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April 4, 2014

Mr. Bryan Carey
Engineering Manager
Alaska Energy Authority
813 West Northern Lights
Anchorage, Alaska 99503

Subject: **Susitna-Watana Dam Project (Project # P-14241-000)**
Independent Board of Consultants and Advisors
Meeting No. 4 - April 2 - 4, 2014 - Bellevue, WA

Dear Mr. Carey:

Introduction

The Fourth Meeting of the Independent Board of Consultants (BOC) was held in Bellevue, Washington during April 2nd, 3rd and 4th, 2014 at the offices of MWH. William Lettis of Lettis Consultants International was added to the Project as the seismic geology expert and advisor to the BOC. The purpose of the meeting was to update the BOC on the status of the PMP and PMF studies, the Site Specific Seismic Hazards Analysis studies, as well as the 2014 geotechnical investigation program plans. The progress of the RCC dam configuration feasibility and design studies was presented and discussed in detail. The following Report responds to the AEA Questions posed to the Board as well as presents additional considerations regarding seismic geology, fault rupture hazards and ground motions for the site.

Materials were distributed to the Board in advance for their review. The meeting was conducted in general accordance with the attached agenda as Attachment A. The list of attendees that attended the meetings is attached as Attachment B.

The AEA Susitna BOC Comment Log that was distributed to the Board was discussed briefly at the Meeting. The BOC reviewed the Comment Log in detail and will submit comments to AEA.

AEA Questions and BOC Responses

AEA Question 1: *Does the BOC agree that the configuration of the dam is acceptable as a basis for further design evaluation and optimization (and license application), with the proviso that the dynamic analysis be revised with foundation mass etc. and (results of) Site Specific Seismic Hazard Analysis studies, (and) site investigation (for the configuration)?*

BOC Response to Question 1: The BOC agrees that if the result of the planned site investigation program is positive, i.e., that there are no shears, linear features or faults found that can negatively affect the performance of the dam, the configuration of the dam would be acceptable as a basis for further feasibility/design evaluation, analysis and license application. The BOC feels that confirmation of these site conditions are paramount to the feasibility and therefore encourages early completion of the planned foundation investigation. The Site Specific Seismic Hazard Analysis (SSSHA) studies that are being conducted and presented are reasonable and appropriate for determining project feasibility and to serve as a basis for further design evaluation and optimization.

The various dynamic analyses need to be further investigated for the Operating Basis Earthquake (OBE) to show that operation can continue without interruption after an OBE event. Analysis for the MCE should be conducted as a limit case and evaluated for overall stability to ensure that the dam is stable during and after the MCE without sudden and uncontrolled release of the reservoir. Some possible damage and small displacement is acceptable for the MCE case as long as the water retention capability of the dam is maintained. With respect to follow up dynamic analyses, the BOC suggests the following:

1. It is important that dynamic analysis with massed foundation uses appropriate foundation modulus consistent with rock properties at the dam site. A low foundation modulus may be assigned to a narrow strip of elements along the footprint of the dam to account for rock fractures and joints that may exist in shallow depths, but a higher deformation modulus of the rock should be used in the rest of the foundation.
2. Appropriate transmitting or non-reflecting boundary conditions should be applied to the bottom and sides of the foundation model to eliminate reflection of seismic waves at the boundaries of the model.
3. Transmitting boundaries (dampers) with no constraint do not permit acceleration time histories as the seismic input. The ground-surface acceleration time histories therefore should first be deconvolved and then converted to stress time histories and applied to bottom and sides of the model. It is important that the deconvolution and conversion to stress time histories are verified to ensure that they produce similar ground surface acceleration when applied to a foundation block without the dam in place.

AEA Question 2: *Does the BOC agree that the Site Specific Seismic Hazard Analysis (SSSHA) studies performed to date are acceptable with the proviso that further crustal lineament analysis and angled drill holes across the valley under the dam foundation (2014-15 field program) be completed before final seismic criteria can be verified?*

BOC Response to Question 2:

The SSSHA studies accomplished to date cover lineament, probabilistic, and deterministic seismic hazard analyses and are detailed enough to provide preliminary design ground motions for the project. Sensitivity analyses show that further analysis of regional crustal lineaments will not significantly impact the design ground motions in the period range of significant dam response. However, further analysis of site area lineaments and angled drill holes are necessary to assess potential for fault rupture under the dam as a result of primary, secondary, or sympathetic fault displacement, as discussed in more detail under the "Additional Considerations" section below. On this basis, the BOC believes that the main purpose of further lineament analysis at the dam site including angled drill holes should focus on assessment of potential fault displacement and not necessarily on the vibratory ground motion associated with the lineaments. From the BOC perspective the probabilistic and deterministic ground motions are acceptable and can be finalized giving consideration to the following:

1. Based on preliminary measurements, V_{s30} at the dam site could be as high as 2,000 m/s, which is significantly higher than the current value considered (1,080 m/s). The BOC recommends that ground motions be estimated for V_{s30} consistent with the rock properties at the dam, and if necessary be adjusted for the effect of Kappa (effect of upper crust damping).

2. The BOC is generally satisfied with the deterministic estimates of Mmax (i.e. Magnitudes, 7.5, 7.8, and 8.0) and the associated level of ground motions (i.e., 84^{th}% for M7.5 and 69^{th} % for M7.8 and M8.0) for the intraslab events. However, the BOC considers that the magnitude of 7.5 is a more defensible MCE for the dimensions and historical activity of the McKinley Block beneath the site; and recommends that a Mmax of 7.5 at the closest hypocentral distance and 84^{th} percentile deterministic ground motion (pga of 0.76g) be adopted for feasibility/design (see "Additional Considerations").

3. An ANSYS dynamic analysis of Layout-4 indicates a fundamental period of vibration of about 0.55 seconds with sliding and permanent displacements under the MCE ground motion (intraslab M7.5 at 84^{th} percentile, equivalent to a return period of 5,000 years). The nonlinear response of the dam is therefore expected to be sensitive to long-period and long-duration ground motion, typical of interface events. As such, the BOC recommends that in addition to the intraslab ground motion, the dam also be analyzed for the interface deterministic ground motion scaled to the 5000-year UHS at the fundamental period of the dam (0.55 sec).

AEA Question 3: *Does the BOC agree that the draft PMP/PMF studies – prior to completing the report – are acceptable for finalizing the feasibility design and that if there are no changes in conclusion during the finalization of the report that the conclusions can be used for the final design of the spillway?*

BOC Response to Question 3:

Probable Maximum Precipitation (PMP)

Applied Weather Associates (AWA) has made subtle but very significant changes to their modeling approach, many of them based on suggestions from the BOC. It is the BOC's opinion that the current configuration of the model, and the results obtained, represent an accurate, consistent, and defensible estimate of PMP as it would affect the spillway design.

While there are some details which have been identified for modification in the PMP reports, these are mostly minor clarifications and grammar suggestions. The PMP process itself, and the resultant rainfall estimates, are excellent.

The most significant change in modeling procedure is in the storm transposition process. AWA is using a procedure which normalizes precipitation using a comparison with extreme precipitation coverage (such as 100-year grids from NOAA Atlas 14). Then this normalized grid is transposed to the target watershed and multiplied by the extreme coverage values at the target. The result is a process very similar to the so-called "isopercental" method, which is known to work well in areas with complex terrain. We believe that the storm transposition approach currently used by AWA is the most consistent and defensible method available. The BOC recommends that the report be edited for consistency and clarification prior to final submittal.

Probable Maximum Flood (PMF)

The BOC agrees that the PMF inflow hydrograph presented in the draft PMF report represents generally appropriate assumptions and modeling methodologies and the study is sufficiently complete to be used in feasibility design. The BOC commends the thoughtfulness and level of detail shown in the work to date, considering the unusual challenges posed by two factors in particular: the sparseness of historical hydrometeorological data and the dominance of snowmelt in many historical and hypothetical floods.

However, The BOC recommends that additional analyses and investigations be completed before adopting a final design inflow hydrograph, as follows:

1. The constant loss rate of 0.02 inch per hour applied to develop the PMF was less than the calibrated loss function (that is, it resulted in more computed runoff) and was chosen to provide an additional level of conservatism. The BOC concurs with this decision because the original loss function calibration for snowmelt-impacted events is somewhat unreliable, requiring an increase in the precipitation inputs relative to the values provided by Applied Weather Associates (AWA) for the calibration events. When greater-than-observed rainfall has to be added to the model in order to achieve the observed runoff volume, the other inputs affecting volume become very questionable. In fact, the calibrations were not able to conclusively prove that the loss rate was any greater than zero. In the presentation to the BOC on April 3, MWH's hydrologist noted that they had begun the process of applying the adopted PMF loss rate to the calibration events with generally acceptable results. The BOC strongly supports this step – along with the elimination of any arbitrary adjustments to the AWA-provided rainfall data – for the sake of consistency. The BOC would view a less perfect fit to the calibration events to be an acceptable sacrifice in order to avoid adjusting the rainfall data.

2. If the model continues to underestimate snowmelt-impacted events, consider the possibility that the energy budget loss method is not adequately considering the release of free water from a compacted snowpack. One reference addressing this condition is the1966 Bureau of Reclamation Engineering Monograph No. 35.

3. The near-record flood of June 2013 raises the possibility of a "sun-on-snow" PMF. In light of the fact that the PMP rainfall is relatively small and is associated with temperatures substantially lower than the temperatures that may occur in late spring/early summer with no cloud cover, the BOC suggests investigating the snowmelt-only event in at least enough depth to confirm it cannot control the PMF. This investigation would involve two elements:

    - Apply the HEC-1 model to the June 2013 event to confirm that it can replicate this type of flood;
    - Consider whether a probable maximum snowpack combined with unusually high temperatures, with no rain, could produce a controlling PMF. An efficient approach might be to make multiple model runs to determine what temperature/wind combinations would be needed to produce a PMF "contender" and then consult with AWA to evaluate whether such a combination of circumstances is plausible.

4. The sensitivity analysis leading to the adopted PMF model used a June precipitation/snowmelt combination. However, in the "base case" model runs, the August PMP with no snowmelt controlled the PMF. The final study should either address making similar conservative loss rate adjustments to the August case, or explain why the adopted changes apply to rain-on-snow floods but not to summer floods.

5. In the PMF report, Table 9.1-3, run M6 (The October PMP, or 80 percent of the all season PMP, on an October snowpack accumulation) is listed as resulting in a peak inflow of 24,000 cfs. However, in mid-October 1986 the Gold Creek gage recorded a daily flow of 36,000 cfs. The BOC agrees that this case will not control the PMF. Still, to retain confidence in the model assumptions the discrepancy between the computed extreme flood and the observed flood needs to be resolved.

AEA Question 4: *Given the configuration presented does the BOC consider that the planned site investigation is appropriate for the provision of data for feasibility/design of the dam?*

BOC Response to Question 4: The proposed and planned Site Investigation Program for the project was presented at the meeting. This program entails a phased series of field investigations, conducted over the next three years that respond to several of the BOC comments and concerns. The primary focus of the program is to characterize and confirm the geologic/geotechnical conditions in the dam site area. The main objectives include; 1) investigation and verification of the fracture and shear zones and geologic features, 2) evaluation of the potential for offset displacements in the foundation due to earthquake motions; 3) delineation of the frozen ground and groundwater conditions (adits) and 4) evaluation of the abutment stability. Given the above plan and objectives, which can be accomplished by the detailed mapping and exploratory adits and borings planned; the BOC considers the present detailed and phased site investigation appropriate for developing the data for supporting the feasibility and design of the dam.

Additional Considerations:

The BOC agrees that the Site Specific Seismic Hazard Analysis (SSSHA) studies performed to date are acceptable for further design evaluation and optimization with the proviso that the proposed site-specific studies be performed in the 2014-15 field seasons to evaluate the potential for fault rupture at the dam site.

Potential seismic hazard at the site includes two components: (1) Strong ground motion (development of design ground motion criteria), and 2) Fault rupture (documenting the absence of potential for fault displacement through the dam foundation). Fault displacement includes both tectonic fault displacement (primary, secondary or sympathetic) and non-tectonic displacement (e.g., sachung, etc.),

Considerable work has been performed to date to develop probabilistic and deterministic ground motion estimates for the dam. As described below, the BOC considers that this work is sufficient to move forward with further design and optimization studies, and the license application, pending completion of the final SSSHA studies.

Conversely, given site access limitations, only limited assessment has been performed of the potential for fault displacement at the dam site. Given the importance of this potential hazard to selection of the RCC dam design and location, the BOC concurs with the prioritization given to this assessment in the proposed work scope for 2014 field activities, including detailed field mapping, angle boreholes, and dating of identified shear zones. We reiterate our BOC comment following Meeting #2 (Comment 10) "*It is recommended that the energy of the geologists and the funding be focused on the mapping, drilling, and adits at the dam site area in a major effort to define the geometry of the shears in order to locate the dam such that any offsets occurring along these features during an earthquake do not need to be considered. This activity must be given the highest priority compared to the lineament studies at significant distances from the possible dam site*".

Fault Rupture Hazard.

In performing the upcoming 2014 site studies, the BOC recommends that particular attention be given to the following:

1. The Lineament Study provides an excellent basis for further evaluation of geologic features that may intersect the dam site area, and provides explicit criteria for "including" or "excluding" lineaments for further study. Currently, all of the criteria are related to the identification of potential seismic sources for ground motion analysis. The BOC recommends that one or more criteria be added related to the assessment of lineaments for potential fault rupture. For example, all lineaments that project toward the dam site within a 3 to 5 Km radius, regardless of length, should be evaluated for potential fault rupture.

2. During the upcoming 2014 field season, the BOC strongly recommends that explicit attention be given to the evaluation of the Susitna lineament as a potential fault structure, and the potential relationship of this lineament to the NW-SE trending shears mapped through the dam foundation (e.g., as potential Reidel shears). This potential association must be ruled out either by direct observations such as cross cutting relationships or by indirect arguments such as expected sense of slip in the current tectonic stress/strain regime.

3. In addition to mapping observed lineaments in the dam site area, the BOC recommends that a large scale lineament and detailed geologic map of the site area (approximately 1 or 2 kilometer radius around the dam) be prepared documenting the "absence" of lineaments or geologic features that may be associated with tectonic or non-tectonic activity (e.g., sachung features or

other deep-seated sympathetic structures) and explicitly stating in the report that these features are absent at the site.

4. Considerable "legacy" data exist for the site, including the Woodward Clyde lineament and trenching study. For example, trenches on the Susitna lineament and Talkeetna lineament are used to conclude that these features are not active faults. The BOC recommends that the site report include a section or commentary regarding the use of this pre-existing knowledge for current evaluation of these features.

Ground Motion Hazard.

1. Seismic Source Model. The seismic source model developed for the site is well documented and is appropriate for use in both deterministic and probabilistic analysis of ground motion at the site. Sensitivity analyses have identified those parameters of the model that are significant to hazard for further evaluation, including the Mmax distribution on the Intraslab source and selection/weighting of appropriate GMPE models. Sensitivity analyses show that crustal faults in the site region do not contribute significantly to hazard. Thus, the BOC recommends that little further effort be given to characterizing the potential activity of Lineaments in the site region. As needed, any Regional Lineaments "identified for further study" in the Lineament Report may be addressed by assigning a probability of being seismogenic (P(s)), a slip rate based on the threshold of detection, and an Mmax based on lineament length. Sensitivity analyses have shown that incorporating these lineaments as seismic sources will not contribute to ground motion hazard at the site.

2. Mmax of the Intraslab Source. For the deterministic analysis, the BOC supports the use of an Mmax of 7.5 at the closest hypocentral distance and 84th% deterministic ground motion, or an Mmax of 7.8 to 8.0 at a hypocentral distance uniformly distributed on the rupture plane and 84th% deterministic ground motion as recommended in Technical Memorandum 14-04-TM. Alternately, the latter is equivalent to the use of the closest hypocentral distance and 69th % ground motion as shown in 14-04 TM. The BOC recommends that additional discussion be provided in 14-04 TM regarding the hypocentral distribution used in the analysis both in depth (width) and length of potential Intraslab Fault Planes. The BOC recommends that the project team evaluate the fault rupture dimensions associated with recorded magnitude 8 Intraslab earthquakes in the global data base for comparison to the dimensions of the McKinley Block beneath the site. Such an evaluation can be used to assess whether the Intraslab source at the site can support similar large magnitude events, whether a lower Mmax (e.g., 7.5) is defensible for the MCE deterministic evaluation, and to inform the weighting given to the magnitude distribution for the PSHA.

3. Ground Motion Prediction Equation (GMPE) Model. The BOC recommends that a final decision be made on the selection of the GMPE model for the Intraslab source. Currently, the Deterministic and Probabilistic assessments use different GMPE models. For consistency, a final assessment of the GMPE model should be used in the SSSHA studies for development of final seismic design criteria.

Concluding Remarks:

The BOC appreciates that this phase of the Feasibility Study need not get into the final design details; however, it also feels that there are significant basic conditions that influence the configuration and performance of the dam. These factors can and may well affect the feasibility and estimated cost of the Project. Whether the present Feasibility Report addresses or tries to address all of the potential conditions of the dam and its environs is up to both the Owner and the Engineer. However, there are serious conditions and considerations that must be addressed. The following are several considerations identified, by the BOC, that need to be recognized and attended to:

1. The presence or absence of fault or shear features in the foundations that may affect both the static and dynamic performance of the RCC dam. The BOC strongly suggests that these issues be resolved in a timely manner, preferably in the 2014 detailed surface mapping and inclined cross-river borings planned during this first stage of the investigation.
2. The existence of permafrost within the foundation rock formations and how it has affected or will affect the foundation characteristics (i.e. ice jacking, rock block movements, long term foundation permeability etc.). The BOC strongly suggests that these issues be resolved in a timely manner, preferably in the first stage of the investigation (2014-15), from the proposed exploratory adits.
3. Knowing that the dam will be subject to sliding during an MCE event, consideration should be given to shaping of the foundation of each monolith to provide an upstream inclination for additional shear resistance.
4. It is important that upper abutment blocks (thrust blocks) provide adequate support for the arch thrust to capture or limit movements. This may be accomplished by appropriate orientation of the thrust blocks and possibly increasing their cross sections.
5. With the completion of the PMF and estimate of the design ground motion, the BOC reiterates its Comment 12.4 from Board Meeting 2 that special attention should be given to potential of increasing the number of spillway gates thereby reducing the height of piers, which would be more efficient in transferring the arch thrust into the adjacent blocks and improving cross-valley performance of the piers. This issue is also of concern to FERC as a result of a present incident at Wanapum project spillway.
6. Thermal considerations regarding placement of RCC directly on the cold foundations and shrinkage.
7. The transverse joint spacing that is appropriate for the cold climate and the thermal shock stresses generated by the cold water when the reservoir is impounded.
8. Considerations regarding longitudinal cracking from concrete shrinkage and foundation restraint
9. Consideration of foundation grouting within the extremely cold foundation rocks and groundwater.
10. The complications of sequencing of the seasonal placements and the thermal effects on the internal stress development

The BOC recognizes the efforts of AEA, and MWH to provide and present information for our review during the meetings and arrangements. The hospitality and accommodations provided by MWH are greatly appreciated.

The BOC Report was read during a Conference Call on Friday April 4th at 1:00PM from MWHs offices.

Sincerely,

Joseph Ehasz | Brian Forbes | Yusof Ghanaat | Alfred J. Hendron, Jr.

Ellen Faulkner | George Taylor | William R. Lettis

Attachments:

Attachment A – Meeting Agenda

Attachment B – Attendance Sheets

ATTACHMENT A

MEETING AGENDA

SUSITNA-WATANA HYDRO

Susitna-Watana Board of Consultants Meeting #4

MWH Office, 2353 130th Ave. NE #200, Bellevue, WA

Agenda
April 2-4, 2014
8:15 AM – 5:00 PM

Wednesday, April 2nd

(PUBLIC ACCESS)

1.	**Welcome and Introductions** • Safety Topic	**8:15 AM**
2.	**Prior Meetings Comment Response Review**	**8:45 AM**
3.	**2013 Geotechnical Investigation Program** • 2013 Site Investigation Update • Seismic Hazard and Lineament Studies Update	**9:45 AM**

CONCURRENT SESSIONS

(PUBLIC ACCESS)

4A.	**PMP Breakout Session** • PMP Study Update • PMF Study Update	**1:15 PM**

START EXECUTIVE SESSION – CEII

(CEII)

4B.	**Dam Configuration** • Deterministic Analysis of Intraslab • Dam Configuration • FE Analysis Update	**1:15 PM**

Adjourn

SUSITNA-WATANA HYDRO

Susitna-Watana Board of Consultants Meeting #4

MWH Office, 2353 130th Ave. NE #200, Bellevue, WA

Thursday, April 3rd

CONCURRENT SESSIONS

(PUBLIC ACCESS)

5A. PMP Breakout Session (continued) — **8:15 AM**

- PMP Study Update
- PMF Study Update

RESUME EXECUTIVE SESSION – CEII

(CEII)

5B. Dam Configuration (continued) — **8:15 AM**

- Deterministic Analysis of Intraslab
- Dam Configuration
- FE Analysis

END EXECUTIVE SESSION / CONCURRENT SESSIONS

(PUBLIC ACCESS)

6. Geotechnical Investigation Program — **10:00 AM**

7. PMP/PMF Overview — **1:00 PM**

Adjourn

SUSITNA-WATANA HYDRO

Susitna-Watana Board of Consultants Meeting #4

MWH Office, 2353 130th Ave. NE #200, Bellevue, WA

Friday, April 4th

START NON-PUBLIC SESSION

8.	**Board of Consultants Deliberations**	**8:15 AM**

END NON-PUBLIC SESSION

(PUBLIC ACCESS)

9.	**Board of Consultants Conclusions and Recommendations**	**(TBD)**
10.	**Establish Date for Next Board Meeting Adjourn**	

Adjourn

ATTACHMENT B

MEETING ATTENDANCE SHEETS

SUSITNA-WATANA HYDRO

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BOARD OF CONSULTANTS MEETING #4
APRIL 2-4, 2014
BELLEVUE, WA

SIGN-IN-SHEET DAY ONE – WEDNESDAY, APRIL 2ND (AM) Public

Please Print

Name	Company	Email	Phone
Mike Bruen	MWH	[redacted]	
Alfred Hendron Jr.	Self Employed BOC Consultant		
BRIAN FORBES.	B. OC - SWProj		
Yusof Ghanaat	BOC		
JOE EHASZ	BOC		
Bill Lettis	LCI		
George Taylor	Applied Climate		
Ellen Faulkner	BOC (Aynes Associates)		
Douglas Ott	AEA		
Bryan Carey	AEA		
Bill KAPPEL	AWA		
Doug Hultstrand	AWA		
Julie Stanaszek	MWH		
ALED HUGHES	MWH		
Farrokh Javanmardi	MWH		
Dean Osteraa	Fugro Consultants		
Glenn Tarbox	MWH		
BRIAN SADDEN	MWH		

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APRIL 2-4, 2014
BELLEVUE, WA

SIGN-IN-SHEET DAY ONE – WEDNESDAY, APRIL 2ND (AM) Public

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Name	Company	Email	Phone
Dina Hunt	MWH	[redacted]	
WAYNE DYOK	AEA		
Karl Swanson	FERC		
Ed Perez	FERC		
KEN FEARON	FERC-WO		
Doug Johnson	FERC - PRO		
John Haapala	MWH		
Jill Gray	MWH		
Norm Abrahamson	UC Berkeley		
Frank Calcagno (via phone)	FERC		
Peter Dickson	MWH (by phone)		
Dara Glass	CIRI (by phone)		
Joseph Muller	FERC (by phone)		

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BOARD OF CONSULTANTS MEETING #4
APRIL 2-4, 2014
BELLEVUE, WA

SIGN-IN-SHEET DAY ONE – WEDNESDAY, APRIL 2ND (PMP) PM Public

Please Print

Name	Company	Email	Phone
Doug Ott	AEA	[redacted]	
George Taylor	Acs		
Ellen Faulkner	Ayres / BOC		
Bill KAPPEL	AWA		
Doug Hultstrand	AWA		
Jill Gray	MWH		
Doug Johnson	FERC - Portland		
KEN PEARON	FERC - WASHINGTON DC		
John Haapala	MWH		

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APRIL 2-4, 2014
BELLEVUE, WA

SIGN-IN-SHEET DAY ONE – WEDNESDAY, APRIL 2ND (CEII) PM Session

Please Print

Name	Company	Email	Phone
Mike Brewer	MWH	[redacted]	
Dean Ostenaa	Fugro Consultants		
Glenn Tarbox	MWH		
Dina Hunt	MWH		
Norm Abrahamson	UC Berkeley		
WAYNE DYOK	ATBA		
Bryan Carey	AEA		
Frank Calcagno (via telephone)	FERC		
Ed Perez	FERC		
Karl Swanson	FERC		
William Lettis	LCI		
JOE EHASZ	BOC		
YUSOF GHANAAT	BOC		
BRIAN FORBES	BOC		
Alfred J. Hendron Jr.	BOC		
Farrokh Javanmardi	MWH		
ALEC HUGHES	MWH		
Julie Stanaszek	MWH		

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SIGN-IN-SHEET DAY ONE – WEDNESDAY, APRIL 2ND AM Session

Please Print

Name	Company	Email	Phone
Peter Dickson	MWH (by phone)		

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