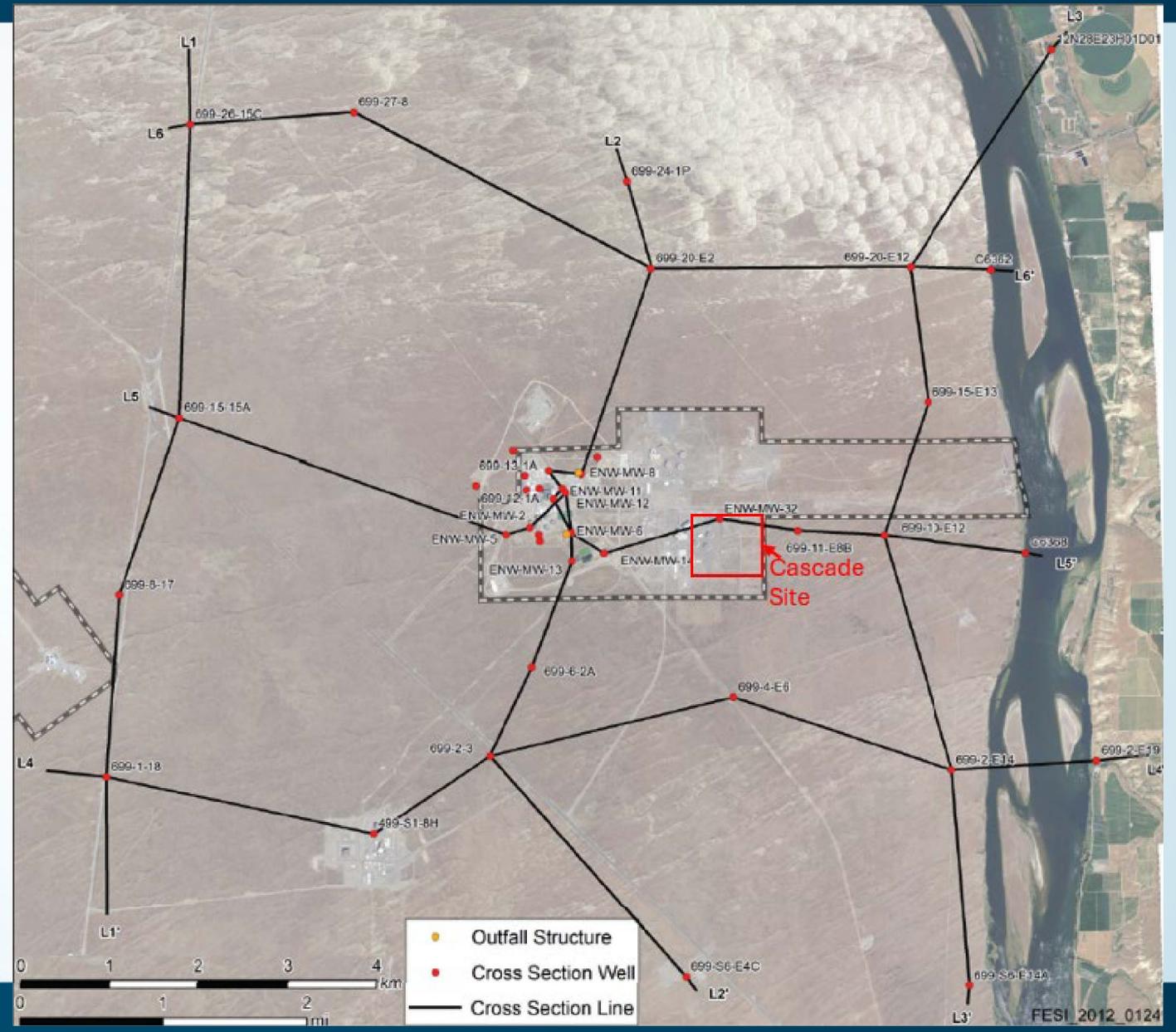
GMRs: Question 3, Same Scope of Analysis?

- No. Site investigations to date are not specific to Cascade footprint.
- However, acceptable because:
 - Columbia, WNP-1/4 geotechnical characteristics are similar
 - Non-invasive MAM/MASW planned for CPA
 - Borings planned for OLA
 - Significant changes to properties not expected

→ RESULT: Historical analyses may be used for Cascade with confirmation.

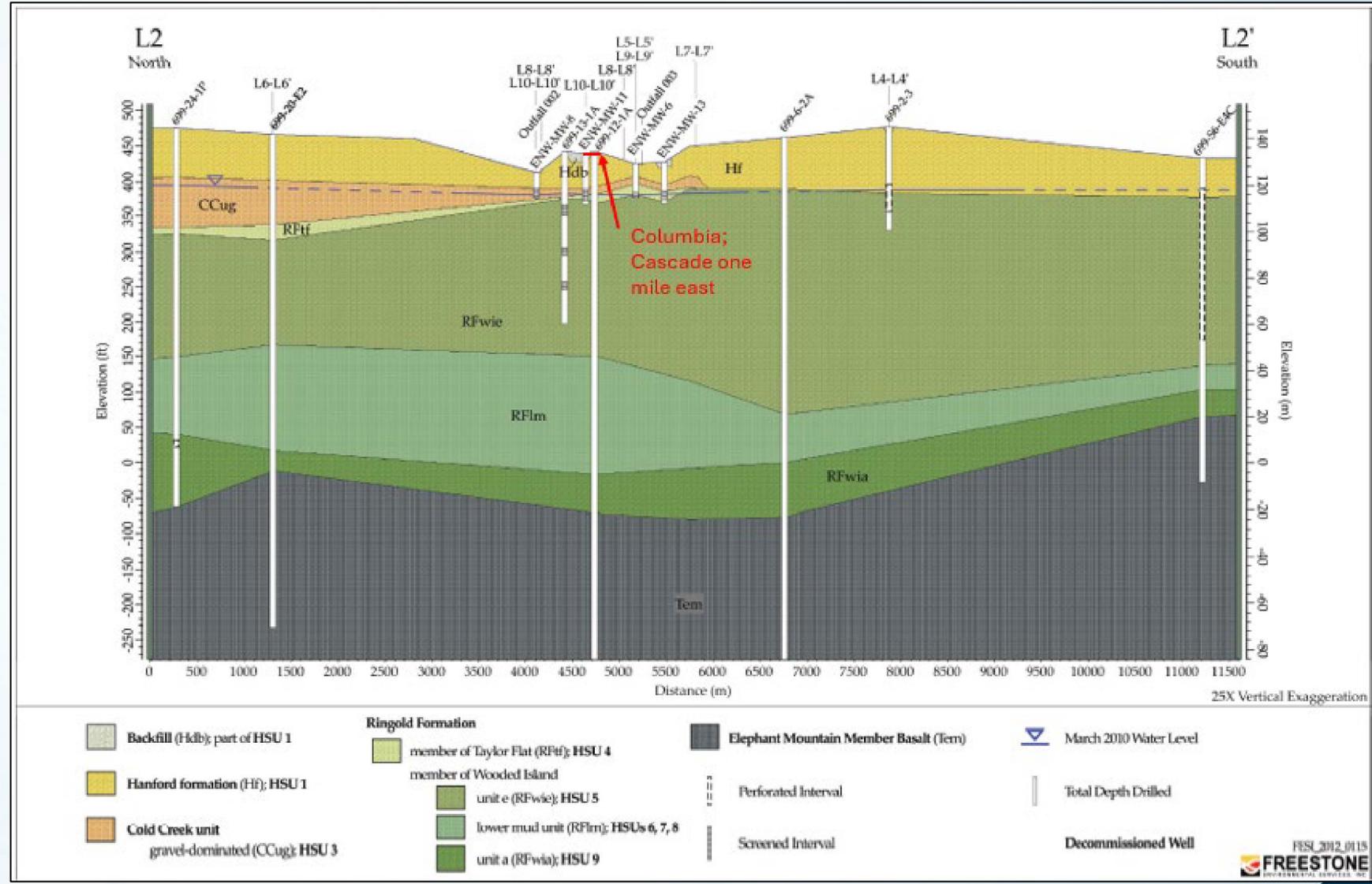
Similarities - 1

Location of stratigraphic profiles and borings used to obtain data to create them at the Columbia and WNP-1/4 sites.



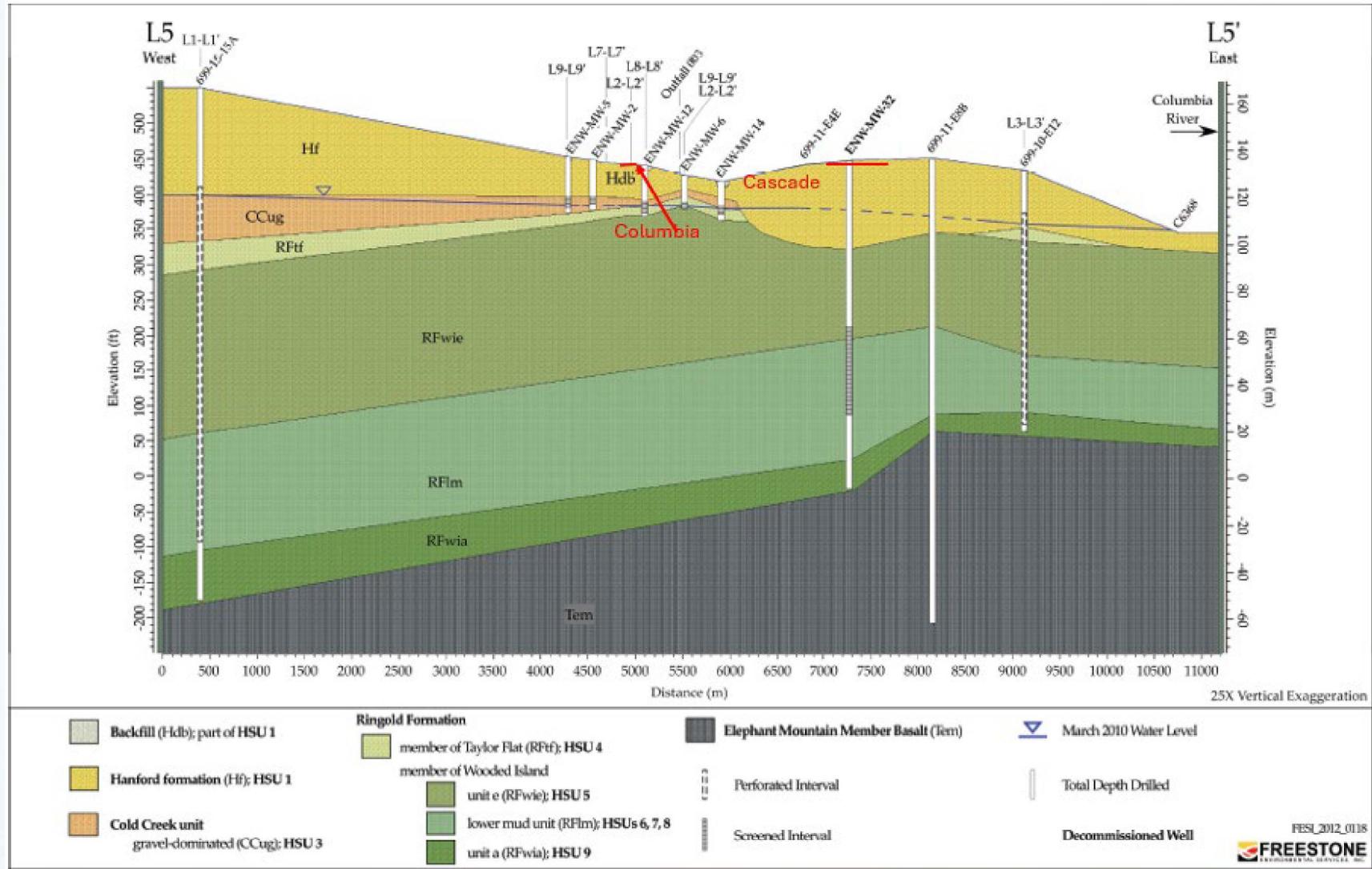
Similarities - 2

North-south stratigraphic line passing through Columbia site



Similarities - 3

East-west stratigraphic line passing through Columbia and Project Site



GMRS: Question 4, Site Unchanged?

- Yes. Subsurface stratigraphy Pasco gravels deposited ~15,000 years ago

→ RESULT: No changes needed to historical analyses for this criteria.

GMRS: Question 5, Appendix B Program?

- No. 2014 Hanford Site-Wide SSHAC Level 3 performed per NRC-approved NUREG/CR-6372 process.
- However, acceptable because:
 - GMRS will be recalculated for CPA under Appendix B process.

→ RESULT: Historical analyses will be updated.

GMRS: Question 6, Copy of Record?

- Yes. Analysis packages are publicly available or retained by Energy Northwest.

→ RESULT: Historical analysis records are available.

Geotechnical Acceptability Evaluation

An aerial rendering of an industrial facility, likely a water treatment plant or dam construction site. The facility consists of several large, rectangular concrete structures with flat roofs, some featuring corrugated metal siding. There are several large cylindrical storage tanks on the left side. A parking lot with numerous cars is visible in the lower-left corner. In the foreground, there is a large, shallow, rectangular pond or reservoir. The background shows a wide, green valley with a large body of water, possibly a reservoir, and a dam structure in the distance. The sky is blue with scattered white clouds.

Geotechnical: Question 1, Same Regulations?

- No. Same reasons as GMRS: GDC N/A for non-light water reactors
- However, acceptable because:
 - ENNN plans to use X-energy PDC-2
 - Original geotechnical work done under 10 CFR 100.10 and under or prior to 10 CFR 100 Appendix A.
 - No changes to 10 CFR 50 Appendix A, GDC 2; issued in 1973.
 - No substantive changes to requirements from 10 CFR 100.10 and Appendix A

→ RESULT: No changes needed to historical analyses based on this criteria.

Geotechnical: Question 2, Same Analysis Methodology?

- No. Guidance documents have changed.
- However, acceptable because:
 - Columbia and WNP-1/4 investigations used then-current standard of care.
 - RG 1.132 and RG 1.138 initial issued were after the CPA approvals and documented the standard of care. No significant changes to work practices.

→ **RESULT:** Historical analyses are consistent with current guidance. No changes needed.

Geotechnical: Question 2, Same Analysis Methodology? (cont.)

Evaluation	Eval Date	Guidance Used for Historical Analyses	Rev Used	Current Guidance	Current Rev
Geotech - Stability of Subsurface Materials and Foundations	1971-1980	NUREG-0800	R0, 11/1975	DANU-ISG-2022-02	3/2024
Geologic and Geotechnical Site Characterization Investigations	1971-1980	10 CFR 100 Appendix A	11/27/1973	RG 1.132	R3, 12/2021
				RG 1.198	R0, 11/2003
Field Investigations for Foundations of Nuclear Power Facilities	1971-1980	10 CFR 100 Appendix A	11/27/1973	NUREG/CR-5738	11/1999
Laboratory Investigations of Soils and Rocks for Engineering Analysis	1971-1980	10 CFR 100 Appendix A	11/27/1973	RG 1.138	R3, 12/2014

Geotechnical: Question 3, Same Scope of Analysis?

- No. Site investigations to date are not specific to Cascade footprint
- However, acceptable because:
 - Site geotechnical characteristics are similar to Columbia and WNP-1/4
 - Borings planned for safety-related structures and foundation design per RG 1.208, RG 1.132, NUREG/CR-5738 (OLA)

→ RESULT: No changes to historical analyses are expected.

Geotechnical: Question 4, Site Unchanged?

- Yes. Subsurface stratigraphy Pasco gravels deposited ~15,000 years ago

→ RESULT: No changes needed to historical analyses for this criterion.

Geotechnical: Question 5, Appendix B Program?

- Yes. Historical investigations from Columbia and WNP-1/4 FSARs all performed under 10 CFR 50 Appendix B.

→ **RESULT:** No changes needed to historical analyses.

Geotechnical: Question 6, Copy of Record?

- Yes, analysis packages are retained by Energy Northwest.

→ RESULT: Historical analysis records are available.

Summary and Conclusions



Question Summary

Evaluation	GMRS	Geotechnical
Same Regulations?	No but justified	No but justified
Same Methods?	No but justified	No but justified
Same Scope of Analysis?	No but justified	No but justified
Site Consistent?	Yes	Yes
App B Program?	No but justified	Yes
Copy of Record?	Yes	Yes

Conclusions

- Evaluation inputs and results (GMRS, geotechnical) can be applied to the Cascade Site.
- Preliminary design and CPA will use Wood GMRS updated as needed based on new information.
- Confirmatory site-specific evaluations are planned.
 - Review current research and literature, esp. Cascadia Subduction zone
 - MAM/MASW testing at ENNN Project Site for sensitivity studies and CPA
 - Sensitivity studies on control point, and epistemic uncertainty for CPA
 - Site-specific borings for Cascade safety-related structures and foundation design for OLA
- CPA will document justification for using historical analyses.

An aerial rendering of a large industrial or processing facility. The facility consists of several interconnected buildings with grey and brown facades, some with multiple levels. There are several large cylindrical storage tanks on the left side. A parking lot with many cars is visible in the lower-left. In the foreground, there is a large, dark, rectangular pond or reservoir. The facility is surrounded by green grass and a dirt road. In the background, there are rolling hills with exposed earth and rock layers under a blue sky with scattered white clouds.

Questions and Comments?

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