Table E-1: Critical Discharge Concentrations (C_d) for POC for Outfall 001/006

Parameter	Units	RRV	Maximum Observed Outfall 001 MPDES 2014 Form 2C	Jan 2010 - June 2014 DMR	City Aug 2014-Aug 2015 Pretreatm	Max Conc (1)	TSD #	CV	Multiplier	C_d
TBELs										
Ammonia	mg/L	0.07	16	22	46.9	**47**	*183*	*1.7*	***0.56***	**26**
Oil & Grease	mg/L		0	14	3	**14**	*75*	*0.6*	***0.9***	**13**
Sulfide (2)	mg/L		0.1	0.2	0.1	**0.2**	*75*	*0.6*	***0.93***	**0.19**
Chromium, TR (3)	µg/L	10	7	10	24	**24**	*75*	*0.6*	***0.93***	**22**
Chromium, Hexavalent	µg/L	2	20	20	10	***20***	*75*	*0.6*	***0.93***	***19***
Phenol	µg/L	10	76	90	25	**90**	*75*	*0.6*	***0.93***	**84**
Nutrients										
Nitrate+Nitrite (N+N)	mg/L	0.02	26	0	0	**26**	*8*	*0.6*	***1.89***	**48**
Total Nitrogen (TN) (4)	mg/L	0.01	49	0	58	**58**	*23*	*0.6*	***1.30***	**75**
Total Phosphorus (TP)	mg/L	0.001	3.6	0	0	**3.6**	*13*	*0.6*	***1.57***	**5.7**
Metals/Toxics										
Total Residual Chlorine	µg/L	100	100	0	0	**100**	*5*	*0.6*	***2.31***	**231**
Fluoride	mg/L	0.2	22.8	0	0	**23**	*9*	*0.6*	***1.81***	**41**
H_2S (2)	µg/L	20	-	-	-	**0**	*0*	*0.6*	**-**	**-**
Benzene	µg/L	0.6	3.1			**3.1**	*8*	*0.6*	***1.90***	**5.9**
Aluminum, Dissolved (5)	µg/L	9.0	53	0	0	**53**	*9*	*0.6*	***1.81***	**96**
Arsenic, TR	µg/L	1.0	195 (6)	0	146	**146**	*14*	*0.6*	***1.54***	**225**
Barium, TR	µg/L	3.0	222	0	0	**222**	*9*	*0.6*	***1.8***	**402**
Cadmium, TR	µg/L	0.03	1.4	0	5	**5.0**	*23*	*0.6*	***1.31***	**6.5**
Copper, TR	µg/L	2.0	11		6	**11**	*23*	*0.6*	***1.31***	**14**
Cyanide	µg/L	3.0	22	0	32	**32**	*23*	*0.6*	***1.3***	**42**
Iron, TR	µg/L	20	1900	0	0	**1900**	*9*	*0.6*	***1.81***	**3,442**
Lead, TR	µg/L	0.3	0.8	0	1	**1.0**	*23*	*0.6*	***1.3***	**1.3**
Mercury, TR	µg/L	0.005	0.07	0	1.2	**1.2**	*23*	*0.6*	***1.3***	**1.6**
Nickel, TR	µg/L	2.0	44	0	11	**44**	*23*	*0.6*	***1.3***	**57**
Selenium, TR	µg/L	1.0	252	0	240	**252**	*75*	*0.6*	***0.94***	**236**
Thallium, TR	µg/L	0.2	*0.3*	0	0	**0.3**	*9*	*0.6*	***1.81***	**0.5**
Zinc, TR	µg/L	8.0	98	0	56	**98**	*23*	*0.6*	***1.3***	**128**

Footnote:
(1) 2014 Form 2C data, monthly DMRs January 2010 - June 2014, and City pretreatment monthly reports: all the sample results were included as part of this analysis other than as specified. If all samples nondetect, highest detection limit used and indicated with underlined and italicized in red.
(2) TBEL regulated as Total Sulfide; WQBEL standard expressed as Hydrogen Sulfide (H_2S). H_2S based on dissolved sulfide x %H2S for pH adjustment (per
(3) TR = Total Recoverable
(4) TN concentration = total organic, as N + ammonia + N+N.
(5) Dissolved Aluminum data obtained from CH2MHILL Excel Table with 2012 data.
(6) Arsenic Treatment Removal System installed June 2014. Previous arsenic data, including from Form 2C, were discounted.

Table E-2: Yellowstone River- Reasonable Potential Analysis for Outfall 006

Parameters	Units	C_d (1)	C_s (2)	Acute C_r (5)	Acute Std	Acute C_r > Std?	Chronic/HHS C_r	Chronic Std	Chronic C_r > Std?	Human Health Std	Human Health C_r > Std?	RP?
TBELs												
Ammonia	mg/L	26	0.05	1.1	4.6	NO	0.13	1.9	NO	NA	NO	
Sulfide	mg/L	0.19	0.02	0.03	NA	NO	0.02	NA	NO	NA	NO	
Chromium, TR (3)	µg/L	22	*10*	10.5	NA	NO	10.0	NA	NO	100	NO	
Chromium, Hexavalent	µg/L	19	*10*	10.4	16	NO	10.0	11	NO	NA	NO	
Phenol	µg/L	84	1.0	4.4	NA	NO	1.3	NA	NO	300	NO	
Nutrients												
Nitrate+Nitrite (N+N)	mg/L	48	0.3	2.3	NA	NO	0.5	NA	NO	10	NO	
Total Nitrogen (TN)	mg/L	75	*0.5*	0.6	NA	NO	0.55	0.50	*Unkn*	NA	NO	*Unknown* - background "<0.5 mg/L"
Total Phosphorus (TP)	mg/L	5.7	0.04	0.04	NA	NO	0.043	0.05	NO	NA	NO	
Metals/Toxics												
Total Residual Chlorine	µg/L	231	-	10	19	NO	0.7	11	NO	4000	NO	
Fluoride	mg/L	41	0.5	2.2	NA	NO	0.6	NA	NO	4.0	NO	
H_2S (4)	µg/L	-	-	-	NA	NO	-	2.0	*Unkn*	NA	NO	*Unknown* - need dissolved sulfide and pH data.
Benzene	µg/L	5.9	-	0.2	NA	NO	0.02	NA	NO	5	NO	
Aluminum, Dissolved	µg/L	96	39	41	750	NO	39	87	NO	NA	NO	
Arsenic, TR	**µg/L**	**225**	**11.2**	20	**340**	**NO**	225	**150**	**YES**	**10**	**YES**	**Yes: HHS**
Barium, TR	µg/L	402	*100*	112	NA	NO	101	NA	NO	1000	NO	
Cadmium, TR	µg/L	6.5	0.05	0.3	1.9	NO	0.07	0.25	NO	5	NO	
Copper, TR	µg/L	14	2.9	3.4	12	NO	2.9	8.4	NO	1300	NO	
Cyanide	µg/L	42	*5*	6.5	22	NO	5.1	5.2	NO	140	NO	
Iron, TR	µg/L	3,442	750	861	NA	NO	759	1000	NO	NA	NO	
Lead, TR	µg/L	1.3	0.5	0.5	69	NO	0.5	2.7	NO	15	NO	
Mercury, TR	µg/L	1.6	*0.06*	0.12	1.7	NO	0.06	0.91	NO	0.05	*Unkn*	*Unknown* - background "<0.06 ug/L"
Nickel, TR	µg/L	57	2	4.3	421	NO	2.2	47	NO	100	NO	
Selenium, TR	µg/L	236	0.65	10	20	NO	1.4	5	NO	50	NO	
Thallium, TR	µg/L	0.5	*0.3*	0.3	NA	NO	0.3	NA	NO	0.24	*Unkn*	*Unknown* - background "<0.3 ug/L"
Zinc, TR	µg/L	128	5	10	108	NO	5.4	108	NO	2000	NO	

Footnotes:

(1) C_d = Critical discharge concentration, based on maximum observed x TSD Multiplier (see Table E-1).

(2) Cs = Critical upstream concentration, based on 75th percentile of observed concentrations provided by CH2MHILL in 2012. Parameters with all nondetects listed with the highest detection limit as underlined red italics.

(3) TR = Total Recoverable

(4) See sulfide conversion to H2S discussion in Table E-1. Insufficient data.

(5) C_r = critical downstream concentration, calculated based on a mass-balance equation using the following assumptions. ***If the upstream concentration Cs is greater than the standard, no mixing is provided.***

	cfs	Receiving Water Low Flow: cfs x % dilution granted x conversion			Projected Discharge			Mass-Balance to Determine Concentration after Mixing
Acute 7Q10 Qs =	**1130**	cfs x 3.6% x 0.646317=	**26.3**	**mgd**	**Acute Qd =**	**1.13**	**mgd**	**Cr = (Qd x Cd) + (Qs x Cs) / Qd + Qs**
Chronic 7Q10 Qs =	1130	cfs x 38% x 0.646317 =	**278**	**mgd**	**Chronic Qd =**	**0.9**	**mgd**	
Nutrient 14Q5 Qs =	**2282**	cfs x 100% x 0.646317 =	**1475**	**mgd**				

Table E-3: WQBEL Development for Yellowstone River (Outfall 006)

Parameters		Standards (C_r)			C_s			Qs			Wasteload Allocations (C_d) Footnote [1]			LTA				n	WQBELs			
units in ug/L unless otherwise indicated		Acute µg/L	Chronic µg/L	HHS µg/L	Background Stream Conc µg/L	Acute Dilution %	Chronic Dilution %	7Q10 cfs	Acute mgd	Chronic/ HHS mgd	**Acute (WLA_a)** µg/L	**Chronic (WLA_c)** µg/L	**HH (WLA_{hh})** µg/L	CV	Acute (LTAa) µg/L	Chronic (LTAc) µg/L	**Minimum (LTAm) µg/L**		**Acute ALS MDL**	**Chronic ALS AML**	**Human Health MDL [2]**	**Human Health AML [2]**
Arsenic, TR	µg/L	340	150	10	11.2	3.6%	38%	1130	26.3	278	7,990	42,950	10	0.6	2,565	22,653	2,565	4	7,990	3,983	**10**	**10**

Footnotes:

(1) WLA = Cd = Cr + [Qs/Qd x (Cr-Cs)] * Qd acute = 1.13 mgd **If the background Cs is > standard, WLA set at the standard.*

Qd chronic/HH = 0.9 mgd

(2) HHS - the AML is equal to the WLA (TSD Section 5.4.4). In addition, concentrations cannot exceed this standard (Circular DEQ-7 Footnote 16). Therefore, both the AML and MDL = HHS.

Table E-4: POC Critical Discharge Concentrations (C_d) for Outfall 002

	Units	RRV	Maximum Observed 2014 Form 2C	Maximum Observed Aug 2014 - Aug 2015 DMRs	Max (1,2) Conc	TSD #	TSD CV	TSD Multiplier	C_d
TBELs									
Ammonia	mg/L	0.07	ND	0.8	**0.8**	*2*	*0.6*	***3.8***	**3.2**
Oil & Grease	mg/L		*5*	1	***1***	*2*	*0.6*	***3.8***	***3.8***
Sulfide (3)	mg/L		ND	*0.04*	***0.04***	*2*	*0.6*	***3.8***	***0.15***
Chromium, TR (4)	µg/L	10	ND	*5*	***5***	*2*	*0.6*	***3.8***	***19***
Chromium, Hexavalent	µg/L	2	ND	*10*	***10***	*2*	*0.6*	***3.8***	***38***
Phenol	µg/L	10	ND	*10*	***10***	*2*	*0.6*	***3.8***	***38***
Nutrients									
Nitrate+Nitrite (N+N)	mg/L	0.02	0.43		**0.4**	*2*	*0.6*	***3.8***	**1.6**
Total Nitrogen (TN)	mg/L	0.01	ND		**0**		*0.6*	***6.2***	**-**
Total Phosphorus (TP)	mg/L	0.001	ND		**0**		*0.6*	***6.2***	**-**
Metals/Toxics									
Total Residual Chlorine	µg/L	100	*100*	*100*	***100***	*2*	*0.6*	***3.8***	***377***
Fluoride	mg/L	0.2	0.45		**0.45**	*2*	*0.6*	***3.8***	**1.7**
H_2S (3)	µg/L	20	ND	-	**0**	*2*	*0.6*	***3.8***	**-**
Aluminum, Dissolved (5)	µg/L	9.0	ND		**0**		*0.6*	***6.2***	**-**
Arsenic, TR	µg/L	1.0	7.3		**7.3**	*2*	*0.6*	***3.8***	**28**
Copper, TR	µg/L	2.0	*10*		***10***	*2*	*0.6*	***3.8***	***38***
Iron, TR	µg/L	20	*50*		***50***	*2*	*0.6*	***3.8***	***190***
Lead, TR	µg/L	0.3	*5*		***5***	*2*	*0.6*	***3.8***	***19***
Selenium, TR	µg/L	1.0	ND	3	**3**	*2*	*0.6*	***3.8***	**11**

Footnotes: ND = No data

(1) 2014 Form 2C data and monthly DMRs January 2010 - September 2015: all the sample results were included as part of this analysis other than as specified. If all samples nondetect, highest detection limit used and indicated with underlined and italicized in red.

(2) Because the water source for Outfall 002 changed to city water in August 2014, thus changing the expected characteristics of the discharge, the Form 2C data was disregarded unless there was no recent data.

(3) TBEL regulated as Total Sulfide; WQBEL standard expressed as Hydrogen Sulfide (H_2S). H_2S based on dissolved sulfide x% H2S for pH adjustment.

(4) TR = Total Recoverable

(5) Total aluminum detected at 15.3 mg/L; no data on dissolved aluminum.

Table E-5: Yegen Drain- Reasonable Potential Analysis (Outfall 002)

Parameters	Units	C_d (1)	C_s (2)	Acute C_r (3)	Acute Std	Acute C_r > Std?	Chronic/HHS C_r (3)	Chronic Std	Chronic C_r > Std?	Human Health Std	Human Health C_r > Std?	RP? Notes:
TBELs												
Ammonia	**mg/L**	**3.2**	**12**	**3.2**	**10**	**NO**	**3.2**	**1.9**	**YES**	**NA**	**NO**	**Yes: Chronic.**
Oil & Grease	mg/L	***3.8***		3.8	10	NO	1.2	10	NO	NA	NO	
Sulfide	mg/L	***0.15***		*0.2*	NA	NO	*0.0*	NA	NO	NA	NO	
Chromium, TR	µg/L	***19***		*19*	NA	NO	*6.0*	NA	NO	100	NO	
Chromium, Hexavalent	µg/L	***38***		*38*	16	Unkn	*12.0*	11	Unkn	NA	NO	*Unknown* : both effluent samples ND at a high detection level.
Phenol	µg/L	38	*1.5*	*38*	NA	NO	*13*	NA	NO	300	NO	
Nutrients												
Nitrate+Nitrite (N+N)	mg/L	1.6	2.9	1.6	NA	NO	2.5	NA	NO	10	NO	
Total Nitrogen (TN)	mg/L	-	0.0	0.0	NA	NO	0	1.3	NO	NA	NO	*Unknown* : no effluent data, only 1 upstream
Total Phosphorus (TP)	mg/L	-	0.00	0.0	NA	NO	0.00	0.15	NO	NA	NO	*Unknown* : no effluent data, only 1 upstream
Metals/Toxics												
Total Residual Chlorine	**µg/L**	***377***		***340***	**19**	**YES**	***120***	**11**	**YES**	**4,000**	**NO**	**Yes: Acute & Chronic**
Fluoride	mg/L	1.7		1.7	NA	NO	0.5	NA	NO	4.0	NO	
Hydrogen Sulfide (H_2S)	µg/L	*0*		*0*	NA	NO	*0*	2	NO	NA	NO	*Unknown* : need data.
Aluminum, Dissolved	µg/L	-		0	750	NO	0	87	NO	NA	NO	
Arsenic, TR	µg/L	28		28	340	NO	8.8	150	NO	10	NO	
Copper, TR	µg/L	*37.9*		*37.9*	34.9	*Unkn*	*12.0*	21.4	NO	1,300	NO	*Unknown* : 2 effluent samples ND, no upstream data
Iron, TR	µg/L	*190*		*190*	NA	NO	*60*	1,000	NO	NA	NO	
Lead, TR	µg/L	*19*		*19*	281	NO	*6.0*	11	NO	15	NO	
Selenium, TR	**µg/L**	**11**	**5.5**	**11**	**20**	**NO**	**11**	**5**	**YES**	**50**	**NO**	**Yes: Chronic ALS**

Footnotes:

(1) C_d = Critical discharge concentration, based on maximum observed (see Table E-4). If Cd is based on nondetect, the concentration is indicated by *italic under-lined red font.*

(2) Cs = critical upstream concentration is the 75th percentile, based on data provided in the 2008 Fact Sheet other than phenol which was an estimate based on literature review.

(3) C_r = critical downstream concentration, calculated based on a mass-balance equation using the following low flow assumptions. ***If the upstream concentration Cs is greater than the standard, no mixing is provided.***

	Available Dilution - Yegen				Projected Discharge for Outfall 002			Cr = (Qd x Cd) + (Qs x Cs)
Acute 7Q10 Qs	1.0	cfs x 0% =	**0**	**mgd**	**Acute Qd =**	**0.6**	**mgd (since Aug 2014)**	**Qd + Qs**
Ammonia and TRC Acute 7Q10 Qs	1.0	cfs x 10% =	**0.065**	**mgd**	**Chronic Qd =**	**0.3**	**mgd**	
Chronic 7Q10 Qs =	1.0	cfs x 100% =	**0.65**	**mgd**				
Nutrient 14Q5 Qs =	1.0	cfs x 100% =	**0.65**	**mgd** * *Need actual seasonal 14Q5*				

Table E-6: WQBEL Development for Yegen Drain (Outfall 002)

Parameters		Standards (C_r)			C_s			Qs			Wasteload Allocations (C_d)			LTA					WQBELs			
		Acute	Chronic	HHS	Background Stream Conc	Acute Dilution %	Chronic Dilution %	7Q10 cfs	Acute mgd	Chronic/ HHS mgd	**Acute (WLA_a) (1)**	**Chronic (WLA_c) (1)**	**HHS**	CV	Acute (LTAa)	Chronic (LTAc)	**Minimum (LTAm)**	n	**Acute ALS MDL**	**Chronic ALS AML**	**HHS MDL (2)**	**HHS AML (2)**
Ammonia	mg/L	10.1	1.9	NA	11.9	10%	100%	1.0	0.06	0.6	10.1	1.9	NA	0.6	3.2	1.5	**1.5**	4	**4.6**	**2.3**	NA	NA
Total Residual Chlorine	µg/L	19	11	4000	0	10%	100%	1.0	0.06	0.6	21	35	12,617	0.6	6.8	18	**6.8**	4	**21**	**10**	12,617	12,617
Selenium, TR	µg/L	20	5.0	50	5.5	0%	100%	1.0	0.00	0.6	20	5.0	146	0.6	6.4	2.6	**2.6**	4	**8.2**	**4.1**	146	146

Footnote:

(1) WLA = Cd = Cr + [Qs/Qd x (Cr-Cs)]. ***If the background Cs is > standard, WLA set at the standard.***

Qd acute = 0.6 mgd

Qd chronic/HH = 0.3 mgd

Table E-7: Critical Effluent Concentrations (Cd) for POC for Storm Water Outfalls 003 - 005

Parameter	Units	RRV	Maximum Observed (1) Outfall 003 -005 2014 Form 2F	DMRs	Max Conc (1)	TSD #	CV	Pn (% for n samples at 95th%)	Z-Score	Multiplier	C_d
TBELs											
Ammonia	mg/L	0.07	0.1	0.4	**0.4**	*9*	*0.6*	*0.72*	*0.57*	***1.8***	**0.6**
Oil & Grease	mg/L		*5*		***5***	*6*	*0.6*	*0.61*	*0.27*	***2.1***	***10.6***
Sulfide (2)	mg/L		0.14	*0.04*	**0.14**	*10*	*0.6*	*0.74*	*0.65*	***1.73***	**0.2**
Chromium, TR (3)	µg/L	10	14		**14**	*6*	*0.6*	*0.61*	*0.27*	***2.13***	**30**
Chromium, Hexavalent	µg/L	2	*10*		***10***	*6*	*0.6*	*0.61*	*0.27*	***2.13***	***21***
Phenol	µg/L	10	20	25	**25**	*7*	*0.6*	*0.65*	*0.39*	***1.99***	**50**
Nutrients											
Nitrate+Nitrite (N+N)	mg/L	0.02		1.0	**1.0**	*1*	*0.6*	*0.05*	*(1.64)*	***6.16***	**6.2**
Total Nitrogen (TN)	mg/L	0.01	3.2	1.9	**3.2**	*6*	*0.6*	*0.61*	*0.27*	***2.13***	**6.8**
Total Phosphorus (TP)	mg/L	0.001	0.031	0.36	**0.4**	*6*	*0.6*	*0.61*	*0.27*	***2.13***	**0.8**
Metals/Toxics											
H_2S (2)	µg/L	20	-	-	**0**	*10*	*0.6*	*0.74*	*0.65*	***1.74***	***0***
Benzene	µg/L	0.6		1.0	**1.0**	*1*	*0.6*	*0.05*	*(1.64)*	***6.20***	**6.2**
Toluene	µg/L	1.0		2.7	**2.7**	*1*	*0.6*	*0.05*	*(1.64)*	***6.20***	**17**
Xylene	µg/L	3.0		2.1	**2.1**	*1*	*0.6*	*0.05*	*(1.64)*	***6.20***	**13**
Arsenic, TR	µg/L	1.0	*5*	15	**15**	*6*	*0.6*	*0.61*	*0.27*	***2.14***	**32**
Copper, TR	µg/L	2.0	7.8		**7.8**	*1*	*0.6*	*0.05*	*(1.64)*	***6.20***	**48**
Selenium, TR	µg/L	1.0	*15*	15	**15**	*10*	*0.6*	*0.74*	*0.65*	***1.74***	**26**

Footnote:
(1) 2014 Form 2F data, monthly DMRs May 2012 - July 2015 for three storm water outfalls: all the sample results were included as part of this analysis other than as specified. If all samples nondetect, highest detection limit used and indicated with underlined and italicized in red.
(2) TBEL regulated as Total Sulfide; WQBEL standard expressed as Hydrogen Sulfide (H_2S).H_2S based on dissolved sulfide x %H2S for pH adjustment per Standard Methods.
(3) TR = Total Recoverable

Table E-8: Yegen Drain- Reasonable Potential Analysis (Storm Water Outfalls 003 - 005)

Parameters	Units	C_d (1)	C_s (2)	Acute C_r	Acute Std	Acute C_r > Std?	Chronic/HH C_r	Chronic Std	Chronic C_r > Std?	Human Health Std	Human Health C_r > Std?	RP? Notes:
TBELs												
Ammonia	mg/L	0.6	12	0.6	10	NO	0.6	1.9	NO	NA	NO	
Oil & Grease	**mg/L**	***10.6***		**10.6**	**10**	**YES**	**1.1**	**10**	**NO**	**NA**	**NO**	**Yes: RP to exceed narrative standard**
Sulfide	mg/L	0.2		0.2	NA	NO	0.03	NA	NO	NA	NO	
Chromium, TR	µg/L	30		30	NA	NO	3.2	NA	NO	100	NO	
Chromium, Hexavalent	µg/L	*21*		*21*	16	*Unkn*	2.3	11	NO	NA	NO	*Unknown:* RP to exceed acute standard due to nondetect at high RRV, and small sample set.
Phenol	µg/L	50	*1.5*	50	NA	NO	6.7	NA	NO	300	NO	
Nutrients												
Nitrate+Nitrite (N+N)	mg/L	6.2	2.9	4.2	NA	NO	3.3	NA	NO	10	NO	
Total Nitrogen (TN)	mg/L	6.8		2.7	NA	NO	0.7	1.3	NO	NA	NO	
Total Phosphorus (TP)	mg/L	0.8		0.3	NA	NO	0.08	0.15	NO	NA	NO	
Metals/Toxics												
H_2S	µg/L	*0*		0	NA	NO	0.0	2	NO	NA	NO	*Unknown:* Need Data
Benzene	µg/L	6.2		6.2	NA	NO	0.7	NA	NO	5	NO	
Toluene	µg/L	17		17	NA	NO	1.8	NA	NO	1000	NO	
Xylene	µg/L	13		13	NA	NO	1.4	NA	NO	10000	NO	
Arsenic, TR	µg/L	32		32	340	NO	3.5	150	NO	10	NO	*Unknown* : No upstream data.
Copper, TR	µg/L	48		48	35	*Unkn*	5.2	21	NO	1300	NO	*Unknown:* RP due to only one sample - large TSD-multiplier.
Selenium, TR	**µg/L**	**26**	**5.5**	**26**	**20**	**YES**	**26**	**5**	**YES**	**50**	**NO**	**Yes: Acute & Chronic**

Footnotes:

(1) C_d = Critical discharge concentration, based on maximum observed (see Table E-7). If Cd is based on nondetect, the concentration is indicated by *italic under-lined red font.*

(2) Cs = critical upstream concentration is the 75th percentile, based on data provided in the 2008 Fact Sheet other than phenol which was an estimate based on literature review.

(3) C_r = critical downstream concentration, calculated based on a mass-balance equation using the following low flow assumptions. ***If the upstream concentration Cs is greater than the standard, no mixing is provided.***

Available Dilution - Yegen

Acute 7Q10 Qs	1.0 cfs x 0% =	**0**	**mgd**	
Ammonia and TRC Acute 7Q10 Qs	1.0 cfs x 10% =	**0.065**	**mgd**	
Chronic 7Q10 Qs =	1.0 cfs x 100% =	**0.65**	**mgd**	
Nutrient 14Q5 Qs =	1.0 cfs x 100% =	**0.65**	**mgd*** *Need actual seasonal 14Q5*	

Projected Discharge for Outfall 004

Acute Qd = 0.43 mgd (300 gpm)

Chronic Qd = 0.078 mgd

Cr = (Qd x Cd) + (Qs x Cs)

Qd + Qs

Table E-9: WQBEL Development for Yegen Drain (Outfalls 003 - 005)

Parameters		Standards (C_r)			C_s			Qs			Wasteload Allocations (C_d)			LTA				n	WQBELs			
		Acute	Chronic	HHS	Background Stream Conc	Acute Dilution %	Chronic Dilution %	7Q10 cfs	Acute mgd	Chronic/ HHS mgd	Acute (WLA_a) (1)	Chronic (WLA_c) (1)	HHS	CV	Acute (LTAa)	Chronic (LTAc)	Minimum (LTAm)		Acute ALS MDL	Chronic ALS AML	HHS MDL (2)	HHS AML (2)
Selenium, TR	µg/L	20	5.0	50	5.5	0%	100%	1	0.00	0.6	20	5.0	50	0.6	6.4	2.6	2.6	4	**8.2**	**4.1**	50	50

Footnote:

(1) WLA = Cd = Cr + [Qs/Qd x (Cr-Cs)]. ***If the background Cs is > standard, WLA set at the standard.***

Qd acute = 0.43 mgd

Qd chronic/HHS = 0.08 mgd

Yegen Drain Hardness-Based Metals Stand

Ambient Total Hardness (as $CaCO_3$) **264** **mg/L***

Cadmium		Copper		Chromium (III)		Le
Acute	*Chronic*	*Acute*	*Chronic*	*Acute*	*Chronic*	*Acute*
5.72 (µg/L)	0.56 (µg/L)	34.9 (µg/L)	21.4 (µg/L)	3993 (µg/L)	191 (µg/L)	281 (µg/L)
0.0057 (mg/L)	0.0006 (mg/L)	0.035 (mg/L)	0.0214 (mg/L)	4.0 (mg/L)	0.191 (mg/L)	0.281 (mg/L)

Yellowstone River Hardness-Based Metals Sta

Ambient Total Hardness (as $CaCO_3$) **88** **mg/L***

Cadmium		Copper		Chromium (III)		Le
Acute	*Chronic*	*Acute*	*Chronic*	*Acute*	*Chronic*	*Acute*
1.87 (µg/L)	0.25 (µg/L)	12.4 (µg/L)	8.4 (µg/L)	1624 (µg/L)	78 (µg/L)	69 (µg/L)
0.0019 (mg/L)	0.0002 (mg/L)	0.012 (mg/L)	0.0084 (mg/L)	1.6 (mg/L)	0.078 (mg/L)	0.069 (mg/L)

lards (from DEQ Circular 7, October 2012)

* 50th percentile value based on 2009 Renewal

ead	Nickel		Silver		Zinc	
Chronic	*Acute*	*Chronic*	*Acute*	*Chronic*	*Acute*	*Chronic*
10.9 (µg/L) 0.0109 (mg/L)	1067 (µg/L) 1.07 (mg/L)	119 (µg/L) 0.119 (mg/L)	21.6 (µg/L) 0.0216 (mg/L)	N/A (µg/L) NA (mg/L)	273 (µg/L) 0.27 (mg/L)	273 (µg/L) 0.27 (mg/L)

andards (from DEQ Circular 7, October 2012)

* 25th percentile value based on 2014 Major Mod

ead	Nickel		Silver		Zinc	
Chronic	*Acute*	*Chronic*	*Acute*	*Chronic*	*Acute*	*Chronic*
2.7 (µg/L) 0.0027 (mg/L)	421 (µg/L) 0.42 (mg/L)	47 (µg/L) 0.047 (mg/L)	3.3 (µg/L) 0.0033 (mg/L)	N/A (µg/L) NA (mg/L)	108 (µg/L) 0.11 (mg/L)	108 (µg/L) 0.11 (mg/L)

Ammonia

Yellowstone River - yes, Salmonids

	75th	Acute	Chronic
pH	8.1		
Temp deg C	15.8		
Ammonia std		4.64	1.93

	Deg C	Ammonia S
	14	2.10
	15.8	**1.93**
0.233	16	1.91

Yegen Drain - no salmonids.

	75th	Acute	Chronic
pH	7.9		
Temp deg C	20.7		
Ammonia Std		10.1	1.88

	Deg C	Ammonia S
	20	1.96
	20.7	**1.88**
1.3	22	1.73

std
0.191

std
0.23

YELLOWSTONE RIVER

	pH s.u.	Total Sulfide mg/L	Dissolved Sulfide (1) mg/L	%	H2S mg/L	ug/L
Oct-11	--	*0.02*	*0.014*	0.25	0.0035	**3.5**
Oct-11	--	*0.02*	*0.014*	0.25	0.0035	3.5
Nov-11	7.4	0.02	0.014	**0.30**	**0.0042**	**4.2**
Nov-11	7.6	*0.02*	*0.014*	0.20	0.0028	2.8
75th %	--	*0.02*	*0.014*	0.26	0.0037	***3.68***

Footnote:
(1) Dissolved Sulfide calculated based on 70% of the Total Sulfide concentration.