Exhibit A-33

Grette Associates LLC
ENVIRONMENTAL CONSULTANTS

TECHNICAL MEMORANDUM

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Attn: Kristin Gaines

Date: August 17, 2016

From: Grette Associates
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File No.: 415.001

Re: Clarifications on the DEIS Comments, Technical Response Analysis of Population-level Impacts on Tribal Fish Resources in Zone 6

I. INTRODUCTION

As part of its SEPA DEIS comments, Millennium Bulk Terminals – Longview (MBT-Longview) submitted a technical response analyzing the potential that its proposed project could result in population-level impacts on tribal fish resources in Zone 6 (Grette Associates 2016). In Section 2 (page 2), the analysis concludes that fish available for harvest in Zone 6 would not include (or would include a negligible component of) a number of ESUs and DPSs, including the Lower Columbia River Chinook ESU (LCR Chinook ESU) which are the fish that are geographically likely to be most susceptible to any project related impacts. The purpose of this memorandum is to supplement the previous technical response and to provide more specificity with respect to any potential population-level impacts from the proposed project to those portions of the LCR Chinook ESU that originate upstream of the Bonneville Dam, including the Spring Creek National Fish Hatchery (Spring Creek NFH) component of this ESU.

A. Relevant Fish Population Data

The Gorge Major Population Group of the LCR Chinook ESU includes populations that originate upstream of the Bonneville Dam: specifically fall- and/or spring-run fish from the Upper Gorge, Hood River, and White Salmon (aka, Big White Salmon) populations. Spring-run fish from these populations are extirpated or nearly so.

There are three fall-type populations originating upstream of the Bonneville Dam: Big White Salmon, Upper Gorge, and Hood River. Data from the Big White Salmon population establish that these fish comprise a very small proportion of the fall-run naturally spawning component of the LCR Chinook ESU, 2.4 percent of total spawners (980 fish, raw spawner count) based on the

most recent 5-year geometric mean (2010-2014, NWFSC 2015[1]). These numbers are consistent with the technical response's conclusion that these naturally spawning fish would include a negligible component of the fish available for harvest in Zone 6. Those spawner counts do not include the fish returning to Spring Creek NFH.

Spring Creek NFH produces LCR Chinook. It is located above Bonneville Dam on the Washington side of the Columbia River in Zone 6, approximately 1 mile downstream of the White Salmon River. The hatchery releases 10.5 million subyearling fall-run Chinook salmon annually. Spring Creek NFH fish contribute to fisheries in Zone 6.

B. Summary of Conclusions Demonstrated in the Technical Response Concerning Construction and Operational Impacts

The technical response reviewed the potential for construction impacts related to dredging and impact pile driving, in addition to operational impacts related to predation (bird and fish). Conclusions from that technical response are summarized below. Construction work windows minimize potential presence of subyearling Chinook for dredging and (more so) for impact pile driving. Table 1 has been adapted from Table 2 of the technical response, by the addition of LCR Chinook.

- A very small subset of individual fish could experience elevated turbidity during dredging; the risk posed by elevated turbidity would be negligible to exposed fish.

- Impact pile driving would affect only a very small proportion of individual emigrating subyearling Chinook, and would be negligible and/or minimal for individual returning adult Chinook.

- Once Docks 2 and 3 are constructed, there may be an increased potential for piscivorous fish to become associated with the structures. However, based on the configuration and relative depths of the docks, a relatively small proportion of juvenile salmon and steelhead are expected to encounter piscivorous fish.

- There is a low likelihood that cormorants or terns would forage in the Project area, and the terminal is unlikely to provide suitable roosting habitat. Therefore these newly constructed docks would not be expected to increase the presence of piscivorous birds at the site.

- Recent mortality studies on migrating fish from Bonneville Dam to the mouth of the River demonstrate that relatively little mortality is occurring upstream of RM 31.5, including a number of developed reaches with numerous large overwater structures and pile. Population-level impacts generally occur downstream of RM 31.5.

[1] The Big White Salmon population is the only fall run population with current spawner estimates. There are no current spawner estimates for the Upper Gorge and Hood River populations, but historically counts for those populations have been consistently much smaller than for the Big White Salmon population, therefore the proportions established by the Big White Salmon population are likely representative fall-run fish for the entire Major Population Group.

In short, construction impacts related to dredging and impact pile driving, in addition to operational impacts related to predation, have a negligible potential to contribute to population-level effects for either naturally spawning or hatchery fish, and therefore would not impact the fish available for harvest in Zone 6. Similarly, operational impacts related to predation would have a negligible potential to contribute to population-level effects and would not impact the number of fish available for harvest in Zone 6.

Table 1. Anticipated presence and habitat use for Zone 6 harvestable Chinook populations in the tidal freshwater region of Columbia River *(Lower Columbia River added for context)*

Impact Pile Driving												**9/ 1**											**12/ 31**															
Dredging and Flow Lane Disposal								**8/1**															**12/ 31**															
			Spring			***Summer***						***Fall***									***Winter***									***Spring***									
Species, ESU/DPS if applicable	**ESA Status**	**Life Stage**	**Jun**			**Jul**			**Aug**			**Sep**			**Oct**			**Nov**			**Dec**			**Jan**			**Feb**			**Mar**			**Apr**			**May**		
			A[1]	**S[1]**	**D[1]**	**A**	**S**	**D**	**A**	**S**	**D**	**A**	**S**	**D**	**A**	**S**	**D**	**A**	**S**	**D**	**A**	**S**	**D**	**A**	**S**	**D**	**A**	**S**	**D**	**A**	**S**	**D**	**A**	**S**	**D**	**A**	**S**	**D**
Chinook salmon ESUs[4]																																						
Snake River fall-run (non-listed: Deschutes River and Upper Columbia River summer/fall-runs)	T	Adults						X			X			X			…																					
		Yrlng			X																										X			X			X	
		Subyr.	…[2]	X[3]		…	X	X	…	X	X		…	…		…	…		…	…									…	X		…	X		…	X		
Snake River spring/summer-run	T	Adults			X			X			X																				…			X			X	
		Yrlng			X																										X			X			X	
Upper Columbia River spring-run	E	Adults																													…			X			X	
		Yrlng			X																										X			X			X	
Lower Columbia River	***T***	***Adults***									***X***			***X***			***X***														***X***			***X***			***X***	
		Yrlng			***X***																		**…**			**…**			**…**			***X***			***X***			***X***	
		Subyr.	***X***	***X***		**…**	***X***	***X***	**…**	***X***	***X***		**…**	**…**		**…**	**…**		**…**	**…**	**…**			**…**			**…**			***X***	***X***		***X***	***X***		***X***	***X***	

[1] A, S, and D habitat categories: Active Channel Margin (OHW waterward to 0 ft CRD), Shallow Water (0 ft CRD to -20 ft CRD), and Deep Water (beyond -20 ft CRD)

[2] "…" denotes may be present, low abundance

[3] "X" denotes present, no relative abundance

[4] As reviewed in Grette Associates 2014a and its Appendix D, juvenile Chinook timing and habitat use in the shallow margin was largely informed by Roegner et al. (2012, 2013), and focused on mainstem sampling locations between RM 34 and RM 70 (reaches C and D in those studies). Roegner et al. 2013 formed the basis for a subsequently published article Teel et al. (2014). The information on Chinook provided herein is consistent with the information presented for mainstem areas in reaches C and D in Teel et al. (2014) [see original technical response for references].

[5] Timing and habitat use for this table represents the naturally spawning component of the LCR Chinook ESU. Hatchery fish from Spring Creek NFH subyearlings are released in two groups (April and May), and are physiologically ready for a rapid migration to saltwater (see discussion in next section).

III. ADDITIONAL INFORMATION ON OPERATIONAL IMPACTS DUE TO WAKE STRANDING

A. Impacts on Naturally Spawning Fish

The technical response discussed the potential for impacts to fish harvest in Zone 6 due to increased wake stranding from vessels calling at the Project facility and concluded that stranding is primarily a risk for small subyearlings from fall-run stocks of the LCR Chinook ESU during the winter, spring, and early summer. It also concluded that because the LCR Chinook ESU does not contribute to tribal fisheries in Zone 6, wake stranding is not an important factor in evaluating population-level impacts on fish available for tribal harvest in Zone 6.

However, the technical response did not address the fact that a small number of LCR chinook spawn in tributaries within Zone 6 and that the Spring Creek NFH produces LCR Chinook. Both groups of fish are harvested by Tribes located in Zone 6 fisheries. Unlike the impact mechanisms described above, vessel wakes can cause mortality to small subyearling LCR Chinook salmon.

As stated above, approximately 2.4 percent of naturally spawning LCR Chinook spawn above Bonneville Dam in the White Salmon River (RM 168). These fish migrate as subyearlings and are expected to rear along the margins of the Columbia River below Bonneville Dam. Fall-run LCR Chinook comprise the vast majority of subyearling Chinook observed in the shallow margins in the tidal freshwater portion of the lower Columbia River (Roegner et al. 2012, 2013).

Fish length influences habitat associations and outmigration pathways, with small fry and fingerlings occupying shallow margin areas and larger fish moving through deepwater channels (Dawley et al. 1986, McCabe et al. 1986, Bottom et al. 2008, Roegner et al. 2012, Roegner et al. 2013, Weitkamp et al. 2012). Therefore, individual fish are expected to transition away from the shoreline as they grow throughout the course of their outmigration. Vessels transiting to and from the Coal Export Terminal would be operating below RM 63. Therefore, LCR Chinook originating from the White Salmon River are expected to have grown and moved farther from the shallow shoreline while transiting the 105 miles to (and beyond) the Coal Export Terminal site. This means these fish are likely less susceptible to stranding than LCR Chinook that originate from locations closer to the Coal Export Terminal site (e.g., LCR Chinook from the Cowlitz River).

Further, due to the Project location (RM 63), only a portion of the potential stranding locations in the lower Columbia River would be passed by vessels calling at the Project facility. As stated in the SEPA DEIS, Barlow Point, a known location of high stranding risk, is directly downstream from the Coal Export Terminal. Because vessels would be slowing as they approach the docks and accelerating as they depart (generally travelling at a slower speed), very little wake would be expected from vessels in this area.

Based on the small contribution of naturally spawned LCR Chinook to fisheries in Zone 6, and the limited exposure to stranding risk from the Coal Export Terminal, the Project is not expected to reduce the numbers of naturally spawning LCR Chinook available for harvest in Zone 6.

B. Impacts to Hatchery Fish

In recent years, releases from the Spring Creek NFH yield from 18,000 to over 30,000 adult returns to the hatchery (USFWS 2013a, 2014, and 2015). This is consistently more than the 10,000 fish escapement goal. In 2014 over 1.1 million adult Chinook of all ESUs passed Bonneville Dam (Columbia River DART 2016). Hatchery returns do not include fish from the Spring Creek NFH harvested in Zone 6 or below Bonneville Dam. For context, over 100,000 adult fish from the Spring Creek NFH were recovered from the 2007 brood year, 85 percent of which were recovered in ocean or Columbia River fisheries (USFWS 2013b).

The Spring Creek NFH is operated to minimize its negative impact on naturally spawning populations of LCR Chinook and other species in order to comply with the Endangered Species Act. This operation is stipulated in the Biological Opinion for the Spring Creek NFH and captured in the following Conservation Measures and Reasonable and Prudent Measures:

- "Emphasize juveniles that are ready to migrate to the ocean and spend a minimum amount of time in the freshwater environment" (Conservation Measure)

- "Reduce potential negative impacts to listed salmon and steelhead from hatchery operations" (Reasonable and Prudent Measure)

The Spring Creek NFH releases 10.5 million fry over two release dates in mid-April and early May (USFWS 2015). These fish range from 65 to 75 mm (based on length data in Absolon and Sandford 2016) and a target weight of 60 to 90 fish per pound (USFWS 2004). In 2008, fish production goals at the Spring Creek NFH were modified in a Memorandum of Agreement (MOA) between a number of treaty tribes and the Federal Columbia River Power System Action Agencies (USFWS 2015). The current hatchery release program reflects production levels going forward. Prior to this MOA, approximately 7.6 million small (≤125 fish per pound) Chinook subyearlings were released by the hatchery. These early released fish would have resided in the lower Columbia River for a relatively long period and competed with naturally spawned fish.

But based on hatchery management changes resulting from the MOA modifications, smolts are currently released at a stage where they are physiologically ready to migrate directly to the ocean in order to reduce potential competitive interactions with naturally spawned fish rearing in the lower Columbia River basin (USFWS 2004, see page 26). This is consistent with observations that Spring Creek fish are consistently the earliest arriving stock of subyearling Chinook in the downstream portion of Columbia River estuary (downstream of Astoria), for known hatchery fish and also unclipped fish that are a presumed mix of hatchery and naturally spawned individuals (Weitkamp et al. 2015). For this reason, Spring Creek NFH subyearling Chinook are likely to spend less time rearing in shallow water margins of the Columbia River than similarly-sized naturally spawned fish. Therefore, they would be both individually and as a group much less susceptible to stranding than naturally spawned LCR Chinook.

The technical response generally addressed the inverse relationship between fish length and stranding risk (i.e., smaller Chinook are much more likely to be stranded due to their use of very shallow water habitat). This inverse relationship is further substantiated by observations made in the lower Columbia River by Bauersfeld (1977) which documented the highest frequency of

stranding for fish between 35 and 45 mm. This was a disproportionally very high stranding frequency for smaller fish relative to the size distribution documented observed during beach seine sampling[2] (Bauersfeld 1977). This demonstrates smaller fish are even more likely to be stranded than the larger ones.

A similar size relationship has been observed for fall Chinook in the middle Columbia River (Hanford Reach) where fish can be stranded by rapid flow fluctuations below Priest Rapids Dam (WDFW 2002). Over the outmigration period, the vast majority of fall Chinook stranded and entrapped following rapid flow changes were <46 mm; 99 percent were <61 mm. Complementary beach seining demonstrated that fall Chinook ≥60 mm were typically present but were not typically stranded. Small Chinook were disproportionately susceptible to stranding and entrapment following flow changes. Similarly, to the work by Bauersfeld (1977), this demonstrates that the smaller Chinook are even more likely to be stranded than the larger ones during rapid flow fluctuations. The Spring Creek NFH Chinook subyearlings (released in April and May) are larger than the subyearling Chinook that are most susceptible to stranding and entrapment.

Overall, Spring Creek NFH subyearling Chinook (at least 65 mm at release) would be both individually and as a group less susceptible to wake stranding compared to LCR Chinook subyearlings as a whole. Moreover, Spring Creek NFH subyearlings are unlikely to be stranded due to their physiological condition at release and rapid migration as demonstrated by their relatively early arrival to the lower estuary (Weitkamp et al. 2015). Therefore, they are unlikely to be stranded at a rate which would contribute to population-level effects that would impact harvest in Zone 6.

IV. CONCLUSION

- Our original technical response as supplemented by this technical memorandum establishes that: Geographically, the Project‘s location in the lower Columbia River has the potential to impact the LCR Chinook ESU. This ESU includes fish originating from upstream of the Bonneville Dam, including:
    - A very small proportion of fall-run, naturally spawned fish, and
    - Hatchery fish from the Spring Creek NFH (can contribute over 100,000 adult fish to yearly fisheries, combining ocean and Columbia River recoveries).
- Construction impacts and operational impacts from the MBT-Longview Project would have negligible potential to contribute to population-level effects for either naturally spawning or hatchery fish from the LCR Chinook ESU, including those originating upstream of the Bonneville Dam.
- Naturally spawned LCR Chinook originating from the White Salmon River (RM 168) are expected to have grown larger and moved farther from the shallow shoreline while transiting the 105 miles to (and beyond) the Coal Export Terminal site (RM 63). These

[2] Stranding observations were made from February through July and beach seining was conducted in March through September. Both sample sets were inclusive of the peak outmigration period for subyearling fall Chinook.

fish are less susceptible to wake stranding than LCR Chinook that originate from locations downstream of Bonneville Dam, closer to the site.

- Based on size, physiological condition, and migration rate, Spring Creek NFH subyearling Chinook would be both individually and as a group less susceptible to wake stranding compared to LCR Chinook subyearlings as a whole.

Overall, the potential effects of construction, operation, and wake stranding from vessels calling at the MBT-Longview Project facility would have negligible potential to contribute to population-level effects within the LCR Chinook ESU. The Project would not impact the number of fish available for harvest in Zone 6.

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