

CALCULATIONS OF NEW MEXICO WATER QUALITY-BASED EFFLUENT LIMITATIONS

NMAC 20.6.4. **NMWQS as of January 14, 2011**

(EPA approved site-specific criteria for aluminum, cadmium, and zinc on April 30, 2012)

Calculations Specifications:

Excel **Revised as of May 1, 2012**

Prepared By: **Isaac Chen 06/11/2019**

STEP 1: REFERENCE IMPLEMENTATION PROCEDURES
INPUT FACILITY AND RECEIVING STREAM DATA
LIST SOURCE OF DATA INPUT

APPENDIX A of FACT SHEET

IMPLEMENTATION PROCEDURES

The State of New Mexico Standards for Interstate and Intrastate Surface Waters are implemented in this spread sheet by using procedures established in the "Procedures for Implementing NPDES Permits in New Mexico" amended May 2011

FACILITY	DATA INPUT	
Permittee	LANL	
NPDES Permit No.	NM0028355	
Outfall No.(s)	001	
Plant Effluent Flow (MGD)	0.154	For industrial and federal facility, use the highest monthly average flow for the past 24 months. For POTWs, use the design flow.
Plant Effluent Flow (cfs)	0.2387	
RECEIVING STREAM	DATA INPUT	
Receiving Stream Name	Sandia Canton	
Basin Name	Rio Grande	
Waterbody Segment Code No.	20.6.4.126	
Is a publicly owned lake or reservoir (enter "1" if it's a lake, "0" if not)	0	
Are acute aquatic life criteria considered (1= yes, 0= no) (MUST enter "1" for 2005 Standards)	1	
Are chronic aquatic life criteria considered (1= yes, 0=no)	1	
Are domestic water supply criteria considered (1= yes, 0=no)	0	
Are irrigation water supply criteria considered (1= yes, 0=no)	0	
Livestock watering and wildlife habitat criteria applied to all streams		
USGS Flow Station	USGS	
WQ Monitoring Station No.	SJR	
Receiving Stream TSS (mg/l)	1.986	For intermittent stream, enter effluent TSS
Receiving Stream Hardness (mg/l as CaCO ₃)	37.5	For intermittent stream, enter effluent Hardness (If no data, 20 mg/l is used)
Receiving Stream Critical Low Flow (4Q3) (cfs)	0	Enter "0" for intermittent stream and lake.
Receiving Stream Harmonic Mean Flow (cfs)	0.00155	Enter harmonic mean or modified harmonic mean flow data
Avg. Water Temperature (C Max)	20.6	
pH (Max)	7.9	
Fraction of stream allowed for mixing (F)	1	Enter 1, if stream morphology data is not available or for intermittent streams.
Fraction of Critical Low Flow	0	

STEP 2: INPUT AMBIENT AND EFFLUENT DATA

CALCULATE IN-STREAM WASTE CONCENTRATIONS

DATA INPUT

Input pollutant geometric mean concentration as micro-gram per liter (ug/l or ppb)

unless other unit is specified for the parameter.

Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, input "1/2 DL" for calculation.

Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, no data is inputted.

If a less than MQL value is reported, input either the reported value or "0" for calculation.

The following formula is used to calculate the Instream Waste Concentration (Cd)

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Cd = [(F \cdot Qa \cdot Ca) + (Qe \cdot 2.13 \cdot Ce)] / (F \cdot Qa + Qe)$$

Where:

Cd = Instream Waste Concentration

F = Fraction of stream allowed for mixing (see "Procedures for Implementing NPDES Permits in New Mexico")

Ce = Reported concentration in effluent

Ca = Ambient stream concentration upstream of discharge

Qe = Plant effluent flow

Qa = Critical low flow of stream at discharge point expressed as the 4Q3 or harmonic mean flow for human health criteria

The following formula convert metals reported in total form to dissolved form if criteria are in dissolved form

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Kp = Kpo \cdot (TSS)^a$$

Kp = Linear partition coefficient; Kpo and a can be found in table below

$$C/Ct = 1 / (1 + Kp \cdot TSS \cdot 10^{-6})$$

TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)

$$\text{Total Metal Criteria (Ct)} = Cr / (C/Ct)$$

C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value

Total Metals	Total Value	Stream Linear Partition Coefficient					Lake Linear Partition Coefficient				
		Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Stream	Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Lake
Arsenic	2	480000	-0.73	290881.6929	0.633837661	1.26767532	480000	-0.73	290881.6929	0.633837661	1.26767532
Chromium III		3360000	-0.93	1775082.655	0.220979133	0	2170000	-0.27	1803039.902	0.218300705	0
Copper		1040000	-0.74	625934.2249	0.445810533	0	2850000	-0.9	1536963.452	0.246766774	0
Lead	0	2800000	-0.8	1617240.602	0.237425932	0	2040000	-0.53	1418081.424	0.262033241	0
Nickel	0.6	490000	-0.57	331396.495	0.603080497	0.3618483	2210000	-0.76	1311982.518	0.277346559	0.16640794
Silver	0	2390000	-1.03	1178906.275	0.299284005	0	2390000	-1.03	1178906.275	0.299284005	0
Zinc	60	1250000	-0.7	773258.2141	0.394369848	23.6621909	3340000	-0.68	2094693.962	0.193796113	11.6277668

The following formula is used to calculate hardness dependent criteria

(Please refer to State Water Quality Standards for details)

Dissolved

WQC (ug/l)

Aluminum (T)	Acute	$e(1.3695[\ln(\text{hardness})]+1.8308)$	892.7752841	If Stream pH < 6.5, enter 750 in cell O113
	Chronic	$e(1.3695[\ln(\text{hardness})]+0.9161)$	357.6786322	If Stream pH < 6.5, enter 87 in cell P113
Cadmium (D)	Acute	$e(0.8968[\ln(\text{hardness})]-3.5699) \cdot CF1$	0.715576115	$CF1 = 1.136672 - 0.041838 \cdot \ln(\text{hardness})$
	Chronic	$e(0.7647[\ln(\text{hardness})]-4.2180) \cdot CF2$	0.223639249	$CF2 = 1.101672 - 0.041838 \cdot \ln(\text{hardness})$

			Dissolved WQC (ug/l)	
Chromium III (D)	Acute	0.316 e(0.819[ln(hardness)]+3.7256)	255.1680018	
	Chronic	0.860 e(0.819[ln(hardness)]+0.6848)	33.19211456	
Copper (D)	Acute	0.960 e(0.9422[ln(hardness)]-1.700)	5.333629869	
	Chronic	0.960 e(0.8545[ln(hardness)]-1.702)	3.873572984	
Lead (D)	Acute	e(1.273[ln(hardness)]-1.46)*CF3	21.87668694	CF3 = 1.46203 - 0.145712*ln(hardness)
	Chronic	e(1.273[ln(hardness)]-4.705)*CF4	0.852503083	CF4 = 1.46203 - 0.145712*ln(hardness)
Manganese (D)	Acute	e(0.3331[ln(hardness)]+6.4676)	2153.539324	
	Chronic	e(0.3331[ln(hardness)]+5.8743)	1189.832672	
Nickel (D)	Acute	0.998 e(0.846[ln(hardness)]+2.255)	204.2184852	
	Chronic	0.997 e(0.846[ln(hardness)]+0.0584)	22.68236886	
Silver (D)	Acute	0.85 e(1.72[ln(hardness)]-6.59)	0.59532219	
Zinc (D)	Acute	0.978 e(0.9094[ln(hardness)]+0.9095)	65.57732859	
	Chronic	0.986 e(0.90947[ln(hardness)]+0.6235)	49.68139038	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc.	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria						
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l						
Radioactivity, Nutrients, and Chlorine															
Aluminum, total	7429-90-5	2.5	19.3	41.109	41.109	41.109	40.8437806	1E+100	5000	1E+100	892.7752841	357.678632	1E+100	N/A	
Barium, dissolved	7440-39-3	100	16.8	35.784	35.784	35.784	35.5531355	2000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Boron, dissolved	7440-42-8	100	82.4	175.512	175.512	175.512	174.379665	1E+100	750	5000	1E+100	1E+100	1E+100	N/A	
Cobalt, dissolved	7440-48-4	50	0	0	0	0	0	1E+100	50	1000	1E+100	1E+100	1E+100	N/A	
Uranium, dissolved	7440-61-1	0.1	0	0	0	0	0	30	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Vanadium, dissolved	7440-62-2	50	0	0	0	0	0	1E+100	100	100	1E+100	1E+100	1E+100	N/A	
Ra-226 and Ra-228 (pCi/l)			0	0	0	0	0	5	1E+100	30	1E+100	1E+100	1E+100	N/A	
Strontium (pCi/l)			0	0	0	0	0	8	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Tritium (pCi/l)			0	0	0	0	0	20000	1E+100	20000	1E+100	1E+100	1E+100	N/A	
Gross Alpha (pCi/l)			0	0	0	0	0	15	1E+100	15	1E+100	1E+100	1E+100	N/A	
Asbestos (fibers/l)			0	0	0	0	0	7000000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Total Residual Chlorine	7782-50-5	33	0	0	0	0	0	1E+100	1E+100	11	19	11	1E+100	N/A	
Nitrate as N (mg/l)			1.14	2.4282	2.4282	2.4282	2.41253419	10	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Nitrite + Nitrate (mg/l)			0	0	0	0	0	1E+100	1E+100	132	1E+100	1E+100	1E+100	N/A	
METALS AND CYANIDE															
Antimony, dissolved (P)	7440-36-0	60	0	0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	640	N/A	
Arsenic, dissolved (P)	7440-38-2	0.5	1.267675322	2.700148436	2.70014844	2.70014844	2.68272812	10	100	200	340	150	9	N/A	
Beryllium, dissolved	7440-41-7	0.5	0	0	0	0	0	4	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Cadmium, dissolved	7440-43-9	1	0	0	0	0	0	5	10	50	0.715576115	0.22363925	1E+100	N/A	
Chromium (III), dissolved	16065-83-1	10	2.7	5.751	5.751	5.751	5.71389677	1E+100	1E+100	1E+100	255.1680018	33.1921146	1E+100	N/A	
Chromium (VI), dissolved	18540-29-9	10	2.7	5.751	5.751	5.751	5.71389677	1E+100	1E+100	1E+100	16	11	1E+100	N/A	
Chromium, dissolved	7440-47-3		2.7	5.751	5.751	5.751	5.71389677	100	100	1000	1E+100	1E+100	1E+100	N/A	
Copper, dissolved	7440-50-8	0.5	2.945	6.27285	6.27285	6.27285	6.23238	1300	200	500	5.333629869	3.87357298	1E+100	N/A	
Lead, dissolved	7439-92-1	0.5	0	0	0	0	0	15	5000	100	21.87668694	0.85250308	1E+100	N/A	
Manganese, dissolved	7439-96-5		0	0	0	0	0	1E+100	1E+100	1E+100	2153.539324	1189.83267	1E+100	N/A	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration					Livestock&	Acute	Chronic	Human	Need	Health	TMDL	
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic			Aquatic
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria			Criteria
			Ca (ug/l)	Ce (ug/l)	2.13°Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l	ug/l	ug/l	ug/l		
Mercury, dissolved	7439-97-6	0.005		0.067	0.14271	0.14271	0.14271	0.14178929	1E+100	1E+100	1E+100	1.4	0.77	1E+100	N/A
Mercury, total	7439-97-6	0.005		0.0027	0.005751	0.005751	0.005751	0.0057139	2	1E+100	0.77	1E+100	1E+100	1E+100	N/A
Molybdenum, dissolved	7439-98-7				0	0	0	0	1E+100	1000	1E+100	1E+100	1E+100	1E+100	N/A
Molybdenum, total recoverable	7439-98-7				0	0	0	0	1E+100	1E+100	1E+100	7920	1895	1E+100	N/A
Nickel, dissolved (P)	7440-02-0	0.5		0.361848298	0.770736875	0.77073688	0.77073688	0.76576438	700	1E+100	1E+100	204.2184852	22.6823689	4600	N/A
Selenium, dissolved (P)	7782-49-2	5		0	0	0	0	0	50	130	50	1E+100	1E+100	4200	N/A
Selenium, dis (SO4 >500 mg/l)		5		0	0	0	0	0	50	250	50	1E+100	1E+100	4200	N/A
Selenium, total recoverable	7782-49-2	5		0	0	0	0	0	1E+100	1E+100	5	20	5	1E+100	N/A
Silver, dissolved	7440-22-4	0.5		0	0	0	0	0	1E+100	1E+100	1E+100	0.59532219	1E+100	1E+100	N/A
Thallium, dissolved (P)	7440-28-0	0.5		0.442	0.94146	0.94146	0.94146	0.93538606	2	1E+100	1E+100	1E+100	1E+100	0.47	N/A
Zinc, dissolved	7440-66-6	20		23.66219087	50.40046654	50.4004665	50.4004665	50.0753022	10500	2000	25000	65.57732859	49.6813904	26000	N/A
Cyanide, total recoverable	57-12-5	10		0	0	0	0	0	200	1E+100	5.2	22	5.2	140	N/A
Dioxin	1764-01-6	0.00001		0	0	0	0	0	3.00E-05	1E+100	1E+100	1E+100	1E+100	5.1E-08	N/A
VOLATILE COMPOUNDS															
Acrolein	107-02-8	50			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	9	N/A
Acrylonitrile	107-13-0	20			0	0	0	0	0.65	1E+100	1E+100	1E+100	1E+100	2.5	N/A
Benzene	71-43-2	10		1.81	3.8553	3.8553	3.8553	3.8304271	5	1E+100	1E+100	1E+100	1E+100	510	N/A
Bromoform	75-25-2	10		3.16	6.7308	6.7308	6.7308	6.68737548	44	1E+100	1E+100	1E+100	1E+100	1400	N/A
Carbon Tetrachloride	56-23-5	2			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	16	N/A
Chlorobenzene	108-90-7	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	1600	N/A
Clorodibromomethane	124-48-1	10		1.47	3.1311	3.1311	3.1311	3.11089935	4.2	1E+100	1E+100	1E+100	1E+100	130	N/A
Chloroform	67-66-3	50		0.82	1.7466	1.7466	1.7466	1.73533161	57	1E+100	1E+100	1E+100	1E+100	4700	N/A
Dichlorobromomethane	75-27-4	10		1.41	3.0033	3.0033	3.0033	2.98392387	5.6	1E+100	1E+100	1E+100	1E+100	170	N/A
1,2-Dichloroethane	107-06-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	370	N/A
1,1-Dichloroethylene	75-35-4	10			0	0	0	0	7	1E+100	1E+100	1E+100	1E+100	7100	N/A
1,2-Dichloropropane	78-87-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	150	N/A
1,3-Dichloropropylene	542-75-6	10			0	0	0	0	3.5	1E+100	1E+100	1E+100	1E+100	210	N/A
Ethylbenzene	100-41-4	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	2100	N/A
Methyl Bromide	74-83-9	50			0	0	0	0	49	1E+100	1E+100	1E+100	1E+100	1500	N/A
Methylene Chloride	75-09-2	20			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	5900	N/A
1,1,2,2-Tetrachloroethane	79-34-5	10			0	0	0	0	1.8	1E+100	1E+100	1E+100	1E+100	40	N/A
Tetrachloroethylene	127-18-4	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	33	N/A
Toluene	108-88-3	10			0	0	0	0	1000	1E+100	1E+100	1E+100	1E+100	15000	N/A
1,2-trans-Dichloroethylene	156-60-5	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	10000	N/A
1,1,1-Trichloroethane	71-55-6				0	0	0	0	200	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
1,1,2-Trichloroethane	79-00-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	160	N/A
Trichloroethylene	79-01-6	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	300	N/A
Vinyl Chloride	75-01-4	10			0	0	0	0	2	1E+100	1E+100	1E+100	1E+100	24	N/A
ACID COMPOUNDS															
2-Chlorophenol	95-57-8	10			0	0	0	0	175	1E+100	1E+100	1E+100	1E+100	150	N/A
2,4-Dichlorophenol	120-83-2	10			0	0	0	0	105	1E+100	1E+100	1E+100	1E+100	290	N/A
2,4-Dimethylphenol	105-67-9	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	850	N/A
4,6-Dinitro-o-Cresol	534-52-1	50			0	0	0	0	14	1E+100	1E+100	1E+100	1E+100	280	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria						
			Ca (ug/l)	Ce (ug/l)	2.13°Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l						
2,4-Dinitrophenol	51-28-5	50			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	5300	N/A
Pentachlorophenol	87-86-5	50			0	0	0	0	1	1E+100	1E+100	19	15	30	N/A
Phenol	108-95-2	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	860000	N/A
2,4,6-Trichlorophenol	88-06-2	10			0	0	0	0	32	1E+100	1E+100	1E+100	1E+100	24	N/A
BASE/NEUTRAL															
Acenaphthene	83-32-9	10			0	0	0	0	2100	1E+100	1E+100	1E+100	1E+100	990	N/A
Anthracene	120-12-7	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	40000	N/A
Benzidine	92-87-5	50			0	0	0	0	0.0015	1E+100	1E+100	1E+100	1E+100	0.002	N/A
Benzo(a)anthracene	56-55-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(a)pyrene	50-32-8	5			0	0	0	0	0.2	1E+100	1E+100	1E+100	1E+100	0.18	N/A
3,4-Benzofluoranthene	205-99-2	10			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(k)fluoranthene	207-08-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Bis(2-chloroethyl)Ether	111-44-4	10			0	0	0	0	0.3	1E+100	1E+100	1E+100	1E+100	5.3	N/A
Bis(2-chloroisopropyl)Ether	108-60-1	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	65000	N/A
Bis(2-ethylhexyl)Phthalate	117-81-7	10		5.09	10.8417	10.8417	10.8417	10.7717535	6	1E+100	1E+100	1E+100	1E+100	22	N/A
Butyl Benzyl Phthalate	85-68-7	10			0	0	0	0	7000	1E+100	1E+100	1E+100	1E+100	1900	N/A
2-Chloronaphthalene	91-58-7	10			0	0	0	0	2800	1E+100	1E+100	1E+100	1E+100	1600	N/A
Chrysene	218-01-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Dibenzo(a,h)anthracene	53-70-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
1,2-Dichlorobenzene	95-50-1	10			0	0	0	0	600	1E+100	1E+100	1E+100	1E+100	1300	N/A
1,3-Dichlorobenzene	541-73-1	10			0	0	0	0	469	1E+100	1E+100	1E+100	1E+100	960	N/A
1,4-Dichlorobenzene	106-46-7	10			0	0	0	0	75	1E+100	1E+100	1E+100	1E+100	190	N/A
3,3'-Dichlorobenzidine	91-94-1	5			0	0	0	0	0.78	1E+100	1E+100	1E+100	1E+100	0.28	N/A
Diethyl Phthalate	84-66-2	10			0	0	0	0	28000	1E+100	1E+100	1E+100	1E+100	44000	N/A
Dimethyl Phthalate	131-11-3	10			0	0	0	0	350000	1E+100	1E+100	1E+100	1E+100	1100000	N/A
Di-n-Butyl Phthalate	84-74-2	10			0	0	0	0	3500	1E+100	1E+100	1E+100	1E+100	4500	N/A
2,4-Dinitrotoluene	121-14-2	10			0	0	0	0	1.1	1E+100	1E+100	1E+100	1E+100	34	N/A
1,2-Diphenylhydrazine	122-66-7	20			0	0	0	0	0.44	1E+100	1E+100	1E+100	1E+100	2	N/A
Fluoranthene	206-44-0	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	140	N/A
Fluorene	86-73-7	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	5300	N/A
Hexachlorobenzene	118-74-1	5			0	0	0	0	1	1E+100	1E+100	1E+100	1E+100	0.0029	N/A
Hexachlorobutadiene	87-68-3	10			0	0	0	0	4.5	1E+100	1E+100	1E+100	1E+100	180	N/A
Hexachlorocyclopentadiene	77-47-4	10			0	0	0	0	50	1E+100	1E+100	1E+100	1E+100	1100	N/A
Hexachloroethane	67-72-1	20			0	0	0	0	25	1E+100	1E+100	1E+100	1E+100	33	N/A
Indeno(1,2,3-cd)Pyrene	193-39-5	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Isophorone	78-59-1	10			0	0	0	0	368	1E+100	1E+100	1E+100	1E+100	9600	N/A
Nitrobenzene	98-95-3	10			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	690	N/A
n-Nitrosodimethylamine	62-75-9	50			0	0	0	0	0.0069	1E+100	1E+100	1E+100	1E+100	30	N/A
n-Nitrosodi-n-Propylamine	621-64-7	20			0	0	0	0	0.05	1E+100	1E+100	1E+100	1E+100	5.1	N/A
n-Nitrosodiphenylamine	86-30-6	20			0	0	0	0	71	1E+100	1E+100	1E+100	1E+100	60	N/A
Pyrene	129-00-0	10			0	0	0	0	1050	1E+100	1E+100	1E+100	1E+100	4000	N/A
1,2,4-Trichlorobenzene	120-82-1	10			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	70	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock & Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria	Irrigation Criteria					
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l					
PESTICIDES AND PCBs															
Aldrin	309-00-2	0.01			0	0	0	0	0.021	1E+100	1E+100	3	1E+100	0.0005	N/A
Alpha-BHC	319-84-6	0.05			0	0	0	0	0.056	1E+100	1E+100	1E+100	1E+100	0.049	N/A
Beta-BHC	319-85-7	0.05			0	0	0	0	0.091	1E+100	1E+100	1E+100	1E+100	0.17	N/A
Gamma-BHC	58-89-9	0.05			0	0	0	0	0.2	1E+100	1E+100	0.95	1E+100	1.8	N/A
Chlordane	57-74-9	0.2			0	0	0	0	2	1E+100	1E+100	2.4	0.0043	0.0081	N/A
4,4'-DDT and derivatives	50-29-3	0.02			0	0	0	0	1	1E+100	0.001	1.1	0.001	0.0022	N/A
Dieldrin	60-57-1	0.02			0	0	0	0	0.022	1E+100	1E+100	0.24	0.056	0.00054	N/A
Diazinon	333-41-5				0	0	0	0	1E+100	1E+100	1E+100	0.17	0.17	1E+100	N/A
Alpha-Endosulfan	959-98-8	0.01			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Beta-Endosulfan	33213-65-9	0.02			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Endosulfan sulfate	1031-7-8	0.1			0	0	0	0	62	1E+100	1E+100	1E+100	1E+100	89	N/A
Endrin	72-20-8	0.02			0	0	0	0	2	1E+100	1E+100	0.086	0.036	0.06	N/A
Endrin Aldehyde	7421-93-4	0.1			0	0	0	0	10.5	1E+100	1E+100	1E+100	1E+100	0.3	N/A
Heptachlor	76-44-8	0.01			0	0	0	0	0.4	1E+100	1E+100	0.52	0.0038	0.00079	N/A
Heptachlor Epoxide	1024-57-3	0.01			0	0	0	0	0.2	1E+100	1E+100	0.52	0.0038	0.00039	N/A
PCBs	1336-36-3	0.2		0.0422	0.089886	0.089886	0.089886	0.08930609	0.5	1E+100	0.014	2	0.014	0.00064	N/A
Toxaphene	8001-35-2	0.3			0	0	0	0	3	1E+100	1E+100	0.73	0.0002	0.0028	N/A

Note: SCORET CODE for reference only. Codes for total form are used except for parameters which have criteria in both total and dissolved forms.

STEP 3: SCAN POTENTIAL INSTREAM WASTE CONCENTRATIONS AGAINST WATER QUALITY CRITERIA
AND ESTABLISH EFFLUENT LIMITATIONS FOR ALL APPLICABLE PARAMETERS

No limits are established if the receiving stream is not designated for the particular uses.

No limits are established if the potential instream waste concentrations are less than the chronic water quality criteria.

The most applicable stringent criteria are used to establish effluent limitations for a given parameter.

Water quality criteria apply at the end-of-pipe for acute aquatic life criteria and discharges to public lakes.

If background concentration exceeds the water quality criteria, water quality criteria apply. And "Need TMDL" shown to the next column of Avg. Mass

Monthly avg concentration = daily max. / 1.5.

APPLICABLE WATER QUALITY-BASED LIMITS

The following formula is used to calculate the allowable daily maximum effluent concentration

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

Daily Max. Conc. = $C_s + (C_s - C_a)(F \cdot Q_a / Q_e)$

Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where:

C_s = Applicable water quality standard

C_a = Ambient stream concentration

F = Fraction of stream allowed for mixing (1.0 is assigned to domestic water supply and human health uses)

Q_e = Plant effluent flow

Q_a = Criteria Low flow (4Q3) or Harmonic Mean flow for Human Health Criteria

CALCULATIONS OF NEW MEXICO WATER QUALITY-BASED EFFLUENT LIMITATIONS

NMAC 20.6.4. **NMWQS as of January 14, 2011**

(EPA approved site-specific criteria for aluminum, cadmium, and zinc on April 30, 2012)

Calculations Specifications:

Excel **Revised as of May 1, 2012**

Prepared By:

Isaac Chen 06/20/2019

STEP 1: REFERENCE IMPLEMENTATION PROCEDURES
INPUT FACILITY AND RECEIVING STREAM DATA
LIST SOURCE OF DATA INPUT

APPENDIX A of FACT SHEET

IMPLEMENTATION PROCEDURES

The State of New Mexico Standards for Interstate and Intrastate Surface Waters are implemented in this spread sheet by using procedures established in the "Procedures for Implementing NPDES Permits in New Mexico" amended May 2011

FACILITY	DATA INPUT	
Permittee	LANL	
NPDES Permit No.	NM0028355	
Outfall No.(s)	03A027	
Plant Effluent Flow (MGD)	0.051	For industrial and federal facility, use the highest monthly average flow for the past 24 months. For POTWs, use the design flow.
Plant Effluent Flow (cfs)	0.07905	

RECEIVING STREAM	DATA INPUT	
Receiving Stream Name	Sandia Canton	
Basin Name	Rio Grande	
Waterbody Segment Code No.	20.6.4.126	
Is a publicly owned lake or reservoir (enter "1" if it's a lake, "0" if not)	0	
Are acute aquatic life criteria considered (1= yes, 0= no) (MUST enter "1" for 2005 Standards)	1	
Are chronic aquatic life criteria considered (1= yes, 0=no)	1	
Are domestic water supply criteria considered (1= yes, 0=no)	0	
Are irrigation water supply criteria considered (1= yes, 0=no)	0	
Livestock watering and wildlife habitat criteria applied to all streams		
USGS Flow Station	USGS	
WQ Monitoring Station No.	SJR	
Receiving Stream TSS (mg/l)	1.986	Outfall 001's TSS
Receiving Stream Hardness (mg/l as CaCO ₃)	37.5	Outfall 001's Hardness
Receiving Stream Critical Low Flow (4Q3) (cfs)	0.154	Outfall 001's Long-term flow
Receiving Stream Harmonic Mean Flow (cfs)	0.154	Enter harmonic mean or modified harmonic mean flow data
Avg. Water Temperature (C)	23	
pH (Avg)	8.3	
Fraction of stream allowed for mixing (F)	1	Enter 1, if stream morphology data is not available or for intermittent streams.
Fraction of Critical Low Flow	0.154	

STEP 2: INPUT AMBIENT AND EFFLUENT DATA

CALCULATE IN-STREAM WASTE CONCENTRATIONS

DATA INPUT

Input pollutant geometric mean concentration as micro-gram per liter (ug/l or ppb)

unless other unit is specified for the parameter.

Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, input "1/2 DL" for calculation.

Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, no data is inputted.

If a less than MQL value is reported, input either the reported value or "0" for calculation.

The following formula is used to calculate the Instream Waste Concentration (Cd)

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Cd = [(F \cdot Qa \cdot Ca) + (Qe \cdot 2.13 \cdot Ce)] / (F \cdot Qa + Qe)$$

Where:

Cd = Instream Waste Concentration

F = Fraction of stream allowed for mixing (see "Procedures for Implementing NPDES Permits in New Mexico")

Ce = Reported concentration in effluent

Ca = Ambient stream concentration upstream of discharge

Qe = Plant effluent flow

Qa = Critical low flow of stream at discharge point expressed as the 4Q3 or harmonic mean flow for human health criteria

The following formula convert metals reported in total form to dissolved form if criteria are in dissolved form

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Kp = Kpo \cdot (TSS)^a$$

Kp = Linear partition coefficient; Kpo and a can be found in table below

$$C/Ct = 1 / (1 + Kp \cdot TSS \cdot 10^{-6})$$

TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)

$$\text{Total Metal Criteria (Ct)} = Cr / (C/Ct)$$

C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value

Total Metals	Total Value	Stream Linear Partition Coefficient					Lake Linear Partition Coefficient				
		Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Stream	Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Lake
Arsenic	2	480000	-0.73	290881.6929	0.633837661	1.26767532	480000	-0.73	290881.6929	0.633837661	1.26767532
Chromium III		3360000	-0.93	1775082.655	0.220979133	0	2170000	-0.27	1803039.902	0.218300705	0
Copper		1040000	-0.74	625934.2249	0.445810533	0	2850000	-0.9	1536963.452	0.246766774	0
Lead	0	2800000	-0.8	1617240.602	0.237425932	0	2040000	-0.53	1418081.424	0.262033241	0
Nickel	0	490000	-0.57	331396.495	0.603080497	0	2210000	-0.76	1311982.518	0.277346559	0
Silver	0	2390000	-1.03	1178906.275	0.299284005	0	2390000	-1.03	1178906.275	0.299284005	0
Zinc	206	1250000	-0.7	773258.2141	0.394369848	81.2401886	3340000	-0.68	2094693.962	0.193796113	39.9219993

The following formula is used to calculate hardness dependent criteria

(Please refer to State Water Quality Standards for details)

Dissolved

WQC (ug/l)

Aluminum (T)	Acute	$e(1.3695[\ln(\text{hardness})]+1.8308)$	892.7752841	If Stream pH < 6.5, enter 750 in cell O113
	Chronic	$e(1.3695[\ln(\text{hardness})]+0.9161)$	357.6786322	If Stream pH < 6.5, enter 87 in cell P113
Cadmium (D)	Acute	$e(0.8968[\ln(\text{hardness})]-3.5699) \cdot CF1$	0.715576115	$CF1 = 1.136672 - 0.041838 \cdot \ln(\text{hardness})$
	Chronic	$e(0.7647[\ln(\text{hardness})]-4.2180) \cdot CF2$	0.223639249	$CF2 = 1.101672 - 0.041838 \cdot \ln(\text{hardness})$

				Dissolved WQC (ug/l)	
Chromium III (D)	Acute		0.316 e(0.819[ln(hardness)]+3.7256)	255.1680018	
	Chronic		0.860 e(0.819[ln(hardness)]+0.6848)	33.19211456	
Copper (D)	Acute		0.960 e(0.9422[ln(hardness)]-1.700)	5.333629869	
	Chronic		0.960 e(0.8545[ln(hardness)]-1.702)	3.873572984	
Lead (D)	Acute		e(1.273[ln(hardness)]-1.46)*CF3	21.87668694	CF3 = 1.46203 - 0.145712*ln(hardness)
	Chronic		e(1.273[ln(hardness)]-4.705)*CF4	0.852503083	CF4 = 1.46203 - 0.145712*ln(hardness)
Manganese (D)	Acute		e(0.3331[ln(hardness)]+6.4676)	2153.539324	
	Chronic		e(0.3331[ln(hardness)]+5.8743)	1189.832672	
Nickel (D)	Acute		0.998 e(0.846[ln(hardness)]+2.255)	204.2184852	
	Chronic		0.997 e(0.846[ln(hardness)]+0.0584)	22.68236886	
Silver (D)	Acute		0.85 e(1.72[ln(hardness)]-6.59)	0.59532219	
Zinc (D)	Acute		0.978 e(0.9094[ln(hardness)]+0.9095)	65.57732859	
	Chronic		0.986 e(0.90947[ln(hardness)]+0.6235)	49.68139038	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc. Ca (ug/l)	Effluent Conc. Ce (ug/l)	Acute Aquatic 2.13*Ce	Domestic Supply Cd,dom (ug/l)	Chronic Aquatic Cd (ug/l)	Human Health Cd,hh (ug/l)	Domestic Criteria ug/l						
Radioactivity, Nutrients, and Chlorine															
Aluminum, total	7429-90-5	2.5		23.2	49.416	16.7617885	16.7617885	16.7617885	1E+100	5000	1E+100	892.7752841	357.678632	1E+100	N/A
Barium, dissolved	7440-39-3	100		8.92	18.9996	6.44461867	6.44461867	6.44461867	2000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Boron, dissolved	7440-42-8	100		109	232.17	78.7515061	78.7515061	78.7515061	1E+100	750	5000	1E+100	1E+100	1E+100	N/A
Cobalt, dissolved	7440-48-4	50		0	0	0	0	0	1E+100	50	1000	1E+100	1E+100	1E+100	N/A
Uranium, dissolved	7440-61-1	0.1		0	0	0	0	0	30	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Vanadium, dissolved	7440-62-2	50		0	0	0	0	0	1E+100	100	100	1E+100	1E+100	1E+100	N/A
Ra-226 and Ra-228 (pCi/l)				0	0	0	0	0	5	1E+100	30	1E+100	1E+100	1E+100	N/A
Strontium (pCi/l)				0	0	0	0	0	8	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Tritium (pCi/l)				0	0	0	0	0	20000	1E+100	20000	1E+100	1E+100	1E+100	N/A
Gross Alpha (pCi/l)				2.79	5.9427	2.01574956	2.01574956	2.01574956	15	1E+100	15	1E+100	1E+100	1E+100	N/A
Asbestos (fibers/l)				0	0	0	0	0	7000000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Total Residual Chlorine	7782-50-5	33		0	0	0	0	0	1E+100	1E+100	11	19	11	1E+100	N/A
Nitrate as N (mg/l)				0	0	0	0	0	10	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Nitrite + Nitrate (mg/l)				0	0	0	0	0	1E+100	1E+100	132	1E+100	1E+100	1E+100	N/A
METALS AND CYANIDE															
Antimony, dissolved (P)	7440-36-0	60		0	0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	640	N/A
Arsenic, dissolved (P)	7440-38-2	0.5		1.267675322	2.700148436	0.91588386	0.91588386	0.91588386	10	100	200	340	150	9	N/A
Beryllium, dissolved	7440-41-7	0.5		0	0	0	0	0	4	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Cadmium, dissolved	7440-43-9	1		0	0	0	0	0	5	10	50	0.715576115	0.22363925	1E+100	N/A
Chromium (III), dissolved	16065-83-1	10		0	0	0	0	0	1E+100	1E+100	1E+100	255.1680018	33.1921146	1E+100	N/A
Chromium (VI), dissolved	18540-29-9	10		0	0	0	0	0	1E+100	1E+100	1E+100	16	11	1E+100	N/A
Chromium, dissolved	7440-47-3			0	0	0	0	0	100	100	1000	1E+100	1E+100	1E+100	N/A
Copper, dissolved	7440-50-8	0.5		13.57	28.9041	9.80420127	9.80420127	9.80420127	1300	200	500	5.333629869	3.87357298	1E+100	N/A
Lead, dissolved	7439-92-1	0.5		0	0	0	0	0	15	5000	100	21.87668694	0.85250308	1E+100	N/A
Manganese, dissolved	7439-96-5			3.63	7.7319	2.6226419	2.6226419	2.6226419	1E+100	1E+100	1E+100	2153.539324	1189.83267	1E+100	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock&	Acute	Chronic	Human	Need
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic	Aquatic	Health	TMDL
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria
			Ca (ug/l)	Ce (ug/l)	2.13°Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
Mercury, dissolved	7439-97-6	0.005			0	0	0	0	1E+100	1E+100	1E+100	1.4	0.77	1E+100	N/A
Mercury, total	7439-97-6	0.005		0.067	0.14271	0.04840689	0.04840689	0.04840689	2	1E+100	0.77	1E+100	1E+100	1E+100	N/A
Molybdenum, dissolved	7439-98-7			0.868	1.84884	0.62712209	0.62712209	0.62712209	1E+100	1000	1E+100	1E+100	1E+100	1E+100	N/A
Molybdenum, total recoverable	7439-98-7			0.868	1.84884	0.62712209	0.62712209	0.62712209	1E+100	1E+100	1E+100	7920	1895	1E+100	N/A
Nickel, dissolved (P)	7440-02-0	0.5		0	0	0	0	0	700	1E+100	1E+100	204.2184852	22.6823689	4600	N/A
Selenium, dissolved (P)	7782-49-2	5		0	0	0	0	0	50	130	50	1E+100	1E+100	4200	N/A
Selenium, dis (SO4 >500 mg/l)		5			0	0	0	0	50	250	50	1E+100	1E+100	4200	N/A
Selenium, total recoverable	7782-49-2	5		0	0	0	0	0	1E+100	1E+100	5	20	5	1E+100	N/A
Silver, dissolved	7440-22-4	0.5		0	0	0	0	0	1E+100	1E+100	1E+100	0.59532219	1E+100	1E+100	N/A
Thallium, dissolved (P)	7440-28-0	0.5		0.6	1.278	0.43349453	0.43349453	0.43349453	2	1E+100	1E+100	1E+100	1E+100	0.47	N/A
Zinc, dissolved	7440-66-6	20		81.24018864	173.0416018	58.6952955	58.6952955	58.6952955	10500	2000	25000	65.57732859	49.6813904	26000	N/A
Cyanide, total recoverable	57-12-5	10		1.67	3.5571	1.20655977	1.20655977	1.20655977	200	1E+100	5.2	22	5.2	140	N/A
Dioxin	1764-01-6	0.00001		0	0	0	0	0	3.00E-05	1E+100	1E+100	1E+100	1E+100	5.1E-08	N/A
VOLATILE COMPOUNDS															
Acrolein	107-02-8	50			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	9	N/A
Acrylonitrile	107-13-0	20			0	0	0	0	0.65	1E+100	1E+100	1E+100	1E+100	2.5	N/A
Benzene	71-43-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	510	N/A
Bromoform	75-25-2	10		15.5	33.015	11.1986087	11.1986087	11.1986087	44	1E+100	1E+100	1E+100	1E+100	1400	N/A
Carbon Tetrachloride	56-23-5	2			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	16	N/A
Chlorobenzene	108-90-7	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	1600	N/A
Clorodibromomethane	124-48-1	10		40	85.2	28.8996353	28.8996353	28.8996353	4.2	1E+100	1E+100	1E+100	1E+100	130	N/A
Chloroform	67-66-3	50		15.7	33.441	11.3431068	11.3431068	11.3431068	57	1E+100	1E+100	1E+100	1E+100	4700	N/A
Dichlorobromomethane	75-27-4	10		28.9	61.557	20.8799865	20.8799865	20.8799865	5.6	1E+100	1E+100	1E+100	1E+100	170	N/A
1,2-Dichloroethane	107-06-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	370	N/A
1,1-Dichloroethylene	75-35-4	10			0	0	0	0	7	1E+100	1E+100	1E+100	1E+100	7100	N/A
1,2-Dichloropropane	78-87-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	150	N/A
1,3-Dichloropropylene	542-75-6	10			0	0	0	0	3.5	1E+100	1E+100	1E+100	1E+100	210	N/A
Ethylbenzene	100-41-4	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	2100	N/A
Methyl Bromide	74-83-9	50			0	0	0	0	49	1E+100	1E+100	1E+100	1E+100	1500	N/A
Methylene Chloride	75-09-2	20			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	5900	N/A
1,1,2,2-Tetrachloroethane	79-34-5	10			0	0	0	0	1.8	1E+100	1E+100	1E+100	1E+100	40	N/A
Tetrachloroethylene	127-18-4	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	33	N/A
Toluene	108-88-3	10			0	0	0	0	1000	1E+100	1E+100	1E+100	1E+100	15000	N/A
1,2-trans-Dichloroethylene	156-60-5	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	10000	N/A
1,1,1-Trichloroethane	71-55-6				0	0	0	0	200	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
1,1,2-Trichloroethane	79-00-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	160	N/A
Trichloroethylene	79-01-6	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	300	N/A
Vinyl Chloride	75-01-4	10			0	0	0	0	2	1E+100	1E+100	1E+100	1E+100	24	N/A
ACID COMPOUNDS															
2-Chlorophenol	95-57-8	10			0	0	0	0	175	1E+100	1E+100	1E+100	1E+100	150	N/A
2,4-Dichlorophenol	120-83-2	10			0	0	0	0	105	1E+100	1E+100	1E+100	1E+100	290	N/A
2,4-Dimethylphenol	105-67-9	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	850	N/A
4,6-Dinitro-o-Cresol	534-52-1	50			0	0	0	0	14	1E+100	1E+100	1E+100	1E+100	280	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria						
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l						
2,4-Dinitrophenol	51-28-5	50			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	5300	N/A
Pentachlorophenol	87-86-5	50			0	0	0	0	1	1E+100	1E+100	19	15	30	N/A
Phenol	108-95-2	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	860000	N/A
2,4,6-Trichlorophenol	88-06-2	10			0	0	0	0	32	1E+100	1E+100	1E+100	1E+100	24	N/A
BASE/NEUTRAL															
Acenaphthene	83-32-9	10			0	0	0	0	2100	1E+100	1E+100	1E+100	1E+100	990	N/A
Anthracene	120-12-7	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	40000	N/A
Benzidine	92-87-5	50			0	0	0	0	0.0015	1E+100	1E+100	1E+100	1E+100	0.002	N/A
Benzo(a)anthracene	56-55-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(a)pyrene	50-32-8	5			0	0	0	0	0.2	1E+100	1E+100	1E+100	1E+100	0.18	N/A
3,4-Benzofluoranthene	205-99-2	10			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(k)fluoranthene	207-08-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Bis(2-chloroethyl)Ether	111-44-4	10			0	0	0	0	0.3	1E+100	1E+100	1E+100	1E+100	5.3	N/A
Bis(2-chloroisopropyl)Ether	108-60-1	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	65000	N/A
Bis(2-ethylhexyl)Phthalate	117-81-7	10			0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	22	N/A
Butyl Benzyl Phthalate	85-68-7	10			0	0	0	0	7000	1E+100	1E+100	1E+100	1E+100	1900	N/A
2-Chloronaphthalene	91-58-7	10			0	0	0	0	2800	1E+100	1E+100	1E+100	1E+100	1600	N/A
Chrysene	218-01-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Dibenzo(a,h)anthracene	53-70-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
1,2-Dichlorobenzene	95-50-1	10			0	0	0	0	600	1E+100	1E+100	1E+100	1E+100	1300	N/A
1,3-Dichlorobenzene	541-73-1	10			0	0	0	0	469	1E+100	1E+100	1E+100	1E+100	960	N/A
1,4-Dichlorobenzene	106-46-7	10			0	0	0	0	75	1E+100	1E+100	1E+100	1E+100	190	N/A
3,3'-Dichlorobenzidine	91-94-1	5			0	0	0	0	0.78	1E+100	1E+100	1E+100	1E+100	0.28	N/A
Diethyl Phthalate	84-66-2	10			0	0	0	0	28000	1E+100	1E+100	1E+100	1E+100	44000	N/A
Dimethyl Phthalate	131-11-3	10			0	0	0	0	350000	1E+100	1E+100	1E+100	1E+100	1100000	N/A
Di-n-Butyl Phthalate	84-74-2	10			0	0	0	0	3500	1E+100	1E+100	1E+100	1E+100	4500	N/A
2,4-Dinitrotoluene	121-14-2	10			0	0	0	0	1.1	1E+100	1E+100	1E+100	1E+100	34	N/A
1,2-Diphenylhydrazine	122-66-7	20			0	0	0	0	0.44	1E+100	1E+100	1E+100	1E+100	2	N/A
Fluoranthene	206-44-0	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	140	N/A
Fluorene	86-73-7	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	5300	N/A
Hexachlorobenzene	118-74-1	5			0	0	0	0	1	1E+100	1E+100	1E+100	1E+100	0.0029	N/A
Hexachlorobutadiene	87-68-3	10			0	0	0	0	4.5	1E+100	1E+100	1E+100	1E+100	180	N/A
Hexachlorocyclopentadiene	77-47-4	10			0	0	0	0	50	1E+100	1E+100	1E+100	1E+100	1100	N/A
Hexachloroethane	67-72-1	20			0	0	0	0	25	1E+100	1E+100	1E+100	1E+100	33	N/A
Indeno(1,2,3-cd)Pyrene	193-39-5	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Isophorone	78-59-1	10			0	0	0	0	368	1E+100	1E+100	1E+100	1E+100	9600	N/A
Nitrobenzene	98-95-3	10			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	690	N/A
n-Nitrosodimethylamine	62-75-9	50			0	0	0	0	0.0069	1E+100	1E+100	1E+100	1E+100	30	N/A
n-Nitrosodi-n-Propylamine	621-64-7	20			0	0	0	0	0.05	1E+100	1E+100	1E+100	1E+100	5.1	N/A
n-Nitrosodiphenylamine	86-30-6	20			0	0	0	0	71	1E+100	1E+100	1E+100	1E+100	60	N/A
Pyrene	129-00-0	10			0	0	0	0	1050	1E+100	1E+100	1E+100	1E+100	4000	N/A
1,2,4-Trichlorobenzene	120-82-1	10			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	70	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock & Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria	Irrigation Criteria					
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l					
PESTICIDES AND PCBs															
Aldrin	309-00-2	0.01			0	0	0	0	0.021	1E+100	1E+100	3	1E+100	0.0005	N/A
Alpha-BHC	319-84-6	0.05			0	0	0	0	0.056	1E+100	1E+100	1E+100	1E+100	0.049	N/A
Beta-BHC	319-85-7	0.05			0	0	0	0	0.091	1E+100	1E+100	1E+100	1E+100	0.17	N/A
Gamma-BHC	58-89-9	0.05			0	0	0	0	0.2	1E+100	1E+100	0.95	1E+100	1.8	N/A
Chlordane	57-74-9	0.2			0	0	0	0	2	1E+100	1E+100	2.4	0.0043	0.0081	N/A
4,4'-DDT and derivatives	50-29-3	0.02			0	0	0	0	1	1E+100	0.001	1.1	0.001	0.0022	N/A
Dieldrin	60-57-1	0.02			0	0	0	0	0.022	1E+100	1E+100	0.24	0.056	0.00054	N/A
Diazinon	333-41-5				0	0	0	0	1E+100	1E+100	1E+100	0.17	0.17	1E+100	N/A
Alpha-Endosulfan	959-98-8	0.01			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Beta-Endosulfan	33213-65-9	0.02			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Endosulfan sulfate	1031-7-8	0.1			0	0	0	0	62	1E+100	1E+100	1E+100	1E+100	89	N/A
Endrin	72-20-8	0.02			0	0	0	0	2	1E+100	1E+100	0.086	0.036	0.06	N/A
Endrin Aldehyde	7421-93-4	0.1			0	0	0	0	10.5	1E+100	1E+100	1E+100	1E+100	0.3	N/A
Heptachlor	76-44-8	0.01			0	0	0	0	0.4	1E+100	1E+100	0.52	0.0038	0.00079	N/A
Heptachlor Epoxide	1024-57-3	0.01			0	0	0	0	0.2	1E+100	1E+100	0.52	0.0038	0.00039	N/A
PCBs	1336-36-3	0.2			0	0	0	0	0.5	1E+100	0.014	2	0.014	0.00064	N/A
Toxaphene	8001-35-2	0.3			0	0	0	0	3	1E+100	1E+100	0.73	0.0002	0.0028	N/A

Note: SCORET CODE for reference only. Codes for total form are used except for parameters which have criteria in both total and dissolved forms.

STEP 3: SCAN POTENTIAL INSTREAM WASTE CONCENTRATIONS AGAINST WATER QUALITY CRITERIA
AND ESTABLISH EFFLUENT LIMITATIONS FOR ALL APPLICABLE PARAMETERS

No limits are established if the receiving stream is not designated for the particular uses.

No limits are established if the potential instream waste concentrations are less than the chronic water quality criteria.

The most applicable stringent criteria are used to establish effluent limitations for a given parameter.

Water quality criteria apply at the end-of-pipe for acute aquatic life criteria and discharges to public lakes.

If background concentration exceeds the water quality criteria, water quality criteria apply. And "Need TMDL" shown to the next column of Avg. Mass

Monthly avg concentration = daily max. / 1.5.

APPLICABLE WATER QUALITY-BASED LIMITS

The following formula is used to calculate the allowable daily maximum effluent concentration

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

Daily Max. Conc. = $C_s + (C_s - C_a)(F \cdot Q_a / Q_e)$

Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where: C_s = Applicable water quality standard

C_a = Ambient stream concentration

F = Fraction of stream allowed for mixing (1.0 is assigned to domestic water supply and human health uses)

Q_e = Plant effluent flow

Q_a = Criteria Low flow (4Q3) or Harmonic Mean flow for Human Health Criteria

CALCULATIONS OF NEW MEXICO WATER QUALITY-BASED EFFLUENT LIMITATIONS

NMAC 20.6.4. **NMWQS as of January 14, 2011**

(EPA approved site-specific criteria for aluminum, cadmium, and zinc on April 30, 2012)

Calculations Specifications:

Excel **Revised as of May 1, 2012**

Prepared By:

Isaac Chen 06/13/2019

STEP 1: REFERENCE IMPLEMENTATION PROCEDURES
INPUT FACILITY AND RECEIVING STREAM DATA
LIST SOURCE OF DATA INPUT

APPENDIX A
of FACT SHEET

IMPLEMENTATION PROCEDURES

The State of New Mexico Standards for Interstate and Intrastate Surface Waters are implemented in this spread sheet by using procedures established in the "Procedures for Implementing NPDES Permits in New Mexico" amended May 2011

FACILITY	DATA INPUT	
Permittee	LANL	
NPDES Permit No.	NM0028355	
Outfall No.(s)	03A048	
Plant Effluent Flow (MGD)	0.088	For industrial and federal facility, use the highest monthly average flow for the past 24 months. For POTWs, use the design flow.
Plant Effluent Flow (cfs)	0.1364	

RECEIVING STREAM	DATA INPUT	
Receiving Stream Name	Los Alamos Canyon	
Basin Name	Rio Grande	
Waterbody Segment Code No.	20.6.4.128	
Is a publicly owned lake or reservoir (enter "1" if it's a lake, "0" if not)	0	
Are acute aquatic life criteria considered (1= yes, 0= no) (MUST enter "1" for 2005 Standards)	1	
Are chronic aquatic life criteria considered (1= yes, 0=no)	0	
Are domestic water supply criteria considered (1= yes, 0=no)	0	
Are irrigation water supply criteria considered (1= yes, 0=no)	0	
Livestock watering and wildlife habitat criteria applied to all streams		
USGS Flow Station	USGS	
WQ Monitoring Station No.	SJR	
Receiving Stream TSS (mg/l)	1.96	For intermittent stream, enter effluent TSS
Receiving Stream Hardness (mg/l as CaCO ₃)	126	RANGE: 0 - 400 For intermittent stream, enter effluent Hardness (If no data, 20 mg/l is used)
Receiving Stream Critical Low Flow (4Q3) (cfs)	0	Enter "0" for intermittent stream and lake.
Receiving Stream Harmonic Mean Flow (cfs)	0.00155	Enter harmonic mean or modified harmonic mean flow data
Avg. Water Temperature (C)	21.7	
pH (Avg)	8.7	
Fraction of stream allowed for mixing (F)	1	Enter 1, if stream morphology data is not available or for intermittent streams.
Fraction of Critical Low Flow	0	

STEP 2: INPUT AMBIENT AND EFFLUENT DATA

CALCULATE IN-STREAM WASTE CONCENTRATIONS

DATA INPUT

Input pollutant geometric mean concentration as micro-gram per liter (ug/l or ppb)

unless other unit is specified for the parameter.

Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, input "1/2 DL" for calculation.

Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, no data is inputted.

If a less than MQL value is reported, input either the reported value or "0" for calculation.

The following formula is used to calculate the Instream Waste Concentration (Cd)

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Cd = [(F \cdot Qa \cdot Ca) + (Qe \cdot 2.13 \cdot Ce)] / (F \cdot Qa + Qe)$$

Where:

Cd = Instream Waste Concentration

F = Fraction of stream allowed for mixing (see "Procedures for Implementing NPDES Permits in New Mexico")

Ce = Reported concentration in effluent

Ca = Ambient stream concentration upstream of discharge

Qe = Plant effluent flow

Qa = Critical low flow of stream at discharge point expressed as the 4Q3 or harmonic mean flow for human health criteria

The following formula convert metals reported in total form to dissolved form if criteria are in dissolved form

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Kp = Kpo \cdot (TSS)^a$$

Kp = Linear partition coefficient; Kpo and a can be found in table below

$$C/Ct = 1 / (1 + Kp \cdot TSS \cdot 10^{-6})$$

TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)

$$\text{Total Metal Criteria (Ct)} = Cr / (C/Ct)$$

C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value

Total Metals	Total Value	Stream Linear Partition Coefficient					Lake Linear Partition Coefficient				
		Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Stream	Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Lake
Arsenic	4.26	480000	-0.73	293693.48	0.634663054	2.70366461	480000	-0.73	293693.48	0.634663054	2.70366461
Chromium III	9.43	3360000	-0.93	1796971.259	0.221137974	2.0853311	2170000	-0.27	1809466.698	0.219946764	2.07409799
Copper	1.06	1040000	-0.74	632068.0623	0.446657204	0.47345664	2850000	-0.9	1555300.801	0.247011801	0.26183251
Lead	0	2800000	-0.8	1634380.508	0.237903454	0	2040000	-0.53	1428020.525	0.263232692	0
Nickel	0.6	490000	-0.57	333895.1566	0.604436136	0.36266168	2210000	-0.76	1325188.503	0.277980899	0.16678854
Silver	0	2390000	-1.03	1195017.176	0.299201103	0	2390000	-1.03	1195017.176	0.299201103	0
Zinc	0	1250000	-0.7	780424.2632	0.395314487	0	3340000	-0.68	2113549.085	0.194455823	0

The following formula is used to calculate hardness dependent criteria

(Please refer to State Water Quality Standards for details)

Dissolved

WQC (ug/l)

Aluminum (T)	Acute	$e(1.3695[\ln(\text{hardness})]+1.8308)$	4694.223886	If Stream pH < 6.5, enter 750 in cell O113
	Chronic	$e(1.3695[\ln(\text{hardness})]+0.9161)$	1880.678832	If Stream pH < 6.5, enter 87 in cell P113
Cadmium (D)	Acute	$e(0.8968[\ln(\text{hardness})]-3.5699) \cdot CF1$	2.012451806	$CF1 = 1.136672 - 0.041838 \cdot \ln(\text{hardness})$
	Chronic	$e(0.7647[\ln(\text{hardness})]-4.2180) \cdot CF2$	0.534834117	$CF2 = 1.101672 - 0.041838 \cdot \ln(\text{hardness})$

			Dissolved WQC (ug/l)	
Chromium III (D)	Acute	0.316 e(0.819[ln(hardness)]+3.7256)	688.4907041	
	Chronic	0.860 e(0.819[ln(hardness)]+0.6848)	89.55849543	
Copper (D)	Acute	0.960 e(0.9422[ln(hardness)]-1.700)	16.70858766	
	Chronic	0.960 e(0.8545[ln(hardness)]-1.702)	10.911103	
Lead (D)	Acute	e(1.273[ln(hardness)]-1.46)*CF3	82.98210551	CF3 = 1.46203 - 0.145712*ln(hardness)
	Chronic	e(1.273[ln(hardness)]-4.705)*CF4	3.233693519	CF4 = 1.46203 - 0.145712*ln(hardness)
Manganese (D)	Acute	e(0.3331[ln(hardness)]+6.4676)	3224.604233	
	Chronic	e(0.3331[ln(hardness)]+5.8743)	1781.597127	
Nickel (D)	Acute	0.998 e(0.846[ln(hardness)]+2.255)	569.3483667	
	Chronic	0.997 e(0.846[ln(hardness)]+0.0584)	63.23702601	
Silver (D)	Acute	0.85 e(1.72[ln(hardness)]-6.59)	4.786914026	
Zinc (D)	Acute	0.978 e(0.9094[ln(hardness)]+0.9095)	197.4270516	
	Chronic	0.986 e(0.90947[ln(hardness)]+0.6235)	149.5834426	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc.	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria						
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l						
Radioactivity, Nutrients, and Chlorine															
Aluminum, total	7429-90-5	2.5	19.3	41.109	41.109	41.109	40.6471011	1E+100	5000	1E+100	4694.223886	1880.67883	1E+100	N/A	
Barium, dissolved	7440-39-3	100	76.4	162.732	162.732	162.732	160.903551	2000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Boron, dissolved	7440-42-8	100	66.4	141.432	141.432	141.432	139.842876	1E+100	750	5000	1E+100	1E+100	1E+100	N/A	
Cobalt, dissolved	7440-48-4	50	0	0	0	0	0	1E+100	50	1000	1E+100	1E+100	1E+100	N/A	
Uranium, dissolved	7440-61-1	0.1	0	0	0	0	0	30	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Vanadium, dissolved	7440-62-2	50	0	0	0	0	0	1E+100	100	100	1E+100	1E+100	1E+100	N/A	
Ra-226 and Ra-228 (pCi/l)			0.189	0.40257	0.40257	0.40257	0.39804674	5	1E+100	30	1E+100	1E+100	1E+100	N/A	
Strontium (pCi/l)			0	0	0	0	0	8	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Tritium (pCi/l)			0	0	0	0	0	20000	1E+100	20000	1E+100	1E+100	1E+100	N/A	
Gross Alpha (pCi/l)			1.85	3.9405	3.9405	3.9405	3.89622472	15	1E+100	15	1E+100	1E+100	1E+100	N/A	
Asbestos (fibers/l)			0	0	0	0	0	7000000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Total Residual Chlorine	7782-50-5	33	0	0	0	0	0	1E+100	1E+100	11	19	11	1E+100	N/A	
Nitrate as N (mg/l)			3.11	6.6243	6.6243	6.6243	6.54986966	10	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Nitrite + Nitrate (mg/l)			0	0	0	0	0	1E+100	1E+100	132	1E+100	1E+100	1E+100	N/A	
METALS AND CYANIDE															
Antimony, dissolved (P)	7440-36-0	60	0	0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	640	N/A	
Arsenic, dissolved (P)	7440-38-2	0.5	2.70366461	5.75880562	5.75880562	5.75880562	5.69409994	10	100	200	340	150	9	N/A	
Beryllium, dissolved	7440-41-7	0.5	0	0	0	0	0	4	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Cadmium, dissolved	7440-43-9	1	0	0	0	0	0	5	10	50	2.012451806	0.53483412	1E+100	N/A	
Chromium (III), dissolved	16065-83-1	10	0	0	0	0	0	1E+100	1E+100	1E+100	688.4907041	89.5584954	1E+100	N/A	
Chromium (VI), dissolved	18540-29-9	10	0	0	0	0	0	1E+100	1E+100	1E+100	16	11	1E+100	N/A	
Chromium, dissolved	7440-47-3		0	0	0	0	0	100	100	1000	1E+100	1E+100	1E+100	N/A	
Copper, dissolved	7440-50-8	0.5	0.473456636	1.008462634	1.00846263	1.00846263	0.99713159	1300	200	500	16.70858766	10.911103	1E+100	N/A	
Lead, dissolved	7439-92-1	0.5	0	0	0	0	0	15	5000	100	82.98210551	3.23369352	1E+100	N/A	
Manganese, dissolved	7439-96-5		0	0	0	0	0	1E+100	1E+100	1E+100	3224.604233	1781.59713	1E+100	N/A	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock&	Acute	Chronic	Human	Need
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic	Aquatic	Health	TMDL
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria
			Ca (ug/l)	Ce (ug/l)	2.13°Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
Mercury, dissolved	7439-97-6	0.005		0.0009	0.001917	0.001917	0.001917	0.00189546	1E+100	1E+100	1E+100	1.4	0.77	1E+100	N/A
Mercury, total	7439-97-6	0.005		0.0009	0.001917	0.001917	0.001917	0.00189546	2	1E+100	0.77	1E+100	1E+100	1E+100	N/A
Molybdenum, dissolved	7439-98-7			2.45	5.2185	5.2185	5.2185	5.15986517	1E+100	1000	1E+100	1E+100	1E+100	1E+100	N/A
Molybdenum, total recoverable	7439-98-7			2.45	5.2185	5.2185	5.2185	5.15986517	1E+100	1E+100	1E+100	7920	1895	1E+100	N/A
Nickel, dissolved (P)	7440-02-0	0.5		0.362661681	0.772469381	0.77246938	0.77246938	0.76378995	700	1E+100	1E+100	569.3483667	63.237026	4600	N/A
Selenium, dissolved (P)	7782-49-2	5		0	0	0	0	0	50	130	50	1E+100	1E+100	4200	N/A
Selenium, dis (SO4 >500 mg/l)		5		0	0	0	0	0	50	250	50	1E+100	1E+100	4200	N/A
Selenium, total recoverable	7782-49-2	5		0	0	0	0	0	1E+100	1E+100	5	20	5	1E+100	N/A
Silver, dissolved	7440-22-4	0.5		0	0	0	0	0	1E+100	1E+100	1E+100	4.786914026	1E+100	1E+100	N/A
Thallium, dissolved (P)	7440-28-0	0.5		0.19	0.4047	0.4047	0.4047	0.40015281	2	1E+100	1E+100	1E+100	1E+100	0.47	N/A
Zinc, dissolved	7440-66-6	20		0	0	0	0	0	10500	2000	25000	197.4270516	149.583443	26000	N/A
Cyanide, total recoverable	57-12-5	10		0	0	0	0	0	200	1E+100	5.2	22	5.2	140	N/A
Dioxin	1764-01-6	0.00001		0	0	0	0	0	3.00E-05	1E+100	1E+100	1E+100	1E+100	5.1E-08	N/A
VOLATILE COMPOUNDS															
Acrolein	107-02-8	50			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	9	N/A
Acrylonitrile	107-13-0	20			0	0	0	0	0.65	1E+100	1E+100	1E+100	1E+100	2.5	N/A
Benzene	71-43-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	510	N/A
Bromoform	75-25-2	10		0	0	0	0	0	44	1E+100	1E+100	1E+100	1E+100	1400	N/A
Carbon Tetrachloride	56-23-5	2			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	16	N/A
Chlorobenzene	108-90-7	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	1600	N/A
Clorodibromomethane	124-48-1	10			0	0	0	0	4.2	1E+100	1E+100	1E+100	1E+100	130	N/A
Chloroform	67-66-3	50			0	0	0	0	57	1E+100	1E+100	1E+100	1E+100	4700	N/A
Dichlorobromomethane	75-27-4	10			0	0	0	0	5.6	1E+100	1E+100	1E+100	1E+100	170	N/A
1,2-Dichloroethane	107-06-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	370	N/A
1,1-Dichloroethylene	75-35-4	10			0	0	0	0	7	1E+100	1E+100	1E+100	1E+100	7100	N/A
1,2-Dichloropropane	78-87-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	150	N/A
1,3-Dichloropropylene	542-75-6	10			0	0	0	0	3.5	1E+100	1E+100	1E+100	1E+100	210	N/A
Ethylbenzene	100-41-4	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	2100	N/A
Methyl Bromide	74-83-9	50			0	0	0	0	49	1E+100	1E+100	1E+100	1E+100	1500	N/A
Methylene Chloride	75-09-2	20			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	5900	N/A
1,1,2,2-Tetrachloroethane	79-34-5	10			0	0	0	0	1.8	1E+100	1E+100	1E+100	1E+100	40	N/A
Tetrachloroethylene	127-18-4	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	33	N/A
Toluene	108-88-3	10			0	0	0	0	1000	1E+100	1E+100	1E+100	1E+100	15000	N/A
1,2-trans-Dichloroethylene	156-60-5	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	10000	N/A
1,1,1-Trichloroethane	71-55-6				0	0	0	0	200	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
1,1,2-Trichloroethane	79-00-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	160	N/A
Trichloroethylene	79-01-6	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	300	N/A
Vinyl Chloride	75-01-4	10			0	0	0	0	2	1E+100	1E+100	1E+100	1E+100	24	N/A
ACID COMPOUNDS															
2-Chlorophenol	95-57-8	10			0	0	0	0	175	1E+100	1E+100	1E+100	1E+100	150	N/A
2,4-Dichlorophenol	120-83-2	10			0	0	0	0	105	1E+100	1E+100	1E+100	1E+100	290	N/A
2,4-Dimethylphenol	105-67-9	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	850	N/A
4,6-Dinitro-o-Cresol	534-52-1	50			0	0	0	0	14	1E+100	1E+100	1E+100	1E+100	280	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria						
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l						
2,4-Dinitrophenol	51-28-5	50			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	5300	N/A
Pentachlorophenol	87-86-5	50			0	0	0	0	1	1E+100	1E+100	19	15	30	N/A
Phenol	108-95-2	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	860000	N/A
2,4,6-Trichlorophenol	88-06-2	10			0	0	0	0	32	1E+100	1E+100	1E+100	1E+100	24	N/A
BASE/NEUTRAL					0										
Acenaphthene	83-32-9	10			0	0	0	0	2100	1E+100	1E+100	1E+100	1E+100	990	N/A
Anthracene	120-12-7	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	40000	N/A
Benzidine	92-87-5	50			0	0	0	0	0.0015	1E+100	1E+100	1E+100	1E+100	0.002	N/A
Benzo(a)anthracene	56-55-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(a)pyrene	50-32-8	5			0	0	0	0	0.2	1E+100	1E+100	1E+100	1E+100	0.18	N/A
3,4-Benzofluoranthene	205-99-2	10			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(k)fluoranthene	207-08-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Bis(2-chloroethyl)Ether	111-44-4	10			0	0	0	0	0.3	1E+100	1E+100	1E+100	1E+100	5.3	N/A
Bis(2-chloroisopropyl)Ether	108-60-1	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	65000	N/A
Bis(2-ethylhexyl)Phthalate	117-81-7	10			0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	22	N/A
Butyl Benzyl Phthalate	85-68-7	10			0	0	0	0	7000	1E+100	1E+100	1E+100	1E+100	1900	N/A
2-Chloronaphthalene	91-58-7	10			0	0	0	0	2800	1E+100	1E+100	1E+100	1E+100	1600	N/A
Chrysene	218-01-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Dibenzo(a,h)anthracene	53-70-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
1,2-Dichlorobenzene	95-50-1	10			0	0	0	0	600	1E+100	1E+100	1E+100	1E+100	1300	N/A
1,3-Dichlorobenzene	541-73-1	10			0	0	0	0	469	1E+100	1E+100	1E+100	1E+100	960	N/A
1,4-Dichlorobenzene	106-46-7	10			0	0	0	0	75	1E+100	1E+100	1E+100	1E+100	190	N/A
3,3'-Dichlorobenzidine	91-94-1	5			0	0	0	0	0.78	1E+100	1E+100	1E+100	1E+100	0.28	N/A
Diethyl Phthalate	84-66-2	10			0	0	0	0	28000	1E+100	1E+100	1E+100	1E+100	44000	N/A
Dimethyl Phthalate	131-11-3	10			0	0	0	0	350000	1E+100	1E+100	1E+100	1E+100	1100000	N/A
Di-n-Butyl Phthalate	84-74-2	10			0	0	0	0	3500	1E+100	1E+100	1E+100	1E+100	4500	N/A
2,4-Dinitrotoluene	121-14-2	10			0	0	0	0	1.1	1E+100	1E+100	1E+100	1E+100	34	N/A
1,2-Diphenylhydrazine	122-66-7	20			0	0	0	0	0.44	1E+100	1E+100	1E+100	1E+100	2	N/A
Fluoranthene	206-44-0	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	140	N/A
Fluorene	86-73-7	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	5300	N/A
Hexachlorobenzene	118-74-1	5			0	0	0	0	1	1E+100	1E+100	1E+100	1E+100	0.0029	N/A
Hexachlorobutadiene	87-68-3	10			0	0	0	0	4.5	1E+100	1E+100	1E+100	1E+100	180	N/A
Hexachlorocyclopentadiene	77-47-4	10			0	0	0	0	50	1E+100	1E+100	1E+100	1E+100	1100	N/A
Hexachloroethane	67-72-1	20			0	0	0	0	25	1E+100	1E+100	1E+100	1E+100	33	N/A
Indeno(1,2,3-cd)Pyrene	193-39-5	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Isophorone	78-59-1	10			0	0	0	0	368	1E+100	1E+100	1E+100	1E+100	9600	N/A
Nitrobenzene	98-95-3	10			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	690	N/A
n-Nitrosodimethylamine	62-75-9	50			0	0	0	0	0.0069	1E+100	1E+100	1E+100	1E+100	30	N/A
n-Nitrosodi-n-Propylamine	621-64-7	20			0	0	0	0	0.05	1E+100	1E+100	1E+100	1E+100	5.1	N/A
n-Nitrosodiphenylamine	86-30-6	20			0	0	0	0	71	1E+100	1E+100	1E+100	1E+100	60	N/A
Pyrene	129-00-0	10			0	0	0	0	1050	1E+100	1E+100	1E+100	1E+100	4000	N/A
1,2,4-Trichlorobenzene	120-82-1	10			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	70	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock & Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria	Irrigation Criteria					
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l					
PESTICIDES AND PCBs															
Aldrin	309-00-2	0.01			0	0	0	0	0.021	1E+100	1E+100	3	1E+100	0.0005	N/A
Alpha-BHC	319-84-6	0.05			0	0	0	0	0.056	1E+100	1E+100	1E+100	1E+100	0.049	N/A
Beta-BHC	319-85-7	0.05			0	0	0	0	0.091	1E+100	1E+100	1E+100	1E+100	0.17	N/A
Gamma-BHC	58-89-9	0.05			0	0	0	0	0.2	1E+100	1E+100	0.95	1E+100	1.8	N/A
Chlordane	57-74-9	0.2			0	0	0	0	2	1E+100	1E+100	2.4	0.0043	0.0081	N/A
4,4'-DDT and derivatives	50-29-3	0.02			0	0	0	0	1	1E+100	0.001	1.1	0.001	0.0022	N/A
Dieldrin	60-57-1	0.02			0	0	0	0	0.022	1E+100	1E+100	0.24	0.056	0.00054	N/A
Diazinon	333-41-5				0	0	0	0	1E+100	1E+100	1E+100	0.17	0.17	1E+100	N/A
Alpha-Endosulfan	959-98-8	0.01			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Beta-Endosulfan	33213-65-9	0.02			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Endosulfan sulfate	1031-7-8	0.1			0	0	0	0	62	1E+100	1E+100	1E+100	1E+100	89	N/A
Endrin	72-20-8	0.02			0	0	0	0	2	1E+100	1E+100	0.086	0.036	0.06	N/A
Endrin Aldehyde	7421-93-4	0.1			0	0	0	0	10.5	1E+100	1E+100	1E+100	1E+100	0.3	N/A
Heptachlor	76-44-8	0.01			0	0	0	0	0.4	1E+100	1E+100	0.52	0.0038	0.00079	N/A
Heptachlor Epoxide	1024-57-3	0.01			0	0	0	0	0.2	1E+100	1E+100	0.52	0.0038	0.00039	N/A
PCBs	1336-36-3	0.2			0	0	0	0	0.5	1E+100	0.014	2	0.014	0.00064	N/A
Toxaphene	8001-35-2	0.3			0	0	0	0	3	1E+100	1E+100	0.73	0.0002	0.0028	N/A

Note: SCORET CODE for reference only. Codes for total form are used except for parameters which have criteria in both total and dissolved forms.

STEP 3: SCAN POTENTIAL INSTREAM WASTE CONCENTRATIONS AGAINST WATER QUALITY CRITERIA
AND ESTABLISH EFFLUENT LIMITATIONS FOR ALL APPLICABLE PARAMETERS

No limits are established if the receiving stream is not designated for the particular uses.

No limits are established if the potential instream waste concentrations are less than the chronic water quality criteria.

The most applicable stringent criteria are used to establish effluent limitations for a given parameter.

Water quality criteria apply at the end-of-pipe for acute aquatic life criteria and discharges to public lakes.

If background concentration exceeds the water quality criteria, water quality criteria apply. And "Need TMDL" shown to the next column of Avg. Mass

Monthly avg concentration = daily max. / 1.5.

APPLICABLE WATER QUALITY-BASED LIMITS

The following formula is used to calculate the allowable daily maximum effluent concentration

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

Daily Max. Conc. = $C_s + (C_s - C_a)(F \cdot Q_a / Q_e)$

Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where:

C_s = Applicable water quality standard

C_a = Ambient stream concentration

F = Fraction of stream allowed for mixing (1.0 is assigned to domestic water supply and human health uses)

Q_e = Plant effluent flow

Q_a = Criteria Low flow (4Q3) or Harmonic Mean flow for Human Health Criteria

CALCULATIONS OF NEW MEXICO WATER QUALITY-BASED EFFLUENT LIMITATIONS

NMAC 20.6.4. **NMWQS as of January 14, 2011**

(EPA approved site-specific criteria for aluminum, cadmium, and zinc on April 30, 2012)

Calculations Specifications:

Excel **Revised as of May 1, 2012**

Prepared By: **Isaac Chen 06/13/2019**

STEP 1: REFERENCE IMPLEMENTATION PROCEDURES
INPUT FACILITY AND RECEIVING STREAM DATA
LIST SOURCE OF DATA INPUT

APPENDIX A of FACT SHEET

IMPLEMENTATION PROCEDURES

The State of New Mexico Standards for Interstate and Intrastate Surface Waters are implemented in this spread sheet by using procedures established in the "Procedures for Implementing NPDES Permits in New Mexico" amended May 2011

FACILITY	DATA INPUT	
Permittee	LANL	
NPDES Permit No.	NM0028355	
Outfall No.(s)	03A113	
Plant Effluent Flow (MGD)	0.0016	For industrial and federal facility, use the highest monthly average flow for the past 24 months. For POTWs, use the design flow.
Plant Effluent Flow (cfs)	0.00248	
RECEIVING STREAM	DATA INPUT	
Receiving Stream Name	Sandia Canyon	
Basin Name	Rio Grande	
Waterbody Segment Code No.	20.6.4.128	
Is a publicly owned lake or reservoir (enter "1" if it's a lake, "0" if not)	0	
Are acute aquatic life criteria considered (1= yes, 0= no) (MUST enter "1" for 2005 Standards)	1	
Are chronic aquatic life criteria considered (1= yes, 0=no)	0	
Are domestic water supply criteria considered (1= yes, 0=no)	0	
Are irrigation water supply criteria considered (1= yes, 0=no)	0	
Livestock watering and wildlife habitat criteria applied to all streams		
USGS Flow Station	USGS	
WQ Monitoring Station No.	SJR	
Receiving Stream TSS (mg/l)	1.8	For intermittent stream, enter effluent TSS
Receiving Stream Hardness (mg/l as CaCO ₃)	96	For intermittent stream, enter effluent Hardness (If no data, 20 mg/l is used)
Receiving Stream Critical Low Flow (4Q3) (cfs)	0	Enter "0" for intermittent stream and lake.
Receiving Stream Harmonic Mean Flow (cfs)	0.00155	Enter harmonic mean or modified harmonic mean flow data
Avg. Water Temperature (C)	21.8	
pH (Avg)	8.5	
Fraction of stream allowed for mixing (F)	1	Enter 1, if stream morphology data is not available or for intermittent streams.
Fraction of Critical Low Flow	0	

STEP 2: INPUT AMBIENT AND EFFLUENT DATA

CALCULATE IN-STREAM WASTE CONCENTRATIONS

DATA INPUT

Input pollutant geometric mean concentration as micro-gram per liter (ug/l or ppb)

unless other unit is specified for the parameter.

Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, input "1/2 DL" for calculation.

Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, no data is inputted.

If a less than MQL value is reported, input either the reported value or "0" for calculation.

The following formula is used to calculate the Instream Waste Concentration (Cd)

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Cd = [(F \cdot Qa \cdot Ca) + (Qe \cdot 2.13 \cdot Ce)] / (F \cdot Qa + Qe)$$

Where:

Cd = Instream Waste Concentration

F = Fraction of stream allowed for mixing (see "Procedures for Implementing NPDES Permits in New Mexico")

Ce = Reported concentration in effluent

Ca = Ambient stream concentration upstream of discharge

Qe = Plant effluent flow

Qa = Critical low flow of stream at discharge point expressed as the 4Q3 or harmonic mean flow for human health criteria

The following formula convert metals reported in total form to dissolved form if criteria are in dissolved form

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Kp = Kpo \cdot (TSS \cdot a)$$

Kp = Linear partition coefficient; Kpo and a can be found in table below

$$C/Ct = 1 / (1 + Kp \cdot TSS \cdot 10^{-6})$$

TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)

$$\text{Total Metal Criteria (Ct)} = Cr / (C/Ct)$$

C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value

Total Metals	Total Value	Stream Linear Partition Coefficient					Lake Linear Partition Coefficient				
		Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Stream	Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Lake
Arsenic	2	480000	-0.73	312530.4294	0.639977566	1.27995513	480000	-0.73	312530.4294	0.639977566	1.27995513
Chromium III	0	3360000	-0.93	1945072.742	0.222166388	0	2170000	-0.27	1851553.04	0.230797878	0
Copper	10.4	1040000	-0.74	673180.7453	0.452135707	4.70221135	2850000	-0.9	1679189.096	0.248599121	2.58543086
Lead	0.518	2800000	-0.8	1749605.065	0.241005139	0.12484066	2040000	-0.53	1493948.889	0.271068236	0.14041335
Nickel	0.6	490000	-0.57	350502.2031	0.613156888	0.36789413	2210000	-0.76	1413790.86	0.282101489	0.16926089
Silver	0	2390000	-1.03	1304569.5	0.298665702	0	2390000	-1.03	1304569.5	0.298665702	0
Zinc	0	1250000	-0.7	828360.267	0.40143739	0	3340000	-0.68	2239552.065	0.198759987	0

The following formula is used to calculate hardness dependent criteria

(Please refer to State Water Quality Standards for details)

Dissolved

WQC (ug/l)

Aluminum (T)	Acute	$e(1.3695[\ln(\text{hardness})]+1.8308)$	3234.646244	If Stream pH < 6.5, enter 750 in cell O113
	Chronic	$e(1.3695[\ln(\text{hardness})]+0.9161)$	1295.918317	If Stream pH < 6.5, enter 87 in cell P113
Cadmium (D)	Acute	$e(0.8968[\ln(\text{hardness})]-3.5699) \cdot CF1$	1.596137868	$CF1 = 1.136672 - 0.041838 \cdot \ln(\text{hardness})$
	Chronic	$e(0.7647[\ln(\text{hardness})]-4.2180) \cdot CF2$	0.439914443	$CF2 = 1.101672 - 0.041838 \cdot \ln(\text{hardness})$

			Dissolved WQC (ug/l)		
Chromium III (D)	Acute		0.316 e(0.819[ln(hardness)]+3.7256)	551.0293659	
	Chronic		0.860 e(0.819[ln(hardness)]+0.6848)	71.67759951	
Copper (D)	Acute		0.960 e(0.9422[ln(hardness)]-1.700)	12.93202601	
	Chronic		0.960 e(0.8545[ln(hardness)]-1.702)	8.648739044	
Lead (D)	Acute		e(1.273[ln(hardness)]-1.46)*CF3	61.77208289	CF3 = 1.46203 - 0.145712*ln(hardness)
	Chronic		e(1.273[ln(hardness)]-4.705)*CF4	2.407169388	CF4 = 1.46203 - 0.145712*ln(hardness)
Manganese (D)	Acute		e(0.3331[ln(hardness)]+6.4676)	2945.354265	
	Chronic		e(0.3331[ln(hardness)]+5.8743)	1627.311235	
Nickel (D)	Acute		0.998 e(0.846[ln(hardness)]+2.255)	452.3411118	
	Chronic		0.997 e(0.846[ln(hardness)]+0.0584)	50.24113236	
Silver (D)	Acute		0.85 e(1.72[ln(hardness)]-6.59)	2.99864332	
Zinc (D)	Acute		0.978 e(0.9094[ln(hardness)]+0.9095)	154.1725819	
	Chronic		0.986 e(0.90947[ln(hardness)]+0.6235)	116.8088485	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc. Ca (ug/l)	Effluent Conc. Ce (ug/l)	Acute Aquatic 2.13*Ce	Domestic Supply Cd,dom (ug/l)	Chronic Aquatic Cd (ug/l)	Human Health Cd,hh (ug/l)	Domestic Criteria ug/l						
Radioactivity, Nutrients, and Chlorine															
Aluminum, total	7429-90-5	2.5		19.3	41.109	41.109	41.109	25.2978462	1E+100	5000	1E+100	3234.646244	1295.91832	1E+100	N/A
Barium, dissolved	7440-39-3	100		60.3	128.439	128.439	128.439	79.0393846	2000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Boron, dissolved	7440-42-8	100		49.3	105.009	105.009	105.009	64.6209231	1E+100	750	5000	1E+100	1E+100	1E+100	N/A
Cobalt, dissolved	7440-48-4	50		0	0	0	0	0	1E+100	50	1000	1E+100	1E+100	1E+100	N/A
Uranium, dissolved	7440-61-1	0.1		0	0	0	0	0	30	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Vanadium, dissolved	7440-62-2	50		0	0	0	0	0	1E+100	100	100	1E+100	1E+100	1E+100	N/A
Ra-226 and Ra-228 (pCi/l)				0	0	0	0	0	5	1E+100	30	1E+100	1E+100	1E+100	N/A
Strontium (pCi/l)				0	0	0	0	0	8	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Tritium (pCi/l)				0	0	0	0	0	20000	1E+100	20000	1E+100	1E+100	1E+100	N/A
Gross Alpha (pCi/l)				2.95	6.2835	6.2835	6.2835	3.86676923	15	1E+100	15	1E+100	1E+100	1E+100	N/A
Asbestos (fibers/l)				0	0	0	0	0	7000000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Total Residual Chlorine	7782-50-5	33		0	0	0	0	0	1E+100	1E+100	11	19	11	1E+100	N/A
Nitrate as N (mg/l)				0.779	1.65927	1.65927	1.65927	1.02108923	10	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Nitrite + Nitrate (mg/l)				0	0	0	0	0	1E+100	1E+100	132	1E+100	1E+100	1E+100	N/A
METALS AND CYANIDE															
Antimony, dissolved (P)	7440-36-0	60		0	0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	640	N/A
Arsenic, dissolved (P)	7440-38-2	0.5		1.279955132	2.72630443	2.72630443	2.72630443	1.6777258	10	100	200	340	150	9	N/A
Beryllium, dissolved	7440-41-7	0.5		0	0	0	0	0	4	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Cadmium, dissolved	7440-43-9	1		0	0	0	0	0	5	10	50	1.596137868	0.43991444	1E+100	N/A
Chromium (III), dissolved	16065-83-1	10		0	0	0	0	0	1E+100	1E+100	1E+100	551.0293659	71.6775995	1E+100	N/A
Chromium (VI), dissolved	18540-29-9	10		0	0	0	0	0	1E+100	1E+100	1E+100	16	11	1E+100	N/A
Chromium, dissolved	7440-47-3			7.87	16.7631	16.7631	16.7631	10.3157538	100	100	1000	1E+100	1E+100	1E+100	N/A
Copper, dissolved	7440-50-8	0.5		4.702211348	10.01571017	10.0157102	10.0157102	6.16351395	1300	200	500	12.93202601	8.64873904	1E+100	N/A
Lead, dissolved	7439-92-1	0.5		0.124840662	0.26591061	0.26591061	0.26591061	0.1636373	15	5000	100	61.77208289	2.40716939	1E+100	N/A
Manganese, dissolved	7439-96-5			2.4	5.112	5.112	5.112	3.14584615	1E+100	1E+100	1E+100	2945.354265	1627.31123	1E+100	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration						Livestock&	Acute	Chronic	Human	Need	TMDL	
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic	Aquatic		Health
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria	Criteria		Criteria
			Ca (ug/l)	Ce (ug/l)	2.13°Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l	ug/l	ug/l	ug/l		
Mercury, dissolved	7439-97-6	0.005		0.011	0.02343	0.02343	0.02343	0.01441846	1E+100	1E+100	1E+100	1.4	0.77	1E+100	N/A
Mercury, total	7439-97-6	0.005		0.011	0.02343	0.02343	0.02343	0.01441846	2	1E+100	0.77	1E+100	1E+100	1E+100	N/A
Molybdenum, dissolved	7439-98-7			2.02	4.3026	4.3026	4.3026	2.64775385	1E+100	1000	1E+100	1E+100	1E+100	1E+100	N/A
Molybdenum, total recoverable	7439-98-7			2.02	4.3026	4.3026	4.3026	2.64775385	1E+100	1E+100	1E+100	7920	1895	1E+100	N/A
Nickel, dissolved (P)	7440-02-0	0.5		0.367894133	0.783614503	0.7836145	0.7836145	0.48222431	700	1E+100	1E+100	452.3411118	50.2411324	4600	N/A
Selenium, dissolved (P)	7782-49-2	5		0	0	0	0	0	50	130	50	1E+100	1E+100	4200	N/A
Selenium, dis (SO4 >500 mg/l)		5		0	0	0	0	0	50	250	50	1E+100	1E+100	4200	N/A
Selenium, total recoverable	7782-49-2	5		0	0	0	0	0	1E+100	1E+100	5	20	5	1E+100	N/A
Silver, dissolved	7440-22-4	0.5		0	0	0	0	0	1E+100	1E+100	1E+100	2.99864332	1E+100	1E+100	N/A
Thallium, dissolved (P)	7440-28-0	0.5		0.261	0.55593	0.55593	0.55593	0.34211077	2	1E+100	1E+100	1E+100	1E+100	0.47	N/A
Zinc, dissolved	7440-66-6	20		0	0	0	0	0	10500	2000	25000	154.1725819	116.808849	26000	N/A
Cyanide, total recoverable	57-12-5	10		1.67	3.5571	3.5571	3.5571	2.18898462	200	1E+100	5.2	22	5.2	140	N/A
Dioxin	1764-01-6	0.00001		0	0	0	0	0	3.00E-05	1E+100	1E+100	1E+100	1E+100	5.1E-08	N/A
VOLATILE COMPOUNDS															
Acrolein	107-02-8	50			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	9	N/A
Acrylonitrile	107-13-0	20			0	0	0	0	0.65	1E+100	1E+100	1E+100	1E+100	2.5	N/A
Benzene	71-43-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	510	N/A
Bromoform	75-25-2	10			0	0	0	0	44	1E+100	1E+100	1E+100	1E+100	1400	N/A
Carbon Tetrachloride	56-23-5	2			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	16	N/A
Chlorobenzene	108-90-7	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	1600	N/A
Clorodibromomethane	124-48-1	10			0	0	0	0	4.2	1E+100	1E+100	1E+100	1E+100	130	N/A
Chloroform	67-66-3	50			0	0	0	0	57	1E+100	1E+100	1E+100	1E+100	4700	N/A
Dichlorobromomethane	75-27-4	10			0	0	0	0	5.6	1E+100	1E+100	1E+100	1E+100	170	N/A
1,2-Dichloroethane	107-06-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	370	N/A
1,1-Dichloroethylene	75-35-4	10			0	0	0	0	7	1E+100	1E+100	1E+100	1E+100	7100	N/A
1,2-Dichloropropane	78-87-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	150	N/A
1,3-Dichloropropylene	542-75-6	10			0	0	0	0	3.5	1E+100	1E+100	1E+100	1E+100	210	N/A
Ethylbenzene	100-41-4	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	2100	N/A
Methyl Bromide	74-83-9	50			0	0	0	0	49	1E+100	1E+100	1E+100	1E+100	1500	N/A
Methylene Chloride	75-09-2	20			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	5900	N/A
1,1,2,2-Tetrachloroethane	79-34-5	10			0	0	0	0	1.8	1E+100	1E+100	1E+100	1E+100	40	N/A
Tetrachloroethylene	127-18-4	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	33	N/A
Toluene	108-88-3	10			0	0	0	0	1000	1E+100	1E+100	1E+100	1E+100	15000	N/A
1,2-trans-Dichloroethylene	156-60-5	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	10000	N/A
1,1,1-Trichloroethane	71-55-6				0	0	0	0	200	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
1,1,2-Trichloroethane	79-00-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	160	N/A
Trichloroethylene	79-01-6	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	300	N/A
Vinyl Chloride	75-01-4	10			0	0	0	0	2	1E+100	1E+100	1E+100	1E+100	24	N/A
ACID COMPOUNDS															
2-Chlorophenol	95-57-8	10			0	0	0	0	175	1E+100	1E+100	1E+100	1E+100	150	N/A
2,4-Dichlorophenol	120-83-2	10			0	0	0	0	105	1E+100	1E+100	1E+100	1E+100	290	N/A
2,4-Dimethylphenol	105-67-9	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	850	N/A
4,6-Dinitro-o-Cresol	534-52-1	50			0	0	0	0	14	1E+100	1E+100	1E+100	1E+100	280	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria						
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l						
2,4-Dinitrophenol	51-28-5	50			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	5300	N/A
Pentachlorophenol	87-86-5	50			0	0	0	0	1	1E+100	1E+100	19	15	30	N/A
Phenol	108-95-2	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	860000	N/A
2,4,6-Trichlorophenol	88-06-2	10			0	0	0	0	32	1E+100	1E+100	1E+100	1E+100	24	N/A
BASE/NEUTRAL															
Acenaphthene	83-32-9	10			0	0	0	0	2100	1E+100	1E+100	1E+100	1E+100	990	N/A
Anthracene	120-12-7	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	40000	N/A
Benzidine	92-87-5	50			0	0	0	0	0.0015	1E+100	1E+100	1E+100	1E+100	0.002	N/A
Benzo(a)anthracene	56-55-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(a)pyrene	50-32-8	5			0	0	0	0	0.2	1E+100	1E+100	1E+100	1E+100	0.18	N/A
3,4-Benzofluoranthene	205-99-2	10			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(k)fluoranthene	207-08-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Bis(2-chloroethyl)Ether	111-44-4	10			0	0	0	0	0.3	1E+100	1E+100	1E+100	1E+100	5.3	N/A
Bis(2-chloroisopropyl)Ether	108-60-1	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	65000	N/A
Bis(2-ethylhexyl)Phthalate	117-81-7	10			0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	22	N/A
Butyl Benzyl Phthalate	85-68-7	10			0	0	0	0	7000	1E+100	1E+100	1E+100	1E+100	1900	N/A
2-Chloronaphthalene	91-58-7	10			0	0	0	0	2800	1E+100	1E+100	1E+100	1E+100	1600	N/A
Chrysene	218-01-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Dibenzo(a,h)anthracene	53-70-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
1,2-Dichlorobenzene	95-50-1	10			0	0	0	0	600	1E+100	1E+100	1E+100	1E+100	1300	N/A
1,3-Dichlorobenzene	541-73-1	10			0	0	0	0	469	1E+100	1E+100	1E+100	1E+100	960	N/A
1,4-Dichlorobenzene	106-46-7	10			0	0	0	0	75	1E+100	1E+100	1E+100	1E+100	190	N/A
3,3'-Dichlorobenzidine	91-94-1	5			0	0	0	0	0.78	1E+100	1E+100	1E+100	1E+100	0.28	N/A
Diethyl Phthalate	84-66-2	10			0	0	0	0	28000	1E+100	1E+100	1E+100	1E+100	44000	N/A
Dimethyl Phthalate	131-11-3	10			0	0	0	0	350000	1E+100	1E+100	1E+100	1E+100	1100000	N/A
Di-n-Butyl Phthalate	84-74-2	10			0	0	0	0	3500	1E+100	1E+100	1E+100	1E+100	4500	N/A
2,4-Dinitrotoluene	121-14-2	10			0	0	0	0	1.1	1E+100	1E+100	1E+100	1E+100	34	N/A
1,2-Diphenylhydrazine	122-66-7	20			0	0	0	0	0.44	1E+100	1E+100	1E+100	1E+100	2	N/A
Fluoranthene	206-44-0	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	140	N/A
Fluorene	86-73-7	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	5300	N/A
Hexachlorobenzene	118-74-1	5			0	0	0	0	1	1E+100	1E+100	1E+100	1E+100	0.0029	N/A
Hexachlorobutadiene	87-68-3	10			0	0	0	0	4.5	1E+100	1E+100	1E+100	1E+100	180	N/A
Hexachlorocyclopentadiene	77-47-4	10			0	0	0	0	50	1E+100	1E+100	1E+100	1E+100	1100	N/A
Hexachloroethane	67-72-1	20			0	0	0	0	25	1E+100	1E+100	1E+100	1E+100	33	N/A
Indeno(1,2,3-cd)Pyrene	193-39-5	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Isophorone	78-59-1	10			0	0	0	0	368	1E+100	1E+100	1E+100	1E+100	9600	N/A
Nitrobenzene	98-95-3	10			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	690	N/A
n-Nitrosodimethylamine	62-75-9	50			0	0	0	0	0.0069	1E+100	1E+100	1E+100	1E+100	30	N/A
n-Nitrosodi-n-Propylamine	621-64-7	20			0	0	0	0	0.05	1E+100	1E+100	1E+100	1E+100	5.1	N/A
n-Nitrosodiphenylamine	86-30-6	20			0	0	0	0	71	1E+100	1E+100	1E+100	1E+100	60	N/A
Pyrene	129-00-0	10			0	0	0	0	1050	1E+100	1E+100	1E+100	1E+100	4000	N/A
1,2,4-Trichlorobenzene	120-82-1	10			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	70	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc Ca (ug/l)	Effluent Conc. Ce (ug/l)	Acute Aquatic 2.13*Ce	Domestic Supply Cd,dom (ug/l)	Chronic Aquatic Cd (ug/l)	Human Health Cd,hh (ug/l)	Domestic Criteria ug/l	Irrigation Criteria ug/l					
PESTICIDES AND PCBs															
Aldrin	309-00-2	0.01			0	0	0	0	0.021	1E+100	1E+100	3	1E+100	0.0005	N/A
Alpha-BHC	319-84-6	0.05			0	0	0	0	0.056	1E+100	1E+100	1E+100	1E+100	0.049	N/A
Beta-BHC	319-85-7	0.05			0	0	0	0	0.091	1E+100	1E+100	1E+100	1E+100	0.17	N/A
Gamma-BHC	58-89-9	0.05			0	0	0	0	0.2	1E+100	1E+100	0.95	1E+100	1.8	N/A
Chlordane	57-74-9	0.2			0	0	0	0	2	1E+100	1E+100	2.4	0.0043	0.0081	N/A
4,4'-DDT and derivatives	50-29-3	0.02			0	0	0	0	1	1E+100	0.001	1.1	0.001	0.0022	N/A
Dieldrin	60-57-1	0.02			0	0	0	0	0.022	1E+100	1E+100	0.24	0.056	0.00054	N/A
Diazinon	333-41-5				0	0	0	0	1E+100	1E+100	1E+100	0.17	0.17	1E+100	N/A
Alpha-Endosulfan	959-98-8	0.01			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Beta-Endosulfan	33213-65-9	0.02			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Endosulfan sulfate	1031-7-8	0.1			0	0	0	0	62	1E+100	1E+100	1E+100	1E+100	89	N/A
Endrin	72-20-8	0.02			0	0	0	0	2	1E+100	1E+100	0.086	0.036	0.06	N/A
Endrin Aldehyde	7421-93-4	0.1			0	0	0	0	10.5	1E+100	1E+100	1E+100	1E+100	0.3	N/A
Heptachlor	76-44-8	0.01			0	0	0	0	0.4	1E+100	1E+100	0.52	0.0038	0.00079	N/A
Heptachlor Epoxide	1024-57-3	0.01			0	0	0	0	0.2	1E+100	1E+100	0.52	0.0038	0.00039	N/A
PCBs	1336-36-3	0.2			0	0	0	0	0.5	1E+100	0.014	2	0.014	0.00064	N/A
Toxaphene	8001-35-2	0.3			0	0	0	0	3	1E+100	1E+100	0.73	0.0002	0.0028	N/A

Note: SCORET CODE for reference only. Codes for total form are used except for parameters which have criteria in both total and dissolved forms.

STEP 3: SCAN POTENTIAL INSTREAM WASTE CONCENTRATIONS AGAINST WATER QUALITY CRITERIA
AND ESTABLISH EFFLUENT LIMITATIONS FOR ALL APPLICABLE PARAMETERS

No limits are established if the receiving stream is not designated for the particular uses.

No limits are established if the potential instream waste concentrations are less than the chronic water quality criteria.

The most applicable stringent criteria are used to establish effluent limitations for a given parameter.

Water quality criteria apply at the end-of-pipe for acute aquatic life criteria and discharges to public lakes.

If background concentration exceeds the water quality criteria, water quality criteria apply. And "Need TMDL" shown to the next column of Avg. Mass

Monthly avg concentration = daily max. / 1.5.

APPLICABLE WATER QUALITY-BASED LIMITS

The following formula is used to calculate the allowable daily maximum effluent concentration

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

Daily Max. Conc. = $C_s + (C_s - C_a)(F \cdot Q_a / Q_e)$

Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where: C_s = Applicable water quality standard

C_a = Ambient stream concentration

F = Fraction of stream allowed for mixing (1.0 is assigned to domestic water supply and human health uses)

Q_e = Plant effluent flow

Q_a = Criteria Low flow (4Q3) or Harmonic Mean flow for Human Health Criteria

CALCULATIONS OF NEW MEXICO WATER QUALITY-BASED EFFLUENT LIMITATIONS

NMAC 20.6.4. **NMWQS as of January 14, 2011**

(EPA approved site-specific criteria for aluminum, cadmium, and zinc on April 30, 2012)

Calculations Specifications:

Excel **Revised as of May 1, 2012**

Prepared By:

Isaac Chen 06/13/2019

STEP 1: REFERENCE IMPLEMENTATION PROCEDURES
INPUT FACILITY AND RECEIVING STREAM DATA
LIST SOURCE OF DATA INPUT

APPENDIX A
of FACT SHEET

IMPLEMENTATION PROCEDURES

The State of New Mexico Standards for Interstate and Intrastate Surface Waters are implemented in this spread sheet by using procedures established in the "Procedures for Implementing NPDES Permits in New Mexico" amended May 2011

FACILITY	DATA INPUT	
Permittee	LANL	
NPDES Permit No.	NM0028355	
Outfall No.(s)	03A160	
Plant Effluent Flow (MGD)	0.0026	For industrial and federal facility, use the highest monthly average flow for the past 24 months. For POTWs, use the design flow.
Plant Effluent Flow (cfs)	0.00403	
RECEIVING STREAM	DATA INPUT	
Receiving Stream Name	Ten Site Canyon	
Basin Name	Rio Grande	
Waterbody Segment Code No.	20.6.4.128	
Is a publicly owned lake or reservoir (enter "1" if it's a lake, "0" if not)	0	
Are acute aquatic life criteria considered (1= yes, 0= no) (MUST enter "1" for 2005 Standards)	1	
Are chronic aquatic life criteria considered (1= yes, 0=no)	0	
Are domestic water supply criteria considered (1= yes, 0=no)	0	
Are irrigation water supply criteria considered (1= yes, 0=no)	0	
Livestock watering and wildlife habitat criteria applied to all streams		
USGS Flow Station	USGS	
WQ Monitoring Station No.	SJR	
Receiving Stream TSS (mg/l)	1.1	For intermittent stream, enter effluent TSS
Receiving Stream Hardness (mg/l as CaCO ₃)	118	For intermittent stream, enter effluent Hardness (If no data, 20 mg/l is used)
Receiving Stream Critical Low Flow (4Q3) (cfs)	0	Enter "0" for intermittent stream and lake.
Receiving Stream Harmonic Mean Flow (cfs)	0.00155	Enter harmonic mean or modified harmonic mean flow data
Avg. Water Temperature (C)	23.4	
pH (Avg)	8.7	
Fraction of stream allowed for mixing (F)	1	Enter 1, if stream morphology data is not available or for intermittent streams.
Fraction of Critical Low Flow	0	

STEP 2: INPUT AMBIENT AND EFFLUENT DATA**CALCULATE IN-STREAM WASTE CONCENTRATIONS**

DATA INPUT

Input pollutant geometric mean concentration as micro-gram per liter (ug/l or ppb)

unless other unit is specified for the parameter.

Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, input "1/2 DL" for calculation.

Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, no data is inputted.

If a less than MQL value is reported, input either the reported value or "0" for calculation.

The following formula is used to calculate the Instream Waste Concentration (Cd)

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Cd = [(F \cdot Qa \cdot Ca) + (Qe \cdot 2.13 \cdot Ce)] / (F \cdot Qa + Qe)$$

Where:

Cd = Instream Waste Concentration

F = Fraction of stream allowed for mixing (see "Procedures for Implementing NPDES Permits in New Mexico")

Ce = Reported concentration in effluent

Ca = Ambient stream concentration upstream of discharge

Qe = Plant effluent flow

Qa = Critical low flow of stream at discharge point expressed as the 4Q3 or harmonic mean flow for human health criteria

The following formula convert metals reported in total form to dissolved form if criteria are in dissolved form

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Kp = Kpo \cdot (TSS)^a$$

Kp = Linear partition coefficient; Kpo and a can be found in table below

$$C/Ct = 1 / (1 + Kp \cdot TSS \cdot 10^{-6})$$

TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)

$$\text{Total Metal Criteria (Ct)} = Cr / (C/Ct)$$

C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value

Total Metals	Total Value	Stream Linear Partition Coefficient					Lake Linear Partition Coefficient				
		Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Stream	Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Lake
Arsenic	2.59	480000	-0.73	447738.6415	0.670011136	1.73532884	480000	-0.73	447738.6415	0.670011136	1.73532884
Chromium III	30.4	3360000	-0.93	3074992.637	0.228180684	6.9366928	2170000	-0.27	2114870.157	0.300629171	9.13912681
Copper	7.48	1040000	-0.74	969176.2259	0.484005119	3.62035829	2850000	-0.9	2615721.146	0.257911881	1.92918087
Lead	1.52	2800000	-0.8	2594441.504	0.259478378	0.39440714	2040000	-0.53	1939510.094	0.319135922	0.4850866
Nickel	1.35	490000	-0.57	464090.0416	0.662032858	0.89374436	2210000	-0.76	2055577.394	0.306641693	0.41396629
Silver	0	2390000	-1.03	2166523.655	0.295580246	0	2390000	-1.03	2166523.655	0.295580246	0
Zinc	4.4	1250000	-0.7	1169324.727	0.437396108	1.92454287	3340000	-0.68	3130397.16	0.22505102	0.99022449

The following formula is used to calculate hardness dependent criteria

(Please refer to State Water Quality Standards for details)

Dissolved

WQC (ug/l)

Aluminum (T)	Acute	$e(1.3695[\ln(\text{hardness})]+1.8308)$	4290.903489	If Stream pH < 6.5, enter 750 in cell O113
	Chronic	$e(1.3695[\ln(\text{hardness})]+0.9161)$	1719.093839	If Stream pH < 6.5, enter 87 in cell P113
Cadmium (D)	Acute	$e(0.8968[\ln(\text{hardness})]-3.5699) \cdot CF1$	1.903052516	$CF1 = 1.136672 - 0.041838 \cdot \ln(\text{hardness})$
	Chronic	$e(0.7647[\ln(\text{hardness})]-4.2180) \cdot CF2$	0.510219698	$CF2 = 1.101672 - 0.041838 \cdot \ln(\text{hardness})$

			Dissolved WQC (ug/l)	
Chromium III (D)	Acute	0.316 e(0.819[ln(hardness)]+3.7256)	652.4781435	
	Chronic	0.860 e(0.819[ln(hardness)]+0.6848)	84.87400118	
Copper (D)	Acute	0.960 e(0.9422[ln(hardness)]-1.700)	15.70716627	
	Chronic	0.960 e(0.8545[ln(hardness)]-1.702)	10.31632939	
Lead (D)	Acute	e(1.273[ln(hardness)]-1.46)*CF3	77.29751456	CF3 = 1.46203 - 0.145712*ln(hardness)
	Chronic	e(1.273[ln(hardness)]-4.705)*CF4	3.012173171	CF4 = 1.46203 - 0.145712*ln(hardness)
Manganese (D)	Acute	e(0.3331[ln(hardness)]+6.4676)	3154.909369	
	Chronic	e(0.3331[ln(hardness)]+5.8743)	1743.090643	
Nickel (D)	Acute	0.998 e(0.846[ln(hardness)]+2.255)	538.6129315	
	Chronic	0.997 e(0.846[ln(hardness)]+0.0584)	59.82326806	
Silver (D)	Acute	0.85 e(1.72[ln(hardness)]-6.59)	4.276173743	
Zinc (D)	Acute	0.978 e(0.9094[ln(hardness)]+0.9095)	185.9941067	
	Chronic	0.986 e(0.90947[ln(hardness)]+0.6235)	140.9204605	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc. Ca (ug/l)	Effluent Conc. Ce (ug/l)	Acute Aquatic 2.13*Ce	Domestic Supply Cd,dom (ug/l)	Chronic Aquatic Cd (ug/l)	Human Health Cd,hh (ug/l)	Domestic Criteria ug/l						
Radioactivity, Nutrients, and Chlorine															
Aluminum, total	7429-90-5	2.5	0	0	0	0	0	1E+100	5000	1E+100	4290.903489	1719.09384	1E+100	N/A	
Barium, dissolved	7440-39-3	100	1.4	2.982	2.982	2.982	2.15366667	2000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Boron, dissolved	7440-42-8	100	216	460.08	460.08	460.08	332.28	1E+100	750	5000	1E+100	1E+100	1E+100	N/A	
Cobalt, dissolved	7440-48-4	50		0	0	0	0	1E+100	50	1000	1E+100	1E+100	1E+100	N/A	
Uranium, dissolved	7440-61-1	0.1		0	0	0	0	30	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Vanadium, dissolved	7440-62-2	50		0	0	0	0	1E+100	100	100	1E+100	1E+100	1E+100	N/A	
Ra-226 and Ra-228 (pCi/l)			0.379	0.80727	0.80727	0.80727	0.58302833	5	1E+100	30	1E+100	1E+100	1E+100	N/A	
Strontium (pCi/l)				0	0	0	0	8	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Tritium (pCi/l)				0	0	0	0	20000	1E+100	20000	1E+100	1E+100	1E+100	N/A	
Gross Alpha (pCi/l)			0.96	2.0448	2.0448	2.0448	1.4768	15	1E+100	15	1E+100	1E+100	1E+100	N/A	
Asbestos (fibers/l)				0	0	0	0	7000000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Total Residual Chlorine	7782-50-5	33	0	0	0	0	0	1E+100	1E+100	11	19	11	1E+100	N/A	
Nitrate as N (mg/l)			4.51	9.6063	9.6063	9.6063	6.93788333	10	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Nitrite + Nitrate (mg/l)				0	0	0	0	1E+100	1E+100	132	1E+100	1E+100	1E+100	N/A	
METALS AND CYANIDE															
Antimony, dissolved (P)	7440-36-0	60	0	0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	640	N/A	
Arsenic, dissolved (P)	7440-38-2	0.5	1.735328843	3.696250436	3.69625044	3.69625044	2.6695142	10	100	200	340	150	9	N/A	
Beryllium, dissolved	7440-41-7	0.5	0	0	0	0	0	4	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Cadmium, dissolved	7440-43-9	1	0	0	0	0	0	5	10	50	1.903052516	0.5102197	1E+100	N/A	
Chromium (III), dissolved	16065-83-1	10	30.4	64.752	64.752	64.752	46.7653333	1E+100	1E+100	1E+100	652.4781435	84.8740012	1E+100	N/A	
Chromium (VI), dissolved	18540-29-9	10	30.4	64.752	64.752	64.752	46.7653333	1E+100	1E+100	1E+100	16	11	1E+100	N/A	
Chromium, dissolved	7440-47-3		30.4	64.752	64.752	64.752	46.7653333	100	100	1000	1E+100	1E+100	1E+100	N/A	
Copper, dissolved	7440-50-8	0.5	3.620358294	7.711363165	7.71136317	7.71136317	5.56931784	1300	200	500	15.70716627	10.3163294	1E+100	N/A	
Lead, dissolved	7439-92-1	0.5	0.394407135	0.840087198	0.8400872	0.8400872	0.60672964	15	5000	100	77.29751456	3.01217317	1E+100	N/A	
Manganese, dissolved	7439-96-5		2	4.26	4.26	4.26	3.07666667	1E+100	1E+100	1E+100	3154.909369	1743.09064	1E+100	N/A	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Livestock&	Acute	Chronic	Human	Need	TMDL
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic	Aquatic	Health	
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria	
			Ca (ug/l)	Ce (ug/l)	2.13°Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l	ug/l	ug/l	ug/l		
Mercury, dissolved	7439-97-6	0.005	0.66	1.4058	1.4058	1.4058	1.0153	1E+100	1E+100	1E+100	1.4	0.77	1E+100	N/A	
Mercury, total	7439-97-6	0.005	0.66	1.4058	1.4058	1.4058	1.0153	2	1E+100	0.77	1E+100	1E+100	1E+100	N/A	
Molybdenum, dissolved	7439-98-7		15.5	33.015	33.015	33.015	23.8441667	1E+100	1000	1E+100	1E+100	1E+100	1E+100	N/A	
Molybdenum, total recoverable	7439-98-7		15.5	33.015	33.015	33.015	23.8441667	1E+100	1E+100	1E+100	7920	1895	1E+100	N/A	
Nickel, dissolved (P)	7440-02-0	0.5	0.893744358	1.903675483	1.90367548	1.90367548	1.37487674	700	1E+100	1E+100	538.6129315	59.8232681	4600	N/A	
Selenium, dissolved (P)	7782-49-2	5	72.3	153.999	153.999	153.999	111.2215	50	130	50	1E+100	1E+100	4200	N/A	
Selenium, dis (SO4 >500 mg/l)		5		0	0	0	0	50	250	50	1E+100	1E+100	4200	N/A	
Selenium, total recoverable	7782-49-2	5	72.3	153.999	153.999	153.999	111.2215	1E+100	1E+100	5	20	5	1E+100	N/A	
Silver, dissolved	7440-22-4	0.5	0	0	0	0	0	1E+100	1E+100	1E+100	4.276173743	1E+100	1E+100	N/A	
Thallium, dissolved (P)	7440-28-0	0.5	0	0	0	0	0	2	1E+100	1E+100	1E+100	1E+100	0.47	N/A	
Zinc, dissolved	7440-66-6	20	1.924542874	4.099276321	4.09927632	4.09927632	2.96058845	10500	2000	25000	185.9941067	140.92046	26000	N/A	
Cyanide, total recoverable	57-12-5	10	21.8	46.434	46.434	46.434	33.5356667	200	1E+100	5.2	22	5.2	140	N/A	
Dioxin	1764-01-6	0.00001	0	0	0	0	0	3.00E-05	1E+100	1E+100	1E+100	1E+100	5.1E-08	N/A	
VOLATILE COMPOUNDS															
Acrolein	107-02-8	50		0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	9	N/A	
Acrylonitrile	107-13-0	20		0	0	0	0	0.65	1E+100	1E+100	1E+100	1E+100	2.5	N/A	
Benzene	71-43-2	10		0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	510	N/A	
Bromoform	75-25-2	10		0	0	0	0	44	1E+100	1E+100	1E+100	1E+100	1400	N/A	
Carbon Tetrachloride	56-23-5	2		0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	16	N/A	
Chlorobenzene	108-90-7	10		0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	1600	N/A	
Clorodibromomethane	124-48-1	10		0	0	0	0	4.2	1E+100	1E+100	1E+100	1E+100	130	N/A	
Chloroform	67-66-3	50		0	0	0	0	57	1E+100	1E+100	1E+100	1E+100	4700	N/A	
Dichlorobromomethane	75-27-4	10		0	0	0	0	5.6	1E+100	1E+100	1E+100	1E+100	170	N/A	
1,2-Dichloroethane	107-06-2	10		0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	370	N/A	
1,1-Dichloroethylene	75-35-4	10		0	0	0	0	7	1E+100	1E+100	1E+100	1E+100	7100	N/A	
1,2-Dichloropropane	78-87-5	10		0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	150	N/A	
1,3-Dichloropropylene	542-75-6	10		0	0	0	0	3.5	1E+100	1E+100	1E+100	1E+100	210	N/A	
Ethylbenzene	100-41-4	10		0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	2100	N/A	
Methyl Bromide	74-83-9	50		0	0	0	0	49	1E+100	1E+100	1E+100	1E+100	1500	N/A	
Methylene Chloride	75-09-2	20		0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	5900	N/A	
1,1,2,2-Tetrachloroethane	79-34-5	10		0	0	0	0	1.8	1E+100	1E+100	1E+100	1E+100	40	N/A	
Tetrachloroethylene	127-18-4	10		0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	33	N/A	
Toluene	108-88-3	10		0	0	0	0	1000	1E+100	1E+100	1E+100	1E+100	15000	N/A	
1,2-trans-Dichloroethylene	156-60-5	10		0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	10000	N/A	
1,1,1-Trichloroethane	71-55-6			0	0	0	0	200	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
1,1,2-Trichloroethane	79-00-5	10		0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	160	N/A	
Trichloroethylene	79-01-6	10		0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	300	N/A	
Vinyl Chloride	75-01-4	10		0	0	0	0	2	1E+100	1E+100	1E+100	1E+100	24	N/A	
ACID COMPOUNDS															
2-Chlorophenol	95-57-8	10		0	0	0	0	175	1E+100	1E+100	1E+100	1E+100	150	N/A	
2,4-Dichlorophenol	120-83-2	10		0	0	0	0	105	1E+100	1E+100	1E+100	1E+100	290	N/A	
2,4-Dimethylphenol	105-67-9	10		0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	850	N/A	
4,6-Dinitro-o-Cresol	534-52-1	50		0	0	0	0	14	1E+100	1E+100	1E+100	1E+100	280	N/A	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock&	Acute	Chronic	Human	Need	
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic	Aquatic	Health	TMDL	
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria	
2,4-Dinitrophenol	51-28-5	50			0	0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	5300	N/A
Pentachlorophenol	87-86-5	50			0	0	0	0	0	1	1E+100	1E+100	19	15	30	N/A
Phenol	108-95-2	10		0	0	0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	860000	N/A
2,4,6-Trichlorophenol	88-06-2	10			0	0	0	0	0	32	1E+100	1E+100	1E+100	1E+100	24	N/A
BASE/NEUTRAL																
Acenaphthene	83-32-9	10			0	0	0	0	0	2100	1E+100	1E+100	1E+100	1E+100	990	N/A
Anthracene	120-12-7	10			0	0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	40000	N/A
Benzidine	92-87-5	50			0	0	0	0	0	0.0015	1E+100	1E+100	1E+100	1E+100	0.002	N/A
Benzo(a)anthracene	56-55-3	5		0	0	0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(a)pyrene	50-32-8	5			0	0	0	0	0	0.2	1E+100	1E+100	1E+100	1E+100	0.18	N/A
3,4-Benzofluoranthene	205-99-2	10			0	0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(k)fluoranthene	207-08-9	5			0	0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Bis(2-chloroethyl)Ether	111-44-4	10			0	0	0	0	0	0.3	1E+100	1E+100	1E+100	1E+100	5.3	N/A
Bis(2-chloroisopropyl)Ether	108-60-1	10			0	0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	65000	N/A
Bis(2-ethylhexyl)Phthalate	117-81-7	10			0	0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	22	N/A
Butyl Benzyl Phthalate	85-68-7	10			0	0	0	0	0	7000	1E+100	1E+100	1E+100	1E+100	1900	N/A
2-Chloronaphthalene	91-58-7	10			0	0	0	0	0	2800	1E+100	1E+100	1E+100	1E+100	1600	N/A
Chrysene	218-01-9	5			0	0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Dibenzo(a,h)anthracene	53-70-3	5			0	0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
1,2-Dichlorobenzene	95-50-1	10			0	0	0	0	0	600	1E+100	1E+100	1E+100	1E+100	1300	N/A
1,3-Dichlorobenzene	541-73-1	10			0	0	0	0	0	469	1E+100	1E+100	1E+100	1E+100	960	N/A
1,4-Dichlorobenzene	106-46-7	10			0	0	0	0	0	75	1E+100	1E+100	1E+100	1E+100	190	N/A
3,3'-Dichlorobenzidine	91-94-1	5			0	0	0	0	0	0.78	1E+100	1E+100	1E+100	1E+100	0.28	N/A
Diethyl Phthalate	84-66-2	10		67.4	143.562	143.562	143.562	103.683667	0	28000	1E+100	1E+100	1E+100	1E+100	44000	N/A
Dimethyl Phthalate	131-11-3	10			0	0	0	0	0	350000	1E+100	1E+100	1E+100	1E+100	1100000	N/A
Di-n-Butyl Phthalate	84-74-2	10			0	0	0	0	0	3500	1E+100	1E+100	1E+100	1E+100	4500	N/A
2,4-Dinitrotoluene	121-14-2	10			0	0	0	0	0	1.1	1E+100	1E+100	1E+100	1E+100	34	N/A
1,2-Diphenylhydrazine	122-66-7	20			0	0	0	0	0	0.44	1E+100	1E+100	1E+100	1E+100	2	N/A
Fluoranthene	206-44-0	10			0	0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	140	N/A
Fluorene	86-73-7	10			0	0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	5300	N/A
Hexachlorobenzene	118-74-1	5			0	0	0	0	0	1	1E+100	1E+100	1E+100	1E+100	0.0029	N/A
Hexachlorobutadiene	87-68-3	10			0	0	0	0	0	4.5	1E+100	1E+100	1E+100	1E+100	180	N/A
Hexachlorocyclopentadiene	77-47-4	10			0	0	0	0	0	50	1E+100	1E+100	1E+100	1E+100	1100	N/A
Hexachloroethane	67-72-1	20			0	0	0	0	0	25	1E+100	1E+100	1E+100	1E+100	33	N/A
Indeno(1,2,3-cd)Pyrene	193-39-5	5			0	0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Isophorone	78-59-1	10			0	0	0	0	0	368	1E+100	1E+100	1E+100	1E+100	9600	N/A
Nitrobenzene	98-95-3	10			0	0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	690	N/A
n-Nitrosodimethylamine	62-75-9	50			0	0	0	0	0	0.0069	1E+100	1E+100	1E+100	1E+100	30	N/A
n-Nitrosodi-n-Propylamine	621-64-7	20			0	0	0	0	0	0.05	1E+100	1E+100	1E+100	1E+100	5.1	N/A
n-Nitrosodiphenylamine	86-30-6	20			0	0	0	0	0	71	1E+100	1E+100	1E+100	1E+100	60	N/A
Pyrene	129-00-0	10			0	0	0	0	0	1050	1E+100	1E+100	1E+100	1E+100	4000	N/A
1,2,4-Trichlorobenzene	120-82-1	10			0	0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	70	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc Ca (ug/l)	Effluent Conc. Ce (ug/l)	Acute Aquatic 2.13*Ce	Domestic Supply Cd,dom (ug/l)	Chronic Aquatic Cd (ug/l)	Human Health Cd,hh (ug/l)	Domestic Criteria ug/l	Irrigation Criteria ug/l					
PESTICIDES AND PCBs															
Aldrin	309-00-2	0.01			0	0	0	0	0.021	1E+100	1E+100	3	1E+100	0.0005	N/A
Alpha-BHC	319-84-6	0.05			0	0	0	0	0.056	1E+100	1E+100	1E+100	1E+100	0.049	N/A
Beta-BHC	319-85-7	0.05			0	0	0	0	0.091	1E+100	1E+100	1E+100	1E+100	0.17	N/A
Gamma-BHC	58-89-9	0.05			0	0	0	0	0.2	1E+100	1E+100	0.95	1E+100	1.8	N/A
Chlordane	57-74-9	0.2			0	0	0	0	2	1E+100	1E+100	2.4	0.0043	0.0081	N/A
4,4'-DDT and derivatives	50-29-3	0.02			0	0	0	0	1	1E+100	0.001	1.1	0.001	0.0022	N/A
Dieldrin	60-57-1	0.02			0	0	0	0	0.022	1E+100	1E+100	0.24	0.056	0.00054	N/A
Diazinon	333-41-5				0	0	0	0	1E+100	1E+100	1E+100	0.17	0.17	1E+100	N/A
Alpha-Endosulfan	959-98-8	0.01			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Beta-Endosulfan	33213-65-9	0.02			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Endosulfan sulfate	1031-7-8	0.1			0	0	0	0	62	1E+100	1E+100	1E+100	1E+100	89	N/A
Endrin	72-20-8	0.02			0	0	0	0	2	1E+100	1E+100	0.086	0.036	0.06	N/A
Endrin Aldehyde	7421-93-4	0.1			0	0	0	0	10.5	1E+100	1E+100	1E+100	1E+100	0.3	N/A
Heptachlor	76-44-8	0.01			0	0	0	0	0.4	1E+100	1E+100	0.52	0.0038	0.00079	N/A
Heptachlor Epoxide	1024-57-3	0.01			0	0	0	0	0.2	1E+100	1E+100	0.52	0.0038	0.00039	N/A
PCBs	1336-36-3	0.2			0	0	0	0	0.5	1E+100	0.014	2	0.014	0.00064	N/A
Toxaphene	8001-35-2	0.3			0	0	0	0	3	1E+100	1E+100	0.73	0.0002	0.0028	N/A

Note: SCORET CODE for reference only. Codes for total form are used except for parameters which have criteria in both total and dissolved forms.

STEP 3: SCAN POTENTIAL INSTREAM WASTE CONCENTRATIONS AGAINST WATER QUALITY CRITERIA
AND ESTABLISH EFFLUENT LIMITATIONS FOR ALL APPLICABLE PARAMETERS

No limits are established if the receiving stream is not designated for the particular uses.

No limits are established if the potential instream waste concentrations are less than the chronic water quality criteria.

The most applicable stringent criteria are used to establish effluent limitations for a given parameter.

Water quality criteria apply at the end-of-pipe for acute aquatic life criteria and discharges to public lakes.

If background concentration exceeds the water quality criteria, water quality criteria apply. And "Need TMDL" shown to the next column of Avg. Mass

Monthly avg concentration = daily max. / 1.5.

APPLICABLE WATER QUALITY-BASED LIMITS

The following formula is used to calculate the allowable daily maximum effluent concentration

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

Daily Max. Conc. = $C_s + (C_s - C_a)(F \cdot Q_a / Q_e)$

Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where:

C_s = Applicable water quality standard

C_a = Ambient stream concentration

F = Fraction of stream allowed for mixing (1.0 is assigned to domestic water supply and human health uses)

Q_e = Plant effluent flow

Q_a = Criteria Low flow (4Q3) or Harmonic Mean flow for Human Health Criteria

CALCULATIONS OF NEW MEXICO WATER QUALITY-BASED EFFLUENT LIMITATIONS

NMAC 20.6.4. **NMWQS as of January 14, 2011**

(EPA approved site-specific criteria for aluminum, cadmium, and zinc on April 30, 2012)

Calculations Specifications:

Excel **Revised as of May 1, 2012**

Prepared By:

Isaac Chen 06/13/2019

STEP 1: REFERENCE IMPLEMENTATION PROCEDURES
INPUT FACILITY AND RECEIVING STREAM DATA
LIST SOURCE OF DATA INPUT

APPENDIX A of FACT SHEET

IMPLEMENTATION PROCEDURES

The State of New Mexico Standards for Interstate and Intrastate Surface Waters are implemented in this spread sheet by using procedures established in the "Procedures for Implementing NPDES Permits in New Mexico" amended May 2011

FACILITY	DATA INPUT	
Permittee	LANL	
NPDES Permit No.	NM0028355	
Outfall No.(s)	03A181	
Plant Effluent Flow (MGD)	0.0094	For industrial and federal facility, use the highest monthly average flow for the past 24 months. For POTWs, use the design flow.
Plant Effluent Flow (cfs)	0.01457	

RECEIVING STREAM	DATA INPUT	
Receiving Stream Name	Mortandad Canyon	
Basin Name	Rio Grande	
Waterbody Segment Code No.	20.6.4.128	
Is a publicly owned lake or reservoir (enter "1" if it's a lake, "0" if not)	0	
Are acute aquatic life criteria considered (1= yes, 0= no) (MUST enter "1" for 2005 Standards)	1	
Are chronic aquatic life criteria considered (1= yes, 0=no)	0	
Are domestic water supply criteria considered (1= yes, 0=no)	0	
Are irrigation water supply criteria considered (1= yes, 0=no)	0	
Livestock watering and wildlife habitat criteria applied to all streams		
USGS Flow Station	USGS	
WQ Monitoring Station No.	SJR	
Receiving Stream TSS (mg/l)	0.7	For intermittent stream, enter effluent TSS
Receiving Stream Hardness (mg/l as CaCO ₃)	103.6	For intermittent stream, enter effluent Hardness (If no data, 20 mg/l is used)
Receiving Stream Critical Low Flow (4Q3) (cfs)	0	Enter "0" for intermittent stream and lake.
Receiving Stream Harmonic Mean Flow (cfs)	0.00155	Enter harmonic mean or modified harmonic mean flow data
Avg. Water Temperature (C)	22.2	
pH (Avg)	8.8	
Fraction of stream allowed for mixing (F)	1	Enter 1, if stream morphology data is not available or for intermittent streams.
Fraction of Critical Low Flow	0	

STEP 2: INPUT AMBIENT AND EFFLUENT DATA

CALCULATE IN-STREAM WASTE CONCENTRATIONS

DATA INPUT

Input pollutant geometric mean concentration as micro-gram per liter (ug/l or ppb)

unless other unit is specified for the parameter.

Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, input "1/2 DL" for calculation.

Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, no data is inputted.

If a less than MQL value is reported, input either the reported value or "0" for calculation.

The following formula is used to calculate the Instream Waste Concentration (Cd)

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Cd = [(F \cdot Qa \cdot Ca) + (Qe \cdot 2.13 \cdot Ce)] / (F \cdot Qa + Qe)$$

Where:

Cd = Instream Waste Concentration

F = Fraction of stream allowed for mixing (see "Procedures for Implementing NPDES Permits in New Mexico")

Ce = Reported concentration in effluent

Ca = Ambient stream concentration upstream of discharge

Qe = Plant effluent flow

Qa = Critical low flow of stream at discharge point expressed as the 4Q3 or harmonic mean flow for human health criteria

The following formula convert metals reported in total form to dissolved form if criteria are in dissolved form

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Kp = Kpo \cdot (TSS)^a$$

Kp = Linear partition coefficient; Kpo and a can be found in table below

$$C/Ct = 1 / (1 + Kp \cdot TSS \cdot 10^{-6})$$

TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)

$$\text{Total Metal Criteria (Ct)} = Cr / (C/Ct)$$

C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value

Total Metals	Total Value	Stream Linear Partition Coefficient					Lake Linear Partition Coefficient				
		Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Stream	Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Lake
Arsenic	2.55	480000	-0.73	622758.5061	0.696412315	1.7758514	480000	-0.73	622758.5061	0.696412315	1.7758514
Chromium III	12.5	3360000	-0.93	4681640.917	0.233800619	2.92250774	2170000	-0.27	2389369.21	0.374173295	4.67716619
Copper	3.24	1040000	-0.74	1354131.341	0.513375501	1.66333662	2850000	-0.9	3928770.173	0.266656774	0.86396795
Lead	0	2800000	-0.8	3724599.66	0.277221812	0	2040000	-0.53	2464496.503	0.366952607	0
Nickel	1.88	490000	-0.57	600468.4551	0.704062764	1.323638	2210000	-0.76	2898129.338	0.330175694	0.6207303
Silver	0	2390000	-1.03	3451015.578	0.292764823	0	2390000	-1.03	3451015.578	0.292764823	0
Zinc	0	1250000	-0.7	1604506.146	0.470997326	0	3340000	-0.68	4256766.221	0.251272926	0

The following formula is used to calculate hardness dependent criteria

(Please refer to State Water Quality Standards for details)

Dissolved

WQC (ug/l)

Aluminum (T)	Acute	$e(1.3695[\ln(\text{hardness})]+1.8308)$	3590.389147	If Stream pH < 6.5, enter 750 in cell O113
	Chronic	$e(1.3695[\ln(\text{hardness})]+0.9161)$	1438.442016	If Stream pH < 6.5, enter 87 in cell P113
Cadmium (D)	Acute	$e(0.8968[\ln(\text{hardness})]-3.5699) \cdot CF1$	1.703247989	$CF1 = 1.136672 - 0.041838 \cdot \ln(\text{hardness})$
	Chronic	$e(0.7647[\ln(\text{hardness})]-4.2180) \cdot CF2$	0.464673878	$CF2 = 1.101672 - 0.041838 \cdot \ln(\text{hardness})$

			Dissolved WQC (ug/l)	
Chromium III (D)	Acute	0.316 e(0.819[ln(hardness)]+3.7256)	586.5084103	
	Chronic	0.860 e(0.819[ln(hardness)]+0.6848)	76.29269425	
Copper (D)	Acute	0.960 e(0.9422[ln(hardness)]-1.700)	13.89448887	
	Chronic	0.960 e(0.8545[ln(hardness)]-1.702)	9.230536328	
Lead (D)	Acute	e(1.273[ln(hardness)]-1.46)*CF3	67.11530851	CF3 = 1.46203 - 0.145712*ln(hardness)
	Chronic	e(1.273[ln(hardness)]-4.705)*CF4	2.615387219	CF4 = 1.46203 - 0.145712*ln(hardness)
Manganese (D)	Acute	e(0.3331[ln(hardness)]+6.4676)	3021.059826	
	Chronic	e(0.3331[ln(hardness)]+5.8743)	1669.138634	
Nickel (D)	Acute	0.998 e(0.846[ln(hardness)]+2.255)	482.4573767	
	Chronic	0.997 e(0.846[ln(hardness)]+0.0584)	53.58611961	
Silver (D)	Acute	0.85 e(1.72[ln(hardness)]-6.59)	3.418511689	
Zinc (D)	Acute	0.978 e(0.9094[ln(hardness)]+0.9095)	165.2334031	
	Chronic	0.986 e(0.90947[ln(hardness)]+0.6235)	125.1897468	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc. Ca (ug/l)	Effluent Conc. Ce (ug/l)	Acute Aquatic 2.13*Ce	Domestic Supply Cd,dom (ug/l)	Chronic Aquatic Cd (ug/l)	Human Health Cd,hh (ug/l)	Domestic Criteria ug/l						
Radioactivity, Nutrients, and Chlorine															
Aluminum, total	7429-90-5	2.5		19.3	41.109	41.109	41.109	37.1562115	1E+100	5000	1E+100	3590.389147	1438.44202	1E+100	N/A
Barium, dissolved	7440-39-3	100		64.4	137.172	137.172	137.172	123.982385	2000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Boron, dissolved	7440-42-8	100		45	95.85	95.85	95.85	86.6336538	1E+100	750	5000	1E+100	1E+100	1E+100	N/A
Cobalt, dissolved	7440-48-4	50		0	0	0	0	0	1E+100	50	1000	1E+100	1E+100	1E+100	N/A
Uranium, dissolved	7440-61-1	0.1		0	0	0	0	0	30	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Vanadium, dissolved	7440-62-2	50		0	0	0	0	0	1E+100	100	100	1E+100	1E+100	1E+100	N/A
Ra-226 and Ra-228 (pCi/l)				0.549	1.16937	1.16937	1.16937	1.05693058	5	1E+100	30	1E+100	1E+100	1E+100	N/A
Strontium (pCi/l)				0	0	0	0	0	8	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Tritium (pCi/l)				0	0	0	0	0	20000	1E+100	20000	1E+100	1E+100	1E+100	N/A
Gross Alpha (pCi/l)				0.772	1.64436	1.64436	1.64436	1.48624846	15	1E+100	15	1E+100	1E+100	1E+100	N/A
Asbestos (fibers/l)				0	0	0	0	0	7000000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Total Residual Chlorine	7782-50-5	33		0	0	0	0	0	1E+100	1E+100	11	19	11	1E+100	N/A
Nitrate as N (mg/l)				1.42	3.0246	3.0246	3.0246	2.73377308	10	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Nitrite + Nitrate (mg/l)				0	0	0	0	0	1E+100	1E+100	132	1E+100	1E+100	1E+100	N/A
METALS AND CYANIDE															
Antimony, dissolved (P)	7440-36-0	60		0	0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	640	N/A
Arsenic, dissolved (P)	7440-38-2	0.5		1.775851403	3.782563489	3.78256349	3.78256349	3.41885546	10	100	200	340	150	9	N/A
Beryllium, dissolved	7440-41-7	0.5		0	0	0	0	0	4	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Cadmium, dissolved	7440-43-9	1		0	0	0	0	0	5	10	50	1.703247989	0.46467388	1E+100	N/A
Chromium (III), dissolved	16065-83-1	10		12.5	26.625	26.625	26.625	24.0649038	1E+100	1E+100	1E+100	586.5084103	76.2926943	1E+100	N/A
Chromium (VI), dissolved	18540-29-9	10		12.5	26.625	26.625	26.625	24.0649038	1E+100	1E+100	1E+100	16	11	1E+100	N/A
Chromium, dissolved	7440-47-3			12.5	26.625	26.625	26.625	24.0649038	100	100	1000	1E+100	1E+100	1E+100	N/A
Copper, dissolved	7440-50-8	0.5		1.663336624	3.542907008	3.54290701	3.54290701	3.20224287	1300	200	500	13.89448887	9.23053633	1E+100	N/A
Lead, dissolved	7439-92-1	0.5		0	0	0	0	0	15	5000	100	67.11530851	2.61538722	1E+100	N/A
Manganese, dissolved	7439-96-5			0	0	0	0	0	1E+100	1E+100	1E+100	3021.059826	1669.13863	1E+100	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Livestock&	Acute	Chronic	Human	Need	TMDL
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic	Aquatic	Health	
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria	
			Ca (ug/l)	Ce (ug/l)	2.13°Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l	ug/l	ug/l	ug/l		
Mercury, dissolved	7439-97-6	0.005		0.0002	0.000426	0.000426	0.000426	0.00038504	1E+100	1E+100	1E+100	1.4	0.77	1E+100	N/A
Mercury, total	7439-97-6	0.005		0.0002	0.000426	0.000426	0.000426	0.00038504	2	1E+100	0.77	1E+100	1E+100	1E+100	N/A
Molybdenum, dissolved	7439-98-7			2.92	6.2196	6.2196	6.2196	5.62156154	1E+100	1000	1E+100	1E+100	1E+100	1E+100	N/A
Molybdenum, total recoverable	7439-98-7			2.92	6.2196	6.2196	6.2196	5.62156154	1E+100	1E+100	1E+100	7920	1895	1E+100	N/A
Nickel, dissolved (P)	7440-02-0	0.5		1.323637996	2.819348932	2.81934893	2.81934893	2.54825769	700	1E+100	1E+100	482.4573767	53.5861196	4600	N/A
Selenium, dissolved (P)	7782-49-2	5		0	0	0	0	0	50	130	50	1E+100	1E+100	4200	N/A
Selenium, dis (SO4 >500 mg/l)		5			0	0	0	0	50	250	50	1E+100	1E+100	4200	N/A
Selenium, total recoverable	7782-49-2	5		0	0	0	0	0	1E+100	1E+100	5	20	5	1E+100	N/A
Silver, dissolved	7440-22-4	0.5		0	0	0	0	0	1E+100	1E+100	1E+100	3.418511689	1E+100	1E+100	N/A
Thallium, dissolved (P)	7440-28-0	0.5		0.212	0.45156	0.45156	0.45156	0.40814077	2	1E+100	1E+100	1E+100	1E+100	0.47	N/A
Zinc, dissolved	7440-66-6	20		0	0	0	0	0	10500	2000	25000	165.2334031	125.189747	26000	N/A
Cyanide, total recoverable	57-12-5	10		0	0	0	0	0	200	1E+100	5.2	22	5.2	140	N/A
Dioxin	1764-01-6	0.00001		0	0	0	0	0	3.00E-05	1E+100	1E+100	1E+100	1E+100	5.1E-08	N/A
VOLATILE COMPOUNDS															
Acrolein	107-02-8	50			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	9	N/A
Acrylonitrile	107-13-0	20			0	0	0	0	0.65	1E+100	1E+100	1E+100	1E+100	2.5	N/A
Benzene	71-43-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	510	N/A
Bromoform	75-25-2	10			0	0	0	0	44	1E+100	1E+100	1E+100	1E+100	1400	N/A
Carbon Tetrachloride	56-23-5	2			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	16	N/A
Chlorobenzene	108-90-7	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	1600	N/A
Clorodibromomethane	124-48-1	10			0	0	0	0	4.2	1E+100	1E+100	1E+100	1E+100	130	N/A
Chloroform	67-66-3	50			0	0	0	0	57	1E+100	1E+100	1E+100	1E+100	4700	N/A
Dichlorobromomethane	75-27-4	10			0	0	0	0	5.6	1E+100	1E+100	1E+100	1E+100	170	N/A
1,2-Dichloroethane	107-06-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	370	N/A
1,1-Dichloroethylene	75-35-4	10			0	0	0	0	7	1E+100	1E+100	1E+100	1E+100	7100	N/A
1,2-Dichloropropane	78-87-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	150	N/A
1,3-Dichloropropylene	542-75-6	10			0	0	0	0	3.5	1E+100	1E+100	1E+100	1E+100	210	N/A
Ethylbenzene	100-41-4	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	2100	N/A
Methyl Bromide	74-83-9	50			0	0	0	0	49	1E+100	1E+100	1E+100	1E+100	1500	N/A
Methylene Chloride	75-09-2	20			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	5900	N/A
1,1,2,2-Tetrachloroethane	79-34-5	10			0	0	0	0	1.8	1E+100	1E+100	1E+100	1E+100	40	N/A
Tetrachloroethylene	127-18-4	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	33	N/A
Toluene	108-88-3	10			0	0	0	0	1000	1E+100	1E+100	1E+100	1E+100	15000	N/A
1,2-trans-Dichloroethylene	156-60-5	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	10000	N/A
1,1,1-Trichloroethane	71-55-6				0	0	0	0	200	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
1,1,2-Trichloroethane	79-00-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	160	N/A
Trichloroethylene	79-01-6	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	300	N/A
Vinyl Chloride	75-01-4	10			0	0	0	0	2	1E+100	1E+100	1E+100	1E+100	24	N/A
ACID COMPOUNDS															
2-Chlorophenol	95-57-8	10			0	0	0	0	175	1E+100	1E+100	1E+100	1E+100	150	N/A
2,4-Dichlorophenol	120-83-2	10			0	0	0	0	105	1E+100	1E+100	1E+100	1E+100	290	N/A
2,4-Dimethylphenol	105-67-9	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	850	N/A
4,6-Dinitro-o-Cresol	534-52-1	50			0	0	0	0	14	1E+100	1E+100	1E+100	1E+100	280	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria						
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l						
2,4-Dinitrophenol	51-28-5	50			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	5300	N/A
Pentachlorophenol	87-86-5	50			0	0	0	0	1	1E+100	1E+100	19	15	30	N/A
Phenol	108-95-2	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	860000	N/A
2,4,6-Trichlorophenol	88-06-2	10			0	0	0	0	32	1E+100	1E+100	1E+100	1E+100	24	N/A
BASE/NEUTRAL															
Acenaphthene	83-32-9	10			0	0	0	0	2100	1E+100	1E+100	1E+100	1E+100	990	N/A
Anthracene	120-12-7	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	40000	N/A
Benzidine	92-87-5	50			0	0	0	0	0.0015	1E+100	1E+100	1E+100	1E+100	0.002	N/A
Benzo(a)anthracene	56-55-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(a)pyrene	50-32-8	5			0	0	0	0	0.2	1E+100	1E+100	1E+100	1E+100	0.18	N/A
3,4-Benzofluoranthene	205-99-2	10			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(k)fluoranthene	207-08-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Bis(2-chloroethyl)Ether	111-44-4	10			0	0	0	0	0.3	1E+100	1E+100	1E+100	1E+100	5.3	N/A
Bis(2-chloroisopropyl)Ether	108-60-1	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	65000	N/A
Bis(2-ethylhexyl)Phthalate	117-81-7	10			0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	22	N/A
Butyl Benzyl Phthalate	85-68-7	10			0	0	0	0	7000	1E+100	1E+100	1E+100	1E+100	1900	N/A
2-Chloronaphthalene	91-58-7	10			0	0	0	0	2800	1E+100	1E+100	1E+100	1E+100	1600	N/A
Chrysene	218-01-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Dibenzo(a,h)anthracene	53-70-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
1,2-Dichlorobenzene	95-50-1	10			0	0	0	0	600	1E+100	1E+100	1E+100	1E+100	1300	N/A
1,3-Dichlorobenzene	541-73-1	10			0	0	0	0	469	1E+100	1E+100	1E+100	1E+100	960	N/A
1,4-Dichlorobenzene	106-46-7	10			0	0	0	0	75	1E+100	1E+100	1E+100	1E+100	190	N/A
3,3'-Dichlorobenzidine	91-94-1	5			0	0	0	0	0.78	1E+100	1E+100	1E+100	1E+100	0.28	N/A
Diethyl Phthalate	84-66-2	10			0	0	0	0	28000	1E+100	1E+100	1E+100	1E+100	44000	N/A
Dimethyl Phthalate	131-11-3	10			0	0	0	0	350000	1E+100	1E+100	1E+100	1E+100	1100000	N/A
Di-n-Butyl Phthalate	84-74-2	10			0	0	0	0	3500	1E+100	1E+100	1E+100	1E+100	4500	N/A
2,4-Dinitrotoluene	121-14-2	10			0	0	0	0	1.1	1E+100	1E+100	1E+100	1E+100	34	N/A
1,2-Diphenylhydrazine	122-66-7	20			0	0	0	0	0.44	1E+100	1E+100	1E+100	1E+100	2	N/A
Fluoranthene	206-44-0	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	140	N/A
Fluorene	86-73-7	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	5300	N/A
Hexachlorobenzene	118-74-1	5			0	0	0	0	1	1E+100	1E+100	1E+100	1E+100	0.0029	N/A
Hexachlorobutadiene	87-68-3	10			0	0	0	0	4.5	1E+100	1E+100	1E+100	1E+100	180	N/A
Hexachlorocyclopentadiene	77-47-4	10			0	0	0	0	50	1E+100	1E+100	1E+100	1E+100	1100	N/A
Hexachloroethane	67-72-1	20			0	0	0	0	25	1E+100	1E+100	1E+100	1E+100	33	N/A
Indeno(1,2,3-cd)Pyrene	193-39-5	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Isophorone	78-59-1	10			0	0	0	0	368	1E+100	1E+100	1E+100	1E+100	9600	N/A
Nitrobenzene	98-95-3	10			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	690	N/A
n-Nitrosodimethylamine	62-75-9	50			0	0	0	0	0.0069	1E+100	1E+100	1E+100	1E+100	30	N/A
n-Nitrosodi-n-Propylamine	621-64-7	20			0	0	0	0	0.05	1E+100	1E+100	1E+100	1E+100	5.1	N/A
n-Nitrosodiphenylamine	86-30-6	20			0	0	0	0	71	1E+100	1E+100	1E+100	1E+100	60	N/A
Pyrene	129-00-0	10			0	0	0	0	1050	1E+100	1E+100	1E+100	1E+100	4000	N/A
1,2,4-Trichlorobenzene	120-82-1	10			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	70	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock & Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria	Irrigation Criteria					
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l					
PESTICIDES AND PCBs															
Aldrin	309-00-2	0.01			0	0	0	0	0.021	1E+100	1E+100	3	1E+100	0.0005	N/A
Alpha-BHC	319-84-6	0.05			0	0	0	0	0.056	1E+100	1E+100	1E+100	1E+100	0.049	N/A
Beta-BHC	319-85-7	0.05			0	0	0	0	0.091	1E+100	1E+100	1E+100	1E+100	0.17	N/A
Gamma-BHC	58-89-9	0.05			0	0	0	0	0.2	1E+100	1E+100	0.95	1E+100	1.8	N/A
Chlordane	57-74-9	0.2			0	0	0	0	2	1E+100	1E+100	2.4	0.0043	0.0081	N/A
4,4'-DDT and derivatives	50-29-3	0.02			0	0	0	0	1	1E+100	0.001	1.1	0.001	0.0022	N/A
Dieldrin	60-57-1	0.02			0	0	0	0	0.022	1E+100	1E+100	0.24	0.056	0.00054	N/A
Diazinon	333-41-5				0	0	0	0	1E+100	1E+100	1E+100	0.17	0.17	1E+100	N/A
Alpha-Endosulfan	959-98-8	0.01			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Beta-Endosulfan	33213-65-9	0.02			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Endosulfan sulfate	1031-7-8	0.1			0	0	0	0	62	1E+100	1E+100	1E+100	1E+100	89	N/A
Endrin	72-20-8	0.02			0	0	0	0	2	1E+100	1E+100	0.086	0.036	0.06	N/A
Endrin Aldehyde	7421-93-4	0.1			0	0	0	0	10.5	1E+100	1E+100	1E+100	1E+100	0.3	N/A
Heptachlor	76-44-8	0.01			0	0	0	0	0.4	1E+100	1E+100	0.52	0.0038	0.00079	N/A
Heptachlor Epoxide	1024-57-3	0.01			0	0	0	0	0.2	1E+100	1E+100	0.52	0.0038	0.00039	N/A
PCBs	1336-36-3	0.2			0	0	0	0	0.5	1E+100	0.014	2	0.014	0.00064	N/A
Toxaphene	8001-35-2	0.3			0	0	0	0	3	1E+100	1E+100	0.73	0.0002	0.0028	N/A

Note: SCORET CODE for reference only. Codes for total form are used except for parameters which have criteria in both total and dissolved forms.

STEP 3: SCAN POTENTIAL INSTREAM WASTE CONCENTRATIONS AGAINST WATER QUALITY CRITERIA
AND ESTABLISH EFFLUENT LIMITATIONS FOR ALL APPLICABLE PARAMETERS

No limits are established if the receiving stream is not designated for the particular uses.

No limits are established if the potential instream waste concentrations are less than the chronic water quality criteria.

The most applicable stringent criteria are used to establish effluent limitations for a given parameter.

Water quality criteria apply at the end-of-pipe for acute aquatic life criteria and discharges to public lakes.

If background concentration exceeds the water quality criteria, water quality criteria apply. And "Need TMDL" shown to the next column of Avg. Mass

Monthly avg concentration = daily max. / 1.5.

APPLICABLE WATER QUALITY-BASED LIMITS

The following formula is used to calculate the allowable daily maximum effluent concentration

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

Daily Max. Conc. = $C_s + (C_s - C_a)(F \cdot Q_a / Q_e)$

Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where:

C_s = Applicable water quality standard

C_a = Ambient stream concentration

F = Fraction of stream allowed for mixing (1.0 is assigned to domestic water supply and human health uses)

Q_e = Plant effluent flow

Q_a = Criteria Low flow (4Q3) or Harmonic Mean flow for Human Health Criteria

CALCULATIONS OF NEW MEXICO WATER QUALITY-BASED EFFLUENT LIMITATIONS

NMAC 20.6.4. **NMWQS as of January 14, 2011**

(EPA approved site-specific criteria for aluminum, cadmium, and zinc on April 30, 2012)

Calculations Specifications:

Excel **Revised as of May 1, 2012**

Prepared By:

Isaac Chen 06/12/2019

STEP 1: REFERENCE IMPLEMENTATION PROCEDURES
INPUT FACILITY AND RECEIVING STREAM DATA
LIST SOURCE OF DATA INPUT

APPENDIX A of FACT SHEET

IMPLEMENTATION PROCEDURES

The State of New Mexico Standards for Interstate and Intrastate Surface Waters are implemented in this spread sheet by using procedures established in the "Procedures for Implementing NPDES Permits in New Mexico" amended May 2011

FACILITY	DATA INPUT	
Permittee	LANL	
NPDES Permit No.	NM0028355	
Outfall No.(s)	03A199	
Plant Effluent Flow (MGD)	0.036	For industrial and federal facility, use the highest monthly average flow for the past 24 months. For POTWs, use the design flow.
Plant Effluent Flow (cfs)	0.0558	

RECEIVING STREAM	DATA INPUT	
Receiving Stream Name	Sandia Canyon	
Basin Name	Rio Grande	
Waterbody Segment Code No.	20.6.4.128	
Is a publicly owned lake or reservoir (enter "1" if it's a lake, "0" if not)	0	
Are acute aquatic life criteria considered (1= yes, 0= no) (MUST enter "1" for 2005 Standards)	1	
Are chronic aquatic life criteria considered (1= yes, 0=no)	0	
Are domestic water supply criteria considered (1= yes, 0=no)	0	
Are irrigation water supply criteria considered (1= yes, 0=no)	0	
Livestock watering and wildlife habitat criteria applied to all streams		
USGS Flow Station	USGS	
WQ Monitoring Station No.	SJR	
Receiving Stream TSS (mg/l)	1.51	Outfall 001's TSS
Receiving Stream Hardness (mg/l as CaCO ₃)	79.1	Outfall 001's Hardness
Receiving Stream Critical Low Flow (4Q3) (cfs)	0	Outfall 001's Long-term flow
Receiving Stream Harmonic Mean Flow (cfs)	0.00155	Enter harmonic mean or modified harmonic mean flow data
Avg. Water Temperature C Max	23.4	
pH (Max)	8.5	
Fraction of stream allowed for mixing (F)	1	Enter 1, if stream morphology data is not available or for intermittent streams.
Fraction of Critical Low Flow	0	

STEP 2: INPUT AMBIENT AND EFFLUENT DATA

CALCULATE IN-STREAM WASTE CONCENTRATIONS

DATA INPUT

Input pollutant geometric mean concentration as micro-gram per liter (ug/l or ppb)

unless other unit is specified for the parameter.

Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, input "1/2 DL" for calculation.

Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, no data is inputted.

If a less than MQL value is reported, input either the reported value or "0" for calculation.

The following formula is used to calculate the Instream Waste Concentration (Cd)

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Cd = [(F \cdot Qa \cdot Ca) + (Qe \cdot 2.13 \cdot Ce)] / (F \cdot Qa + Qe)$$

Where:

Cd = Instream Waste Concentration

F = Fraction of stream allowed for mixing (see "Procedures for Implementing NPDES Permits in New Mexico")

Ce = Reported concentration in effluent

Ca = Ambient stream concentration upstream of discharge

Qe = Plant effluent flow

Qa = Critical low flow of stream at discharge point expressed as the 4Q3 or harmonic mean flow for human health criteria

The following formula convert metals reported in total form to dissolved form if criteria are in dissolved form

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Kp = Kpo \cdot (TSS)^a$$

Kp = Linear partition coefficient; Kpo and a can be found in table below

$$C/Ct = 1 / (1 + Kp \cdot TSS \cdot 10^{-6})$$

TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)

$$\text{Total Metal Criteria (Ct)} = Cr / (C/Ct)$$

C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value

Total Metals	Total Value	Stream Linear Partition Coefficient					Lake Linear Partition Coefficient				
		Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Stream	Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Lake
Arsenic	2	480000	-0.73	355294.1574	0.650832274	1.30166455	480000	-0.73	355294.1574	0.650832274	1.30166455
Chromium III		3360000	-0.93	2290291.263	0.22429874	0	2170000	-0.27	1941493.577	0.254345797	0
Copper		1040000	-0.74	766638.0991	0.463472884	0	2850000	-0.9	1966824.491	0.251895198	0
Lead	0	2800000	-0.8	2013615.166	0.247490514	0	2040000	-0.53	1639730.162	0.287687614	0
Nickel	0.6	490000	-0.57	387417.4873	0.630914665	0.3785488	2210000	-0.76	1615733.739	0.290718131	0.17443088
Silver	0	2390000	-1.03	1563333.539	0.297562932	0	2390000	-1.03	1563333.539	0.297562932	0
Zinc	3.6	1250000	-0.7	936755.2805	0.414164342	1.49099163	3340000	-0.68	2523725.655	0.207864523	0.74831228

The following formula is used to calculate hardness dependent criteria

(Please refer to State Water Quality Standards for details)

Dissolved

WQC (ug/l)

Aluminum (T)	Acute	$e(1.3695[\ln(\text{hardness})]+1.8308)$	2481.184341	If Stream pH < 6.5, enter 750 in cell O113
	Chronic	$e(1.3695[\ln(\text{hardness})]+0.9161)$	994.0537523	If Stream pH < 6.5, enter 87 in cell P113
Cadmium (D)	Acute	$e(0.8968[\ln(\text{hardness})]-3.5699) \cdot CF1$	1.353189824	$CF1 = 1.136672 - 0.041838 \cdot \ln(\text{hardness})$
	Chronic	$e(0.7647[\ln(\text{hardness})]-4.2180) \cdot CF2$	0.38274295	$CF2 = 1.101672 - 0.041838 \cdot \ln(\text{hardness})$

			Dissolved WQC (ug/l)	
Chromium III (D)	Acute	$0.316 e^{(0.819[\ln(\text{hardness})]+3.7256)}$	470.2200511	
	Chronic	$0.860 e^{(0.819[\ln(\text{hardness})]+0.6848)}$	61.1659679	
Copper (D)	Acute	$0.960 e^{(0.9422[\ln(\text{hardness})]-1.700)}$	10.77537756	
	Chronic	$0.960 e^{(0.8545[\ln(\text{hardness})]-1.702)}$	7.329828781	
Lead (D)	Acute	$e^{(1.273[\ln(\text{hardness})]-1.46)*CF3}$	49.98611145	CF3 = 1.46203 - 0.145712*ln(hardness)
	Chronic	$e^{(1.273[\ln(\text{hardness})]-4.705)*CF4}$	1.947887001	CF4 = 1.46203 - 0.145712*ln(hardness)
Manganese (D)	Acute	$e^{(0.3331[\ln(\text{hardness})]+6.4676)}$	2761.376203	
	Chronic	$e^{(0.3331[\ln(\text{hardness})]+5.8743)}$	1525.663168	
Nickel (D)	Acute	$0.998 e^{(0.846[\ln(\text{hardness})]+2.255)}$	383.9917582	
	Chronic	$0.997 e^{(0.846[\ln(\text{hardness})]+0.0584)}$	42.64962933	
Silver (D)	Acute	$0.85 e^{(1.72[\ln(\text{hardness})]-6.59)}$	2.149224792	
Zinc (D)	Acute	$0.978 e^{(0.9094[\ln(\text{hardness})]+0.9095)}$	129.2800109	
	Chronic	$0.986 e^{(0.90947[\ln(\text{hardness})]+0.6235)}$	97.94766583	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc. Ca (ug/l)	Effluent Conc. Ce (ug/l)	Acute Aquatic 2.13*Ce	Domestic Supply Cd,dom (ug/l)	Chronic Aquatic Cd (ug/l)	Human Health Cd,hh (ug/l)	Domestic Criteria ug/l						
Radioactivity, Nutrients, and Chlorine															
Aluminum, total	7429-90-5	2.5		19.3	41.109	41.109	41.109	39.9979459	1E+100	5000	1E+100	2481.184341	994.053752	1E+100	N/A
Barium, dissolved	7440-39-3	100		51.7	110.121	110.121	110.121	107.144757	2000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Boron, dissolved	7440-42-8	100		34.9	74.337	74.337	74.337	72.3278919	1E+100	750	5000	1E+100	1E+100	1E+100	N/A
Cobalt, dissolved	7440-48-4	50		0	0	0	0	0	1E+100	50	1000	1E+100	1E+100	1E+100	N/A
Uranium, dissolved	7440-61-1	0.1		0	0	0	0	0	30	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Vanadium, dissolved	7440-62-2	50		0	0	0	0	0	1E+100	100	100	1E+100	1E+100	1E+100	N/A
Ra-226 and Ra-228 (pCi/l)				0.7747	1.650111	1.650111	1.650111	1.60551341	5	1E+100	30	1E+100	1E+100	1E+100	N/A
Strontium (pCi/l)				0	0	0	0	0	8	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Tritium (pCi/l)				0	0	0	0	0	20000	1E+100	20000	1E+100	1E+100	1E+100	N/A
Gross Alpha (pCi/l)				2.88	6.1344	6.1344	6.1344	5.96860541	15	1E+100	15	1E+100	1E+100	1E+100	N/A
Asbestos (fibers/l)				0	0	0	0	0	7000000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Total Residual Chlorine	7782-50-5	33		0.98	2.0874	2.0874	2.0874	2.03098378	1E+100	1E+100	11	19	11	1E+100	N/A
Nitrate as N (mg/l)				0	0	0	0	0	10	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Nitrite + Nitrate (mg/l)				1.4	2.982	2.982	2.982	2.90140541	1E+100	1E+100	132	1E+100	1E+100	1E+100	N/A
METALS AND CYANIDE															
Antimony, dissolved (P)	7440-36-0	60		0	0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	640	N/A
Arsenic, dissolved (P)	7440-38-2	0.5		1.301664548	2.772545488	2.77254549	2.77254549	2.69761183	10	100	200	340	150	9	N/A
Beryllium, dissolved	7440-41-7	0.5		0	0	0	0	0	4	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Cadmium, dissolved	7440-43-9	1		0	0	0	0	0	5	10	50	1.353189824	0.38274295	1E+100	N/A
Chromium (III), dissolved	16065-83-1	10		0	0	0	0	0	1E+100	1E+100	1E+100	470.2200511	61.1659679	1E+100	N/A
Chromium (VI), dissolved	18540-29-9	10		0	0	0	0	0	1E+100	1E+100	1E+100	16	11	1E+100	N/A
Chromium, dissolved	7440-47-3			0	0	0	0	0	100	100	1000	1E+100	1E+100	1E+100	N/A
Copper, dissolved	7440-50-8	0.5		1.845	3.92985	3.92985	3.92985	3.82363784	1300	200	500	10.77537756	7.32982878	1E+100	N/A
Lead, dissolved	7439-92-1	0.5		0	0	0	0	0	15	5000	100	49.98611145	1.947887	1E+100	N/A
Manganese, dissolved	7439-96-5			0	0	0	0	0	1E+100	1E+100	1E+100	2761.376203	1525.66317	1E+100	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration						Livestock&	Acute	Chronic	Human	Need	TMDL	
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic	Aquatic		Health
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria	Criteria		Criteria
			Ca (ug/l)	Ce (ug/l)	2.13°Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l	ug/l	ug/l	ug/l		
Mercury, dissolved	7439-97-6	0.005		0.0027	0.005751	0.005751	0.005751	0.00559557	1E+100	1E+100	1E+100	1.4	0.77	1E+100	N/A
Mercury, total	7439-97-6	0.005		0.0027	0.005751	0.005751	0.005751	0.00559557	2	1E+100	0.77	1E+100	1E+100	1E+100	N/A
Molybdenum, dissolved	7439-98-7			1.85	3.9405	3.9405	3.9405	3.834	1E+100	1000	1E+100	1E+100	1E+100	1E+100	N/A
Molybdenum, total recoverable	7439-98-7			1.85	3.9405	3.9405	3.9405	3.834	1E+100	1E+100	1E+100	7920	1895	1E+100	N/A
Nickel, dissolved (P)	7440-02-0	0.5		0.378548799	0.806308942	0.80630894	0.80630894	0.78451681	700	1E+100	1E+100	383.9917582	42.6496293	4600	N/A
Selenium, dissolved (P)	7782-49-2	5		0	0	0	0	0	50	130	50	1E+100	1E+100	4200	N/A
Selenium, dis (SO4 >500 mg/l)		5		0	0	0	0	0	50	250	50	1E+100	1E+100	4200	N/A
Selenium, total recoverable	7782-49-2	5		0	0	0	0	0	1E+100	1E+100	5	20	5	1E+100	N/A
Silver, dissolved	7440-22-4	0.5		0	0	0	0	0	1E+100	1E+100	1E+100	2.149224792	1E+100	1E+100	N/A
Thallium, dissolved (P)	7440-28-0	0.5		0.282	0.60066	0.60066	0.60066	0.58442595	2	1E+100	1E+100	1E+100	1E+100	0.47	N/A
Zinc, dissolved	7440-66-6	20		1.490991631	3.175812175	3.17581217	3.17581217	3.08997941	10500	2000	25000	129.2800109	97.9476658	26000	N/A
Cyanide, total recoverable	57-12-5	10		0	0	0	0	0	200	1E+100	5.2	22	5.2	140	N/A
Dioxin	1764-01-6	0.00001		0	0	0	0	0	3.00E-05	1E+100	1E+100	1E+100	1E+100	5.1E-08	N/A
VOLATILE COMPOUNDS															
Acrolein	107-02-8	50			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	9	N/A
Acrylonitrile	107-13-0	20			0	0	0	0	0.65	1E+100	1E+100	1E+100	1E+100	2.5	N/A
Benzene	71-43-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	510	N/A
Bromoform	75-25-2	10		0.85	1.8105	1.8105	1.8105	1.76156757	44	1E+100	1E+100	1E+100	1E+100	1400	N/A
Carbon Tetrachloride	56-23-5	2			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	16	N/A
Chlorobenzene	108-90-7	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	1600	N/A
Clorodibromomethane	124-48-1	10		0	0	0	0	0	4.2	1E+100	1E+100	1E+100	1E+100	130	N/A
Chloroform	67-66-3	50		0	0	0	0	0	57	1E+100	1E+100	1E+100	1E+100	4700	N/A
Dichlorobromomethane	75-27-4	10		0	0	0	0	0	5.6	1E+100	1E+100	1E+100	1E+100	170	N/A
1,2-Dichloroethane	107-06-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	370	N/A
1,1-Dichloroethylene	75-35-4	10			0	0	0	0	7	1E+100	1E+100	1E+100	1E+100	7100	N/A
1,2-Dichloropropane	78-87-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	150	N/A
1,3-Dichloropropylene	542-75-6	10			0	0	0	0	3.5	1E+100	1E+100	1E+100	1E+100	210	N/A
Ethylbenzene	100-41-4	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	2100	N/A
Methyl Bromide	74-83-9	50			0	0	0	0	49	1E+100	1E+100	1E+100	1E+100	1500	N/A
Methylene Chloride	75-09-2	20		0	0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	5900	N/A
1,1,2,2-Tetrachloroethane	79-34-5	10			0	0	0	0	1.8	1E+100	1E+100	1E+100	1E+100	40	N/A
Tetrachloroethylene	127-18-4	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	33	N/A
Toluene	108-88-3	10		0	0	0	0	0	1000	1E+100	1E+100	1E+100	1E+100	15000	N/A
1,2-trans-Dichloroethylene	156-60-5	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	10000	N/A
1,1,1-Trichloroethane	71-55-6				0	0	0	0	200	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
1,1,2-Trichloroethane	79-00-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	160	N/A
Trichloroethylene	79-01-6	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	300	N/A
Vinyl Chloride	75-01-4	10			0	0	0	0	2	1E+100	1E+100	1E+100	1E+100	24	N/A
ACID COMPOUNDS															
2-Chlorophenol	95-57-8	10			0	0	0	0	175	1E+100	1E+100	1E+100	1E+100	150	N/A
2,4-Dichlorophenol	120-83-2	10			0	0	0	0	105	1E+100	1E+100	1E+100	1E+100	290	N/A
2,4-Dimethylphenol	105-67-9	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	850	N/A
4,6-Dinitro-o-Cresol	534-52-1	50			0	0	0	0	14	1E+100	1E+100	1E+100	1E+100	280	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria						
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l						
2,4-Dinitrophenol	51-28-5	50			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	5300	N/A
Pentachlorophenol	87-86-5	50			0	0	0	0	1	1E+100	1E+100	19	15	30	N/A
Phenol	108-95-2	10		3.36	7.1568	7.1568	7.1568	6.96337297	10500	1E+100	1E+100	1E+100	1E+100	860000	N/A
2,4,6-Trichlorophenol	88-06-2	10			0	0	0	0	32	1E+100	1E+100	1E+100	1E+100	24	N/A
BASE/NEUTRAL															
Acenaphthene	83-32-9	10			0	0	0	0	2100	1E+100	1E+100	1E+100	1E+100	990	N/A
Anthracene	120-12-7	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	40000	N/A
Benzidine	92-87-5	50			0	0	0	0	0.0015	1E+100	1E+100	1E+100	1E+100	0.002	N/A
Benzo(a)anthracene	56-55-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(a)pyrene	50-32-8	5			0	0	0	0	0.2	1E+100	1E+100	1E+100	1E+100	0.18	N/A
3,4-Benzofluoranthene	205-99-2	10			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(k)fluoranthene	207-08-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Bis(2-chloroethyl)Ether	111-44-4	10			0	0	0	0	0.3	1E+100	1E+100	1E+100	1E+100	5.3	N/A
Bis(2-chloroisopropyl)Ether	108-60-1	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	65000	N/A
Bis(2-ethylhexyl)Phthalate	117-81-7	10			0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	22	N/A
Butyl Benzyl Phthalate	85-68-7	10			0	0	0	0	7000	1E+100	1E+100	1E+100	1E+100	1900	N/A
2-Chloronaphthalene	91-58-7	10			0	0	0	0	2800	1E+100	1E+100	1E+100	1E+100	1600	N/A
Chrysene	218-01-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Dibenzo(a,h)anthracene	53-70-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
1,2-Dichlorobenzene	95-50-1	10			0	0	0	0	600	1E+100	1E+100	1E+100	1E+100	1300	N/A
1,3-Dichlorobenzene	541-73-1	10			0	0	0	0	469	1E+100	1E+100	1E+100	1E+100	960	N/A
1,4-Dichlorobenzene	106-46-7	10			0	0	0	0	75	1E+100	1E+100	1E+100	1E+100	190	N/A
3,3'-Dichlorobenzidine	91-94-1	5			0	0	0	0	0.78	1E+100	1E+100	1E+100	1E+100	0.28	N/A
Diethyl Phthalate	84-66-2	10			0	0	0	0	28000	1E+100	1E+100	1E+100	1E+100	44000	N/A
Dimethyl Phthalate	131-11-3	10			0	0	0	0	350000	1E+100	1E+100	1E+100	1E+100	1100000	N/A
Di-n-Butyl Phthalate	84-74-2	10			0	0	0	0	3500	1E+100	1E+100	1E+100	1E+100	4500	N/A
2,4-Dinitrotoluene	121-14-2	10			0	0	0	0	1.1	1E+100	1E+100	1E+100	1E+100	34	N/A
1,2-Diphenylhydrazine	122-66-7	20			0	0	0	0	0.44	1E+100	1E+100	1E+100	1E+100	2	N/A
Fluoranthene	206-44-0	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	140	N/A
Fluorene	86-73-7	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	5300	N/A
Hexachlorobenzene	118-74-1	5			0	0	0	0	1	1E+100	1E+100	1E+100	1E+100	0.0029	N/A
Hexachlorobutadiene	87-68-3	10			0	0	0	0	4.5	1E+100	1E+100	1E+100	1E+100	180	N/A
Hexachlorocyclopentadiene	77-47-4	10			0	0	0	0	50	1E+100	1E+100	1E+100	1E+100	1100	N/A
Hexachloroethane	67-72-1	20			0	0	0	0	25	1E+100	1E+100	1E+100	1E+100	33	N/A
Indeno(1,2,3-cd)Pyrene	193-39-5	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Isophorone	78-59-1	10			0	0	0	0	368	1E+100	1E+100	1E+100	1E+100	9600	N/A
Nitrobenzene	98-95-3	10			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	690	N/A
n-Nitrosodimethylamine	62-75-9	50			0	0	0	0	0.0069	1E+100	1E+100	1E+100	1E+100	30	N/A
n-Nitrosodi-n-Propylamine	621-64-7	20			0	0	0	0	0.05	1E+100	1E+100	1E+100	1E+100	5.1	N/A
n-Nitrosodiphenylamine	86-30-6	20			0	0	0	0	71	1E+100	1E+100	1E+100	1E+100	60	N/A
Pyrene	129-00-0	10			0	0	0	0	1050	1E+100	1E+100	1E+100	1E+100	4000	N/A
1,2,4-Trichlorobenzene	120-82-1	10			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	70	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc Ca (ug/l)	Effluent Conc. Ce (ug/l)	Acute Aquatic 2.13*Ce	Domestic Supply Cd,dom (ug/l)	Chronic Aquatic Cd (ug/l)	Human Health Cd,hh (ug/l)	Domestic Criteria ug/l	Irrigation Criteria ug/l					
PESTICIDES AND PCBs															
Aldrin	309-00-2	0.01			0	0	0	0	0.021	1E+100	1E+100	3	1E+100	0.0005	N/A
Alpha-BHC	319-84-6	0.05			0	0	0	0	0.056	1E+100	1E+100	1E+100	1E+100	0.049	N/A
Beta-BHC	319-85-7	0.05			0	0	0	0	0.091	1E+100	1E+100	1E+100	1E+100	0.17	N/A
Gamma-BHC	58-89-9	0.05			0	0	0	0	0.2	1E+100	1E+100	0.95	1E+100	1.8	N/A
Chlordane	57-74-9	0.2			0	0	0	0	2	1E+100	1E+100	2.4	0.0043	0.0081	N/A
4,4'-DDT and derivatives	50-29-3	0.02			0	0	0	0	1	1E+100	0.001	1.1	0.001	0.0022	N/A
Dieldrin	60-57-1	0.02			0	0	0	0	0.022	1E+100	1E+100	0.24	0.056	0.00054	N/A
Diazinon	333-41-5				0	0	0	0	1E+100	1E+100	1E+100	0.17	0.17	1E+100	N/A
Alpha-Endosulfan	959-98-8	0.01			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Beta-Endosulfan	33213-65-9	0.02			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Endosulfan sulfate	1031-7-8	0.1			0	0	0	0	62	1E+100	1E+100	1E+100	1E+100	89	N/A
Endrin	72-20-8	0.02			0	0	0	0	2	1E+100	1E+100	0.086	0.036	0.06	N/A
Endrin Aldehyde	7421-93-4	0.1			0	0	0	0	10.5	1E+100	1E+100	1E+100	1E+100	0.3	N/A
Heptachlor	76-44-8	0.01			0	0	0	0	0.4	1E+100	1E+100	0.52	0.0038	0.00079	N/A
Heptachlor Epoxide	1024-57-3	0.01			0	0	0	0	0.2	1E+100	1E+100	0.52	0.0038	0.00039	N/A
PCBs	1336-36-3	0.2			0	0	0	0	0.5	1E+100	0.014	2	0.014	0.00064	N/A
Toxaphene	8001-35-2	0.3			0	0	0	0	3	1E+100	1E+100	0.73	0.0002	0.0028	N/A

Note: SCORET CODE for reference only. Codes for total form are used except for parameters which have criteria in both total and dissolved forms.

STEP 3: SCAN POTENTIAL INSTREAM WASTE CONCENTRATIONS AGAINST WATER QUALITY CRITERIA
AND ESTABLISH EFFLUENT LIMITATIONS FOR ALL APPLICABLE PARAMETERS

No limits are established if the receiving stream is not designated for the particular uses.

No limits are established if the potential instream waste concentrations are less than the chronic water quality criteria.

The most applicable stringent criteria are used to establish effluent limitations for a given parameter.

Water quality criteria apply at the end-of-pipe for acute aquatic life criteria and discharges to public lakes.

If background concentration exceeds the water quality criteria, water quality criteria apply. And "Need TMDL" shown to the next column of Avg. Mass

Monthly avg concentration = daily max. / 1.5.

APPLICABLE WATER QUALITY-BASED LIMITS

The following formula is used to calculate the allowable daily maximum effluent concentration

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

Daily Max. Conc. = $C_s + (C_s - C_a)(F \cdot Q_a / Q_e)$

Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where:

C_s = Applicable water quality standard

C_a = Ambient stream concentration

F = Fraction of stream allowed for mixing (1.0 is assigned to domestic water supply and human health uses)

Q_e = Plant effluent flow

Q_a = Criteria Low flow (4Q3) or Harmonic Mean flow for Human Health Criteria

CALCULATIONS OF NEW MEXICO WATER QUALITY-BASED EFFLUENT LIMITATIONS

NMAC 20.6.4. **NMWQS as of January 14, 2011**

(EPA approved site-specific criteria for aluminum, cadmium, and zinc on April 30, 2012)

Calculations Specifications:

Excel **Revised as of May 1, 2012**

Prepared By:

Isaac Chen 06/14/2019

STEP 1: REFERENCE IMPLEMENTATION PROCEDURES
INPUT FACILITY AND RECEIVING STREAM DATA
LIST SOURCE OF DATA INPUT

APPENDIX A of FACT SHEET

IMPLEMENTATION PROCEDURES

The State of New Mexico Standards for Interstate and Intrastate Surface Waters are implemented in this spread sheet by using procedures established in the "Procedures for Implementing NPDES Permits in New Mexico" amended May 2011

FACILITY	DATA INPUT	
Permittee	LANL	
NPDES Permit No.	NM0028355	
Outfall No.(s)	04A022	
Plant Effluent Flow (MGD)	0.001	For industrial and federal facility, use the highest monthly average flow for the past 24 months. For POTWs, use the design flow.
Plant Effluent Flow (cfs)	0.00155	
RECEIVING STREAM	DATA INPUT	
Receiving Stream Name	Mortandad Canyon	
Basin Name	Rio Grande	
Waterbody Segment Code No.	20.6.4.128	
Is a publicly owned lake or reservoir (enter "1" if it's a lake, "0" if not)	0	
Are acute aquatic life criteria considered (1= yes, 0= no) (MUST enter "1" for 2005 Standards)	1	
Are chronic aquatic life criteria considered (1= yes, 0=no)	0	
Are domestic water supply criteria considered (1= yes, 0=no)	0	
Are irrigation water supply criteria considered (1= yes, 0=no)	0	
Livestock watering and wildlife habitat criteria applied to all streams		
USGS Flow Station	USGS	
WQ Monitoring Station No.	SJR	
Receiving Stream TSS (mg/l)	3.63	For intermittent stream, enter effluent TSS
Receiving Stream Hardness (mg/l as CaCO ₃)	44.5	For intermittent stream, enter effluent Hardness (If no data, 20 mg/l is used)
Receiving Stream Critical Low Flow (4Q3) (cfs)	0	Enter "0" for intermittent stream and lake.
Receiving Stream Harmonic Mean Flow (cfs)	0.00155	Enter harmonic mean or modified harmonic mean flow data
Avg. Water Temperature (C)	20.8	
pH (Avg)	8.1	
Fraction of stream allowed for mixing (F)	1	Enter 1, if stream morphology data is not available or for intermittent streams.
Fraction of Critical Low Flow	0	

STEP 2: INPUT AMBIENT AND EFFLUENT DATA

CALCULATE IN-STREAM WASTE CONCENTRATIONS

DATA INPUT

Input pollutant geometric mean concentration as micro-gram per liter (ug/l or ppb)

unless other unit is specified for the parameter.

Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, input "1/2 DL" for calculation.

Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, no data is inputted.

If a less than MQL value is reported, input either the reported value or "0" for calculation.

The following formula is used to calculate the Instream Waste Concentration (Cd)

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Cd = [(F \cdot Qa \cdot Ca) + (Qe \cdot 2.13 \cdot Ce)] / (F \cdot Qa + Qe)$$

Where:

Cd = Instream Waste Concentration

F = Fraction of stream allowed for mixing (see "Procedures for Implementing NPDES Permits in New Mexico")

Ce = Reported concentration in effluent

Ca = Ambient stream concentration upstream of discharge

Qe = Plant effluent flow

Qa = Critical low flow of stream at discharge point expressed as the 4Q3 or harmonic mean flow for human health criteria

The following formula convert metals reported in total form to dissolved form if criteria are in dissolved form

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Kp = Kpo \cdot (TSS \cdot 10^{-6})$$

Kp = Linear partition coefficient; Kpo and a can be found in table below

$$C/Ct = 1 / (1 + Kp \cdot TSS \cdot 10^{-6})$$

TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)

$$\text{Total Metal Criteria (Ct)} = Cr / (C/Ct)$$

C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value

Total Metals	Total Value	Stream Linear Partition Coefficient					Lake Linear Partition Coefficient				
		Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Stream	Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Lake
Arsenic	2	480000	-0.73	187287.7624	0.595289624	1.19057925	480000	-0.73	187287.7624	0.595289624	1.19057925
Chromium III	3.49	3360000	-0.93	1013038.886	0.213797135	0.746152	2170000	-0.27	1532092.354	0.152404286	0.53189096
Copper	5.46	1040000	-0.74	400592.152	0.407473137	2.22480333	2850000	-0.9	893159.2441	0.235728521	1.28707772
Lead	0	2800000	-0.8	998234.8583	0.216282034	0	2040000	-0.53	1030100.638	0.211003169	0
Nickel	0.6	490000	-0.57	234989.9581	0.539661462	0.32379688	2210000	-0.76	829589.4848	0.249288914	0.14957335
Silver	0	2390000	-1.03	633423.3622	0.303092133	0	2390000	-1.03	633423.3622	0.303092133	0
Zinc	26.5	1250000	-0.7	506961.9627	0.352078965	9.33009258	3340000	-0.68	1389984.514	0.165408356	4.38332144

The following formula is used to calculate hardness dependent criteria

(Please refer to State Water Quality Standards for details)

Dissolved

WQC (ug/l)

Aluminum (T)	Acute	$e(1.3695[\ln(\text{hardness})]+1.8308)$	1128.587855	If Stream pH < 6.5, enter 750 in cell O113
	Chronic	$e(1.3695[\ln(\text{hardness})]+0.9161)$	452.1538258	If Stream pH < 6.5, enter 87 in cell P113
Cadmium (D)	Acute	$e(0.8968[\ln(\text{hardness})]-3.5699) \cdot CF1$	0.828219245	$CF1 = 1.136672 - 0.041838 \cdot \ln(\text{hardness})$
	Chronic	$e(0.7647[\ln(\text{hardness})]-4.2180) \cdot CF2$	0.252988923	$CF2 = 1.101672 - 0.041838 \cdot \ln(\text{hardness})$

			Dissolved WQC (ug/l)	
Chromium III (D)	Acute	$0.316 e(0.819[\ln(\text{hardness})]+3.7256)$	293.563092	
	Chronic	$0.860 e(0.819[\ln(\text{hardness})]+0.6848)$	38.18652697	
Copper (D)	Acute	$0.960 e(0.9422[\ln(\text{hardness})]-1.700)$	6.26693826	
	Chronic	$0.960 e(0.8545[\ln(\text{hardness})]-1.702)$	4.483587547	
Lead (D)	Acute	$e(1.273[\ln(\text{hardness})]-1.46)*CF3$	26.47570177	CF3 = 1.46203 - 0.145712*ln(hardness)
	Chronic	$e(1.273[\ln(\text{hardness})]-4.705)*CF4$	1.031720088	CF4 = 1.46203 - 0.145712*ln(hardness)
Manganese (D)	Acute	$e(0.3331[\ln(\text{hardness})]+6.4676)$	2279.878541	
	Chronic	$e(0.3331[\ln(\text{hardness})]+5.8743)$	1259.635219	
Nickel (D)	Acute	$0.998 e(0.846[\ln(\text{hardness})]+2.255)$	236.0354136	
	Chronic	$0.997 e(0.846[\ln(\text{hardness})]+0.0584)$	26.21624731	
Silver (D)	Acute	$0.85 e(1.72[\ln(\text{hardness})]-6.59)$	0.799093336	
Zinc (D)	Acute	$0.978 e(0.9094[\ln(\text{hardness})]+0.9095)$	76.62108191	
	Chronic	$0.986 e(0.90947[\ln(\text{hardness})]+0.6235)$	58.04883439	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc.	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria						
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l						
Radioactivity, Nutrients, and Chlorine															
Aluminum, total	7429-90-5	2.5	19.3	41.109	41.109	41.109	20.5545	1E+100	5000	1E+100	1128.587855	452.153826	1E+100	N/A	
Barium, dissolved	7440-39-3	100	64.3	136.959	136.959	136.959	68.4795	2000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Boron, dissolved	7440-42-8	100	20.9	44.517	44.517	44.517	22.2585	1E+100	750	5000	1E+100	1E+100	1E+100	N/A	
Cobalt, dissolved	7440-48-4	50	0	0	0	0	0	1E+100	50	1000	1E+100	1E+100	1E+100	N/A	
Uranium, dissolved	7440-61-1	0.1	0	0	0	0	0	30	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Vanadium, dissolved	7440-62-2	50	0	0	0	0	0	1E+100	100	100	1E+100	1E+100	1E+100	N/A	
Ra-226 and Ra-228 (pCi/l)			0.534	1.13742	1.13742	1.13742	0.56871	5	1E+100	30	1E+100	1E+100	1E+100	N/A	
Strontium (pCi/l)			0	0	0	0	0	8	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Tritium (pCi/l)			0	0	0	0	0	20000	1E+100	20000	1E+100	1E+100	1E+100	N/A	
Gross Alpha (pCi/l)			1.14	2.4282	2.4282	2.4282	1.2141	15	1E+100	15	1E+100	1E+100	1E+100	N/A	
Asbestos (fibers/l)			0	0	0	0	0	7000000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Total Residual Chlorine	7782-50-5	33	0	0	0	0	0	1E+100	1E+100	11	19	11	1E+100	N/A	
Nitrate as N (mg/l)			0.0434	0.092442	0.092442	0.092442	0.046221	10	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Nitrite + Nitrate (mg/l)			0.215	0.45795	0.45795	0.45795	0.228975	1E+100	1E+100	132	1E+100	1E+100	1E+100	N/A	
METALS AND CYANIDE															
Antimony, dissolved (P)	7440-36-0	60	0	0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	640	N/A	
Arsenic, dissolved (P)	7440-38-2	0.5	1.190579248	2.535933798	2.5359338	2.5359338	1.2679669	10	100	200	340	150	9	N/A	
Beryllium, dissolved	7440-41-7	0.5	0	0	0	0	0	4	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Cadmium, dissolved	7440-43-9	1	0	0	0	0	0	5	10	50	0.828219245	0.25298892	1E+100	N/A	
Chromium (III), dissolved	16065-83-1	10	3.49	7.4337	7.4337	7.4337	3.71685	1E+100	1E+100	1E+100	293.563092	38.186527	1E+100	N/A	
Chromium (VI), dissolved	18540-29-9	10	3.49	7.4337	7.4337	7.4337	3.71685	1E+100	1E+100	1E+100	16	11	1E+100	N/A	
Chromium, dissolved	7440-47-3		3.49	7.4337	7.4337	7.4337	3.71685	100	100	1000	1E+100	1E+100	1E+100	N/A	
Copper, dissolved	7440-50-8	0.5	2.224803328	4.738831088	4.73883109	4.73883109	2.36941554	1300	200	500	6.26693826	4.48358755	1E+100	N/A	
Lead, dissolved	7439-92-1	0.5	0	0	0	0	0	15	5000	100	26.47570177	1.03172009	1E+100	N/A	
Manganese, dissolved	7439-96-5		0	0	0	0	0	1E+100	1E+100	1E+100	2279.878541	1259.63522	1E+100	N/A	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration						Livestock&	Acute	Chronic	Human	Need	TMDL	
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic	Aquatic		Health
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria	Criteria		Criteria
			Ca (ug/l)	Ce (ug/l)	2.13°Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l	ug/l	ug/l	ug/l		
Mercury, dissolved	7439-97-6	0.005		0.0003	0.000639	0.000639	0.000639	0.0003195	1E+100	1E+100	1E+100	1.4	0.77	1E+100	N/A
Mercury, total	7439-97-6	0.005		0.0003	0.000639	0.000639	0.000639	0.0003195	2	1E+100	0.77	1E+100	1E+100	1E+100	N/A
Molybdenum, dissolved	7439-98-7			1.67	3.5571	3.5571	3.5571	1.77855	1E+100	1000	1E+100	1E+100	1E+100	1E+100	N/A
Molybdenum, total recoverable	7439-98-7			1.67	3.5571	3.5571	3.5571	1.77855	1E+100	1E+100	1E+100	7920	1895	1E+100	N/A
Nickel, dissolved (P)	7440-02-0	0.5		0.323796877	0.689687348	0.68968735	0.68968735	0.34484367	700	1E+100	1E+100	236.0354136	26.2162473	4600	N/A
Selenium, dissolved (P)	7782-49-2	5		0	0	0	0	0	50	130	50	1E+100	1E+100	4200	N/A
Selenium, dis (SO4 >500 mg/l)		5			0	0	0	0	50	250	50	1E+100	1E+100	4200	N/A
Selenium, total recoverable	7782-49-2	5		0	0	0	0	0	1E+100	1E+100	5	20	5	1E+100	N/A
Silver, dissolved	7440-22-4	0.5		0	0	0	0	0	1E+100	1E+100	1E+100	0.799093336	1E+100	1E+100	N/A
Thallium, dissolved (P)	7440-28-0	0.5		0.0806	0.171678	0.171678	0.171678	0.085839	2	1E+100	1E+100	1E+100	1E+100	0.47	N/A
Zinc, dissolved	7440-66-6	20		9.330092577	19.87309719	19.8730972	19.8730972	9.93654859	10500	2000	25000	76.62108191	58.0488344	26000	N/A
Cyanide, total recoverable	57-12-5	10		1.67	3.5571	3.5571	3.5571	1.77855	200	1E+100	5.2	22	5.2	140	N/A
Dioxin	1764-01-6	0.00001		0	0	0	0	0	3.00E-05	1E+100	1E+100	1E+100	1E+100	5.1E-08	N/A
VOLATILE COMPOUNDS															
Acrolein	107-02-8	50			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	9	N/A
Acrylonitrile	107-13-0	20			0	0	0	0	0.65	1E+100	1E+100	1E+100	1E+100	2.5	N/A
Benzene	71-43-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	510	N/A
Bromoform	75-25-2	10			0	0	0	0	44	1E+100	1E+100	1E+100	1E+100	1400	N/A
Carbon Tetrachloride	56-23-5	2			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	16	N/A
Chlorobenzene	108-90-7	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	1600	N/A
Clorodibromomethane	124-48-1	10			0	0	0	0	4.2	1E+100	1E+100	1E+100	1E+100	130	N/A
Chloroform	67-66-3	50			0	0	0	0	57	1E+100	1E+100	1E+100	1E+100	4700	N/A
Dichlorobromomethane	75-27-4	10			0	0	0	0	5.6	1E+100	1E+100	1E+100	1E+100	170	N/A
1,2-Dichloroethane	107-06-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	370	N/A
1,1-Dichloroethylene	75-35-4	10			0	0	0	0	7	1E+100	1E+100	1E+100	1E+100	7100	N/A
1,2-Dichloropropane	78-87-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	150	N/A
1,3-Dichloropropylene	542-75-6	10			0	0	0	0	3.5	1E+100	1E+100	1E+100	1E+100	210	N/A
Ethylbenzene	100-41-4	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	2100	N/A
Methyl Bromide	74-83-9	50			0	0	0	0	49	1E+100	1E+100	1E+100	1E+100	1500	N/A
Methylene Chloride	75-09-2	20			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	5900	N/A
1,1,2,2-Tetrachloroethane	79-34-5	10			0	0	0	0	1.8	1E+100	1E+100	1E+100	1E+100	40	N/A
Tetrachloroethylene	127-18-4	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	33	N/A
Toluene	108-88-3	10			0	0	0	0	1000	1E+100	1E+100	1E+100	1E+100	15000	N/A
1,2-trans-Dichloroethylene	156-60-5	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	10000	N/A
1,1,1-Trichloroethane	71-55-6				0	0	0	0	200	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
1,1,2-Trichloroethane	79-00-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	160	N/A
Trichloroethylene	79-01-6	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	300	N/A
Vinyl Chloride	75-01-4	10			0	0	0	0	2	1E+100	1E+100	1E+100	1E+100	24	N/A
ACID COMPOUNDS															
2-Chlorophenol	95-57-8	10			0	0	0	0	175	1E+100	1E+100	1E+100	1E+100	150	N/A
2,4-Dichlorophenol	120-83-2	10			0	0	0	0	105	1E+100	1E+100	1E+100	1E+100	290	N/A
2,4-Dimethylphenol	105-67-9	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	850	N/A
4,6-Dinitro-o-Cresol	534-52-1	50			0	0	0	0	14	1E+100	1E+100	1E+100	1E+100	280	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock&	Acute	Chronic	Human	Need
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic	Aquatic	Health	TMDL
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria
			Ca (ug/l)	Ce (ug/l)	2.13°Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
2,4-Dinitrophenol	51-28-5	50			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	5300	N/A
Pentachlorophenol	87-86-5	50			0	0	0	0	1	1E+100	1E+100	19	15	30	N/A
Phenol	108-95-2	10		0	0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	860000	N/A
2,4,6-Trichlorophenol	88-06-2	10			0	0	0	0	32	1E+100	1E+100	1E+100	1E+100	24	N/A
BASE/NEUTRAL															
Acenaphthene	83-32-9	10			0	0	0	0	2100	1E+100	1E+100	1E+100	1E+100	990	N/A
Anthracene	120-12-7	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	40000	N/A
Benzidine	92-87-5	50			0	0	0	0	0.0015	1E+100	1E+100	1E+100	1E+100	0.002	N/A
Benzo(a)anthracene	56-55-3	5		0	0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(a)pyrene	50-32-8	5			0	0	0	0	0.2	1E+100	1E+100	1E+100	1E+100	0.18	N/A
3,4-Benzofluoranthene	205-99-2	10			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(k)fluoranthene	207-08-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Bis(2-chloroethyl)Ether	111-44-4	10			0	0	0	0	0.3	1E+100	1E+100	1E+100	1E+100	5.3	N/A
Bis(2-chloroisopropyl)Ether	108-60-1	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	65000	N/A
Bis(2-ethylhexyl)Phthalate	117-81-7	10			0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	22	N/A
Butyl Benzyl Phthalate	85-68-7	10			0	0	0	0	7000	1E+100	1E+100	1E+100	1E+100	1900	N/A
2-Chloronaphthalene	91-58-7	10			0	0	0	0	2800	1E+100	1E+100	1E+100	1E+100	1600	N/A
Chrysene	218-01-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Dibenzo(a,h)anthracene	53-70-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
1,2-Dichlorobenzene	95-50-1	10			0	0	0	0	600	1E+100	1E+100	1E+100	1E+100	1300	N/A
1,3-Dichlorobenzene	541-73-1	10			0	0	0	0	469	1E+100	1E+100	1E+100	1E+100	960	N/A
1,4-Dichlorobenzene	106-46-7	10			0	0	0	0	75	1E+100	1E+100	1E+100	1E+100	190	N/A
3,3'-Dichlorobenzidine	91-94-1	5			0	0	0	0	0.78	1E+100	1E+100	1E+100	1E+100	0.28	N/A
Diethyl Phthalate	84-66-2	10		67.4	143.562	143.562	143.562	71.781	28000	1E+100	1E+100	1E+100	1E+100	44000	N/A
Dimethyl Phthalate	131-11-3	10			0	0	0	0	350000	1E+100	1E+100	1E+100	1E+100	1100000	N/A
Di-n-Butyl Phthalate	84-74-2	10			0	0	0	0	3500	1E+100	1E+100	1E+100	1E+100	4500	N/A
2,4-Dinitrotoluene	121-14-2	10			0	0	0	0	1.1	1E+100	1E+100	1E+100	1E+100	34	N/A
1,2-Diphenylhydrazine	122-66-7	20			0	0	0	0	0.44	1E+100	1E+100	1E+100	1E+100	2	N/A
Fluoranthene	206-44-0	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	140	N/A
Fluorene	86-73-7	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	5300	N/A
Hexachlorobenzene	118-74-1	5			0	0	0	0	1	1E+100	1E+100	1E+100	1E+100	0.0029	N/A
Hexachlorobutadiene	87-68-3	10			0	0	0	0	4.5	1E+100	1E+100	1E+100	1E+100	180	N/A
Hexachlorocyclopentadiene	77-47-4	10			0	0	0	0	50	1E+100	1E+100	1E+100	1E+100	1100	N/A
Hexachloroethane	67-72-1	20			0	0	0	0	25	1E+100	1E+100	1E+100	1E+100	33	N/A
Indeno(1,2,3-cd)Pyrene	193-39-5	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Isophorone	78-59-1	10			0	0	0	0	368	1E+100	1E+100	1E+100	1E+100	9600	N/A
Nitrobenzene	98-95-3	10			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	690	N/A
n-Nitrosodimethylamine	62-75-9	50			0	0	0	0	0.0069	1E+100	1E+100	1E+100	1E+100	30	N/A
n-Nitrosodi-n-Propylamine	621-64-7	20			0	0	0	0	0.05	1E+100	1E+100	1E+100	1E+100	5.1	N/A
n-Nitrosodiphenylamine	86-30-6	20			0	0	0	0	71	1E+100	1E+100	1E+100	1E+100	60	N/A
Pyrene	129-00-0	10			0	0	0	0	1050	1E+100	1E+100	1E+100	1E+100	4000	N/A
1,2,4-Trichlorobenzene	120-82-1	10			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	70	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc Ca (ug/l)	Effluent Conc. Ce (ug/l)	Acute Aquatic 2.13*Ce	Domestic Supply Cd,dom (ug/l)	Chronic Aquatic Cd (ug/l)	Human Health Cd,hh (ug/l)	Domestic Criteria ug/l	Irrigation Criteria ug/l					
PESTICIDES AND PCBs															
Aldrin	309-00-2	0.01			0	0	0	0	0.021	1E+100	1E+100	3	1E+100	0.0005	N/A
Alpha-BHC	319-84-6	0.05			0	0	0	0	0.056	1E+100	1E+100	1E+100	1E+100	0.049	N/A
Beta-BHC	319-85-7	0.05			0	0	0	0	0.091	1E+100	1E+100	1E+100	1E+100	0.17	N/A
Gamma-BHC	58-89-9	0.05			0	0	0	0	0.2	1E+100	1E+100	0.95	1E+100	1.8	N/A
Chlordane	57-74-9	0.2			0	0	0	0	2	1E+100	1E+100	2.4	0.0043	0.0081	N/A
4,4'-DDT and derivatives	50-29-3	0.02			0	0	0	0	1	1E+100	0.001	1.1	0.001	0.0022	N/A
Dieldrin	60-57-1	0.02			0	0	0	0	0.022	1E+100	1E+100	0.24	0.056	0.00054	N/A
Diazinon	333-41-5				0	0	0	0	1E+100	1E+100	1E+100	0.17	0.17	1E+100	N/A
Alpha-Endosulfan	959-98-8	0.01			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Beta-Endosulfan	33213-65-9	0.02			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Endosulfan sulfate	1031-7-8	0.1			0	0	0	0	62	1E+100	1E+100	1E+100	1E+100	89	N/A
Endrin	72-20-8	0.02			0	0	0	0	2	1E+100	1E+100	0.086	0.036	0.06	N/A
Endrin Aldehyde	7421-93-4	0.1			0	0	0	0	10.5	1E+100	1E+100	1E+100	1E+100	0.3	N/A
Heptachlor	76-44-8	0.01			0	0	0	0	0.4	1E+100	1E+100	0.52	0.0038	0.00079	N/A
Heptachlor Epoxide	1024-57-3	0.01			0	0	0	0	0.2	1E+100	1E+100	0.52	0.0038	0.00039	N/A
PCBs	1336-36-3	0.2			0	0	0	0	0.5	1E+100	0.014	2	0.014	0.00064	N/A
Toxaphene	8001-35-2	0.3			0	0	0	0	3	1E+100	1E+100	0.73	0.0002	0.0028	N/A

Note: SCORET CODE for reference only. Codes for total form are used except for parameters which have criteria in both total and dissolved forms.

STEP 3: SCAN POTENTIAL INSTREAM WASTE CONCENTRATIONS AGAINST WATER QUALITY CRITERIA
AND ESTABLISH EFFLUENT LIMITATIONS FOR ALL APPLICABLE PARAMETERS

No limits are established if the receiving stream is not designated for the particular uses.

No limits are established if the potential instream waste concentrations are less than the chronic water quality criteria.

The most applicable stringent criteria are used to establish effluent limitations for a given parameter.

Water quality criteria apply at the end-of-pipe for acute aquatic life criteria and discharges to public lakes.

If background concentration exceeds the water quality criteria, water quality criteria apply. And "Need TMDL" shown to the next column of Avg. Mass

Monthly avg concentration = daily max. / 1.5.

APPLICABLE WATER QUALITY-BASED LIMITS

The following formula is used to calculate the allowable daily maximum effluent concentration

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

Daily Max. Conc. = $C_s + (C_s - C_a)(F \cdot Q_a / Q_e)$

Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where: C_s = Applicable water quality standard

C_a = Ambient stream concentration

F = Fraction of stream allowed for mixing (1.0 is assigned to domestic water supply and human health uses)

Q_e = Plant effluent flow

Q_a = Criteria Low flow (4Q3) or Harmonic Mean flow for Human Health Criteria

CALCULATIONS OF NEW MEXICO WATER QUALITY-BASED EFFLUENT LIMITATIONS

NMAC 20.6.4. **NMWQS as of January 14, 2011**

(EPA approved site-specific criteria for aluminum, cadmium, and zinc on April 30, 2012)

Calculations Specifications:

Excel **Revised as of May 1, 2012**

Prepared By:

Isaac Chen 06/14/2019

STEP 1: REFERENCE IMPLEMENTATION PROCEDURES
INPUT FACILITY AND RECEIVING STREAM DATA
LIST SOURCE OF DATA INPUT

APPENDIX A of FACT SHEET

IMPLEMENTATION PROCEDURES

The State of New Mexico Standards for Interstate and Intrastate Surface Waters are implemented in this spread sheet by using procedures established in the "Procedures for Implementing NPDES Permits in New Mexico" amended May 2011

FACILITY	DATA INPUT	
Permittee	LANL	
NPDES Permit No.	NM0028355	
Outfall No.(s)	05A055	
Plant Effluent Flow (MGD)	0.0003	For industrial and federal facility, use the highest monthly average flow for the past 24 months. For POTWs, use the design flow.
Plant Effluent Flow (cfs)	0.000465	
RECEIVING STREAM	DATA INPUT	
Receiving Stream Name	Canon de Valle	
Basin Name	Rio Grande	
Waterbody Segment Code No.	20.6.4.128	
Is a publicly owned lake or reservoir (enter "1" if it's a lake, "0" if not)	0	
Are acute aquatic life criteria considered (1= yes, 0= no) (MUST enter "1" for 2005 Standards)	1	
Are chronic aquatic life criteria considered (1= yes, 0=no)	0	
Are domestic water supply criteria considered (1= yes, 0=no)	0	
Are irrigation water supply criteria considered (1= yes, 0=no)	0	
Livestock watering and wildlife habitat criteria applied to all streams		
USGS Flow Station	USGS	
WQ Monitoring Station No.	SJR	
Receiving Stream TSS (mg/l)	0.57	For intermittent stream, enter effluent TSS
Receiving Stream Hardness (mg/l as CaCO ₃)	2.9	For intermittent stream, enter effluent Hardness (If no data, 20 mg/l is used)
Receiving Stream Critical Low Flow (4Q3) (cfs)	0	Enter "0" for intermittent stream and lake.
Receiving Stream Harmonic Mean Flow (cfs)	0.00155	Enter harmonic mean or modified harmonic mean flow data
Avg. Water Temperature (C)	23.7	
pH (Avg)	8.7	
Fraction of stream allowed for mixing (F)	1	Enter 1, if stream morphology data is not available or for intermittent streams.
Fraction of Critical Low Flow	0	

STEP 2: INPUT AMBIENT AND EFFLUENT DATA

CALCULATE IN-STREAM WASTE CONCENTRATIONS

DATA INPUT

Input pollutant geometric mean concentration as micro-gram per liter (ug/l or ppb)

unless other unit is specified for the parameter.

Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, input "1/2 DL" for calculation.

Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, no data is inputted.

If a less than MQL value is reported, input either the reported value or "0" for calculation.

The following formula is used to calculate the Instream Waste Concentration (Cd)

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Cd = [(F \cdot Qa \cdot Ca) + (Qe \cdot 2.13 \cdot Ce)] / (F \cdot Qa + Qe)$$

Where:

Cd = Instream Waste Concentration

F = Fraction of stream allowed for mixing (see "Procedures for Implementing NPDES Permits in New Mexico")

Ce = Reported concentration in effluent

Ca = Ambient stream concentration upstream of discharge

Qe = Plant effluent flow

Qa = Critical low flow of stream at discharge point expressed as the 4Q3 or harmonic mean flow for human health criteria

The following formula convert metals reported in total form to dissolved form if criteria are in dissolved form

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Kp = Kpo \cdot (TSS \cdot a)$$

Kp = Linear partition coefficient; Kpo and a can be found in table below

$$C/Ct = 1 / (1 + Kp \cdot TSS \cdot 10^{-6})$$

TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)

$$\text{Total Metal Criteria (Ct)} = Cr / (C/Ct)$$

C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value

Total Metals	Total Value	Stream Linear Partition Coefficient					Lake Linear Partition Coefficient				
		Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Stream	Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Lake
Arsenic	22.9	480000	-0.73	723523.4187	0.708010542	16.2134414	480000	-0.73	723523.4187	0.708010542	16.2134414
Chromium III	1.56	3360000	-0.93	5667292.939	0.23638667	0.36876321	2170000	-0.27	2525652.071	0.40989962	0.63944341
Copper	11.2	1040000	-0.74	1576470.855	0.526707109	5.89911962	2850000	-0.9	4726694.026	0.27069346	3.03176675
Lead	3.49	2800000	-0.8	4389935.576	0.285529648	0.99649847	2040000	-0.53	2747998.516	0.389657074	1.35990319
Nickel	5.26	490000	-0.57	675067.8298	0.722131851	3.79841353	2210000	-0.76	3387875.041	0.341170151	1.794555
Silver	0	2390000	-1.03	4264290.665	0.291490318	0	2390000	-1.03	4264290.665	0.291490318	0
Zinc	49.8	1250000	-0.7	1852668.059	0.486376404	24.2215449	3340000	-0.68	4894987.25	0.263842306	13.1393469

The following formula is used to calculate hardness dependent criteria

(Please refer to State Water Quality Standards for details)

Dissolved

WQC (ug/l)

Aluminum (T)	Acute	$e(1.3695[\ln(\text{hardness})]+1.8308)$	26.81392533	If Stream pH < 6.5, enter 750 in cell O113
	Chronic	$e(1.3695[\ln(\text{hardness})]+0.9161)$	10.74264521	If Stream pH < 6.5, enter 87 in cell P113
Cadmium (D)	Acute	$e(0.8968[\ln(\text{hardness})]-3.5699) \cdot CF1$	0.079903104	$CF1 = 1.136672 - 0.041838 \cdot \ln(\text{hardness})$
	Chronic	$e(0.7647[\ln(\text{hardness})]-4.2180) \cdot CF2$	0.035145412	$CF2 = 1.101672 - 0.041838 \cdot \ln(\text{hardness})$

		Dissolved WQC (ug/l)	
Chromium III (D)	Acute	0.316 e(0.819[ln(hardness)]+3.7256)	31.36162552
	Chronic	0.860 e(0.819[ln(hardness)]+0.6848)	4.079503149
Copper (D)	Acute	0.960 e(0.9422[ln(hardness)]-1.700)	0.478235716
	Chronic	0.960 e(0.8545[ln(hardness)]-1.702)	0.434731504
Lead (D)	Acute	e(1.273[ln(hardness)]-1.46)*CF3	1.177067495
	Chronic	e(1.273[ln(hardness)]-4.705)*CF4	0.04586863
Manganese (D)	Acute	e(0.3331[ln(hardness)]+6.4676)	918.0530214
	Chronic	e(0.3331[ln(hardness)]+5.8743)	507.2252305
Nickel (D)	Acute	0.998 e(0.846[ln(hardness)]+2.255)	23.42358172
	Chronic	0.997 e(0.846[ln(hardness)]+0.0584)	2.601636772
Silver (D)	Acute	0.85 e(1.72[ln(hardness)]-6.59)	0.007290257
Zinc (D)	Acute	0.978 e(0.9094[ln(hardness)]+0.9095)	6.394909833
	Chronic	0.986 e(0.90947[ln(hardness)]+0.6235)	4.843916315

CF3 = 1.46203 - 0.145712*ln(hardness)
CF4 = 1.46203 - 0.145712*ln(hardness)

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc. Ca (ug/l)	Effluent Conc. Ce (ug/l)	Acute Aquatic 2.13*Ce	Domestic Supply Cd,dom (ug/l)	Chronic Aquatic Cd (ug/l)	Human Health Cd,hh (ug/l)	Domestic Criteria ug/l						
Radioactivity, Nutrients, and Chlorine															
Aluminum, total	7429-90-5	2.5	19.3	41.109	41.109	41.109	9.48669231	1E+100	5000	1E+100	26.81392533	10.7426452	1E+100	N/A	
Barium, dissolved	7440-39-3	100	1.47	3.1311	3.1311	3.1311	0.72256154	2000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Boron, dissolved	7440-42-8	100	1510	3216.3	3216.3	3216.3	742.223077	1E+100	750	5000	1E+100	1E+100	1E+100	N/A	
Cobalt, dissolved	7440-48-4	50	0	0	0	0	0	1E+100	50	1000	1E+100	1E+100	1E+100	N/A	
Uranium, dissolved	7440-61-1	0.1	0	0	0	0	0	30	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Vanadium, dissolved	7440-62-2	50	0	0	0	0	0	1E+100	100	100	1E+100	1E+100	1E+100	N/A	
Ra-226 and Ra-228 (pCi/l)			0.1819	0.387447	0.387447	0.387447	0.08941085	5	1E+100	30	1E+100	1E+100	1E+100	N/A	
Strontium (pCi/l)			0	0	0	0	0	8	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Tritium (pCi/l)			0	0	0	0	0	20000	1E+100	20000	1E+100	1E+100	1E+100	N/A	
Gross Alpha (pCi/l)			0	0	0	0	0	15	1E+100	15	1E+100	1E+100	1E+100	N/A	
Asbestos (fibers/l)			0	0	0	0	0	7000000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Total Residual Chlorine	7782-50-5	33	0.02	0.0426	0.0426	0.0426	0.00983077	1E+100	1E+100	11	19	11	1E+100	N/A	
Nitrate as N (mg/l)			#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	10	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Nitrite + Nitrate (mg/l)			29.5	62.835	62.835	62.835	14.5003846	1E+100	1E+100	132	1E+100	1E+100	1E+100	N/A	
METALS AND CYANIDE															
Antimony, dissolved (P)	7440-36-0	60	22.1	47.073	47.073	47.073	10.863	6	1E+100	1E+100	1E+100	1E+100	640	N/A	
Arsenic, dissolved (P)	7440-38-2	0.5	16.2134414	34.53463019	34.5346302	34.5346302	7.96953004	10	100	200	340	150	9	N/A	
Beryllium, dissolved	7440-41-7	0.5	0.2	0.426	0.426	0.426	0.09830769	4	1E+100	1E+100	1E+100	1E+100	1E+100	N/A	
Cadmium, dissolved	7440-43-9	1	0	0	0	0	0	5	10	50	0.079903104	0.03514541	1E+100	N/A	
Chromium (III), dissolved	16065-83-1	10	1.56	3.3228	3.3228	3.3228	0.7668	1E+100	1E+100	1E+100	31.36162552	4.07950315	1E+100	N/A	
Chromium (VI), dissolved	18540-29-9	10	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	1E+100	1E+100	1E+100	16	11	1E+100	N/A	
Chromium, dissolved	7440-47-3		1.56	3.3228	3.3228	3.3228	0.7668	100	100	1000	1E+100	1E+100	1E+100	N/A	
Copper, dissolved	7440-50-8	0.5	5.899119617	12.56512478	12.5651248	12.5651248	2.89964418	1300	200	500	0.478235716	0.4347315	1E+100	N/A	
Lead, dissolved	7439-92-1	0.5	0.996498471	2.122541742	2.12254174	2.12254174	0.48981733	15	5000	100	1.177067495	0.04586863	1E+100	N/A	
Manganese, dissolved	7439-96-5		0	0	0	0	0	1E+100	1E+100	1E+100	918.0530214	507.22523	1E+100	N/A	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock&	Acute	Chronic	Human	Need
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic	Aquatic	Health	TMDL
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria
			Ca (ug/l)	Ce (ug/l)	2.13°Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
Mercury, dissolved	7439-97-6	0.005			0	0	0	0	1E+100	1E+100	1E+100	1.4	0.77	1E+100	N/A
Mercury, total	7439-97-6	0.005		0.085	0.18105	0.18105	0.18105	0.04178077	2	1E+100	0.77	1E+100	1E+100	1E+100	N/A
Molybdenum, dissolved	7439-98-7			34.7	73.911	73.911	73.911	17.0563846	1E+100	1000	1E+100	1E+100	1E+100	1E+100	N/A
Molybdenum, total recoverable	7439-98-7			34.7	73.911	73.911	73.911	17.0563846	1E+100	1E+100	1E+100	7920	1895	1E+100	N/A
Nickel, dissolved (P)	7440-02-0	0.5		3.798413535	8.090620829	8.09062083	8.09062083	1.86706635	700	1E+100	1E+100	23.42358172	2.60163677	4600	N/A
Selenium, dissolved (P)	7782-49-2	5		0	0	0	0	0	50	130	50	1E+100	1E+100	4200	N/A
Selenium, dis (SO4 >500 mg/l)		5			0	0	0	0	50	250	50	1E+100	1E+100	4200	N/A
Selenium, total recoverable	7782-49-2	5		9.25	19.7025	19.7025	19.7025	4.54673077	1E+100	1E+100	5	20	5	1E+100	N/A
Silver, dissolved	7440-22-4	0.5		0	0	0	0	0	1E+100	1E+100	1E+100	0.007290257	1E+100	1E+100	N/A
Thallium, dissolved (P)	7440-28-0	0.5		0.6	1.278	1.278	1.278	0.29492308	2	1E+100	1E+100	1E+100	1E+100	0.47	N/A
Zinc, dissolved	7440-66-6	20		24.22154492	51.59189067	51.5918907	51.5918907	11.9058209	10500	2000	25000	6.394909833	4.84391632	26000	N/A
Cyanide, total recoverable	57-12-5	10		1.67	3.5571	3.5571	3.5571	0.82086923	200	1E+100	5.2	22	5.2	140	N/A
Dioxin	1764-01-6	0.00001		0	0	0	0	0	3.00E-05	1E+100	1E+100	1E+100	1E+100	5.1E-08	N/A
VOLATILE COMPOUNDS															
Acrolein	107-02-8	50			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	9	N/A
Acrylonitrile	107-13-0	20			0	0	0	0	0.65	1E+100	1E+100	1E+100	1E+100	2.5	N/A
Benzene	71-43-2	10			#VALUE!	#VALUE!	#VALUE!	#VALUE!	5	1E+100	1E+100	1E+100	1E+100	510	N/A
Bromoform	75-25-2	10			#VALUE!	#VALUE!	#VALUE!	#VALUE!	44	1E+100	1E+100	1E+100	1E+100	1400	N/A
Carbon Tetrachloride	56-23-5	2			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	16	N/A
Chlorobenzene	108-90-7	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	1600	N/A
Clorodibromomethane	124-48-1	10			#VALUE!	#VALUE!	#VALUE!	#VALUE!	4.2	1E+100	1E+100	1E+100	1E+100	130	N/A
Chloroform	67-66-3	50			#VALUE!	#VALUE!	#VALUE!	#VALUE!	57	1E+100	1E+100	1E+100	1E+100	4700	N/A
Dichlorobromomethane	75-27-4	10			#VALUE!	#VALUE!	#VALUE!	#VALUE!	5.6	1E+100	1E+100	1E+100	1E+100	170	N/A
1,2-Dichloroethane	107-06-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	370	N/A
1,1-Dichloroethylene	75-35-4	10			0	0	0	0	7	1E+100	1E+100	1E+100	1E+100	7100	N/A
1,2-Dichloropropane	78-87-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	150	N/A
1,3-Dichloropropylene	542-75-6	10			0	0	0	0	3.5	1E+100	1E+100	1E+100	1E+100	210	N/A
Ethylbenzene	100-41-4	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	2100	N/A
Methyl Bromide	74-83-9	50			0	0	0	0	49	1E+100	1E+100	1E+100	1E+100	1500	N/A
Methylene Chloride	75-09-2	20			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	5900	N/A
1,1,2,2-Tetrachloroethane	79-34-5	10			0	0	0	0	1.8	1E+100	1E+100	1E+100	1E+100	40	N/A
Tetrachloroethylene	127-18-4	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	33	N/A
Toluene	108-88-3	10			0	0	0	0	1000	1E+100	1E+100	1E+100	1E+100	15000	N/A
1,2-trans-Dichloroethylene	156-60-5	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	10000	N/A
1,1,1-Trichloroethane	71-55-6				0	0	0	0	200	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
1,1,2-Trichloroethane	79-00-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	160	N/A
Trichloroethylene	79-01-6	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	300	N/A
Vinyl Chloride	75-01-4	10			0	0	0	0	2	1E+100	1E+100	1E+100	1E+100	24	N/A
ACID COMPOUNDS															
2-Chlorophenol	95-57-8	10			0	0	0	0	175	1E+100	1E+100	1E+100	1E+100	150	N/A
2,4-Dichlorophenol	120-83-2	10			0	0	0	0	105	1E+100	1E+100	1E+100	1E+100	290	N/A
2,4-Dimethylphenol	105-67-9	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	850	N/A
4,6-Dinitro-o-Cresol	534-52-1	50			0	0	0	0	14	1E+100	1E+100	1E+100	1E+100	280	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria						
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l						
2,4-Dinitrophenol	51-28-5	50			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	5300	N/A
Pentachlorophenol	87-86-5	50			0	0	0	0	1	1E+100	1E+100	19	15	30	N/A
Phenol	108-95-2	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	860000	N/A
2,4,6-Trichlorophenol	88-06-2	10			0	0	0	0	32	1E+100	1E+100	1E+100	1E+100	24	N/A
BASE/NEUTRAL															
Acenaphthene	83-32-9	10			0	0	0	0	2100	1E+100	1E+100	1E+100	1E+100	990	N/A
Anthracene	120-12-7	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	40000	N/A
Benzidine	92-87-5	50			0	0	0	0	0.0015	1E+100	1E+100	1E+100	1E+100	0.002	N/A
Benzo(a)anthracene	56-55-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(a)pyrene	50-32-8	5			0	0	0	0	0.2	1E+100	1E+100	1E+100	1E+100	0.18	N/A
3,4-Benzofluoranthene	205-99-2	10			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(k)fluoranthene	207-08-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Bis(2-chloroethyl)Ether	111-44-4	10			0	0	0	0	0.3	1E+100	1E+100	1E+100	1E+100	5.3	N/A
Bis(2-chloroisopropyl)Ether	108-60-1	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	65000	N/A
Bis(2-ethylhexyl)Phthalate	117-81-7	10			0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	22	N/A
Butyl Benzyl Phthalate	85-68-7	10			0	0	0	0	7000	1E+100	1E+100	1E+100	1E+100	1900	N/A
2-Chloronaphthalene	91-58-7	10			0	0	0	0	2800	1E+100	1E+100	1E+100	1E+100	1600	N/A
Chrysene	218-01-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Dibenzo(a,h)anthracene	53-70-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
1,2-Dichlorobenzene	95-50-1	10			0	0	0	0	600	1E+100	1E+100	1E+100	1E+100	1300	N/A
1,3-Dichlorobenzene	541-73-1	10			0	0	0	0	469	1E+100	1E+100	1E+100	1E+100	960	N/A
1,4-Dichlorobenzene	106-46-7	10			0	0	0	0	75	1E+100	1E+100	1E+100	1E+100	190	N/A
3,3'-Dichlorobenzidine	91-94-1	5			0	0	0	0	0.78	1E+100	1E+100	1E+100	1E+100	0.28	N/A
Diethyl Phthalate	84-66-2	10			0	0	0	0	28000	1E+100	1E+100	1E+100	1E+100	44000	N/A
Dimethyl Phthalate	131-11-3	10			0	0	0	0	350000	1E+100	1E+100	1E+100	1E+100	1100000	N/A
Di-n-Butyl Phthalate	84-74-2	10			0	0	0	0	3500	1E+100	1E+100	1E+100	1E+100	4500	N/A
2,4-Dinitrotoluene	121-14-2	10			0	0	0	0	1.1	1E+100	1E+100	1E+100	1E+100	34	N/A
1,2-Diphenylhydrazine	122-66-7	20			0	0	0	0	0.44	1E+100	1E+100	1E+100	1E+100	2	N/A
Fluoranthene	206-44-0	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	140	N/A
Fluorene	86-73-7	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	5300	N/A
Hexachlorobenzene	118-74-1	5			0	0	0	0	1	1E+100	1E+100	1E+100	1E+100	0.0029	N/A
Hexachlorobutadiene	87-68-3	10			0	0	0	0	4.5	1E+100	1E+100	1E+100	1E+100	180	N/A
Hexachlorocyclopentadiene	77-47-4	10			0	0	0	0	50	1E+100	1E+100	1E+100	1E+100	1100	N/A
Hexachloroethane	67-72-1	20			0	0	0	0	25	1E+100	1E+100	1E+100	1E+100	33	N/A
Indeno(1,2,3-cd)Pyrene	193-39-5	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Isophorone	78-59-1	10			0	0	0	0	368	1E+100	1E+100	1E+100	1E+100	9600	N/A
Nitrobenzene	98-95-3	10			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	690	N/A
n-Nitrosodimethylamine	62-75-9	50			0	0	0	0	0.0069	1E+100	1E+100	1E+100	1E+100	30	N/A
n-Nitrosodi-n-Propylamine	621-64-7	20			0	0	0	0	0.05	1E+100	1E+100	1E+100	1E+100	5.1	N/A
n-Nitrosodiphenylamine	86-30-6	20			0	0	0	0	71	1E+100	1E+100	1E+100	1E+100	60	N/A
Pyrene	129-00-0	10			0	0	0	0	1050	1E+100	1E+100	1E+100	1E+100	4000	N/A
1,2,4-Trichlorobenzene	120-82-1	10			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	70	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock & Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria	Irrigation Criteria					
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l					
PESTICIDES AND PCBs															
Aldrin	309-00-2	0.01			0	0	0	0	0.021	1E+100	1E+100	3	1E+100	0.0005	N/A
Alpha-BHC	319-84-6	0.05			0	0	0	0	0.056	1E+100	1E+100	1E+100	1E+100	0.049	N/A
Beta-BHC	319-85-7	0.05			0	0	0	0	0.091	1E+100	1E+100	1E+100	1E+100	0.17	N/A
Gamma-BHC	58-89-9	0.05			0	0	0	0	0.2	1E+100	1E+100	0.95	1E+100	1.8	N/A
Chlordane	57-74-9	0.2			0	0	0	0	2	1E+100	1E+100	2.4	0.0043	0.0081	N/A
4,4'-DDT and derivatives	50-29-3	0.02			0	0	0	0	1	1E+100	0.001	1.1	0.001	0.0022	N/A
Dieldrin	60-57-1	0.02			0	0	0	0	0.022	1E+100	1E+100	0.24	0.056	0.00054	N/A
Diazinon	333-41-5				0	0	0	0	1E+100	1E+100	1E+100	0.17	0.17	1E+100	N/A
Alpha-Endosulfan	959-98-8	0.01			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Beta-Endosulfan	33213-65-9	0.02			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Endosulfan sulfate	1031-7-8	0.1			0	0	0	0	62	1E+100	1E+100	1E+100	1E+100	89	N/A
Endrin	72-20-8	0.02			0	0	0	0	2	1E+100	1E+100	0.086	0.036	0.06	N/A
Endrin Aldehyde	7421-93-4	0.1			0	0	0	0	10.5	1E+100	1E+100	1E+100	1E+100	0.3	N/A
Heptachlor	76-44-8	0.01			0	0	0	0	0.4	1E+100	1E+100	0.52	0.0038	0.00079	N/A
Heptachlor Epoxide	1024-57-3	0.01			0	0	0	0	0.2	1E+100	1E+100	0.52	0.0038	0.00039	N/A
PCBs	1336-36-3	0.2			#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.5	1E+100	0.014	2	0.014	0.00064	N/A
Toxaphene	8001-35-2	0.3			0	0	0	0	3	1E+100	1E+100	0.73	0.0002	0.0028	N/A

Note: SCORET CODE for reference only. Codes for total form are used except for parameters which have criteria in both total and dissolved forms.

STEP 3: SCAN POTENTIAL INSTREAM WASTE CONCENTRATIONS AGAINST WATER QUALITY CRITERIA
AND ESTABLISH EFFLUENT LIMITATIONS FOR ALL APPLICABLE PARAMETERS

No limits are established if the receiving stream is not designated for the particular uses.

No limits are established if the potential instream waste concentrations are less than the chronic water quality criteria.

The most applicable stringent criteria are used to establish effluent limitations for a given parameter.

Water quality criteria apply at the end-of-pipe for acute aquatic life criteria and discharges to public lakes.

If background concentration exceeds the water quality criteria, water quality criteria apply. And "Need TMDL" shown to the next column of Avg. Mass

Monthly avg concentration = daily max. / 1.5.

APPLICABLE WATER QUALITY-BASED LIMITS

The following formula is used to calculate the allowable daily maximum effluent concentration

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

Daily Max. Conc. = $C_s + (C_s - C_a)(F \cdot Q_a / Q_e)$

Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where: C_s = Applicable water quality standard

C_a = Ambient stream concentration

F = Fraction of stream allowed for mixing (1.0 is assigned to domestic water supply and human health uses)

Q_e = Plant effluent flow

Q_a = Criteria Low flow (4Q3) or Harmonic Mean flow for Human Health Criteria

CALCULATIONS OF NEW MEXICO WATER QUALITY-BASED EFFLUENT LIMITATIONS

NMAC 20.6.4. **NMWQS as of January 14, 2011**

(EPA approved site-specific criteria for aluminum, cadmium, and zinc on April 30, 2012)

Calculations Specifications:

Excel **Revised as of May 1, 2012**

Prepared By:

Isaac Chen 06/14/2019

STEP 1: REFERENCE IMPLEMENTATION PROCEDURES
INPUT FACILITY AND RECEIVING STREAM DATA
LIST SOURCE OF DATA INPUT

APPENDIX A of FACT SHEET

IMPLEMENTATION PROCEDURES

The State of New Mexico Standards for Interstate and Intrastate Surface Waters are implemented in this spread sheet by using procedures established in the "Procedures for Implementing NPDES Permits in New Mexico" amended May 2011

FACILITY	DATA INPUT	
Permittee	LANL	
NPDES Permit No.	NM0028355	
Outfall No.(s)	13S	
Plant Effluent Flow (MGD)	0.229	For industrial and federal facility, use the highest monthly average flow for the past 24 months. For POTWs, use the design flow.
Plant Effluent Flow (cfs)	0.35495	

RECEIVING STREAM	DATA INPUT	
Receiving Stream Name	Canada del Buey	
Basin Name	Rio Grande	
Waterbody Segment Code No.	20.6.4.128	
Is a publicly owned lake or reservoir (enter "1" if it's a lake, "0" if not)	0	
Are acute aquatic life criteria considered (1= yes, 0= no) (MUST enter "1" for 2005 Standards)	1	
Are chronic aquatic life criteria considered (1= yes, 0=no)	0	
Are domestic water supply criteria considered (1= yes, 0=no)	0	
Are irrigation water supply criteria considered (1= yes, 0=no)	0	
Livestock watering and wildlife habitat criteria applied to all streams		
USGS Flow Station	USGS	
WQ Monitoring Station No.	SJR	
Receiving Stream TSS (mg/l)	5.08	For intermittent stream, enter effluent TSS
Receiving Stream Hardness (mg/l as CaCO ₃)	73.6	For intermittent stream, enter effluent Hardness (If no data, 20 mg/l is used)
Receiving Stream Critical Low Flow (4Q3) (cfs)	0	Enter "0" for intermittent stream and lake.
Receiving Stream Harmonic Mean Flow (cfs)	0.00155	Enter harmonic mean or modified harmonic mean flow data
Avg. Water Temperature (C)	25.5	
pH (Avg)	7.7	
Fraction of stream allowed for mixing (F)	1	Enter 1, if stream morphology data is not available or for intermittent streams.
Fraction of Critical Low Flow	0	

STEP 2: INPUT AMBIENT AND EFFLUENT DATA

CALCULATE IN-STREAM WASTE CONCENTRATIONS

DATA INPUT

Input pollutant geometric mean concentration as micro-gram per liter (ug/l or ppb)

unless other unit is specified for the parameter.

Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, input "1/2 DL" for calculation.

Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, no data is inputted.

If a less than MQL value is reported, input either the reported value or "0" for calculation.

The following formula is used to calculate the Instream Waste Concentration (Cd)

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Cd = [(F \cdot Qa \cdot Ca) + (Qe \cdot 2.13 \cdot Ce)] / (F \cdot Qa + Qe)$$

Where:

Cd = Instream Waste Concentration

F = Fraction of stream allowed for mixing (see "Procedures for Implementing NPDES Permits in New Mexico")

Ce = Reported concentration in effluent

Ca = Ambient stream concentration upstream of discharge

Qe = Plant effluent flow

Qa = Critical low flow of stream at discharge point expressed as the 4Q3 or harmonic mean flow for human health criteria

The following formula convert metals reported in total form to dissolved form if criteria are in dissolved form

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Kp = Kpo \cdot (TSS \cdot a)$$

Kp = Linear partition coefficient; Kpo and a can be found in table below

$$C/Ct = 1 / (1 + Kp \cdot TSS \cdot 10^{-6})$$

TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)

$$\text{Total Metal Criteria (Ct)} = Cr / (C/Ct)$$

C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value

Total Metals	Total Value	Stream Linear Partition Coefficient					Lake Linear Partition Coefficient				
		Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Stream	Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Lake
Arsenic	3	480000	-0.73	146541.532	0.573252831	1.71975849	480000	-0.73	146541.532	0.573252831	1.71975849
Chromium III	0	3360000	-0.93	741115.7194	0.209869409	0	2170000	-0.27	1399189.481	0.123336764	0
Copper	1.2	1040000	-0.74	312387.8918	0.386558512	0.46387021	2850000	-0.9	660035.8408	0.229727571	0.27567309
Lead	0	2800000	-0.8	762899.0279	0.20510603	0	2040000	-0.53	862030.0391	0.18590427	0
Nickel	0.6	490000	-0.57	194023.2451	0.503616448	0.30216987	2210000	-0.76	642592.7959	0.23450115	0.14070069
Silver	0	2390000	-1.03	448082.8039	0.305226021	0	2390000	-1.03	448082.8039	0.305226021	0
Zinc	48.5	1250000	-0.7	400687.1496	0.329436026	15.9776473	3340000	-0.68	1106010.226	0.151090908	7.32790903

The following formula is used to calculate hardness dependent criteria

(Please refer to State Water Quality Standards for details)

Dissolved

WQC (ug/l)

Aluminum (T)	Acute	$e(1.3695[\ln(\text{hardness})]+1.8308)$	2247.995845	If Stream pH < 6.5, enter 750 in cell O113
	Chronic	$e(1.3695[\ln(\text{hardness})]+0.9161)$	900.6298598	If Stream pH < 6.5, enter 87 in cell P113
Cadmium (D)	Acute	$e(0.8968[\ln(\text{hardness})]-3.5699) \cdot CF1$	1.272508812	$CF1 = 1.136672 - 0.041838 \cdot \ln(\text{hardness})$
	Chronic	$e(0.7647[\ln(\text{hardness})]-4.2180) \cdot CF2$	0.363409234	$CF2 = 1.101672 - 0.041838 \cdot \ln(\text{hardness})$

			Dissolved WQC (ug/l)	
Chromium III (D)	Acute	0.316 e(0.819[ln(hardness)]+3.7256)	443.2691779	
	Chronic	0.860 e(0.819[ln(hardness)]+0.6848)	57.660213	
Copper (D)	Acute	0.960 e(0.9422[ln(hardness)]-1.700)	10.06799267	
	Chronic	0.960 e(0.8545[ln(hardness)]-1.702)	6.892061072	
Lead (D)	Acute	e(1.273[ln(hardness)]-1.46)*CF3	46.18470369	CF3 = 1.46203 - 0.145712*ln(hardness)
	Chronic	e(1.273[ln(hardness)]-4.705)*CF4	1.799751598	CF4 = 1.46203 - 0.145712*ln(hardness)
Manganese (D)	Acute	e(0.3331[ln(hardness)]+6.4676)	2695.876488	
	Chronic	e(0.3331[ln(hardness)]+5.8743)	1489.474509	
Nickel (D)	Acute	0.998 e(0.846[ln(hardness)]+2.255)	361.2794249	
	Chronic	0.997 e(0.846[ln(hardness)]+0.0584)	40.1269903	
Silver (D)	Acute	0.85 e(1.72[ln(hardness)]-6.59)	1.898664064	
Zinc (D)	Acute	0.978 e(0.9094[ln(hardness)]+0.9095)	121.0788732	
	Chronic	0.986 e(0.90947[ln(hardness)]+0.6235)	91.73369566	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc. Ca (ug/l)	Effluent Conc. Ce (ug/l)	Acute Aquatic 2.13*Ce	Domestic Supply Cd,dom (ug/l)	Chronic Aquatic Cd (ug/l)	Human Health Cd,hh (ug/l)	Domestic Criteria ug/l						
Radioactivity, Nutrients, and Chlorine															
Aluminum, total	7429-90-5	2.5		21.7	46.221	46.221	46.221	46.0200391	1E+100	5000	1E+100	2247.995845	900.62986	1E+100	N/A
Barium, dissolved	7440-39-3	100		21.8	46.434	46.434	46.434	46.232113	2000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Boron, dissolved	7440-42-8	100		51.9	110.547	110.547	110.547	110.066361	1E+100	750	5000	1E+100	1E+100	1E+100	N/A
Cobalt, dissolved	7440-48-4	50		0	0	0	0	1E+100	50	1000	1E+100	1E+100	1E+100	1E+100	N/A
Uranium, dissolved	7440-61-1	0.1		0	0	0	0	30	1E+100	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Vanadium, dissolved	7440-62-2	50		0	0	0	0	1E+100	100	100	1E+100	1E+100	1E+100	1E+100	N/A
Ra-226 and Ra-228 (pCi/l)				0.487	1.03731	1.03731	1.03731	1.03279996	5	1E+100	30	1E+100	1E+100	1E+100	N/A
Strontium (pCi/l)				0	0	0	0	8	1E+100	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Tritium (pCi/l)				0	0	0	0	20000	1E+100	20000	1E+100	1E+100	1E+100	1E+100	N/A
Gross Alpha (pCi/l)				1.16	2.4708	2.4708	2.4708	2.46005739	15	1E+100	15	1E+100	1E+100	1E+100	N/A
Asbestos (fibers/l)				0	0	0	0	7000000	1E+100	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Total Residual Chlorine	7782-50-5	33		1.62	3.4506	3.4506	3.4506	3.43559739	1E+100	1E+100	11	19	11	1E+100	N/A
Nitrate as N (mg/l)				#VALUE!	#VALUE!	#VALUE!	#VALUE!	10	1E+100	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Nitrite + Nitrate (mg/l)				0.0498	0.106074	0.106074	0.106074	0.10561281	1E+100	1E+100	132	1E+100	1E+100	1E+100	N/A
METALS AND CYANIDE															
Antimony, dissolved (P)	7440-36-0	60		0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	1E+100	640	N/A
Arsenic, dissolved (P)	7440-38-2	0.5		1.719758494	3.663085593	3.66308559	3.66308559	3.64715913	10	100	200	340	150	9	N/A
Beryllium, dissolved	7440-41-7	0.5		0	0	0	0	4	1E+100	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Cadmium, dissolved	7440-43-9	1		0	0	0	0	5	10	50	1.272508812	0.36340923	1E+100	1E+100	N/A
Chromium (III), dissolved	16065-83-1	10		0	0	0	0	1E+100	1E+100	1E+100	443.2691779	57.660213	1E+100	1E+100	N/A
Chromium (VI), dissolved	18540-29-9	10		0	0	0	0	1E+100	1E+100	1E+100	16	11	1E+100	1E+100	N/A
Chromium, dissolved	7440-47-3			0	0	0	0	100	100	1000	1E+100	1E+100	1E+100	1E+100	N/A
Copper, dissolved	7440-50-8	0.5		0.463870214	0.988043556	0.98804356	0.98804356	0.98374771	1300	200	500	10.06799267	6.89206107	1E+100	N/A
Lead, dissolved	7439-92-1	0.5		0	0	0	0	15	5000	100	46.18470369	1.7997516	1E+100	1E+100	N/A
Manganese, dissolved	7439-96-5			0	0	0	0	1E+100	1E+100	1E+100	2695.876488	1489.47451	1E+100	1E+100	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Livestock&	Acute	Chronic	Human	Need	
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic	Aquatic	Health	TMDL
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria
			Ca (ug/l)	Ce (ug/l)	2.13°Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
Mercury, dissolved	7439-97-6	0.005			0	0	0	0	1E+100	1E+100	1E+100	1.4	0.77	1E+100	N/A
Mercury, total	7439-97-6	0.005		0.067	0.14271	0.14271	0.14271	0.14208952	2	1E+100	0.77	1E+100	1E+100	1E+100	N/A
Molybdenum, dissolved	7439-98-7			1.85	3.9405	3.9405	3.9405	3.92336739	1E+100	1000	1E+100	1E+100	1E+100	1E+100	N/A
Molybdenum, total recoverable	7439-98-7			1.85	3.9405	3.9405	3.9405	3.92336739	1E+100	1E+100	1E+100	7920	1895	1E+100	N/A
Nickel, dissolved (P)	7440-02-0	0.5		0.302169869	0.643621821	0.64362182	0.64362182	0.64082347	700	1E+100	1E+100	361.2794249	40.1269903	4600	N/A
Selenium, dissolved (P)	7782-49-2	5			0	0	0	0	50	130	50	1E+100	1E+100	4200	N/A
Selenium, dis (SO4 >500 mg/l)		5			0	0	0	0	50	250	50	1E+100	1E+100	4200	N/A
Selenium, total recoverable	7782-49-2	5		0	0	0	0	0	1E+100	1E+100	5	20	5	1E+100	N/A
Silver, dissolved	7440-22-4	0.5		0	0	0	0	0	1E+100	1E+100	1E+100	1.898664064	1E+100	1E+100	N/A
Thallium, dissolved (P)	7440-28-0	0.5		0.6	1.278	1.278	1.278	1.27244348	2	1E+100	1E+100	1E+100	1E+100	0.47	N/A
Zinc, dissolved	7440-66-6	20		15.97764727	34.03238868	34.0323887	34.0323887	33.8844218	10500	2000	25000	121.0788732	91.7336957	26000	N/A
Cyanide, total recoverable	57-12-5	10		1.67	3.5571	3.5571	3.5571	3.54163435	200	1E+100	5.2	22	5.2	140	N/A
Dioxin	1764-01-6	0.00001		0	0	0	0	0	3.00E-05	1E+100	1E+100	1E+100	1E+100	5.1E-08	N/A
VOLATILE COMPOUNDS															
Acrolein	107-02-8	50			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	9	N/A
Acrylonitrile	107-13-0	20			0	0	0	0	0.65	1E+100	1E+100	1E+100	1E+100	2.5	N/A
Benzene	71-43-2	10		0.68	1.4484	1.4484	1.4484	1.44210261	5	1E+100	1E+100	1E+100	1E+100	510	N/A
Bromoform	75-25-2	10		4.46	9.4998	9.4998	9.4998	9.45849652	44	1E+100	1E+100	1E+100	1E+100	1400	N/A
Carbon Tetrachloride	56-23-5	2			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	16	N/A
Chlorobenzene	108-90-7	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	1600	N/A
Clorodibromomethane	124-48-1	10		25.2	53.676	53.676	53.676	53.4426261	4.2	1E+100	1E+100	1E+100	1E+100	130	N/A
Chloroform	67-66-3	50		20.2	43.026	43.026	43.026	42.8389304	57	1E+100	1E+100	1E+100	1E+100	4700	N/A
Dichlorobromomethane	75-27-4	10		32.6	69.438	69.438	69.438	69.1360957	5.6	1E+100	1E+100	1E+100	1E+100	170	N/A
1,2-Dichloroethane	107-06-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	370	N/A
1,1-Dichloroethylene	75-35-4	10			0	0	0	0	7	1E+100	1E+100	1E+100	1E+100	7100	N/A
1,2-Dichloropropane	78-87-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	150	N/A
1,3-Dichloropropylene	542-75-6	10			0	0	0	0	3.5	1E+100	1E+100	1E+100	1E+100	210	N/A
Ethylbenzene	100-41-4	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	2100	N/A
Methyl Bromide	74-83-9	50			0	0	0	0	49	1E+100	1E+100	1E+100	1E+100	1500	N/A
Methylene Chloride	75-09-2	20			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	5900	N/A
1,1,2,2-Tetrachloroethane	79-34-5	10			0	0	0	0	1.8	1E+100	1E+100	1E+100	1E+100	40	N/A
Tetrachloroethylene	127-18-4	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	33	N/A
Toluene	108-88-3	10			0	0	0	0	1000	1E+100	1E+100	1E+100	1E+100	15000	N/A
1,2-trans-Dichloroethylene	156-60-5	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	10000	N/A
1,1,1-Trichloroethane	71-55-6				0	0	0	0	200	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
1,1,2-Trichloroethane	79-00-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	160	N/A
Trichloroethylene	79-01-6	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	300	N/A
Vinyl Chloride	75-01-4	10			0	0	0	0	2	1E+100	1E+100	1E+100	1E+100	24	N/A
ACID COMPOUNDS															
2-Chlorophenol	95-57-8	10			0	0	0	0	175	1E+100	1E+100	1E+100	1E+100	150	N/A
2,4-Dichlorophenol	120-83-2	10			0	0	0	0	105	1E+100	1E+100	1E+100	1E+100	290	N/A
2,4-Dimethylphenol	105-67-9	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	850	N/A
4,6-Dinitro-o-Cresol	534-52-1	50			0	0	0	0	14	1E+100	1E+100	1E+100	1E+100	280	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria						
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l						
2,4-Dinitrophenol	51-28-5	50			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	5300	N/A
Pentachlorophenol	87-86-5	50			0	0	0	0	1	1E+100	1E+100	19	15	30	N/A
Phenol	108-95-2	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	860000	N/A
2,4,6-Trichlorophenol	88-06-2	10			0	0	0	0	32	1E+100	1E+100	1E+100	1E+100	24	N/A
BASE/NEUTRAL															
Acenaphthene	83-32-9	10			0	0	0	0	2100	1E+100	1E+100	1E+100	1E+100	990	N/A
Anthracene	120-12-7	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	40000	N/A
Benzidine	92-87-5	50			0	0	0	0	0.0015	1E+100	1E+100	1E+100	1E+100	0.002	N/A
Benzo(a)anthracene	56-55-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(a)pyrene	50-32-8	5			0	0	0	0	0.2	1E+100	1E+100	1E+100	1E+100	0.18	N/A
3,4-Benzofluoranthene	205-99-2	10			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(k)fluoranthene	207-08-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Bis(2-chloroethyl)Ether	111-44-4	10			0	0	0	0	0.3	1E+100	1E+100	1E+100	1E+100	5.3	N/A
Bis(2-chloroisopropyl)Ether	108-60-1	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	65000	N/A
Bis(2-ethylhexyl)Phthalate	117-81-7	10			0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	22	N/A
Butyl Benzyl Phthalate	85-68-7	10			0	0	0	0	7000	1E+100	1E+100	1E+100	1E+100	1900	N/A
2-Chloronaphthalene	91-58-7	10			0	0	0	0	2800	1E+100	1E+100	1E+100	1E+100	1600	N/A
Chrysene	218-01-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Dibenzo(a,h)anthracene	53-70-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
1,2-Dichlorobenzene	95-50-1	10			0	0	0	0	600	1E+100	1E+100	1E+100	1E+100	1300	N/A
1,3-Dichlorobenzene	541-73-1	10			0	0	0	0	469	1E+100	1E+100	1E+100	1E+100	960	N/A
1,4-Dichlorobenzene	106-46-7	10			0	0	0	0	75	1E+100	1E+100	1E+100	1E+100	190	N/A
3,3'-Dichlorobenzidine	91-94-1	5			0	0	0	0	0.78	1E+100	1E+100	1E+100	1E+100	0.28	N/A
Diethyl Phthalate	84-66-2	10			0	0	0	0	28000	1E+100	1E+100	1E+100	1E+100	44000	N/A
Dimethyl Phthalate	131-11-3	10			0	0	0	0	350000	1E+100	1E+100	1E+100	1E+100	1100000	N/A
Di-n-Butyl Phthalate	84-74-2	10			0	0	0	0	3500	1E+100	1E+100	1E+100	1E+100	4500	N/A
2,4-Dinitrotoluene	121-14-2	10			0	0	0	0	1.1	1E+100	1E+100	1E+100	1E+100	34	N/A
1,2-Diphenylhydrazine	122-66-7	20			0	0	0	0	0.44	1E+100	1E+100	1E+100	1E+100	2	N/A
Fluoranthene	206-44-0	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	140	N/A
Fluorene	86-73-7	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	5300	N/A
Hexachlorobenzene	118-74-1	5			0	0	0	0	1	1E+100	1E+100	1E+100	1E+100	0.0029	N/A
Hexachlorobutadiene	87-68-3	10			0	0	0	0	4.5	1E+100	1E+100	1E+100	1E+100	180	N/A
Hexachlorocyclopentadiene	77-47-4	10			0	0	0	0	50	1E+100	1E+100	1E+100	1E+100	1100	N/A
Hexachloroethane	67-72-1	20			0	0	0	0	25	1E+100	1E+100	1E+100	1E+100	33	N/A
Indeno(1,2,3-cd)Pyrene	193-39-5	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Isophorone	78-59-1	10			0	0	0	0	368	1E+100	1E+100	1E+100	1E+100	9600	N/A
Nitrobenzene	98-95-3	10			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	690	N/A
n-Nitrosodimethylamine	62-75-9	50			0	0	0	0	0.0069	1E+100	1E+100	1E+100	1E+100	30	N/A
n-Nitrosodi-n-Propylamine	621-64-7	20			0	0	0	0	0.05	1E+100	1E+100	1E+100	1E+100	5.1	N/A
n-Nitrosodiphenylamine	86-30-6	20			0	0	0	0	71	1E+100	1E+100	1E+100	1E+100	60	N/A
Pyrene	129-00-0	10			0	0	0	0	1050	1E+100	1E+100	1E+100	1E+100	4000	N/A
1,2,4-Trichlorobenzene	120-82-1	10			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	70	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria	Irrigation Criteria					
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l					
PESTICIDES AND PCBs															
Aldrin	309-00-2	0.01			0	0	0	0	0.021	1E+100	1E+100	3	1E+100	0.0005	N/A
Alpha-BHC	319-84-6	0.05			0	0	0	0	0.056	1E+100	1E+100	1E+100	1E+100	0.049	N/A
Beta-BHC	319-85-7	0.05			0	0	0	0	0.091	1E+100	1E+100	1E+100	1E+100	0.17	N/A
Gamma-BHC	58-89-9	0.05			0	0	0	0	0.2	1E+100	1E+100	0.95	1E+100	1.8	N/A
Chlordane	57-74-9	0.2			0	0	0	0	2	1E+100	1E+100	2.4	0.0043	0.0081	N/A
4,4'-DDT and derivatives	50-29-3	0.02			0	0	0	0	1	1E+100	0.001	1.1	0.001	0.0022	N/A
Dieldrin	60-57-1	0.02			0	0	0	0	0.022	1E+100	1E+100	0.24	0.056	0.00054	N/A
Diazinon	333-41-5				0	0	0	0	1E+100	1E+100	1E+100	0.17	0.17	1E+100	N/A
Alpha-Endosulfan	959-98-8	0.01			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Beta-Endosulfan	33213-65-9	0.02			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Endosulfan sulfate	1031-7-8	0.1			0	0	0	0	62	1E+100	1E+100	1E+100	1E+100	89	N/A
Endrin	72-20-8	0.02			0	0	0	0	2	1E+100	1E+100	0.086	0.036	0.06	N/A
Endrin Aldehyde	7421-93-4	0.1			0	0	0	0	10.5	1E+100	1E+100	1E+100	1E+100	0.3	N/A
Heptachlor	76-44-8	0.01			0	0	0	0	0.4	1E+100	1E+100	0.52	0.0038	0.00079	N/A
Heptachlor Epoxide	1024-57-3	0.01			0	0	0	0	0.2	1E+100	1E+100	0.52	0.0038	0.00039	N/A
PCBs	1336-36-3	0.2		0.00064	0.0013632	0.0013632	0.0013632	0.00135727	0.5	1E+100	0.014	2	0.014	0.00064	N/A
Toxaphene	8001-35-2	0.3			0	0	0	0	3	1E+100	1E+100	0.73	0.0002	0.0028	N/A

Note: SCORET CODE for reference only. Codes for total form are used except for parameters which have criteria in both total and dissolved forms.

STEP 3: SCAN POTENTIAL INSTREAM WASTE CONCENTRATIONS AGAINST WATER QUALITY CRITERIA
AND ESTABLISH EFFLUENT LIMITATIONS FOR ALL APPLICABLE PARAMETERS

No limits are established if the receiving stream is not designated for the particular uses.

No limits are established if the potential instream waste concentrations are less than the chronic water quality criteria.

The most applicable stringent criteria are used to establish effluent limitations for a given parameter.

Water quality criteria apply at the end-of-pipe for acute aquatic life criteria and discharges to public lakes.

If background concentration exceeds the water quality criteria, water quality criteria apply. And "Need TMDL" shown to the next column of Avg. Mass

Monthly avg concentration = daily max. / 1.5.

APPLICABLE WATER QUALITY-BASED LIMITS

The following formula is used to calculate the allowable daily maximum effluent concentration

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

Daily Max. Conc. = $C_s + (C_s - C_a)(F \cdot Q_a / Q_e)$

Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where:

C_s = Applicable water quality standard

C_a = Ambient stream concentration

F = Fraction of stream allowed for mixing (1.0 is assigned to domestic water supply and human health uses)

Q_e = Plant effluent flow

Q_a = Criteria Low flow (4Q3) or Harmonic Mean flow for Human Health Criteria

CALCULATIONS OF NEW MEXICO WATER QUALITY-BASED EFFLUENT LIMITATIONS

NMAC 20.6.4. **NMWQS as of January 14, 2011**

(EPA approved site-specific criteria for aluminum, cadmium, and zinc on April 30, 2012)

Calculations Specifications:

Excel **Revised as of May 1, 2012**

Prepared By:

Isaac Chen 08/27/2019

STEP 1: REFERENCE IMPLEMENTATION PROCEDURES
INPUT FACILITY AND RECEIVING STREAM DATA
LIST SOURCE OF DATA INPUT

APPENDIX A of FACT SHEET

IMPLEMENTATION PROCEDURES

The State of New Mexico Standards for Interstate and Intrastate Surface Waters are implemented in this spread sheet by using procedures established in the "Procedures for Implementing NPDES Permits in New Mexico" amended May 2011

FACILITY	DATA INPUT	
Permittee	LANL	
NPDES Permit No.	NM0028355	
Outfall No.(s)	051	
Plant Effluent Flow (MGD)	0.03984	One-day discharge rate is used for this screening
Plant Effluent Flow (cfs)	0.061752	
RECEIVING STREAM	DATA INPUT	
Receiving Stream Name	Mortandad Canyon	
Basin Name	Rio Grande	
Waterbody Segment Code No.	20.6.4.128	
Is a publicly owned lake or reservoir (enter "1" if it's a lake, "0" if not)	0	
Are acute aquatic life criteria considered (1= yes, 0= no) (MUST enter "1" for 2005 Standards)	1	
Are chronic aquatic life criteria considered (1= yes, 0=no)	0	
Are domestic water supply criteria considered (1= yes, 0=no)	0	
Are irrigation water supply criteria considered (1= yes, 0=no)	0	
Livestock watering and wildlife habitat criteria applied to all streams		
USGS Flow Station	USGS	
WQ Monitoring Station No.	SJR	
Receiving Stream TSS (mg/l)	0.57	For intermittent stream, enter effluent TSS
Receiving Stream Hardness (mg/l as CaCO ₃)	77.4	For intermittent stream, enter effluent Hardness (If no data, 20 mg/l is used)
Receiving Stream Critical Low Flow (4Q3) (cfs)	0	Enter "0" for intermittent stream and lake.
Receiving Stream Harmonic Mean Flow (cfs)	0.00155	Enter harmonic mean or modified harmonic mean flow data
Avg. Water Temperature (C)	20	
pH (Avg)	8.9	
Fraction of stream allowed for mixing (F)	1	Enter 1, if stream morphology data is not available or for intermittent streams.
Fraction of Critical Low Flow	0	

STEP 2: INPUT AMBIENT AND EFFLUENT DATA

CALCULATE IN-STREAM WASTE CONCENTRATIONS

DATA INPUT

Input pollutant geometric mean concentration as micro-gram per liter (ug/l or ppb)
 unless other unit is specified for the parameter.
 Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, input "1/2 DL" for calculation.
 Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, no data is inputted.
 If a less than MQL value is reported, input either the reported value or "0" for calculation.

The following formula is used to calculate the Instream Waste Concentration (Cd)

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Cd = [(F \cdot Qa \cdot Ca) + (Qe \cdot 2.13 \cdot Ce)] / (F \cdot Qa + Qe)$$

Where:

Cd = Instream Waste Concentration

F = Fraction of stream allowed for mixing (see "Procedures for Implementing NPDES Permits in New Mexico")

Ce = Reported concentration in effluent

Ca = Ambient stream concentration upstream of discharge

Qe = Plant effluent flow

Qa = Critical low flow of stream at discharge point expressed as the 4Q3 or harmonic mean flow for human health criteria

The following formula convert metals reported in total form to dissolved form if criteria are in dissolved form

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

$$Kp = Kpo \cdot (TSS \cdot a)$$

Kp = Linear partition coefficient; Kpo and a can be found in table below

$$C/Ct = 1 / (1 + Kp \cdot TSS \cdot 10^{-6})$$

TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)

$$\text{Total Metal Criteria (Ct)} = Cr / (C/Ct)$$

C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value

Total Metals	Total Value	Stream Linear Partition Coefficient					Lake Linear Partition Coefficient				
		Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Stream	Kpo	alpha (a)	Kp	C/Ct	Dissolved Value in Lake
Arsenic	0	480000	-0.73	723523.4187	0.708010542	0	480000	-0.73	723523.4187	0.708010542	0
Chromium III	0	3360000	-0.93	5667292.939	0.23638667	0	2170000	-0.27	2525652.071	0.40989962	0
Copper	11	1040000	-0.74	1576470.855	0.526707109	5.7937782	2850000	-0.9	4726694.026	0.27069346	2.97762806
Lead	0.524	2800000	-0.8	4389935.576	0.285529648	0.14961754	2040000	-0.53	2747998.516	0.389657074	0.20418031
Nickel	6.59	490000	-0.57	675067.8298	0.722131851	4.7588489	2210000	-0.76	3387875.041	0.341170151	2.2483113
Silver	0	2390000	-1.03	4264290.665	0.291490318	0	2390000	-1.03	4264290.665	0.291490318	0
Zinc	7.79	1250000	-0.7	1852668.059	0.486376404	3.78887219	3340000	-0.68	4894987.25	0.263842306	2.05533157

The following formula is used to calculate hardness dependent criteria

(Please refer to State Water Quality Standards for details)

Dissolved

WQC (ug/l)

Aluminum (T)	Acute	$e(1.3695[\ln(\text{hardness})]+1.8308)$	2408.446941	If Stream pH < 6.5, enter 750 in cell O113
	Chronic	$e(1.3695[\ln(\text{hardness})]+0.9161)$	964.9124733	If Stream pH < 6.5, enter 87 in cell P113
Cadmium (D)	Acute	$e(0.8968[\ln(\text{hardness})]-3.5699) \cdot CF1$	1.328344218	$CF1 = 1.136672 - 0.041838 \cdot \ln(\text{hardness})$
	Chronic	$e(0.7647[\ln(\text{hardness})]-4.2180) \cdot CF2$	0.376809019	$CF2 = 1.101672 - 0.041838 \cdot \ln(\text{hardness})$

				Dissolved WQC (ug/l)	
Chromium III (D)	Acute	0.316 e(0.819[ln(hardness)]+3.7256)		461.9271099	
	Chronic	0.860 e(0.819[ln(hardness)]+0.6848)		60.08722662	
Copper (D)	Acute	0.960 e(0.9422[ln(hardness)]-1.700)		10.55704437	
	Chronic	0.960 e(0.8545[ln(hardness)]-1.702)		7.195006254	
Lead (D)	Acute	e(1.273[ln(hardness)]-1.46)*CF3		48.8091135	CF3 = 1.46203 - 0.145712*ln(hardness)
	Chronic	e(1.273[ln(hardness)]-4.705)*CF4		1.902021081	CF4 = 1.46203 - 0.145712*ln(hardness)
Manganese (D)	Acute	e(0.3331[ln(hardness)]+6.4676)		2741.464366	
	Chronic	e(0.3331[ln(hardness)]+5.8743)		1514.661857	
Nickel (D)	Acute	0.998 e(0.846[ln(hardness)]+2.255)		376.9983511	
	Chronic	0.997 e(0.846[ln(hardness)]+0.0584)		41.87287771	
Silver (D)	Acute	0.85 e(1.72[ln(hardness)]-6.59)		2.07039277	
Zinc (D)	Acute	0.978 e(0.9094[ln(hardness)]+0.9095)		126.7508019	
	Chronic	0.986 e(0.90947[ln(hardness)]+0.6235)		96.03129068	

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration							Irrigation Criteria ug/l	Livestock& Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc. Ca (ug/l)	Effluent Conc. Ce (ug/l)	Acute Aquatic 2.13*Ce	Domestic Supply Cd,dom (ug/l)	Chronic Aquatic Cd (ug/l)	Human Health Cd,hh (ug/l)	Domestic Criteria ug/l						
Radioactivity, Nutrients, and Chlorine															
Aluminum, total	7429-90-5	2.5		19.3	41.109	41.109	41.109	40.1024133	1E+100	5000	1E+100	2408.446941	964.912473	1E+100	N/A
Barium, dissolved	7440-39-3	100		1.87	3.9831	3.9831	3.9831	3.88557062	2000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Boron, dissolved	7440-42-8	100		93.8	199.794	199.794	199.794	194.901884	1E+100	750	5000	1E+100	1E+100	1E+100	N/A
Cobalt, dissolved	7440-48-4	50		1	2.13	2.13	2.13	2.07784525	1E+100	50	1000	1E+100	1E+100	1E+100	N/A
Uranium, dissolved	7440-61-1	0.1			0	0	0	0	30	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Vanadium, dissolved	7440-62-2	50			0	0	0	0	1E+100	100	100	1E+100	1E+100	1E+100	N/A
Ra-226 and Ra-228 (pCi/l)					0	0	0	0	5	1E+100	30	1E+100	1E+100	1E+100	N/A
Strontium (pCi/l)					0	0	0	0	8	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Tritium (pCi/l)					0	0	0	0	20000	1E+100	20000	1E+100	1E+100	1E+100	N/A
Gross Alpha (pCi/l)				2.22	4.7286	4.7286	4.7286	4.61281645	15	1E+100	15	1E+100	1E+100	1E+100	N/A
Asbestos (fibers/l)					0	0	0	0	7000000	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Total Residual Chlorine	7782-50-5	33			0	0	0	0	1E+100	1E+100	11	19	11	1E+100	N/A
Nitrate as N (mg/l)				7.63	16.2519	16.2519	16.2519	15.8539593	10	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Nitrite + Nitrate (mg/l)				7.63	16.2519	16.2519	16.2519	15.8539593	1E+100	1E+100	132	1E+100	1E+100	1E+100	N/A
METALS AND CYANIDE															
Antimony, dissolved (P)	7440-36-0	60		0	0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	640	N/A
Arsenic, dissolved (P)	7440-38-2	0.5		0	0	0	0	0	10	100	200	340	150	9	N/A
Beryllium, dissolved	7440-41-7	0.5		0	0	0	0	0	4	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
Cadmium, dissolved	7440-43-9	1		0	0	0	0	0	5	10	50	1.328344218	0.37680902	1E+100	N/A
Chromium (III), dissolved	16065-83-1	10		0	0	0	0	0	1E+100	1E+100	1E+100	461.9271099	60.0872266	1E+100	N/A
Chromium (VI), dissolved	18540-29-9	10		0	0	0	0	0	1E+100	1E+100	1E+100	16	11	1E+100	N/A
Chromium, dissolved	7440-47-3			0	0	0	0	0	100	100	1000	1E+100	1E+100	1E+100	N/A
Copper, dissolved	7440-50-8	0.5		5.793778195	12.34074756	12.3407476	12.3407476	12.0385745	1300	200	500	10.55704437	7.19500625	1E+100	N/A
Lead, dissolved	7439-92-1	0.5		0.149617535	0.31868535	0.31868535	0.31868535	0.31088209	15	5000	100	48.8091135	1.90202108	1E+100	N/A
Manganese, dissolved	7439-96-5			21.4	45.582	45.582	45.582	44.4658883	1E+100	1E+100	1E+100	2741.464366	1514.66186	1E+100	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock&	Acute	Chronic	Human	Need
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic	Aquatic	Health	TMDL
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria
			Ca (ug/l)	Ce (ug/l)	2.13°Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
Mercury, dissolved	7439-97-6	0.005			0	0	0	0	1E+100	1E+100	1E+100	1.4	0.77	1E+100	N/A
Mercury, total	7439-97-6	0.005		0.067	0.14271	0.14271	0.14271	0.13921563	2	1E+100	0.77	1E+100	1E+100	1E+100	N/A
Molybdenum, dissolved	7439-98-7			4.43	9.4359	9.4359	9.4359	9.20485446	1E+100	1000	1E+100	1E+100	1E+100	1E+100	N/A
Molybdenum, total recoverable	7439-98-7			4.43	9.4359	9.4359	9.4359	9.20485446	1E+100	1E+100	1E+100	7920	1895	1E+100	N/A
Nickel, dissolved (P)	7440-02-0	0.5		4.758848896	10.13634815	10.1363481	10.1363481	9.88815157	700	1E+100	1E+100	376.9983511	41.8728777	4600	N/A
Selenium, dissolved (P)	7782-49-2	5		0	0	0	0	0	50	130	50	1E+100	1E+100	4200	N/A
Selenium, dis (SO4 >500 mg/l)		5			0	0	0	0	50	250	50	1E+100	1E+100	4200	N/A
Selenium, total recoverable	7782-49-2	5		0	0	0	0	0	1E+100	1E+100	5	20	5	1E+100	N/A
Silver, dissolved	7440-22-4	0.5		0	0	0	0	0	1E+100	1E+100	1E+100	2.07039277	1E+100	1E+100	N/A
Thallium, dissolved (P)	7440-28-0	0.5		0.6	1.278	1.278	1.278	1.24670715	2	1E+100	1E+100	1E+100	1E+100	0.47	N/A
Zinc, dissolved	7440-66-6	20		3.788872187	8.070297758	8.07029776	8.07029776	7.87269008	10500	2000	25000	126.7508019	96.0312907	26000	N/A
Cyanide, total recoverable	57-12-5	10		1.67	3.5571	3.5571	3.5571	3.47000157	200	1E+100	5.2	22	5.2	140	N/A
Dioxin	1764-01-6	0.00001		0	0	0	0	0	3.00E-05	1E+100	1E+100	1E+100	1E+100	5.1E-08	N/A
VOLATILE COMPOUNDS															
Acrolein	107-02-8	50			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	9	N/A
Acrylonitrile	107-13-0	20			0	0	0	0	0.65	1E+100	1E+100	1E+100	1E+100	2.5	N/A
Benzene	71-43-2	10			#VALUE!	#VALUE!	#VALUE!	#VALUE!	5	1E+100	1E+100	1E+100	1E+100	510	N/A
Bromoform	75-25-2	10		0	0	0	0	0	44	1E+100	1E+100	1E+100	1E+100	1400	N/A
Carbon Tetrachloride	56-23-5	2			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	16	N/A
Chlorobenzene	108-90-7	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	1600	N/A
Clorodibromomethane	124-48-1	10			#VALUE!	#VALUE!	#VALUE!	#VALUE!	4.2	1E+100	1E+100	1E+100	1E+100	130	N/A
Chloroform	67-66-3	50		12	25.56	25.56	25.56	24.934143	57	1E+100	1E+100	1E+100	1E+100	4700	N/A
Dichlorobromomethane	75-27-4	10		0	0	0	0	0	5.6	1E+100	1E+100	1E+100	1E+100	170	N/A
1,2-Dichloroethane	107-06-2	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	370	N/A
1,1-Dichloroethylene	75-35-4	10			0	0	0	0	7	1E+100	1E+100	1E+100	1E+100	7100	N/A
1,2-Dichloropropane	78-87-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	150	N/A
1,3-Dichloropropylene	542-75-6	10			0	0	0	0	3.5	1E+100	1E+100	1E+100	1E+100	210	N/A
Ethylbenzene	100-41-4	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	2100	N/A
Methyl Bromide	74-83-9	50			0	0	0	0	49	1E+100	1E+100	1E+100	1E+100	1500	N/A
Methylene Chloride	75-09-2	20			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	5900	N/A
1,1,2,2-Tetrachloroethane	79-34-5	10			0	0	0	0	1.8	1E+100	1E+100	1E+100	1E+100	40	N/A
Tetrachloroethylene	127-18-4	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	33	N/A
Toluene	108-88-3	10			0	0	0	0	1000	1E+100	1E+100	1E+100	1E+100	15000	N/A
1,2-trans-Dichloroethylene	156-60-5	10			0	0	0	0	100	1E+100	1E+100	1E+100	1E+100	10000	N/A
1,1,1-Trichloroethane	71-55-6				0	0	0	0	200	1E+100	1E+100	1E+100	1E+100	1E+100	N/A
1,1,2-Trichloroethane	79-00-5	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	160	N/A
Trichloroethylene	79-01-6	10			0	0	0	0	5	1E+100	1E+100	1E+100	1E+100	300	N/A
Vinyl Chloride	75-01-4	10			0	0	0	0	2	1E+100	1E+100	1E+100	1E+100	24	N/A
ACID COMPOUNDS															
2-Chlorophenol	95-57-8	10			0	0	0	0	175	1E+100	1E+100	1E+100	1E+100	150	N/A
2,4-Dichlorophenol	120-83-2	10			0	0	0	0	105	1E+100	1E+100	1E+100	1E+100	290	N/A
2,4-Dimethylphenol	105-67-9	10			0	0	0	0	700	1E+100	1E+100	1E+100	1E+100	850	N/A
4,6-Dinitro-o-Cresol	534-52-1	50			0	0	0	0	14	1E+100	1E+100	1E+100	1E+100	280	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock&	Acute	Chronic	Human	Need
			Ambient	Effluent	Acute	Domestic	Chronic	Human	Domestic	Irrigation	Wildlife	Aquatic	Aquatic	Health	TMDL
			Conc	Conc.	Aquatic	Supply	Aquatic	Health	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria	Criteria
2,4-Dinitrophenol	51-28-5	50			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	5300	N/A
Pentachlorophenol	87-86-5	50			0	0	0	0	1	1E+100	1E+100	19	15	30	N/A
Phenol	108-95-2	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	860000	N/A
2,4,6-Trichlorophenol	88-06-2	10			0	0	0	0	32	1E+100	1E+100	1E+100	1E+100	24	N/A
BASE/NEUTRAL															
Acenaphthene	83-32-9	10			0	0	0	0	2100	1E+100	1E+100	1E+100	1E+100	990	N/A
Anthracene	120-12-7	10			0	0	0	0	10500	1E+100	1E+100	1E+100	1E+100	40000	N/A
Benzidine	92-87-5	50			0	0	0	0	0.0015	1E+100	1E+100	1E+100	1E+100	0.002	N/A
Benzo(a)anthracene	56-55-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(a)pyrene	50-32-8	5			0	0	0	0	0.2	1E+100	1E+100	1E+100	1E+100	0.18	N/A
3,4-Benzofluoranthene	205-99-2	10			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Benzo(k)fluoranthene	207-08-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Bis(2-chloroethyl)Ether	111-44-4	10			0	0	0	0	0.3	1E+100	1E+100	1E+100	1E+100	5.3	N/A
Bis(2-chloroisopropyl)Ether	108-60-1	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	65000	N/A
Bis(2-ethylhexyl)Phthalate	117-81-7	10			0	0	0	0	6	1E+100	1E+100	1E+100	1E+100	22	N/A
Butyl Benzyl Phthalate	85-68-7	10			0	0	0	0	7000	1E+100	1E+100	1E+100	1E+100	1900	N/A
2-Chloronaphthalene	91-58-7	10			0	0	0	0	2800	1E+100	1E+100	1E+100	1E+100	1600	N/A
Chrysene	218-01-9	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Dibenzo(a,h)anthracene	53-70-3	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
1,2-Dichlorobenzene	95-50-1	10			0	0	0	0	600	1E+100	1E+100	1E+100	1E+100	1300	N/A
1,3-Dichlorobenzene	541-73-1	10			0	0	0	0	469	1E+100	1E+100	1E+100	1E+100	960	N/A
1,4-Dichlorobenzene	106-46-7	10			0	0	0	0	75	1E+100	1E+100	1E+100	1E+100	190	N/A
3,3'-Dichlorobenzidine	91-94-1	5			0	0	0	0	0.78	1E+100	1E+100	1E+100	1E+100	0.28	N/A
Diethyl Phthalate	84-66-2	10			0	0	0	0	28000	1E+100	1E+100	1E+100	1E+100	44000	N/A
Dimethyl Phthalate	131-11-3	10			0	0	0	0	350000	1E+100	1E+100	1E+100	1E+100	1100000	N/A
Di-n-Butyl Phthalate	84-74-2	10		0.52	1.1076	1.1076	1.1076	1.08047953	3500	1E+100	1E+100	1E+100	1E+100	4500	N/A
2,4-Dinitrotoluene	121-14-2	10			0	0	0	0	1.1	1E+100	1E+100	1E+100	1E+100	34	N/A
1,2-Diphenylhydrazine	122-66-7	20			0	0	0	0	0.44	1E+100	1E+100	1E+100	1E+100	2	N/A
Fluoranthene	206-44-0	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	140	N/A
Fluorene	86-73-7	10			0	0	0	0	1400	1E+100	1E+100	1E+100	1E+100	5300	N/A
Hexachlorobenzene	118-74-1	5			0	0	0	0	1	1E+100	1E+100	1E+100	1E+100	0.0029	N/A
Hexachlorobutadiene	87-68-3	10			0	0	0	0	4.5	1E+100	1E+100	1E+100	1E+100	180	N/A
Hexachlorocyclopentadiene	77-47-4	10			0	0	0	0	50	1E+100	1E+100	1E+100	1E+100	1100	N/A
Hexachloroethane	67-72-1	20			0	0	0	0	25	1E+100	1E+100	1E+100	1E+100	33	N/A
Indeno(1,2,3-cd)Pyrene	193-39-5	5			0	0	0	0	0.048	1E+100	1E+100	1E+100	1E+100	0.18	N/A
Isophorone	78-59-1	10			0	0	0	0	368	1E+100	1E+100	1E+100	1E+100	9600	N/A
Nitrobenzene	98-95-3	10			0	0	0	0	18	1E+100	1E+100	1E+100	1E+100	690	N/A
n-Nitrosodimethylamine	62-75-9	50			0	0	0	0	0.0069	1E+100	1E+100	1E+100	1E+100	30	N/A
n-Nitrosodi-n-Propylamine	621-64-7	20			0	0	0	0	0.05	1E+100	1E+100	1E+100	1E+100	5.1	N/A
n-Nitrosodiphenylamine	86-30-6	20			0	0	0	0	71	1E+100	1E+100	1E+100	1E+100	60	N/A
Pyrene	129-00-0	10			0	0	0	0	1050	1E+100	1E+100	1E+100	1E+100	4000	N/A
1,2,4-Trichlorobenzene	120-82-1	10			0	0	0	0	70	1E+100	1E+100	1E+100	1E+100	70	N/A

POLLUTANTS	CAS No.	MQL	Instream Waste Concentration								Livestock & Wildlife Criteria ug/l	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	Need TMDL
			Ambient Conc	Effluent Conc.	Acute Aquatic	Domestic Supply	Chronic Aquatic	Human Health	Domestic Criteria	Irrigation Criteria					
			Ca (ug/l)	Ce (ug/l)	2.13*Ce	Cd,dom (ug/l)	Cd (ug/l)	Cd,hh (ug/l)	ug/l	ug/l					
PESTICIDES AND PCBs															
Aldrin	309-00-2	0.01			0	0	0	0	0.021	1E+100	1E+100	3	1E+100	0.0005	N/A
Alpha-BHC	319-84-6	0.05			0	0	0	0	0.056	1E+100	1E+100	1E+100	1E+100	0.049	N/A
Beta-BHC	319-85-7	0.05			0	0	0	0	0.091	1E+100	1E+100	1E+100	1E+100	0.17	N/A
Gamma-BHC	58-89-9	0.05			0	0	0	0	0.2	1E+100	1E+100	0.95	1E+100	1.8	N/A
Chlordane	57-74-9	0.2			0	0	0	0	2	1E+100	1E+100	2.4	0.0043	0.0081	N/A
4,4'-DDT and derivatives	50-29-3	0.02			0	0	0	0	1	1E+100	0.001	1.1	0.001	0.0022	N/A
Dieldrin	60-57-1	0.02			0	0	0	0	0.022	1E+100	1E+100	0.24	0.056	0.00054	N/A
Diazinon	333-41-5				0	0	0	0	1E+100	1E+100	1E+100	0.17	0.17	1E+100	N/A
Alpha-Endosulfan	959-98-8	0.01			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Beta-Endosulfan	33213-65-9	0.02			0	0	0	0	62	1E+100	1E+100	0.22	0.056	89	N/A
Endosulfan sulfate	1031-7-8	0.1			0	0	0	0	62	1E+100	1E+100	1E+100	1E+100	89	N/A
Endrin	72-20-8	0.02			0	0	0	0	2	1E+100	1E+100	0.086	0.036	0.06	N/A
Endrin Aldehyde	7421-93-4	0.1			0	0	0	0	10.5	1E+100	1E+100	1E+100	1E+100	0.3	N/A
Heptachlor	76-44-8	0.01			0	0	0	0	0.4	1E+100	1E+100	0.52	0.0038	0.00079	N/A
Heptachlor Epoxide	1024-57-3	0.01			0	0	0	0	0.2	1E+100	1E+100	0.52	0.0038	0.00039	N/A
PCBs	1336-36-3	0.2			#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.5	1E+100	0.014	2	0.014	0.00064	N/A
Toxaphene	8001-35-2	0.3			0	0	0	0	3	1E+100	1E+100	0.73	0.0002	0.0028	N/A

Note: SCORET CODE for reference only. Codes for total form are used except for parameters which have criteria in both total and dissolved forms.

STEP 3: SCAN POTENTIAL INSTREAM WASTE CONCENTRATIONS AGAINST WATER QUALITY CRITERIA
AND ESTABLISH EFFLUENT LIMITATIONS FOR ALL APPLICABLE PARAMETERS

No limits are established if the receiving stream is not designated for the particular uses.

No limits are established if the potential instream waste concentrations are less than the chronic water quality criteria.

The most applicable stringent criteria are used to establish effluent limitations for a given parameter.

Water quality criteria apply at the end-of-pipe for acute aquatic life criteria and discharges to public lakes.

If background concentration exceeds the water quality criteria, water quality criteria apply. And "Need TMDL" shown to the next column of Avg. Mass

Monthly avg concentration = daily max. / 1.5.

APPLICABLE WATER QUALITY-BASED LIMITS

The following formula is used to calculate the allowable daily maximum effluent concentration

See "Procedures for Implementing NPDES Permits in New Mexico" amended July 2009

Daily Max. Conc. = $C_s + (C_s - C_a)(F \cdot Q_a / Q_e)$

Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where: C_s = Applicable water quality standard

C_a = Ambient stream concentration

F = Fraction of stream allowed for mixing (1.0 is assigned to domestic water supply and human health uses)

Q_e = Plant effluent flow

Q_a = Criteria Low flow (4Q3) or Harmonic Mean flow for Human Health Criteria

