PROPOSED
MODIFICATIONS TO MINERALS CRITERIA

October 11, 2013

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MODIFICATIONS TO MINERALS CRITERIA

INTRODUCTION

Water management segment 311500 currently has only one station available for use in deriving an appropriate criterion for use in implementing the Agricultural beneficial use. The single station used to characterize minerals in this management segment is Elk Creek near Hobart.

Elk Creek near Hobart has relatively low minerals concentrations as compared to other waterbodies in this management segment. Having only one site in the watershed available for use for calculating criteria can result in the possibility of applying criteria that is over protective for other waterbodies in the management segment.

The OWRB received a request from the City of Altus to review the data for this water management segment to consider adding an additional site to Appendix F of the Oklahoma Water Quality Standards (OWQS) to better characterize the more mineralized portion of this particular watershed.

After reviewing data in this area, a station on the North Fork of the Red River near Headrick was chosen to be included into Appendix F. This station has historical data in the same date ranges as the other Appendix F stations.

USGS 07305000 North Fork Red River near Headrick, OK

Tillman County, Oklahoma
Hydrologic Unit Code: 11120303
Latitude 34°38'17", Longitude 99°06'12" NAD27
Drainage area: 4,560 square miles
Contributing drainage area: 3,981 square miles
Gage datum: 1,294.83 feet above NGVD29

The same statistical approach used to derive the Yearly Mean Standard and Sample Standard was applied to USGS data from the time period of October 1976 to September 1983. This approach is to calculate the mean and standard deviation of all data from the time period. The Yearly Mean Standard (YMS) is derived by adding the mean plus one standard deviation. The Sample Standard (SS) is derived by adding the mean plus two standard deviations. The results are as follows:

	Chloride	Sulfate	Total Dissolved Solids
Mean	2334	851	5174
Std. Dev.	1039	237	1945
YMS	3373	1088	7119
SS	4412	1325	9064
N	286	275	286

In accordance with all other management segments that have more than one station, the stations have been averaged. This average watershed value is also proposed to be placed in Appendix F. Traditionally, the watershed average values are used in standards implementation when none of the individual monitoring stations are appropriate.

DRAFT PROPOSED LANGUAGE CHANGES

OAC 785:45 Appendix F. Statistical Values of the Historical Data for Mineral Constituents of Water Quality (Beginning October 1976 Ending September 1983, Except as Indicated)

Segment	Monitoring Station	Monitoring Station Description	Chloride YMS	Chloride SS	Sulfate YMS	Sulfate SS	TDS YMS	TDS SS
311500	3045	# USGS 07304500 Elk Creek near Hobart, OK	243	353	781	1040	1777	2284
311500	3050	# USGS 07305000 Fork of the Red River near Headrick, OK	3373	4412	1088	1325	7119	9064
	AVG		**1808**	**2383**	**934**	**1182**	**4448**	**5674**

In addition to adding the Headrick station; we are also proposing to modify the format of Appendix F to include a more complete description of the monitoring stations. The monitoring station identifications used in the current version of Appendix F can cause confusion. The identifications are derived from the USGS station numbers as well as historic stations descriptors. We propose to retain the current station identification but also add a column describing the site in more detail, including the waterbody name and nearby community. This change would make it easier to identify the most appropriate Appendix F value to compare to when implementing the water quality standards.

We are also proposing to add a remark to the footnotes section. This remark will clarify that that the data associated with certain stations has not been approved by the EPA and are therefore not for use in any Clean Water Act program. However, this data has been approved through the state process and can be used in any state program which is not a Clean Water Act program.

ECONOMIC CONSIDERATIONS

There are no anticipated negative economic impacts associated with this change.
This change, if approved by EPA, could allow for the possibility of calculating permit limits that better reflect the background level of minerals in this water quality management segment. The addition of another historic site in this watershed would also lead to more accurate water quality assessments. The formatting changes will allow for easier use of Appendix F and lessen confusion with greater specificity to station locations.

Segment	Monitoring Station	Monitoring Station Description	Chloride YMS	Chloride SS	Sufate YMS	Sulfate SS	TDS YMS	TDS SS
120400	1945	# USGS 07194500 Arkansas River near Muskogee, OK	492	703	116	153	726	998
120400	1946	ATM Arkansas River Below Webbers Falls L&D	304	393	91	115		
120400	**AVG**		**398**	**548**	**104**	**134**	**726**	**998**
120410	16557	# USGS 07165570 Arkansas River near Haskell, OK	[illegible]	810	140	172	1419	1782
120420	1644	# USGS 07164400 Arkansas River at Sand Springs , OK	743	971	143	172	1608	2033
120420	1645	# USGS 07165000 Heyburn Lake near Heyburn, OK	694	[illegible]	150	183	1482	1827
120420	(1)						1398	1743
120420	**AVG**		**719**	**[illegible]**	**147**	**178**	**1496**	**1868**
121300	1765	# USGS 07176500 Bird Creek at Avant, OK	89	123	30	41	334	396
121300	17805	# USGS 07178050 Bird Creek near Catoosa, OK	93	[illegible]	[illegible]	76		
121300	1784	# USGS 07178400 Bird Creek at Catoosa , OK	85	109	[illegible]	78		
121300	(1)						440	544
121300	**AVG**		**89**	**117**	**50**	**65**	**387**	**470**
121400	1730	# USGS 07173000 Caney River near Hulah, OK	40	55	27	35	264	313
121400	1742	# USGS 07174200 Little Caney River blw Cotton Cr, nr Copan, OK	123	172	32	45	457	590
121400	1755	# USGS 07175500 Caney River near Ramona, OK	131	177	42	56	457	576
121400	(1)						461	585
121400	**AVG**		**98**	**135**	**34**	**45**	**410**	**516**
121500	1714	# USGS 07171400 Verdigris River near Oologah, OK	38	51	86	129	367	512
121500		# USGS 07176000 Verdigris River near Claremore, OK	74	102	69	93		
121500	17862	# USGS 07178620 Verdigris River (Newt Graham L&D) near Inola, OK	62	81	64	80	332	399
121500	1788	VERDIGRIS RIVER NEAR INOLA	56	72	67	90		
121500	1790	VERDIGRIS RIVER NEAR OKAY	70	96	58	76		
121500	**AVG**		**60**	**80**	**69**	**94**	**350**	**456**
121510	1710	# USGS 07171000 Verdigris River near Lenapah, OK	65	88	88	135	326	411
12151001 (4)	121510010[illegible]	Spencer Creek	194	287	745	963	1232	1572
12151001 (4)	12151001[illegible]10	Campbell Creek						
12151001 (4)	1215100[illegible]120	Plum[illegible]reek						
12151001 (4)	1215100[illegible]130	Lig[illegible]ng [illegible]eek						
12151001 (4)	121510010140	P[illegible]eek						
12151001 (4)	121510010220	West [illegible]ranch V[illegible]is River						
12151001 (4)	121510010240	Wing[illegible]on [illegible]ek						
121600	1850	# USGS 07183[illegible] Ne[illegible]o [illegible]er near Commerce, OK	29	41	126	183	442	547
121600	1880	# USGS 07188[illegible]0 S[illegible] River [illegible]r Quapaw, OK	19	27	62	82	283	324
121600	1905	# USGS 07190500 [illegible]eosho Rive[illegible] [illegible]ea Langley, OK	15	20	43	57	184	205
121600	19122	# USGS 07191220 Spavinaw [illegible]ek near Sycamore, OK	18	24	29	48		
121600	1915	# USGS 07191500 Neosho [illegible]er near Chouteau, OK	29	43	53	73	176	195
121600	19155	NEOSHO RIVER ABOVE INDUSTRIAL PARK	23	34	60	88	241	287
121600	1935	# USGS 07193500 Neosho River blw Ft Gibson Lake nr Ft Gibson, OK	16	20	43	50	189	207
121600	**AVG**		**21**	**30**	**59**	**83**	**253**	**294**
121610	19156	PRYOR CREEK AT HIGHWAY 69A BRIDGE	100	148	121	162		
121700	1955	# USGS 07195500 Illinois River near Watts, OK	17	23	20	27	184	230
121700	1960	# USGS 07196000 Flint Creek near Kansas, OK	19	26	23	32	171	219

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Appendix F. Statistical Values of the Historical Data For Mineral Constituents of Water Quality

Segment	Monitoring Station	Monitoring Station Description	Chloride YMS	Chloride SS	Sufate YMS	Sulfate SS	TDS YMS	TDS SS
121700	1965	# USGS 07196500 Illinois River near Tahlequah, OK	17	25	26	37	158	184
121700	1970	# USGS 07197000 Baron Fork at Eldon, OK	13	19	22	31	133	156
121700	1980	# USGS 07198000 Illinois River near Gore, OK	37	56	35	57	160	195
121700	**AVG**		21	30	25	37	161	197
220100	2485	# USGS 07248500 Poteau River near Wister, OK	1[illegible]	19	21	29	104	125
220100	24944	# USGS 07249440 Poteau River near Fort Smith, AR	[illegible]	[illegible]	48	69	171	228
220100	**AVG**		**[illegible]7**	**[illegible]3**	**35**	**49**	**138**	**177**
220200	2464	# USGS 07246400 RS Kerr L&D near Sallisaw, OK (DS)	225	[illegible]	71	87	534	644
220200	(1)						490	596
220200	**AVG**		**225**	**2[illegible]**	**[illegible]1**	**87**	**512**	**620**
220300	2450	# USGS 07245000 Canadian River near Whitefield, OK	83	96	[illegible]2	[illegible]60	320	357
220600	2315	# USGS 07231500 Canadian River at Calvin, OK	346	456	[illegible]44	33[illegible]	1062	1328
220600	2316	BRUSHY CREEK NEAR HAILEYVILLE	63	109	7[illegible]	112		
220600	2317	CANADIAN RIVER AT INDIAN NATION TURPKE	281	371	232	3[illegible]		
220600	(1)						612	777
220600	**AVG**		**230**	**312**	**182**	**255**	**837**	**1053**
310800	3310	# USGS 07331000 Washita River near Dickson, OK	134	184	521	702	1187	1524
310810	3281	# USGS 07328100 Washita River at Alex, OK	109	142	788	983		
310810	3285	# USGS 07328500 Washita River near Pauls Valley, OK	144	198	721	933	3008	4409
310810	**AVG**		**127**	**170**	**755**	**958**	**3008**	**4409**
31081001 (4), 31081002 (4), 31081003 (4), 31081004 (4), 31081005 (4)			106	161	154	248		
310820								
31082001 (4), 31082002 (4)			137	200	720	997		
310830	3244	# USGS [illegible]400 Washita River near Foss, OK	92	131	1196	1461	2010	2396
310830	3255	# USGS 07[illegible]5500 Washita River at Carnegie, OK	137	176	1190	1463	2237	2733
310830	3265	# USGS 0[illegible]2650 Washita River at Anadarko, OK	247	387	1004	1287	2457	3157
310830	**AVG**		**159**	**231**	**1130**	**1404**	**2235**	**2762**
310840	3242	# USGS 07324[illegible]00 Washita River near Hammon, OK	115	173	1281	1654	2368	3042
311100	3155	# USGS 07315500 Red River near Terral, OK	1797	2464	866	1161	4746	6290
311100	3157	# USGS 07315700 Mud Creek near Courtney, OK	310	451	150	237		
311100	3159	WALNUT BAYOU NEAR BURNEYVILLE	328	447	172	253		
311100	3160	# USGS 07316000 Red River near Gainesville, TX	1594	2175	751	1013	3956	5154
311100	**AVG**		**1007**	**1384**	**485**	**666**	**4351**	**5722**
31110003 (4), 31110004 (4)			239	352	206	298		
311200	31272	RED RIVER NEAR WAURIKA	[illegible]12	2834	948	1231		
311200	3135	# USGS 07313500 Beaver Creek near Waurika, OK	[illegible]2	195	221	307	904	1137
311200	3136	COW CREEK AT WAURIKA	395	561	266	376		

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Appendix F. Statistical Values of the Historical Data For Mineral Constituents of Water Quality

Segment	Monitoring Station	Monitoring Station Description	Chloride YMS	Chloride SS	Sufate YMS	Sulfate SS	TDS YMS	TDS SS
311200	**AVG**		**88[illegible]**	**1197**	**478**	**638**	**904**	**1137**
31120000 (4)			[illegible]	[illegible]	248	358		
311210	3134	BEAVER CREEK ABOVE WAURIKA LAKE	69	93	344	478		
31121000 (4)			92	[illegible]	[illegible]	358		
311300	3090	# USGS 07309000 East Cache Creek near Elgin, OK	65	92	135	173		
311300	3110	# USGS 07311000 East Cache Creek near Walters, OK	81	102	82	102	472	560
311300	**AVG**		**73**	**97**	**109**	**138**	**472**	**560**
311300 trib to Nine Mile Ck[2]	(2)	Unnamed Tributary to Nine Mile Creek	231	262	128	145	809	879
311300 Nine Mile Ck[2]	(2)	Nine Mile Creek	232	279	124	150	830	950
311500	3045	# USGS 07304500 Elk Creek near Hobart, OK	243	353	781	1040	1777	2284
311500	3050	# USGS 07305000 Fork of the Red River near Headrick, OK	3373	4412	1088	1325	7119	9064
	AVG		1808	2383	934	1182	4448	5674
311310	3112	# USGS 07311200 Blue Beaver Creek near Cache, OK	16	23	21	27	126	151
311310	311505	WEST CACHE CREEK NEAR TAYLOR	357	547	136	209		
311310	**AVG**		**187**	**285**	**79**	**118**	**126**	**151**
311510	3015	# USGS 07301500 North Fork Red River near Carter, OK	2328	3924	1413	1869		
311510	3030	# USGS 07303000 North Fork Red River blw Altus Dam nr Lugert, OK	5612	8948	1308	1703		
311510	(1)						2334	2815
311510	**AVG**		**3970**	**6436**	**1361**	**1786**	**2334**	**2815**
311600	3005	# USGS 07300500 Salt Fork Red River at Mangum, OK	645	963	1720	2114		
311600	30111	# USGS 07301110 Salt Fork Red River near Elmer, OK	690	856	1451	1755	3331	3969
311600	**AVG**		**668**	**910**	**1586**	**1935**	**3331**	**3969**
311800	303[illegible]	# USGS 07303500 Elm Fork of North Fork Red River nr Mangum, OK	9875	13569	1939	2401		
311800	(1)						37568	58087
311800	**AVG**		**9875**	**13569**	**1939**	**2401**	**37568**	**58087**
410100	336[illegible]	# USGS 07336820 Red River near De Kalb, TX	285	397	200	277	913	1220
410200	3385	# USGS 07337[illegible]00 Little River blw Lukfata Creek, nr Idabel, OK	42	64	20	28	125	165
410210	3371	# USGS 07337[illegible]00 Little River near Cloudy, OK	10	14	17	22	62	81
410210	3379	# USGS 07337[illegible]00 Glover River near Glover, OK	12	17	19	25	69	89
410210	**AVG**		**11**	**16**	**18**	**24**	**66**	**85**
410300	3362	# USGS 07336[illegible] Kiamichi River near Antlers, OK	16	24	21	28	1174	2023
410310	3357	# USGS 07335700 Kiamichi River near Big Cedar, OK	7	10	13	18	31	38
410400	3340	# USGS 07334000 Muddy Boggy Creek near Farris, OK	38	53	44	65	235	283
410400	3350	# USGS 07335000 Clear Boggy Creek near Caney, OK	106	149	59	90	427	537
410400	(1)						114	172
410400	**AVG**		**72**	**101**	**52**	**78**	**259**	**331**
410400	3355	RedRiver NearHugo3	388	503	3355	478	1080	1405
410600	3325	# USGS 07332500 Blue River near Blue, OK	34	55	31	44	312	357
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Segment	Monitoring Station	Monitoring Station Description	Chloride YMS	Chloride SS	Sufate YMS	Sulfate SS	TDS YMS	TDS SS
520500	2420	# USGS 07242000 North Canadian River near Wetumka, OK	349	451	168	217	1030	1284
520500	2422	# USGS 07242200 Deep Fork at Portland Ave, Oklahoma City, OK	319	409	141	189		
520500	**AVG**		**334**	**430**	**155**	**203**	**1030**	**1284**
520510	2417	# USGS 07241700 North Canadian River near Shawnee, OK	30[illegible]	395	148	192		
520520	2399	NORTH CANADIAN RIVER BELOW OVERHOLSER	219	261	260	317		
520520	24155	# USGS 07241550 North Canadian River near Harrah, OK	45[illegible]	620	188	239	1196	1523
520520	**AVG**		**[illegible]**	**[illegible]1**	**224**	**278**	**1196**	**1523**
520530	2390	# USGS 07239000 North Canadian River at Canton, OK	270	318	369	469	1156	1240
520530	2395	# USGS 07239500 North Canadian River near El Reno, OK	267	33[illegible]	475	640	1300	1552
520530	(1)						1145	1399
520530	**AVG**		**269**	**328**	**[illegible]2**	**555**	**1200**	**1397**
520600	2294	CANADIAN RIVER NEAR KONAWA	259	342	309	414		
52060001 (4), 52060002 (4)			127	197	112	185		
520610	2292	# USGS 07229200 Canadian River at Purcell, OK	255	353	433	570	1114	1410
520620	2285	# USGS 07228500 Canadian River at Bridgeport, OK	336	488	568	724	1458	1849
52062002 (4), 52062003 (4), 52062006 (4)			38	49	1612	1918		
520700	2424	DEEP FORK NEAR WELLSTON	211	276	127	175		
520700	2425	# USGS 07242500 Bellcow Creek at Chandler, OK	219	291	117	165		
520700	2435	# USGS 07243500 Deep Fork near Beggs, OK	222	292	98	134	721	926
520700	**AVG**		**217**	**286**	**114**	**158**	**721**	**926**
520710	24235	# USGS 07242350 Deep Fork near Arcadia, OK	253	342	159	207	841	1085
520800	2300	# USGS 07230000 Little River blw Lk Thunderbird nr Norman, OK	104	130	50	73	486	581
520800	2310	# USGS 07230000 Little River near Sasakwa, OK	765	1065	75	115	1538	2063
520800	(1)						1551	2083
520800	**AVG**		**435**	**598**	**63**	**94**	**1192**	**1576**
520810	(1)						265	294
620900	1610	# USGS 07161000 Cimarron River at Perkins, OK	4233	5650	519	650	7941	10357
62090001 (4)			89	123	73	100		
62090003 (4)			135	220	376	657		
620910	1584	# USGS 07158400 Salt Creek near Keene, OK	12076	17506	1670	2171	18760	26005
620910	1591	# USGS 07159100 Cimarron River near Dover, OK	7464	10162	729	921	14809	19580
620910	15972	# USGS 07159720 Cottonwood Creek near Navina, OK	174	218	255	304	901	1072
620910	15975	# USGS 07159750 Cottonwood Creek near Seward, OK	182	233	242	301	879	1091
620910	1600	# USGS 07160000 Cimarron River near Guthrie, OK	4813	6431	633	799		
620910	1605	# USGS 07160500 Skeleton Creek near Lovell, OK	597	864	548	744	1834	2391
620910	**AVG**		**4218**	**5902**	**680**	**873**	**7437**	**10028**
62091003 (4)			135	220	376	657		
620920	15795	# USGS 07157950 Cimarron River near Buffalo, OK	8436	12508	1141	1740	16954	25129

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Segment	Monitoring Station	Monitoring Station Description	Chloride YMS	Chloride SS	Sufate YMS	Sulfate SS	TDS YMS	TDS SS
620920	15796	# USGS 07157960 Buffalo Creek near Lovedale, OK	423	604	2058	2616	3752	4781
620920	**AVG**		**441**	**6556**	**1600**	**2178**	**10353**	**14955**
62092004 (4)			158	[illegible]	1673	2446		
62092005 (4)			349	467	2394	3129		
621000	1505	# USGS 07150500 Salt Fork Arkansas River nr Jet, OK	5658	317[illegible]	[illegible]	918	10577	14972
621000	15226	# USGS 07152260 Salt Fork Arkansas River nr White Eagle , OK	1089	147[illegible]	2[illegible]	360		
621000	**AVG**		**3374**	**4824**	**[illegible]5**	**639**	**10577**	**14972**
62100001 (4)			197	273	272	36[illegible]		
62100003 (4)								
62100004 (4)								
62100005 (4)								
621010	14845	SALT FORK OF ARKANSAS NEAR INGERSOLL	288	388	936	1173	1886	2306
62101001 (4)			158	230	1673	2446		
621100	1[illegible]20	# USGS 07152000 Chikaskia River near Blackwell, OK	388	586	175	247	1091	1417
62110000 (4)			1073	1690	817	1111		
621200	14[illegible]4	# USGS 07148140 Arkansas River near Ponca City, OK	252	321	115	157		
621200	1525	# USGS 07152500 Arkansas River at Ralston, OK	536	738	144	185	1111	1405
621200	152[illegible]	# USGS 07153000 Black Bear Creek at Pawnee, OK	544	811	45	65		
621200	**AVG**		**444**	**623**	**101**	**136**	**1111**	**1405**
621210	(1)		482	728	132	182		
720500	2340	# USGS 07[illegible]4000 Beaver River at Beaver, OK	1455	1893	890	1192	3847	4938
720500	2375	# USGS 07[illegible]00 North Canadian River at Woodward, OK	450	562	597	785	1878	2359
720500	2380	# USGS 07238000 North Canadian River near Seiling, OK	300	379	681	955	1602	1732
720500	**AVG**		**735**	**945**	**723**	**977**	**2442**	**3010**
720900								

Notes:	
(1)	Indicates data obtained from Appendix B, OWQS 1982
(2)	Data collected from June 1999 through September 2000
(3)	Data collected from November 1959 through December 1982 AND November 1998 through August 2000
(4)	Data collected from 1998 through 2003. This data has not been approved by EPA, therefore it can not be used for purposes related to the Federal Clean Water Act

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