MECHANICAL DATA SHEET

SHELL AND TUBE HEAT EXCHANGER

PLANT ITEM No.
24590-PTF-MB-FEP-RBLR-00001A

Data Sheet No.
24590-PTF-MED-FEP-00009

Project:	***RPP-WTP***	Description: ALG 18 FEB 07	***Waste Feed Evaporator Reboiler***
Project No:	***24590***	P&ID:	***24590-PTF-M6-FEP-00002002***
Site:	***Hanford***	Process ~~Calc.~~ DATA	***24590-PTF-MEC-FEP-00001***
Process flow diagram:	***24590-PTF-M5-V17T-00004002***	Manufacturer Name:	***Framatome ANP / Northwest Copper Works, INC.***

R11042823

General Data

Quality Level	***Q (See Note 8)***	TEMA (Class/Type)		***B***
Seismic Category	***SC-I***	Flow Type (Counter current, etc)		***2 - pass tubeside***
Design Code	***ASME VIII Div 1***	Heat Exchanger Duty	Btu/hr	***17,800,000***
Code Stamp	***Yes***	Heat Exchanger Area	ft^2	***2224***
NB Registration	***Yes***	ΔT (LMTD/Corrected LMTD)	°F	***96.5***

ISSUED BY RPP-WTP PDC

Thermal/Hydraulic Data

		Shell Side		Tube Side	
Fluid Name		***Steam***		***Waste Feed Recirculation***	
Fluid Quantities: Total	lbm/hr	***18,314*** 3		***6,524,607***	
Condensable Vapor (In/Out)		***18,313***	***3.0***	***N/A***	***N/A***
Liquid		***N/A***	***18,310***	***6,524,607***	***6,524,607***
Noncondensable		***1.0***	***1.0***	***N/A***	***N/A***
Temperature (In/Out)	°F	* 3	* 3	* 3	* 3
Density	lbm/ft^3	* 3	* 3	* 3	***1.19***
Viscosity	Cp	* 3	* 3	* 3	***12***
Molecular Weight		* 3	* 3	* 3	* 3
Molecular Weight, Noncondensable		* 3	* 3	* 3	* 3
Specific Heat	Btu/lbm-°F	* 3	* 3	* 3	* 3
Thermal Conductivity	Btu/hr-ft-°F	***N/A***	***N/A***	***N/A***	***N/A***
Latent Heat	Btu/lbm @ °F	***N/A***		***N/A***	
Inlet pressure	psia	***14.4***		***N/A***	
Tube side Velocity	ft/s	***N/A***		***6.0***	
Pressure Drop (Allowed)	psi	***N/A***		***N/A***	
Fouling Resistance (Min)	$hr\text{-}ft^2\text{-}°F/Btu$	***0.0015***		***0.007***	

Mechanical Design Data

		Shell Side		Tube Side	
Design Pressure (Max/Min)	psig	***50***	***Full Vacuum***	***50***	***Full Vacuum***
Design Temperature (Max/Min)	°F	***275***	***49***	***175***	***49***
Corrosion Allowance	inch	***0.040***		***0.040***	
Erosion Allowance	inch	***N/A***		***N/A***	
Shell OD / ID	inch	***60 ID***		Overall Dimensions (H x W x L) inch	***72 x 72 x 180***
Total No. of Tubes		***800***		Tube OD inch	***1.5***

Material Data

Shell	***SA 240 304 SS (max carbon 0.030%)***	Shell Cover	***SA 240 304 SS (max carbon 0.030%)***
Channel/Bonnet	***SB 582 UNS N06030 (Alloy G-30)***	Channel Cover	***SB 582 UNS N06030 (Alloy G-30)***
Tube	***SB 622 UNS N06030 (Alloy G-30 SMLS)***	Floating Head Cover	***N/A***
Stationary Tube Sheet	***SB 582 UNS N06030 (Alloy G-30)***	Floating Tube Sheet	***N/A***
Shell Side Gaskets	***N/A***	Tube Side Gaskets	***N/A***
Partition Seals	***N/A***	Baffles/Supports	***SA 240 304 SS (max carbon 0.030%)***
Insulation	***N/A***	Forgings (Shell Side)	***N/A***
Bolting	***N/A***	Forgings (Channel)	***N/A***

BECHTEL	**MECHANICAL DATA SHEET** **SHELL AND TUBE HEAT EXCHANGER**	**PLANT ITEM No.** ***24590-PTF-MB-FEP-RBLR-00001A*** **Data Sheet No.** ***24590-PTF-MED-FEP-00009***

Construction Data *(To be determined by the supplier when not specified by the buyer)*

Cross Baffle Type	*	% Baffle Cut (Dia.)	*	Spacing (c/c) inch	*
Bypass Seal Arrangement	*	Longitudinal Seal Type	*	Expansion Joint Type	*
Inlet Nozzle ρV^2	*	Bundle Entrance ρV^2	*	Bundle Exit ρV^2	*
Tube Support Type	*	U-bend Support Type	*	Weight of Bundle lbf	*
Operating Weight lbf	*	Full of Water lbf	*	Weight of Shell lbf	*

Notes

**** To be determined / verified by Vendor.*** 3

***** Deleted.*** 3

(1) All welds are continuous to avoid crevices, weld surface finish is descaled as laid.
(2) All welded construction.
(3) Tube to tubesheet joint shall be strength welded.
(4) Contents of this document are Dangerous Waste Permit Affecting.
(5) Not Used.
(6) Not Used.
(7) For nozzles loads, see 24590-PTF-3PS-MEVV-T0001.
3 ***(8) Vendor will provide item at BNI quality level Q specification, which corresponds with vendor quality level QL-2.***
(9) Vendor design information is from document 24590-QL-POA-MEVV-00001-02-00056.
(10) For equipment cyclic data, see 24590-PTF-3PS-MEVV-T0001.
(11) The physical design parameters shall be determined by the seller based on TEMA and HEI standards.
3 ***(12) Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.***

Safety screening / evaluation required? ☒Yes ☐No If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below.

Rev.	Description	By	Checked	EN&S	Approved	Date
3	Updated to reflect WSGM analysis, 24590-PTF-U0N-W16T-00003 and incorporate DOE AEA note (12). * INDICATES VALUES TO BE UPDATED. OTHER DATA UPDATED	D. Tate	R. Rickenbach	Butt Hall	J. Julyk	2/19/09
2	Incorporated Vendor Design and Equipment Qualification data	R. Rickenbach	C. Knauss	S. Woolfolk	J. Julyk	07/22/2008
1	Incorporated Vendor Design	E. Le	R. Nowak	N/A	J. Julyk	04/04/2005
0	Issued for Procurement	E. Le	S. Shah	N/A	J. Julyk	04/30/2003

EQUIPMENT QUALIFICATION DATASHEET (EQD)

Equipment Identification △3

Component Tag Number	24590-PTF-MB-FEP-RBLR-00001A	Safety Classification	☒ SC ☐ SS ☐ APC ☐ SDC ☐ SDS ☐ RRC Note 12 △3
Manufacturer / Supplier	Northwest Copper Works / Areva FS △3		
Requisition Number	24590-QL-POA-MEVV-00001		
Model	N/A	Seismic Category	☒ SC-I ☐ SC-II ☐ SC-III ☐ SC-IV Note 12 △3
Description (Include descriptive text [e.g., location, elevation])	Waste Feed Evaporator Reboiler, Room P-0123, elevation 0'-0"		
Safety Function(s)	Confinement (ref. 1) △3		

Seismic Safety Function	☒ Yes ☐ No	Room Number(s): P-0123	
Maintenance Accessible	☒ Yes ☐ No	Method of Maintenance Access:	☒ Remote ☐ Hands On ☐ None
Seismic Operability Requirements:	△3 ☐ During Seismic Event	△3 ☐ After Seismic Event	
ITS Equipment Type:	☒ Passive Mechanical	☐ Active Mechanical	☐ Electrical

Equipment Environmental Qualification (EEQ)

Environment ☐ Mild ☒ Harsh Contamination Class: C5 Radiation Class: R5	Hi Rad Service ☒ Yes ☐ No	Design Life (yrs) ☒ 40 ☐ Other ____

Parameter Type/Units	Parameter Value	Time Duration (number)	Time Units	WTP Document Number (BUYER)	Submittal Number (SELLER)
Normal					
Normal High Temperature (°F)	113	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal Low Temperature (°F)	59	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal High Relative Humidity (%RH)	100	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Relative Humidity (%RH)	5	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal High Pressure (in.-w.g.)	0	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Pressure (in.-w.g.)	-1.4	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Radiation Dose Rate (mR/hr)	△3 Note 9	40	yrs	Note 9	Note 1
Vibration Magnitude (g)	N/A	N/A	N/A	N/A	Note 1
Vibration Frequency (Hz)	N/A	N/A	N/A	N/A	Note 1
Additional Normal Information:	See note 2 for pressure units.				

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Equipment Environmental Qualification (EEQ) *(continued)*

Parameter Type/Units	Parameter Value	Time Duration (number)	Time units	WTP Document Number (BUYER)	Submittal Number (SELLER)
Abnormal					
Abnormal High Temperature (°F)	3 131	8	hr/yr	24590-PTF-U0D-W16T-00001, Note 6 3	Note 1
Abnormal Low Temperature (°F)	59	8	hr/yr	24590-WTP-DB-01-001, Notes 6 & 10	Note 1
Abnormal High Relative Humidity (%RH)	100	24	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Relative Humidity (%RH)	2	22	hr/yr	24590-PTF-U0D-W16T-00001, Note 11 3	Note 1
Abnormal High Pressure (in.-w.g.)	4	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Pressure (in.-w.g.)	-7.3	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Radiation Dose Rate (mR/hr)	3 Notes 3&9	3 0	3 hr/yr	Note 9	Note 1
Wet Sprinkler System Present	No	N/A 3	N/A 3	24590-PTF-U0D-W16T-00001	Note 1
Additional Abnormal Information	See note 2 for pressure units.				
Design Basis Events (DBE)					
DBE High Temperature (°F)	148	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6 & 11 3	Note 1
DBE Low Temperature (°F)	40	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
DBE High Relative Humidity (%RH)	100	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Relative Humidity (%RH)	2	1000	hrs	24590-PTF-U0D-W16T-00001, Note 11 3	Note 1
DBE High Pressure (in.-w.g.)	4	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Pressure (in.-w.g.)	-7.3	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Radiation Dose Rate (mR/hr)	3 Notes 3&9	3 0	3 hr/yr	Note 9	Note 1
Flood Height (ft)	2.08	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
Submergence (ft)	0, Note 4	1000 3	hrs	24590-PTF-U0D-W16T-00001 24590-QL-POA-MEVV-00001-01-00907	Note 1
Chemical/Spray Exposure	Yes	3 1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
Additional DBE Information	See note 2 for pressure units.				

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DBE Chemical Exposure Details	
DBE Chemical Types/Concentrations	2M Sodium Hydroxide 3 0.25M Sodium Hydroxide 3 0.1M Sodium Hydroxide 3 Antifoam Agent 2M Nitric Acid 3 Recovered Nitric Acid 3

Interfaces (Electrical)	
Power Supply Voltage (VAC, VDC)	N/A
Power Supply Frequency (Hz)	N/A
Power Connection Method	N/A
I/O Signals to/from Equipment	N/A
I/O Connection Method	N/A

Interfaces (Mechanical)	
Mounting Configuration (orientation)	TBD
Mounting Method (bolts, welds, etc.)	Welded, 24590-PTF-DD-S13T-00026
Auxiliary Devices	N/A

Equipment Seismic Qualification (ESQ)

Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification (BUYER)	Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks	24590-WTP-3PS-SS90-T0001	002	N/A
Specified Seismic Load (BUYER)	Seismic Analysis of Pretreatment Building - WSGM In-Structure Response Spectre (ISRS) 3	24590-PTF-S0C-S15T-00057 3	00A 3	Calculation is not included in MR, see attached figures 21E, 22E and 24E per CCN 185267. 3
Design Seismic Load (SELLER	Note 1	Note 1	Note 1	Note 1
Qualification Method (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Report Number (SELLER)	Note 1	Note 1	Note 1	Note 1
Submittal Number (BUYER)	TBD	TBD	TBD	N/A

Notes and Additional Information

Notes

1. Data to be provided by SELLER through the submittal process as required on the G-321E.
2. Where pressure is given in inches of water column (in-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in-w.g.).
3. Abnormal and DBE radiation dose rates are set equal to normal and do not contribute to the total integrated dose. 3
4. Submergence depth is the difference between the lowest point on the equipment and the flood depth above the floor. The submergence depth is set to zero if the lowest section of the equipment is above the flood depth.
5. Environmental data from reference 3 is for room environment only.
6. For application of AISC N690, the normal temperatures are not used. Abnormal temperatures shall be applied as Normal Operation Temperature, T_O, with seismic effects, E_S. The Design basis event temperature shall be applied as a Thermal Load generated by a postulated accident, T_A, without seismic effects, E_s or E_o.
7. The equipment qualification will be documented in accordance with the requirements in Appendix D of Engineering Specification for Environmental Qualification of Mechanical Equipment, document number 24590-WTP-3PS-G000-T0015 for the passive and active safety functions.
8. Deleted. 3
9. Beta radiation dose is 1.39 E+07 mRad/hr based on the ratio of Strontium-90 from reference 7 3 as compared to the Strontium and Beta dose given in reference 8. 3 Gamma dose rate is not to exceed 2.0 E+06 mRad/hr per CCN 175006.
10. Abnormal low temperature, as calculated in reference 3, is based on a Loss of Heating Accident (LOHA) which occurs when steam supply to the building is lost. Since the evaporators are run on steam, this would cause the evaporators to go off-line. Abnormal low temperature will be based on reference 4 at 59°F.
11. Parameter value used on data sheet has been previously established and determined more conservative than values 3 derived from the reference document noted.
12. For commercial reasons, safety and seismic classification may be higher than elsewhere documented, and therefore 3 conservative.

Reference

1. 24590-WTP-PSAR-ESH-01-002-02, Rev. 04A, Preliminary documented safety analysis to support construction 3 authorization; PT facility specific information.
2. CCN #096661, FEP and CNP Evaporator Vent Problems with New PVP Isolation Valve.
3. 24590-PTF-U0D-W16T-00001, Rev. 0, PTF Room Environment Datasheet.
4. 24590-WTP-DB-ENG-01-001, Rev. 1M, Basis Of Design. 3
5. 24590-PTF-U0N-W16T-00001, Add data for room p-0427. Incorporate additional steam break analysis. 3
6. 24590-PTF-U0N-W16T-00003, Revised temperature & relative humidity data for PTF rooms. 3
7. 24590-WTP-Z0C-50-00008, Rev. B, Comparison of Source Terms for use in Shielding Calculations. 3
8. 24590-LAB-Z0C-80-00001, Rev. D, Beta and Gamma Dose Rate Determinations from Laboratory Sample Bottles. 3

RPP-WTP Pretreatment Facility ISRS

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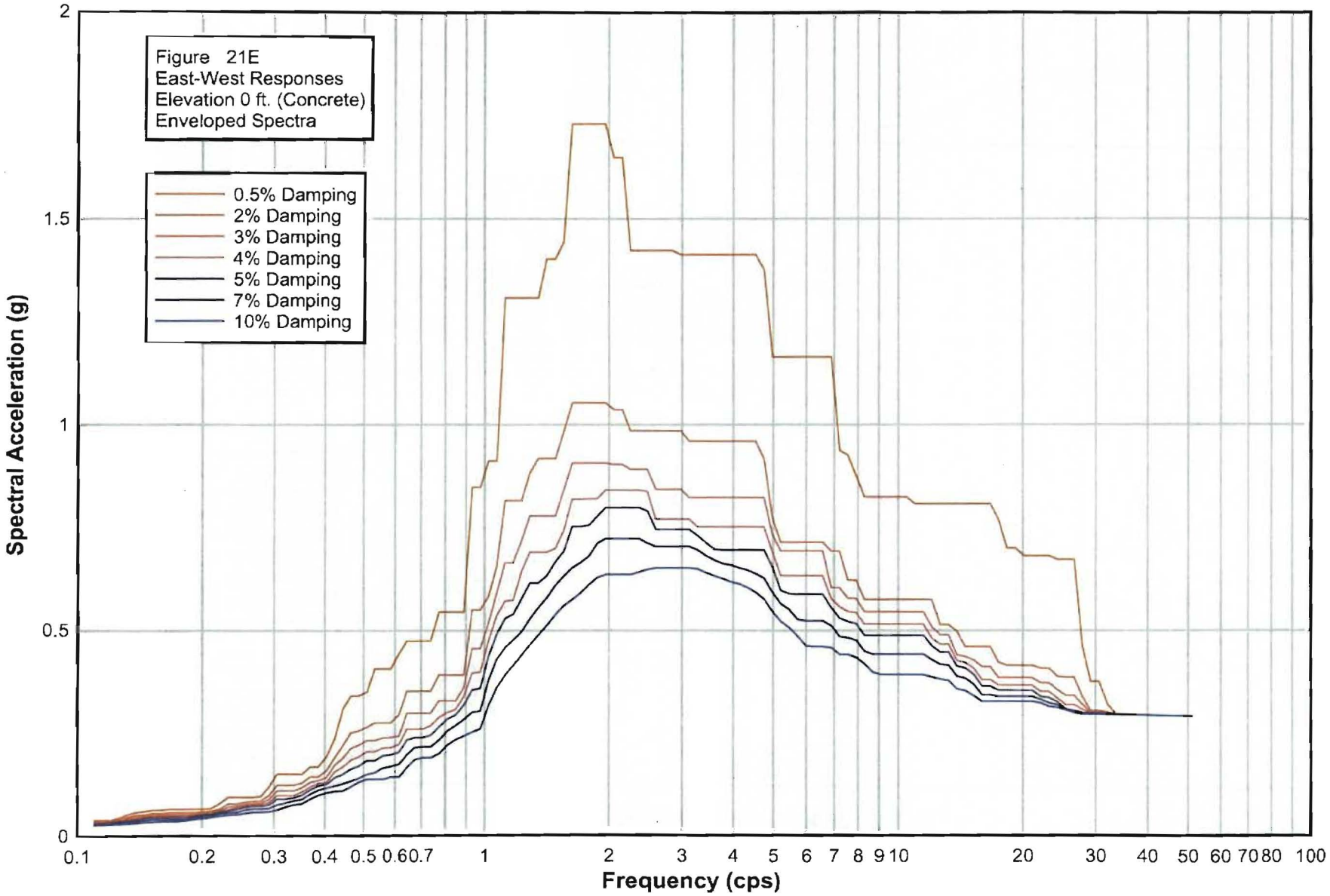
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



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RPP-WTP Pretreatment Facility ISRS

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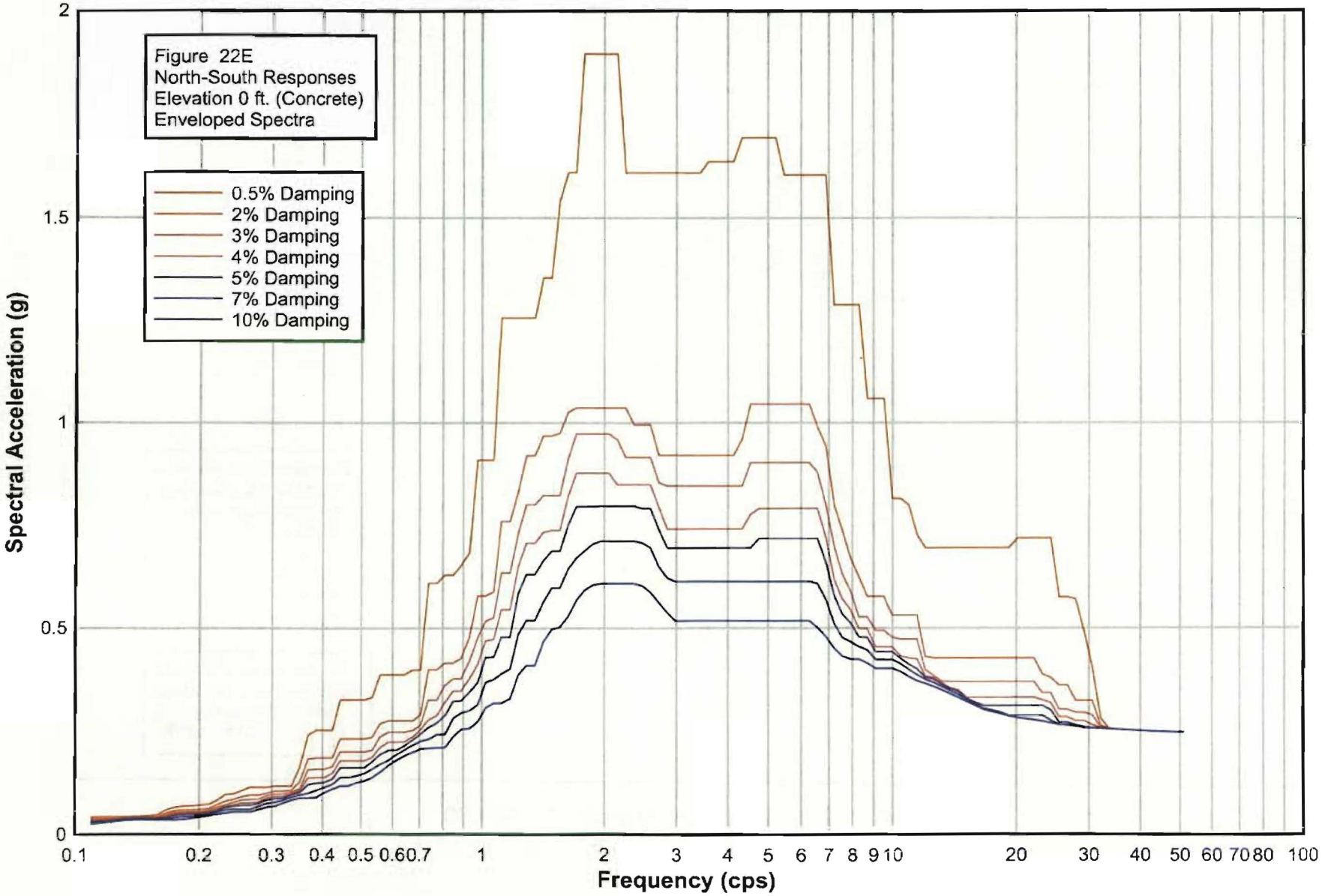
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



RPP-WTP Pretreatment Facility ISRS

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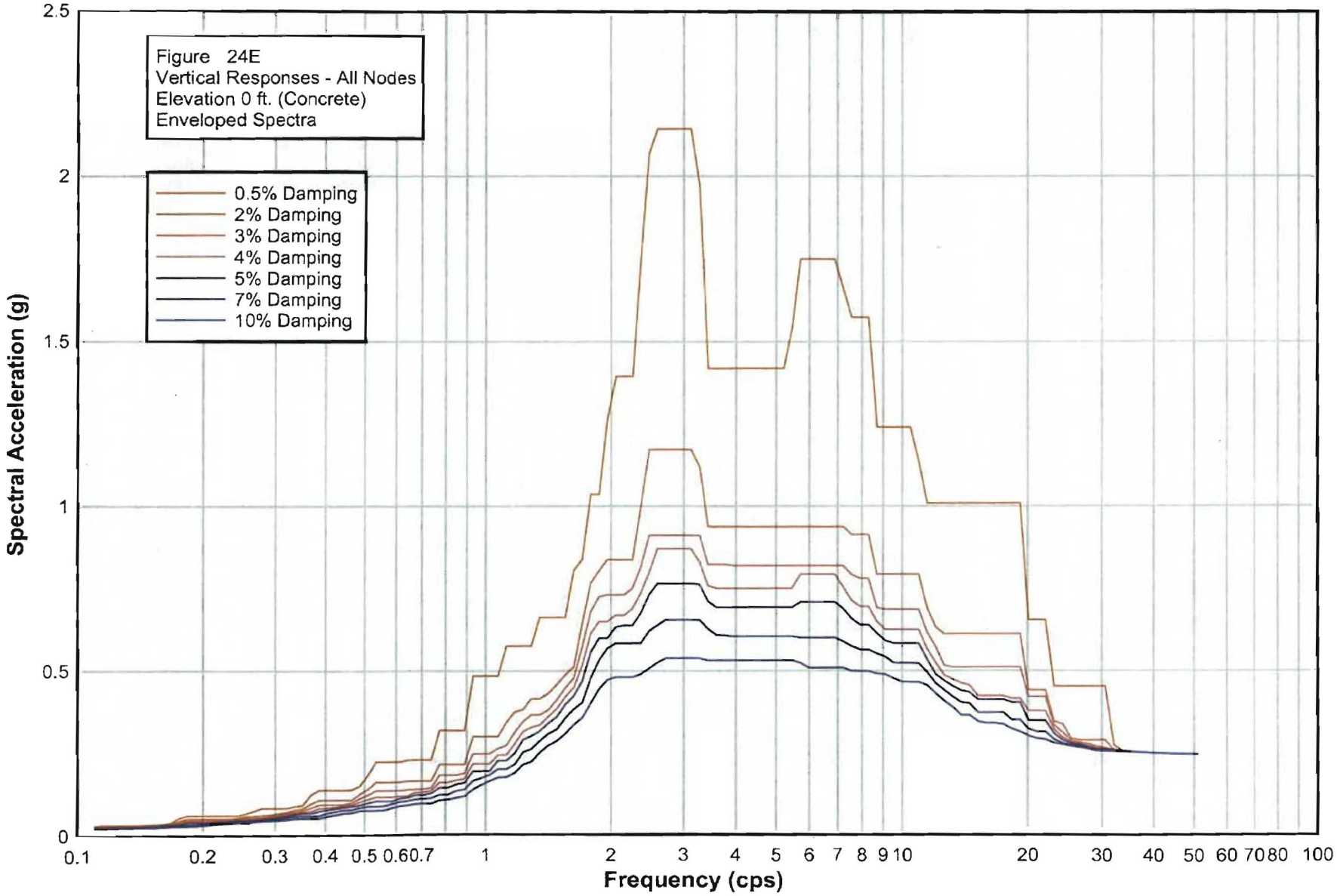
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~ Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0375	0.1098	0.0345	0.1098	0.0327	0.1098	0.0312	0.1098	0.0298	0.1098	0.0274	0.1098	0.0252
0.115	0.0375	0.115	0.0345	0.115	0.0327	0.115	0.0312	0.115	0.0299	0.115	0.0277	0.115	0.0259
0.1204	0.0375	0.1204	0.0345	0.1204	0.0331	0.1204	0.0322	0.1204	0.0312	0.1204	0.0294	0.1204	0.0268
0.1262	0.0431	0.1262	0.0397	0.1262	0.0378	0.1262	0.036	0.1262	0.0343	0.1262	0.0314	0.1262	0.0277
0.1322	0.0505	0.1322	0.0451	0.1322	0.042	0.1322	0.0393	0.1322	0.0369	0.1322	0.0328	0.1322	0.0281
0.1385	0.0561	0.1385	0.049	0.1385	0.045	0.1385	0.0415	0.1385	0.0384	0.1385	0.0344	0.1385	0.0303
0.1451	0.0582	0.1451	0.0509	0.1451	0.0475	0.1451	0.0444	0.1451	0.0419	0.1451	0.0374	0.1451	0.0325
0.152	0.0617	0.152	0.0546	0.152	0.0507	0.152	0.0472	0.152	0.0442	0.152	0.0392	0.152	0.0336
0.1592	0.0619	0.1592	0.0546	0.1592	0.0507	0.1592	0.0472	0.1592	0.0442	0.1592	0.0394	0.1592	0.0347
0.1668	0.0639	0.1668	0.056	0.1668	0.0516	0.1668	0.0479	0.1668	0.0448	0.1668	0.04	0.1668	0.0353
0.1748	0.0639	0.1748	0.056	0.1748	0.0516	0.1748	0.0479	0.1748	0.0448	0.1748	0.04	0.1748	0.0353
0.1831	0.0639	0.1831	0.056	0.1831	0.0516	0.1831	0.0479	0.1831	0.0448	0.1831	0.04	0.1831	0.0364
0.1918	0.064	0.1918	0.056	0.1918	0.0516	0.1918	0.0491	0.1918	0.0473	0.1918	0.0442	0.1918	0.0401
0.2009	0.0641	0.2009	0.0581	0.2009	0.0556	0.2009	0.0533	0.2009	0.0511	0.2009	0.0472	0.2009	0.0422
0.2105	0.0664	0.2105	0.0603	0.2105	0.0575	0.2105	0.0549	0.2105	0.0525	0.2105	0.049	0.2105	0.0448
0.2205	0.078	0.2205	0.0645	0.2205	0.0618	0.2205	0.0594	0.2205	0.0571	0.2205	0.0531	0.2205	0.0482
0.231	0.0931	0.231	0.0772	0.231	0.0692	0.231	0.0628	0.231	0.0597	0.231	0.0554	0.231	0.0502
0.242	0.0931	0.242	0.0772	0.242	0.0722	0.242	0.0678	0.242	0.0637	0.242	0.0565	0.242	0.0512
0.2535	0.0931	0.2535	0.0817	0.2535	0.077	0.2535	0.0728	0.2535	0.069	0.2535	0.0625	0.2535	0.0547
0.2656	0.0931	0.2656	0.0839	0.2656	0.0794	0.2656	0.0753	0.2656	0.0716	0.2656	0.065	0.2656	0.0571
0.2783	0.0955	0.2783	0.0844	0.2783	0.0794	0.2783	0.0753	0.2783	0.0716	0.2783	0.065	0.2783	0.0575
0.2915	0.1183	0.2915	0.0982	0.2915	0.0885	0.2915	0.081	0.2915	0.075	0.2915	0.0666	0.2915	0.0586
0.3054	0.1498	0.3054	0.123	0.3054	0.1093	0.3054	0.0982	0.3054	0.0892	0.3054	0.0757	0.3054	0.0632
0.3199	0.1498	0.3199	0.123	0.3199	0.1093	0.3199	0.0982	0.3199	0.0892	0.3199	0.0797	0.3199	0.07
0.3352	0.1498	0.3352	0.123	0.3352	0.1093	0.3352	0.0982	0.3352	0.0927	0.3352	0.0852	0.3352	0.0755
0.3511	0.1498	0.3511	0.1285	0.3511	0.1168	0.3511	0.1065	0.3511	0.0994	0.3511	0.0891	0.3511	0.0782
0.3678	0.1677	0.3678	0.1435	0.3678	0.13	0.3678	0.1183	0.3678	0.112	0.3678	0.1014	0.3678	0.0894
0.3853	0.1677	0.3853	0.1435	0.3853	0.134	0.3853	0.1273	0.3853	0.1213	0.3853	0.1109	0.3853	0.0986
0.4037	0.1925	0.4037	0.1587	0.4037	0.1415	0.4037	0.1298	0.4037	0.1251	0.4037	0.1163	0.4037	0.1044
0.4229	0.2359	0.4229	0.1897	0.4229	0.1713	0.4229	0.1551	0.4229	0.1411	0.4229	0.1206	0.4229	0.1079
0.4431	0.3083	0.4431	0.219	0.4431	0.1881	0.4431	0.167	0.4431	0.1495	0.4431	0.1263	0.4431	0.1089
0.4642	0.3407	0.4642	0.2508	0.4642	0.2123	0.4642	0.1837	0.4642	0.1622	0.4642	0.1328	0.4642	0.1192
0.4863	0.3407	0.4863	0.2548	0.4863	0.2198	0.4863	0.1918	0.4863	0.1692	0.4863	0.1398	0.4863	0.1303
0.5094	0.3496	0.5094	0.2641	0.5094	0.2311	0.5094	0.2042	0.5094	0.182	0.5094	0.1485	0.5094	0.1369

PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~
Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.4063	0.5337	0.2745	0.5337	0.2311	0.5337	0.2042	0.5337	0.182	0.5337	0.1529	0.5337	0.1371
0.5591	0.4063	0.5591	0.2745	0.5591	0.2378	0.5591	0.213	0.5591	0.194	0.5591	0.1646	0.5591	0.1371
0.5857	0.4063	0.5857	0.2745	0.5857	0.2385	0.5857	0.2142	0.5857	0.1966	0.5857	0.1681	0.5857	0.1425
0.6136	0.4438	0.6136	0.2944	0.6136	0.2421	0.6136	0.2213	0.6136	0.2032	0.6136	0.1733	0.6136	0.1425
0.6428	0.4742	0.6428	0.3514	0.6428	0.2975	0.6428	0.2588	0.6428	0.2323	0.6428	0.1964	0.6428	0.1655
0.6734	0.4742	0.6734	0.3514	0.6734	0.2975	0.6734	0.2588	0.6734	0.2383	0.6734	0.2137	0.6734	0.1844
0.7055	0.4742	0.7055	0.3514	0.7055	0.2975	0.7055	0.2588	0.7055	0.2383	0.7055	0.2155	0.7055	0.1892
0.7391	0.4742	0.7391	0.3514	0.7391	0.2975	0.7391	0.2667	0.7391	0.2438	0.7391	0.2155	0.7391	0.1892
0.7743	0.5449	0.7743	0.3911	0.7743	0.3284	0.7743	0.2875	0.7743	0.2646	0.7743	0.2323	0.7743	0.1993
0.8111	0.5449	0.8111	0.3911	0.8111	0.3284	0.8111	0.2996	0.8111	0.2837	0.8111	0.2551	0.8111	0.2205
0.8497	0.5449	0.8497	0.3911	0.8497	0.3284	0.8497	0.3072	0.8497	0.2942	0.8497	0.2684	0.8497	0.2339
0.8902	0.5449	0.8902	0.3911	0.8902	0.3604	0.8902	0.3382	0.8902	0.318	0.8902	0.2831	0.8902	0.2427
0.9326	0.8469	0.9326	0.5495	0.9326	0.4554	0.9326	0.3957	0.9326	0.3545	0.9326	0.3003	0.9326	0.2517
0.977	0.8469	0.977	0.5495	0.977	0.4554	0.977	0.3975	0.977	0.3585	0.977	0.3036	0.977	0.2596
1.0235	0.9107	1.0235	0.5826	1.0235	0.5168	1.0235	0.4731	1.0235	0.4362	1.0235	0.3776	1.0235	0.3164
1.0723	0.9107	1.0723	0.6542	1.0723	0.5901	1.0723	0.535	1.0723	0.4906	1.0723	0.4288	1.0723	0.36
1.1233	1.3081	1.1233	0.8142	1.1233	0.6641	1.1233	0.5708	1.1233	0.5287	1.1233	0.4575	1.1233	0.3904
1.1768	1.3081	1.1768	0.8142	1.1768	0.6641	1.1768	0.5735	1.1768	0.5393	1.1768	0.4764	1.1768	0.4143
1.2328	1.3081	1.2328	0.8142	1.2328	0.7174	1.2328	0.6427	1.2328	0.577	1.2328	0.4965	1.2328	0.439
1.2916	1.3081	1.2916	0.8822	1.2916	0.7774	1.2916	0.6895	1.2916	0.6157	1.2916	0.5283	1.2916	0.4653
1.353	1.3081	1.353	0.9165	1.353	0.7774	1.353	0.6895	1.353	0.6157	1.353	0.5556	1.353	0.4889
1.4175	1.4021	1.4175	0.9165	1.4175	0.7774	1.4175	0.6895	1.4175	0.6326	1.4175	0.5795	1.4175	0.5119
1.485	1.4021	1.485	0.9165	1.485	0.7774	1.485	0.6984	1.485	0.6672	1.485	0.6099	1.485	0.539
1.5557	1.4438	1.5557	0.9843	1.5557	0.8409	1.5557	0.7415	1.5557	0.6919	1.5557	0.6323	1.5557	0.5603
1.6298	1.729	1.6298	1.0527	1.6298	0.9055	1.6298	0.8177	1.6298	0.7518	1.6298	0.6519	1.6298	0.5748
1.7074	1.729	1.7074	1.0527	1.7074	0.9055	1.7074	0.8177	1.7074	0.7518	1.7074	0.6652	1.7074	0.5915
1.7887	1.729	1.7887	1.0527	1.7887	0.9055	1.7887	0.8185	1.7887	0.7553	1.7887	0.6808	1.7887	0.6117
1.8738	1.729	1.8738	1.0527	1.8738	0.9055	1.8738	0.8185	1.8738	0.7765	1.8738	0.7113	1.8738	0.6287
1.963	1.729	1.963	1.0527	1.963	0.9055	1.963	0.8397	1.963	0.7973	1.963	0.7229	1.963	0.6359
2.0565	1.6472	2.0565	1.0359	2.0565	0.902	2.0565	0.8397	2.0565	0.7973	2.0565	0.7229	2.0565	0.6359
2.1544	1.6472	2.1544	1.0359	2.1544	0.902	2.1544	0.8397	2.1544	0.7973	2.1544	0.7229	2.1544	0.6359
2.257	1.4229	2.257	0.9839	2.257	0.8903	2.257	0.8397	2.257	0.7973	2.257	0.7229	2.257	0.6361
2.3645	1.4229	2.3645	0.9839	2.3645	0.8903	2.3645	0.8397	2.3645	0.7973	2.3645	0.7229	2.3645	0.6418
2.4771	1.4229	2.4771	0.9839	2.4771	0.8903	2.4771	0.8363	2.4771	0.7896	2.4771	0.7121	2.4771	0.6484
2.595	1.4229	2.595	0.9839	2.595	0.8416	2.595	0.7692	2.595	0.745	2.595	0.7036	2.595	0.6522

PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~ Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
2.7186	1.4229	2.7186	0.9839	2.7186	0.8416	2.7186	0.7692	2.7186	0.745	2.7186	0.7036	2.7186	0.6522
2.848	1.4229	2.848	0.9839	2.848	0.8416	2.848	0.7692	2.848	0.745	2.848	0.7036	2.848	0.6522
2.9836	1.4127	2.9836	0.9839	2.9836	0.8416	2.9836	0.7692	2.9836	0.745	2.9836	0.7036	2.9836	0.6522
3.1257	1.4127	3.1257	0.9586	3.1257	0.8211	3.1257	0.7692	3.1257	0.745	3.1257	0.7036	3.1257	0.6522
3.2745	1.4127	3.2745	0.9586	3.2745	0.8211	3.2745	0.751	3.2745	0.7299	3.2745	0.6954	3.2745	0.6492
3.4305	1.4127	3.4305	0.9586	3.4305	0.8211	3.4305	0.751	3.4305	0.7126	3.4305	0.681	3.4305	0.6403
3.5938	1.4127	3.5938	0.9586	3.5938	0.8211	3.5938	0.751	3.5938	0.6971	3.5938	0.671	3.5938	0.6329
3.7649	1.4127	3.7649	0.9586	3.7649	0.8211	3.7649	0.751	3.7649	0.6954	3.7649	0.6626	3.7649	0.6263
3.9442	1.4127	3.9442	0.9586	3.9442	0.8211	3.9442	0.751	3.9442	0.6954	3.9442	0.659	3.9442	0.6182
4.132	1.4127	4.132	0.9586	4.132	0.8211	4.132	0.751	4.132	0.6954	4.132	0.6519	4.132	0.6132
4.3288	1.4127	4.3288	0.9586	4.3288	0.8211	4.3288	0.751	4.3288	0.6954	4.3288	0.6467	4.3288	0.6045
4.5349	1.4127	4.5349	0.9586	4.5349	0.8211	4.5349	0.751	4.5349	0.6954	4.5349	0.6383	4.5349	0.5926
4.7508	1.376	4.7508	0.9153	4.7508	0.8211	4.7508	0.751	4.7508	0.6954	4.7508	0.6271	4.7508	0.5766
4.977	1.1649	4.977	0.7722	4.977	0.7324	4.977	0.6911	4.977	0.6536	4.977	0.5927	4.977	0.5466
5.214	1.1649	5.214	0.7138	5.214	0.6926	5.214	0.6329	5.214	0.5972	5.214	0.5647	5.214	0.5221
5.4623	1.1649	5.4623	0.7138	5.4623	0.6926	5.4623	0.6329	5.4623	0.5893	5.4623	0.5516	5.4623	0.5074
5.7224	1.1649	5.7224	0.7138	5.7224	0.6926	5.7224	0.6329	5.7224	0.5878	5.7224	0.5268	5.7224	0.486
5.9948	1.1649	5.9948	0.7138	5.9948	0.6926	5.9948	0.6329	5.9948	0.5878	5.9948	0.5235	5.9948	0.4626
6.2803	1.1649	6.2803	0.7138	6.2803	0.6926	6.2803	0.6329	6.2803	0.5878	6.2803	0.5235	6.2803	0.4608
6.5793	1.1649	6.5793	0.7138	6.5793	0.6926	6.5793	0.6329	6.5793	0.5878	6.5793	0.5235	6.5793	0.4608
6.8926	1.1649	6.8926	0.6922	6.8926	0.6037	6.8926	0.5767	6.8926	0.5551	6.8926	0.5117	6.8926	0.4579
7.2208	0.9369	7.2208	0.6922	7.2208	0.6037	7.2208	0.5573	7.2208	0.5298	7.2208	0.4851	7.2208	0.4415
7.5646	0.9251	7.5646	0.6226	7.5646	0.5783	7.5646	0.5462	7.5646	0.5217	7.5646	0.4826	7.5646	0.4415
7.9248	0.8741	7.9248	0.6213	7.9248	0.5773	7.9248	0.5435	7.9248	0.5163	7.9248	0.4761	7.9248	0.4338
8.3022	0.8232	8.3022	0.5748	8.3022	0.5453	8.3022	0.5153	8.3022	0.4877	8.3022	0.449	8.3022	0.4181
8.6975	0.8232	8.6975	0.5748	8.6975	0.5453	8.6975	0.5153	8.6975	0.4877	8.6975	0.4421	8.6975	0.3975
9.1116	0.8232	9.1116	0.5748	9.1116	0.5453	9.1116	0.5153	9.1116	0.4877	9.1116	0.4421	9.1116	0.3917
9.5455	0.8232	9.5455	0.5748	9.5455	0.5453	9.5455	0.5153	9.5455	0.4877	9.5455	0.4421	9.5455	0.3917
10	0.8232	10	0.5748	10	0.5453	10	0.5153	10	0.4877	10	0.4421	10	0.3917
10.4762	0.8232	10.4762	0.5748	10.4762	0.5453	10.4762	0.5153	10.4762	0.4877	10.4762	0.4421	10.4762	0.3917
10.975	0.8069	10.975	0.5748	10.975	0.5453	10.975	0.5153	10.975	0.4877	10.975	0.4421	10.975	0.3917
11.4976	0.8069	11.4976	0.5748	11.4976	0.5453	11.4976	0.5153	11.4976	0.4877	11.4976	0.4421	11.4976	0.3917
12.045	0.8069	12.045	0.5748	12.045	0.5088	12.045	0.481	12.045	0.4623	12.045	0.4284	12.045	0.3857
12.6186	0.8069	12.6186	0.5137	12.6186	0.4887	12.6186	0.4663	12.6186	0.4469	12.6186	0.4171	12.6186	0.3809
13.2194	0.8069	13.2194	0.5136	13.2194	0.4887	13.2194	0.4663	13.2194	0.4469	13.2194	0.4149	13.2194	0.3775

PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~ Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
13.8489	0.8069	13.8489	0.4975	13.8489	0.44	13.8489	0.426	13.8489	0.4124	13.8489	0.3875	13.8489	0.3566
14.5083	0.8069	14.5083	0.4604	14.5083	0.4358	14.5083	0.4216	14.5083	0.408	14.5083	0.3834	14.5083	0.3525
15.1991	0.8069	15.1991	0.4604	15.1991	0.4273	15.1991	0.4075	15.1991	0.3925	15.1991	0.368	15.1991	0.3399
15.9228	0.8069	15.9228	0.4604	15.9228	0.4111	15.9228	0.379	15.9228	0.3633	15.9228	0.3417	15.9228	0.3258
16.681	0.8069	16.681	0.4604	16.681	0.4111	16.681	0.379	16.681	0.3633	16.681	0.3417	16.681	0.3258
17.4753	0.7678	17.4753	0.4222	17.4753	0.384	17.4753	0.3658	17.4753	0.3531	17.4753	0.338	17.4753	0.3258
18.3074	0.6991	18.3074	0.4145	18.3074	0.384	18.3074	0.3654	18.3074	0.3531	18.3074	0.338	18.3074	0.3258
19.1791	0.6991	19.1791	0.4145	19.1791	0.384	19.1791	0.3654	19.1791	0.3531	19.1791	0.338	19.1791	0.3258
20.0923	0.6809	20.0923	0.4145	20.0923	0.384	20.0923	0.3654	20.0923	0.3531	20.0923	0.338	20.0923	0.3258
21.049	0.6809	21.049	0.4145	21.049	0.384	21.049	0.3654	21.049	0.3531	21.049	0.338	21.049	0.3258
22.0513	0.6809	22.0513	0.4076	22.0513	0.3711	22.0513	0.3497	22.0513	0.3377	22.0513	0.3309	22.0513	0.3223
23.1013	0.6809	23.1013	0.4076	23.1013	0.3711	23.1013	0.3497	23.1013	0.3352	23.1013	0.3223	23.1013	0.3135
24.2013	0.6714	24.2013	0.3876	24.2013	0.3546	24.2013	0.3339	24.2013	0.3248	24.2013	0.3182	24.2013	0.3115
25.3536	0.6714	25.3536	0.3853	25.3536	0.3408	25.3536	0.3181	25.3536	0.3075	25.3536	0.3068	25.3536	0.3051
26.5609	0.6714	26.5609	0.3853	26.5609	0.3408	26.5609	0.3181	26.5609	0.3041	26.5609	0.2986	26.5609	0.2992
27.8256	0.4616	27.8256	0.3378	27.8256	0.3191	27.8256	0.3066	27.8256	0.2988	27.8256	0.296	27.8256	0.2956
29.1505	0.3753	29.1505	0.3037	29.1505	0.2996	29.1505	0.2979	29.1505	0.297	29.1505	0.296	29.1505	0.2951
30.5386	0.3753	30.5386	0.3037	30.5386	0.2996	30.5386	0.2979	30.5386	0.297	30.5386	0.296	30.5386	0.2951
31.9927	0.3196	31.9927	0.2994	31.9927	0.2977	31.9927	0.2968	31.9927	0.2961	31.9927	0.2952	31.9927	0.2943
33.516	0.2961	33.516	0.2957	33.516	0.2953	33.516	0.295	33.516	0.2948	33.516	0.2945	33.516	0.2942
35.1119	0.2952	35.1119	0.2948	35.1119	0.2947	35.1119	0.2946	35.1119	0.2944	35.1119	0.2942	35.1119	0.2939
36.7838	0.2943	36.7838	0.2943	36.7838	0.2942	36.7838	0.2941	36.7838	0.294	36.7838	0.2938	36.7838	0.2936
38.5353	0.2938	38.5353	0.2937	38.5353	0.2936	38.5353	0.2936	38.5353	0.2935	38.5353	0.2934	38.5353	0.2932
40.3702	0.2932	40.3702	0.2931	40.3702	0.2931	40.3702	0.293	40.3702	0.293	40.3702	0.2929	40.3702	0.2928
42.2924	0.2925	42.2924	0.2926	42.2924	0.2925	42.2924	0.2925	42.2924	0.2925	42.2924	0.2924	42.2924	0.2923
44.3062	0.2922	44.3062	0.2921	44.3062	0.2921	44.3062	0.2921	44.3062	0.292	44.3062	0.292	44.3062	0.2919
46.4159	0.2917	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916
48.626	0.2913	48.626	0.2912	48.626	0.2912	48.626	0.2912	48.626	0.2912	48.626	0.2912	48.626	0.2912
50.9414	0.2907	50.9414	0.2908	50.9414	0.2908	50.9414	0.2908	50.9414	0.2908	50.9414	0.2908	50.9414	0.2909

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~ Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0404	0.1098	0.0365	0.1098	0.0342	0.1098	0.0321	0.1098	0.0302	0.1098	0.0271	0.1098	0.0235
0.115	0.0404	0.115	0.0365	0.115	0.0342	0.115	0.0321	0.115	0.0302	0.115	0.0271	0.115	0.0253
0.1204	0.0404	0.1204	0.0365	0.1204	0.0342	0.1204	0.0321	0.1204	0.0306	0.1204	0.0293	0.1204	0.0274
0.1262	0.0404	0.1262	0.0365	0.1262	0.0349	0.1262	0.034	0.1262	0.033	0.1262	0.0313	0.1262	0.0295
0.1322	0.0404	0.1322	0.038	0.1322	0.0368	0.1322	0.0357	0.1322	0.0346	0.1322	0.0331	0.1322	0.0316
0.1385	0.041	0.1385	0.039	0.1385	0.0379	0.1385	0.037	0.1385	0.0362	0.1385	0.0347	0.1385	0.0329
0.1451	0.0415	0.1451	0.0397	0.1451	0.0386	0.1451	0.0377	0.1451	0.0368	0.1451	0.0353	0.1451	0.0333
0.152	0.0438	0.152	0.04	0.152	0.0386	0.152	0.0377	0.152	0.0368	0.152	0.0353	0.152	0.0333
0.1592	0.0461	0.1592	0.0415	0.1592	0.0394	0.1592	0.0377	0.1592	0.0368	0.1592	0.0353	0.1592	0.0333
0.1668	0.0583	0.1668	0.0505	0.1668	0.0462	0.1668	0.0425	0.1668	0.0394	0.1668	0.0353	0.1668	0.0333
0.1748	0.0643	0.1748	0.0565	0.1748	0.0521	0.1748	0.0482	0.1748	0.0448	0.1748	0.0392	0.1748	0.0333
0.1831	0.0666	0.1831	0.0583	0.1831	0.0541	0.1831	0.0504	0.1831	0.047	0.1831	0.0413	0.1831	0.0351
0.1918	0.0676	0.1918	0.0584	0.1918	0.0541	0.1918	0.0505	0.1918	0.0472	0.1918	0.0415	0.1918	0.0376
0.2009	0.0696	0.2009	0.0595	0.2009	0.0541	0.2009	0.0509	0.2009	0.0481	0.2009	0.0431	0.2009	0.0405
0.2105	0.0719	0.2105	0.0616	0.2105	0.0578	0.2105	0.0543	0.2105	0.051	0.2105	0.0476	0.2105	0.0438
0.2205	0.0815	0.2205	0.0705	0.2205	0.0647	0.2205	0.0596	0.2205	0.0568	0.2205	0.0528	0.2205	0.048
0.231	0.0954	0.231	0.079	0.231	0.0704	0.231	0.0667	0.231	0.0634	0.231	0.0577	0.231	0.0509
0.242	0.0977	0.242	0.0841	0.242	0.0771	0.242	0.071	0.242	0.0669	0.242	0.06	0.242	0.0531
0.2535	0.1051	0.2535	0.0906	0.2535	0.0825	0.2535	0.0755	0.2535	0.0694	0.2535	0.06	0.2535	0.0531
0.2656	0.1135	0.2656	0.0943	0.2656	0.084	0.2656	0.0755	0.2656	0.0694	0.2656	0.06	0.2656	0.0531
0.2783	0.1135	0.2783	0.0943	0.2783	0.084	0.2783	0.0776	0.2783	0.0736	0.2783	0.0666	0.2783	0.0591
0.2915	0.1135	0.2915	0.0994	0.2915	0.093	0.2915	0.0874	0.2915	0.0826	0.2915	0.0745	0.2915	0.0653
0.3054	0.1163	0.3054	0.104	0.3054	0.0971	0.3054	0.0909	0.3054	0.0855	0.3054	0.0768	0.3054	0.0674
0.3199	0.1163	0.3199	0.104	0.3199	0.0971	0.3199	0.0909	0.3199	0.0864	0.3199	0.0812	0.3199	0.075
0.3352	0.1163	0.3352	0.1068	0.3352	0.1025	0.3352	0.0986	0.3352	0.095	0.3352	0.0888	0.3352	0.0821
0.3511	0.1636	0.3511	0.1274	0.3511	0.1102	0.3511	0.105	0.3511	0.101	0.3511	0.0944	0.3511	0.0865
0.3678	0.2398	0.3678	0.1821	0.3678	0.1557	0.3678	0.1356	0.3678	0.1202	0.3678	0.0985	0.3678	0.0872
0.3853	0.2521	0.3853	0.185	0.3853	0.1576	0.3853	0.137	0.3853	0.1232	0.3853	0.1054	0.3853	0.0884
0.4037	0.2521	0.4037	0.185	0.4037	0.1576	0.4037	0.137	0.4037	0.1254	0.4037	0.1131	0.4037	0.1
0.4229	0.2521	0.4229	0.185	0.4229	0.1633	0.4229	0.1471	0.4229	0.1332	0.4229	0.1202	0.4229	0.1087
0.4431	0.3253	0.4431	0.2305	0.4431	0.1995	0.4431	0.1774	0.4431	0.1605	0.4431	0.137	0.4431	0.1162
0.4642	0.3253	0.4642	0.2305	0.4642	0.1995	0.4642	0.1774	0.4642	0.1605	0.4642	0.137	0.4642	0.1162
0.4863	0.3253	0.4863	0.2305	0.4863	0.1995	0.4863	0.1774	0.4863	0.1605	0.4863	0.1405	0.4863	0.1237
0.5094	0.3253	0.5094	0.2305	0.5094	0.1995	0.5094	0.1774	0.5094	0.1605	0.5094	0.1467	0.5094	0.1284

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~ Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping Freq.	0.50% Accel.	Freq.	2% Accel.	Freq.	3% Accel.	Freq.	4% Accel.	Freq.	5% Accel.	Freq.	7% Accel.	Freq.	10% Accel.
0.5337	0.3317	0.5337	0.235	0.5337	0.2031	0.5337	0.1861	0.5337	0.1756	0.5337	0.1573	0.5337	0.1368
0.5591	0.3864	0.5591	0.2681	0.5591	0.2359	0.5591	0.2104	0.5591	0.1932	0.5591	0.1694	0.5591	0.1505
0.5857	0.3864	0.5857	0.2751	0.5857	0.2466	0.5857	0.223	0.5857	0.2031	0.5857	0.1791	0.5857	0.1667
0.6136	0.3864	0.6136	0.2751	0.6136	0.2466	0.6136	0.223	0.6136	0.2035	0.6136	0.193	0.6136	0.1795
0.6428	0.3864	0.6428	0.2751	0.6428	0.2466	0.6428	0.2234	0.6428	0.2139	0.6428	0.2039	0.6428	0.1896
0.6734	0.3983	0.6734	0.2751	0.6734	0.251	0.6734	0.2354	0.6734	0.2284	0.6734	0.2154	0.6734	0.1984
0.7055	0.3983	0.7055	0.2895	0.7055	0.2641	0.7055	0.2526	0.7055	0.2425	0.7055	0.2254	0.7055	0.2065
0.7391	0.6097	0.7391	0.3987	0.7391	0.3252	0.7391	0.2766	0.7391	0.2581	0.7391	0.2297	0.7391	0.208
0.7743	0.6097	0.7743	0.3987	0.7743	0.3252	0.7743	0.287	0.7743	0.2697	0.7743	0.2412	0.7743	0.2094
0.8111	0.6287	0.8111	0.4148	0.8111	0.3607	0.8111	0.3191	0.8111	0.2867	0.8111	0.2412	0.8111	0.2094
0.8497	0.6287	0.8497	0.4148	0.8497	0.3768	0.8497	0.3473	0.8497	0.3221	0.8497	0.2809	0.8497	0.2363
0.8902	0.6527	0.8902	0.4263	0.8902	0.3768	0.8902	0.3473	0.8902	0.3236	0.8902	0.2939	0.8902	0.2537
0.9326	0.6829	0.9326	0.4768	0.9326	0.4187	0.9326	0.376	0.9326	0.344	0.9326	0.299	0.9326	0.2562
0.977	0.9086	0.977	0.5785	0.977	0.4758	0.977	0.4112	0.977	0.3674	0.977	0.3135	0.977	0.2721
1.0235	0.9086	1.0235	0.5785	1.0235	0.517	1.0235	0.4689	1.0235	0.429	1.0235	0.368	1.0235	0.3069
1.0723	0.9086	1.0723	0.5886	1.0723	0.5252	1.0723	0.4728	1.0723	0.4295	1.0723	0.3754	1.0723	0.318
1.1233	1.2562	1.1233	0.759	1.1233	0.6339	1.1233	0.5449	1.1233	0.4784	1.1233	0.3889	1.1233	0.318
1.1768	1.2562	1.1768	0.759	1.1768	0.6339	1.1768	0.5449	1.1768	0.4784	1.1768	0.4006	1.1768	0.3289
1.2328	1.2562	1.2328	0.8302	1.2328	0.7291	1.2328	0.6491	1.2328	0.5837	1.2328	0.4845	1.2328	0.3864
1.2916	1.2562	1.2916	0.9189	1.2916	0.7993	1.2916	0.7058	1.2916	0.6308	1.2916	0.5188	1.2916	0.4097
1.353	1.2562	1.353	0.9189	1.353	0.7993	1.353	0.7058	1.353	0.6308	1.353	0.5188	1.353	0.4097
1.4175	1.3538	1.4175	0.9674	1.4175	0.8219	1.4175	0.7323	1.4175	0.6639	1.4175	0.5631	1.4175	0.4667
1.485	1.3538	1.485	0.9674	1.485	0.8219	1.485	0.7371	1.485	0.6874	1.485	0.5977	1.485	0.4967
1.5557	1.5417	1.5557	0.9739	1.5557	0.8219	1.5557	0.7371	1.5557	0.6874	1.5557	0.5977	1.5557	0.5028
1.6298	1.6087	1.6298	1.0257	1.6298	0.9121	1.6298	0.8203	1.6298	0.7505	1.6298	0.6443	1.6298	0.5288
1.7074	1.6087	1.7074	1.0361	1.7074	0.9722	1.7074	0.8761	1.7074	0.795	1.7074	0.6704	1.7074	0.5676
1.7887	1.8947	1.7887	1.0361	1.7887	0.9722	1.7887	0.8761	1.7887	0.795	1.7887	0.6869	1.7887	0.5915
1.8738	1.8947	1.8738	1.0361	1.8738	0.9722	1.8738	0.8761	1.8738	0.795	1.8738	0.7041	1.8738	0.6047
1.963	1.8947	1.963	1.0361	1.963	0.9722	1.963	0.8761	1.963	0.7962	1.963	0.7116	1.963	0.6087
2.0565	1.8947	2.0565	1.0361	2.0565	0.9722	2.0565	0.8761	2.0565	0.7962	2.0565	0.7116	2.0565	0.6087
2.1544	1.8947	2.1544	1.0361	2.1544	0.9581	2.1544	0.8481	2.1544	0.7962	2.1544	0.7116	2.1544	0.6087
2.257	1.6082	2.257	1.0361	2.257	0.9149	2.257	0.8481	2.257	0.7962	2.257	0.7116	2.257	0.6087
2.3645	1.6082	2.3645	0.9942	2.3645	0.9149	2.3645	0.8481	2.3645	0.7962	2.3645	0.7116	2.3645	0.6087
2.4771	1.6082	2.4771	0.9942	2.4771	0.9149	2.4771	0.8481	2.4771	0.7904	2.4771	0.7069	2.4771	0.6029
2.595	1.6082	2.595	0.9942	2.595	0.9149	2.595	0.8481	2.595	0.7904	2.595	0.6952	2.595	0.5873

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~ Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
2.7186	1.6082	2.7186	0.9202	2.7186	0.8531	2.7186	0.7931	2.7186	0.7395	2.7186	0.6495	2.7186	0.562
2.848	1.6082	2.848	0.9202	2.848	0.845	2.848	0.7403	2.848	0.6948	2.848	0.6221	2.848	0.5376
2.9836	1.6082	2.9836	0.9202	2.9836	0.845	2.9836	0.7403	2.9836	0.6947	2.9836	0.6133	2.9836	0.5177
3.1257	1.6082	3.1257	0.9202	3.1257	0.845	3.1257	0.7403	3.1257	0.6947	3.1257	0.6133	3.1257	0.5177
3.2745	1.6082	3.2745	0.9202	3.2745	0.845	3.2745	0.7403	3.2745	0.6947	3.2745	0.6133	3.2745	0.5177
3.4305	1.6082	3.4305	0.9202	3.4305	0.845	3.4305	0.7403	3.4305	0.6947	3.4305	0.6133	3.4305	0.5177
3.5938	1.6349	3.5938	0.9202	3.5938	0.845	3.5938	0.7403	3.5938	0.6947	3.5938	0.6133	3.5938	0.5177
3.7649	1.6349	3.7649	0.9202	3.7649	0.845	3.7649	0.7403	3.7649	0.6947	3.7649	0.6133	3.7649	0.5177
3.9442	1.6349	3.9442	0.9202	3.9442	0.845	3.9442	0.7403	3.9442	0.6947	3.9442	0.6133	3.9442	0.5177
4.132	1.6349	4.132	0.9202	4.132	0.845	4.132	0.7403	4.132	0.6947	4.132	0.6133	4.132	0.5177
4.3288	1.6926	4.3288	0.9596	4.3288	0.845	4.3288	0.7403	4.3288	0.6947	4.3288	0.6133	4.3288	0.5177
4.5349	1.6926	4.5349	1.0457	4.5349	0.9018	4.5349	0.7756	4.5349	0.6947	4.5349	0.6133	4.5349	0.5177
4.7508	1.6926	4.7508	1.0457	4.7508	0.9018	4.7508	0.7899	4.7508	0.7174	4.7508	0.6133	4.7508	0.5177
4.977	1.6926	4.977	1.0457	4.977	0.9018	4.977	0.7899	4.977	0.7174	4.977	0.6133	4.977	0.5177
5.214	1.6926	5.214	1.0457	5.214	0.9018	5.214	0.7899	5.214	0.7174	5.214	0.6133	5.214	0.5177
5.4623	1.603	5.4623	1.0457	5.4623	0.9018	5.4623	0.7899	5.4623	0.7174	5.4623	0.6133	5.4623	0.5177
5.7224	1.603	5.7224	1.0457	5.7224	0.9018	5.7224	0.7899	5.7224	0.7174	5.7224	0.6133	5.7224	0.5177
5.9948	1.603	5.9948	1.0457	5.9948	0.9018	5.9948	0.7899	5.9948	0.7174	5.9948	0.6133	5.9948	0.5177
6.2803	1.603	6.2803	1.0457	6.2803	0.9018	6.2803	0.7899	6.2803	0.7174	6.2803	0.6133	6.2803	0.5177
6.5793	1.603	6.5793	0.9892	6.5793	0.8782	6.5793	0.7899	6.5793	0.7174	6.5793	0.6083	6.5793	0.5013
6.8926	1.603	6.8926	0.9433	6.8926	0.7981	6.8926	0.72	6.8926	0.6594	6.8926	0.5693	6.8926	0.4789
7.2208	1.2885	7.2208	0.7992	7.2208	0.6983	7.2208	0.6182	7.2208	0.5792	7.2208	0.511	7.2208	0.4506
7.5646	1.2885	7.5646	0.7357	7.5646	0.6298	7.5646	0.5704	7.5646	0.5329	7.5646	0.4765	7.5646	0.4309
7.9248	1.2885	7.9248	0.6692	7.9248	0.5894	7.9248	0.5439	7.9248	0.5121	7.9248	0.466	7.9248	0.4241
8.3022	1.2885	8.3022	0.6243	8.3022	0.5267	8.3022	0.4982	8.3022	0.4778	8.3022	0.4544	8.3022	0.4241
8.6975	1.0592	8.6975	0.5768	8.6975	0.5267	8.6975	0.4982	8.6975	0.4767	8.6975	0.446	8.6975	0.4145
9.1116	1.0592	9.1116	0.5768	9.1116	0.4939	9.1116	0.4536	9.1116	0.442	9.1116	0.4229	9.1116	0.4013
9.5455	1.0592	9.5455	0.5768	9.5455	0.4939	9.5455	0.4536	9.5455	0.442	9.5455	0.4229	9.5455	0.4013
10	0.8146	10	0.531	10	0.4775	10	0.4536	10	0.442	10	0.4229	10	0.4013
10.4762	0.8146	10.4762	0.531	10.4762	0.4725	10.4762	0.4318	10.4762	0.4256	10.4762	0.4126	10.4762	0.3942
10.975	0.7982	10.975	0.531	10.975	0.4725	10.975	0.4261	10.975	0.412	10.975	0.3988	10.975	0.3816
11.4976	0.7266	11.4976	0.531	11.4976	0.4725	11.4976	0.4244	11.4976	0.4001	11.4976	0.3859	11.4976	0.3714
12.045	0.6949	12.045	0.4302	12.045	0.3979	12.045	0.3828	12.045	0.3795	12.045	0.3743	12.045	0.3648
12.6186	0.6949	12.6186	0.4263	12.6186	0.3839	12.6186	0.3789	12.6186	0.3746	12.6186	0.367	12.6186	0.3574
13.2194	0.6949	13.2194	0.4263	13.2194	0.3691	13.2194	0.3654	13.2194	0.3624	13.2194	0.3568	13.2194	0.3489

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Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
13.8489	0.6949	13.8489	0.4263	13.8489	0.3684	13.8489	0.3531	13.8489	0.3514	13.8489	0.3468	13.8489	0.3398
14.5083	0.6949	14.5083	0.4263	14.5083	0.3684	14.5083	0.3479	14.5083	0.3436	14.5083	0.3374	14.5083	0.3305
15.1991	0.6949	15.1991	0.4263	15.1991	0.3684	15.1991	0.3303	15.1991	0.3274	15.1991	0.3248	15.1991	0.3203
15.9228	0.6949	15.9228	0.4263	15.9228	0.3684	15.9228	0.3303	15.9228	0.3191	15.9228	0.3152	15.9228	0.3107
16.681	0.6949	16.681	0.4263	16.681	0.3684	16.681	0.3303	16.681	0.3102	16.681	0.304	16.681	0.301
17.4753	0.6949	17.4753	0.4263	17.4753	0.3684	17.4753	0.3303	17.4753	0.3102	17.4753	0.2998	17.4753	0.2959
18.3074	0.6949	18.3074	0.4263	18.3074	0.3684	18.3074	0.3303	18.3074	0.3102	18.3074	0.2949	18.3074	0.2912
19.1791	0.6949	19.1791	0.4263	19.1791	0.3684	19.1791	0.3303	19.1791	0.3102	19.1791	0.2867	19.1791	0.2854
20.0923	0.7176	20.0923	0.4263	20.0923	0.3684	20.0923	0.3303	20.0923	0.3102	20.0923	0.2866	20.0923	0.2811
21.049	0.7176	21.049	0.4263	21.049	0.3684	21.049	0.3303	21.049	0.3102	21.049	0.2866	21.049	0.2784
22.0513	0.7176	22.0513	0.4263	22.0513	0.3684	22.0513	0.3303	22.0513	0.3102	22.0513	0.2866	22.0513	0.2758
23.1013	0.7176	23.1013	0.3871	23.1013	0.3411	23.1013	0.3241	23.1013	0.3102	23.1013	0.2866	23.1013	0.2728
24.2013	0.7176	24.2013	0.3785	24.2013	0.3411	24.2013	0.3172	24.2013	0.2996	24.2013	0.2743	24.2013	0.2684
25.3536	0.5748	25.3536	0.3598	25.3536	0.3013	25.3536	0.2826	25.3536	0.2697	25.3536	0.264	25.3536	0.2647
26.5609	0.5748	26.5609	0.3598	26.5609	0.3007	26.5609	0.2819	26.5609	0.2697	26.5609	0.264	26.5609	0.2628
27.8256	0.5698	27.8256	0.3224	27.8256	0.2932	27.8256	0.2734	27.8256	0.2629	27.8256	0.2613	27.8256	0.2603
29.1505	0.4937	29.1505	0.3224	29.1505	0.2932	29.1505	0.2734	29.1505	0.2585	29.1505	0.2561	29.1505	0.2571
30.5386	0.4049	30.5386	0.3224	30.5386	0.2867	30.5386	0.2633	30.5386	0.2559	30.5386	0.2553	30.5386	0.2556
31.9927	0.2797	31.9927	0.2618	31.9927	0.2573	31.9927	0.2565	31.9927	0.2559	31.9927	0.2553	31.9927	0.2549
33.516	0.2539	33.516	0.2548	33.516	0.2549	33.516	0.2548	33.516	0.2546	33.516	0.2543	33.516	0.2539
35.1119	0.2533	35.1119	0.2532	35.1119	0.2531	35.1119	0.2531	35.1119	0.253	35.1119	0.2529	35.1119	0.2527
36.7838	0.252	36.7838	0.2519	36.7838	0.2518	36.7838	0.2518	36.7838	0.2518	36.7838	0.2517	36.7838	0.2516
38.5353	0.2507	38.5353	0.2507	38.5353	0.2506	38.5353	0.2506	38.5353	0.2506	38.5353	0.2506	38.5353	0.2505
40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2495
42.2924	0.2486	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487
44.3062	0.2478	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479
46.4159	0.2472	46.4159	0.2471	46.4159	0.2471	46.4159	0.2471	46.4159	0.2471	46.4159	0.2471	46.4159	0.2472
48.626	0.2464	48.626	0.2464	48.626	0.2464	48.626	0.2464	48.626	0.2464	48.626	0.2465	48.626	0.2465
50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458

PTEE024.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~
Figure 24E ~ Vertical Responses - Slab/Wall Joints ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0291	0.1098	0.026	0.1098	0.0244	0.1098	0.0229	0.1098	0.022	0.1098	0.0212	0.1098	0.0204
0.115	0.0308	0.115	0.026	0.115	0.0244	0.115	0.0233	0.115	0.0229	0.115	0.0221	0.115	0.0213
0.1204	0.0313	0.1204	0.0262	0.1204	0.0245	0.1204	0.024	0.1204	0.0236	0.1204	0.0229	0.1204	0.0218
0.1262	0.0313	0.1262	0.027	0.1262	0.0257	0.1262	0.0246	0.1262	0.0241	0.1262	0.0233	0.1262	0.0221
0.1322	0.0313	0.1322	0.0271	0.1322	0.0258	0.1322	0.0247	0.1322	0.0242	0.1322	0.0234	0.1322	0.0225
0.1385	0.0313	0.1385	0.0277	0.1385	0.0265	0.1385	0.0254	0.1385	0.0245	0.1385	0.0235	0.1385	0.0225
0.1451	0.0316	0.1451	0.0294	0.1451	0.0282	0.1451	0.027	0.1451	0.0259	0.1451	0.0239	0.1451	0.0225
0.152	0.032	0.152	0.0299	0.152	0.0286	0.152	0.0273	0.152	0.0262	0.152	0.0241	0.152	0.0225
0.1592	0.033	0.1592	0.031	0.1592	0.0299	0.1592	0.0288	0.1592	0.0277	0.1592	0.0261	0.1592	0.0241
0.1668	0.0367	0.1668	0.0323	0.1668	0.0312	0.1668	0.0302	0.1668	0.0292	0.1668	0.0276	0.1668	0.0256
0.1748	0.0507	0.1748	0.0427	0.1748	0.0385	0.1748	0.035	0.1748	0.0321	0.1748	0.0284	0.1748	0.0264
0.1831	0.0586	0.1831	0.0492	0.1831	0.0442	0.1831	0.0399	0.1831	0.0362	0.1831	0.0306	0.1831	0.0266
0.1918	0.0586	0.1918	0.0492	0.1918	0.0442	0.1918	0.0399	0.1918	0.0362	0.1918	0.0306	0.1918	0.0267
0.2009	0.0586	0.2009	0.0492	0.2009	0.0442	0.2009	0.0399	0.2009	0.0362	0.2009	0.0323	0.2009	0.0293
0.2105	0.0586	0.2105	0.0492	0.2105	0.0442	0.2105	0.0399	0.2105	0.0384	0.2105	0.0357	0.2105	0.0322
0.2205	0.0586	0.2205	0.0492	0.2205	0.0453	0.2205	0.0426	0.2205	0.0406	0.2205	0.0376	0.2205	0.0337
0.231	0.0586	0.231	0.0492	0.231	0.0458	0.231	0.0439	0.231	0.042	0.231	0.0387	0.231	0.0352
0.242	0.0586	0.242	0.0509	0.242	0.0485	0.242	0.0463	0.242	0.0444	0.242	0.041	0.242	0.0368
0.2535	0.0648	0.2535	0.0572	0.2535	0.0528	0.2535	0.0488	0.2535	0.0453	0.2535	0.041	0.2535	0.0371
0.2656	0.0731	0.2656	0.0586	0.2656	0.0534	0.2656	0.049	0.2656	0.0453	0.2656	0.0424	0.2656	0.0402
0.2783	0.0816	0.2783	0.0598	0.2783	0.0534	0.2783	0.05	0.2783	0.0485	0.2783	0.0459	0.2783	0.0426
0.2915	0.0816	0.2915	0.0619	0.2915	0.058	0.2915	0.0546	0.2915	0.0516	0.2915	0.048	0.2915	0.0437
0.3054	0.0816	0.3054	0.0662	0.3054	0.062	0.3054	0.0583	0.3054	0.0548	0.3054	0.0488	0.3054	0.0448
0.3199	0.0816	0.3199	0.0701	0.3199	0.0659	0.3199	0.0622	0.3199	0.0588	0.3199	0.0531	0.3199	0.0468
0.3352	0.0871	0.3352	0.0766	0.3352	0.0706	0.3352	0.0658	0.3352	0.0624	0.3352	0.0565	0.3352	0.0496
0.3511	0.0905	0.3511	0.0805	0.3511	0.0748	0.3511	0.0698	0.3511	0.0653	0.3511	0.0578	0.3511	0.0502
0.3678	0.1216	0.3678	0.0951	0.3678	0.0823	0.3678	0.0722	0.3678	0.0653	0.3678	0.0578	0.3678	0.0502
0.3853	0.136	0.3853	0.1056	0.3853	0.0918	0.3853	0.0807	0.3853	0.0718	0.3853	0.0587	0.3853	0.0502
0.4037	0.136	0.4037	0.1056	0.4037	0.0918	0.4037	0.082	0.4037	0.076	0.4037	0.0663	0.4037	0.0569
0.4229	0.136	0.4229	0.1056	0.4229	0.0918	0.4229	0.0848	0.4229	0.0796	0.4229	0.0707	0.4229	0.0609
0.4431	0.136	0.4431	0.1056	0.4431	0.0932	0.4431	0.0884	0.4431	0.0838	0.4431	0.0755	0.4431	0.0652
0.4642	0.1375	0.4642	0.1059	0.4642	0.0974	0.4642	0.0915	0.4642	0.086	0.4642	0.0764	0.4642	0.0667
0.4863	0.1479	0.4863	0.1238	0.4863	0.1107	0.4863	0.0995	0.4863	0.0901	0.4863	0.082	0.4863	0.0725
0.5094	0.181	0.5094	0.138	0.5094	0.1214	0.5094	0.108	0.5094	0.0971	0.5094	0.0861	0.5094	0.0744

PTEE024.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~
Figure 24E ~ Vertical Responses - Slab/Wall Joints ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.2215	0.5337	0.1602	0.5337	0.134	0.5337	0.1151	0.5337	0.1024	0.5337	0.0861	0.5337	0.0744
0.5591	0.2215	0.5591	0.1602	0.5591	0.134	0.5591	0.1151	0.5591	0.1024	0.5591	0.0884	0.5591	0.0754
0.5857	0.2215	0.5857	0.1602	0.5857	0.134	0.5857	0.1151	0.5857	0.1024	0.5857	0.094	0.5857	0.0825
0.6136	0.2215	0.6136	0.1602	0.6136	0.134	0.6136	0.1175	0.6136	0.1108	0.6136	0.1001	0.6136	0.0874
0.6428	0.2268	0.6428	0.163	0.6428	0.1365	0.6428	0.1175	0.6428	0.1126	0.6428	0.1027	0.6428	0.0894
0.6734	0.2268	0.6734	0.163	0.6734	0.1377	0.6734	0.128	0.6734	0.12	0.6734	0.1074	0.6734	0.0928
0.7055	0.2268	0.7055	0.163	0.7055	0.1377	0.7055	0.128	0.7055	0.12	0.7055	0.1086	0.7055	0.0945
0.7391	0.2268	0.7391	0.163	0.7391	0.1413	0.7391	0.1333	0.7391	0.1253	0.7391	0.1108	0.7391	0.0945
0.7743	0.3163	0.7743	0.2131	0.7743	0.1804	0.7743	0.1581	0.7743	0.1421	0.7743	0.1213	0.7743	0.1037
0.8111	0.3163	0.8111	0.2131	0.8111	0.1804	0.8111	0.1581	0.8111	0.1421	0.8111	0.1213	0.8111	0.1064
0.8497	0.3163	0.8497	0.2131	0.8497	0.1804	0.8497	0.1652	0.8497	0.1528	0.8497	0.133	0.8497	0.112
0.8902	0.3163	0.8902	0.2131	0.8902	0.1856	0.8902	0.17	0.8902	0.1571	0.8902	0.1368	0.8902	0.1165
0.9326	0.484	0.9326	0.298	0.9326	0.2451	0.9326	0.2142	0.9326	0.192	0.9326	0.1628	0.9326	0.1368
0.977	0.484	0.977	0.298	0.977	0.2451	0.977	0.2142	0.977	0.192	0.977	0.171	0.977	0.15
1.0235	0.484	1.0235	0.298	1.0235	0.2451	1.0235	0.2142	1.0235	0.1926	1.0235	0.1805	1.0235	0.1621
1.0723	0.484	1.0723	0.298	1.0723	0.2615	1.0723	0.2409	1.0723	0.2242	1.0723	0.1989	1.0723	0.1731
1.1233	0.5753	1.1233	0.3411	1.1233	0.2701	1.1233	0.2409	1.1233	0.2242	1.1233	0.1989	1.1233	0.1746
1.1768	0.5753	1.1768	0.3734	1.1768	0.3107	1.1768	0.2749	1.1768	0.2469	1.1768	0.213	1.1768	0.1874
1.2328	0.5753	1.2328	0.3807	1.2328	0.3438	1.2328	0.3132	1.2328	0.2882	1.2328	0.2506	1.2328	0.2132
1.2916	0.5753	1.2916	0.4139	1.2916	0.3646	1.2916	0.3262	1.2916	0.2999	1.2916	0.2601	1.2916	0.2214
1.353	0.6629	1.353	0.4139	1.353	0.3646	1.353	0.3329	1.353	0.3146	1.353	0.2846	1.353	0.2493
1.4175	0.6629	1.4175	0.429	1.4175	0.3788	1.4175	0.3575	1.4175	0.3384	1.4175	0.3064	1.4175	0.271
1.485	0.6629	1.485	0.457	1.485	0.4099	1.485	0.3825	1.485	0.3581	1.485	0.32	1.485	0.2847
1.5557	0.6629	1.5557	0.4867	1.5557	0.4466	1.5557	0.4193	1.5557	0.3959	1.5557	0.3551	1.5557	0.3075
1.6298	0.8057	1.6298	0.5109	1.6298	0.4763	1.6298	0.4473	1.6298	0.4224	1.6298	0.3819	1.6298	0.335
1.7074	0.8379	1.7074	0.6416	1.7074	0.5704	1.7074	0.5139	1.7074	0.4676	1.7074	0.4014	1.7074	0.3559
1.7887	1.0345	1.7887	0.7676	1.7887	0.6799	1.7887	0.6122	1.7887	0.5562	1.7887	0.4772	1.7887	0.4004
1.8738	1.0345	1.8738	0.8046	1.8738	0.7255	1.8738	0.6502	1.8738	0.5996	1.8738	0.5318	1.8738	0.4441
1.963	1.2645	1.963	0.838	1.963	0.7316	1.963	0.6502	1.963	0.5996	1.963	0.5683	1.963	0.4717
2.0565	1.3932	2.0565	0.838	2.0565	0.7316	2.0565	0.6698	2.0565	0.6339	2.0565	0.584	2.0565	0.4802
2.1544	1.3932	2.1544	0.838	2.1544	0.7316	2.1544	0.6698	2.1544	0.6389	2.1544	0.584	2.1544	0.4802
2.257	1.3932	2.257	0.838	2.257	0.7519	2.257	0.6898	2.257	0.6389	2.257	0.584	2.257	0.4802
2.3645	1.7479	2.3645	0.9979	2.3645	0.8154	2.3645	0.7361	2.3645	0.6766	2.3645	0.584	2.3645	0.4889
2.4771	2.068	2.4771	1.1705	2.4771	0.9105	2.4771	0.7993	2.4771	0.7332	2.4771	0.6216	2.4771	0.5073
2.595	2.142	2.595	1.1705	2.595	0.9105	2.595	0.871	2.595	0.7663	2.595	0.6393	2.595	0.5251

PTEE024.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~ Figure 24E ~ Vertical Responses - Slab/Wall Joints ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
2.7186	2.142	2.7186	1.1705	2.7186	0.9105	2.7186	0.871	2.7186	0.7663	2.7186	0.6554	2.7186	0.5385
2.848	2.142	2.848	1.1705	2.848	0.9105	2.848	0.871	2.848	0.7663	2.848	0.6554	2.848	0.5385
2.9836	2.142	2.9836	1.1705	2.9836	0.9105	2.9836	0.871	2.9836	0.7663	2.9836	0.6554	2.9836	0.5385
3.1257	2.142	3.1257	1.1705	3.1257	0.9105	3.1257	0.871	3.1257	0.7663	3.1257	0.6554	3.1257	0.5385
3.2745	1.9687	3.2745	1.1168	3.2745	0.9105	3.2745	0.831	3.2745	0.7634	3.2745	0.6554	3.2745	0.5385
3.4305	1.4171	3.4305	0.9374	3.4305	0.8241	3.4305	0.7591	3.4305	0.7116	3.4305	0.628	3.4305	0.5317
3.5938	1.4171	3.5938	0.9374	3.5938	0.8241	3.5938	0.7511	3.5938	0.6929	3.5938	0.6087	3.5938	0.5317
3.7649	1.4171	3.7649	0.9374	3.7649	0.8241	3.7649	0.7511	3.7649	0.6929	3.7649	0.6075	3.7649	0.5317
3.9442	1.4171	3.9442	0.9374	3.9442	0.8199	3.9442	0.7511	3.9442	0.6929	3.9442	0.605	3.9442	0.5317
4.132	1.4171	4.132	0.9374	4.132	0.8199	4.132	0.7511	4.132	0.6929	4.132	0.605	4.132	0.5317
4.3288	1.4171	4.3288	0.9374	4.3288	0.8199	4.3288	0.7511	4.3288	0.6929	4.3288	0.605	4.3288	0.5317
4.5349	1.4171	4.5349	0.9374	4.5349	0.8199	4.5349	0.7511	4.5349	0.6929	4.5349	0.605	4.5349	0.5317
4.7508	1.4171	4.7508	0.9374	4.7508	0.8199	4.7508	0.7511	4.7508	0.6929	4.7508	0.605	4.7508	0.5317
4.977	1.4171	4.977	0.9374	4.977	0.8199	4.977	0.7511	4.977	0.6929	4.977	0.605	4.977	0.5317
5.214	1.4171	5.214	0.9374	5.214	0.8199	5.214	0.7511	5.214	0.6929	5.214	0.605	5.214	0.5317
5.4623	1.5403	5.4623	0.9374	5.4623	0.8199	5.4623	0.7511	5.4623	0.6929	5.4623	0.605	5.4623	0.5317
5.7224	1.7489	5.7224	0.9374	5.7224	0.8199	5.7224	0.7937	5.7224	0.7092	5.7224	0.6012	5.7224	0.5234
5.9948	1.7489	5.9948	0.9374	5.9948	0.8199	5.9948	0.7937	5.9948	0.7092	5.9948	0.6012	5.9948	0.5079
6.2803	1.7489	6.2803	0.9374	6.2803	0.8199	6.2803	0.7937	6.2803	0.7092	6.2803	0.6012	6.2803	0.5079
6.5793	1.7489	6.5793	0.9374	6.5793	0.8199	6.5793	0.7937	6.5793	0.7092	6.5793	0.6012	6.5793	0.5079
6.8926	1.7489	6.8926	0.9374	6.8926	0.8199	6.8926	0.7937	6.8926	0.7092	6.8926	0.6012	6.8926	0.5079
7.2208	1.6603	7.2208	0.9374	7.2208	0.8199	7.2208	0.7553	7.2208	0.6892	7.2208	0.5885	7.2208	0.5079
7.5646	1.5723	7.5646	0.9134	7.5646	0.7926	7.5646	0.7147	7.5646	0.6591	7.5646	0.5747	7.5646	0.4988
7.9248	1.5723	7.9248	0.9134	7.9248	0.7814	7.9248	0.6958	7.9248	0.6399	7.9248	0.564	7.9248	0.4979
8.3022	1.5723	8.3022	0.9134	8.3022	0.7814	8.3022	0.6958	8.3022	0.6399	8.3022	0.564	8.3022	0.4979
8.6975	1.2382	8.6975	0.7934	8.6975	0.6919	8.6975	0.6496	8.6975	0.6135	8.6975	0.5519	8.6975	0.4907
9.1116	1.2382	9.1116	0.7934	9.1116	0.6874	9.1116	0.6253	9.1116	0.5914	9.1116	0.5425	9.1116	0.4886
9.5455	1.2382	9.5455	0.7934	9.5455	0.6874	9.5455	0.6253	9.5455	0.5832	9.5455	0.5235	9.5455	0.4755
10	1.2382	10	0.7934	10	0.6874	10	0.6253	10	0.5832	10	0.5229	10	0.4655
10.4762	1.2382	10.4762	0.7934	10.4762	0.6874	10.4762	0.6253	10.4762	0.5832	10.4762	0.5229	10.4762	0.4646
10.975	1.1339	10.975	0.7934	10.975	0.6874	10.975	0.6253	10.975	0.5832	10.975	0.5219	10.975	0.4646
11.4976	1.0079	11.4976	0.6912	11.4976	0.6174	11.4976	0.5657	11.4976	0.5336	11.4976	0.4943	11.4976	0.4547
12.045	1.0079	12.045	0.6323	12.045	0.5726	12.045	0.5241	12.045	0.4881	12.045	0.4608	12.045	0.4296
12.6186	1.0079	12.6186	0.6123	12.6186	0.5153	12.6186	0.4854	12.6186	0.4686	12.6186	0.44	12.6186	0.4071
13.2194	1.0079	13.2194	0.6123	13.2194	0.5102	13.2194	0.4731	13.2194	0.452	13.2194	0.4197	13.2194	0.3883

PTEE024.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~ Figure 24E ~ Vertical Responses - Slab/Wall Joints ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping Freq.	0.50% Accel.	Freq.	2% Accel.	Freq.	3% Accel.	Freq.	4% Accel.	Freq.	5% Accel.	Freq.	7% Accel.	Freq.	10% Accel.
13.8489	1.0079	13.8489	0.6123	13.8489	0.5102	13.8489	0.4615	13.8489	0.4386	13.8489	0.4022	13.8489	0.3633
14.5083	1.0079	14.5083	0.6123	14.5083	0.5102	14.5083	0.4547	14.5083	0.4329	14.5083	0.3988	14.5083	0.3633
15.1991	1.0079	15.1991	0.6123	15.1991	0.5102	15.1991	0.4217	15.1991	0.4105	15.1991	0.3706	15.1991	0.3433
15.9228	1.0079	15.9228	0.6123	15.9228	0.5102	15.9228	0.4217	15.9228	0.4105	15.9228	0.3706	15.9228	0.3385
16.681	1.0079	16.681	0.6123	16.681	0.5102	16.681	0.4217	16.681	0.4105	16.681	0.3706	16.681	0.3385
17.4753	1.0079	17.4753	0.6123	17.4753	0.5102	17.4753	0.4217	17.4753	0.4105	17.4753	0.3703	17.4753	0.3348
18.3074	1.0079	18.3074	0.6123	18.3074	0.5102	18.3074	0.4136	18.3074	0.4017	18.3074	0.3481	18.3074	0.3209
19.1791	1.0079	19.1791	0.6123	19.1791	0.5102	19.1791	0.4136	19.1791	0.4017	19.1791	0.3481	19.1791	0.3122
20.0923	0.6551	20.0923	0.4391	20.0923	0.419	20.0923	0.3759	20.0923	0.3461	20.0923	0.319	20.0923	0.2989
21.049	0.6551	21.049	0.4391	21.049	0.419	21.049	0.3759	21.049	0.3461	21.049	0.3119	21.049	0.2909
22.0513	0.6551	22.0513	0.4391	22.0513	0.419	22.0513	0.3759	22.0513	0.3461	22.0513	0.3119	22.0513	0.2881
23.1013	0.4513	23.1013	0.3434	23.1013	0.3322	23.1013	0.3192	23.1013	0.3064	23.1013	0.2882	23.1013	0.278
24.2013	0.4513	24.2013	0.3354	24.2013	0.3097	24.2013	0.2945	24.2013	0.286	24.2013	0.2772	24.2013	0.2733
25.3536	0.4513	25.3536	0.2912	25.3536	0.2849	25.3536	0.2812	25.3536	0.2777	25.3536	0.2725	25.3536	0.269
26.5609	0.4513	26.5609	0.2865	26.5609	0.2793	26.5609	0.2755	26.5609	0.2728	26.5609	0.269	26.5609	0.265
27.8256	0.4513	27.8256	0.2865	27.8256	0.2752	27.8256	0.2694	27.8256	0.2651	27.8256	0.2626	27.8256	0.2598
29.1505	0.4513	29.1505	0.2865	29.1505	0.2672	29.1505	0.2622	29.1505	0.2586	29.1505	0.2556	29.1505	0.2542
30.5386	0.4513	30.5386	0.2865	30.5386	0.2637	30.5386	0.2581	30.5386	0.2572	30.5386	0.2554	30.5386	0.2534
31.9927	0.2716	31.9927	0.2566	31.9927	0.2561	31.9927	0.2556	31.9927	0.2551	31.9927	0.2541	31.9927	0.2527
33.516	0.2543	33.516	0.2538	33.516	0.2536	33.516	0.2533	33.516	0.253	33.516	0.2524	33.516	0.2515
35.1119	0.2519	35.1119	0.2517	35.1119	0.2515	35.1119	0.2514	35.1119	0.2512	35.1119	0.2508	35.1119	0.2502
36.7838	0.2501	36.7838	0.25	36.7838	0.2499	36.7838	0.2498	36.7838	0.2496	36.7838	0.2494	36.7838	0.249
38.5353	0.2486	38.5353	0.2485	38.5353	0.2485	38.5353	0.2484	38.5353	0.2483	38.5353	0.2481	38.5353	0.2479
40.3702	0.2474	40.3702	0.2473	40.3702	0.2473	40.3702	0.2472	40.3702	0.2472	40.3702	0.247	40.3702	0.2468
42.2924	0.2463	42.2924	0.2463	42.2924	0.2462	42.2924	0.2462	42.2924	0.2461	42.2924	0.2461	42.2924	0.2459
44.3062	0.2454	44.3062	0.2453	44.3062	0.2453	44.3062	0.2453	44.3062	0.2453	44.3062	0.2452	44.3062	0.2451
46.4159	0.2446	46.4159	0.2445	46.4159	0.2445	46.4159	0.2445	46.4159	0.2445	46.4159	0.2444	46.4159	0.2444
48.626	0.2438	48.626	0.2438	48.626	0.2438	48.626	0.2438	48.626	0.2438	48.626	0.2437	48.626	0.2437
50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431