Name	Size	Kind
Arkwood Agenda for 9-5-2013 R6	113 KB	Portable Document Format (PDF)
I - Promise of the Administrator	--	Folder
EPA - FY 2011 to 2015 strategic plan copy	16.7 MB	Portable Document Format (PDF)
II - Unfulfilled promises in official communications	--	Folder
II - cited documents	--	Folder
061115DevineADEQtoCLO	588 KB	Portable Document Format (PDF)
19991104 Knudson EPA To Judge Wagner	206 KB	Portable Document Format (PDF)
III - APC&EC ignored Grisham Jr letter to Chair Chamberlin delivered by Judge Moulton	--	Folder
III - cited documents	--	Folder
20120516 CCG Jr to Chair Chamberlin re Arkwood copy	1.2 MB	Portable Document Format (PDF)
Re- draft letter Grisham to APC&E Commission Chair copy	822 KB	Portable Document Format (PDF)
III - Supplemental Documentation	--	Folder
20120319 Luckett to Rhodes	224 KB	Portable Document Format (PDF)
APC&E Commission Home Page	146 KB	Portable Document Format (PDF)
Re/ Arkwood.pdf	116 KB	Portable Document Format (PDF)
IV - ADEQ & EPA resolve and unify Arkwood penta/H20 remedial goal	--	Folder
IV - cited documents	--	Folder
20100728 Cusher to Grisham - 5 RE/ Arkwood Superfund Site copy	127 KB	Portable Document Format (PDF)
20120214 Clem to Ghose re revised H2O standard	873 KB	Portable Document Format (PDF)
20121106 Moix to EPA - 9383907	335 KB	Portable Document Format (PDF)
20121218 Mescher regarding ADEQ & H2O	916 KB	Portable Document Format (PDF)
Sanders - pentachlorophenol_red	1.1 MB	Portable Document Format (PDF)
IV - Supplemental Documentation	--	Folder
2 RE/ Arkwood Superfund Site.pdf	100 KB	Portable Document Format (PDF)
3 RE/ Arkwood Superfund Site.pdf	127 KB	Portable Document Format (PDF)
4 Re/ Arkwood Superfund Site.pdf	152 KB	Portable Document Format (PDF)
4Re/ Arkwood Superfund Site.pdf	87 KB	Portable Document Format (PDF)
5 RE/ Arkwood Superfund Site.pdf	127 KB	Portable Document Format (PDF)
2002_12_30_criteria_wqctable_hh_calc_matrix copy	419 KB	Portable Document Format (PDF)
2005 Devine ADEQ - ground_water_remediation_interim_policy_and_guidance copy	211 KB	Portable Document Format (PDF)
2010-07-16-1500_Re Arkwood Superfund Site.pdf	24 KB	Portable Document Format (PDF)
2011 APC&EC Reg 2	13.2 MB	Portable Document Format (PDF)
2011-04-04_5 yr rev comm final-3 copy	7.6 MB	Portable Document Format (PDF)
2012 Huling - 9423092 copy	184 KB	Portable Document Format (PDF)
2012 June GW remediation summary - 9423037 copy 2	149 KB	Portable Document Format (PDF)
2012-02-06_Water Quality Stds	506 KB	Pages Publication
980130ArjmandiLetterARstandardH2O	59 KB	Portable Document Format (PDF)
9383907 copy	335 KB	Portable Document Format (PDF)
20120713 Moix to Tzhone re H2O standard ~15 ugl	1.2 MB	Portable Document Format (PDF)
20120809 Mescher to EPA re ground remed summ.pdf	5.1 MB	Portable Document Format (PDF)
20121218 Mescher regarding ADEQ & H2O copy	916 KB	Portable Document Format (PDF)
20130822 CCGJr H2O cleanup standard agenda item	102 KB	Portable Document Format (PDF)
ADEQ INTERNAL - 2010-07-02-1440 Surface water standards for PCP.pdf	15 KB	Portable Document Format (PDF)
ADEQ INTERNAL - 2010-07-06_FW Arkwood Superfund Site.pdf	24 KB	Portable Document Format (PDF)
ADEQ INTERNAL - 2010-07-07_RE Surface water standards for PCP.pdf	16 KB	Portable Document Format (PDF)
ADEQ INTERNAL - 2010-07-28_grisham draft resp-RE Arkwood Superfund Site	21 KB	Portable Document Format (PDF)
ADEQ INTERNAL - 2010-07-28-1035_FW Arkwood Superfund Site".pdf	22 KB	Portable Document Format (PDF)
ADEQ INTERNAL EMAIL - 2010-08-13-1452_FW Arkwood analyses"	36 KB	Portable Document Format (PDF)
ADEQ RESONSE 01 - 2010-07-01-1113_Re Arkwood Superfund Site"	17 KB	Portable Document Format (PDF)
ADEQ RESPONSE - 2010-08-27_response to CG"	118 KB	Portable Document Format (PDF)
arkansas_water_law_2011_draft copy	328 KB	Portable Document Format (PDF)
Arkwood Superfund Site.pdf	608 KB	Portable Document Format (PDF)
Email CCGJr to SLT re Fwd- Arkwood - Pentachlorophenol | Pesticides | US EPA"	766 KB	Portable Document Format (PDF)
GroundwaterRemediationDocument8222012 copy	369 KB	Portable Document Format (PDF)
nrwqc-2009-1 p2.pdf	59 KB	Portable Document Format (PDF)
Ozark Underground - 9383008 copy	12.2 MB	Portable Document Format (PDF)
Penta - Basic Information about Pentachl...ted Drinking Water Contaminants | US EPA	55 KB	Portable Document Format (PDF)
pentachlorophenol_red copy	1.1 MB	Portable Document Format (PDF)
Preview of "Six-Year Review of Drinking Water Standards | The Six-Year Review | US EPA"	52 KB	Portable Document Format (PDF)
RE/ Arkwood Superfund Site.pdf	137 KB	Portable Document Format (PDF)
remedial summary - 9423037 copy	149 KB	Portable Document Format (PDF)
Request for guidance letter to ADEQ.pdf	874 KB	Portable Document Format (PDF)
to Clem - Re/ Arkwood Superfund Site.pdf	197 KB	Portable Document Format (PDF)
to Clem Fwd/ FW/ Arkwood analyses.pdf	651 KB	Portable Document Format (PDF)
Transcript ADEQ Meeting 4-12-11 copy	352 KB	Pages Publication
U00000F7K copy	346 KB	Portable Document Format (PDF)

695115

Name	Size	Kind
V - Suggestions for Improvement	--	Folder
V - Supplemental Documentation	--	Folder
1995 Admin Record Index EPA - n4000ALTQ copy	58.3 MB	Portable Document Format (PDF)
EPA Community Relations Plan - n4000ANTU copy	7.2 MB	Portable Document Format (PDF)
V part A compare Arkwood to Koppers Oroville R9 reporting on EPA website	--	Folder
summary form 2 KoppersFYR-Final.pdf	64 KB	Portable Document Format (PDF)
1 AW cpfpub splash info sys.pdf	99 KB	Portable Document Format (PDF)
2001 update Koppersweb9_01 copy	168 KB	Portable Document Format (PDF)
2002 update koppers8_02 copy	234 KB	Portable Document Format (PDF)
2003 update Koppers CD Aug_03 183k copy	269 KB	Portable Document Format (PDF)
2008 fact sheet Koppers1_08 260kb copy	378 KB	Portable Document Format (PDF)
AR index part 2 - Superfund Site Docume...(Oroville Plant, Pacific Southwest, US EPA	331 KB	Portable Document Format (PDF)
AR index- Superfund Site Document, Kop...(Oroville Plant, Pacific Southwest, US EPA	281 KB	Portable Document Format (PDF)
Cleanup Activities - Superfund Information Systems- Site Progress Profile"	145 KB	Portable Document Format (PDF)
closeout - Koppers PCOR_text only copy	346 KB	Portable Document Format (PDF)
Contaminants - Superfund Information Systems- Site Progress Profile	111 KB	Portable Document Format (PDF)
FINAL pdf Compare websites for Koppers Oroville to Arkwood copy	6.3 MB	Portable Document Format (PDF)
FINAL ppt Compare websites for Koppers Oroville to Arkwood copy 2.ppt	7.6 MB	Microsoft PowerPoint 97 - 2004 p
GPRA Measures - Superfund Information Systems- Site Progress Profile	100 KB	Portable Document Format (PDF)
Institutional Controls for Arkwood, Inc. | US EPA	44 KB	Portable Document Format (PDF)
koppers entire site ROD.pdf	21 KB	Portable Document Format (PDF)
koppers groundwater remediation modification.pdf	450 KB	Portable Document Format (PDF)
Koppers Semiannual 2008 RA Report Text [573KB] copy	756 KB	Portable Document Format (PDF)
KoppersFYR-Final copy	3.5 MB	Portable Document Format (PDF)
OUs - Superfund Information Systems- Site Progress Profile	103 KB	Portable Document Format (PDF)
p2 koppers entire site ROD.pdf	27 KB	Portable Document Format (PDF)
p3 koppers entire site ROD.pdf	25 KB	Portable Document Format (PDF)
site characteristics 1 koppers entire site ROD.pdf	25 KB	Portable Document Format (PDF)
site characteristics 2 koppers entire site ROD.pdf	24 KB	Portable Document Format (PDF)
summary form p1 koppers entire site ROD.pdf	86 KB	Portable Document Format (PDF)
Superfund Site Overview Koppers Co., Inc. (Oroville Plant), Pacific Southwest, US EPA	94 KB	Portable Document Format (PDF)
table 5-2 p1 koppers entire site ROD.pdf	24 KB	Portable Document Format (PDF)
table 5-2 p2 koppers entire site ROD.pdf	17 KB	Portable Document Format (PDF)
table 5-2 p3 koppers entire site ROD.pdf	23 KB	Portable Document Format (PDF)
V part B Refine FOIA process	--	Folder
~Fwd/ EPA Response to Grisham FOIA request EPA-R6-2013-001194.pdf	849 KB	Portable Document Format (PDF)
~ Fwd/ Undeliverable/ Re/ Your Freedom...6-2013-003351 / ARKWOOD SF SITE.pdf	323 KB	Portable Document Format (PDF)
~ Re/ EPA Response to Grisham FOIA request EPA-R6-2013-001194.pdf	97 KB	Portable Document Format (PDF)
appeal of EPA-R6-2013-003349.pdf	114 KB	Portable Document Format (PDF)
EPA Response to Grisham FOIA request EPA-R6-2013-001194.pdf	304 KB	Portable Document Format (PDF)
Fwd/ EPA Response to Grisham FOIA request EPA-R6-2013-001194.pdf	850 KB	Portable Document Format (PDF)
Fwd/ Final Disposition, Request EPA-R6-2013-002441.pdf	77 KB	Portable Document Format (PDF)
Fwd/ Interim Release, Request EPA-R6-2012-000715 - 06-FCI-00411-12.pdf	85 KB	Portable Document Format (PDF)
Fwd/ Undeliverable/ Re/ Extension letter...(subject heading altered by Grisham).pdf	681 KB	Portable Document Format (PDF)
Fwd/ Your FOIA Request - EPA-R6-2013-003351.pdf	219 KB	Portable Document Format (PDF)
New FOIA requests and difficulty with ap...3-001194 and EPA-R6-2013-002441.pdf	122 KB	Portable Document Format (PDF)
Preview of "Expedited Processing Decision - see attached correspondence" copy	317 KB	Portable Document Format (PDF)
Preview of "FOIA - Freedom of Information Act".pdf	53 KB	Portable Document Format (PDF)
Re/ [External] appeal of EPA-R6-2013-003349.pdf	33 KB	Portable Document Format (PDF)
Re/ [External] what I see.pdf	278 KB	Portable Document Format (PDF)
Re/ Arkwood questions & Fwd/ FOIA Req...R6-2013-001194 Submitted - REPLY.pdf	97 KB	Portable Document Format (PDF)
RE/ Delivery Notification/ Delivery has failed.pdf	111 KB	Portable Document Format (PDF)
Re/ Notice of Ten-day Extension for FOIA...Q-APP-2013-004621 / SSID # 06A3.pdf	685 KB	Portable Document Format (PDF)

Name	Size	Kind
V part D - Address systemc failures	--	Folder
EPA disregarded CCGJr Comments & Concerns Ignored in Final 3rd 5-Year Review	--	Folder
2011 April xx Cover CCGJr to CAS - FIN...ncernsReDraft3rd5yearReview copy.pdf	557 KB	Portable Document Format (PDF)
20110428 CAS to CCGJr confirm comm...Third Five-Year Review for Arkwood.pdf	39 KB	Portable Document Format (PDF)
B0000CA4O copy	7.8 MB	Portable Document Format (PDF)
cover final comments 3rdFYR - Fwd/ C...iew for Arkwood, Inc. Superfund Site.pdf	576 KB	Portable Document Format (PDF)
FINAL3rd5yearReviewInterviewForm.pdf	100 KB	Portable Document Format (PDF)
FINALGrishamJrConcernsReDraft3rd5yearReview.pdf	86 KB	Portable Document Format (PDF)
Fwd/ Complaint of EPA staff non-respo...artial Deletion/ Fwd/ formal request.pdf	614 KB	Portable Document Format (PDF)
Z00017H88 copy	27 MB	Portable Document Format (PDF)
Ghose's conduct	--	Folder
!EPA's Shawn Ghose to PRP McKesson's...n / Please delete this after reading.".pdf	1.4 MB	Portable Document Format (PDF)
Arkwood Record of Decision.pdf	63 KB	Portable Document Format (PDF)
ghose 9302132 copy	34 KB	Portable Document Format (PDF)
Ghose misconduct - Fwd/ EPA's Shawn...Please delete this after reading." copy 2	1.6 MB	Portable Document Format (PDF)
ghose to mescher 9302051.pdf	42 KB	Portable Document Format (PDF)
ghose to mescher 9302121.pdf	75 KB	Portable Document Format (PDF)
ghose to mescher accept changes 9302123.pdf	93 KB	Portable Document Format (PDF)
ghose to mescher no to adeq comments 9302066 copy	27 KB	Portable Document Format (PDF)
ghose to mescher re grisham 9302113.pdf	67 KB	Portable Document Format (PDF)
ghose to mescher re pub notice 9302115.pdf	72 KB	Portable Document Format (PDF)
ghose to mesher delete after reading 9302044 copy	81 KB	Portable Document Format (PDF)
ghose to mesher re ritchie 9302124.pdf	41 KB	Portable Document Format (PDF)
mescher to ghose re draft and IC 9302106.pdf	85 KB	Portable Document Format (PDF)
mescher to ghose re her final draft 9156352.pdf	107 KB	Portable Document Format (PDF)
mescher to ghose re include ? adeq comments 9302065.pdf	107 KB	Portable Document Format (PDF)
mescher to ghose re mck draft fyr 9302067-1.pdf	103 KB	Portable Document Format (PDF)
Re/ Arkwood Superfund Site.pdf	130 KB	Portable Document Format (PDF)
Moya's conduct	--	Folder
20130307 Kirst to CG "several unsuccessful attempts"	44 KB	Portable Document Format (PDF)
20130308 Ortiz to CG copy	446 KB	Portable Document Format (PDF)
20130308 Ortiz to CG_0001.pdf	421 KB	Portable Document Format (PDF)
Appeal - FOIA - Freedom of Information Act" copy	46 KB	Portable Document Format (PDF)
August 2012 Monthly Progress Report....pdf	523 KB	Portable Document Format (PDF)
dupe2? Re/ Arkwood Monthly Report - July 2012.pdf	46 KB	Portable Document Format (PDF)
Examples- FOIA Requests EPA-R6-2013-003350 Submitted	40 KB	Portable Document Format (PDF)
Feb Dallas Calls	19 KB	Portable Document Format (PDF)
FOIA Request EPA-R6-2013-003349 Submitted	40 KB	Portable Document Format (PDF)
FOIA Request EPA-R6-2013-003351 Submitted	41 KB	Portable Document Format (PDF)
Fwd/ Your Freedom of Information Act...-2013-003351 / ARKWOOD SF SITE.pdf	52 KB	Portable Document Format (PDF)
V part G - FOIA request R^-2013-003349/ EPA-HQ-2013-004621and appeal	--	Folder
20130308 Ortiz to CG copy	446 KB	Portable Document Format (PDF)
Appeal - FOIA - Freedom of Information Act" copy	46 KB	Portable Document Format (PDF)
Appeal - First Partial Response EPA-R6-2013-003349 - A (HQ-APP-2013-004621).pdf	149 KB	Portable Document Format (PDF)
appeal grab	259 KB	TIFF image
appeal grab II	314 KB	TIFF image
FOIA Request EPA-R6-2013-003349 Submitted	40 KB	Portable Document Format (PDF)
Fwd/ Your Freedom of Information Act R...R6-2013-003351 / ARKWOOD SF SITE.pdf	52 KB	Portable Document Format (PDF)
Preview of "FOIA - Freedom of Information Act"	46 KB	Portable Document Format (PDF)
Preview of "FOIA - Freedom of Information Act" copy	52 KB	Portable Document Format (PDF)
R6 - Extension Letter - 03-07-13 -EPA-R6-2013-003349.pdf	22 KB	Portable Document Format (PDF)
Re/ Notice of Ten-day Extension for FOIA...Q-APP-2013-004621 / SSID # 06A3.pdf	67 KB	Portable Document Format (PDF)
V part H - Address Sept 21-23 2010 issue with EPA webmaster Ducat	--	Folder
2 Re/ Information Request Line Response.pdf	557 KB	Portable Document Format (PDF)
Final - Re/ Information Request Line Response.pdf	108 KB	Portable Document Format (PDF)
Re/ Information Request Line Response.pdf	73 KB	Portable Document Format (PDF)

Name	Size	Kind
V part I - Additional examples of agency unresponsiveness	--	Folder
2 Re/ Complaint of EPA staff non-respon...Partial Deletion/ Fwd/ formal request.pdf	590 KB	Portable Document Format (PDF)
2 Re/ Grisham Jr letter concerning McKesson activities at Arkwood.pdf	90 KB	Portable Document Format (PDF)
20111123ReqPartDel-2 copy	377 KB	Portable Document Format (PDF)
addition to my part V suggestions please.pdf	71 KB	Portable Document Format (PDF)
Arkwood Superfund Site - Agenda for November 9, 2011 Meeting .pdf	113 KB	Portable Document Format (PDF)
CAS "delay or misunderstanding" of req t...Partial Deletion/ Fwd/ formal request.pdf	59 KB	Portable Document Format (PDF)
CAS re deletion - delayed and ignored - Re/ formal request.pdf	415 KB	Portable Document Format (PDF)
Complaint of EPA staff non-responsivene...Partial Deletion/ Fwd/ formal request.pdf	469 KB	Portable Document Format (PDF)
dupe? Re/ Arkwood Monthly Report - July 2012.pdf	74 KB	Portable Document Format (PDF)
dupe2? Fwd/ EPA Response to Grisham FOIA request EPA-R6-2013-001194.pdf	838 KB	Portable Document Format (PDF)
Fwd/ Grisham Jr letter concerning McKesson activities at Arkwood.pdf	572 KB	Portable Document Format (PDF)
Fwd/ Inquiry/ Arkwood Inc. Third Five-Year Review Report.pdf	615 KB	Portable Document Format (PDF)
Fwd/ New FOIA requests and difficulty wi...-001194 and EPA-R6-2013-002441.pdf	126 KB	Portable Document Format (PDF)
Fwd/ Notice of Ten-day Extension for FOI...Q-APP-2013-004621 / SSID # 06A3.pdf	114 KB	Portable Document Format (PDF)
nearly 2 years ago - Agenda_Arkwood Su..._ Curt Grisham Mtg _ November 8, 2011_	34 KB	Portable Document Format (PDF)
nearly 2 years ago - Arkwood Superfund Site - Followup Action Items .pdf	347 KB	Portable Document Format (PDF)
Re/ Arkwood Monthly Report - July 2012.pdf	76 KB	Portable Document Format (PDF)
Re/ Arkwood/ request for simple letter.pdf	92 KB	Portable Document Format (PDF)
Re/ Fwd/ Grisham Jr letter concerning McKesson activities at Arkwood.pdf	56 KB	Portable Document Format (PDF)
Re/ Grisham Jr letter concerning McKesson activities at Arkwood.pdf	556 KB	Portable Document Format (PDF)
receipt of two additional subject matters for Sep 5 meeting copy	214 KB	Portable Document Format (PDF)
VI - New Conceptual Site Model	--	Folder
VI - cited documents	--	Folder
ARKWOOD MAP1-2 copy	461 KB	Portable Document Format (PDF)
Arkwood_BdryMod_Nov2009 from 6_30_2009 survey-2-1 copy	4.3 MB	Portable Document Format (PDF)
COMPLETE ROD - 9125680 copy 2	12.7 MB	Portable Document Format (PDF)
Consent Decree 9125694 copy 2	1.7 MB	Portable Document Format (PDF)
Huling - Tech Asst Tzhone apr-22-2013 copy 3	212 KB	Portable Document Format (PDF)
VI - Supplemental Documentation	--	Folder
1992 Invalid Dye Tracer Study copy 2	64.4 MB	Portable Document Format (PDF)
2012 Annual Report by Oxford - 9412116 copy	667 KB	Portable Document Format (PDF)
2012 ChemRisk - 682008 copy	13.3 MB	Portable Document Format (PDF)
2012 June 27 tech review	169 KB	Portable Document Format (PDF)
2012 June GW remediation summary - 9423037 copy 2	149 KB	Portable Document Format (PDF)
Arkwood Superfund Site boundary inexplicably redefined in 2009.pdf	4.9 MB	Portable Document Format (PDF)
Arkwood_BdryMod_Nov2009 from 6_30_2009 survey-2 copy	4.3 MB	Portable Document Format (PDF)
Arkwood_GeneralSiteFeatures_v1_Aerial (2) (2)	504 KB	Portable Document Format (PDF)
Arkwood_SiteLocationMap_v1_Aerial (2) (2) (2)	530 KB	Portable Document Format (PDF)
EPA Non-Cancer Toxicity Value for Dioxi...RCLA-RCRA Cleanups |Superfund | US EPA	65 KB	Portable Document Format (PDF)
fate & transport? - 2012_08_15_Dye TracerTest_Critical Review_2012	150 KB	Portable Document Format (PDF)
Figure 4 (2)	256 KB	Portable Document Format (PDF)
Final Site Closeout Report copy	233.6 MB	Portable Document Format (PDF)
Forrester Group - 0000DJL1 copy	79 MB	Portable Document Format (PDF)
HHS Prelim Health Assess - 3100K5UD copy	35.6 MB	Portable Document Format (PDF)
Letter to Bud Grisham Aug.21.12 copy	586 KB	Portable Document Format (PDF)
McK response to EPA - Arkwood - 8-9-2012 - Responses to comments	5.4 MB	Portable Document Format (PDF)
Ozark Underground - 9383008 copy 2	12.2 MB	Portable Document Format (PDF)
Raucher to Moya re dioxin - 9383059 copy	327 KB	Portable Document Format (PDF)
Re/ Arkwood Superfund Site boundary inexplicably redefined in 2009.pdf	67 KB	Portable Document Format (PDF)
sep-03-2012 copy	148 KB	Portable Document Format (PDF)
Tech Asst Tzhone apr-15-2013 copy 2	199 KB	Portable Document Format (PDF)
Tech Asst Tzhone apr-22-2013 copy	212 KB	Portable Document Format (PDF)
Tech Asst Tzhone Highlights 2012 copy	148 KB	Portable Document Format (PDF)
Tech Asst Tzhone p18 Highlights 2012 copy	163 KB	Portable Document Format (PDF)

Name	Size	Kind
VII - Comments on "draft corrected deed notice"	--	Folder
VII - cited documents	--	Folder
20130828 Moran to CCGJr - Arkwood Site - Draft Corrected Deed Notice"	1.4 MB	Portable Document Format (PDF)
Arkwood_ DRAFT CORRECTED_Deed_Notice_8.27.2013 Draft copy	123 KB	Portable Document Format (PDF)
VII - Supplemental Documentation	--	Folder
100326MescherDeedRestrct copy	2.9 MB	Portable Document Format (PDF)
20100830 Recorded Grisham Deed Notice copy	591 KB	Portable Document Format (PDF)
20120208 CCGJr draft Arkwood CORRECTION Deed Notice	100 KB	Portable Document Format (PDF)
20130828 Moran to CCGJr acknow - RE- Arkwood Site - Draft Corrected Deed Notice	95 KB	Portable Document Format (PDF)
20130829 - Corrected Deed Notice - Transmittal via First Class Mail to Mr. Bud Grisham	530 KB	Portable Document Format (PDF)
Arkwood Deed Notice FINAL DW	89 KB	Portable Document Format (PDF)
Arkwood deed restriction amendment.pdf	5.6 MB	Portable Document Format (PDF)
Don Williams confirmed - Re/ Fwd/ Emailing/ Recorded Grisham Deed Notice.pdf	23 KB	Portable Document Format (PDF)
Draft Deed Notice for the Arkwood Site.pdf	110 KB	Portable Document Format (PDF)
ic fact sheet copy	766 KB	Portable Document Format (PDF)
Ltr to Bud Grisham August 29.2013	2.4 MB	Portable Document Format (PDF)
Mescher to Ghose re deed notice B0000FV89 copy	457 KB	Portable Document Format (PDF)
Moran re meeting - Arkwood Superfund Site - Followup Action Items .pdf	347 KB	Portable Document Format (PDF)
Re/ Arkwood Revitalization/ Grisham Jr....am Jr. Request for Clarification - REPLY.pdf	73 KB	Portable Document Format (PDF)
Re/ Fwd/ Arkwood site - REPLY .pdf	573 KB	Portable Document Format (PDF)
Suggested Draft for Arkwood, Inc. Correction Deed Notice.pdf	1 MB	Portable Document Format (PDF)
Survey Maps for Arkwood.pdf	672 KB	Portable Document Format (PDF)
Williams to CCGJr - Re/ Final draft Arkwood Deed Notice.pdf	110 KB	Portable Document Format (PDF)
VIII - Arkwood Land Revitalization	--	Folder
VIII - cited documents	--	Folder
Luckett to Norton NWAEDC	207 KB	Portable Document Format (PDF)
Luckett to Rhodes - SWRAU3.19.12	224 KB	Portable Document Format (PDF)
OSWER 9200 - sf_ff_final_cprm_guidance-3 copy 2	954 KB	Portable Document Format (PDF)
OSWER 9365 - rfrguidance copy	315 KB	Portable Document Format (PDF)
VIII - Supplemental Documentation	--	Folder
1Re/ Arkwood Revitalization/ Grisham Jr....Jr. Request for Clarification - REPLY .pdf	133 KB	Portable Document Format (PDF)
1st FYR - 6J00EEI1 copy	10.6 MB	Portable Document Format (PDF)
2 Re/ Arkwood site activities..pdf	55 KB	Portable Document Format (PDF)
2Re/ Arkwood Revitalization/ Grisham Jr....m Jr. Request for Clarification - REPLY.pdf	126 KB	Portable Document Format (PDF)
1985 Omaha letter to Tyson - Doc Id # 906980 copy	475 KB	Portable Document Format (PDF)
1995 Assit Admin landuse directive	1.6 MB	Portable Document Format (PDF)
071225chrondocs copy	1.8 MB	Portable Document Format (PDF)
Arkwood Revitalization/ Grisham Jr. Com...& Grisham Jr. Request for Clarification.pdf	577 KB	Portable Document Format (PDF)
bfhbkcmp-11 copy	2.3 MB	Portable Document Format (PDF)
BFPP Memo copy	442 KB	Portable Document Format (PDF)
Brownfield Grants, CERCLA Liability, and All Appropriate Inquiries copy	185 KB	Portable Document Format (PDF)
Brownfield SEPs copy	171 KB	Portable Document Format (PDF)
diupe? Re/ Arkwood Revitalization/ Grish...Jr. Request for Clarification - REPLY .pdf	596 KB	Portable Document Format (PDF)
dupe? Fwd/ EPA Ready for Reuse determination - Conroe Creosoting Site, Conroe TX.pdf	482 KB	Portable Document Format (PDF)
ER3 FAQs copy	180 KB	Portable Document Format (PDF)
Fwd- Inquiry- Arkwood Inc. Third Five-Year Review Report	614 KB	Portable Document Format (PDF)
Fwd/ Arkwood/ request for simple letter.pdf	287 KB	Portable Document Format (PDF)
Fwd/ Arkwood/ request for simple letter.pdf	331 KB	Portable Document Format (PDF)
Guidance on Agreement with Prospective Purchasers copy	17.3 MB	Portable Document Format (PDF)
Landowner Protections Under CERCLA copy	952 KB	Portable Document Format (PDF)
landuse-5 copy	1.6 MB	Portable Document Format (PDF)
Letter to Bud Grisham Aug.21.12 copy	586 KB	Portable Document Format (PDF)
Ltr to Don Smith 2.15.12 copy	270 KB	Portable Document Format (PDF)
Ltr to Mr. Bud Grisham 5.8.12-2 copy	286 KB	Portable Document Format (PDF)
Luckett to Rhodes ADEQ	224 KB	Portable Document Format (PDF)
Re/ Arkwood Site - Follow-up to Today's Conference Call.pdf	130 KB	Portable Document Format (PDF)
Re/ Arkwood site activities..pdf	53 KB	Portable Document Format (PDF)
Re/ response on inquiries.pdf	74 KB	Portable Document Format (PDF)
readyforuse copy	95 KB	Portable Document Format (PDF)
reusedirective-4 copy	15.2 MB	Portable Document Format (PDF)
RfR mention - sri-regional-seeds.pdf	127 KB	Portable Document Format (PDF)
rfrfactsheet copy	73 KB	Portable Document Format (PDF)
sitewide_a-3 copy	175 KB	Portable Document Format (PDF)
sitewide-3 copy	869 KB	Portable Document Format (PDF)
Superfund Reuse - Planning for the Future copy	1.2 MB	Portable Document Format (PDF)
SWRAU3_19_12-4 copy	224 KB	Portable Document Format (PDF)
SWRAULtr2.28.2012 copy	207 KB	Portable Document Format (PDF)
The Revitalization Handbook ALL copy	1.4 MB	Portable Document Format (PDF)
Top 10 Questions copy	5.3 MB	Portable Document Format (PDF)
transmemo copy	847 KB	Portable Document Format (PDF)

Name	Size	Kind
sitewide-3 copy	869 KB	Portable Document Format (PDF)
Superfund Reuse - Planning for the Future copy	1.2 MB	Portable Document Format (PDF)
SWRAU3_19_12-4 copy	224 KB	Portable Document Format (PDF)
SWRAULtr2.28.2012 copy	207 KB	Portable Document Format (PDF)
The Revitalization Handbook ALL copy	1.4 MB	Portable Document Format (PDF)
Top 10 Questions copy	5.3 MB	Portable Document Format (PDF)
transmemo copy	847 KB	Portable Document Format (PDF)
ULTRA KEY DOCUMENT - Revitalizing Co...italization Handbook) - bfhbkcmp-11.pdf	59 KB	Portable Document Format (PDF)
▼ wIX -Liability concerns	--	Folder
▼ IX - Supplemental Documentation	--	Folder
2011 Revitalization Handbook	2.3 MB	Portable Document Format (PDF)
AAI Final Fact Sheet copy	50 KB	Portable Document Format (PDF)
AAI Final Rule copy	480 KB	Portable Document Format (PDF)
BFPP Memo copy 2	441 KB	Portable Document Format (PDF)
Bonf PP CERCLA Memo copy	210 KB	Portable Document Format (PDF)
Brownfield Grants, CERCLA Liability, and All Appropriate Inquiries copy 2	185 KB	Portable Document Format (PDF)
Bud's deposition copy	13 MB	Portable Document Format (PDF)
Comfort Letter Memo copy	13.5 MB	Portable Document Format (PDF)
Common Element Guide copy	510 KB	Portable Document Format (PDF)
Common Element Ref copy	179 KB	Portable Document Format (PDF)
▼ X - Close Out/ Deletion	--	Folder
Record of Decision	12.6 MB	Portable Document Format (PDF)
▼ X - cited documents	--	Folder
20111125 CAS - Re/ formal request.pdf	415 KB	Portable Document Format (PDF)
Consent Decree 9125694 copy 3	1.7 MB	Portable Document Format (PDF)
Natl closeout procedure guidance	453 KB	Portable Document Format (PDF)
OWSER Directive 9320 - Close Out - 2011 guidance copy	2.1 MB	Portable Document Format (PDF)
▼ X - Supplemental Documentation	--	Folder
05addendum copy	626 KB	Portable Document Format (PDF)
6J00EL5N copy	36.4 MB	Portable Document Format (PDF)
1987 1st amendment admin order consent copy	302 KB	Portable Document Format (PDF)
1988 Admin Order of Consent - 00004WH3 copy	55.4 MB	Portable Document Format (PDF)
1990 Sept ROD 6J00EL8P copy	44.7 MB	Portable Document Format (PDF)
1991 draft consent decree copy	71.5 MB	Portable Document Format (PDF)
2011 Woolford EPA transmittal copy	1.2 MB	Portable Document Format (PDF)
20111123 CCGJr to CAS - formal request for partial deletion - ReqPartDel	377 KB	Portable Document Format (PDF)
20111123 cover of CCGJr to CAS - formal request for deletion	442 KB	Portable Document Format (PDF)
ADEQ internal - 2012-04-02_RE Arkwood Moix email re delist.pdf	16 KB	Portable Document Format (PDF)
Arkwood added afterthought - Proposed...ational Priorities List (NPL) | US EPA" copy	215 KB	Portable Document Format (PDF)
CAS response to CCGJr - DELETION? - Re...nc. Partial Deletion- Fwd- formal request"	58 KB	Portable Document Format (PDF)
Close Out Procedures for National Priorities List Sites | Superfund | US EPA	45 KB	Portable Document Format (PDF)
Consent Decree - Complete copy	1.5 MB	Portable Document Format (PDF)
Direct final rule - findel copy	48 KB	Portable Document Format (PDF)
direction final deletion transmittal copy	168 KB	Portable Document Format (PDF)
EPA sample amend to close - appends copy	778 KB	Portable Document Format (PDF)
Federal Deletion Templates	425 KB	TIFF image
Re/ formal request.pdf	68 KB	Portable Document Format (PDF)
Request Arkwood, Inc. Superfund site be...al deletion from National Priorities List.pdf	63 KB	Portable Document Format (PDF)
Sanchez next step deletion write letter.pdf	415 KB	Portable Document Format (PDF)
▼ XI - On-site H2O injection "pilot study"	--	Folder
▼ XI - cited documents	--	Folder
2011 Annual Report copy	376 KB	Portable Document Format (PDF)
20120510 CCGJr to CAS no detrimental effect	37 KB	Portable Document Format (PDF)
Mescher pilot inop no detrimental effect copy	168 KB	Portable Document Format (PDF)
Re/ McKesson's Mescher to EPA/ "Discont...ntration of PCP at the spring mouth.".pdf	47 KB	Portable Document Format (PDF)
▼ XI - Supplemental Documentation	--	Folder
2005 Pilot Study Proposal sans cover copy	867 KB	Portable Document Format (PDF)
2012 June GW remediation summary - 9423037 copy	149 KB	Portable Document Format (PDF)
20050722 EPA Ghose to McKesson Mescher copy	168 KB	Portable Document Format (PDF)
20111130GrishamJrToSanchez	1.1 MB	Portable Document Format (PDF)
20120419 Sanchez to Grisham Junior - Complete copy	3.4 MB	Portable Document Format (PDF)
20121009 Mescher delayed response to EPA Moya	3.7 MB	Portable Document Format (PDF)
20121011 Ozark Underground concludes	12.2 MB	Portable Document Format (PDF)
Fwd/ EPA's Shawn Ghose to PRP McKesso...ean / Please delete this after reading.".pdf	1.6 MB	Portable Document Format (PDF)
Fwd/ Grisham Jr letter concerning McKesson activities at Arkwood.pdf	568 KB	Portable Document Format (PDF)
Grisham Jr letter concerning McKesson activities at Arkwood.pdf	552 KB	Portable Document Format (PDF)
GroundwaterRemediationDocument8222012.pdf	369 KB	Portable Document Format (PDF)
Mescher pilot inop no detrimental effect	168 KB	Portable Document Format (PDF)
Pierson Process proposal - 9125692 copy	9.7 MB	Portable Document Format (PDF)
Re/ Arkwood Site - Status Report.pdf	50 KB	Portable Document Format (PDF)
Compare Arkwood to Koppers Oroville K9 reporting on EPA website	--	Folder

Arkwood Meeting Agenda - September 5, 2013 - 1:00 PM CT - EPA Region 6
Top-level Outline - Supporting Documentation Appended by Compact Disk

I. Promise of the Administrator - EPA FY 2011-2015 Strategic Plan (SP)

II. Unfulfilled promises in official communications

III. Ignored letter to John Chamberlin, Chair, Arkansas Pollution Control and Ecology Commission (APC&EC) as delivered by Hon. Charles Moulton, Administrative Law Judge, APC&EC, not acknowledged or answered by APC&EC or ADEQ

IV. ADEQ & EPA: resolve and unify Arkwood Superfund Site H2O Remedial Goal for pentachlorophenol contamination levels

V. Suggestions for EPA improvement

VI. New Conceptual Site Model

VII. Comments and questions on EPA “draft of the corrected deed notice”

VIII. Arkwood Land Revitalization

IX. Liability concerns

X. Close Out / Deletion

XI. Discontinuance of on-site H2O injection "pilot study"

I. Promise of the Administrator - EPA FY 2011-2015 Strategic Plan (SP)

A. *"To follow the Administration's focus on strengthening programs and achieving results, the EPA is implementing near-term Priority Goals that serve as key indicators of progress toward our five strategic goals. We will continue to affirm the core values of* ***science, transparency and the rule of law*** *in addressing these priorities. These are the most urgent issues we must confront through 2015"* (Emphasis added)

1. Lisa P. Jackson, p. 1, "Message from the Administrator," Fiscal Year 2011–2015 EPA Strategic Plan, Achieving Our Vision, U.S. Environmental Protection, Agency September 30, 2010

B. Strategic Goal 3 (of 5 in SP): "Cleaning Up Communities and Advancing Sustainable Development"

1. Objective 3 (of 4 under Goal 3 in SP): "Restore Land"

a) "In an effort to improve the accountability, transparency, and effectiveness of EPA's cleanup programs, **EPA has initiated the Integrated Cleanup Initiative (ICI**), a multi-year effort to better use the most appropriate assessment and cleanup authorities to address a greater number of sites, **accelerate cleanups, and put sites back into productive use** while protecting human health and the environment." (Emphasis added)

b) "**As part of the ICI**, EPA will develop a **new suite of performance measures** that will **support comprehensive management** of the cleanup life cycle by addressing three critical points in the cleanup process—starting, **advancing**, and **completing site cleanup**." (Emphasis added)

c) "EPA is also implementing its Community Engagement Initiative designed to enhance our involvement with local communities and stakeholders so that they may **meaningfully participate in decisions** on land cleanup, emergency response, and management of hazardous substances and waste." (Emphasis added)

d) "The goals of this initiative are to **ensure transparent and accessible** decision-making processes, to **deliver information** that communities can use to participate meaningfully, to **improve EPA responsiveness** to community perspectives, and to **ensure timely cleanup decisions**." (Emphasis added)

C. Questions pertinent to above:

(1) Has ICI been implemented for Arkwood Superfund Site?

(2) Has Community Engagement Initiative been implemented for Arkwood Superfund Site?

(3) Describe EPA ICI performance measures regarding Arkwood for:

(a) accelerating cleanup

(b) advancing site cleanup

(c) completing site cleanup

(d) putting site back into productive use

(e) supporting comprehensive management

(f) enhancing EPA involvement with local communities

(g) delivering information
(h) ensuring transparency and accessibility
(i) improving EPA responsiveness
(j) ensure timely cleanup decisions

II. Unfulfilled promises in official communications:
   A. Letter dated November 15, 2006 from Devine to Arkansas State Representative Charles L. Ormond
      1. "Based on all available information, **I see no reason the site can not be redeveloped and placed back into productive use.** As we have discussed, this would allow Boone County's economic development agency to market this site for future industrial uses."
   B. Letter dated November 4, 1989 from Myron O. Knudson P.E., Director, Superfund Division, EPA Region 6 to Judge Dale Wagner of Boone County, Arkansas
      1. "However, cleanup of the groundwater New Cricket Spring, is anticipated soon. As soon as this happens EPA plans to delist the site from the NPL and return it to productive use."

III. Why was my letter May 16, 2012 to John Chamberlin, Chair, Arkansas Pollution Control and Ecology Commission never acknowledged or answered?
   A. Delivered via Hon. Charles Moulton, Administrative Law Judge on moulton@adeq.state.ar.us

IV. ADEQ & EPA: resolve and unify Arkwood Superfund Site H2O Remedial Goal for pentachlorophenol contamination levels and address following inconsistencies:
   A. "Estimated Environmental Concentrations (EECs) for surface water have been calculated by the Agency. Drinking water levels of concern (DWLOCs) for acute and chronic dietary risk from drinking water were calculated. DWLOCs calculated for surface water for pentachlorophenol were **10,465 ppb for adult** males and females and **2,990 ppb for children** ages 1-6." (Emphasis added)
      1. Frank T. Sanders, Director, Antimicrobials Division, EPA, in the Reregistration Eligibility Decision for Pentachlorophenol, September 28, 2008 EPA 739-R-08-008
   B. "Organisms in the effluent discharge stream experience chronic exposure, therefore; the **chronic standard of 15.57 ug/l is the appropriate standard for the Arkwood Site.**"
      1. Sarah Clem, ADEQ Branch Manager, Water Quality Planning, Water Division, ADEQ to EPA Region 6, letter of February 14, 2012
   C. "According to the email from Jean Mescher, McKesson, dated October 3, 2012 provided with the subject report, samples cannot be obtained 20 feet downstream from the weir as requested by ADEQ during periods of low flow since the effluent 'sinks into the subsurface before reaching the culvert'. This statement describes the effluent returning to a subsurface status and therefore returning to the state of groundwater. For this reason the **Maximum Contaminant Level (MCL) for pentachlorophenol (PCP) of 1.0 ug/l should be used in lieu of the aquatic toxicity standard of 15.57 ug/l which is currently used.**"

1. Mark Moix, Engineer, PE, Technical Branch, Hazardous Waste Division, ADEQ in a certified letter dated November 6, 2012 to Ruben Moya, RPM Superfund, EPA Region 6 (Emphasis added)

D. "During the review, it was noticed that the ADEQ water quality standard of 15.57 ug/l is apparently being used as the screening level for PCP in lieu of the MCL of 1.0 ug/l. However, this standard pertains to aquatic toxicity only and does not address **potential human health concerns**. Even as it is apparently assumed that the stream is **not a source for potable water**, the **MCL of 1.0 ug/l should be the applicable screening level** for the following reasons: • Much of the groundwater which rises from the spring and becomes surface water returns to groundwater and **appears to migrate offsite, as groundwater** • According to past correspondence, it appears the consensus of the EPA, ADEQ and McKesson, that **some groundwater is circumventing the spring and migrating beyond** the spring as groundwater."

1. Mark Moix, Engineer, PE, Technical Branch, Hazardous Waste Division, ADEQ in a certified letter dated November 6, 2012 to Ruben Moya, RPM Superfund, EPA Region 6 (Emphasis added)

E. "At this time, **ADEQ has not adopted the Human Health Criteria** in EPA's National Recommended Water Quality Criteria for Pentachlorophenol."

1. Annette Cusher, P.E., Remedial/Corrective Action Engineer Supervisor, Technical Branch, Hazardous Waste Division, ADEQ in email to Charles Grisham, Junior dated July 28, 2010

F. Please see attached support documentation on separate DVD

1. My email of August 22, 2013 to Stephen Tzhone, with nine (9) attachments

V. Suggestions for EPA improvement (supporting documentation appended by CD)

A. Compare website for Arkwood reporting to that of Koppers Oroville Plant (R9)
B. Refine FOIA request/response process
C. Create marketplace for RfR sites on EPA website, assist owners with marketing
D. Address systemic failures that cost taxpayers money and hurt agency efficacy
E. Proactively engage the community, economic development commissions, government, and private industry at the local, regional and state levels to assist in developing comprehensive solution for site reuse
F. Get better contractors (or, preferably, assume in-house responsibility and maintain with Federal salaried staff) for EPA public-facing website (epa.gov), including all public subdomains
G. Address the circumstances surrounding my FOIA request #R6-2013-003349, which became FOIA appeal EPA-HQ-2013-004621
H. Address the September 21-23, 2010 Superfund Information Systems "Customized CERCLIS/RODS Report Order Form (ROD)" issue
I. Address additional examples of unresponsiveness in documentation provided separately to EPA on CD

VI. New Conceptual Site Model

A. "During the current 5 year review period, it is recommended that EPA Region 6 consider a re-review of existing site characterization data and information, the need to develop a more accurate CSM which advances the understanding of (1) the nature and extent of waste residuals that currently exist at the site, (2)

the ground water flow directions/patterns, (3) contaminant fate and transport, and (4) whether New Cricket Spring captures all of the contaminated water that emanates from the site. It is also recommended that a hydrogeologic investigation be initiated that includes the review of previous ground water investigations reports, remedial investigations, etc.

1. (13-R06-002) (S. Huling (GWERD) 580-436-8610) in Highlights, National Risk Management Research Laboratory Ground Water and Ecosystems Restoration Division Robert S. Kerr Environmental Research Center, Status Report for the week of April 22, 2013

B. Clarify site's actual boundaries and legal description per the new conceptual site model
   1. Compare the following:
      a) 1988 Consent Decree description (18.076 acres)
      b) 1990 ROD maps and description ("approximately 15 acres")
      c) "survey for McKesson Inc" dated 30 June 2009 with expanded boundary (30.74 acres)
      d) EPA R6 aerial map with expanded boundary created 17 November 2009 (30.74 acres)

C. Can site area boundaries be reduced in size as result of new Conceptual Site Model?

D. Result of the site's reassessment for dioxin risk

E. Besides dioxin & pentachlorophenol, what other chemicals are of concern at Arkwood?

F. Details and outcomes of any other studies performed for all media

VII. Comments and questions on EPA "draft of the corrected deed notice" received August 27, 2013 from Gloria Moran, Assistant Regional Counsel (6RC-S) Superfund Branch, U.S. Environmental Protection Agency

A. What is the legal definition of "groundwater" for these purposes?

B. No drinking water (wells or otherwise) were ever documented as contaminated
   1. City water supply was built as a precaution

C. Suggested changes:
   1. paragraph 6 "Soil Contamination" should say "...concentrations that ***do not*** allow..."
   2. paragraph 7 "Groundwater" add **"Property Owner shall have no responsibility whatsoever for the mouth of New Cricket Spring, where water remedy is in effect, as the mouth of New Cricket Spring is physically located off of the subject real property."**
   3. paragraph 7 "Groundwater" add, **"Existing deep wells on site are not considered groundwater for the purpose of this IC and are therefore not limited or restricted hereby."**
   4. paragraph 8 "Engineering Controls" Find more definitive and limiting language to specify these controls exactly
      a) more specific and limited than "...certain engineering controls including..."
   5. paragraph 8 "Engineering Controls" replace "for at least 30 years following the completion of remediation" with **"until December 31, 2025."**

6. paragraph 8 “Engineering Controls” ii) “maintaining the topsoil and grass cover” add **“except the owner may remove the topsoil and grass cover by providing a replacement concrete, asphalt or other compacted material cover acceptable to US EPA.”**
7. paragraph 12 “Monitoring and Maintenance, etc.” iii. “Certify in writing to the USEPA, etc.” replace “for at least 30 years following the completion of remediation” with **“until December 31, 2025.”**
8. paragraph 14 “Notices” i. add **“except said notice is not required when the property is conveyed to a beneficiary of the estate mentioned above.”**

VIII. Arkwood Land Revitalization
- A. What is the timeframe for Arkwood’s return to productive use?
  1. Built into new Conceptual Site Model?
- B. Status of SWRAU certification
- C. EPA affirms Casey Luckett-Snyder’s statements:
  1. “Otherwise stated, EPA concurs that Arkwood Inc. Superfund site is ready for industrial reuse.”
  2. “The current property owner has advised EPA that he is looking for potential purchasers for the Arkwood Inc. Superfund site property and EPA supports efforts to bring the site into industrial reuse.”
     - a) Letters of February 28, 2012 from Mr. Luckett-Snyder to J. Michael Norton, Executive Director, The Northwest Arkansas Economic Development District, Inc. and March 19, 2012 from Mr. Luckett-Snyder to Clyde Rhodes, Hazardous Waste Division Chief, Arkansas Department of Environmental Quality (since replaced now by Tammie J. Hynum)
- D. Status of determination of RfR effort
  1. as per “Guidance for Preparing Superfund Ready for Reuse Determinations (OSWER 9365.0-33-D)
- E. Does Arkwood meet both the “PFP” and “RAU” measures?
  1. as per “Guidance for Documenting and Reporting Performance in Achieving Land Revitalization” (OSWER 9200.1-74)

IX. Liability concerns
- A. What is financial “threshold” for EPA to pursue the assets of a PRP?
- B. Exempt proceeds of any sale of Arkwood site from claim or garnishment?
- C. Self-implementing aspect of Brownfield protections for BFPPs is intimidating
  1. Other assurances possible for BFPPs?
  2. If agreement regarding the cleanup is complete and satisfied between parties, could EPA covenant with McKesson or other PRP promising not to sue?
     - a) as per Ms. Moran in telephone conversation of March 25, 2013
  3. de minimus/ de micromus or other provision to release my father as PRP from liability forever?
  4. Where do beneficiaries of estate who come into ownership of superfund site stand in liability chain?

X. Close Out / Deletion

A. as per Close Out Procedures for National Priorities List Sites (OSWER Directive 9320.2-22 May 2011)
   1. "Deleting a site from the NPL requires a **modification to the Code of Federal Regulations**. To perform this task, the Administrative Procedure Act requires formal administrative rule-making procedures which include creating a docket, publishing notices in the Federal Register, and holding a formal public comment period." (5.4 "The Deletion Process")

B. Has Mr. Sanchez written to ADEQ requesting their concurrence that the Arkwood Inc. Superfund site (EPA ID: ARD084930148 Site ID: 0600124) be submitted for partial deletion from the National Priorities List?
   1. "The first step involves EPA sending a letter to ADEQ requesting their approval to delete the site. CAS"
      a) November 25, 2011, email to CCGJr from Carlos Sanchez

C. Is Arkwood a candidate for Direct Final/ Direct Deletion/ Direct Final Rulemaking Process?

D. When will US District Court relinquish jurisdiction?
   1. "Retention of Jurisdiction," Consent Decree, 1988

E. What other loose ends must eventually wrap up for closeout/ deletion?
   1. Petition to amend?

XI. Outcome of the discontinuance of on-site H2O injection "pilot study" and recommendation for the "study" going forward

A. Was sufficient data gathered to account for wide variations year-to-year of rainfall, other variables not analyzable in short term?

B. Resolve following discrepancies:
   1. On May 10, 2012 I wrote to Carlos Sanchez and said:
      a) "I would like to draw your attention please to Jean Mescher's statement in her March 9, 2010 letter to EPA under IV. PROBLEMS ENCOUNTERED OR ANTICIPATED:
         (1) 'None. Discontinued operation of the pilot system does not appear to have a detrimental effect on the concentration of PCP at the spring mouth.'
      b) On May 11, 2012, at 10:56 AM, Carlos Sanchez wrote:
         (1) "Thanks Curt for the information, **This will help in making the decision to continue the pilot project.** Last week we requested that Mckesson conclude this Pilot Project and prepare a report on the result of the pilot test. EPA believes that Mckesson has sufficient information to make an evaluation."
      c) Compare and contrast the following two official statement by McKesson in reporting to EPA:
         (1) "The increased flow through New Cricket Spring since initiation of the pilot system for injection of ozonated and non-ozonated water into the flow channel of New Cricket Spring **is believed to have enhanced** the degradation of PCP." (Emphasis added)
            (a) From "2011 Annual Report Arkwood, Inc." prepared on behalf of McKesson Corporation

(2) "Discontinued operation of the pilot system **does not appear to have a detrimental effect** on the concentration of PCP at the spring mouth." (Emphasis added)

(a) Jean A. Mescher, Project Coordinator, Director, Environmental Services, McKesson in letter of March 9, 2010 to Shawn Ghose, EPA Project Coordinator

C. Will onsite injection operations cease permanently?

1. remove apparatus
2. fill and seal wells drilled onsite by PRP
3. repair soil cap disrupted by this "pilot" at the site of contamination

U.S. ENVIRONMENTAL PROTECTION AGENCY

FY 2011–2015 EPA Strategic Plan

Achieving Our Vision

EPA's Mission:

To Protect Human Health and the Environment

Strategic Goals

Goal 1: Taking Action on Climate Change and Improving Air Quality

Goal 2: Protecting America's Waters

Goal 3: Cleaning Up Communities and Advancing Sustainable Development

Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution

Goal 5: Enforcing Environmental Laws

Cross-Cutting Fundamental Strategies

Expanding the Conversation on Environmentalism

Working for Environmental Justice and Children's Health

Advancing Science, Research, and Technological Innovation

Strengthening State, Tribal, and International Partnerships

Strengthening EPA's Workforce and Capabilities

Core Values:

Science, Transparency, Rule of Law

Fiscal Year 2011–2015 EPA Strategic Plan

Achieving Our Vision

U.S. Environmental Protection Agency
September 30, 2010

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Message from the Administrator

Since beginning my tenure as Administrator of the U.S. Environmental Protection Agency, I have been challenged by the difficult issues we face and inspired by the talent and dedication of our extraordinary work force. There is no doubt the EPA is on the job. We have made exceptional progress in protecting the environment of America's communities and restoring the trust of the American people. And we have made a number of historic environmental advances along the way. The year 2010 marks the EPA's 40th anniversary. It is a moment of celebration but also a time when we face some of the most complex and far-reaching environmental challenges in the history of the EPA, our nation and our planet. It is critical that we work harder and look further ahead.

The EPA's *FY 2011–2015 Strategic Plan* provides a blueprint for accomplishing our priorities for the next five years. This plan presents five strategic goals for advancing our environmental and human-health mission outcomes, accompanied by five cross-cutting fundamental strategies that seek to focus the EPA's work to meet the growing environmental protection needs of the day. To follow the Administration's focus on strengthening programs and achieving results, the EPA is implementing near-term Priority Goals that serve as key indicators of progress toward our five strategic goals. We will continue to affirm the core values of science, transparency and the rule of law in addressing these priorities. These are the most urgent issues we must confront through 2015.

As we prepared this strategic plan, we also were responding to one of the nation's worst environmental disasters, the Deepwater Horizon BP oil spill, which seriously affected the ecological and economic health of the Gulf Coast's communities. A sustained, effective recovery and restoration effort will require significant commitments of resources, scientific and technical expertise and coordination with a range of partners in the months and years ahead. This strategic plan offers a solid foundation for the EPA's long-term response to the impacts of the BP oil spill. As President Obama has said, our government will do "everything in our power to protect our natural resources, compensate those who have been harmed, rebuild what has been damaged, and help this region persevere like it has done so many times before." The EPA will work tirelessly to address the environmental and human-health effects and set the Gulf Coast on the path to recovery.

The EPA's Strategic Goals

Taking Action on Climate Change and Improving Air Quality: America's communities face serious health and environmental challenges from air pollution and the growing effects of climate change. During my first year as Administrator, the EPA finalized an endangerment finding on greenhouse gases, proposed the first national rules to reduce greenhouse-gas emissions under the Clean Air Act and initiated a national reporting system for greenhouse-gas emissions. All of these advances signaled historic progress in the fight against climate change. Climate change must be considered and integrated into all aspects of our work. While the EPA stands ready to help Congress craft strong, science-based climate legislation that addresses the spectrum of issues, we will assess and develop regulatory tools as warranted under law using the authority of the Clean Air Act.

We have strengthened the ambient air-quality standards for nitrogen dioxide and sulfur dioxide and proposed stronger standards for ozone, which will help millions of Americans breathe easier and lead healthier lives. We also are developing a comprehensive strategy for a cleaner and more efficient power sector, with strong and achievable emission-reduction goals for sulfur dioxide, nitrogen oxide, mercury and other air toxics. Strengthening the ambient air-quality standards consistent with the latest scientific information and gaining additional reductions in air toxics from a range of industrial facilities will significantly improve air quality and reduce risks to communities across the country. Improved monitoring, timely and thorough permitting and vigorous enforcement are our key tools for air-quality improvement.

Protecting America's Waters: Despite considerable progress, America's waters remain imperiled. From nutrient loadings and stormwater runoff to invasive species and drinking-water contaminants, water quality and enforcement programs face complex challenges that demand both traditional and innovative strategies. We will work hand-in-hand with states and tribes to develop nutrient limits and intensify our work to restore and protect the quality of the nation's streams, rivers, lakes, bays, oceans and aquifers. The EPA also will use its authority to protect and restore threatened natural treasures such as the Great Lakes, the Chesapeake Bay and the Gulf of Mexico; to address our neglected urban rivers; to ensure safe drinking water; and to reduce pollution from nonpoint and industrial dischargers. We will initiate measures to address post-construction runoff, water-quality impairments from surface mining and drinking-water contamination.

Cleaning Up Communities and Advancing Sustainable Development: Using all the tools at our disposal, including targeted enforcement and compliance efforts, the EPA will continue to make our communities safer and healthier. We are accelerating these efforts through our Superfund program to confront significant local environmental challenges. The collapse of a coal-ash impoundment in Kingston, Tenn., focused the EPA's attention on how these disposal facilities are managed nationwide. In response, the EPA proposed options for the nation's first rules to address the risks from the disposal of coal ash generated by coal-fired power plants. By maximizing the potential of our brownfields program to spur environmental cleanups and by fostering stronger partnerships with stakeholders affected by our cleanups, we are moving toward our goal of building sustainable, healthy, economically vibrant communities. And by strengthening our work with tribal communities, we are advancing our efforts to build environmental-management capacity and program implementation in Indian country.

Ensuring the Safety of Chemicals and Preventing Pollution: One of our highest priorities is ensuring the safety of the chemicals that make up the building blocks of modern society. Increasingly, the chemicals used to make our products, build our homes and support our way of life end up in the environment and in our bodies. Last year, the Administration announced principles for modernizing the more than 30-year-old Toxic Substances Control Act, under which we assess and regulate chemicals. To move forward and to make long-overdue progress, we are shifting our focus to filling in critical missing information on the chemicals most widely produced and used in commerce and addressing chemicals that pose unreasonable risk to the environment or human health. Pending legislative action by Congress, the EPA is strengthening its chemical safety program by coordinating with appropriate federal agencies to maximize use of current TSCA authorities, supported by the best available science, to aggressively assess and manage the risks of chemicals used in consumer products, the workplace and the environment. Additionally, under the Federal Insecticide, Fungicide, and Rodenticide Act, the EPA and the states register or license pesticides for use in the U.S. The EPA also is taking steps to increase transparency and public access to TSCA-related chemical information, committing to review and, where appropriate, to challenge and declassify Confidential Business Information claims for hundreds of annual new submissions and more than 20,000 previous submissions through FY 2015. By encouraging pollution prevention, we will promote the use of safer chemical alternatives, implement conservation techniques, promote efficient reuse of materials and better align the chemical-production processes with the principles of green chemistry.

Enforcing Environmental Laws: Effective, consistent enforcement is critical to achieving the human-health and environmental benefits expected from our environmental laws. The EPA, through the rule of law, will

ensure compliance with environmental requirements and, as warranted, will employ vigorous and targeted civil and criminal enforcement. We will achieve significant environmental results by focusing our efforts on the most serious water, air and chemical hazards and by working closely with states and tribes. We will protect the public by criminally prosecuting willful, intentional and serious violations of federal environmental laws.

The EPA's Cross-Cutting Fundamental Strategies

As a companion to our strategic goals, which chart the Agency's direction for achieving mission results during the next five years, the EPA's five cross-cutting fundamental strategies set explicit expectations for changing the way we approach our work. These five strategies will inform the work of every program and regional office and help us meet the challenges we face today.

Expanding the Conversation on Environmentalism: Every American has a stake in clean air and water, chemical safety, restoring contaminated industrial and mining sites and strong enforcement of environmental statutes. Every community must be part of the conversation. We will take broad steps to expand the conversation on environmentalism to communities across America, building capacity, increasing transparency and listening to the public. We will engage citizens to hear all the voices that must be part of our nation's dialogue on environmental issues.

Working for Environmental Justice and Children's Health: We will work alongside entities that bear important responsibilities for the day-to-day mission of environmental protection and strengthen oversight to ensure programs are consistently delivered nationwide. We will use a variety of approaches, including regulations, enforcement, research, community-based programs and outreach to protect children and low-income, minority and tribal populations disproportionately impacted by environmental and human-health hazards.

Advancing Science, Research and Technological Innovation: The EPA will advance the scientific research and technological innovation that is essential to enhancing our ability to protect human health and the environment.

Strengthening State, Tribal and International Partnerships: We will strengthen partnerships with states, tribes and the international community. Hand-in-hand with these partnership efforts and inclusive environmentalism, we will address pollution problems and protect human health.

Strengthening the EPA's Work Force and Capabilities: We will adopt improved, innovative and creative management approaches and exemplify stewardship, transparency and accountability in addressing increasingly complex environmental and human-health challenges. We will foster a culture of excellence and provide the infrastructure, technology, training and tools to support a talented, diverse, and highly motivated work force that supports the Administration's human capital and acquisition priorities.

Forty years after the birth of the EPA, we have a rare opportunity to spark a new era of environmental and human-health protection. The American people and countries around the world look to us for leadership. It is up to us to embrace this moment, so our children and grandchildren can have a cleaner, healthier future. We will face new challenges, new opportunities and new possibilities for achieving our vision of a cleaner, greener and more sustainable environment. I have tremendous confidence in the talent and spirit of our work force, and I know we will meet our challenges head-on, as One EPA. Fueled by our energy, our ideas, and our passion, this strategic plan will help guide our path to success.

Lisa P. Jackson

Introduction

Recent events in the Gulf Coast region and elsewhere have brought to the forefront how much we value our environment. Our homes, our livelihoods, our health and that of our children depend on clean water to drink, clean air to breathe, and healthy ecosystems that produce our food and the raw materials that support modern life. The U.S. Environmental Protection Agency (EPA) and its mission to protect human health and the environment have never been more vital than they are today.

The *Fiscal Year (FY) 2011–2015 EPA Strategic Plan* responds to this increasing degree of environmental awareness and the challenges that lie ahead.[1] We have created a streamlined, executive-level *Plan* that sets the Agency's direction, advances the Administrator's priorities, and will be used routinely by the Agency's senior leadership as a management tool. We have sharpened our strategic goals and objectives and offer a more focused set of strategic measures to better inform our understanding of progress and challenges alike in managing our programs. We intend to pursue these goals and objectives as One EPA, through meaningful collaboration across the Agency. Our new cross-cutting fundamental strategies are directed at refocusing and tangibly changing the way we carry out our work. We anticipate that this new approach will foster a renewed commitment to accountability, transparency, and inclusion.

Our five strategic goals represent a simplified and meaningful approach to our work and reflect the results we hope to achieve on behalf of the American people:

- Goal 1: Taking Action on Climate Change and Improving Air Quality
- Goal 2: Protecting America's Waters
- Goal 3: Cleaning Up Communities and Advancing Sustainable Development
- Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution
- Goal 5: Enforcing Environmental Laws

To achieve the long-term goals and associated objectives and strategic measures set out in this *Plan*, we will track progress through annual performance measures, which are presented in EPA's *Annual Performance Plans and Budgets*. We will report on our performance against these annual measures in our *Annual Performance Reports*, and use this performance information as we establish priorities, develop future budget submissions, and manage programs. Additionally, EPA reports on High Priority Performance Goals (Priority Goals), a new component of this Administration's performance management framework. Priority Goals are specific, measurable, ambitious, near-term targets that align with our long-term strategic measures and annual measures. The Priority Goals communicate the performance improvements we will accomplish relative to our priorities using existing legislative authority and resources. The Priority Goals constitute 18- to 24-month operational targets the Agency will work to accomplish, distinguishing the Priority Goals from the longer-term measures. This process will come full circle as we evaluate these performance data to develop future *Strategic Plans*.

Our measures for the *FY 2011–2015 EPA Strategic Plan* draw upon some of the indicators contained in

EPA's 2008 Report on the Environment (ROE).[2] The indicators help us to monitor trends in environmental conditions and environmental influences on human health. Our efforts to develop the report and regularly update the indicators have advanced our performance measurement work by bringing together existing and new analytical information on the environment and human health.

During the five-year horizon of this *Plan*, we know that we will face unanticipated challenges and opportunities that will affect our ability to achieve our objectives and the specific measurable results that we have described. In particular, we recognize that numerous entities vital to our success—federal[3], state, tribal, and local governments, and cooperating partners and stakeholders—are operating under resource constraints that could impede our joint progress. This *Plan* provides the framework to address these challenges and make necessary adjustments.

This *FY 2011–2015 EPA Strategic Plan* sets forth our vision and commitment to preserve the environment for future generations and to protect human health in the places where people live, work, learn, and play. It is our hope that you will join us as we undertake the important work that lies ahead.

Consultation Efforts

The Government Performance and Results Act of 1993 directs all federal departments and agencies to consult with parties interested in or likely to be affected by a strategic plan. Consultation with EPA's federal, state, local, and tribal government partners and our many stakeholders is an integral part of the Agency's strategic planning process. To that end, EPA:

Engaged with key partners and co-regulators throughout the effort to develop the *Draft Plan*.

Significantly expanded our outreach efforts for public review of the *Draft FY 2011–2015 EPA Strategic Plan* to enhance transparency and inclusion. We issued, for the first time, a news release in both English and Spanish and a *Federal Register Notice* and used www.regulations.gov to encourage feedback on the *Draft Plan*.

Sent notification letters to over 800 organizations and individuals to request input. These entities included leaders of the Agency's Congressional authorizing and appropriations committees; states and state associations; all federally-recognized tribes; tribal organizations; local government representatives; other federal agencies; public health organizations; environmental, public interest, and public policy groups; and representatives of the regulated community.

Established an on-line discussion forum to engage with the public on implementing the cross-cutting fundamental strategies to tangibly change the way we work. Comments received through the discussion forum can be viewed at https://blog.epa.gov/strategicplan.

Our efforts to significantly expand our outreach for public review of the *Draft Plan* resulted in over 500 public comments, compared to approximately 50 public comments for prior *Draft Strategic Plans*.

End Notes:

1 The *Fiscal Year 2011–2015 EPA Strategic Plan* covers the timeframe from October 1, 2010 through September 30, 2015 unless otherwise noted.

2 EPA electronic *Report on the Environment* is available at http://www.epa.gov/roe.

3 Federal entities with whom we expect continued cooperation or coordination for EPA's five strategic goals include: Agriculture, Army Corps of Engineers, Commerce, Consumer Product Safety Commission, Defense, Education, Energy, Federal Emergency Management Agency, General Services Administration, Health and Human Services, Homeland Security, Housing and Urban Development, Interior, Justice, Labor, National Aeronautics and Space Administration, National Science Foundation, Nuclear Regulatory Commission, Small Business Administration, State, Transportation, Treasury, Tennessee Valley Authority, U.S. Agency for International Development, and U.S. Trade Representative.

Goal 1: Taking Action on Climate Change and Improving Air Quality

Reduce greenhouse gas emissions and develop adaptation strategies to address climate change, and protect and improve air quality.

Climate change poses risks to human health, the environment, cultural resources, the economy, and quality of life.[1] These changes are expected to create further challenges to protecting human health and welfare. Many effects of climate change are already evident and will persist into the future regardless of future levels of greenhouse gas (GHG) emissions. Potential climate change impacts may include, for example, increased smog levels in many regions of the country, making it more difficult to attain or maintain clean air. A rise in sea level or increased precipitation intensity may increase flooding, which would affect water quality, as large volumes of water can transport contaminants and overload storm and wastewater systems. In order to protect human health and the environment, EPA must recognize and consider the challenge a changing climate poses to the environment.

Since passage of the Clean Air Act Amendments in 1990, nationwide air quality has improved significantly.[2] Despite this progress, about 127 million Americans lived in counties that did not meet air quality standards for at least one pollutant in 2008. Long-term exposure to air pollution can cause cancer and damage to the immune, neurological, reproductive, cardiovascular, and respiratory systems.[3] Because people spend much of their lives indoors, the quality of indoor air is also a major concern. Twenty percent of the population spends the day indoors in elementary and secondary schools, where problems with leaky roofs and with heating, ventilation, and air conditioning systems can trigger a host of health problems, including asthma and allergies. Exposure to indoor radon is responsible for an estimated 20,000 premature lung cancer deaths each year.[4]

Objectives:

- **Address Climate Change.** Reduce the threats posed by climate change by reducing greenhouse gas emissions and taking actions that help communities and ecosystems become more resilient to the effects of climate change.
- **Improve Air Quality.** Achieve and maintain health-based air pollution standards and reduce risk from toxic air pollutants and indoor air contaminants.
- **Restore the Ozone Layer.** Restore the earth's stratospheric ozone layer and protect the public from the harmful effects of ultraviolet (UV) radiation.
- **Reduce Unnecessary Exposure to Radiation.** Minimize unnecessary releases of radiation and be prepared to minimize impacts should unwanted releases occur.

Strategic Measures associated with this Goal are on pages 43 through 45.

Reduce GHG Emissions and Develop Adaptation Strategies to Address Climate Change

EPA's strategies to address climate change support the President's GHG emissions reduction goals. EPA and its partners will reduce GHG emissions domestically and internationally through cost-effective, voluntary programs while pursuing additional regulatory actions as needed. Our efforts include:

- Developing and implementing a national system for reporting GHG emissions. (Implementing the mandatory GHG reporting rule is one of the Agency's Priority Goals.)[5]
- Issuing new standards to reduce emissions from cars and light-duty trucks for model years 2012 through 2016, extending that program to model year 2017 and beyond, and creating a similar program to reduce GHGs from medium- and heavy-duty trucks for model years 2014–2018. (Implementing the light-duty GHG rule is one of the Agency's Priority Goals.)[6]
- Developing standards to reduce GHG emissions from nonroad sources such as marine and aircraft and land-based nonroad equipment and locomotives.
- Implementing permitting requirements for facilities that emit large amounts of GHGs to encourage design and construction of more efficient and advanced processes that will contribute to a clean energy economy.
- Implementing refocused voluntary programs that maximize GHG reductions through the greater use of energy-efficient technologies, products, and practices, and promoting energy and transportation policies that benefit the environment and human health.
- Collaborating with state, local, and tribal governments on regulatory and policy initiatives, technical assistance, and voluntary programs related to climate change mitigation and adaption.
- Collaborating with countries and other international partners to reduce methane emissions and deliver clean energy to markets around the world through the Global Methane Initiative.
- Developing a comprehensive report to Congress on black carbon that will provide a foundation for evaluating future approaches to black carbon mitigation.
- Pursuing a sustainable, life-cycle approach to managing materials.
- Identifying and assessing substitute chemical and ozone-depleting substances and processes for their global-warming potential.
- Educating the public about climate change and actions people can take to reduce GHG emissions.

Adaptation initiatives aim to increase the resilience of communities and ecosystems to climate change by increasing their ability to anticipate, prepare for, respond to, and recover from the impacts of climate change. Many of the outcomes EPA is working to attain are sensitive to weather and climate. Consequently, every action EPA takes, including promulgating regulations and implementing programs, should take these fluctuations into consideration. For example, EPA models the ways in which weather affects air quality when it develops air quality standards, and cannot assume that climate is constant, an assumption typically made in the rulemaking process.

EPA must adapt and plan for future changes in climate, work with state, tribal, and local partners, and continue to collaborate with the U.S. Global Change Research Program and the Interagency Task Force on Climate Change Adaptation.[7] The Agency must incorporate the anticipated, unprecedented changes in climate into its programs and rules, drawing on the critical information and tools provided by EPA researchers, to continue to fulfill statutory, regulatory, and programmatic requirements.

Improve Air Quality

Taking into account the most current health effects research findings[8], EPA recently completed new, more health-protective standards for lead, sulfur dioxide, and nitrogen dioxide. We are in the process of reviewing the ozone, particulate matter, and carbon monoxide standards. Over the next five years, we will

work with states and tribes to develop and implement plans to achieve and maintain these standards. Our research provides the tools and information necessary for EPA, states, and tribes to implement air quality standards and controls.

In 2011, we expect to complete and begin implementing a rule to replace the Clean Air Interstate Rule that was remanded to us by the courts in 2008. Strengthening the standards and decreasing the emissions that contribute to interstate transport of air pollution will help many areas of the country attain the standards and achieve significant improvements in human health. As we implement the standards, we will do so in a way that protects disproportionately-impacted low-income and minority communities. We are also working with partners and stakeholders to improve the overall air quality management system and to address air quality challenges expected over the next 10 to 20 years. These efforts include improving the state implementation plan approval process, implementing a national training strategy, and developing effective air quality strategies that address multiple pollutants and consider the interplay between air quality and factors such as land use, energy, transportation, and climate.

We will address emissions from vehicles, engines, and fuels through an integrated strategy that combines regulatory approaches that take advantage of technological advances and cleaner fuels with voluntary programs that reduce vehicle, engine, and equipment activity and emissions. We are working with refiners, renewable fuel producers, and others to implement regulations to increase the amount of renewable fuel blended into gasoline. Through the National Clean Diesel Campaign, we support diesel emission reductions that can be achieved through such actions as switching to cleaner fuels; engine retrofit, repair, and replacement; and idle reduction.

Air toxics are both widespread and community-specific. They are emitted by large industry, small businesses, motor vehicles, and many other common activities. While certain chemicals are ubiquitous throughout the country, in some areas of concentrated industrial and/or mobile source activity, concentrations may be significantly greater. EPA will continue to set and enforce control technology-based air toxics emissions standards and, where needed, amend those standards to address residual risk and technology advancements.

EPA is developing a strategy aimed at reducing toxic air pollution from stationary sources in a way that targets priority categories of sources, reduces pollution in communities, utilizes a more cost-effective 'sector-based' approach, and provides tools to help communities and other stakeholders participate in rulemaking. These priority categories include petroleum refining, iron and steel, chemical manufacturing, utilities, non-utility boilers, oil and gas, and Portland cement. As part of this strategy, EPA will take advantage of the natural overlap of certain air toxics and criteria pollutant rules and coordinate the development and implementation of Maximum Achievable Control Technology (MACT) and New Source Performance Standards (NSPS) where it makes sense. Often, there are opportunities to control air toxic and criteria pollutants together. By coordinating MACT standard

development for specific source categories with other rulemaking efforts, EPA can substantially reduce the resources needed to develop standards; provide more certainty and lower cost for industry; simplify implementation for states, local, and tribal agencies; and, enhance cost-effective regulatory approaches.

Along with these regulatory efforts, EPA has a wide range of voluntary efforts to reduce emissions, including programs to reduce multi-media and cumulative risks. Through data from our national toxics monitoring network and from national and local assessments, we are able to better characterize risks and assess priorities. We work with state and local agencies, tribes, schools, and community groups to identify communities where air toxics pollution is occurring at unsafe levels and aggressively take action to reduce air toxics pollution within those areas.

Often the people most exposed to air pollutants are those most susceptible to the effects—the young, the elderly, and the chronically ill. To improve indoor air quality, EPA deploys programs that educate the public about indoor air quality concerns, including radon, and promotes public action to reduce potential risks in homes, schools, and workplaces. EPA also collaborates with state and tribal organizations, environmental and public health officials, housing and building organizations, school personnel who manage school environments, and health care providers, who treat children prone to or suffering disproportionately from asthma. The focus of these efforts is to support communities' efforts to address indoor air quality health risks. We also provide policy and technical support and financially assist states and tribes in developing and implementing effective radon programs.

Restore the Ozone Layer

EPA will implement programs that reduce and control ozone-depleting substances (ODS), enforce rules on their production, import, and emission, and facilitate the transition to substitutes that reduce GHG emissions and save energy. We will continue partnership programs that minimize the release of ODS and programs that educate the public about the importance of protection from ultra-violet radiation.

Reduce Unnecessary Exposure to Radiation

Recognizing the potential hazards of radiation, Congress charged EPA with the primary responsibility for protecting people and the environment from harmful and avoidable exposures. In fulfilling this responsibility, we will review and update our radiation protection regulations and guidance, operate the national radiation monitoring system, maintain radiological emergency response capabilities, oversee the disposal of radioactive waste at the Waste Isolation Pilot Plant, inspect waste generator facilities, and evaluate compliance with applicable environmental laws and regulations.

Applied Research

EPA's research efforts will focus on a number of air quality and climate areas over the next several years. In particular, EPA will:

- Conduct integrated science assessments of criteria air pollutants and provide new data and approaches for improving these assessments;
- Improve inventory and risk information to better inform Agency actions relative to air toxics;
- Promote resilience and adaptation by connecting air quality, water quality, and land use managers with climate change information and decision-support tools;
- Promote systems research and life-cycle analysis in analyzing the health and environmental impacts of energy production and operation, including biofuels; and,
- Investigate the influence of climate change on clean air, as well as the impacts of emissions from low-carbon fuels in transportation.

End Notes:

1 Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson (eds.). 2009. Global Climate Change Impacts in the United States (New York, New York: Cambridge University Press). Available at http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf.

2 U.S. EPA, 2010. *Our Nation's Air-Status and Trends through 2008.* EPA-454/R-09-002. Available at http://epa.gov/airtrends/2010/index.html.

3 U.S. EPA, 2007. *The Plain English Guide to the Clean Air Act.* EPA-456/K-07-001. Available at http://www.epa.gov/air/peg/peg.pdf.

4 U.S. EPA, 2003. *EPA's Assessment of Risks from Radon in Homes.* EPA 402-R-03-003. Available at http://www.epa.gov/radon/pdfs/402-r-03-003.pdf

5 Implementing the mandatory GHG reporting rule is one of the Agency's Priority Goals: By June 15, 2011, EPA will make publicly available 100 percent of facility-level GHG emissions data submitted to EPA in accordance with the GHG Reporting Rule, compliant with policies protecting confidential business information (CBI).

6 Implementing the light-duty GHG rule is one of the Agency's Priority Goals: In 2011, EPA, working with DOT, will begin implementation of regulations designed to reduce the GHG emissions from light-duty vehicles sold in the U.S. starting with model year 2012.

7 The U.S. Global Change Research Program coordinates and integrates federal research on changes in the global environment and their implications for society. It was mandated by Congress in the Global Change Research Act of 1990 (P.L. 101-606). In 2009, the White House Council on Environmental Quality, the Office of Science and Technology Policy, and the National Oceanic and Atmospheric Administration initiated the Interagency Climate Change Adaptation Task Force. When the President signed the Executive Order on Federal Leadership in Environmental, Energy, and Economic Performance in October 2009, he called on the Task Force to develop federal recommendations for adapting to climate change impacts both domestically and internationally.

8 U.S. EPA, 2006. *Air Quality Criteria for Lead (2006) Final Report.* EPA/600/R-05/144aF-bF. Available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=158823.

U.S. EPA, 2008. *Integrated Science Assessment (ISA) for Sulfur Oxides–Health Criteria (Final Report).* EPA/600/R-08/047F. Available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=198843.

U.S. EPA, 2008. *Integrated Science Assessment for Oxides of Nitrogen–Health Criteria (Final Report).* EPA/600/R-08/071. Available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=194645.

Goal 2: Protecting America's Waters

Protect and restore our waters to ensure that drinking water is safe, and that aquatic ecosystems sustain fish, plants and wildlife, and economic, recreational, and subsistence activities.

The nation's water resources are the lifeblood of our communities, supporting our economy and way of life. Across most of our country, we enjoy and depend upon reliable sources of clean and safe water. Several decades ago, however, many of our drinking water systems provided water to the tap with very limited treatment. Drinking water was often the cause of illnesses linked to microbiological and other contaminants. Many of our surface waters would not have met today's water quality standards. Some of the nation's rivers were open sewers, posing health risks, and many waterbodies were so polluted that safe swimming, fishing, and recreation were not possible.

We have made significant progress since enactment of the landmark Clean Water Act and Safe Drinking Water Act almost 40 years ago. Today, the enhanced quality of our surface waters and the greater safety of our drinking water are testaments to decades of environmental protection and investment, but serious challenges remain. Small drinking water systems are particularly challenged by the need to improve infrastructure and develop the capacity to meet new and existing standards. Tens of thousands of homes, primarily in tribal and disadvantaged communities and the territories, still lack access to basic sanitation and drinking water. The rate at which new waters are listed for water quality impairments exceeds the pace at which restored waters are removed from the list.

Objectives:

- **Protect Human Health.** Reduce human exposure to contaminants in drinking water, fish and shellfish, and recreational waters, including protecting source waters.
- **Protect and Restore Watersheds and Aquatic Ecosystems.** Protect the quality of rivers, lakes, streams, and wetlands on a watershed basis, and protect urban, coastal, and ocean waters.

Strategic Measures associated with this Goal are on pages 46 through 48.

Pollution discharged from industrial, municipal, agricultural, and stormwater sources continue to be causes of water quality problems, but other significant contributors include loss of habitat and habitat fragmentation, hydrologic alteration, the spread of invasive species, and climate change. For many years, nonpoint source pollution—principally nitrogen, phosphorus, and sediments—has been recognized as the largest remaining impediment to improving water quality. Recent national surveys have found that our waters are stressed by nutrient pollution, excess sedimentation, and degradation of shoreline vegetation, which affect upwards of 50 percent of our lakes and streams.[1] Climate change will compound these

problems, highlighting the urgency to evaluate with our partners options for protecting infrastructure, conserving water, reducing energy use, adopting "green" infrastructure and watershed-based practices, and improving the resilience of infrastructural and natural systems, including utilities, watersheds, and estuaries.[2]

Over the next five years, EPA will work with states, territories, and tribes to safeguard human health, make America's water systems sustainable and secure, strengthen the protection of our aquatic ecosystems, improve watershed-based approaches, focus efforts in key geographic areas[3], and take action on climate change. EPA has established two Priority Goals for the revision of drinking water standards to strengthen public health protection[4] and the development of state watershed implementation plans in support of the Chesapeake Bay total maximum daily load called for in the Chesapeake Bay Protection and Restoration Executive Order.[5] Working with our partners, the Agency's effort to protect our waters is aimed at two objectives—protecting human health and protecting and restoring watersheds and aquatic ecosystems.

Protect Human Health

Sustaining the quality and supply of our water resources is essential to safeguarding human health. More than 290 million people living in the United States rely on the safety of tap water provided by public water systems that are subject to national drinking water standards. Over the next five years, EPA will help protect human health and make America's water systems sustainable and secure by:

- Financing public water system infrastructure to protect and maintain drinking water quality;
- Strengthening compliance with drinking water standards;
- Continuing to protect sources of drinking water from contamination;
- Developing new and revising existing drinking water standards; and,
- Supporting states, tribes, territories, and local water systems in implementing these standards.

While promoting sustainable management of drinking water infrastructure, we will provide needed oversight and technical assistance to states, territories, and tribes so that their water systems comply with or exceed existing standards and are able to comply with new standards. We will also promote the construction of infrastructure that brings safe drinking water into the homes of small, rural, and disadvantaged communities and increase efforts to guard the nation's critical drinking water infrastructure.

In addition, EPA is actively working Agency-wide and with external partners and stakeholders to implement a new, multi-faceted drinking water strategy. It is designed to streamline decision making and expand protection to meet the needs of rural, urban, and other communities. This shift in approach seeks to address chemicals and contaminants by group, as opposed to working on a chemical-by-chemical basis; fostering the development of new drinking water treatment technologies; using the authority of multiple statutes; and, encouraging collaboration with states and tribes to share more complete data from monitoring at public water systems.

Science-based standards are essential to protect our public water systems, groundwater and surface waterbodies, and recreational waters. These standards are the foundation for tools to safeguard human health such as advisories for beaches, fish consumption, and drinking water. Over the next five years, we will expand that science to improve our understanding of emerging potential waterborne threats to human health. We will also increase efforts to protect and improve beach water quality for our communities, including the development of new criteria and testing methods that provide quicker results and enable faster action on beach safety.

Protect and Restore Watersheds and Aquatic Ecosystems

People and the ecological integrity of aquatic systems rely on healthy watersheds. EPA employs a suite of programs to protect and improve water quality in the nation's watersheds—rivers, lakes, wetlands, and streams—as well as in our estuarine, coastal, and ocean waters. In partnership with states, territories, local governments, and tribes, EPA's core water programs help:

- Protect, restore, maintain, and improve water quality by financing wastewater treatment infrastructure;
- Conduct monitoring and assessment;
- Establish pollution reduction targets;
- Update water quality standards;
- Issue and enforce discharge permits; and,
- Implement programs to prevent or reduce nonpoint source pollution.

Over the next five years, EPA will continue efforts to restore waterbodies that do not meet water quality standards, preserve and protect high quality aquatic resources, and protect, restore, and improve wetland acreage and quality. The Agency will improve the way existing tools are used, explore how innovative tools can be applied, and enhance efforts and cross-media collaboration to protect and prevent water quality impairment in healthy watersheds.

In partnership with states, tribes, and local communities, EPA is developing a clean water strategy that will outline objectives for advancing the vision of the Clean Water Act and actions EPA will take to achieve those objectives. The Agency will explore ways to improve the condition of the urban waterways that may have been overlooked or under-represented in local environmental problem solving. We will also work more aggressively to reduce and control pollutants that are discharged from industrial, municipal, agricultural, and stormwater sources, and vessels, as well as to implement programs to prevent and reduce pollution that washes off the land during rain events. By promoting "green" infrastructure and sustainable landscape management, EPA will help restore natural hydrologic systems and reduce pollution from stormwater events.[6]

EPA will also lead efforts to restore and protect aquatic ecosystems and wetlands, particularly in key geographic areas[3], to address complex and cross-boundary challenges. EPA is heading up a multi-agency effort to restore and protect the Great Lakes, one of America's great waters, through the Great Lakes Restoration Initiative.[7] In other parts of the nation, we will focus on nutrient pollution, which threatens the long-term health of important ecosystems such as the Chesapeake Bay. Further, given the environmental catastrophe resulting from the Deepwater Horizon BP oil spill, EPA will take necessary actions to support efforts to remove oil from and restore the Gulf of Mexico ecosystem. EPA will provide assistance to other federal, state, tribal, and local partners as they work to restore the water, wetlands, beaches, and surrounding communities of this vital area. We will also begin to identify actions to respond and adapt to the current and potential impacts of climate change on aquatic resources, including the current and potential impacts associated with warming temperatures, changes in rainfall amount and intensity, and sea level rise.[8]

Applied Research

EPA's research will help ensure that natural and engineered water systems have the capacity and resiliency to meet current and future water needs for the range of water-use and ecological requirements. These efforts will help position the Agency to meet the future needs in water resources management by:

- Evaluating individual and groups of contaminants for the protection of human health and the environment;
- Developing innovative tools, technologies, and strategies for managing water resources (including stormwater); and,
- Supporting a systems approach for protecting and restoring aquatic systems. The development of watershed-level data, tools, and approaches is crucial to our ability to provide adequate and safe water resources.

End Notes:

1 U.S. EPA, 2006. *Wadeable Streams Assessment: A Collaborative Survey of the Nation's Streams.* EPA 841-B-06-002. Available at http://www.epa.gov/owow/streamsurvey. See also EPA, 2010. *National Lakes Assessment: A Collaborative Survey of the Nation's Lakes.* EPA 841-R-09-001. Available at http://www.epa.gov/lakessurvey/pdf/nla_chapter0.pdf.

2 Resilience is the ability of a system to absorb change and disturbance and still retain its fundamental function and/or structure.

3 Key geographic areas in the national water program include the Chesapeake Bay, the Great Lakes, the Gulf of Mexico, the U.S.–Mexico Border region, the Pacific Islands, the Long Island Sound, the South Florida Ecosystem, the Puget Sound Basin, the Columbia River Basin, and the San Francisco Bay Delta Estuary. For more information on these programs and their performance measures, see the annual National Water Program Guidance, available at http://www.epa.gov/water/waterplan/index.html.

4 EPA has developed a Priority Goal as part of the drinking water strategy efforts: Over the next two years, EPA will initiate review/revision of at least four drinking water standards to strengthen public health protection.

5 EPA has developed a Priority Goal to support the Chesapeake Bay Executive Order: Chesapeake Bay watershed states (including the District of Columbia) will develop and submit Phase I watershed implementation plans by the end of CY 2010 and Phase II plans by the end of CY 2011 in support of EPA's final Chesapeake Bay total maximum daily load (TMDL) and consistent with the expectations and schedule described in EPA's letters of November 4 and December 29, 2009, and June 11, 2010. For more information, see http://executiveorder.chesapeakebay.net.

6 For information on managing wet weather with green infrastructure, see http://cfpub.epa.gov/npdes/home.cfm?program_id=298.

7 Great Lakes Restoration Initiative, information available at http://greatlakesrestoration.us/.

8 United States Global Change Research Program, information available at http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts.

Goal 3: Cleaning Up Communities and Advancing Sustainable Development

Clean up communities, advance sustainable development, and protect disproportionately impacted low-income, minority, and tribal communities. Prevent releases of harmful substances and clean up and restore contaminated areas.

Uncontrolled releases of waste and hazardous substances can contaminate our drinking water and threaten healthy ecosystems. EPA leads efforts to preserve, restore, and protect these precious resources so they are available for both current and future generations. Over the next several years, our highest priorities under this goal are to prevent and reduce exposure to contaminants and accelerate the pace of cleanups across the country. EPA works collaboratively with international, state, and tribal partners to achieve these aims and with communities to ensure that they have a say in environmental decisions that affect them. Our efforts are guided by scientific data, research, and tools that alert us to emerging issues and inform decisions on managing materials and addressing contaminated properties.

Promote Sustainable and Livable Communities

EPA supports urban, suburban, and rural community goals of improving environmental, human health, and quality-of-life outcomes through partnerships that also promote economic opportunities, energy efficiency, and revitalized neighborhoods. Sustainable communities balance their economic and natural assets so that the diverse needs of local residents can be met now and in the future with limited environmental

Objectives:

- **Promote Sustainable and Livable Communities.** Support sustainable, resilient, and livable communities by working with local, state, tribal, and federal partners to promote smart growth, emergency preparedness and recovery planning, brownfield redevelopment, and the equitable distribution of environmental benefits.
- **Preserve Land.** Conserve resources and prevent land contamination by reducing waste generation, increasing recycling, and ensuring proper management of waste and petroleum products.
- **Restore Land.** Prepare for and respond to accidental or intentional releases of contaminants and clean up and restore polluted sites.
- **Strengthen Human Health and Environmental Protection in Indian Country.** Support federally-recognized tribes to build environmental management capacity, assess environmental conditions and measure results, and implement environmental programs in Indian country.

Strategic Measures associated with this Goal are on pages 49 through 51.

impacts. EPA accomplishes these outcomes by working with communities, other federal agencies, states, and national experts to develop and encourage development strategies that have better outcomes for air quality, water quality, and land preservation and revitalization.

Development and building construction practices may result in a broad range of impacts on human health and the environment. EPA is working with other federal, state, and local partners to develop best practices and guidance on aspects of sustainability related to how and where development occurs, including promoting smarter growth patterns and encouraging widespread adoption of green building technologies to support our strategic goals.

For example, EPA has joined with the U.S. Department of Housing and Urban Development (HUD) and the U.S. Department of Transportation (DOT) to minimize the environmental impacts of development, which may include improved access to affordable housing, more transportation options, and lower transportation costs.[1] Through a set of guiding "livability" principles and a partnership agreement that will guide the agencies' efforts, this partnership is coordinating federal housing, transportation, water, and other infrastructure investments to protect the environment, promote equitable development, and help to address the challenges of climate change.

EPA is committed to ensuring environmental justice regardless of race, color, national origin, or income. Recognizing that minority and/or low-income communities may face disproportionate environmental risks, we work to protect these communities from adverse health and environmental effects and to ensure they are given the opportunity to participate meaningfully in environmental cleanup decisions.

EPA's brownfields program emphasizes environmental and human health protection in a manner that stimulates economic development and job creation by awarding competitive grants to assess and clean up brownfield properties and providing job training opportunities, particularly in underserved communities.[2] We also provide outreach and technical assistance to communities, including area-wide planning approaches, to identify: viable end uses of a single, large property or groups of brownfield properties; associated air and water infrastructure investments; and, environmental improvements in the surrounding area to revitalize the community. Under EPA's brownfields Priority Goal, area-wide planning will be conducted with the participation of other federal agencies, states, tribes, and local governments and communities to identify resources and approvals necessary to carry out actions identified in area-wide plans.[3] This new approach differs from the way EPA brownfields resources have traditionally been used, recognizing that approaching the assessment and cleanup needs of a brownfields-impacted area can be more effective than focusing on individual sites in isolation of the adjacent or surrounding area.

Preserve Land

EPA and authorized states issue and enforce permits for the treatment, storage, or disposal of hazardous wastes to ensure that facilities subject to Resource Conservation and Recovery Act (RCRA) regulations operate safely. To prevent future environmental contamination and to protect the health of the estimated three million people living within a mile of hazardous waste management facilities[4], EPA and its state partners continue their efforts to issue, update, or maintain RCRA permits for approximately 10,000 hazardous waste units (such as incinerators and landfills) at these facilities.

EPA is increasing emphasis on life-cycle based materials management. In order to respond to RCRA's mandate to conserve resources and energy, EPA will focus on strategies that emphasize sustainable materials management by identifying and reducing or minimizing waste at all life-cycle stages, from extraction of raw materials through end of life.[5] Through this approach, EPA will focus on improving resource use through evaluating the environmental impacts of life-cycle stages of a material, product, or service, including identifying GHG benefits. EPA will develop national strategies that consider using less environmentally intensive and toxic materials and continue to promote downstream solutions, like reuse and recycling, to conserve our resources for future generations.

To reduce the risk posed by underground storage tanks (USTs) located at nearly a quarter of a million facilities throughout the country, EPA and states are working to ensure that every UST system is inspected

at least once every three years. As fuel types change, UST systems must be equipped to safely store the new fuels. EPA is working to ensure biofuels are stored in compatible UST systems.

Restore Land

Challenging and complex environmental problems, such as contaminated soil, sediment, and groundwater that can cause human health concerns, persist at many contaminated properties. EPA's Superfund, RCRA corrective action, leaking underground storage tank, and brownfields cleanup programs, and Toxic Substances Control Act (TSCA) cleanups of polychlorinated biphenyls (PCBs), reduce risks to human health and the environment by assessing and cleaning up these sites to maintain or put them back into productive use.

In an effort to improve the accountability, transparency, and effectiveness of EPA's cleanup programs, EPA has initiated the Integrated Cleanup Initiative (ICI), a multi-year effort to better use the most appropriate assessment and cleanup authorities to address a greater number of sites, accelerate cleanups, and put sites back into productive use while protecting human health and the environment. By using the relevant tools available in each of the cleanup programs, including enforcement, EPA will better leverage the resources available to address needs at individual sites. EPA will examine all aspects of the cleanup programs, identifying key process improvements and enhanced efficiencies. As part of the ICI, EPA will develop a new suite of performance measures that will support comprehensive management of the cleanup life cycle by addressing three critical points in the cleanup process—starting, advancing, and completing site cleanup.

EPA is continuing to improve its readiness to respond to releases of harmful substances, including oil spills, by clarifying authorities, training personnel, and providing proper equipment. Given the Deepwater Horizon BP oil spill and the efforts to clean up and restore the Gulf of Mexico, EPA will review its current rules, guidelines and procedures on oil spills. EPA will ensure that it has the appropriate tools to prevent, prepare for, respond to, and recover from such incidents within its jurisdiction.[6]

National preparedness is essential to ensure that emergency responders are able to address multiple, large-scale emergencies, including those that may involve chemicals, oil, biological agents, radiation, or weapons of mass destruction. Consistent with the government-wide National Response Framework, EPA prepares for the possibility of multiple, simultaneous, nationally significant incidents across several regions and provides guidance and technical assistance to state and local planning and response organizations.

EPA's hazardous waste programs are working to reduce the energy use and environmental footprint during the investigation and remediation of sites. As part of this effort, EPA's Superfund program will implement its green remediation strategy to reduce the energy, water, and materials used during site cleanups while ensuring that protective remedies are implemented.[7]

EPA is also implementing its Community Engagement Initiative designed to enhance our involvement with local communities and stakeholders so that they may meaningfully participate in decisions on land cleanup, emergency response, and management of hazardous substances and waste. The goals of this initiative are to ensure transparent -and accessible decision-making processes, to deliver information that communities can use to participate meaningfully, to improve EPA responsiveness to community perspectives, and to ensure timely cleanup decisions.

Strengthen Human Health and Environmental Protection in Indian Country

Under federal environmental statutes, EPA is responsible for protecting human health and the environment in Indian country. EPA's commitment to tribal environmental and human health protection, through the recognition of tribal sovereignty and self-determination, has been steadfast for over 25 years, as formally established in the Agency's 1984 Indian Policy.[8] EPA works with over 500 federally-recognized tribes located across the United States to improve environmental and human health outcomes. Indian country totals more than 70 million acres with reservations ranging from less than 10 acres to more than 14 million acres. Difficult environmental and health challenges remain in many of these areas, including lack of access to safe drinking water, sanitation, adequate waste facilities, and other environmental safeguards taken for granted elsewhere.

In collaboration with our tribal partners and fulfilling our government-to-government responsibilities, EPA will engage in a two-part strategy for strengthening human health and environmental protection in Indian country. First, EPA will provide the opportunity for federally-recognized tribes to create an effective and results-oriented environmental capacity-building presence. Second, EPA will ensure that its programs are implemented in Indian country either by EPA or through opportunities for implementation of environmental programs by tribes themselves.

Applied Research

In the area of cleaning up communities, research will allow EPA to identify and apply approaches that better inform and guide environmentally sustainable behavior, protect human health and ecosystems, and provide the products and services needed for mitigation, management, remediation, and long-term stewardship of contaminated sites. It will also provide state, tribal, and local decision makers with the knowledge needed to make smart, systems-based decisions that will inform a balanced approach to their cleanup and development needs.

End Notes:

1 Our Built and Natural Environments: A Technical Review of the Interactions between Land Use, Transportation, and Environmental Quality. Information available at http://www.epa.gov/dced/built.htm.

2 For more information about EPA's brownfields program, see http://www.epa.gov/brownfields.

3 EPA has developed a Priority Goal for brownfields: By 2012, EPA will have initiated 20 enhanced brownfields community level projects that will include a new area-wide planning effort to benefit under-served and economically disadvantaged communities. This will allow those communities to assess and address a single large or multiple brownfields sites within their boundaries, thereby advancing area-wide planning to enable redevelopment of brownfields properties on a broader scale. EPA will provide technical assistance, coordinate its enforcement, water, and air quality programs, and work with other federal agencies, states, tribes, and local governments to implement associated targeted environmental improvements identified in each community's area-wide plan.

4 This refers to the total estimated number of people that live within a mile of each of the RCRA hazardous waste facilities that have approved controls in place. Site-specific data can be queried from the Enforcement and Compliance History On-line database, which provides fast, integrated searches of EPA and state data for regulated facilities (see http://www.epa-otis.gov/echo/compliance_report_rcra.html). Population data included in the database is from the 2000 U.S. Census.

5 For more information on sustainable materials management, see *Sustainable Materials Management: The Road Ahead.* EPA 530R-09-009. Available at http://www.epa.gov/osw/inforesources/pubs/vision2.pdf

6 Several federal agencies have jurisdiction and authority for oil spill preparedness, response, and recovery in the U.S. in addition to EPA, including the Department of Transportation and the Coast Guard. EPA's efforts will focus on those aspects of the national oil spill program for which they have authority and responsibility, primarily the inland area and fixed facilities, as well as sharing best practices, pertinent research, and lessons learned with its federal partners.

7 More information about Superfund and green remediation at EPA is available at http://www.epa.gov/superfund/greenremediation.

8 The 1984 EPA Policy for the Administration of Environmental Programs on Indian Reservations is available at http://www.epa.gov/tribal/pdf/indian-policy-84.pdf.

Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution

Reduce the risk and increase the safety of chemicals and prevent pollution at the source.

Chemicals are involved in the production of everything from our homes and cars to the cell phones we carry and the food we eat. Thousands of chemicals have become ubiquitous in our everyday lives and everyday products, as well as in our environment and our bodies. Chemicals are often released into the environment as a result of their manufacture, processing, use, and disposal. Research shows that children receive greater exposures to chemicals because they inhale or ingest more air, food, or water on a body-weight basis than adults do.[1] Other vulnerable groups, including low-income, minority, and indigenous populations, are also disproportionately impacted by, and thus particularly at risk from, chemicals.

Objectives:

- **Ensure Chemical Safety.** Reduce the risk of chemicals that enter our products, our environment, and our bodies.
- **Promote Pollution Prevention.** Conserve and protect natural resources by promoting pollution prevention and the adoption of other stewardship practices by companies, communities, governmental organizations, and individuals.

Strategic Measures associated with this Goal are on pages 52 through 53.

In 2009, the Administration announced principles for modernizing the Toxic Substances Control Act (TSCA) to help inform efforts underway in Congress to reauthorize and significantly strengthen EPA's ability to assess the safety of industrial chemicals and adequately protect against unreasonable environmental or public health risks.[2] TSCA is outdated and should be revised to provide stronger and clearer authority for EPA to collect and act upon critical data regarding chemical risks. While TSCA does provide some authority to EPA to collect chemical information and mandate industry to conduct testing, there remain large, troubling gaps in the available data and state of knowledge on many widely used chemicals in commerce. EPA's authority to require development and submission of information and testing data is limited by legal hurdles and procedural requirements. As we look to the future, it is important to work together with Congress and stakeholders to modernize and strengthen the tools available under TSCA to prevent harmful chemicals from entering the marketplace and to increase confidence that those chemicals that remain are safe and do not endanger the environment or human health, especially for consumers, workers, and sensitive subpopulations like children.

The 1990 Pollution Prevention Act established preventing pollution before it is generated as national environmental policy. EPA is enhancing cross-cutting efforts to advance sustainable practices, safer chemicals, greener processes and practices, and safer products.

Ensure Chemical Safety

Chemical safety is one of EPA's highest priorities. EPA's approach to chemical risk management leverages expertise, information, and resources by collaborating with other countries, federal agencies, states, tribes, and the public to improve chemical safety.[3] Children and other disproportionately exposed and affected groups, including low-income, minority, and indigenous populations, require more explicit consideration in EPA's chemical risk assessments and management actions, in accordance with the Executive Orders and guidance on children's health and environmental justice.[4]

EPA employs a variety of strategies under several statutes to ensure the safety of chemicals. These include:

- Controlling the risks of new chemicals before they are introduced or reintroduced into commerce;
- Evaluating chemicals already in use;
- Developing and implementing regulatory and other actions to eliminate or reduce identified chemical risks; and,
- Making public the data necessary to assess chemical safety to the extent allowed by law.[5,6]

EPA has enhanced its work to ensure the safety of existing chemicals by taking action to restrict the production and use of chemicals posing unreasonable risks and better assess chemicals that may pose environmental or public health concerns. This will quicken the Agency's pace in characterizing the hazards posed by the highest volume chemicals, maximize use of existing TSCA authorities to increase the availability of chemical information, and accelerate work to identify safer alternatives.

Over the next five years, the Agency will implement risk management actions for chemicals that pose unreasonable risk to the environment or human health, carefully considering how the most vulnerable populations are potentially affected. EPA is strengthening rules to keep track of chemicals in commerce and adding chemicals and data requirements to better inform both EPA and the public about releases of toxic chemicals into the environment. EPA is

increasing its evaluation of claims of confidentiality in order to make all health and safety data for chemicals in commerce more publicly available to the extent allowed by law. EPA is also applying increasingly sophisticated scientific tools in reviewing hundreds of new chemical submissions each year under TSCA and increasing the efficiency and effectiveness of these reviews through the implementation of electronic submission and management systems.[7]

EPA will make major strides in guarding against exposure to chemicals that continue to pose potential risks to human health and the environment even after their hazards have been identified and certain uses have been phased out. For example, to continue to reduce childhood blood lead levels, EPA is working in partnership with states and tribes to certify hundreds of thousands of lead-paint professionals and expand public awareness of lead risks by implementing requirements for the use of lead-safe practices in renovation, remodeling, and painting activities in millions of older homes.[8,9]

Over the next five years, EPA will manage a comprehensive pesticide risk reduction program through science-based registration and reevaluation processes, a worker safety program, certification and training

activities, and support for integrated pest management. EPA's current pesticide review processes focus on ensuring that pesticide registrations comply with the Endangered Species Act and achieve broader Agency objectives for water quality protection. The review processes will continue to place emphasis on the protection of potentially sensitive populations, such as children, by reducing exposures from pesticides used in and around homes, schools, and other public areas. EPA is reviewing its worker safety certification and training regulations to ensure that they are adequately protective. EPA's review processes ensure that pesticides can be used safely and are available for use to maintain a safe and affordable food supply, to address public health outbreaks, and to minimize property damage that can occur from insects and pests.[10]

EPA is also working to identify and address any potential risks of nanoscale materials during new and existing chemical review and on improving data collection efforts.[11] In addition, EPA is implementing a comprehensive testing program to screen for chemicals' potential to interact with the endocrine system.[12] More broadly, EPA is looking comprehensively across statutes to determine the best tools to apply to specific problems. For example, under a new drinking water strategy, the Agency is exploring how to use the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and TSCA to ensure that drinking water is protected from pesticides and industrial chemicals and that chemicals found in drinking water are being screened for endocrine disrupting properties using the authorities of the Safe Drinking Water Act (SDWA), the Federal Food, Drug, and Cosmetic Act (FFDCA), and FIFRA.

Prevent Pollution at the Source

The Pollution Prevention Act of 1990 established national pollution prevention policy. Time and experience have added to our understanding and appreciation of the value of preventing pollution before it occurs. Pollution prevention is central to all of EPA's sustainability strategies, and EPA will continue to incorporate pollution prevention principles into our policies, regulations, and actions. Pollution prevention, a long-standing priority for EPA, encourages companies, communities, governmental organizations, and individuals to prevent pollution and waste before generation by implementing conservation techniques, promoting efficient re-use of materials, making production processes more sustainable, and promoting the use of safer substances. Together with new technology development, these pollution prevention practices result in significant co-benefits, such as the conservation of raw materials, water, and energy; reduction in the use of hazardous and high global-warming-potential materials; promotion of safer chemical substitutes; reduction of greenhouse gas emissions; and, the elimination of pollutant transfers across air, water, and land. EPA will collaborate with states and other partners to review pollution prevention results and identify enhanced pollution prevention strategies. This will also include continuing grants to states to support vital state pollution prevention infrastructures and fund technical assistance for local businesses.

EPA promotes "green" chemistry through the development and use of innovative chemical technologies. The Agency advances environmentally-conscious design, commercialization, and use of "green" engineering processes and sets standards for labeling programs that meet stringent criteria giving consumers assurance about the environmental integrity of the products they use. In addition, EPA helps agencies across the federal government comply with green purchasing requirements, thereby stimulating demand for "greener" products and services.[13]

Research

EPA chemicals research will continue to provide the scientific foundation for addressing the risks of chemical exposure in humans and wildlife. It will include enhanced chemical screening and testing approaches for priority-setting and context-relevant chemical assessment and management. Research will inform Agency actions and help local decision makers address contaminants of greatest concern to them, particularly with respect to air toxics and drinking water issues. EPA will continue assessments of high priority chemicals. EPA's research program also will promote discoveries and innovations in green chemistry and green engineering to help encourage use of safer chemicals in commerce.

End Notes:

1 Environmental Working Group, 2005. *Body Burden–The Pollution in Newborns*. Available at http://www.ewg.org/reports/bodyburden2/execsumm.php.

2 Essential Principles for Reform of Chemicals Management Legislation. Available at http://www.epa.gov/oppt/existingchemicals/pubs/principles.html.

3 "EPA Increases Transparency of Chemical Risk Information: Action part of continued comprehensive reform of toxic substances laws." EPA News Release, January 21, 2010. Available at http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceeac8525735900400c27/631cf22eb540c4db852576b2004eca47!OpenDocument.

4 Executive Orders include: E.O. 13045 (Protection of Children from Environmental Health Risks and Safety Risks) and E.O. 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations). Relevant guidance documents can be found on EPA's environmental justice and children's health websites, http://www.epa.gov/compliance/environmentaljustice/index.html and http://yosemite.epa.gov/ochp/ochpweb.nsf/content/homepage.htm.

5 Collecting and Assessing Information on Chemicals. Available at http://www.epa.gov/oppt/existingchemicals/pubs/collectinfo.html.

6 Managing Chemical Risk. Available at http://www.epa.gov/oppt/existingchemicals/pubs/managechemrisk.html.

7 Overview of EPA New Chemicals Program. Available at http://www.epa.gov/oppt/newchems.

8 Information about childhood lead poisoning is available at http://www.leadfreekids.org

9 EPA Lead-Safe Certification Program. Available at http://www.epa.gov/lead/pubs/toolkits.htm

10 EPA pesticides program information is available at http://www.epa.gov/pesticides.

11 Information about nanotechnology is available at http://www.epa.gov/ncer/nano/factsheet/.

12 Information about the EPA Endocrine Disruptor Screening Program is available at http://www.epa.gov/scipoly/oscpendo/index.htm.

13 Information about the EPA Environmentally Preferable Purchasing Program is available at http://www.epa.gov/epp/pubs/about/about.htm.

Goal 5: Enforcing Environmental Laws

Protect human health and the environment through vigorous and targeted civil and criminal enforcement. Assure compliance with environmental laws.

Vigorous enforcement supports EPA's ambitious goals to protect human health and the environment. Achieving these goals for safe drinking water, lakes and streams that are fishable and swimmable, clean air to breathe, and communities and neighborhoods that are free from chemical contamination requires both new strategies and compliance with the rules we already have. By addressing noncompliance swiftly and effectively, EPA's civil and criminal enforcement cases directly reduce pollution and risk, and deter others from violating the law.

EPA enforcement takes aggressive action against pollution problems that make a difference in communities. Through vigorous civil and criminal enforcement and other compliance tools, EPA targets the most serious water, air, and chemical hazards, and advances environmental justice by protecting low-income, minority, and tribal communities that are disproportionately impacted by such hazards.

Vigorous civil and criminal enforcement plays a central role in achieving the bold goals below that the Administrator has set for EPA:

- **Taking Action on Climate Change and Improving Air Quality:** EPA will take effective actions to reduce air pollution from the largest sources, including coal-fired power plants and the cement, acid, and glass sectors, to improve air quality. Enforcement to cut toxic air pollution in communities improves the health of communities, particularly low-income, minority, and tribal communities that are disproportionately impacted by pollution. Enforcement supports reductions in greenhouse gases (GHG) through enforcement settlements that encourage GHG emission reductions. EPA will also work to ensure compliance with new standards and reporting requirements for GHG emissions as they are developed.
- **Protecting America's Waters:** EPA is revamping enforcement and working with state permitting authorities under the Clean Water Act Action Plan[1] to make progress on the most important water pollution problems. This work includes, as a Priority Goal, increasing enforcement actions in waters that do not meet water quality standards. In addition the Agency will

Objective:

- **Enforce Environmental Laws.** Pursue vigorous civil and criminal enforcement that targets the most serious water, air, and chemical hazards in communities. Assure strong, consistent, and effective enforcement of federal environmental laws nationwide.

Strategic Measures associated with this Goal are on pages 54 through 55.

continue to focus on getting raw sewage out of water, cutting pollution from animal waste, and reducing pollution from stormwater runoff.[2] Enforcement will help to clean up great waters like the Chesapeake Bay and will assist in revitalizing urban communities by protecting urban waters. Enforcement will also support the goal of assuring safe drinking water for all communities, including in Indian country.

- **Cleaning Up Communities and Advancing Sustainable Development:** EPA protects communities by requiring responsible parties to conduct cleanups, saving federal dollars for sites where there are no other alternatives. Aggressively pursuing these parties to clean up sites ultimately reduces direct human exposures to hazardous pollutants and contaminants, provides for long-term human health protection, and makes contaminated properties available for reuse.

- **Ensuring the Safety of Chemicals and Preventing Pollution:** Reforming chemical management enforcement and reducing exposure to pesticides will help protect human health. Enforcement reduces direct human exposures to toxic chemicals and pesticides and supports long-term human health protection.

Criminal enforcement underlines our commitment to pursuing the most serious pollution violations. EPA's criminal enforcement program will focus on cases across all media that involve serious harm or injury; hazardous or toxic releases; ongoing, repetitive, or multiple releases; serious documented exposure to pollutants; and, violators with significant repeat or chronic noncompliance or prior criminal conviction.

EPA shares accountability for environmental and human health protection with states and tribes. We work together to target the most important pollution violations and ensure that companies that do the right thing and are responsible neighbors are not put at a competitive disadvantage. EPA also has a responsibility to oversee state and tribal implementation of federal laws to ensure that the same level of protection for the environment and the public applies across the country.

Enforcement can help to promote environmental justice by targeting pollution problems that disproportionately impact low-income, minority, and tribal communities. Ensuring compliance with environmental laws is particularly important in communities that are exposed to greater environmental health risks. EPA fosters community involvement by making information about compliance and government action available to the public.[3]

Increased transparency is an effective tool for improving compliance. By making information on violations both available and understandable, EPA empowers citizens to demand better compliance.

End Notes:

1 An overview of the Clean Water Action Plan is available at http://www.epa.gov/oecaerth/civil/cwa/cwaenfplan.html.

2 EPA has developed a Priority Goal for water enforcement: EPA will increase pollutant reducing enforcement actions in waters that do not meet water quality standards, and post results and analysis on the web.

3 Information about compliance and government action is available at http://www.epa.gov/compliance/index.html.

External Factors and Emerging Issues

EPA sets goals and objectives in carrying out its mission to protect human health and the environment, but there are always factors outside of EPA's control that affect our ability to do our work. For example, the changing economic, legal, and regulatory landscape often affects the Agency's resources, anticipated activities, and direction. As part of a dynamic global community addressing technological changes, EPA is confronted with challenges, emerging issues, and opportunities every day. An oil spill, flood, hurricane, tragedy, or other disasters can swiftly divert the Agency's anticipated focus. Other issues, such as climate change and population growth, can create long-term challenges that run deep and across many EPA programs. Additionally, EPA accomplishes much of its work through partnerships, particularly with states and tribes, and any budget shortfalls they experience can affect our ability to achieve our goals.

External factors and emerging issues present both opportunities and challenges to EPA. Specifically, over the next five years, EPA will be actively engaged in a variety of areas:

- **Climate Change:** Energy and transportation policies continue to evolve and influence the Agency's ability to improve air quality and address climate change issues. Impacts of climate change, such as changes in rainfall amount and intensity, shifting weather and seasonal patterns, and increases in flood plain elevations and sea levels, will also affect progress towards many of the goals. Yet other developments may have positive environmental impacts. The growth of alternative energy sources and increased investments in energy efficiency can reduce greenhouse gas emissions and improve local air quality.
- **American Reinvestment and Recovery Act (ARRA):** We expect the long-term impact of ARRA[1] funding will advance assessment and cleanup activities at former industrial sites, help address local water infrastructure needs, and spur technological innovation, promoting energy efficiency, alternative energy supplies, and new technologies and innovation in water infrastructure.
- **Water Quality:** Water quality programs face challenges such as increases in nutrient loadings and stormwater runoff, aging infrastructure, and population growth (which can increase water consumption and place additional stress on aging water infrastructures). The Agency needs to examine carefully the potential impacts of and solutions to these issues, including effects on water quality and quantity that could result in the long term from climate change.
- **Waste Management:** Our necessary reliance on private parties, state and tribal partners, the use of new and innovative control technologies, and the involvement of other federal agencies in remediation efforts can all affect our efforts to remediate contaminated sites and prevent waste. New waste streams are continually emerging, such as those from mining of rare earth elements which are used in clean-energy technologies, potentially presenting increased opportunities for recycling of valuable materials and challenges for safe disposal of new waste streams.
- **Protective Site Cleanup:** Hazardous waste programs are intended to provide permanent solutions to contaminated media at sites or facilities to the extent practicable. Complications can arise when new scientific information concerning contaminants at a site suggests that a risk assessment that was protective when a remedy was selected is no longer protective given the contaminant levels remaining at a site and their potential exposure pathways and uses. As appropriate, EPA must incorporate emerging science into decision making to maintain its commitment to provide permanent solutions.
- **Chemical Safety:** Legislative reforms to the Toxic Substances Control Act in line with the Administration's principles would provide EPA

with the ability to obtain and publicly disclose critical information on the risks posed by chemicals. This will strengthen our chemical risk assessment and management programs, and significantly improve federal and state ability to manage and mitigate risk from industrial chemicals.

- **Communities:** Citizen science—individual citizens and community groups that monitor and document environmental trends—can expand the reach of EPA's own field presence. Communities have access to more environmental, economic, and social data than ever before that can be synthesized and analyzed through varying tools and technologies. With this information, communities can make smarter management decisions which may lead to increasingly effective stewardship. While citizen science requires expert support to ensure the quality of environmental data and to facilitate knowledge-building, with the right tools, communities can spur local industry and others to do a better job of complying with environmental laws and regulations.

The world in which EPA works continues to change rapidly. The recent oil spill in the Gulf of Mexico is a catastrophic environmental problem that will have significant consequences and require innovative technological and other solutions. A wide range of new technologies are on the horizon in areas as diverse as nanotechnology catalysts and nanosolar cells, nanomaterials for rehabilitation of water pipes, advanced battery technologies, accurate and inexpensive portable and real-time sensors, and the application of synthetic biology to algal biofuel production. Emerging technologies may present new environmental problems that need to be understood and addressed, and at the same time will create opportunities for building an advanced technological infrastructure. EPA will continue to do its best to anticipate change and be prepared to address the inevitable challenges and opportunities that we will face in the future.

End Note:

1 Information about the American Reinvestment and Recovery Act is available at http://www.recovery.gov.

Summary of Program Evaluation

The Administration has emphasized the importance of using program evaluation to provide the evidence needed to demonstrate that our programs are meeting their intended outcomes. By assessing how well a program is working and *why*, program evaluation can help EPA identify where our activities have the greatest impact on protecting human health and the environment, provide the road map needed to replicate successes, and conversely, identify areas needing improvement. This is particularly important as EPA meets its obligations for transparency and accountability.

For the *Strategic Plan*, we look to the results of past evaluations to inform our program strategies for the next five years. Evaluation results may affirm existing strategies or identify opportunities for improvement and may lead to changes in policy, resource decisions, and program implementation. For example, the Government Accountability Office's 2007 evaluation of the Toxic Substances Control Act helped frame Administrator Jackson's September 2009 announcement of an integrated approach to chemical management and a set of principles for reform. Additionally, EPA commissioned the National Academy of Public Administration (NAPA) to conduct an independent evaluation of the Community Action for a Renewed Environment (CARE) Demonstration Program, a competitive grant program that offers an innovative way for a community to organize and take action to reduce toxic pollution in its local environment.[1] Recommendations and feedback from this evaluation have informed EPA's strategic changes and investment decisions in the program.

Our plans for future program evaluations include cyclical reviews of our research and development programs. These are geared to ensure that our research priorities meet our future challenges. Examples of other future evaluations include assessing the impact of our "green" chemical labeling program on consumer purchasing habits and measuring the success of less resource-intensive remediation strategies to clean up hazardous waste sites across the country.

While EPA conducts a variety of design, process, and outcome evaluations, under the Administration's government-wide evaluation initiative, EPA is working to evolve and expand our portfolio to conduct more rigorous impact evaluations that will enhance program effectiveness. Recently completed process and program evaluations from EPA and external organizations that informed the strategies in the *Strategic Plan* and a preliminary list of future program evaluations EPA plans to conduct are described in more detail at the *EPA Strategic Plan* website.[2]

End Notes:

1 National Academy of Public Administration, 2009. *Putting Community First: A Promising Approach to Federal Collaboration for Environmental Improvement.* Available at http://www.napawash.org/pc_management_studies/CARE/5-21-09_Final_Evaluation_Report.pdf.

2 EPA *Strategic Plan* website: http://www.epa.gov/ocfo/plan/plan.htm.

Cross-Cutting Fundamental Strategies

Introduction

Since EPA's inception over 40 years ago, we have focused not only on our mission to achieve environmental and human health results but also on how we work to accomplish those results. Achievement of each of these goals and objectives is shared across EPA. Through this *Plan*, EPA is placing an increased focus on how we work to achieve those results.

We have developed a set of cross-cutting strategies that stem from the Administrator's priorities and are designed to fundamentally change how we work, both internally and externally, to achieve the mission outcomes articulated under our five strategic goals. This *Plan* describes the vision and operating principles for each of the cross-cutting strategies:

- Expanding the conversation on environmentalism;
- Working for environmental justice and children's health;
- Advancing science, research, and technological innovation;
- Strengthening state, tribal, and international partnerships; and,
- Strengthening EPA's workforce and capabilities.

The Agency will develop annual action plans with commitments that align with existing planning, budget, and accountability processes. In implementing these strategies through annual action plans, we are embarking on a deliberate, focused effort to take tangible, measurable actions to transform the way we deliver environmental and human health protection.

Expanding the Conversation on Environmentalism

Engage and empower communities and partners, including those who have been historically under-represented, in order to support and advance environmental protection and human health nationwide.

We have begun a new era of outreach at EPA and seek to include a broader range of people and communities in our work and expand our engagement with communities historically under-represented in our decision-making processes. We will build stronger working relationships throughout the country, particularly with tribes, communities of color, economically-distressed cities and towns, young people, and others.

To accomplish these goals, we will:

- Call for innovation and bold thinking and ask all employees to bring their creativity and talents to their everyday work to enhance outreach and transparency in all our programs.
- Ensure that our science is explained clearly and accessible to all communities, communicating and educating in plain language the complexities of environmental, health, policy, and regulatory issues.
- Educate and empower individuals, communities, and Agency partners in decision making through public access to environmental information and data.
- Ensure that the Agency's regulations, policies, budget, and decision-making processes are transparent and accessible through increased access to environmental data sources, community right-to-know tools, and direct stakeholder engagement.
- Address barriers to improve engagement with historically under-represented sectors of the nation.
- Use traditional and new media to inform and educate the public about Agency activities and provide opportunities for community feedback.
- Encourage citizens to understand the complexities and impacts of environmental issues and environmental stewardship, and provide avenues and tools that enhance their ability to participate in processes that could affect them.

Working for Environmental Justice and Children's Health

Work to reduce and prevent harmful exposures and health risks to children and underserved, disproportionately impacted low-income, minority, and tribal communities, and support community efforts to build healthy, sustainable green neighborhoods.

Advancing environmental justice and protecting children's health must be driving forces in our decisions across all EPA programs. The underlying principles for this commitment are reducing exposures for those at greatest risk and ensuring that environmental justice and children's health protection are integral to all Agency activities. All populations—including minority, low-income, and indigenous populations—that are vulnerable to environmental pollution are at risk of having poor health outcomes. These vulnerabilities may arise because of higher exposures to pollution in places where they work, live, and play, and/or diminished abilities to withstand, cope with, or recover from exposure to environmental pollution.[1] Children are often most acutely affected by environmental stressors. Research has demonstrated that prenatal and early life exposures to environmental hazards can cause lifelong diseases, medical conditions, and disabilities.[2]

Environmental justice and children's health protection will be achieved when all Americans, regardless of age, race, economic status, or ethnicity, have access to clean water, clean air, and healthy communities. To accomplish this, EPA will use a variety of approaches, including regulation, enforcement, research, outreach, community-based programs, and partnerships to protect children and disproportionately impacted, overburdened populations from environmental and human health hazards. Our success in advancing environmental justice and children's health protection will result from fully incorporating these priorities into all of our activities across each of the strategic goals of the Agency. We anticipate that our leadership in advancing environmental justice and children's health protection will inspire and engage a broad spectrum of partners in the public and private sector to do the same.

Specifically, EPA will:

- In our regulatory capacity, implement the nation's environmental laws using the best science and environmental monitoring data to address the potential for adverse health effects from environmental factors in disproportionately impacted, overburdened populations and vulnerable age groups. EPA programs will incorporate environmental justice and children's health considerations at each stage of the Agency's regulation development process and in implementation of environmental regulations.
- Develop and use environmental and human health indicators to measure improvements in environmental conditions and health in disproportionately impacted communities and among vulnerable age groups.

- In our work on safe management of pesticides and industrial chemicals, take into account disproportionately impacted, overburdened populations, and women of child-bearing age, infants, children, and adolescents, and encourage the use of "green chemistry" to spur the development of safer chemicals and production processes.
- Apply the best available scientific methods to assess the potential for disproportionate exposures and health impacts resulting from environmental hazards on minority, low-income, and indigenous populations, women of child-bearing age, infants, children, and adolescents, to support EPA decision making, and to develop the tools to assess risk from multiple stressors.
- Engage communities in our work to protect human health and the environment. EPA will align multiple community-based programs to provide funding and technical assistance to communities to build capacity to address critical issues affecting children's health and disproportionately impacted populations.
- Work with other federal agencies[3] to engage communities and coordinate funding and technical support for efforts to build healthy, sustainable, and green neighborhoods, and work with residents to promote equitable development.

End Notes:

1 See the following sources:

World Health Organization, 2006. *Principles for Evaluating Health Risks in Children*. Environmental Health Criteria, 237. Available at http://whqlibdoc.who.int/publications/2006/924157237X_eng.pdf;

EPA, 2003. Framework for Cumulative Risk Assessment. Risk Assessment Forum. EPA/630/P-02/001F. Available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=54944; and,

EPA, 2004. *Ensuring Risk Reduction in Communities with Multiple Stressors: Environmental Justice and Cumulative Risks/Impacts*. Available at http://www.epa.gov/environmentaljustice/resources/publications/nejac/nejac-cum-risk-rpt-122104.pdf.

2 National Institutes of Health, National Institute of Environmental Health Sciences, 2008. *Linking Early Environmental Exposures to Adult Diseases*. Available at http://www.niehs.nih.gov/health/docs/linking-exposures.pdf.

3 Including the Departments of Housing Urban and Development, Health and Human Services, Energy, Agriculture, Transportation, Interior, Labor, and Education.

Advancing Science, Research, and Technological Innovation

Advance a rigorous basic and applied science research and development agenda that informs, enables, and empowers and delivers innovative and sustainable solutions to environmental problems. Provide relevant and robust scientific data and findings to support the Agency's policy and decision-making needs.

The major challenges we face to human health and the environment are not incremental problems, and they do not lend themselves to incremental solutions. EPA will promote innovative solutions to environmental problems that reduce or eliminate pollution while avoiding unintended and/or unwanted consequences, addressing pollutants, chemicals, and materials throughout their life cycle from raw material to final disposition.

The Office of Management and Budget (OMB) has reiterated the critical and timely need for innovation in science and technology, building on the President's *Strategy for American Innovation*.[1,2] OMB identifies priorities that include new approaches to multi-disciplinary research, new approaches for accelerating technology commercialization and innovation, interagency and international collaborations, and better communication with the public on science, technology, and innovation.

Environmental sustainability is a guidepost for science, research, and technological innovation at EPA.[3] Sustainability is a broader approach to environmental protection that considers trade-offs in production processes and materials use. Sustainable solutions prevent chemicals from entering the environment or eliminate, rather than simply reduce, the production of waste through better materials management.

EPA must help drive high quality research, sound science, and technology innovation to sustainably address air quality, climate change, water quality and quantity, unreasonable risks from toxic chemicals, ecosystem degradation, and other environmental issues. EPA will inform, enable, and stimulate the development of sustainable solutions to current and future challenges because sustainable and innovative environmental solutions can also be more economically efficient.

EPA science and research must always inform the decisions that are essential to the protection of human health and the environment and empower the broader community that supports our mission. To address challenging environmental problems in this manner, EPA research will:

- **Provide timely, responsive, and relevant solutions:** EPA's science, research, and technological innovation depend on partnerships and a continuing dialogue with internal and external partners and stakeholders to ensure that EPA efforts focus on the highest priority problems faced by the Agency and the nation. Building on traditional collaboration efforts, EPA will also leverage the scientific discoveries of others to achieve even more responsive solutions to the environmental problems that our communities face.

- **Transcend traditional scientific disciplines:** A broad perspective—one that integrates knowledge from a wide variety of sources—is key to developing sustainable solutions. In all aspects of our work, from problem identification, to research design and conduct, to implementation and adoption of solutions, EPA must rely on diverse disciplines. Environmental problems often raise complex scientific and technological issues that require non-traditional approaches. If EPA is to advance progress on these challenging problems, we must rely on integrated, trans-disciplinary research that complements traditional, single-discipline approaches.

- **Communicate widely and openly:** Great work, done invisibly, cannot have an impact. To maximize the impact and utility of our research, EPA will communicate the design, definition, conduct, transfer, and implementation of the work we do. We will translate our science so that it is accessible, understandable, relevant to, and used by stakeholders and the general public. EPA must document our successes to maximize the value of our scientific work.

- **Catalyze sustainable innovation:** EPA's efforts alone will not be enough to address the environmental challenges our nation faces. As we develop and promote these technology innovations, EPA must account for life-cycle perspectives and support technologies that fully consider environmental and social impacts, and collaborate with partners in academia, government, and industry to assess impacts and promote effective product stewardship. EPA must also guide sustainable solutions on the path from conceptual and proof-of-concept stages, through research and development, to commercialization and deployment. EPA must understand and engage the marketplace to ensure the effectiveness of these solutions. Additionally, EPA must be receptive to external innovations in science, research, and technology that can enhance EPA's effectiveness in fulfilling our mission.

End Notes:

1 OMB Memorandum M-10-30, July 21, 2010. "Science and Technology Priorities for the FY2012 Budget." Available at http://www.whitehouse.gov/sites/default/files/omb/memoranda/2010/m10-30.pdf.

2 Press Release from the White House Office of the Press Secretary, September 21, 2009. "President Obama Lays Out Strategy for American Innovation." Available at http://www.whitehouse.gov/the_press_office/President-Obama-Lays-Out-Strategy-for-American-Innovation/.

3 Information on the EPA Sustainability Program is available at http://www.epa.gov/sustainability/.

Strengthening State, Tribal, and International Partnerships

Deliver on our commitment to a clean and healthy environment through consultation and shared accountability with states, tribes, and the global community for addressing the highest priority problems.

EPA will strengthen its state, tribal, and international partnerships to achieve our mutual environmental and human health goals. As we work together, our relationships must continue to be based on integrity, trust, and shared accountability to make the most effective use of our respective bodies of knowledge, our existing authorities, our resources, and our talents.

Successful partnerships will be based on four working principles: consultation, collaboration, cooperation, and accountability. By *consulting*, we will engage our partners in a timely fashion as we consider approaches to our environmental work so that each partner can make an early and meaningful contribution toward the final result. By *collaborating*, we will not only share information, but we will actively work together with our partners to use all available resources to reach our environmental and human health goals. As our work progresses, we will *cooperate*, viewing each other with respect as allies who must work successfully together if our goals are to be achieved. Through shared *accountability*, we will ensure that environmental benefits are consistently delivered nationwide. In carrying out these responsibilities, EPA will ensure through oversight that state and tribal implementation of federal laws achieves a consistent level of protection for the environment and human health.

With States

Under our federal environmental laws, EPA and the states share responsibility for protecting human health and the environment. With this relationship as the cornerstone of the nation's environmental protection system, EPA will:

- Improve implementation and consistent delivery of national environmental programs through closer consultation and transparency.
- Work with states to seek efficient use of resources through work-sharing, joint planning using data analysis and targeting to address priorities, and other approaches.
- Play a stronger management role to facilitate the exchange of data with states to improve program effectiveness and efficiency.
- Consult with state and local governments on a routine basis to ensure that the development and implementation of rules is consistent with *EPA's Action Development Process: Guidance on Executive Order 13132* (Federalism), which recognizes the division of governmental responsibilities between the federal government and the states.

- Strengthen state–EPA shared accountability by focusing oversight on the most significant and pressing state program performance challenges, using data and analysis to speed program improvements.
- Ensure a level playing field across states to improve compliance and address the most serious violations.

With Tribes

The relationship between the United States Government and federally-recognized tribes is unique and has developed throughout the course of the nation's history. In strengthening this relationship, EPA will:

- Focus on increasing tribal capacity to establish and implement environmental programs while ensuring that our national programs are as effective in Indian country as they are throughout the rest of the nation.
- Enhance our effort as we work with tribes on a government-to-government basis, based upon the Constitution, treaties, laws, executive orders, and a long history of Supreme Court rulings.
- Strengthen our cross-cultural sensitivity with tribes, recognizing that tribes have cultural, jurisdictional, and legal features that must be considered when coordinating and implementing environmental programs in Indian country.

With Other Countries

To achieve our domestic environmental and human health goals, international partnerships are essential. Pollution is often carried by winds and water across national boundaries, posing risks many hundreds and thousands of miles away. Many concerns, like climate change, are universal. In the international arena, EPA will:

- Expand our partnership efforts in multilateral forums and in key bilateral relationships.
- Enhance existing and nurture new international partnerships to promote a new era of global environmental stewardship based on common interests, shared values, and mutual respect.

Strengthening EPA's Workforce and Capabilities

Continuously improve EPA's internal management, encourage innovation and creativity in all aspects of our work, and ensure that EPA is an excellent workplace that attracts and retains a topnotch, diverse workforce, positioned to meet and address the environmental challenges of the 21st century.

Achieving positive environmental and human health outcomes through cleaner and safer air, water, and land, and through protection of our natural resources is the focal point of all our work at EPA. This compelling mission attracts workers eager to make a difference and drives employees across the Agency to work together. EPA fully supports the Administration's efforts to reform the federal government's hiring system to ensure highly qualified individuals are available to strengthen EPA's workforce. EPA believes these reforms will improve the Agency's ability to protect human health and the environment more effectively and efficiently.

EPA is a complex organization. This is both an asset and a challenge. To achieve its mission, EPA is continuously building and nurturing a skilled workforce, finding new ways to use the power of information, working together through enhanced communication, and demanding transparency and accountability at all levels. With innovative and creative management and a talented, diverse, and highly motivated workforce, EPA will be positioned to meet head-on the complex environmental challenges of the present and future.

To achieve this goal, EPA will:

- Recruit, develop, and retain a diverse and creative workforce, equipped with the technical skill and knowledge needed to accomplish the Agency's mission and to meet evolving environmental challenges.
- Cultivate a workplace that values a high quality work life, provides employee-friendly policies and facilities, and invests in the information infrastructure, technology, and security essential to support a mobile workforce.
- Practice outstanding resource stewardship to ensure that all Agency programs operate with fiscal responsibility and management integrity, are efficiently and consistently delivered nationwide, and demonstrate results.
- Take advantage of existing and emerging tools to improve and enhance communication, transparency, and accountability.
- Integrate energy efficiency and environmental considerations into our work practices as core components of Agency business models and operations.
- Improve the effectiveness and efficiency of the Agency's acquisition function by strengthening requirements development, contract management, and internal review practices; maximizing the use of competition in contracting, reducing high-risk contracts; improving how contracts are structured; building the skills of the acquisition workforce; and improving management of the EPA acquisition workforce.

Strategic Measurement Framework

Introduction

The *Strategic Plan* provides the foundation for EPA's performance management system—planning, budgeting, performance measurement, and accountability. The *Plan* contains EPA's strategic measurement framework of long-term goals, objectives, and strategic measures, which describe the measurable human health and environmental results the Agency is working to achieve over the next five years.

To achieve the long-term goals, objectives, and strategic measures set out in this *Plan*, EPA designs annual performance measures which are presented in EPA's *Annual Performance Plans and Budgets*. The Agency reports on our performance against these annual measures in *Annual Performance Reports*, and uses this performance information to establish priorities and develop future budget submissions. The Agency also uses this performance data to evaluate our progress and develop future *Strategic Plans*.

EPA's strategic planning and decision-making benefits from other sources of information as well, including program evaluations and environmental indicators. A number of the strategic measures in this *Strategic Plan* are based on indicators contained in EPA's *2008 Report on the Environment* (ROE). The ROE identifies a set of peer-reviewed human health and environmental indicators that allows EPA to track trends in environmental conditions and environmental influences on human health. This information also helps us better articulate and improve the strategic measurement framework in EPA's *Strategic Plan*.

The Agency continues to look for new data and information sources to better characterize the environmental conditions targeted by our programs and improve our understanding of the integrated and complex relationships involved in maintaining human health and environmental well-being.

Significant Changes in the Strategic Measurement Framework

We have made significant changes to our measurement framework in this *Plan*. We revised our five strategic goals to sharpen and align them with the Administrator's priorities, including a heightened focus on cross-program activities addressing climate change adaptation and mitigation, sustainable communities, and chemical safety. We revised our suite of strategic measures—the measurable environmental and human health outcomes we are working to achieve—in several significant ways. First, we significantly reduced the number of strategic measures by focusing on the key outcomes most important to advance the Administrator's priorities and the Agency's mission. The goal was to create a *smaller, more strategic, and more meaningful set that Agency leadership uses to manage*. Second, for consistency purposes, we placed all the quantified measurable results at the lowest level in the framework—the strategic measures. Third, we updated the strategic measures to reflect targets and baselines appropriate for the FY 2011–2015 time

horizon. Lastly, we removed the separate objectives and strategic measures for the Agency's research and development program from the *Plan* and integrated this work into the programmatic objectives; this critical work supports many of our strategic measures and will continue to be tracked through annual performance measures.

Some of the new strategic directions in our measures are reflected in this *Plan*, but efforts will continue over the next several years to make further revisions in key areas. Highlights of the new measures and continuing efforts are described below.

- **Deepwater Horizon BP Oil Spill in the Gulf of Mexico:** While we are still assessing the unprecedented environmental damage from the Deepwater Horizon BP oil spill and the Agency actions necessary to address the damage and prevent similar disasters in the future, we have added a new strategic measure as a preliminary step to reflect the challenge ahead. This measure addresses efforts to conduct a thorough review of our oil spill program regulations to ensure that these regulations are up to date and effective. The magnitude of the impacts has yet to be fully understood and assessed, so further adjustments may be needed in the future. In addition, EPA is working to develop a water-oriented measure in response to the Deepwater Horizon BP oil spill in the Gulf of Mexico. The measure will reflect efforts to assist in the restoration of the Gulf of Mexico ecosystem, including water, wetlands, beaches, and surrounding communities. Currently, EPA has two program-specific water measures, one that relates to Gulf of Mexico hypoxia and the other to regional coastal aquatic ecosystem health that will be reassessed for impact from the oil spill.

- **Climate Change Adaptation and Mitigation:** The ability of communities to respond to changes in climate over the next decade is critical to achieving many of the environmental outcomes in this *Strategic Plan*. We have incorporated consideration of climate change across all five goals of the *Strategic Plan* and will continue to collaborate with stakeholders, the US Global Change Research Program, the Interagency Taskforce on Climate Change Adaptation, and others. We have added three strategic measures for climate change adaptation under Goal 1. In addition, we have expanded the existing greenhouse gas (GHG) mitigation measure to capture reductions Agency-wide and added a measure to reflect expected GHG reductions resulting from the light-duty vehicle greenhouse gas rule.

- **Land Cleanup:** EPA has begun an Integrated Cleanup Initiative, a multi-year effort to better use assessment and cleanup authorities to address a greater number of sites, accelerate cleanups, and put those sites back into productive use while protecting human health and the environment. The Agency is working to develop a suite of measures that will allow for comprehensive management across cleanup programs and across the cleanup life cycle, with a focus on three critical points in the cleanup process—starting, advancing, and completing site cleanups. As a first step in this process, we are shifting our definition of success at a Superfund site from where the construction of a remedy is complete, to when the site is actually "ready for anticipated use" in a community. In addition, a new site assessment measure has been developed that fully captures the entire assessment workload at the beginning of the Superfund process, a measure which also may be expanded to include progress of other cleanup programs in the future.[1]

- **Chemical Safety:** One of EPA's highest priorities over the next five years is to ensure the safety of chemicals and pesticides used in this country. As part of this effort, EPA is taking a more integrated approach to managing chemical and pesticide risk reduction and, in coordination with other relevant federal agencies, is focusing on consumers, workers, and sensitive subpopulations like children. EPA is enhancing its ability to measure the effects of chemicals and pesticides on human health and the environment by introducing new measures to reduce the concentration of targeted chemicals and pesticides in the general population and children.

- **Enforcement and Compliance Assurance:** The Agency's enforcement and compliance assurance program is moving from a tool-based

(e.g., assistance, incentives, monitoring, and enforcement) to an environmental problem-based (e.g., air, water) approach to addressing noncompliance and environmental harms. Our current approach, rooted largely in the traditional inspection and enforcement model, has shown substantial environmental and human health benefits, but will not be able to keep up with expanding universes of regulated sources. For example, the universe of National Pollutant Discharge Elimination System (NPDES) sources has expanded from about one hundred thousand when the Clean Water Act (CWA) was passed to almost one million today. This is especially true in light of the current economic challenges faced by states, which perform the majority of inspections and enforcement actions. For those programs and sectors that have been the focus of EPA and state attention, the level of noncompliance shows us that serious violations are likely widespread, all but ensuring that there are areas across the country where basic health protections for Americans are in jeopardy.

EPA is adopting new strategic approaches to deal with these challenges that do not solely depend on inspections and enforcement to address serious violations, including:

- Building self-monitoring and reporting requirements into rules, which will allow government to better understand the compliance status at regulated facilities.
- Using 21st century technologies to facilitate the electronic transmission of data directly from regulated sources and states that generate the data, to government agencies that receive the data, which will improve the quality and timeliness of data available to make decisions.
- Making more information available to the public in an easy-to-use, understandable format so the public can demand better facility and government performance.

As part of this new approach, the Agency's enforcement program is developing a suite of measures that expand its ability to communicate to the public. As part of this suite, the Agency is including measures for its criminal enforcement program for the first time in the *Strategic Plan*. The suite of measures addresses:

- **Enforcement Presence/Level-of-Effort Measures:** The extent of the general enforcement and compliance assurance presence in communities;
- **Case-Linked Outcome Indicators:** The annual and long-term trends in environmental benefits resulting from EPA enforcement actions; and
- **Strategic Enforcement Measures:** The results of EPA's focused efforts to address specific, high-priority problems that make a difference to communities.

When viewed together, this suite of measures provides a more comprehensive understanding of the program than has been available previously. This suite of measures is captured in the figure on the next page.

Suite of Strategic Enforcement and Compliance Assurance Measures

Measures in the FY 2011–2015 Strategic Plan		Measures under Development
Enforcement Presence/ Level of Effort Measures	**Case-Linked Outcome Indicators**	**Strategic Enforcement Measures (under development)**
Inspections & evaluations	AIR	AIR
Initiated & concluded civil judicial & administrative enforcement cases	Air pollutants reduced	Air toxics
Compliance status of open, non-Superfund consent decrees	WATER	Criteria air pollutants
Address cost recovery statute of limitations cases with total past costs above $200,000	Water pollutants reduced	WATER
Reaching settlement with potentially responsible parties (PRPs)	WASTE	Raw sewage
Criminal cases with charges filed	Hazardous waste reduced	Animal waste
Criminal cases with defendants convicted	Contaminated media reduced	Water compliance
	CHEMICALS	WASTE
	Toxic and pesticide pollutants	Wastes from mineral processing
	CRIMINAL	Clean up hazardous waste sites in communities
	Criminal cases with most significant impacts	CHEMICALS
	Criminal cases with individual defendants	Reduce exposure to pesticides
		Enforce chemical management rules

The *Strategic Plan* includes five-year measures for EPA's enforcement presence and outcome indicators for which EPA will develop annual performance measures for inclusion in the *Annual Plan and Budget*, similar to all strategic measures included in this *Plan*.

The Agency has historically relied on enforcement presence or level-of-effort measures to communicate its enforcement and compliance presence to the public and regulated industry. These measures illustrate that the Agency is actively and consistently performing the activities necessary to find polluters, take appropriate action, and monitor defendants' compliance with settled enforcement cases. The Agency targets these activities toward the most serious human health and environmental problems across a variety of regulatory programs.

The Agency uses case-linked outcome indicators to communicate the environmental benefits gained from completed enforcement and compliance activities such as compliance assistance, compliance incentives, and enforcement cases. While linked, there is not a linear or proportional relationship between the activities and the outcomes.

Unlike level-of-effort results, which tend to be relatively consistent on a yearly basis, these outcome measures are dominated by very large enforcement cases and will typically vary widely over time depending on the pollution problems being addressed. For example, the measure of pounds of pollution reduced by enforcement actions varies widely from year to year and is not expected to trend upwards from one year to the next. In fact, as the most

significant pollution sources are addressed, the amount of pollution reduced by enforcement in a particular industrial sector should go down over time.

Over the next five years, the Agency will develop a new category of measurement—strategic enforcement measures—designed to demonstrate progress toward achieving its national enforcement goal of aggressively going after specific pollution problems that matter to communities. In addition, the strategic enforcement measures will illustrate the work done in Goal 5 to support Goals 1-4 of this *Strategic Plan*.

To launch this effort, the Agency's enforcement program will focus initially on developing measures that demonstrate progress toward the goals of its six national enforcement initiatives.[2] These initiatives target nationally important pollution problems where enforcement can play an important role to address serious noncompliance. We will develop strategic measures that chart our progress in addressing these significant compliance problems, recognizing that the measures, like the solutions, will vary with the problem. Two examples include: (1) targeting the sectors that contribute the largest amount of serious air pollution that causes significant harm to human health, which include coal-fired utilities and acid, glass, and cement plants; and (2) working to improve compliance by the tens of thousands of animal feeding operations that contribute to water pollution in many communities. We need both aggressive enforcement actions and new creative strategies to tackle sector compliance issues for these important, but very different, problems. Our measures will reflect those strategies, and attempt to do a more complete job of providing meaningful information to the public about our progress than the traditional measures alone can do. What we learn from measures developed for the national enforcement initiatives will be applied in setting measures for our other national enforcement goals.

One of the challenges in improving compliance and reducing pollution is the lack of solid information about facility releases and compliance. These information gaps make it harder to target facilities for enforcement, to understand and develop measures for compliance performance, and for communities to know what pollution is occurring in their own neighborhoods. EPA recognizes that we need to improve facility monitoring of pollution and make that information available to the public using 21st century technologies including more comprehensive electronic reporting. These efforts will increase transparency and create incentives to reduce pollution and to comply with the law, while also giving state and federal governments the information they need to target enforcement and track progress. Over the longer term, as efforts to increase electronically reported facility information take effect, consistently reported, sector-wide data may enable us to generate realistic compliance rates for some sectors. These efforts will help us to strengthen both performance and measures in the years ahead.

Where data, baselines, and targets are available to support the measures, EPA will include new measures for the national initiatives in the *FY 2012 Annual Plan and Budget* in February 2011 and will amend the *Strategic Plan* to include those that are suitable strategic measures. For those measures where EPA does not have existing data, EPA will identify necessary data sources and begin to collect the information with the intention of developing baselines and targets for additional strategic enforcement measures to be included in future *Annual Plans*.

The Agency will also work closely with its state partners to explore how to be more transparent regarding our joint accountability to protect the environment and public health by showing to the public, before FY 2015, both federal and state progress and problems in enforcement and compliance programs, as well as compliance monitoring coverage levels.

EPA's High Priority Performance Goals (Priority Goals)

In addition to the long-term strategic measures, EPA established six near-term Priority Goals in FY 2010 with 18- to 24-month operational targets that advance our strategic goals and serve as key indicators of our work. EPA will report progress on these Priority Goals in the *Annual Plan and Budget* and through the Office of Management and Budget, with results regularly available to the public at www.performance.gov.

EPA's Priority Goals

EPA will improve the country's ability to measure and control greenhouse gas (GHG) emissions. Building a foundation for action is essential.

By June 15, 2011, EPA will make publicly available 100 percent of facility-level GHG emissions data submitted to EPA in accordance with the GHG Reporting Rule, compliant with policies protecting confidential business information (CBI).

In 2011, EPA, working with DOT, will begin implementation of regulations designed to reduce the GHG emissions from light-duty vehicles sold in the U.S. starting with model year 2012.

Clean water is essential for our quality of life and the health of our communities. EPA will take actions over the next two years to improve water quality.

Chesapeake Bay watershed states (including the District of Columbia) will develop and submit Phase I watershed implementation plans by the end of CY 2010 and Phase II plans by the end of CY 2011 in support of EPA's final Chesapeake Bay total maximum daily load (TMDL) and consistent with the expectations and schedule described in EPA's letters of November 4 and December 29, 2009, and June 11, 2010.[3]

Increase pollutant reducing enforcement actions in waters that do not meet water quality standards, and post results and analysis on the web.

Over the next two years, EPA will initiate review/revision of at least four drinking water standards to strengthen public health protection.

EPA will ensure that environmental health and protection is delivered to our communities.

By 2012, EPA will have initiated 20 enhanced brownfields community level projects that will include a new area-wide planning effort to benefit under-served and economically disadvantaged communities. This will allow those communities to assess and address a single large or multiple brownfields sites within their boundaries, thereby advancing area-wide planning to enable redevelopment of brownfields properties on a broader scale. EPA will provide technical assistance, coordinate its enforcement, water, and air quality programs, and work with other federal agencies, states, tribes, and local governments to implement associated targeted environmental improvements identified in each community's area-wide plan.

End Notes:

1 EPA will continue to report site construction completions as an annual performance measure in its *Annual Plan and Budget*.

2 Information about EPA's National Enforcement Initiatives for Fiscal Years 2011–2013 is available at http://www.epa.gov/compliance/data/planning/initiatives/initiatives.html. EPA solicited feedback on its FY 2011–2013 national enforcement initiatives in a Federal Register Notice in January 2010 and in an on-line discussion forum (see http://blog.epa.gov/enforcementnationalpriority).

3 EPA letters available at http://www.epa.gov/reg3wapd/pdf/pdf_chesbay/tmdl_implementation_letter_110409.pdf, http://www.epa.gov/region03/chesapeake/bay_letter_1209.pdf, and http://www.epa.gov/reg3wapd/pdf/pdf_chesbay/TMDLScheduleLetter.pdf.

Goal 1: Taking Action on Climate Change and Improving Air Quality. Reduce greenhouse gas emissions and develop adaptation strategies to address climate change, and protect and improve air quality.

Objective 1.1: Address Climate Change. Reduce the threats posed by climate change by reducing greenhouse gas emissions and taking actions that help communities and ecosystems become more resilient to the effects of climate change.

Strategic Measures:

Address Climate Change

- By 2015, the light-duty vehicle greenhouse gas rule will achieve reductions of 99 $MMTCO_2Eq$. (Baseline FY 2010: 0 $MMTCO_2Eq$.)
- By 2015, additional programs from across EPA will promote practices to help Americans save energy and conserve resources, leading to expected greenhouse gas emissions reductions of 740.1 $MMTCO_2Eq$. from a baseline without adoption of efficient practices. This reduction compares to 500.4 $MMTCO_2Eq$. reduced in 2008. (Baseline FY 2008: ENERGY STAR 140.8 $MMTCO_2Eq$., Industrial Programs[1] 314.2 $MMTCO_2Eq$., Smartway Transportation Partnership 4.2 $MMTCO_2Eq$., Pollution Prevention Programs 6.5 $MMTCO_2Eq$., Sustainable Materials Management Programs[2] 34.3 $MMTCO_2Eq$., WaterSense Program 0.4 $MMTCO_2Eq$., Executive Order 13514[3] GHG Reduction Program 0.0 $MMTCO_2Eq$.)
- By 2015, EPA will integrate climate change science trend and scenario information into five major scientific models and/or decision-support tools used in implementing Agency environmental management programs to further EPA's mission, consistent with existing authorities (preference for one related to air quality, water quality, cleanup programs, and chemical safety).[4] (Baseline FY 2010: 4 scientific models)
- By 2015, EPA will account for climate change by integrating climate change science trend and scenario information into five rule-making processes to further EPA's mission, consistent with existing authorities (preference for one related to air quality, water quality, cleanup programs, and chemical safety).[4] (Baseline FY 2010: 0)
- By 2015, EPA will build resilience to climate change by integrating considerations of climate change impacts and adaptive measures into five major grant, loan, contract, or technical assistance programs to further EPA's mission, consistent with existing authorities (preference for one related to air quality, water quality, cleanup programs, and scientific research).[4] (Baseline FY 2010: 0)

Objective 1.2: Improve Air Quality. Achieve and maintain health-based air pollution standards and reduce risk from toxic air pollutants and indoor air contaminants.

Strategic Measures:

Reduce Criteria Pollutants and Regional Haze

- By 2015, the population-weighted average concentrations of ozone (smog) in all monitored counties will decrease to 0.073 ppm compared to the average of 0.078 ppm in 2009.
- By 2015, the population-weighted average concentrations of inhalable fine particles in all monitored counties will decrease to 10.5 $\mu g/m^3$ compared to the average of 11.7 $\mu g/m^3$ in 2009.

- By 2015, reduce emissions of nitrogen oxides (NO_x) to 14.7 million tons per year compared to the 2009 level of 19.4 million tons emitted.
- By 2015, reduce emissions of sulfur dioxide (SO_2) to 7.4 million tons per year compared to the 2009 level of 13.8 million tons emitted.
- By 2015, reduce emissions of direct particulate matter (PM) to 3.9 million tons per year compared to the 2009 level of 4.2 million tons emitted.
- By 2018, visibility in scenic parks and wilderness areas will improve by 15 percent in the East and 5 percent in the West, on the 20 percent worst visibility days, as compared to visibility on the 20 percent worst days during the 2000–2004 baseline.
- By 2015, with EPA support for developing capability including training, policy, and administrative and technical support, 15 additional tribes will possess the expertise and capability to implement the Clean Air Act in Indian country (as demonstrated by successful completion of an eligibility determination under the Tribal Authority Rule), for a cumulative total of 62 from the 2009 baseline of 47 tribes.

Reduce Air Toxics

- By 2015, reduce emissions of air toxics (toxicity-weighted for cancer) to 4.2 million tons from the 1993 toxicity-weighted baseline of 7.2 million tons.[5]

Reduce the Adverse Ecological Effects of Acid Deposition

- By 2015, air pollution emissions reductions will reduce the number of chronically acidic water bodies and improve associated ecosystem health in acid-sensitive regions of the northern and eastern United States by approximately 10 percent below the 2001 baseline of approximately 500 lakes and 5,000 kilometers of stream length.

Reduce Exposure to Indoor Air Pollutants

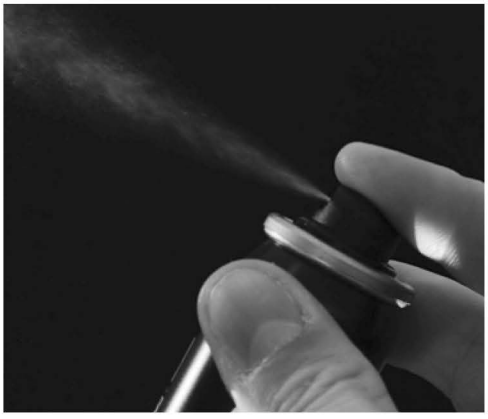
- By 2015, the number of future premature lung cancer deaths prevented annually through lowered radon exposure will increase to 1,460 from the 2008 baseline of 756 future premature lung cancer deaths prevented.
- By 2015, the number of people taking all essential actions to reduce exposure to indoor environmental asthma triggers will increase to 7.6 million from the 2003 baseline of 3.0 million. EPA will place special emphasis on children at home and in schools, and on other disproportionately impacted populations.

Objective 1.3: Restore the Ozone Layer. Restore the earth's stratospheric ozone layer and protect the public from the harmful effects of ultraviolet (UV) radiation.

Strategic Measure:

Reduce Consumption of Ozone-Depleting Substances

- By 2015, U.S. consumption of hydrochlorofluorocarbons (HCFCs), chemicals that deplete the Earth's protective ozone layer, will be less than 1,520 tons per year of ozone depletion potential from the 2009 baseline of 9,900 tons per year. By this time, as a result of worldwide reduction in ozone-depleting substances, the level of "equivalent effective stratospheric chlorine" (EESC) in the atmosphere will have peaked at 3.185 parts per billion (ppb) of air by volume and begun its gradual decline to less than 1.800 ppb (1980 level).



Objective 1.4: Reduce Unnecessary Exposure to Radiation. Minimize unnecessary releases of radiation and be prepared to minimize impacts should unwanted releases occur.

Strategic Measure:

Prepare for Radiological Emergencies

- Through 2015, EPA will maintain a 90 percent level of readiness of radiation program personnel and assets to support federal radiological emergency response and recovery operations, maintaining the 2010 baseline of 90 percent.

End Notes:

1 Industrial Programs include ENERGY STAR for Industry, Natural Gas STAR, Coalbed Methane Outreach Program (CMOP), Landfill Methane Outreach Program (LMOP), Green Power Partnership, Combined Heat and Power Partnership (CHP), Voluntary Aluminum Industry Partnership (VAIP), HFC-23 Emission Reduction Partnerships, Mobile Air Conditioning Climate Protection Partnership (MAC), Environmental Stewardship Initiative, Significant New Alternatives Policy Program (SNAP), Responsible Appliance Disposal Program (RAD), GreenChill Advanced Refrigeration Partnership, and Landfill Rule.

2 Sustainable Materials Management Programs include WasteWise, National Waste Recycling, and Coal Combustion Products Recycling (C2P2).

3 The Federal Leadership in Environmental, Energy, and Economic Performance Executive Order was signed on October 5, 2009. The Executive Order sets sustainability goals for federal agencies and focuses on making improvements in their environmental, energy, and economic performance.

4 The climate is changing and this can impact EPA's ability to achieve its mission and strategic goals. EPA is currently participating in an Interagency Climate Change Adaptation Task Force which will develop recommendations towards a national climate change adaptation strategy in the fall of 2010. EPA's adaptation measures provide a snapshot of EPA's overall effort to integrate climate change adaptation into mainstream decision making within EPA. As the work of the Task Force continues, future measures may be developed that assess the effectiveness of adaptation actions or that reflect a more refined set of climate change adaptation priorities.

5 The 2015 target is an estimate based on the 2005 National Emissions Inventory (NEI) released in 2008, which does not include the impacts of post-2007 rulemakings. Updated estimates that do include the impacts of more recent rulemakings will be available after the release of the 2008 NEI in 2011.

Goal 2: Protecting America's Waters. Protect and restore our waters to ensure that drinking water is safe, and that aquatic ecosystems sustain fish, plants and wildlife, and economic, recreational, and subsistence activities.

Objective 2.1: Protect Human Health. Reduce human exposure to contaminants in drinking water, fish and shellfish, and recreational waters, including protecting source waters.

Strategic Measures:

Water Safe to Drink

- By 2015, 90 percent of community water systems will provide drinking water that meets all applicable health-based drinking water standards through approaches including effective treatment and source water protection. (2005 baseline: 89 percent. Status as of FY 2009: 89 percent.)
- By 2015, 88 percent of the population in Indian country served by community water systems will receive drinking water that meets all applicable health-based drinking water standards. (2005 baseline: 86 percent. Status as of FY 2009: 81 percent.)
- By 2015, in coordination with other federal agencies, provide access to safe drinking water for 136,100 American Indian and Alaska Native homes. (FY 2009 baseline: 80,900 homes. Universe: 360,000 homes.)

Fish and Shellfish Safe to Eat

- By 2015, reduce the percentage of women of childbearing age having mercury levels in blood above the level of concern to 4.6 percent. (2002 baseline: 5.7 percent of women of childbearing age have mercury blood levels above levels of concern identified by the National Health and Nutrition Examination Survey (NHANES).)[1]

Water Safe for Swimming

- By 2015, maintain the percentage of days of the beach season that coastal and Great Lakes beaches monitored by state beach safety programs are open and safe for swimming at 95 percent. (2007 baseline: Beaches open 95 percent of the 679,589 days of the beach season (beach season days are equal to 3,647 beaches multiplied by variable number of days of beach season at each beach). Status as of FY 2009: 95 percent.)[2]

Objective 2.2: Protect and Restore Watersheds and Aquatic Ecosystems. Protect the quality of rivers, lakes, streams, and wetlands on a watershed basis, and protect urban, coastal, and ocean waters.

Strategic Measures:

Improve Water Quality on a Watershed Basis

- By 2015, attain water quality standards for all pollutants and impairments in more than 3,360 water bodies identified in 2002 as not attaining standards (cumulative). (2002 universe: 39,798 water bodies identified by states and tribes as not meeting water quality standards. Water bodies where mercury is among multiple pollutants causing impairment may be counted toward this target when all pollutants but mercury attain standards, but must be identified as still needing restoration for mercury; 1,703 impaired water bodies are impaired by multiple pollutants including mercury, and 6,501 are impaired by mercury alone. Status as of FY 2009: 2,505 water bodies attained standards.)

- By 2015, improve water quality conditions in 330 impaired watersheds nationwide using the watershed approach (cumulative). (2002 baseline: Zero watersheds improved of an estimated 4,800 impaired watersheds of focus having one or more water bodies impaired. The watershed boundaries for this measure are those established at the "12-digit" scale by the U.S. Geological Survey (USGS). Watersheds at this scale average 22 square miles in size. "Improved" means that one or more of the impairment causes identified in 2002 are removed for at least 40 percent of the impaired water bodies or impaired miles/acres, or there is significant watershed-wide improvement, as demonstrated by valid scientific information, in one or more water quality parameters associated with the impairments. Status as of FY 2009: 104 improved watersheds.)

- Through 2015, ensure that the condition of the Nation's streams and lakes does not degrade (i.e., there is no statistically significant increase in the percent rated "poor" and no statistically significant decrease rated "good.") (2006 baseline for streams: 28 percent in good condition; 25 percent in fair condition; 42 percent in poor condition. 2010 baseline for lakes: 56 percent in good condition; 21 percent in fair condition; 22 percent in poor condition.)

- By 2015, improve water quality in Indian country at 50 or more baseline monitoring stations in tribal waters (cumulative) (i.e., show improvement in one or more of seven key parameters: dissolved oxygen, pH, water temperature, total nitrogen, total phosphorus, pathogen indicators, and turbidity) and identify monitoring stations on tribal lands that are showing no degradation in water quality (meaning the waters are meeting uses). (2006 baseline: 185 monitoring stations on tribal waters located where water quality has been depressed and activities are underway or planned to improve water quality, out of an estimated 2,037 stations operated by tribes.)

- By 2015, in coordination with other federal agencies, provide access to basic sanitation for 67,900 American Indian and Alaska Native homes. (FY 2009 baseline: 43,600 homes. Universe: 360,000 homes.)

Improve Coastal and Ocean Waters

- By 2015, improve regional coastal aquatic ecosystem health, as measured on the "good/fair/poor" scale of the National Coastal Condition Report. (FY 2009 baseline: National rating of "fair" or 2.8 where the rating is based on a 4-point system ranging from 1.0 to 5.0 in which 1 is poor and 5 is good using the National Coastal Condition Report indicators for water and sediment, coastal habitat, benthic index, and fish contamination.)

- By 2015, 95 percent of active dredged material ocean dumping sites, as determined by 3-year average, will have achieved environmentally acceptable conditions (as reflected in each site's management plan and measured through onsite monitoring programs). (2009 baseline: 99 percent. FY 2009 universe is 65.) (Due to variability in the universe of sites, results vary from year to year (e.g., between 85 percent and 99 percent). While this much variability is not expected every year, the results are expected to have some change each year.)

- By 2015, working with partners, protect or restore an additional (i.e., measuring from 2009 forward) 600,000 acres of habitat within the study areas for the 28 estuaries that are part of the National Estuary Program. (2009 baseline: 900,956 acres of habitat protected or restored, cumulative from 2002–2009. In FY 2009, 125,437 acres were protected or restored.)

Increase Wetlands

- By 2015, working with partners, achieve a net increase of wetlands nationwide, with additional focus on coastal wetlands, and biological and functional measures and assessment of wetland condition. (2004 baseline: 32,000 acres annual net national wetland gain.)

Improve the Health of the Great Lakes

- By 2015, prevent water pollution and protect aquatic systems so that the overall ecosystem health of the Great Lakes is at least 24.7 points on a 40-point scale. (2009 baseline: Great Lakes rating of 22.5 (expected) on the 40-point scale where the rating uses select Great Lakes State of the Lakes Ecosystem indicators based on a 1 to 5 rating system for each indicator, where 1 is poor and 5 is good.)

- By 2015, remediate a cumulative total of 10.2 million cubic yards of contaminated sediment in the Great Lakes. (2009 baseline: Of the 46.5 million cubic yards once estimated to need remediation in the Great Lakes, 6.0 million cubic yards of contaminated sediments have been remediated from 1997 through 2008.)

Improve the Health of the Chesapeake Bay Ecosystem

- By 2015, achieve 50 percent (92,500 acres) of the 185,000 acres of submerged aquatic vegetation necessary to achieve Chesapeake Bay water quality standards. (2008 baseline: 35 percent, 64,912 acres.)

Restore and Protect the Gulf of Mexico

- By 2015, reduce releases of nutrients throughout the Mississippi River Basin to reduce the size of the hypoxic zone in the Gulf of Mexico to less than 5,000 km^2, as measured by the 5-year running average of the size of the zone. (Baseline: 2005–2009 running average size is 15,670 km^2.)

Restore and Protect the Long Island Sound

- By 2015, reduce the maximum area of hypoxia in Long Island Sound by 15 percent from the pre-TMDL average of 208 square miles as measured by the 5-year running average size of the zone. (Baseline: Pre-total maximum daily load (TMDL) average conditions based on 1987–1999 data is 208 square miles. Post-TMDL includes years 2000–2014. Universe: The total surface area of Long Island Sound is approximately 1,268 square miles; the potential for the maximum area of hypoxia would be 1,268 square miles.)

Restore and Protect the Puget Sound Basin

- By 2015, improve water quality and enable the lifting of harvest restrictions in 4,300 acres of shellfish bed growing areas impacted by degraded or declining water quality in the Puget Sound. (2009 baseline: 1,730 acres of shellfish beds with harvest restrictions in 2006 had their restrictions lifted. Universe: 30,000 acres of commercial shellfish beds with harvest restrictions in 2006.)

Sustain and Restore the U.S.–Mexico Border Environmental Health

- By 2015, provide safe drinking water or adequate wastewater sanitation to 75 percent of the homes in the U.S.–Mexico Border area that lacked access to either service in 2003. (2003 Universe: 98,515 homes lacked drinking water and 690,723 homes lacked adequate wastewater sanitation based on a 2003 assessment of homes in the U.S.–Mexico Border area. 2015 target: 73,886 homes provided with safe drinking water and 518,042 homes with adequate wastewater sanitation.)

End Notes:

1 EPA is in the process of developing a consistent methodology for analyzing the data from Centers for Disease Control and Prevention's National Health and Nutrition Examination Survey (NHANES) reports. The baseline and target may be reset when the analysis is complete at the end of CY 2010.

2 In 2007, EPA added Guam, American Samoa, and the Northern Marianas, which resulted in a lower baseline and target.

Goal 3: Cleaning Up Communities and Advancing Sustainable Development. Clean up communities, advance sustainable development, and protect disproportionately impacted low-income, minority, and tribal communities. Prevent releases of harmful substances and clean up and restore contaminated areas.

Objective 3.1: Promote Sustainable and Livable Communities. Support sustainable, resilient, and livable communities by working with local, state, tribal, and federal partners to promote smart growth, emergency preparedness and recovery planning, brownfield redevelopment, and the equitable distribution of environmental benefits.

Strategic Measures:

Promote Sustainable Communities

- By 2015, reduce the air, water, land, and human health impacts of new growth and development through the use of smart growth and sustainable development strategies in 600 (cumulative) communities, which includes local municipalities, regional entities, and state governments, through activities resulting from EPA and federal partner actions. (Baseline: In FY 2010, an estimated 34 communities will be assisted.)[1]

Assess and Cleanup Brownfields

- By 2015, conduct environmental assessments at 20,600 (cumulative) brownfield properties. (Baseline: As of the end of FY 2009, EPA assessed 14,600 properties.)
- By 2015, make an additional 17,800 acres of brownfield properties ready for reuse from the 2009 baseline. (Baseline: As of the end of FY 2009, EPA made 11,800 acres ready for reuse.)

Reduce Chemical Risks at Facilities and in Communities

- By 2015, continue to maintain the Risk Management Plan (RMP) prevention program and further reduce by 10 percent the number of accidents at RMP facilities. (Baseline: There was an annual average of 190 accidents based on RMP program data between 2005 and 2009.)

Objective 3.2: Preserve Land. Conserve resources and prevent land contamination by reducing waste generation, increasing recycling, and ensuring proper management of waste and petroleum products.

Strategic Measures:

Waste Generation and Recycling

- By 2015, increase the amount of municipal solid waste reduced, reused, or recycled by 2.5 billion pounds. (At the end of FY 2008, 22.5 billion pounds of municipal solid waste had been reduced, reused, or recycled.)
- By 2015, increase beneficial use of coal combustion ash to 50 percent from 40 percent in 2008.
- By 2015, increase by 78 the number of tribes covered by an integrated waste management plan compared to FY 2009. (At the end of FY 2009, 94 of 572 federally recognized tribes were covered by an integrated waste management plan.)
- By 2015, close, clean up, or upgrade 281 open dumps in Indian country and on other tribal lands compared to FY 2009. (At the end of FY 2009, 412 open dumps were closed, cleaned up, or upgraded. As of April 2010, 3,464 open dumps were listed in the

Indian Health Service Operation and Maintenance System Database, which is dynamic because of the ongoing assessment of open dumps.)

Minimize Releases of Hazardous Waste and Petroleum Products

- By 2015, prevent releases at 500 hazardous waste management facilities with initial approved controls or updated controls resulting in the protection of an estimated 3 million people living within a mile of all facilities with controls. (Baseline: At the end of FY 2009, it was estimated that 789 facilities will require these controls out of the universe of 2,468 facilities with about 10,000 process units. The goal of 500 represents 63 percent of the facilities needing controls.)
- Each year through 2015, increase the percentage of underground storage tank (UST) facilities that are in significant operational compliance (SOC) with both release detection and release prevention requirements by 0.5 percent over the previous year's target. (Baseline: This means an increase of facilities in SOC from 65.5 percent in 2010 to 68 percent in 2015.)
- Each year through 2015, reduce the number of confirmed releases at UST facilities to 5 percent fewer than the prior year's target. (Baseline: Between FY 1999 and FY 2009, confirmed UST releases averaged 8,113.)

Objective 3.3: Restore Land. Prepare for and respond to accidental or intentional releases of contaminants and clean up and restore polluted sites.

Strategic Measures:

Deepwater Horizon BP Oil Spill: Oil Spill Program Review

- By 2015, in response to the Deepwater Horizon BP oil spill in the Gulf of Mexico, EPA will conduct a thorough assessment of its rules, guidelines, and procedures relating to all relevant aspects of EPA's oil spill program, including prevention of, preparedness for, response to, and recovery efforts, and update them as needed, and ensure that the Agency has the appropriate tools to respond to environmental disasters of this scale.

Emergency Preparedness and Response

- By 2015, achieve and maintain at least 80 percent of the maximum score on the Core National Approach to Response (NAR) evaluation criteria. (Baseline: In FY 2009, the average Core NAR Score was 84 percent for EPA headquarters, regions, and special teams prepared for responding to emergencies.)[2]
- By 2015, complete an additional 1,700 Superfund removals through Agency-financed actions and through oversight of removals conducted by potentially responsible parties (PRPs). (Baseline: In FY 2009, there were 434 Superfund removal actions completed including 214 funded by the Agency and 220 overseen by the Agency that were conducted by PRPs under a voluntary agreement, an administrative order on consent, or a unilateral administrative order.)
- By 2015, no more than 1.5 million gallons will be spilled annually at Facility Response Plan (FRP) facilities, a 15 percent reduction from the annual average of 1.7 million gallons spilled from 2005–2009.

Cleanup Contaminated Land

- By 2015, complete 93,400 assessments at potential hazardous waste sites to determine if they warrant Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA) remedial response or other cleanup activities. (Baseline: As of 2010, the cumulative total number of assessments completed was 88,000.)[3]
- By 2015, increase to 84 percent the number of Superfund final and deleted NPL sites and RCRA facilities where human exposures to toxins from contaminated sites are under control. (Baseline: As of October 2009, 70 percent Superfund final and deleted NPL sites and RCRA facilities have human exposures under control out of a universe of 5,330.)[4]
- By 2015, increase to 78 percent the number of Resource Conservation and Recovery Act (RCRA) facilities with migration of contaminated groundwater under control. (Baseline: At the

end of FY 2009, the migration of contaminated groundwater was controlled at 58 percent of all 3,746 facilities needing corrective action.)

- By 2015, increase to 56 percent the number of RCRA facilities with final remedies constructed. (Baseline: At the end of FY 2009, all cleanup remedies had been constructed at 32 percent of all 3,746 facilities needing corrective action.)
- Each year through 2015, reduce the backlog of LUST cleanups (confirmed releases that have yet to be cleaned up) that do not meet risk-based standards for human exposure and groundwater migration by 1 percent. This means a decrease from 21 percent in 2009 to 14 percent in 2015. (At the end of FY 2009, there were 100,165 releases not yet cleaned up.)
- Each year through 2015, reduce the backlog of LUST cleanups (confirmed releases that have yet to be cleaned up) in Indian country that do not meet applicable risk-based standards for human exposure and groundwater migration by 1 percent. This means a decrease from 28 percent in 2009 to 22 percent in 2015.
- By 2015, ensure that 799 Superfund NPL sites are "sitewide ready for anticipated use." (Baseline: As of October 2009, 409 final and deleted NPL sites had achieved "sitewide ready for anticipated use.")[5]

Objective 3.4: Strengthen Human Health and Environmental Protection in Indian Country. Support federally-recognized tribes to build environmental management capacity, assess environmental conditions and measure results, and implement environmental programs in Indian country.

Strategic Measures:

Improve Human Health and the Environment in Indian Country

- By 2015, increase the percent of tribes implementing federal regulatory environmental programs in Indian country to 18 percent. (FY 2009 baseline: 13 percent of 572 tribes)
- By 2015, increase the percent of tribes conducting EPA-approved environmental monitoring and assessment activities in Indian country to 50 percent. (FY 2009 baseline: 40 percent of 572 tribes)

End Notes:

1 Included in the cumulative number are communities receiving assistance from: (1) direct EPA technical assistance programs; (2) EPA-funded grants and cooperative agreements to non-governmental organizations; and (3) in a limited number of communities (i.e., 6 of the total 34 communities in the FY 2010 baseline), technical assistance done in collaboration with other EPA programs (such as EPA's brownfields program) and other federal agencies (such as the Federal Emergency Management Agency and the U.S. Departments of Transportation and Housing and Urban Development).

2 Consistent with the government-wide National Response Framework (NRF), EPA will work to fully implement the priorities under its internal NAR so that the Agency is prepared to respond to multiple nationally significant incidents. Core NAR builds upon the Core Emergency Response concept while integrating the priority elements of EPA's NAR Preparedness Plan, and the Homeland Security Priority Workplan, to reflect an Agency-wide assessment of progress.

3 This new strategic measure accounts for all remedial assessments performed at sites addressed under the Superfund program, whereas the measure in the previous (2006–2011) *Strategic Plan* captured only a subset of these assessments (i.e., the final assessments completed at sites). By capturing the assessment work leading to final assessment decisions, including the initial screening assessments to determine Superfund eligibility, the new measure more fully accounts for the work performed during the Superfund site assessment process.

4 EPA is currently revising its dioxin risk assessment which may affect the targets and baselines for the human exposures under control and sitewide ready for anticipated use measures.

5 As part of the Integrated Cleanup Initiative, EPA is evaluating "sitewide ready for anticipated use" across all cleanup programs and may modify the above Superfund measure in the future to include corresponding brownfields, RCRA corrective action, and leaking underground storage tank program goals.

Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution. Reduce the risk and increase the safety of chemicals and prevent pollution at the source.

Objective 4.1: Ensure Chemical Safety. Reduce the risk of chemicals that enter our products, our environment, and our bodies.

Strategic Measures:

Protect Human Health from Chemical Risks

- By 2015, reduce by 40 percent the number of moderate to severe exposure incidents associated with organophosphates and carbamate insecticides in the general population. (Baseline is 316 moderate and severe incidents reported to the Poison Control Center (PCC) National Poison Data System (NPDS) in 2008 for organophosphate and carbamate pesticides.)
- By 2014, reduce the percentage of children with blood lead levels above 5 µg/dl to 1.0 percent or less. (Baseline is 3.0 percent in the 2005–2008 sampling period.)[1]
- By 2014, reduce the percent difference in the geometric mean blood lead level in low-income children 1 to 5 years old as compared to the geometric mean for non-low income children 1 to 5 years old to 10.0 percent. (Baseline is 23.4 percent difference in the geometric mean blood lead level in low-income children 1 to 5 years old as compared to the geometric mean for non-low-income children 1 to 5 years old in 2005–2008.)[1]
- By 2014, reduce the concentration in the general population for the following chemicals: non-specific organophosphate metabolites by 75 percent; chlorpyrifos metabolite (TCPy) by 75 percent; and perfluoro-octanoic acid (PFOA) in serum by 2 percent. (Baselines are derived from the Centers for Disease Control and Prevention's National Health and Nutrition Examination Survey (NHANES) concentration data in the general population and results are reported biennially. Pesticide baselines are based on 2001–2002 95th percentile data for non-specific organophosphate metabolites (0.45 µmol/L) and chlorpyrifos metabolite (TCPy) (12.4 µg/L). PFOA baseline is based on 2005–2006 geometric mean data in serum (3.92 µg/L).)
- By 2014, reduce concentration for the following chemicals in children: non-specific organophosphate metabolites by 75 percent and chlorpyrifos metabolite (TCPy) by 75 percent. (Baselines are derived from the Centers for Disease Control and Prevention's National Health and Nutrition Examination Survey (NHANES) metabolite concentration data in children and results are reported biennially. Pesticide baselines are based on 2001–2002 data for non-specific organophosphate metabolites (0.55 µmol/L) and chlorpyrifos metabolite (TCPy) (16.0 µg/L).)
- By 2015, complete endocrine disruptor screening program (EDSP) decisions for 100 percent of chemicals for which complete EDSP information is expected to be available by the end of 2014. (Baseline is no decisions have been completed through 2009 for any of the chemicals for which complete EDSP information is anticipated to be available by the end of 2014. EDSP decisions for a chemical can range from determining potential to interact with the estrogen, androgen, or thyroid hormone systems to otherwise determining whether further endocrine related testing is necessary.)

Protect Ecosystems from Chemical Risks

- By 2015, no watersheds will exceed aquatic life benchmarks for targeted pesticides. (Based on FY 1992–2001 data from the watersheds sampled by the USGS National Water Quality

Assessment (NAWQA) program, urban watersheds that exceed the National Pesticide Program aquatic life benchmarks are 73 percent for diazinon, 37 percent for chlorpyrifos, and 13 percent for carbaryl. Agricultural watersheds that exceed the National Pesticide Program aquatic life benchmarks are 18 percent for azinphos-methyl and 18 percent for chlorpyrifos.)

Ensure Transparency of Chemical Health and Safety Information

- Through 2015, make all health and safety studies available to the public for chemicals in commerce, to the extent allowed by law. (Baseline is 21,994 confidential business information (CBI) cases of Toxic Substances Control Act (TSCA) health and safety studies as defined in TSCA Section 3(6) that were submitted for chemicals potentially in commerce between the enactment of TSCA and January 21, 2010.)

Objective 4.2: Promote Pollution Prevention. Conserve and protect natural resources by promoting pollution prevention and the adoption of other stewardship practices by companies, communities, governmental organizations, and individuals.

Strategic Measures:

Prevent Pollution and Promote Environmental Stewardship

- By 2015, reduce 15 billion pounds of hazardous materials cumulatively through pollution prevention. (Baseline is 4.8 billion pounds reduced through 2008.)
- By 2015, reduce 9 million metric tons of carbon dioxide equivalent ($MMTCO_2Eq.$) cumulatively through pollution prevention. (Baseline is 6.5 $MMTCO_2Eq.$ reduced through 2008. The data from this measure are also calculated into the Agency's overall GHG measure under Goal 1.)
- By 2015, reduce water use by an additional 24 billion gallons cumulatively through pollution prevention. (Baseline is 51 billion gallons reduced through 2008.)
- By 2015, save $1.2 billion through pollution prevention improvements in business, institutional, and government costs cumulatively. (Baseline is $3.1 billion saved through 2008.)
- Through 2015, increase the use of safer chemicals cumulatively by 40 percent. (Baseline: 476 million pounds of safer chemicals used in 2009 as reported to be in commerce by Design for the Environment program.)

End Note:

1 Centers for Disease Control and Prevention's National Health and Nutrition Examination Survey (NHANES) data are collected in 2-year samples and released incrementally with the data typically becoming available 2 to 3 years after the sampling period ends.

Goal 5: Enforcing Environmental Laws. Protect human health and the environment through vigorous and targeted civil and criminal enforcement. Assure compliance with environmental laws.

Objective 5.1: Enforce Environmental Laws. Pursue vigorous civil and criminal enforcement that targets the most serious water, air, and chemical hazards in communities. Assure strong, consistent, and effective enforcement of federal environmental laws nationwide.

Strategic Measures:

Note: The enforcement measures in this *Plan* reflect: (1) the enforcement presence and level-of-effort measures that reflect the Agency's continued and strong investment in enforcement work; and (2) the reductions in pollution achieved through enforcement cases (i.e., case-specific outcome indicators) which are dominated by the very largest cases and will typically vary widely over time depending on the pollution problems being addressed. EPA is also developing enforcement measures for work done to support the strategic outcomes under each of the media-specific goals in this *Plan*; these measures will be described in future *Annual Plans and Budgets* and *Annual Performance Reports*.

Maintain Enforcement Presence

- By 2015, conduct 105,000 federal inspections and evaluations (5-year cumulative). (FY 2005–2009 baseline: 21,000 annually)
- By 2015, initiate 19,500 civil judicial and administrative enforcement cases (5-year cumulative). (FY 2005–2009 baseline: 3,900 annually)
- By 2015, conclude 19,000 civil judicial and administrative enforcement cases (5-year cumulative). (FY 2005–2009 baseline: 3,800 annually)
- By 2015, maintain review of the overall compliance status of 100 percent of the open consent decrees. (Baseline 2009: 100 percent)
- Each year through 2015, support cleanups and save federal dollars for sites where there are no alternatives by: (1) reaching a settlement or taking an enforcement action before the start of a remedial action at 99 percent of Superfund sites having viable responsible parties other than the federal government; and (2) addressing all cost recovery statute of limitation cases with total past costs greater than or equal to $200,000. (Baseline: 99 percent of sites reaching a settlement or EPA taking an enforcement action (FY 2007–2009 annual average); 100 percent cost recovery statute of limitation cases addressed (FY 2009))
- By 2015, increase the percentage of criminal cases with charges filed to 45 percent. (FY 2006–2010 baseline: 36 percent)
- By 2015, maintain an 85 percent conviction rate for criminal defendants. (FY 2006–2010 baseline: 85 percent)

Support Taking Action on Climate Change and Improving Air Quality

- By 2015, reduce, treat, or eliminate 2,400 million estimated pounds of air pollutants as a result of concluded enforcement actions (5-year cumulative). (FY 2005–2008 baseline: 480 million pounds, annual average over the period)

Support Protecting America's Waters

- By 2015, reduce, treat, or eliminate 1,600 million estimated pounds of water pollutants as a result of concluded enforcement actions (5-year cumulative). (FY 2005–2008 baseline: 320 million pounds, annual average over the period)

Support Cleaning Up Communities and Advancing Sustainable Development

- By 2015, reduce, treat, or eliminate 32,000 million estimated pounds of hazardous waste as a result of concluded enforcement actions (5-year cumulative). (FY 2008 baseline: 6,500 million pounds)
- By 2015, obtain commitments to clean up 1,500 million cubic yards of contaminated soil and groundwater media[1] as a result of concluded CERCLA and RCRA corrective action enforcement actions (5-year cumulative). (FY 2007–2009 baseline: 300 million cubic yards of contaminated soil and groundwater media, annual average over the period)

Support Ensuring the Safety of Chemicals and Preventing Pollution

- By 2015, reduce, treat, or eliminate 19.0 million estimated pounds of toxic and pesticide pollutants as a result of concluded enforcement actions (5-year cumulative). (FY 2005–2008 baseline: 3.8 million pounds, annual average over the period)

Enhance Strategic Deterrence through Criminal Enforcement

- By 2015, increase the percentage of criminal cases having the most significant health, environmental, and deterrence impacts to 50 percent. (FY 2010 baseline: 36 percent)[2]
- By 2015, maintain 75 percent of criminal cases with an individual defendant. (FY 2006–2008 baseline: 75 percent)

End Notes:

1 Contaminated groundwater media, as defined for the Superfund and RCRA corrective action programs, is the volume of physical aquifer (both soil and water) that will be addressed by the response action.

2 EPA collects data on a variety of case attributes to describe the range, complexity, and quality of our criminal enforcement national docket. Cases are tiered depending on factors such as the human health (death, injury) and environmental impacts, the nature of the pollutant and the its release into the environment, and the characteristics of the subject(s). This measure reflects the percentage of cases in the upper tiers.

Office of the Chief Financial Officer
Office of Planning, Analysis, and Accountability (2721A)
United States Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460
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September 2010

ADEQ
ARKANSAS
Department of Environmental Quality

November 15, 2006

Representative Charles L. Ormond
1500 View Street
Morrilton, AR 72110-3725

Re: Arkwood Superfund Site

Dear Representative Ormond:

Based on your October 23, 2006 letter and our recent discussions, I have looked into the current status of Arkwood superfund site. The Arkwood superfund site has just had its second five year review (as performed by EPA) in February 2006. The review concluded that while the remedy is protective of human health and the environment , ongoing groundwater treatment is still needed to treat Pentachlorophenol in the groundwater. In addition, the responsible party for the site, McKesson, has begun a pilot program for injecting ozonated water in a local sinkhole to speed up reduction of Pentachlorophenol in the formation upgradient from the New Cricket Spring. Based on the initial results of this study, the Department is hopeful that this process will decrease the time frame needed to insure that the Pentachlorophenol is removed from the springs and that a full delisting of the site can be accomplished.

Since remediation of the surface of the site has been completed, McKesson may petition for a partial delisting of the surface portion of the site at any time. The Arkansas Department of Environmental Quality would be supportive of this effort and this would allow for the redevelopment of the site. Initial discussions with the EPA also indicate that they would allow a partial delisting of this site. Based on all available information, I see no reason the site can not be redeveloped and placed back into productive use. As we have discussed, this would allow Boone County's economic development agency to market this site for future industrial uses. Any efforts that you could undertake to encourage McKesson to request the partial delisting would expedite redevelopment of the site.

Please let me know if I can provide any further information.

Sincerely,

Marcus C. Devine
Director

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY
8001 NATIONAL DRIVE / POST OFFICE BOX 8913 / LITTLE ROCK, ARKANSAS 72219-8913 / TELEPHONE 501-682-0744 / FAX 501-682-0798
www.adeq.state.ar.us

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

NOV 4 1999

Honorable Dale Wagner
Boone County Judge
Harrison, AR 72601-4228

Dear Judge Wagner:

Thank you for your letter dated October 7, 1999, describing your interest in the Arkwood Superfund Site.

The U.S. Environmental Protection Agency (EPA) as a policy tries to return remediated Superfund sites to productive use at the earliest possible opportunity. At the Arkwood Superfund Site (site) the part that was remediated at the site related to phased action which consisted of pretreatment and storage of contaminated soil near the wood treating plant followed by off-site incineration of the contaminated soil. This remedy was completed in June 1995 and memorialized in the "Preliminary Closeout Report" of June 1996. Deletion from the National Priorities List (NPL) is not dependent on the Five-Year Review. The EPA had contemplated partially delisting the remediated wood treating area , but the remediation of groundwater through fractures in the subsurface at New Cricket Springs is ongoing. The Responsible Party (RP) McKesson, who performed the remedy at the wood treating plant, has indicated that they feel the remediated area should not be put to unrestricted use at this time , as it can recontaminate the New Cricket Spring through fractures in the subsurface and nullify McKesson's efforts to clean up the stream. However, cleanup of the groundwater New Cricket Spring, is anticipated soon. As soon as this happens EPA plans to delist the site from the NPL and return it to productive use.

I hope this information is helpful to you. If you have any questions regarding this matter, please feel free to contact me or Shawn Ghose of my staff at (214) 665-6782.

Sincerely yours,

Myron O. Knudson

Myron O. Knudson, P.E.
Director
Superfund Division

May 16, 2012

John Chamberlin
Chair
Arkansas Pollution Control and Ecology Commission
101 E. Capitol Avenue, Suite 205
Little Rock, AR 72201

Re: Arkwood, Inc. Superfund site, Boone County
AFIN: 05-00003, EPA ID# ARD084930148

Dear Mr. Chamberlin,

I write to request that the Commission assist the Arkansas Department of Environmental Quality (ADEQ or Department hereafter) in understanding and performing its role, responsibility and authority with regard to the above-referenced site.

In a letter to ADEQ dated March 19, 2012 (attached,) Superfund Reuse Coordinator, Casey Luckett Snyder writes:

"EPA concurs that the Arkwood Inc. Superfund site is ready for industrial reuse. The designated representative for the property owner has advised EPA that he is seeking potential purchasers for the Arkwood Inc. Superfund site and EPA supports efforts to bring the site into industrial reuse."

I request that the Commission assist the Department to respond to Ms. Luckett Snyder's letter, stating ADEQ's corresponding support for the Arkwood industrial reuse effort and indicating what program of actions ADEQ will take to assist with the effort.

In July 1, 2010, I was told by the Department its response to an inquiry I had made:

"EPA has not delegated regulatory authority to any state for Superfund oversight. EPA and ADEQ do have an agreement detailing how Superfund sites are addressed in Arkansas. EPA will

consider ADEQ's opinions with regards to Ready for Reuse determinations for EPA lead or PRP lead sites. Arkwood is a PRP lead site with EPA as the main regulatory authority. As such, all Ready for Reuse issues should be coordinated through EPA."

In response to further inquiry that day, the Department said:

"The 'remedial goal' is the same for ADEQ as EPA. The document that sets the remedial goal is the Record of Decision."

I replied to the department on July 2, 2010

"I am trying to understand the exact testing scenario wherein the 'remedial goal' for New Cricket Spring will have been met by both EPA and ADEQ standards. In reading the Record of Decision (ROD) dated 09/28/1990 as it appears on the EPA website, the section headed 'The Selected Remedy' part B. 'Groundwater' states in part:

'THIS REMEDY WAS SELECTED BECAUSE NEW CRICKET SPRING IS NOT HIGHLY CONTAMINATED, ECOLOGICAL DAMAGE FROM THE SITE IS NOT APPARENT, AND NATURAL ATTENUATION MAY OCCUR QUICKLY FOLLOWING THE REMOVAL OF THE SOURCE OF CONTAMINATION AT THE SITE.'

"The abstract for that documents states in part:

'THE SELECTED GROUNDWATER REMEDY IS;
*** MONITOR AREA SPRINGS DURING, AND TWO YEARS AFTER THE SOILS REMEDIATION TO DETERMINE THE DEGREE TO WHICH NATURAL ATTENUATION IS TAKING AFFECT,**
*** IF PENTACHLOROPHENOL LEVELS ARE ABOVE STATE OF ARKANSAS WATER QUALITY STANDARDS AFTER A POST-REMEDIAL MONITORING PERIOD OF TWO YEARS, ERECT A WATER TREATMENT SYSTEM AT NEW CRICKET SPRING TO TREAT TO STATE OF ARKANSAS WATER QUALITY STANDARDS,**
*** TREAT NEW CRICKET SPRING UNTIL LEVELS FALL BELOW STATE STANDARDS.**

*** MONITOR SELECTED DRINKING WATER WELLS FOR 30 YEARS.**
*** PROVIDE SELECTED WELL WATER USERS WITH CITY WATER LINES TO REMOVE ANY UNCERTAINTY IN THEIR WATER SUPPLY.'**

"It does seem to me from reading this portion of the ROD that the 'State of Arkansas water quality standards' for this remedy are the determining measure for attaining the 'remedial goal.'

"Could you please clarify for me the actual technical measurement levels (expressed in the same units of measure used in the historical test data contained in the reports you provided me) that would meet 'State of Arkansas water quality standards' so that I may understand how close we are to attaining the remedial goal?"

To date, ADEQ has not clarified the precise scientific and technical scenario whereby the groundwater remedial goal for the Arkwood site will have been achieved and whereby groundwater remedial operations at the Arkwood site can terminated.

For an example of systemic departmental non-action: the Department wrote to EPA on April 4, 2011 regarding "changes to the Regional screening levels" for water remediation set by ADEQ for the Arkwood site:

"In addition, permitting requirements have changed under the State of Arkansas Continuing Planning Process, Updated and Revised January 2000 (CCP). The revised Monthly average should be 17.38 µg/l and the revised Daily Maximum value should be 34.86 µg/l."

Even though this revision was effective January 2000, the Department did not communicate the new (half as stringent) remedial goal to EPA for more than ten years, and then only after I had questioned the previous standard set by ADEQ. I have other examples of such lapse.

Only after the conclusion of groundwater remedial activity will the Arkwood site be eligible for full deletion from the National Priorities List (NPL,) for which the site is otherwise eligible.

EPA's Carlos Sanchez, Chief Arkansas/Texas Section, Region 6, Superfund Division has already begun exploring with ADEQ the possibility of the Arkwood site's deletion from the NPL.

However, I feel a more coordinated, scientifically rigorous and cooperative effort on the part of ADEQ will be required to achieve an equitable resolution, as the Department must concur with the EPA on any change of status for the Arkwood site.

The Arkwood site has great potential as a transportation hub and locus of industry, situated as it is directly upon the Missouri & Northern Arkansas Railroad (MNAR).

The following officials have shown serious interest in and paid visits to the Arkwood site: Tommy Gibson, General Manager and Anita Horton, Marketing Director, MNAR; Jim O'Donnell, Director, Industrial Development, Railway America, the parent company of MNAR; J. Michael Norton, Executive Director of The Northwest Arkansas Economic Development District, Inc.; and Steve Jones, Building and Sites Coordinator, Arkansas Economic Development Commission.

The Arkwood site has languished unused for too long, after having been determined "construction complete" by EPA in 1996.

With coordinated effort between ADEQ and EPA, this important site could soon be returned to productive use, providing jobs for citizens and tax revenue for the State.

I respectfully submit that it would be good public policy and good for the citizens of Arkansas for ADEQ to appoint an authorized senior staff member to work cooperatively and openly with Casey Luckett Snyder, Reuse Coordinator and with Stephen Tzone, Remedial Project Manager, of EPA Region 6 Superfund toward the return of the Arkwood site to productive industrial use.

The contact information for those EPA staff persons on task for Arkwood Superfund site remediation and redevelopment is found below.

Sincerely,

Charles Curtis Grisham, Jr.

Charles Curtis Grisham, Jr.
Moss Beach, California AND
Elba, Arkansas

enclosure:
EPA letter to Clyde Rhodes dated March 19, 2012

Arkwood Superfund Site Contact Information:

Stephen Tzhone
Remedial Project Manager
EPA Region 6 Superfund
(214) 665-8409
Tzhone.stephen@Epa.gov

Casey Luckett Snyder
Remedial Project Manager/
EPA Region 6 Superfund Reuse Coordinator
(214) 665-7393
luckett.casey@epa.gov

grish.org <curt@grish.org>

May 16, 2012 11:49 AM

To: Charles Moulton <charles.moulton@arkansasag.gov>
Cc: "grish.org" <curt@grish.org>
Re: draft letter Grisham to APC&E Commission Chair

2 Attachments, 1.3 MB

Thank you for your attention.

I attach a revised and signed final version (w/ EPA letter attached here again); please forward unless you think the changes detract.

Changes are:

Page 1: corrected first bolded quote; previous version quoted from very similar letter to Michael Norton of NWAEDD.
Page 3: added the bolded quote dated April 4, 2011 ADEQ to EPA; added paragraphs before and after this added quote; changed a preposition.

Curt

20120516 C...pdf (1.1 MB)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

March 19, 2012

Mr. Clyde Rhodes
Hazardous Waste Division Chief
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

Re: Arkwood Inc. Superfund Site

Dear Mr. Rhodes,

The designated representative for the property owner of the Arkwood Inc. Superfund site has requested that EPA provide you with a letter regarding the site's designation as "Site Wide Ready for Anticipated Use".

In January 2011, EPA designated the Arkwood Inc. Superfund site, located in Boone County, Arkansas, as "Site Wide Ready for Anticipated Use". The SWRAU designation is defined as a *"construction complete National Priorities List site where, for the entire site,*

(1) All cleanup goals in the Record of Decision or other remedy decision document have been achieved for media that may affect current and reasonably anticipated future land uses of the site, so that there are no unacceptable risks; and
(2) All institutional or other controls required in the Record of Decision have been put in place.

EPA is currently working with the property owner and your agency to update the current institutional

controls for the site to allow for industrial reuse only. EPA concurs that the Arkwood Inc. Superfund site is ready for industrial reuse. The designated representative for the property owner has advised EPA that he is seeking potential purchasers for the Arkwood Inc. Superfund site and EPA supports efforts to bring the site into industrial reuse.

If you have any questions, please feel free to contact me at 214-665-7393 or via email at luckett.casey@epa.gov.

Sincerely,

Casey Luckett Snyder

Casey Luckett Snyder
Superfund Reuse Coordinator

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On May 16, 2012, at 7:07 AM, Charles Moulton wrote:

Mr. Grisham –

Your letter, in conjunction with EPA's correspondence, does the trick. I see no reason to alter it.

I will be happy to forward both letters to the Chairman when you are ready.

Charlie

From: grish.org [mailto:curt@grish.org]
Sent: Tuesday, May 15, 2012 4:24 PM
To: Charles Moulton; Patricia (Commission) Goff
Cc: grish.org
Subject: draft letter Grisham to APC&E Commission Chair

Thank you for considering.

Curt Grisham
501-550-4900
curt@grish.org

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

March 19, 2012

Mr. Clyde Rhodes
Hazardous Waste Division Chief
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

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If you have any questions, please feel free to contact me at 214-665-7393 or via email at luckett.casey@epa.gov.

Sincerely,

Casey Luckett Snyder

Casey Luckett Snyder
Superfund Reuse Coordinator

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Arkansas Pollution Control
and Ecology Commission
101 E. Capitol Ave., Suite 205
Little Rock, AR 72201
(501) 682-7890
Lynn Sickel - Chair

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- Preliminary Drafts of Proposed Reg. Changes
- Regulation Formatting And Drafting Guidelines
- Archives - Closed

Arkansas Pollution Control and Ecology Commission

101 E. Capitol Ave., Suite 205, Little Rock, AR 72201
(501) 682-7890
www.adeq.state.ar.us/commission

Lynn Sickel - Chair

Quick Links

- Commission History
- Commission Legislative History
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- Commission Staff

Commission History

The Arkansas Pollution Control and Ecology Commission was first established in 1949 as part of the Arkansas Water Pollution Control Act (Act 472 of 1949).

Since that time, it has undergone significant changes -- including a reorganization in 1991.

Rulemaking Dockets
Economic Impact/ Environmental Benefit Analysis Subcommittees
Legislation Committee
Where We Are
Maps/Directions

The Commission is the environmental policy-making body for Arkansas. With guidance from the Governor, the Legislature, the EPA and others, the Commission determines the environmental policy for the state and the Arkansas Department of Environmental Quality implements those policies.

Though the Commission and the Arkansas Department of Environmental Quality work closely, each is distinctly different.

The Commission is comprised of 13 members, six representing state agencies and seven appointed by the Governor. The six agency representatives are directors -- or their designee -- of the:

- Arkansas Department of Health
- Arkansas Game and Fish Commission
- Arkansas Forestry Commission
- Arkansas Natural Resources Commission
- Arkansas Oil and Gas Commission
- Arkansas Geology Commission

The seven other members of the Commission represent each of the four congressional districts in the state. Each district must have at least one representative on the Commission, but no more than two representatives.

The Commission employs two people:

- Charles Moulton - Administrative Law Judge
- Patricia Goff -- Commission Secretary

By law, the Commission must meet four times each year. In practicality, they meet once a month with the exception of November and December.

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Commission Legislative History

Act 472 of 1949 -- Established the Water Pollution Control Commission as a part of the State Board of Health. Its original membership consisted of the directors of four state agencies: the State Board of Health, the Arkansas Game and Fish Commission, the Arkansas Oil and Gas Commission and the Resources and Development Commission. The Commission also had three citizen members, each appointed by the Governor to represent interest areas of industry, municipalities and agriculture and livestock.

Act 232 of 1953 -- Added to the Commission members the director of the State Forestry and Parks Commission.

Act 503 of 1963 -- Required the Commission to appoint a director "who shall handle such correspondence make and arrange such inspections or investigations, and obtain and assemble or propose such reports and data as the Commission may direct and authorize, and who shall be the executive officer and active administrator of all pollution control activities and shall have such other delegated powers and duties as the Commission may direct or authorize."

Act 183 of 1965 -- Changed the Commission's name to the Arkansas Pollution Control Commission, added authority for air pollution control, removed the Commission from the Health Department and changed the state agency membership. The new composition of the Commission included the directors of five state agencies: the State Board of Health, the Arkansas Game and Fish Commission, the Oil and Gas Commission, the Natural Resources Commission and the State Forestry Commission. The three appointed member representatives remained unchanged.

Act 236 of 1971 -- Added two members to the Commission: the State Geologist and a representative of the state's mining industry. The special-interest representative was appointed by the Governor.

Act 38 of 1971 -- State government reorganization act; created the Arkansas Department of Environmental Quality and provided that the Department Director would be nominated by the Commission and confirmed by the Governor with consent of the State Senate.

Act 930 of 1985 -- Added another member to the Commission and clarified the qualifications of one of the positions to be appointed by the Governor. The additional member, appointed by the Governor, was required to be a member of an organization which belonged to the Arkansas Conservation Coalition. The change in the qualifications of another appointee, a representative of municipalities, was changed to the designation of a representative of city or county government.

Act 744 of 1991 -- Restructured the Commission as follows: Increased the size of the Commission to 13 members by adding two positions to be appointed by the Governor and removed the specific interest area designations for the gubernatorial appointees and required that private citizen appointees "... have knowledge or expertise in matters within the jurisdiction of the Commission including government, business or industry, agriculture and livestock, forestry, health, ecology, recreation and tourism and geology."

Other changes required each congressional district in the state to be represented by at least one of the seven private citizen appointees and provided that no district could have more than two appointees. Also, the act prohibited elected city, county or state officials from serving on the Commission after the expiration

of any current member's term and prohibited the six state agency members from serving as chairman or vice chairman.

The new act required the presence of nine members as a quorum to conduct business, modified the procedures for issuance and revocation of wastewater discharge permits and for appeals of permit decisions involving wastewater discharges.

The changes also removed the selection of the Arkansas Department of Environmental Quality Director from the Commission's authority and placed the selection process directly with the Governor, subject to Senate confirmation.

Act 1230 of 1991 -- Clarified the powers and duties of the Commission and the ADEQ Director.

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Commission Members

Questions/Comments for the Commissioners

Name	Agency or District	Address
Lynn Sickel - Chair Term Expires: 3/29/2014	Appointed: 7/2/1998 Reappointed: 04/15/2010	DeValls Bluff, AR
William Thompson - Vice Chair Term Expires: 3/29/2015	Appointed: 3/22/2001 Reappointed: 4/11/2011	Cabot, AR
Stan Jorgensen Term Expires: 3/29/2014	Appointed: 4/11/2011	Little Rock, AR
John Chamberlin Term Expires: 3/29/2017	Appointed: 04/16/2009	Little Rock, AR
Joseph Bates	Arkansas Department of Health	Little Rock, AR
Lawrence Bengal	Arkansas Oil and Gas Commission (Director)	Little Rock, AR
Mike Armstrong	Arkansas Game & Fish Commission	Little Rock, AR

Darwin Hendrix Term Expires: 3/29/2015	Appointed: 10/17/2007	Antoine, AR
Dana Samples Term Expires: 3/29/2013	Appointed: 3/28/2005 Reappointed: 04/16/2009	Huntsville, AR
Joe Fox	Arkansas Forestry Commission (Director)	Little Rock, AR
John Simpson Term Expires: 3/29/2015	Appointed: 4/16/2007 Reappointed: 4/11/2011	Hot Springs, AR
Bekki White	Arkansas Geological Survey (Director)	Little Rock, AR
Randy Young	Arkansas Natural Resources Commission (Director)	Little Rock, AR

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Committee Membership

Regulations Committee

- Randy Young (Chair)
- Joseph Bates
- John Chamberlin
- Darwin Hendrix
- Stan Jorgensen
- Lynn Sickel
- John Simpson
- William Thompson
- Bekki White

Legislation Committee

- Stan Jorgensen (Chair)
- Lawrence Bengal
- John Chamberlin

- Dana Samples
- William Thompson
- Randy Young

Nominations Committee

- Lynn Sickel (Chair)
- Lawrence Bengal
- Joe Fox
- Dana Samples
- William Thompson
- Randy Young

(Committee assignments effective as of 2012)

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Contact Information

Phone: (501) 682-7890
Fax: (501) 682-7891
Address: 101 E. Capitol Ave., Suite 205, Little Rock, AR 72201 (map)

Commission Staff

Administrative Law Judge: Charles Moulton (501) 682-7893 moulton@adeq.state.ar.us
Commission Secretary: Patricia Goff (501) 682-7890 goffpatti@adeq.state.ar.us

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CC Grisham <grish@me.com>

August 30, 2013 7:55 AM

To: "Tzhone, Stephen" <tzhone.stephen@epa.gov>
Cc: CC Grisham <grish@me.com>, "Sanchez, Carlos" <sanchez.carlos@epa.gov>, "Moran, Gloria" <Moran.Gloria-Small@epa.gov>
Re: Arkwood

3 Attachments, 2.2 MB

Hi Steve,

Attached are copies of following:

1) My letter dated May 16, 2012 to John Chamberlin, then-Chair, Arkansas Pollution Control and Ecology Commission (APC&EC); (Chair now is Lynn Sickel)

2) Email that transmitted 1) above, dated May 16, 2012 from CCGJr to Charles Moulton, Administrative Law Judge, APC&EC, in which Judge Moulton acknowledges: "Your letter, in conjunction with EPA's correspondence, does the trick. I see no reason to alter it. I will be happy to forward both letters to the Chairman when you are ready. Charlie."

3) Copy of Casey Luckett Snyder's letter to ADEQ's Clyde Rhodes then-Chief, Hazardous Waste Division, ADEQ; (Tammie Hynum is now Hazardous Waste Division Chief and Mr. Rhodes is apparently no longer with ADEQ.)

4) Copy of APC&EC website linked from ADEQ website, explaining the role of APC&EC and its relationship to ADEQ, which pragmatically I still don't fully understand myself.

These items will be indexed on by documentation CD appendix, which I will send out today.

Thank you,

Curt

Missing Plug-in

Missing Plug-in

Missing Plug-in

On Aug 30, 2013, at 7:11 AM, "Tzhone, Stephen" <tzhone.stephen@epa.gov> wrote:

Hi Curt,

Can you email a copy of the May 16, 2012 letter as referenced in topic III? It appears that APC&EC is a separate entity from ADEQ… however, we would like to follow up as best we can on this topic prior to our Sep 5 meeting. Please continue to include the May 16, 2012 letter on the CD of referenced materials as well, thanks.

SENT - Arkwood Agenda for 9-5-2013 R6.pdf
III. Why was my letter May 16, 2012 to John Chamberlin, Chair, Arkansas Pollution Control and Ecology Commission never acknowledged or answered?
A. Delivered via Hon. Charles Moulton, Administrative Law Judge on moulton@adeq.state.ar.us

---

http://www.adeq.state.ar.us/commission/#History

Commission History

The Arkansas Pollution Control and Ecology Commission was first established in 1949 as part of the Arkansas Water Pollution Control Act (Act 472 of 1949).
Since that time, it has undergone significant changes -- including a reorganization in 1991.
The Commission is the environmental policy-making body for Arkansas. With guidance from the Governor, the Legislature, the EPA and others, the Commission determines the environmental policy for the state and the Arkansas Department of Environmental Quality implements those policies.
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- Arkansas Natural Resources Commission
- Arkansas Oil and Gas Commission
- Arkansas Geology Commission

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The Commission employs two people:

- Charles Moulton - Administrative Law Judge
- Patricia Goff -- Commission Secretary

By law, the Commission must meet four times each year. In practicality, they meet once a month with the exception of November and December.

Thanks,

Stephen L. Tzhone
Superfund Remedial Project Manager
214.665.8409
tzhone.stephen@epa.gov

From: Kilburn, Dianna [mailto:KILBURN@adeq.state.ar.us]
Sent: Thursday, August 29, 2013 4:15 PM
To: Tzhone, Stephen
Cc: rich@adeq.state.ar.us; Moix, Mark; Cusher, Annette
Subject: Arkwood

Dear Stephen:
In response to Mr. Grisham's comment number 3, the May 16, 2012 letter he refers to was sent to the Chair, John Chamberlain, of the Arkansas Pollution Control and Ecology Commission. The Commission is a separate entity from the Arkansas Department of Environmental Quality. We are not able to address this issue. If Mr. Grisham will share his request with ADEQ we can attempt to address his concerns.

Sincerely,
Dianna Kilburn

"Cusher, Annette" <Cusher@adeq.state.ar.us> July 28, 2010 9:12 AM
To: 'grish' <ccgrish@gmail.com>
Cc: "Kilburn, Dianna" <KILBURN@adeq.state.ar.us>, "Egan, Marilyn" <EGAN@adeq.state.ar.us>, "Hynum, Tammie" <HYNUM@adeq.state.ar.us>, "Sanchez.Carlos@epamail.epa.gov" <Sanchez.Carlos@epamail.epa.gov>, "Ghose.Shawn@epamail.epa.gov" <Ghose.Shawn@epamail.epa.gov>, "Rich, Jay" <RICH@adeq.state.ar.us>, "williams.donald@epa.gov" <williams.donald@epa.gov>
RE: Arkwood Superfund Site

Mr. Grisham,

Responses to your comments and question are below the comments/questions in blue. Once again thank you for your interest in the Arkwood Superfund Site and if you have any further questions, just let us know.

Regards,
Annette

-----Original Message-----
From: grish [mailto:ccgrish@gmail.com]
Sent: Saturday, July 24, 2010 5:49 AM
To: Cusher, Annette
Cc: Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay; williams.donald@epamail.epa.gov; williams.donald@epa.gov
Subject: Re: Arkwood Superfund Site

Dear Ms. Cusher,
I am studying the document titled "ARKANSAS POLLUTION CONTROL AND ECOLOGY COMMISSION REGULATION NO. 2 - REGULATION ESTABLISHING WATER QUALITY STANDARDS FOR SURFACE WATERS OF THE STATE OF ARKANSAS - Adopted by the Arkansas Pollution Control and Ecology Commission on (October 26,2007)" as it appears on the ADEQ website, to which you directed me.
Searching the entire 125-page PDF document, I find only one reference to "Pentachlorophenol." That reference is under Reg. 2.508 "Toxic Substances," which states in part:
"Toxic substances shall not be present in receiving waters, after mixing, in such quantities as to be toxic to human, animal, plant or aquatic life or to interfere with the normal propagation, growth and survival of the indigenous aquatic biota. Acute toxicity standards may not be exceeded outside the zone of initial dilution. Within the ZID acute toxicity standards may be exceeded but acute toxicity may not occur. Chronic toxicity and chronic numeric toxicity standards shall not be exceeded at, or beyond, the edge of the mixing zone. Permitting of all toxic substances shall be in accordance with the toxic implementation strategy found in the Continuing Planning Process. For non permit issues and as a guideline for evaluating toxic substances not listed in the following tables, the Department may consider No Observed Effect Concentrations (NOECs) or other literature values as appropriate. For the substances listed below, the following standards shall apply:"
Thereafter a table follows titled:
"ALL WATERBODIES - AQUATIC LIFE CRITERIA"
The column headings are
"Substance"
"Acute Values (µg/l) (Never to Exceed)"
"Chronic Values (µg/l) (24-hr Average)"
The sole reference I can find to Pentachlorophenol in the entirety of APC&EC Regulation No. 2

appears in this table, wherein the following value is given for Pentachlorophenol in the "Acute Values" column:
e[1.005(pH)-4.869]
The following value is given for Pentachlorophenol in the "Chronic Values" column:
e[1.005(pH)-5.134]
On July 16, 2010, you wrote to me stating in part:
"The remediation goals for New Cricket Spring are calculated according to the equations in APC&EC Regulation 2. Based upon Reg. 2, 2007, the levels are 9.3ug/l for the monthly average and 18.7ug/l for a daily maximum."
Please help me to understand how you derive the values in your above statement and why the standards for Pentachlorophenol are expressed in this cryptic fashion, whereas the standards for all of the eleven (11) other substances listed in the table are expressed simply as a decimal number.
ADEQ's Water Quality Standards for toxics in Regulation No. 2 are adopted from EPA's National Recommended Water Quality Criteria. The folloing website is a table of these Criteria. Please see line 53 for Pentachlorophenol. http://www.epa.gov/waterscience/criteria/wqctable/
The toxicity criteria for PCP are pH dependent, and are therefore represented by the equations. Using the monthly average and daily maximum values respectively, and given that Arkansas Water Quality Standards require pH to be between 6.0 -9.0, values are calculated.
For any substance whose level of concentration in surface water is pH or hardness dependent, an equation given in the regulations is used to calculate the value.
Finally, most notably to my mind, I find no reference whatever to (and therefore no standard for) Pentachlorophenol under the next table in this regulation, which table is titled "ALL WATERBODIES - HUMAN HEALTH CRITERIA".
At this time, ADEQ has not adopted the Human Health Criteria in EPA's National Recommended Water Quality Criteria for Pentachlorophenol.
Further questions I have are regarding the reports you forwarded me on July 1, 2010, especially concerning data contained in the PDF file titled "Arkwood 2009 Annual Report.pdf":
1) What proof is there that operation of the Pilot Water Injection System on the Arkwood site is actually effective at reducing concentrations of Pentachlorophenol in New Cricket Spring?
The sampling data over time (1998-present), since removal of the contaminated soil, have shown a decrease in the level of PCP at the spring. There were spikes in the data and in 2005 additional treatment was set up at the source/ sink hole to treat the remaining soil and groundwater prior to the groundwater discharge at New Cricket Spring.
2) Do the data gathered during the periods of time when the Pilot Water Injection System on the Arkwood site was not fully operational provide evidence that the system is not effective at reducing concentrations of Pentachlorophenol in New Cricket Spring?
Not necessarily. Natural flow levels and precipitation levels also influence the effectiveness. Overall effectiveness will be evaluated again at the next 5 year review, which should begin this fall.
3) Is there evidence that the concentrations of Pentachlorophenol at New Cricket Spring would actually be *lower* if operation of the Pilot Water Injection System on the Arkwood site were *halted*?
No, again spikes in the level of PCP can occur following periods of heavy precipitation due to the precipitation flushing the PCP out of the soil into the groundwater. Treatment at the source by the injection system appears most effective at keeping the levels of PCP low at the spring. This in turn can make the treatment at the spring more effective.

Thank you again for your attention to my concerns.
Sincerely,
Curt Grisham

ADEQ

A R K A N S A S
Department of Environmental Quality

February 14, 2012

USEPA REGION 6
Attn: Mr. Shawn Ghose
Mail Code: 6SF
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

RE: New Cricket Spring Water Quality Standards, Arkwood Superfund Site, Omaha, Arkansas; EPA ID No. ARD084930148; AFIN: 05-00003

Dear Mr. Ghose:

Arkwood is a Superfund site under the direct authority of EPA. The surface water regulations, Arkansas Pollution Control and Ecology Commission (APC&EC) Regulation No. 2 would be an applicable or relevant and appropriate requirement (ARAR). Water Quality Standards and the basis for calculating a specific standard are given in APC&EC Regulation 2. Definitions for all terms used are also in the Regulation.

Because the State Water Quality Standard is pH based, surface water sample(s) proximal to the site are used to determine if the standard should be changed. A review of APC&EC Regulation 2 indicates that the equation for the calculation has not changed since the ROD was issued. In addition, pH data should be included in the weir discharge sample to ensure it falls between 6.0 and 9.0 pH.

The pH data from the nearest ADEQ Water quality monitoring station (WHI0071) for the period 2004-2009 was averaged for use in the calculation. Periodic updates may be made based on more recent or site specific data. This would be done with each five year review of the NPL site at a minimum. Pentachlorophenol Calculations for Surface Discharge, Per Reg. 2.508, the Pentachlorophenol aquatic life water quality standards (WQS) are as follows:

Acute	Chronic
e[1.005(pH)-4.869]	e[1.005(pH)-5.134]
pH = 7.84 s.u.	

The pH used in calculating the standards, 7.84 s.u., is the average pH taken at monitoring station WHI0071 from 2004 – 2009.
Acute Standard
e[1.005(7.84)-4.869] = 20.29 μg/l
Chronic Standard
e[1.005(7.84)-5.134] = 15.57 μg/l

Reasonable potential for water quality violations is determined by comparing the effluent data to the WQS without taking into account a background flow because the 7Q10 of the receiving stream is 0 cfs. In accordance with the procedures outlined in the Continuing Planning Process (CPP), the highest effluent test result is compared to the water quality standards because over twenty data points exist. The highest effluent test result is 20 µg/l which occurred on July 10, 2008. It is important to note that higher test results occurred on October 22, 2007, and July 7, 2008. Those test results, 53.7 µg/l and 189 µg/l respectively, were not used because it appears as though those results were not representative of the effluent.

Comparison with Acute Standard
20 µg/l < 20.29 µg/l
Comparison with Chronic Standard
20 µg/l > 15.57 µg/l

Organisms in the effluent discharge stream experience chronic exposure, therefore; the chronic standard of 15.57µg/l is the appropriate standard for the Arkwood Site. With respect to the previously calculated values, the monthly average would be 15.57 µg/l and the daily maximum would be 20.29 µg/l.

In addition to measuring pH at the sample points, temperature and dissolved oxygen data should be collected. APC&EC Regulation 2.505 requires that dissolved oxygen (D.O.) levels meet or exceed 6.0 mg/l. During the months of March, April, and May, when discharge levels at the weir exceed 15 CFS, the D.O. standard is 6.5 mg/l.

If you have any questions, please contact me at 501-682-0660 or via e-mail at clem@adeq.state.ar.us.

Sincerely,

Sarah Clem
ADEQ Branch Manager
Water Quality Planning, Water Division

cc: M. Moix, Engineer P.E., Hazardous Waste Division, ADEQ

ADEQ

A R K A N S A S
Department of Environmental Quality

HAZARDOUS WASTE DIVISION ROUTING SLIP

June 21, 2012

Subject: Arkwood, Inc. CERCLA Superfund Site

From: Mark Moix MM 6-21-2012

Route in turn to:	*Action Needed*	*Initials*	*Date*
Grant Kneebone	☑ Concurrence ☑ Review (by DK)		6-25-12
Dianna Kilburn	☑ Concurrence ☑ Review		6/22/12 w/ comment
Jay Rich	☑ Concurrence ☑ Review		7-11-12
Annette Cusher	☑ Concurrence ☑ Review		6/25/12
Shane Byrum	☐ Concurrence ☑ Review		6/26/12
Sarah Clem	☑ Concurrence ☑ Review		7-2-12 7-5-12
Mo Shafii	☑ Concurrence ☑ Review		7-2-12
Tammie Hynum	☑ Concurrence ☑ Review		7/11/12 comments 7/3/12 comments 7/11/12
Ryan Benefield	☑ Concurrence ☑ Review		7/12/12

Note: Marking the Concurrence box indicates the individual agrees with the applicable text as it relates to their individual discipline and Work Section (e.g., Engineer; Risk Assessor; Geology; Compliance; Policy/Management), as applicable. Marking the Review box indicates the individual has read the document.

DISPOSITION:

Return to Mark Moix 682-0852

COMMENTS: *Approval letter with comments for the Arkwood, Inc. Groundwater Remediation Summary dated June 2012*

ADEQ
ARKANSAS
Department of Environmental Quality

CERTIFIED MAIL No. 91 7199 9991 7030 4901 5218
Return Receipt Requested

November 6, 2012

U.S. EPA Region 6
Attn: Mr. Ruben Moya
Mail Code: 6SF
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

RE: Monthly Progress Report–September 2012
Arkwood, Inc. Site, Omaha, Arkansas

Dear Mr. Moya:

The Arkansas Department of Environmental Quality - Hazardous Waste Division (ADEQ) has received the Monthly Progress Report–September 2012 for Arkwood, Inc. Site, Omaha, Arkansas dated October 10, 2012. After reviewing the report ADEQ has the following comments:

1. According to the email from Jean Mescher, McKesson, dated October 3, 2012 provided with the subject report, samples cannot be obtained 20 feet downstream from the weir as requested by ADEQ during periods of low flow since the effluent "sinks into the subsurface before reaching the culvert". This statement describes the effluent returning to a subsurface status and therefore returning to the state of groundwater. For this reason the Maximum Contaminant Level (MCL) for pentachlorophenol (PCP) of 1.0 ug/l should be used in lieu of the aquatic toxicity standard of 15.57 ug/l which is currently used.

2. Due to the concern discussed in Comment 1 above, a review was performed of past correspondence for clarification concerning applicable risk levels. During the review, it was noticed that the ADEQ water quality standard of 15.57 ug/l is apparently being used as the screening level for PCP in lieu of the MCL of 1.0 ug/l. However, this standard pertains to aquatic toxicity only and does not address potential human health concerns. Even as it is apparently assumed that the stream is not a source for potable water, the MCL of 1.0 ug/l should be the applicable screening level for the following reasons:

    - Much of the groundwater which rises from the spring and becomes surface water returns to groundwater and appears to migrate offsite, as groundwater.

    - According to past correspondence, it appears the consensus of the EPA, ADEQ and McKesson, that some groundwater is circumventing the spring and migrating beyond the spring as groundwater.

9383907

3. Since the MCL for PCP is applicable for potential risk evaluation, the minimum reporting limit for pentachlorophenol should be less than 1.0 ug/l and not the current reporting limit of 5.0 ug/l.

4. It is noted the increase in concentration to 73.2 ppb PCP at the mouth of New Cricket Spring occurred after onsite injection of clean water ceased. The flow from the spring was 0.4 gpm at the time of sampling. It is recommended that monthly sampling and testing at the site continue as scheduled.

To address concerns discussed above, a minimum PCP reporting limit equal to or less than 1.0 ug/l is recommended for a mutually agreed upon limited period of time by the parties involved or may be used seasonally during low-flow conditions. If you have any comments or questions, please contact me at 501-682-0852 or via e-mail moix@adeq.state.ar.us.

Sincerely,

Mark Moix

Mark Moix
Engineer, PE
Technical Branch
Hazardous Waste Division

cc: Jean Mescher, McKesson Corporation

McKesson Corporation
One Post Street, 34th Floor
San Francisco, CA 94104
608.848.4134 Tel

Jean A. Mescher
Director, Environmental Services

McKESSON
Empowering Healthcare

Via Electronic and Certified Mail

December 18, 2012

Mr. Ruben Moya, Superfund Remedial Project Manager
Superfund AR/LA Enforcement Section (6SF-RA)
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202

Subject: Response to ADEQ Comments Dated November 6, 2012
Re: Monthly Progress Report – September 2012
Arkwood, Inc. Site, Omaha, Arkansas

Dear Mr. Moya:

The purpose of this letter is to offer clarifications and responses to the comments of ADEQ addressed to you dated November 6, 2012 regarding the Monthly Progress Report – September 2012 for the Arkwood, Inc. Site. The ADEQ's comments are presented below in italics followed by our responses.

1. *According to the email from Jean Mescher, McKesson, dated October 3, 2012 provided with the subject report, samples cannot be obtained 20 feet downstream from the weir as requested by ADEQ during periods of low flow since the effluent "sinks into the subsurface before reaching the culvert". This statement describes the effluent returning to a subsurface status and therefore returning to the state of groundwater. For this reason the Maximum Contaminant Level (MCL) for pentachlorophenol (PCP) of 1.0 µg/l should be used in lieu of the aquatic toxicity standard of 15.57 µg/l which is currently used.*

My responses were made based on my familiarity of the Site: 1) For clarification, the reason a sample cannot be collected 20 feet downstream from the weir is that there is only about 15 feet between the effluent discharge point and the entrance to the culvert. 2) During periods of moderate to high flow, a sample can be collected at the entrance to the culvert (about 15 feet from the discharge point). However, during periods of low flow, the effluent may not flow all the way to the culvert at a depth that allows for sampling. Perhaps I oversimplified the conditions of what happens to the water in the discharge ditch. 3) When earlier I said that it "sinks into the subsurface before reaching the culvert", I did not mean to infer that it became groundwater. The weir is approximately six feet from the fence line. At the point the effluent stream leaves the fenced area (goes offsite), the flow is aboveground and visible regardless of the spring flow rate. Offsite, under low flow conditions, the water in the ditch downgradient from the effluent discharge point spreads out within the gravel-lined ditch and is not deep enough to accommodate the 1-liter sampling container used to collect the water sample. At low flow rates, the discharge enters the rock-lined ditch and partially evaporates. That which remains disperses around the voids be-

695115

tween rocks and may be partially absorbed into the surface soil. A small depression was constructed at about 12-feet from the effluent discharge point to accommodate collection of the sample (it is not recommended to make a depression closer to the culvert due to concerns for undermining of the culvert). When we do not see flow reaching the culvert, it may be spreading and flowing in the gravel beneath the culvert. It is still considered to be a surface water discharge since the source of the water (New Cricket Spring) is surface water and the water is discharged at the surface and flows for some distance before it spreads between the rocks in the ditch lining where it may be partially absorbed into the surface materials. In accordance with Arkansas Regulation 2, "surface water" is defined as, "That water contained on the exterior or upper portion of the earth's surface as opposed to groundwater." Using this definition, the effluent discharge is appropriately categorized as surface water.

2. *Due to the concern discussed in Comment 1 above, a review was performed of past correspondence for clarification concerning applicable risk levels. During the review, it was noticed that the ADEQ water quality standard of 15.57 µg/l is apparently being used as the screening level for PCP in lieu of the MCL of 1.0 µg/l. However, this standard pertains to aquatic toxicity only and does not address potential human health concerns. Even as it is apparently assumed that the stream is not a source for potable water, the MCL of 1.0 µg/l should be the applicable screening level for the following reasons:*

   Much of the groundwater which rises from the spring and becomes surface water returns to groundwater and appears to migrate offsite, as groundwater.

   According to past correspondence, it appears the consensus of the EPA, ADEQ and McKesson, that some groundwater is circumventing the spring and migrating beyond the spring as groundwater.

Please see the response under Comment 1 above. There is constant movement between subsurface and surface water bodies as streams and lakes may be gaining or losing hydraulically at different portions of the water body, during various precipitation events and during different times of the year. However, this ongoing interaction between surface and groundwater does not mean that the defined distinctions between surface water and groundwater are eliminated. The dye tracing study conducted for the site demonstrated that the groundwater migrating offsite discharges detectable levels of pentachlorophenol at only one location: New Cricket Spring, which is treated by McKesson.

3. *Since the MCL for PCP is applicable for the potential risk evaluation, the minimum reporting limit for pentachlorophenol should be less than 1.0 µg/l and not the current reporting limit of 5.0 µg/l.*

Please see responses above. We can request that our laboratory, Arkansas Analytical, Inc., report "J" values between 1 µg/l and 5 µg/l with the recognition that a J value is an estimated concentration. In essence, there is not a drinking water EPA Method for PCP. The EPA Method 8270D from SW-846 lists the reporting limit for pentachlorophenol in groundwater as 50 µg/l (ppb). The method detection level (MDL) for Arkansas Analytical for PCP is 1 ppb. There is an

uncertainty as to quantitation for data falling below the lowest standard in the calibration curve. Arkansas Analytical's NELAC accreditation requires that if data lower than their lowest standard is reported, it must be qualified as estimated as a "J" value. The laboratory president states that a value between 1 ppb and 5 ppb will be an estimated value with a range of about -50% to +100% of the actual value - meaning an estimated value of 1 ppb is really somewhere in the range of 0.5 ppb to 2 ppb.

Jeff Reuhr of the ADEQ laboratory provided the following explanation in an email to Diana Kilburn of ADEQ on November 29, 2012:

> *"For Pentachlorophenol our low standard on the five point curve is 500ug/L. This we say is the lowest concentration we can see or report for that parameter. The next step is that we extract 500mL of sample which we concentrate done to 1mL. This is a 500 to 1 concentration so 500ug/L divided by 500 equals a 1ug/L MDL or Reporting limit in this case. On some of the Old Midland samples you will notice we only extracted 50mL or 5mL, so that was why the MDL and Reporting limits changed. For example 50mL extracted then conc to 1mL would result in a MDL of 500ug/L divided by 50 equals 10ug/L MDL or Reporting limit. I realize this is a flaw in our reports, because it is confusing for those reviewing them, but our LIMS requires us to input everything we do and then it does the math. The ADEQ report doesn't have a qualifier because the result is not estimated. It is based on the low standard so we have 100 % confidence in the results.*
>
> *We are able to see that low because you asked us to, and we were able to push/optimize the method to see those levels. Most labs can't or won't push their instruments down to those levels. The main reasons are; their instruments are older and can't, these low levels are very difficult to maintain thus needing almost constant recalibrations, and you end up needing to make more dilutions which screws with your QC.*
>
> *A 5ppb reporting limit for pentachlorophenol isn't that unusual for most Labs to report. They may be able to say they see 1ppb, but they are going to flag the result as estimated."*

We have requested that Arkansas Analytical report PCP values between 1-5 µg/l as a "J" value unless where noted. If further refinements in the analytical process can be made based on additional discussion between Arkansas Analytical and the ADEQ laboratory, we will inform the agencies at that time.

4. *It is noted the increase in concentration to 73.2 ppb PCP at the mouth of New Cricket Spring occurred after onsite injection of clean water ceased. The flow from the spring was 0.4 gpm at the time of sampling. It is recommended that monthly sampling and testing at the site continue as scheduled.*

Monthly sampling and testing at New Cricket Spring and the treatment effluent point will continue as requested.

I certify that the information contained in or accompanying this submission is true, accurate, and complete to the best of my knowledge, information and belief, and that I, as project coordinator, have made reasonable inquiry into its veracity.

If you have any questions regarding this letter, please do not hesitate to contact me at (608) 848-4134.

Sincerely,

Jean A. Mescher, Project Coordinator
Director, Environmental Services

Enclosure

Copy:

- Mark Moix, ADEQ*
- EPA Assistant Regional Counsel (6C-WA)* (w/o enclosure)
- Chief, Superfund Enforcement Branch (6H-E)* (w/o enclosure)

*** CERTIFIED MAIL**

ADEQ
A R K A N S A S
Department of Environmental Quality

CERTIFIED MAIL No. 91 7199 9991 7030 4901 5218
Return Receipt Requested

November 6, 2012

U.S. EPA Region 6
Attn: Mr. Ruben Moya
Mail Code: 6SF
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

RE: Monthly Progress Report–September 2012
Arkwood, Inc. Site, Omaha, Arkansas

Dear Mr. Moya:

The Arkansas Department of Environmental Quality - Hazardous Waste Division (ADEQ) has received the Monthly Progress Report–September 2012 for Arkwood, Inc. Site, Omaha, Arkansas dated October 10, 2012. After reviewing the report ADEQ has the following comments:

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Sincerely,

Mark Moix

Mark Moix
Engineer, PE
Technical Branch
Hazardous Waste Division

cc: Jean Mescher, McKesson Corporation

United States
Environmental Protection
Agency

Prevention, Pesticides
and Toxic Substances
(7510P)

EPA 739-R-08-008
September 25, 2008

Reregistration Eligibility Decision for Pentachlorophenol

REREGISTRATION ELIGIBILITY
DECISION
for
Pentachlorophenol
List B
CASE 2505

Approved By:

Frank T. Sanders
Director, Antimicrobials Division
September 25, 2008

Attachment

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Pentachlorophenol Reregistration Team

Office of Pesticide Programs

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Timothy McMahon
Timothy Leighton
Najm Shamim
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Ecological Risk Assessment
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Office of General Counsel:

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Philip Ross

Office of Enforcement and Compliance Assistance:

David Stangel

Office of Solid Waste:

Ross Elliot

GLOSSARY OF TERMS AND ABBREVIATIONS

a.i.	Active Ingredient
aPAD	Acute Population Adjusted Dose
APHIS	Animal and Plant Health Inspection Service
ARTF	Agricultural Re-entry Task Force
BCF	Bioconcentration Factor
CDC	Centers for Disease Control
CDPR	California Department of Pesticide Regulation
CFR	Code of Federal Regulations
ChEI	Cholinesterase Inhibition
CMBS	Carbamate Market Basket Survey
cPAD	Chronic Population Adjusted Dose
CSFII	USDA Continuing Surveys for Food Intake by Individuals
CWS	Community Water System
DCI	Data Call-In
DEEM	Dietary Exposure Evaluation Model
DL	Double layer clothing {i.e., coveralls over SL}
DWLOC	Drinking Water Level of Comparison
EC	Emulsifiable Concentrate Formulation
EDSP	Endocrine Disruptor Screening Program
EDSTAC	Endocrine Disruptor Screening and Testing Advisory Committee
EEC	Estimated Environmental Concentration. The estimated pesticide concentration in an environment, such as a terrestrial ecosystem.
EP	End-Use Product
EPA	U.S. Environmental Protection Agency
EXAMS	Tier II Surface Water Computer Model
FDA	Food and Drug Administration
FFDCA	Federal Food, Drug, and Cosmetic Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FOB	Functional Observation Battery
FQPA	Food Quality Protection Act
FR	Federal Register
GL	With gloves
GPS	Global Positioning System
HIARC	Hazard Identification Assessment Review Committee
IDFS	Incident Data System
IGR	Insect Growth Regulator
IPM	Integrated Pest Management
RED	Reregistration Eligibility Decision
LADD	Lifetime Average Daily Dose
LC_{50}	Median Lethal Concentration. Statistically derived concentration of a substance expected to cause death in 50% of test animals, usually expressed as the weight of substance per weight or volume of water, air or feed, e.g., mg/l, mg/kg or ppm.
LCO	Lawn Care Operator
LD_{50}	Median Lethal Dose. Statistically derived single dose causing death in 50% of the test animals when administered by the route indicated (oral, dermal, inhalation), expressed as a weight of substance per unit weight of animal, e.g., mg/kg.
LOAEC	Lowest Observed Adverse Effect Concentration
LOAEL	Lowest Observed Adverse Effect Level
LOC	Level of Concern
LOEC	Lowest Observed Effect Concentration
mg/kg/day	Milligram Per Kilogram Per Day
MOE	Margin of Exposure
MP	Manufacturing-Use Product
MRID	Master Record Identification (number). EPA's system of recording and tracking studies submitted.
MRL	Maximum Residue Level

N/A	Not Applicable
NASS	National Agricultural Statistical Service
NAWQA	USGS National Water Quality Assessment
NG	No Gloves
NMFS	National Marine Fisheries Service
NOAEC	No Observed Adverse Effect Concentration
NOAEL	No Observed Adverse Effect Level
NPIC	National Pesticide Information Center
NR	No respirator
OP	Organophosphorus
OPP	EPA Office of Pesticide Programs
ORETF	Outdoor Residential Exposure Task Force
PAD	Population Adjusted Dose
PCA	Percent Crop Area
PDCI	Product Specific Data Call-In
PDP	USDA Pesticide Data Program
PF10	Protection factor 10 respirator
PF5	Protection factor 5 respirator
PHED	Pesticide Handler's Exposure Data
PHI	Pre-harvest Interval
ppb	Parts Per Billion
PPE	Personal Protective Equipment
PRZM	Pesticide Root Zone Model
RBC	Red Blood Cell
RED	Reregistration Eligibility Decision
REI	Restricted Entry Interval
RfD	Reference Dose
RPA	Reasonable and Prudent Alternatives
RPM	Reasonable and Prudent Measures
RQ	Risk Quotient
RTU	(Ready-to-use)
RUP	Restricted Use Pesticide
SCI-GROW	Tier I Ground Water Computer Model
SF	Safety Factor
SL	Single layer clothing
SLN	Special Local Need (Registrations Under Section 24C of FIFRA)
STORET	Storage and Retrieval
TEP	Typical End-Use Product
TGAI	Technical Grade Active Ingredient
TRAC	Tolerance Reassessment Advisory Committee
TTRS	Transferable Turf Residues
UF	Uncertainty Factor
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WPS	Worker Protection Standard

ABSTRACT

The Environmental Protection Agency (EPA or the Agency) has completed the human health and environmental risk assessments for pentachlorophenol and is issuing its risk management decision. The risk assessments, which are summarized below, are based on the review of the required target database supporting the use patterns of currently registered products and additional information received through the public docket. After considering the risks identified in the revised risk assessments, comments received, and mitigation suggestions from interested parties, the Agency developed its risk management decision for uses of pentachlorophenol that pose risks of concern. As a result of this review, EPA has determined that pentachlorophenol containing products are eligible for reregistration, provided that risk mitigation measures are adopted and labels are amended accordingly. That decision is discussed fully in this document. The Agency is aware that research is ongoing regarding pentachlorophenol. The Agency may revisit this decision in the future.

I. INTRODUCTION

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) was amended in 1988 to accelerate the reregistration of products with active ingredients registered prior to November 1, 1984 and amended again by the Pesticide Registration Improvement Act of 2003 to set time frames for the issuance of Reregistration Eligibility Decisions. The amended Act calls for the development and submission of data to support the reregistration of an active ingredient, as well as a review of all submitted data by the U.S. Environmental Protection Agency (EPA or the Agency). Reregistration involves a thorough review of the scientific database underlying a pesticide's registration. The purpose of the Agency's review is to reassess the potential hazards arising from the currently registered uses of the pesticide; to determine the need for additional data on health and environmental effects; and to determine whether or not the pesticide meets the "no unreasonable adverse effects" criteria of FIFRA.

Pentachlorophenol (PCP) is a general biocide which has been used extensively as a fungicide, bactericide, herbicide, molluscicide, algaecide and insecticide by agriculture and other industries including textiles, paints, oil drilling and forestry. Pentachlorophenol also contains chlorinated dibenzodioxins and chlorinated dibenzofurans (CDDs and CDFs) and hexachlorobenzene (HCB) as contaminants formed during the manufacture process. These compounds are inherently toxic, as well as environmentally persistent, and their presence may increase the ecological risk associated with the use of pentachlorophenol. Pentachlorophenol is only one of many sources of CDDs, CDFs, and HCB in the environment making it difficult to quantify the portion of the aggregate environmental risk from CDDs, CDFs, and HCB that is attributable to pentachlorophenol wood treatment uses. The main use of pentachlorophenol, as a heavy duty wood preservative, is to treat utility poles. Although its only remaining use in the U.S. is as a heavy duty wood preservative, pentachlorophenol has been used in rice and sugar production, in water treatment, as a pre-harvest defoliant in cotton, and as a general pre-emergence herbicide. It has also been utilized in numerous products including adhesives, construction materials, leather and paper. Pentachlorophenol is currently classified as a Restricted Use Product (RUP) when used as a heavy duty wood preservative and is predominately used to treat utility poles and cross arms.

This document presents the Agency's revised human health and ecological risk assessments and the Reregistration Eligibility Decision (RED) for pentachlorophenol. The pentachlorophenol case consists of one PC Code: 063001. Pentachlorophenol has been used as a wood preservative since 1936; however, the first pesticidal product containing pentachlorophenol was registered in 1950. For a list of the current products, please see Appendix A.

Currently, all of the pentachlorophenol produced in the U.S. is utilized in wood preservation. There are approximately 60 million utility-owned wood poles and 54 million crossarms in service across the United States which have been treated with wood preservatives (mainly pentachlorophenol and creosote; EPRI 1993). Approximately 36 million of the wood poles in service have been treated with pentachlorophenol (Malecki, 1992), and approximately

95.8% of the crossarms in service were treated with pentachlorophenol (EPRI 1993). An estimated 3% of the treated poles are replaced annually.

The Agency has determined that analysis of the potential need for a special hazard-based safety factor under the FQPA is not needed at this time. The Agency does not anticipate dietary or drinking water exposures based on the registered use patterns and there are no tolerances or tolerance exemptions for the use of pentachlorophenol as an active ingredient. Therefore, an FQPA hazard analysis is not necessary at this time.

This document presents the Agency's decision regarding the reregistration eligibility of the registered uses of pentachlorophenol. In an effort to simplify the RED, the information presented herein is summarized from more detailed information which can be found in the technical supporting documents for pentachlorophenol in this RED. The revised risk assessments and related addenda are not included in this document, but are available in the Public Docket at www.regulations.gov (Docket ID EPA-HQ-OPP-2004-0402).

This document consists of six sections. Section I is the Introduction. Section II provides a Chemical Overview, a profile of the use and usage of pentachlorophenol and its regulatory history. Section III, Summary of pentachlorophenol Risk Assessments, gives an overview of the human health and environmental assessments, based on the data available to the Agency. Section IV, Risk Management and Reregistration, presents the reregistration eligibility and risk management decisions. Section V, What Registrants Need to Do, summarizes the necessary label changes based on the risk mitigation measures outlined in Section IV. Finally, the Appendices list all use patterns eligible for reregistration, bibliographic information, related documents and how to access them, and Data Call-In (DCI) information.

II. Chemical Overview

A. Regulatory History

Pentachlorophenol was first registered as an active ingredient by the United Sates Department of Agriculture (USDA) on December 1, 1950. In 1970, the Environmental Protection Agency (EPA) was established and was charged with protecting human health and the environment, and assumed all pesticide registrations from USDA. Currently, there are six products containing pentachlorophenol as an active ingredient. Pentachlorophenol is a fungicide, bactericide, herbicide, molluscicide, algaecide and insecticide and is only registered for use as a heavy duty wood preservative.

The production of pentachlorophenol for wood preserving began on an experimental basis in the 1930s. In 1947 nearly 3,200 metric tons of pentachlorophenol was reported to have been used in the U.S. by the commercial wood preserving industry. Pentachlorophenol was one of the most widely used biocides in the U.S. prior to regulatory actions to cancel and restrict certain non-wood preservative uses of pentachlorophenol in 1987. Prior to the 1987 Federal Register Notice (Vol. 52, No. 13) which canceled and restricted certain non-wood uses, pentachlorophenol was registered for use as an herbicide, defoliant, mossicide, and as a disinfectant.

Indoor applications of pentachlorophenol are prohibited. These restrictions were imposed on pentachlorophenol registrations as part of the Agency's Special Review process as indicated in the *U.S.EPA Position Document 4 for Wood Preservative Pesticides: Creosote, Pentachlorophenol and Inorganic Arsenicals (1984, amended 1986)*. PD 4 announcing the termination of the Special Review for the non-wood uses of pentachlorophenol was signed 12/29/92 and was published 2/93.

The use of pentachlorophenol to treat wood intended for use in interiors is also prohibited, except for a few low exposure uses (i.e., those support structures which are in contact with the soil in barns, stables, and similar sites and which are subject to decay or insect infestation). Pentachlorophenol is a restricted use pesticide for sale and use by certified applicators only.

In 2000, the Agency canceled 12 products containing pentachlorophenol due to the registrant's failure to pay registration maintenance fees. This resulted in cancellation of all uses of pentachlorophenol as a remedial treatment (a non-pressure treatment using a brush) of utility poles.

The Agency has received requests by the registrants of pesticide products containing pentachlorophenol to voluntarily amend to terminate certain uses of affected products. Two registrants, KMG Chemicals, Inc. and Vulcan Chemicals, requested this action to be effective immediately. KMG Chemicals, Inc. requested that all non-pressure treatment and non-thermal treatments for their product (Pentacon 40) be deleted. Vulcan Chemicals requested to voluntarily cancel spray uses for two of their products (Vulcan GLAZD Penta and Vulcan Premium Four Pound [PCP-2] Concentrate). The Agency has processed these requests. These voluntary use cancellations leave only pressure and thermal wood treatment uses of pentachlorophenol.

B. Chemical Identification

Technical Pentachlorophenol

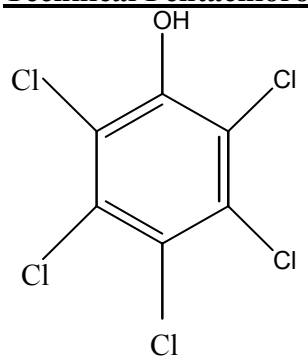

Figure #1. Molecular Structure of Pentachlorophenol

Common name: Pentachlorophenol

Chemical name: 2,3,4,5,6-pentachlorophenol

Chemical family: Aromatic Hydrocarbon Chlorophenol

Empirical formula: $C_6H\,Cl_5O$

CAS Registry No.: 87-86-5

Case number: 2505

OPP Chemical Code: 063001

Molecular weight: 266.34 g/mol

Other names: Pentachlorophenol is abbreviated as PCP. Product names include Dowicide EC-7, Penchlorol, Penta, Pentacon, Penwar, Priltox, Sinituho and Weedone.

Basic manufacturer: KMG-Bernuth, Inc.

Chemical properties: Pentachlorophenol is light brown to tan (Pure pentachlorophenol, however, is white needle-like crystals). It is a solid with a phenolic odor. Pentachlorophenol has a density of 1.978 g/ml; a dissociation constant (K_a) of 1.6×10^{-14}; has a pH of 4.99; and sublimes at 54 ± 2°C. Pentachlorophenol has a melting point of 190-191° C; and has a boiling point of 309° C (decomposes). The vapor pressure is 1.1×10^{-4} mm Hg at 25°C. Pentachlorophenol has a Log K_{OW} of 5.05 at pH 5.1; a Log K_{OC} of 2430 (Georgia, sandy loam), 3420 (Ohio, clay loam), 706 (California, sandy loam), 1410 (Nebraska, blue sandy loam); and its solubility at 20°C is 14 mg/L in water, 1.7 g/g in methanol, and 0.014 g/g in benzene.

C. Use Profile

The following information is a description of the currently registered uses of pentachlorophenol products, and an overview of use sites and application methods. A detailed table of the pentachlorophenol uses that are eligible for reregistration can be found in Appendix A.

Type of Pesticide: Pentachlorophenol is a restricted use pesticide used as a heavy duty wood preservative (fungicide, bactericide, herbicide, molluscicide, algaecide and insecticide).

Carpenter Ants
Mold
Lyctus Powderpost Beetles
Powderpost Beetles
Termites
Wood Rot/Decaying Fungus
Wood Rot/Decaying Organisms
Wood Stain Fungus

Use Classification: Restricted use.

Use Sites: The only registered use of pentachlorophenol is as a heavy duty wood preservative.

Lumber
Seasoned Lumber
Timbers
Wood
Wood Poles/Posts
Wood Products
Wood Pressure Treatment

Formulation Types: soluble concentrate and ready to use

D. Methods and Rates of Application:

A summary of the pentachlorophenol registered uses is given in Table 1 and a more detailed listing is included in Appendix A. Pentachlorophenol is registered for use as a heavy duty wood preservative. All other uses have been canceled.

Table 1: Pentachlorophenol Use Site and Application Rates

Company Name	Label #	Product Name	Formulation
KMG-Bernuth, Inc.	61483-1	Penta 5 Sure-Treat Wood Preserver	RTU
	61483-2	Dura-Treet 40 Wood Preserver	SC
	61483-3	KMG-B Penta Ol Technical Pentachlorophenol	Intermediate
	61483-58	Pentacon-7	RTU
	61483-59	Pentacon-10	RTU
	61483-62	Vulcan GLAZD Penta	Technical

Note: RTU is Ready to Use, and SC is Soluble Concentrate.

E. Disposal Information

In a broad sense, two types of waste are generated through the use of pentachlorophenol wood preservatives: wood treated with pentachlorophenol and industrial waste generated through the application of pentachlorophenol. The disposal requirements differ for each type of waste.

1. Treated Wood

Discarded pentachlorophenol treated lumber is usually land disposed in either construction and demolition landfills, municipal solid waste landfills, or industrial non-hazardous waste landfills. Many state and local governments may have specific regulations, guidelines, or recommendations for the management and disposal of discarded pentachlorophenol treated wood, either explicitly, or sometimes under the larger category of "treated wood." Therefore, EPA recommends that persons contact their state and local authorities regarding specific policies or regulations concerning the disposal of pentachlorophenol treated wood.

EPA estimates that there will remain a supply of pentachlorophenol treated wood that will ultimately require disposal, considering the amount of this building material currently in use, and its typical service life (which can be many years). EPA continues to evaluate the potential impacts of land disposal of discarded pentachlorophenol treated wood.

2. Waste Generated at Wood Treatment Facilities

There are also hazardous waste regulations under the Resource Conservation and Recovery Act (RCRA) that apply specifically to wastes generated at facilities where wood preservatives are used to treat wood. On December 6, 1990 EPA promulgated several hazardous waste listings applicable to wastes generated by wood treaters using certain wood preservative chemicals. (55 *FR* 50450; December 6, 1990 *Federal Register*). One of these hazardous waste listings (Hazardous Waste Number F032) can be found in the hazardous waste regulations at 40 CFR 261.31, and reads as follows:

- ***F032:*** Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with Sec. 261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.

Because pentachlorophenol preservative is a "chlorophenolic formulation," wastes generated from its use falls within the scope of this hazardous waste listing. Thus, wood treaters using pentachlorophenol preservatives would be hazardous waste generators (with respect to any in-scope wastewaters, process residuals, preservative drippage, etc. that are generated) and would be subject to the applicable requirements under RCRA Subtitle C, for example, notification of hazardous waste activity, obtaining an EPA Identification number, use of a hazardous waste manifest for off-site shipments of waste, and most significantly, the use and maintenance of a drip pad as described in 40 CFR 262.34(a)(1)(iii) and part 265, subpart W.

III. Summary of Risk Assessments

A. Background on Wood Preservative Risk Assessment

The purpose of this summary is to assist the reader by identifying the key features and findings of these risk assessments and to help the reader better understand the conclusions reached in the assessments. The human health and ecological risk assessment documents and supporting information listed in Appendix C were used to formulate the safety finding and regulatory decision for pentachlorophenol. While the risk assessments and related addenda are not included in this document, they are available from the OPP Public Docket EPA-HQ-OPP-2004-0402, and may also be accessed from www.regulations.gov. Hard copies of these documents may be found in the OPP public docket. The OPP public docket is located in Room S-4900, One Potomac Yard, 2777 South Crystal Drive, Arlington, VA 22202, and is open Monday through Friday, excluding Federal holidays, from 8:30 a.m. to 4:00 p.m.

The Agency's use of human studies in the pentachlorophenol risk assessment is in accordance with the Agency's Final Rule promulgated on January 26, 2006, related to Protections for Subjects in Human Research, which is codified in 40 CFR Part 26.

For almost all pesticides subject to reregistration, EPA employed an active ingredient-focused approach rather than an application method-focused approach. That is, EPA typically evaluated and made reregistration eligibility decisions for each active ingredient and its associated use sites rather than each use site and its associated active ingredients ("RED for active ingredient X" rather than "RED for applications made by application method X"). However, due to the unique nature in which the chemicals are applied, EPA made the decision

early in the reregistration process (circa 1988) to evaluate heavy duty wood preservative uses collectively using an application method-focused approach.

The term "heavy duty" wood preservative is used to differentiate wood preservatives applied using specialized high pressure treatment cylinders (also called "retorts") from those applied using non-specialized methods (e.g., brush, dip). Figure 1 presents a photograph of a treatment retort. There are three heavy duty wood preservative cases subject to reregistration: chromated arsenicals (Case 0132), pentachlorophenol (Case 2505), and creosote (Case 0139). Because these cases include only heavy duty wood preservatives, to improve readability the words "heavy duty" are often omitted in favor of the generic term "wood preservative" throughout the RED and supporting documents. The Agency notes that other heavy duty wood preservatives exist outside Case 0132, 2505, and 0139; however, uses of these preservatives were not subject to reregistration because the chemicals were not registered prior to November 1, 1984 and are therefore outside the scope of the three heavy duty wood preservative REDs. Heavy duty wood preservatives not included in Case 0132, 2505, and 0139 will be evaluated in the future under the registration review program.

Figure 1. Heavy Duty Wood Preservative High Pressure Treatment Cylinder (Retort)

Again, due to the unique nature in which heavy duty wood preservatives are applied, wood preservative risk assessment requires a different approach than those used for standard agricultural or antimicrobial pesticides. For example, unlike agricultural pesticide handlers who may be exposed to pesticides when mixing/loading, applying, or re-entering an area treated with

a pesticide, treatment facility workers may be exposed to pesticides when handling treated wood and/or performing activities related to operating the treatment cylinder.

This presents two challenges for risk assessment. First, because very few chemicals are applied using retorts, limited data are available to estimate worker exposure. Second, because many of the Agency's exposure models were designed to assess risk from agricultural chemicals, exposure estimates are expected to be conservative and may not be representative of "real world" exposure. The Agency acknowledges these challenges and considered these and other factors when making its reregistration and risk management decisions.

B. Human Health Risk Assessment

Pentachlorophenol is a general biocide which has been used extensively as a fungicide, bactericide, herbicide, molluscicide, algaecide and insecticide by agriculture and other industries including textiles, paints, oil drilling and forestry. However, the only remaining uses of pentachlorophenol are as a heavy duty wood preservative. Pentachlorophenol also contains chlorinated dibenzodioxins and chlorinated dibenzofurans (CDDs and CDFs) and hexachlorobenzene (HCB) as contaminants formed during the manufacture process. However, pentachlorophenol is only one of many sources of CDDs, CDFs, and HCB in the environment making it difficult to quantify the portion of the aggregate environmental risk from CDDs, CDFs, and HCB that is attributable to pentachlorophenol wood treatment uses.

CDDs and CDFs have been identified as micro-contaminants in technical grade pentachlorophenol. CDDs and CDFs have been found throughout the world at low concentrations in air, soil, water, sediment, fish and shellfish, and other food products such as meat and dairy products. CDDs and CDFs are members of a family of polychlorinated isomers of "dioxin-like" compounds. Physical and chemical properties and toxicity vary with the degree of chlorination. The most toxic congener of the family is 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD).

The dioxin/furan contaminants of pentachlorophenol present a unique case for purposes of risk characterization. Up to 17 CDD/CDF congeners are produced as contaminants in the manufacture of technical grade pentachlorophenol. All of these contaminants have chlorine substitution in at least the 2,3,7, and 8 positions, thus imparting these contaminants with "dioxin like" activity. Thus, all must be considered in the risk assessment for the contaminants of pentachlorophenol.

HCB has also been identified as a micro-contaminant in technical grade pentachlorophenol, and is not a naturally occurring compound. It is present in the environment through emissions into the atmosphere due to the manufacture of PCP and numerous emission processes, industrial discharge of HCB containing wastes into waterways as well as due to the manufacturing processes of some pesticides. Since HCB is a micro-contaminant in technical grade pentachlorophenol, it must also be considered in the risk assessment for the contaminants of pentachlorophenol.

1. Toxicity of Pentachlorophenol

A brief overview of the toxicity studies used for determining endpoints in the risk assessment is outlined below in Table 1. Further details on the toxicity of pentachlorophenol can be found in the "Pentachlorophenol-Toxicology Chapter for the Reregistration Eligibility Decision Document.," dated August 29, 2008; and the "***PENTACHLOROPHENOL:*** - Revised Toxicology Endpoint Report.," dated February 11, 2008. These documents are available on the Agency's website in the EPA Docket at: http://www.regulations.gov (Docket ID EPA-HQ-OPP-2004-0402).

The Agency has reviewed all toxicity studies submitted for pentachlorophenol and has determined that the toxicological database is sufficient for reregistration. The studies have been submitted to support guideline requirements. Major features of the toxicology profile are presented below. Table 1 gives a summary of the acute toxicity data and the toxicological endpoints selected for the exposure scenarios are summarized in Table 3. As stated previously, the Agency is aware that research is ongoing regarding pentachlorophenol. The Agency may revisit this decision in the future.

a. Acute Toxicity

The acute toxicity database for pentachlorophenol is considered complete. The acute toxicity of pentachlorophenol is low for dermal toxicity (Toxicity Category IV) and primary dermal irritation (Toxicity Category III) but shows higher toxicity for acute oral toxicity and primary eye irritation (Toxicity Category II). No dermal sensitization was observed with the technical test material. Acceptable acute inhalation toxicity data for pentachlorophenol were not available, but waivers were granted for these data.

The Pentachlorophenol Task Force previously submitted data to the Agency on efforts to develop methods to conduct inhalation studies. This effort was without success, based on an inability to generate consistent chamber concentrations of pentachlorophenol. The Agency has reviewed the documents in its possession regarding requests for waivers of inhalation toxicity data requirements, attempts at generating respirable atmospheres of pentachlorophenol, and conclusions reached in the Position Document 4 for Wood Preservatives (USEPA, 1984). Several difficulties were apparently encountered in the attempt to generate respirable particles of pentachlorophenol. It is concluded that, other issues notwithstanding, the real issue is the ability to maintain a consistent chamber concentration of pentachlorophenol. The previous decision to allow waivers for the acute and 90-day inhalation toxicity studies is upheld, but a Toxicity Category I for inhalation hazard will be assigned. The assignment of a Toxicity Category I is also consistent with regulatory decisions made previously for use of respirators from occupational exposure to pentachlorophenol (USEPA, 1984).

The following table summarizes the acute toxicity of pentachlorophenol. It is noted that the studies cited are older data, in which the test material may contain measureable concentrations of contaminants such as hexachlorodioxins and hexachlorobenzene.

Table 2. Summary of Acute Toxicity Data for Pentachlorophenol

Guideline No.	Study Type	MRID #(s)	Results	Toxicity Category
Acute Toxicity				
870.1100 (§81-1)	Acute Oral	00101715	LD50 = 155 mg/kg (M); LD50 = 137 mg/kg (F)	II
870.1200 (§81-2)	Acute Dermal Toxicity	00101715	LD50 > 3980 mg/kg	IV
870.1300 (§81-3)	Acute Inhalation Toxicity	waiver granted		I
870.2400 (§81-4)	Primary Eye Irritation	00101715	Corneal involvement at day 7 post-instillation	II
870.2500 (§81-5)	Primary Dermal Irritation	00101715	Moderate irritation at 72 hours post-application	III
870.2600 (§81-6)	Dermal Sensitization	42594301	no sensitization observed using Buehler method	NA

b. Carcinogenicity

Pentachlorophenol was classified as a B2 carcinogen (probable human carcinogen) at a joint February 1990 meeting of the FIFRA Science Advisory Panel and Science Advisory Board. The SAP/SAB concluded that the liver tumors, pheochromocytomas, and hemangiosarcomas were treatment-related and supported the B2 classification. These tumors were observed in female mice from a study conducted by the National Toxicology Program in 1989 (NTP Technical Report 349, March 1989) using pure pentachlorophenol or a technical grade formulation, Dowicide EC-7. In November of 1990, the Health Effects Division's Carcinogenicity Assessment Review Committee met and concurred with the B2 classification and also recommended quantification of risk using the combined incidence of hemangiosarcomas, liver tumors, and pheochromocytomas in female mice from the two data sets generated with the two pentachlorophenol formulations used in the NTP study (Health Effects Division document # 013274, HED archive record series). Using a 3/4 scaling factor, an oral cancer risk estimate (q_1*) of 7.0 x 10^{-2} was calculated on this basis The slope factor was calculated as the geometric mean of the individual slope factors derived from two data sets: female mouse data for technical grade and Dowicide EC-7 pentachlorophenol.

EPA is currently completing a new Integrated Risk Information System (IRIS) assessment that will include a cancer unit risk value for pentachlorophenol. Based on the ongoing re-evaluation of the science to estimate carcinogenic potential of pentachlorophenol, OPP will use the current risk estimate for pentachlorophenol until any new risk estimates are fully peer reviewed. However, the EPA process of regulating pesticides allows for reevaluation at any time if new information from the peer review process of the carcinogenic potential of pentachlorophenol warrants.

c. Toxicological Endpoints

On November 25, 1997, the Health Effects Division's Hazard Identification Review committee evaluated the toxicology data base of pentachlorophenol, selected doses and endpoints for acute dietary, chronic dietary (RfD) as well as occupational and residential exposure risk assessments, assessed the carcinogenic potential and addressed the sensitivity of infants and children from exposure to Pentachlorophenol as required by the Food Quality Protection Act (FQPA). In February of 2008, the Agency evaluated updated information with respect to the carcinogenicity of pentachlorophenol. The toxicity endpoints used in the current risk assessment are summarized below in Table 3.

Table 3. Toxicological Endpoints for Pentachlorophenol

Exposure Scenario	Dose Used in Risk Assessment, UF	Target MOE, Uncertainty Factory (UF) for Risk Assessment	Study and Toxicological Effects
Dietary Risk Assessments			
Acute Dietary (all populations)	An acute dietary assessment is not needed for the registered antimicrobial uses of pentachlorophenol, however, an acute endpoint of 30 mg/kg/day was selected from a developmental toxicity study in rats (MRID 43091702), with an uncertainty factor of 100 to calculate the acute RfD.		
Chronic Dietary (all populations)	A chronic dietary assessment is not needed for the registered antimicrobial uses of pentachlorophenol; however, a chronic endpoint of 1.5 mg/kg/day, the LOAEL from a chronic toxicity study in dogs (MRID 43882701), was previously selected, with an uncertainty factor of 300 to calculate the chronic RfD.		
Non-Dietary Risk Assessments			
Incidental Oral	An incidental oral risk assessment is not required for the registered antimicrobial uses of pentachlorophenol.		
Dermal (short- and intermediate-term)	NOAEL = 30 mg/kg/day	MOE = 100	Developmental Toxicity study – rats MRID 43091702
Dermal (long-term)	LOAEL = 1.5 mg/kg/day UF: 3X for lack of a NOAEL	MOE = 300	Chronic Toxicity study – dogs MRID 43982701
Inhalation (all durations)	No inhalation data available for pentachlorophenol. Inhalation risks for occupational exposure were not performed because most inhalation values derived from the biomonitoring study in workers were below the level of quantitation, thus implying that the majority of worker exposure is through dermal contact with pentachlorophenol		

Exposure Scenario	Dose Used in Risk Assessment, UF	Target MOE, Uncertainty Factory (UF) for Risk Assessment	Study and Toxicological Effects
Carcinogenicity (oral)	Classified as a B2 (probable human carcinogen) carcinogen by the Health Effects Division Carcinogenicity Assessment Review Committee and EPA's Science Advisory Board. An oral cancer risk estimate (q_1*) of 7.0 x 10^{-2} was calculated based on the incidences of hepatocellular neoplasms, adrenal medullary neoplasms, and hemangiosarcomas that developed in female mice treated with technical grade PCP or Dowicide EC-7 (NTP, 1989). The slope factor was calculated as the geometric mean of the individual slope factors derived from two data sets: female mouse data for technical grade and Dowicide EC-7 pentachlorophenol.		

Notes: UF = uncertainty factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, PAD = population adjusted dose (a = acute, c = chronic) RfD = reference dose.

2. Toxicity of Dioxin/Furan

The concept of toxic equivalency factors (TEFs) has been developed to facilitate risk assessment of exposure to chemical mixtures of CDDs and CDFs. In this procedure, individual TEFs are assigned to the various congeners of CDDs and CDFs. These values have been published by both the USEPA and the World Health Organization (Younes, 1998) and are based on assigning relative values in relation to 2,3,7,8-TCDD, which is assigned a TEF value of 1.0, it being the most potent congener. Multiplying the exposure concentration of individual congeners by their respective TEFs yields a toxic equivalency, which, when summed for all the components of the mixture, gives the toxic equivalency quotient (TEQ) for that mixture and is an indication of the additional exposure from the pentachlorophenol contaminants.

Recent developments in science policy in the Agency have resulted in a shift towards calculation of non-cancer risk from dioxins and furans using a body burden approach rather than a dose or intake approach. This is appropriate for dioxin/furan contaminants of pentachlorophenol due to the long half-life of these chemicals. The Agency's Office of Research and Development (ORD) has led the effort in characterizing hazards and risks from exposure to dioxins and dioxin-like compounds, and the OPP, in its assessment of non-cancer risks posed by the dioxin/furan contaminants in pentachlorophenol, is working with ORD to express these risks using the methodologies developed in ORD for calculation of body burdens from exposure to the contaminants in pentachlorophenol treated wood.

a. Acute and Chronic Toxicity

Acute and chronic non-cancer toxicity have not been determined and are pending assessment using models developed by the Agency's Office of Research and Development (ORD) to determine actual body burdens. Only long-term dioxin absorbed doses are presented for calculation of the lifetime average daily doses (LADDs).

b. Carcinogenicity

A carcinogenic endpoint related to absorbed doses of CDD and CDF micro-contaminants has been identified. A cancer risk greater than one in a million is of concern.

In 1985, EPA classified 2,3,7,8-TCDD and related compounds as "probable" human carcinogens based on the available data. Since that time, the database relating to the carcinogenicity of dioxin and related compounds has grown and strengthened considerably. Under EPA's current approach, 2,3,7,8-TCDD is best characterized as a "human carcinogen." This means that, based on the weight of all of the evidence (human, animal, mode of action), 2,3,7,8- TCDD meets the stringent criteria that allows EPA and the scientific community to accept a causal relationship between 2,3,7,8-TCDD exposure and cancer hazard. Other dioxin-like compounds are characterized as "likely" human carcinogens primarily because of the lack of epidemiological evidence associated with their carcinogenicity, although there is a strong inference based on toxic equivalency that they would behave in humans as 2,3,7,8-TCDD does.

At this time, the knowledge of the mechanism of action of dioxin, receptor theory, and the available dose-response data do not firmly establish a scientific basis for replacing a linear procedure for estimating cancer potency. Therefore, for purposes of cancer risk assessment, the Agency is using the currently published slope factor of 1.0×10^{5} $(mg/kg/day)^{-1}$ for the 2,3,7,8 congener.

For additional information, please see the *Pentachlorophenol- Risk Assessment for the Reregistration Eligibility Decision (RED) Document*, dated August 29, 2008; located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

3. Toxicity of Hexachlorobenzene

The Agency has identified HCB as a persistent, bio-accumulative, and toxic (PBT) environmental pollutant contaminating water and food-chain sources. Human health effects associated with exposure to HCB include skin lesions, nerve and liver damage as short-term effects. Long-term effects from lifetime exposures include damage to liver and kidneys, reproductive effects, benign tumors of endocrine glands, and cancer.

The manufacturing process of pentachlorophenol produces several known contaminants of toxicological concern including HCB. The exposure and risk assessment for HCB in pentachlorophenol will focus on the use of pentachlorophenol as a wood preservative and the potential occupational exposure to HCB through this use.

a. Acute and Chronic Toxicity

The toxicology of hexachlorobenzene is discussed in detail within the 1991 "Drinking Water Criteria Document for Hexachlorobenzene", prepared by the U.S. EPA's Office of Health and Environmental Assessment (U.S. EPA, 1991) and the "ATSDR Toxicological Profile for Hexachlorobenzene" (ATSDR, 2002). Both assessments characterize the acute toxicity of HCB as low, with oral LD50 values in the range from 3500-10,000 mg/kg in rats, and other data citing 1700 mg/kg in rats, 2600 mg/kg in rabbits, and 4000 mg/kg in mice.

b. Carcinogenicity

The Agency has classified HCB as a B2 (probable human) carcinogen, based on data sets that showed induction of tumors of the thyroid, liver, and kidney in three rodent species (U.S.EPA, IRIS, 1996). In the IRIS database, the oral cancer slope factor was 1.7 $(mg/kg/day)^{-1}$ based on hepatocellular carcinomas in female Sprague-Dawley rats using a 2/3's animal to human scaling factor. However, based on current Agency policy a 3/4's scaling factor is applied to adjust the slope factor. The cancer slope factor for HCB was modified by 0.6X to account for the newer factor. For this evaluation, carcinogenic risk was assessed for non-dietary exposure to HCB using the modified cancer slope factor of 1.02 $(mg/kg/day)^{-1}$.

c. Toxicological Endpoints

The Agency has selected toxicity endpoints for HCB for use in exposure and risk assessments. These endpoints were selected using the available scientific literature on HCB (U.S. EPA, 2003). A summary of these endpoints is shown below in Table 4.

Table 4. Toxicological Endpoints for Hexachlorobenzene

Exposure Scenario	Dose	Endpoint	Study	Target MOE
Non-Dietary Risk Assessments				
Incidental Oral: Short-Term	NOAEL= 40 mg/kg/day	body weight loss, hyperesthesia, tremors, convulsions in maternal rats at 60 mg/kg/day.	Developmental Toxicity- Rat (Khera, 1974)	100
Incidental Oral: Intermediate-Term	NOAEL= 0.5 mg/kg/day	increased incidence of liver porphyrin levels in female rats at 2 mg/kg/day	15 Week Oral Toxicity- Rat (Kuiper- Goodman et al, 1977)	100
Dermal: Short-Term	Oral NOAEL = 40 mg/kg/day	body weight loss, hyperesthesia, tremors, convulsions in maternal rats at 60 mg/kg/day.	Developmental Toxicity- Rat (Khera, 1974)	100
Dermal: Intermediate-Term	Oral NOAEL = 0.5 mg/kg/day	increased incidence of liver porphyrin levels in female rats at 2 mg/kg/day	15 Week Oral Toxicity- Rat (Kuiper- Goodman et al, 1977)	100
Dermal: Long-Term	Oral NOAEL =0.08 mg/kg/day	hepatic centrilobular basophilic chromogenesis at 0.29 mg/kg/day	Chronic Toxicity - Rat (Arnold et al., 1985)	100
Inhalation: Short-, Intermediate-, and Long-Term	No route-specific endpoints are available for HCB. Therefore, in accordance with Agency policy, oral endpoints and route extrapolation are employed to estimate inhalation risks as needed.			1000
Oral Cancer Slope Factor (CSF)	Q*=1.02 $(mg/kg/day)^{-1}$ (Extrapolated using a Q*of 1.7 $(mg/kg/day)^{-1}$ derived from a linearized multistage model to which a 3/4 scaling factor was applied: 1.7 x 0.6 =1.02)	B2 (probable human carcinogen) based on data showing significant increases in liver and renal tumor incidences in hamsters and rats	Sourced to EPA REDs for DCPA, November 1998, and Chlorothalonil, April 1999 and EPA's IRIS Database.	The Agency typically will not allow Occupational non-dietary risks to exceed 10^{-6}.

Recommended MOEs of 100 are based on applied uncertainty factors used to account for inter-species extrapolation (10x) and intra-species variability (10x).

For additional information, please see the *Pentachlorophenol- Risk Assessment for the Reregistration Eligibility Decision (RED) Document*, dated August 29, 2008; located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

4. Dietary Exposure and Risk from Food and Drinking Water

There are no existing food uses for the wood preservative uses of pentachlorophenol. Dietary monitoring data assembled by the Food and Drug Administration indicated the presence of pentachlorophenol in certain food items (i.e. milk, pears, pork, but these data are old (i.e. 1991), and FDA discontinued monitoring for pentachlorophenol residues after 1992 based on lack of detectable residue. Since wood treated with pentachlorophenol is not available for sale to the general public, and play activities in children around treated utility poles is not likely to occur, residential risk assessment is not necessary for pentachlorophenol and a FQPA analysis is not needed. However, population-based biological monitoring data from the National Health and Nutrition Surveys (NHANES) were available to assess the exposure of the general population to pentachlorophenol. The NHANES data provides an encompassing review of all pentachlorophenol exposures; the specific pentachlorophenol treated wood contribution to total pentachlorophenol exposure cannot be differentiated. Because NHANES does not include exposures to children under the age of 6 years old, the Children's Total Exposure to Persistent Pesticides and Other Persistent Organic Pollutants (CTEPP) study (Wilson, et al. 2007) was used to include estimates of exposures to children under 6 years old. For additional information on the potential risks resulting from residential exposure, please see section 6 Residential Exposure and Risk.

It should be noted that the majority of developmental toxicity studies on pentachlorophenol show no teratogenic effects, but some older studies, especially those of Schwetz et al. (1974) and Welsh et al. (1987), showed toxic effects of pentachlorophenol in offspring that occurred at dose levels below those producing maternal toxicity. In addition, it is recognized that the contaminants hexachlorodioxin and 2,3,7,8 tetrachlorodioxin are considered teratogenic chemicals. Due to this reason combined with the knowledge that hexachlorodioxin is a contaminant of pentachlorophenol, the warning labels on pentachlorophenol formulations with respect to potential teratogenic effects have remained.

For additional information, please see the *Previous Pentachlorophenol Dietary Exposure and Risk Chapter Used In 2004 for the Reregistration Eligibility Decision (RED) Document*, dated March 7, 2008; *Previous Polychlorinated dibenzo-p-dioxins (CDDs) and Polychlorinated dibenzofurans (CDFs) Dietary Exposure Chapter Developed in 2005 for the Pentachlorophenol Reregistration Eligibility Decision (RED) Document*, dated March 7, 2008; *Previous Hexachlorobenzene (HCB) Dietary Exposure Chapter Developed in 2005 for the Pentachlorophenol Reregistration Eligibility Decision (RED) Document*, dated March 7, 2008; and *Revised PCP Human Exposure RED Chapter*, dated September 8, 2008 located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

a. Dietary and Drinking Water

Dietary risk is characterized in terms of the Population Adjusted Dose (PAD), which reflects the reference dose (RfD), either acute or chronic. This calculation is performed for each population subgroup. A risk estimate that is less than 100% of the acute or chronic PAD is not of concern.

b. Pentachlorophenol

Typically a dietary risk assessment would not be necessary for pentachlorophenol based upon the current restrictions on use of this pesticide that have been in place since 1984. However, monitoring data from FDA from 1991 showed levels of pentachlorophenol in only a few food items, and at levels that approached the limit of detection. Therefore, the Agency conducted a dietary assessment based on available monitoring data. Using conservative assumptions and the dietary monitoring data collected when pentachlorophenol was still present in certain foods (1991), exposure to pentachlorophenol through food (based on FDA monitoring data) represents 2.4% of the chronic RfD for the most exposed subpopulation in the U.S. (Children ages 1-6). Exposure to all other groups represents less than 0.5% of the chronic RfD.

Surface water runoff from pentachlorophenol treated utility poles may be a possible source for pentachlorophenol or its transformation products in drinking water or in foods. Estimated Environmental Concentrations (EECs) for surface water have been calculated by the Agency. Drinking water levels of concern (DWLOCs) for acute and chronic dietary risk from drinking water were calculated. DWLOCs calculated for surface water for pentachlorophenol were 10,465 ppb for adult males and females and 2,990 ppb for children ages 1-6. Using the PRZM-EXAMS model, available environmental fate data, and conservative assumptions, the estimated environmental concentrations calculated by the Agency for surface water were less than 1 ppb. EECs for groundwater were not available for comparison against DWLOC values; however, based on pentachlorophenol's physical/chemical characteristics and available monitoring data, it is not expected to add significantly to this risk assessment.

For additional information, please see the *Previous Pentachlorophenol Dietary Exposure and Risk Chapter Used in 2004 for the Reregistration Eligibility Decision (RED) Document*, dated March 7, 2008; and, *Estimated Environmental Concentrations (EECs) for Pentachlorophenol Using PRZM-EXAMS Models*, dated March 3, 2008 located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

c. Dioxins and Furans

A dietary risk assessment was not necessary for pentachlorophenol; however, the Agency has examined residue data that demonstrates there are potential sources of dietary exposure to low concentrations of dioxins/furans found throughout the world.

Dietary intake is generally recognized as the primary source of human exposure to CDDs and CDFs. Residue data are available for meat, fish, dairy products, eggs and fruits and vegetables. Residue data are reported in terms of both parts per trillion (ppt) and in terms of toxicity equivalents for both CDDs and CDFs.

Very little residue data are available for crops for residues of CDD and CDF; however, there is a limited amount of residue data available for foods of Canadian and U.S. origin for fruits, vegetables and wheat. The only residues reported for these commodities were for the octachlorodibenzodioxin congener and ranged from 0.6 - 8 ppt.

Samples of vegetable oil from the U.S. were analyzed for CDD and CDF cogence. No residues of tetrachlorodibenzodioxin (TCDD) were detected in the samples. Residues of the other cogence of CDDs and CDFs analyzed for ranged from 0.22 ppt - 33.1 ppt. The 33.1 ppt value is for the octachlorodibenzodioxin congener.

Toxicity equivalent residue data are reported for both environmental media and food. Food residue data are for levels found in both Canadian and U.S. vegetable fats, fish, shellfish, milk and dairy products, eggs, meat and poultry. Mean residues are all reported at levels of less than 2 ppt CDD and CDF toxicity equivalents. The maximum mean CDD/CDF toxicity equivalent residues were reported in freshwater fish at 1.2±1.2 ppt.

For additional information, please see the *Previous Polychlorinated dibenzo-p-dioxins (CDDs) and Polychlorinated dibenzofurans (CDFs) Dietary Exposure Chapter Developed in 2005 for the Pentachlorophenol Reregistration Eligibility Decision (RED) Document*, dated March 7, 2008; located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

d. Hexachlorobenzene

A dietary risk assessment was not necessary for pentachlorophenol; however, there are other potential sources of dietary exposure to HCB. Therefore, the Agency has also examined residue monitoring data for HCB in food commodities.

There are currently no HCB pesticide tolerances established for food commodities and there are no registered uses for HCB on food commodities. However, dietary exposure to residues of HCB will likely occur as an incidental residue on terrestrial crops as a result of direct application of a pesticide containing HCB as an impurity to agricultural crops in the field. Dietary exposure to HCB residues on terrestrial crops and aquatic organisms can also occur as a result of HCB emission into the atmosphere from various sources followed by deposition of HCB onto agricultural crops, and from industrial discharge or agricultural pesticide run-off into waterways. The source of HCB residues occurring in food commodities cannot be distinguished in an analysis for residues. Therefore, it is not certain that these residues result from use of PCP-treated wood.

Residue monitoring data for HCB are available from the USDA Pesticide Data Program; the USDA Field Safety and Inspection Service; the FDA Pesticide Residue Monitoring Program on meat, milk, fish and various other agricultural commodities; and the FDA Total Diet Study. The monitoring data reflect the analyses of thousands of food samples and cover a period of several years.

The data show few residues of HCB were detected in monitoring samples from FDA or USDA. The majority of detected residues were reported in fish. Detectable residues were more likely to be found in domestic monitoring samples than in imported samples. The majority of reported HCB residues are trace amounts (0.01 ppm range).

For additional information, please see the *Previous Hexachlorobenzene (HCB) Dietary Exposure Chapter Developed in 2005 for the Pentachlorophenol Reregistration Eligibility Decision (RED) Document*, dated March 7, 2008; located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

5. Residential Post-application Exposure and Risk

The opportunity for residential consumer contact is limited since pentachlorophenol treated wood is not sold to the general public; however, population-based biological monitoring data from the National Health and Nutrition Surveys (NHANES) were available to assess the exposure of the general population to pentachlorophenol. The NHANES data provides an encompassing review of all pentachlorophenol exposures; the specific pentachlorophenol treated wood contribution to total pentachlorophenol exposure cannot be differentiated. Because NHANES does not include exposures to children under the age of 6 years old, the Children's Total Exposure to Persistent Pesticides and Other Persistent Organic Pollutants (CTEPP) study (Wilson, et al. 2007) was used to include estimates of exposures to children under 6 years old. For additional information, please see the "Revised PCP Human Exposure RED Chapter," September 8, 2008.

Sources of pentachlorophenol other than the currently registered pressure treatment of wood include hexachlorobenzene and lindane, as an emission from incineration of chlorine-containing waste, and also during pyrolysis of polyvinyl chlorides (ATSDR 2001). In the past, PCP was also registered as a termiticide, fungicide, herbicide, molluscicide, algaecide, disinfectant, and for antifoulant paint. It was also used as a preservative for timber used in the construction of log homes. The use of PCP was restricted to wood treatment in 1984.

a. Residential Post-application Non-cancer Exposure and Risk Using NHANES

The following information has been excerpted from Cohen (2008). Since the 1960s, the National Center for Health Statistics, a division of the Centers for Disease Control and Prevention has conducted the National Health and Nutrition Surveys (NHANES), a series of US national surveys of the health and nutrition status of the non-institutionalized civilian population. NHANES 2001 to 2002 included laboratory measurements on 9,929 subjects. This analysis uses urinary concentrations of pentachlorophenol measured in urine spot samples of at least 20 mL collected from a random one-third sample of 3,028 subjects of ages 6 and older. The dose conversion calculations also used the NHANES measurements of creatinine concentrations, body weight, body height, as well as the age, gender, and race of each subject. The NHANES 2001-2002 data were obtained from the NHANES website: www.cdc.gov/nchs/nhanes.htm. Although pentachlorophenol data have been collected for the 2003-2004, these data have not yet been publicly released. The data are expected to be released by the end of 2008.

EPA evaluates health effects in terms of toxicity endpoints that represent an exposure level in mg or µg per kilogram body weight that is not expected to be associated with adverse health effects. The conversion of measured spot urine concentrations to daily doses can be difficult because of variable dilution caused by wide fluctuations in fluid intake and excretion. Dose calculation is also difficult because there is no way to determine from the NHANES data

from what route of exposure (i.e., oral, dermal, inhalation) and when (i.e., duration and time interval prior to measurement) the exposure to PCP occurred, and because of uncertainty and variability in the absorption, distribution, metabolism, and excretion (ADME) parameters.

The long-term target MOE of 300 was used to assess the pentachlorophenol non-cancer risks. The non-cancer risk drivers are for pentachlorophenol, not HCB (i.e., pentachlorophenol non-cancer risks are greater than those of HCB). Therefore, only the non cancer risks for pentachlorophenol were provided. The Agency is following the outcome of the current EPA's Office of Research and Development (ORD) body burden approach/research for the non-cancer risks to dioxin. The Agency is aware that research is ongoing regarding pentachlorophenol. The Agency may revisit this decision in the future.

Total potential exposures and risks from NHANES are presented for the following age groups and subpopulations: all age groups (MOE of 70730); ages 6-11 (MOE of 69544); ages 12-19 (MOE of 58512); ages 20-59 (MOE of 74329); ages ≥ 60 (MOE of 69980); male (MOE of 75512); females (MOE of 66666); Mexican-American (MOE of 134690); white (MOE of 71396), non-Hispanic (MOE of 71396); and black, non-Hispanic (MOE of 47774). The total exposure and risk calculated using the NHANES data demonstrates that for pentachlorophenol (e.g., assuming all pentachlorophenol exposure results from pentachlorophenol treated poles, presentation of various dose conversion methods including the assumption that all individuals excrete a daily urine volume of the 95th percentile of the population), the total risks result in no unreasonable adverse effects from the currently registered wood preservative use.

b. Residential Post-application Non-cancer Exposure and Risk Using CTEPP

The long-term target MOE of 300 was used to assess the non-cancer risks to children 1.5 to 5 years old. The CTEPP data indicate 89 and 99 percent of the samples had detectable levels of pentachlorophenol in NC and OH, respectively. However, the total potential exposure and risk calculated using the CTEPP data demonstrates that for children 1.5 to 5 years old, risks resulting from pentachlorophenol exposure below the Agency's level of concern. MOEs range from 2,400 to 95,000.

c. Residential Post-application Cancer Exposure and Risk Using NHANES and CTEPP

The lifetime average daily dose (LADD) is estimated by combining the results of both the CTEPP and NHANES data sets. The LADD is estimated by averaging the estimated daily dose for each year in a lifetime of 75 years. This assumes the frequency and lifetime duration of exposure is constant (i.e., exposed 365 days per year and 75 years of exposure). CTEPP data are used to estimate the ages 0 to 5 years and NHANES is used to estimate ages 6 to 75 years. In addition to the LADD, the 95th percent lower and upper confidence intervals are also provided for the means. A detailed description of the LADD estimate combining both CTEPP and NHANES data sets are provided in Cohen (2008).

There are currently other sources of pentachlorophenol exposure that are not attributable to pentachlorophenol pressure treated wood; however, the general population biological monitoring data do not allow for the proportioning of exposure to source of contamination. Therefore, the exposures and risks reported are based on the total exposure to pentachlorophenol. Direct measurements of dioxins/furans and HCB exposures for the general population attributed to pentachlorophenol pressure treated wood are not available for this assessment. Therefore, to be inclusive of determining potential exposures to pentachlorophenol contaminants, the amounts of dioxins/furans and HCB in pentachlorophenol are used to extrapolate pentachlorophenol measured exposures to estimate dioxin/furan and HCB exposures.

The potential cancer risks for pentachlorophenol, HCB, and dioxin are 9.8E-7, 1.1E-9, and 5.8E-7, respectively. The risks at the 95th percent upper confidence interval for pentachlorophenol, HCB, and dioxin are 1.5E-6, 1.6E-9, and 8.7E-7, respectively. Future refinements to this assessment should focus on determining contributions of sources to total pentachlorophenol exposure.

6. Aggregate Risk Assessment

The Food Quality Protection Act amendments to the Federal Food, Drug, and Cosmetic Act (FFDCA, Section 408(b)(2)(A)(ii)) require "that there is reasonable certainty that no harm will result from aggregate exposure to pesticide chemical residue, including all anticipated dietary exposures and other exposures for which there are reliable information." Aggregate exposure is the total exposure to a single chemical (or its residues) that may occur from dietary (i.e., food and drinking water), residential, and other non-occupational sources, and from all known or plausible exposure routes (oral, dermal, and inhalation). Typically in a case such as pentachlorophenol, the Agency would not conduct acute and chronic aggregate assessments based on the lack of dietary exposure, the lack of pentachlorophenol to enter or persist in groundwater, and the lack of residential applications.

However, as discussed above, the Agency used the NHANES and CTEPP data to estimate the exposure of the general public to pentachlorophenol from a national survey of random individuals. Based on the wide survey and number of samples, these data provide a broad view of pentachlorophenol exposure from all sources. Although a typical aggregate assessment was not conducted, the NHANES and CTEPP data have provided actual aggregate exposure information for pentachlorophenol. Additional information can be found in the *Revised PCP Human Exposure RED Chapter*, dated September 8, 2008; located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

7. Occupational Exposure and Risk

Workers can be exposed to pentachlorophenol through mixing, loading, applying a pesticide or re-entering treated sites. There are potential exposures from use in commercial and industrial settings *via* the dermal and inhalation routes.

Significant exposure is not expected due to mixing/loading per se because treatment plants utilize automated methods for chemical preservative delivery (metered feed/pump) and closed application techniques (treatment cylinder). However, there is the potential for workers near the treatment cylinder door to inhale treatment solution mist when the door is opened following treatment and/or to contact treatment solution residue on equipment such as charge cables and the treated wood itself. Although in many cases treated wood is moved mechanically (e.g., forklifts), this is not required on current product labeling and is currently accomplished manually in some cases.

For treatment facility exposure scenarios, where possible the Agency estimated risk for each job function that could be performed at a typical treatment facility. Although an effort was made to differentiate risk estimates by job function, the Agency acknowledges that the studies used to estimate exposure reflect actual treatment facility practices in that one person often performed more than one job function. Therefore, estimated risks presented by job function are not considered representative of one individual performing one job function and may reflect additional exposure and risk incurred by performing tasks outside the definitions presented below.

- ***Treatment Operator (TO):*** Primary duties for a pressure treatment operator include opening closing valves transferring treatment liquids, opening and closing treatment vessel doors, cleaning pentachlorophenol residues on doors and latches, performing tram maintenance and positioning, and handling leads, chains and cleanup.

- ***Treatment Assistant (TA):*** TAs perform many of the same functions as the TO including opening and closing valves and doors, cleaning pentachlorophenol residues on doors and latches, performing tram maintenance and positioning, and handle leads and chains and cleanup. However, TAs may perform more manual duties such as drip pad and filter cleaning.

- ***Loader Operator (LO):*** LOs operate open-cab forklifts used to load untreated wood onto charge trams, move charges into and out of treatment cylinders, remove charge leads and bands from treated wood, distributed treated wood to load-out area, and load treated wood for shipment. Most work is done in and around drip pad area. LOs may perform certain out-of-cab tasks such as collecting tank samples and performing test boring and lab analysis of treatment solutions in wood.

- ***Tram Setter (TS):*** TSs manually position trams for loading, place wood spacers on trams where needed to elevate wood to be treated and place drawbridges for treatments. TSs also performs lead and chain handling and operates cylinder door controls. They perform various labor and cleanup duties in treatment and drip pad area including sweeping pressure-washed drip pad and tracks; removing and shredding all bands from treated stacks of lumber, picking up and disposing of treated CCA wood waste, cleaning cylinders, and handling hazardous waste.

- ***Stacker Operator (SO):*** SOs work at a fixed position at a facility that mechanically remove wood spacers from stacks of treated (including freshly treated) lumber. They operate lumber stacking devices which arrange treated boards in stacks for banding and shipment to customers, and remove wood spacer sticks from bundles of treated boards. The major task is to manually position ends of all treated loose boards moving through device so they are evenly positioned. They also perform minor maintenance on the equipment and site.

- ***Supervisor (S):*** The Supervisors mainly perform the duties of a second LO when the LO at this site is busy performing other tasks. They take test borings and pressure-wash the drip pad. In addition, Ss perform tasks away from the treatment areas including bringing untreated wood to the treatment loading dock from other parts of the plant.

- ***Test Borer (TB):*** The TB bores lumber after treatment. TB cuts borings from treated poles or ties for on-site analysis to test for preservative penetration. They also perform other QC laboratory duties. Most time is spent away from the treatment area.

- ***Tally Man (TM):*** The main duties of the TM include counting and inspecting incoming and outgoing truckloads of wood products (untreated and treated wood), and supervision of loading and unloading of lumber trucks at drip pad and elsewhere. They also perform some treatment-related duties, such as end-marking of treated items or chaining of charges for treatment and removal of lead cables after treatment.

a. Pentachlorophenol Occupational Handler Exposure and Risk

The Agency has determined that there are potential worker risks of concern for mixers, loaders, applicators, and handlers associated with the currently registered uses of pentachlorophenol. For occupational handlers, potential short and intermediate-term non-cancer risks are not of concern (i.e., MOE greater than 100); however, potential non-cancer long-term dermal risks (i.e., MOE less than 300) for the pressure treatment operators using liquid formulation (MOE of 230) are of concern. For pressure treatment assistants using both crystalline grade product (MOE of 130) and liquid formulation (MOE of 79) potential long-term non-cancer risks are also of concern.

Total potential cancer risks for all four handler scenarios assessed are of concern (i.e., risks greater than 1.0×10^{-6}). (insert 10-4 to 10-6 is ok when benefits are seen) The results for the cancer risk estimates indicate that cancer risks are of concern for the treatment operator handling both crystalline grade product (7.9×10^{-5}) and liquid formulation (1.7×10^{-4}), and for the treatment assistant handling both crystalline grade product (3.1×10^{-4}) and liquid formulation (4.9×10^{-4}).

b. Dioxin Occupational Handler Exposure and Risk

Handler exposure to pentachlorophenol wood preservatives, as product concentrates and treatment solutions result in potential exposure to CDDs and CDFs during handler operations (mixers, loaders, and applicators of pentachlorophenol) in pressure treatment plants.

Non-cancer handler risks have not been calculated and are pending assessment using models developed by the Agency's Office of Research and Development (ORD) to determine actual body burdens. Only long-term dioxin/furan absorbed doses are presented for calculation of the lifetime average daily doses (LADDs) used for the handler cancer risk assessment.

Occupational handler cancer risk estimates have been calculated for dioxin/furan exposures resulting from the registered uses of pentachlorophenol. A cancer risk estimate greater than one in a million ($1.0x10^{-6}$) is of concern. Most of the assessed occupational handler scenarios exceed the Agency's level of concern for potential worker cancer risks. Potential cancer risks are greater than $1.0x10^{-4}$ for the pressure treatment operator handling liquid formulation ($2.0x10^{-4}$), the pressure treatment assistant handling crystalline product ($3.6x10^{-4}$), and the liquid formulation ($5.6x10^{-4}$). Potential cancer risks are greater than $1.0x10^{-5}$for the treatment operator handling the crystalline product ($9.0x10^{-5}$).

c. Hexachlorobenzene Handler Exposure and Risk

Handler exposure to pentachlorophenol wood preservatives, as product concentrates and treatment solutions result in potential exposure to HCB during handler operations (mixers, loaders, and applicators of pentachlorophenol) in pressure treatment plants.

For absorbed short-, intermediate- and long-term exposures to HCB, the Agency's level of concern are MOEs that are less than 100. None of the occupational handler scenarios assessed exceeded the Agency's level of concern for potential non-cancer risks.

Occupational handler cancer risks have been calculated for HCB exposures resulting from the registered uses of pentachlorophenol. A cancer risk greater than one in a million ($1.0x10^{-6}$) is of concern. None of the occupational handler scenarios assessed exceeded the Agency's level of concern (i.e., $1.0x10^{-6}$).

d. Pentachlorophenol Occupational Post-application Exposure and Risk

The Agency has determined that there are no potential non-cancer risks of concern relating to occupational post-application exposure to individuals following pentachlorophenol applications in wood pressure treatment facilities. However, potential post-application cancer risks for pressure treatment loader operator ($6.9x10^{-5}$), pressure treatment test borer ($6.1x10^{-5}$), general helpers ($3.6x10^{-5}$), and electrical utility linemen ($2.5x10^{-5}$) are of concern. A potential cancer risk that is greater than one in a million (i.e., $1.0x10^{-6}$) is of concern.

For additional information, please see the *Revised PCP Human Exposure RED Chapter*, dated September 8, 2008, located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

e. Dioxin/Furan Occupational Post-application Exposure and Risk

Occupational post-application exposure scenarios for dioxins and furans resulting from the registered uses of pentachlorophenol were identified primarily for pressure treatment workers. In addition, a scenario was included for utility linemen. Post-application or reentry exposures in treatment plants may occur after the wood has been pressure treated. Individuals may be exposed to dioxins and furans through contact with pentachlorophenol treated wood products or equipment used to pressure treat wood. Exposure activities include sampling pentachlorophenol retort mixtures, moving trams and treated poles, boring wood cores, and performing cleanup activities on drip pads. The industrial workers involved in post-application activities for this assessment include the test borer, loader operator, and general helper (as representative of pressure treatment plant workers), and the utility linemen involved with post-application handling of pentachlorophenol treated utility poles. The average doses for the pressure treatment operator and treatment assistant were used to estimate long-term exposure to dioxins and furans resulting from the uses of pentachlorophenol. Where applicable, the pentachlorophenol exposures were converted into CDD and CDF equivalents using the TEQ approach in order to estimate exposure and assess risk. These long-term dioxin absorbed doses were calculated for the representative scenarios by adjusting the pentachlorophenol absorbed doses by the EPA-TEQ factor of 0.813 ng/mg as derived from EPA industry monitoring data for pentachlorophenol production years 1998-1999.

Potential non-cancer post-application risks have not been quantified and are pending assessment using models developed by the Agency's Office of Research and Development (ORD) to determine actual body burdens. Only long-term dioxin absorbed doses are presented for calculation of the lifetime average daily doses (LADDs) used for the post-application cancer risk assessment.

Potential occupational post-application cancer risks have been calculated for dioxin/furan exposures resulting from the registered uses of pentachlorophenol. A cancer risk estimate greater than one in a million ($1.0x10^{-6}$) is of concern. Most of the assessed occupational handler scenarios exceed the Agency's level of concern for potential worker cancer risks. Potential cancer risks are greater than $1.0x10^{-5}$ for the pressure treatment loader operator ($8.0x10^{-5}$), pressure treatment test borer ($6.5x10^{-5}$), general helpers ($4.7x10^{-5}$), and electrical utility linemen ($3.0x10^{-5}$).

For additional information, please see the *Occupational Exposure and Risk Assessment of Dioxins and Furans (CDDs/CDFs) in Pentachlorophenol*, dated September 8, 2008; located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

f. Hexachlorobenzene Post-application Exposure and Risk

Occupational post-application exposure scenarios for HCB resulting from the registered uses of pentachlorophenol were identified primarily for pressure treatment workers. In addition, a scenario was included for utility linemen. Post-application or reentry exposures in treatment plants may occur after the wood has been pressure treated. Individuals may be exposed to HCB

through contact with pentachlorophenol treated wood products or equipment used to pressure-treat wood.

The Agency has determined that Margins of Exposure (MOEs) of 100 or greater are appropriate for acceptable risks from absorbed short-, intermediate- and long-term exposures to HCB. None of the occupational post-application scenarios assessed exceeded the Agency's level of concern for non-cancer aggregate risks.

Potential occupational post-application cancer risks have been calculated for HCB exposures resulting from the registered uses of pentachlorophenol. A cancer risk estimate greater than one in a million ($1.0x10^{-6}$) is of concern. None of the occupational post-application scenarios assessed exceeded the Agency's level of concern (i.e., $1.0x10^{-6}$) for potential cancer risks.

For additional information, please see the *Occupational Exposure and Risk Assessment of Hexachlorobenzene (HCB) in Pentachlorophenol*, dated March 6, 2008; located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

8. Pentachlorophenol Human Incident Data

An extensive body of literature exists on the health effects (acute and chronic) of pentachlorophenol in humans. Many of the pentachlorophenol incident reports are well structured and appear in the literature to be well executed. Populations are well defined, controls are generally selected appropriately, and analyses are appropriate and adequate. However, major weaknesses in exposure assessment methods often limit the validity of reported findings, either positively or negatively. Of the 24 original articles reviewed for this document, a large majority used questionnaire or interview data, provided either by the study participants or by surrogates, as exposure variables. Often, this information was for mixed exposures including known or unknown contaminants rather than for pentachlorophenol alone. Industrial hygiene monitoring data was rarely available for the assessment of individual exposures. Therefore, in some instances, industrial hygiene expertise was used to judge exposures.

Even considering the above limitations, a reasonably strong argument can be made that exposure to pentachlorophenol is associated with increased risks of a number of diseases, namely chloracne, soft tissue sarcoma (STS), and non-Hodgkin's lymphoma (NHL). Increased risks of developing STS were reported in six studies, although statistical significance was reached in only three. Of five studies reporting increased risk for NHL, only one was statistically significant. Increased risks were also reported for lymphatic cancer, hematopoietic cancer, and Parkinson's Disease, but the associations were generally not significant. While it is known that nerve conduction velocity is slowed by exposure to chlorophenols, as well as many other chemicals, studies with this dysfunction as an endpoint showed ambivalent results. Two studies showed associations between exposure of parents to chlorophenols and negative effects in subsequently born offspring, but results in these studies were not statistically significant.

Considering the number of studies, the consistency among a number of outcomes, as well as the general absence of statistical significance, there appears to be reasonable evidence that exposure to chlorophenols may often be associated with chloracne, STS, NHL, and possibly abnormal births. Whether these health effects result from exposure to pentachlorophenol specifically, or to one or more other chemicals typically found as contaminants, is not clear. Based on the evidence collected to date, careful control of exposures to chlorophenols, including pentachlorophenol, is certainly warranted.

For additional information, please see the *Epidemiology and Incident Reports Associated with Pentachlorophenol*, dated March 9, 2008; located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

D. Environmental Risk Assessment

Pentachlorophenol is used mainly as a wood preservative and is usually applied to wood as a liquid formulation (5% solution) composed of pentachlorophenol plus hydrocarbon diluents such as P-9 oil, No. 2 fuel oil, kerosene or mineral spirits. Formulated products may include from 5% to greater than 80% active ingredient and typically include water repellents such as paraffin. Introduction of pentachlorophenol into the environment may occur from spills and runoff, and through releases from treated wood by leaching and/or volatilization; these may occur at wood treatment, storage and disposal sites as well as at the locations of wood usage. Pentachlorophenol may also enter the environment by wastewater discharge or holding pond overflow, both of which may occur at wood treating facilities.

Pentachlorophenol contains chlorinated dibenzodioxins and chlorinated dibenzofurans (CDD and CDFs) as contaminants formed during the manufacture process. The main use of pentachlorophenol, a wood preservative, is to treat utility poles. There are an estimated 36 million pentachlorophenol treated utility poles in service in the United States. Annually, nearly 1 million additional utility poles are replaced (3 percent replacement rate) on land and in water. The Agency has estimated that the utility poles in service contain approximately 374 kg of dioxin toxicity equivalents (I-TEQs). The CDD and CDFs in these poles may be released into the environment via volatilization and leaching. In addition, CDD and CDFs may enter the environment during the pressure-treatment of the utility poles when the utility poles are removed from service and are disposed in landfills. These compounds are inherently toxic, as well as environmentally persistent, and their presence may increase the ecological risk associated with the use of pentachlorophenol. There are many congeners of CDDs and CDFs, ranging from monochlorinated to octachlorinated. The most toxic for each compound seems to be the 2, 3, 7, 8-tetrachlorinated congener, referred to as TCDD or TCDF for dioxin or furan, respectively.

Pentachlorophenol is only one of many sources of CDDs and CDFs in the environment making it difficult to quantify the portion of the aggregate environmental risk from CDDs and CDFs that is attributable to pentachlorophenol wood treatment uses.

Hexachlorobenzene (HCB) is also a contaminant formed during the manufacturing process of pentachlorophenol and is a very stable chlorinated aromatic compound that was commonly used as a pesticide until 1965. Currently, there are no commercial uses of the

substance in the United States. HCB may be formed as a byproduct during the manufacture of chemicals used as solvents, pesticides and other chlorine-containing compounds. Small amounts of this compound can also be produced during combustion processes such as burning of city wastes.

HCB is widely distributed throughout the global ecosystem because if its mobility and resistance to degradation. It has been detected in all environmental media and in numerous types of living organisms including insects, aquatic biota, birds and mammals. HCB has also been shown to bioaccumulate in both aquatic and terrestrial organisms.

A summary of the Agency's environmental risk assessment is presented below. The following risk characterization is intended to describe the magnitude of the estimated ecological hazards and environmental risks for the currently registered antimicrobial uses of pentachlorophenol and its micro-contaminants.

1. Environmental Fate and Transport

In general, the environmental fate and transport of pentachlorophenol in soil and water will depend on the pH of the systems. The chemical behavior and the physical properties of pentachlorophenol will depend on whether it exists primarily as the phenol (under more acidic conditions) or the phenolate anion (under basic conditions).

a. Pentachlorophenol

- ***Water:*** Pentachlorophenol is hydrolytically stable in water at pH 4 to pH 9, precluding hydrolysis as a major degradation process in the environment. Chemical degradation of pentachlorophenol in water will occur mainly through photo-degradation. In surface water, pentachlorophenol will rapidly photo-degrade when exposed to direct sunlight, with more rapid degradation occurring with increased pH (when the compound is dissociated).

- ***Soil:*** Wood treated with pentachlorophenol may release the compound through volatilization or leaching. Additionally, pentachlorophenol may be photo-degraded on the wood surface, making degradates available for leaching. All three processes are affected by the solvent systems/carriers used in the application of the compound. The leaching of pentachlorophenol out of utility poles may also partially depend on the method of application (pressure or thermal treatment). Pentachlorophenol may be leached from the poles as the compound moves with either aqueous solution (as from rain) or with the solvent down the pole, either at the surface or within the pole. Based on experimental data, it was determined that the main mechanism for the leaching of pentachlorophenol and its micro-contaminants is the downward migration of the oil carrier along the vertical axis of the pole, designated as "Gravitational Induced Downward Migration of Oil" (GIDMO). Leaching of pentachlorophenol in aqueous solution from rainwater is not considered to be as important as GIDMO, as the replenishment rate at pole surfaces is a limiting factor with respect to the availability of the compound for leaching. Thus, contamination of subsurface soil found in the vicinity of utility poles may result from the downward movement of pentachlorophenol within the

pole, with subsequent leaching from the bottom part of the pole to the soil surface or to the subsoil near the underground portion of the pole, as well as from the downward movement of pentachlorophenol from the surface soils to the subsoil. When leaching of pentachlorophenol from treated poles occurs, the simultaneous leaching of the carrier solvents may affect the mobility of the compound in the soil. Literature and laboratory studies indicate that pentachlorophenol applied in oil is rapidly transported from the upper portion of the poles to the underground portion for the first few years of use, and became relatively constant with time.

Because of the demonstrated tendency for pentachlorophenol to adsorb to soils and the moderately rapid degradation of the compound in the environment, it is not likely that groundwater contamination will result from usage of utility poles, except in situations where the bottom of the pole is directly in contact with the water table (or with a fluctuating water table) or where the leaching occurs from multiple poles in a wood storage or treatment area.

- ***Air:*** Pentachlorophenol is a relatively volatile compound, while its sodium salt in nonvolatile. In the atmosphere, volatilized pentachlorophenol may undergo photolytic degradation or may react with photo-chemically produced hydroxyl radicals. Atmospheric pentachlorophenol which is associated with particulate matter or moisture will be lost from the atmosphere through wet deposition. Based on pentachlorophenol's low Henry's law constant, volatilization from aqueous systems will not be a significant mode of transport in the environment.

For detailed discussions of the environmental fate and transport of pentachlorophenol, see the *Environmental Fate and Transport Assessment of Pentachlorophenol (PCP) for Reregistration Eligibility Decision (RED) Process*, dated February 16, 2008; located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

b. Dioxins/Furans

Presence of CDDs and CDFs in the environmental compartments resulting from the wood preservative use is due to volatilization into air; leaching from PCP treated poles into water and soil; dry and wet deposition onto air, water, and soils; and sorption into soils. The available data indicate that CDDs and CDFs, particularly the tetras- and higher chlorinated congeners, are extremely stable under most environmental conditions. However, some of these congeners, under certain conditions, are photolytically unstable and in some cases undergo photo-oxidation. Most of the congeners are also resistant to biodegradation under aerobic or anaerobic soil conditions and most are persistent in soils**.**

The process of bioaccumulation has been observed in the benthic organisms, however, bio-transformation processes up the food chain have not been observed. Fish and invertebrates can likely bioaccumulate 2,3,7,8-substituted CDD and CDFs from water columns and sediments. However, because most CDD and CDFs in a water column and sediment are associated with particulate matter and dissolved organic matter, bioaccumulation most likely starts with uptake

of CDD and CDFs by benthic organisms directly from sediment pore waters and by ingestion of contaminated particles. Organisms preying on benthic organisms would possibly transfer the CDD and CDFs up the food chain but no sound scientific data have been obtained.

For detailed discussions of the environmental fate and transport of dioxins/furans, see the *Environmental Fate Modeling of Dioxin in Technical Grade Pentachlorophenol*, dated March 4, 2008; located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

c. Hexachlorobenzene

HCB is a stable and highly persistent molecule and does not hydrolyze in aqueous medium and is likely to become immobile in soils. It has large sorption partition coefficients. Aerobic and anaerobic biodegradation half lives are long and therefore the main route of dissipation would possibly be through sorption to soils in the terrestrial settings and to sediment organic and inorganic particulate matter in aqueous medium. Because the K_{OC} is high it has a tendency to bind strongly with soil particles and therefore less mobile, the possibility of contamination by HCB of ground water does not seem likely. Because of high binding constants with soils, HCB may possibly accumulate in benthic sediment and bioaccumulate in benthic organisms. Based on monitoring data, it is unlikely that HCB concentration in surface water would exceed 10 ppt (0.01 µg/L).

For detailed discussions of the environmental fate and transport of hexachlorobenzene, see the *Environmental Fate Modeling of Hexachlorobenzene in Technical Grade Pentachlorophenol*, dated March 4, 2008; located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

2. Terrestrial and Aquatic Organism Exposure and Risk

An ecological risk assessment was conducted to assess impacts of pentachlorophenol residues from treated wood uses. Risk characterization integrates the results of the exposure and ecotoxicity data to evaluate the likelihood of adverse ecological effects.

a. Pentachlorophenol

The environmental risk assessment indicates that typical concentrations of pentachlorophenol in terrestrial and aquatic environments from wood treatment uses are not expected to be of sufficient quantity or duration to adversely impact terrestrial or aquatic organisms.

b. Dioxins/Furans

Currently there are no FIFRA guideline studies required for the micro-contaminants dioxin/furan, since they are not currently registered, and data on the ecological effects of CDDs and CDFs are relatively limited. Most research efforts have been focused primarily on 2,3,7,8-chlorinated CDD and CDFs, especially 2,3,7,8-TCDD. CDDs and CDFs are very highly toxic to

birds, mammals and aquatic organisms. CDDs (and possibly furans) are capable of producing lasting toxic effects; even a relatively short exposure to TCDD (as little as 6 hours) can result in mortality of fish eggs occurring as much as 80 days later. TCDD is a known endocrine disruptor, and it is likely that other dioxin congeners and furans produce similar effects. Available literature indicates that there are potential acute and chronic risks to birds and chronic risks to mammals from CDDs and CDFs from pentachlorophenol treated wood, especially considering the tendency of CDDs and CDFs to persist and bioaccumulate.

Acute and chronic risks to aquatic organisms are unlikely to occur from runoff of CDDs and CDFs from pentachlorophenol treated wood. However, due to uptake of these compounds by sediment, coupled with the persistence and bioaccumulation of CDDs and CDFs, they may eventually reach toxic levels and pose risks to aquatic organisms through the food web.

Pentachlorophenol is only one of many sources of CDDs and CDFs in the environment making it difficult to quantify the portion of the aggregate environmental risk from CDDs and CDFs that is attributable to pentachlorophenol wood treatment uses.

All environmental exposure and risk assessments are associated with uncertainties which may range from low to high, thus affecting the reliability or certainty of the risk estimations. In the case of the environmental assessment for CDDs and CDFs the uncertainties associated with this assessment are considered high. However, there are no well-established environmental exposure models or methods for determining wildlife (and, particularly, terrestrial wildlife) exposures to 2, 3, 7, 8-TCDD, CDDs, or CDFs released from pentachlorophenol-treated utility poles into the environment.

For the terrestrial environmental assessment, where estimated Risk Quotients (RQs) exceed acute and chronic Levels of Concern (LOCs) for avian and small mammal species, the Agency recognizes that these risk calculations are highly conservative and contain a high degree of uncertainty. Because of this conservatism and uncertainty, EPA believes that these risk calculations may overestimate the potential terrestrial risks which may occur. It is possible, for example, that the present calculated RQs may be orders of magnitude lower than determined.

In an attempt to better characterize this terrestrial assessment the Agency wants to point out the two highly conservative and unrealistic assumptions used in this assessment:

- ***Feeding Activity**:* It is assumed that small mammals and birds will selectively feed (all day and every day until mortality or reproductive effects occur) within a 5 cm (or 2 inches) area surrounding a pentachlorophenol-treated telephone pole; and

- ***Diet**:* It is assumed that 100 % of a small mammal's or bird's diet will be contaminated with 2, 3, 7, 8-TCDD, CDDs, and/or CDFs (while feeding within the 2 inches area).

Although the Agency used these assumptions, we acknowledge that both are highly conservative, unrealistic, and unlikely to occur because:

- ***Home ranges**:* The home ranges (where animals roost/rest, nest, breed, feed) for the surrogate species (bobwhite quail and meadow vole), as well as for other species, are considerably larger (in acres) than a 2 inches area around a pentachlorophenol-treated utility pole. This aspect negates the assumption that organisms will selectively feed within 2 inches of a pentachlorophenol-treated utility pole.

- ***Animal food items**:* Considering the home ranges and feeding habits of small mammals and birds, it is highly unlikely that 100 % (or possibly any portion) of these organisms' diets will be contaminated with dioxins. The assessment addresses a 2 inches area around a pentachlorophenol-treated pole and ingestion of only soil and plant matter. However, birds and small mammals will move freely throughout their home ranges and consume dietary items that typically include animal matter as well as plant matter. Further, soil ingestion often occurs incidentally unless (as with birds) the organism is actively seeking grit in its diet.

Additionally, the Agency notes that:

- ***Environmental fate**:* CDD and CDFs are highly lipophilic (fat soluble), neutral organic compounds that are tightly sorbed onto soils and therefore have limited tendencies to move from the point of deposition. They are primarily sorbed to clay and organic matter because of high surface area and chemical reactivity of these soil components. As a result, the characteristics of these compounds and the soil components are expected to negate the assumption that 2, 3, 7, 8-TCDD, CDDs, or CDFs might move significant distances from pentachlorophenol-treated utility poles into large portions of an animal's home range (thus, providing for increased exposure).

- ***Environmental modeling**:* The environmental modeling used to estimate soil EECs for bobwhite quail and meadow voles is based primarily on dioxin levels released via wood erosion as opposed to leaching. Thus, the estimated concentrations in soils immediately adjacent to pentachlorophenol-treated utility poles are based on the accumulation of wood particles which break away from the pole due to wood erosion. This creates additional uncertainty for the terrestrial risk assessment since soil ingestion by small mammals and birds may, or may not include ingestion of such wood particles. Further, these soil EECs were used to estimate the EECs in plant dietary matter. This creates more uncertainty in the assessment as well.

Considering the above, the Agency does not want to discount the highly toxic nature of 2, 3, 7, 8-TCDD, CDDs, or CDFs, which may be released from pentachlorophenol-treated utility poles into the environment. However, the Agency acknowledges the difficulties in estimating terrestrial wildlife exposures since there are no well-established environmental exposure models or methods for determining terrestrial wildlife exposures to 2, 3, 7, 8-TCDD, CDDs, or CDFs released from such utility poles into terrestrial environs. We recognize that the terrestrial risk assessment approach used is conservative and has a high degree of uncertainty. That being said,

we believe the weight of evidence indicates that the terrestrial risks for birds and mammals foraging near pentachlorophenol-treated utility poles is minimal.

Environmental RQs for terrestrial, aquatic, and plant species have been calculated using non-guideline studies for CDDs and CDFs resulting from all potential sources. Avian acute and chronic RQs (63 and 68 respectively), and mammal chronic RQs (4) are of concern. The Agency typically considers RQs above 0.5 data to be of concern. The RQs for aquatic organisms and plants (both terrestrial and aquatic) were calculated and are not of concern. For additional information, please see Chlorinated Dibenzo Dioxins (CDDs) and Chlorinated Dibenzo Furans (CDFs) as Contaminants of Pentachlorophenol Ecological Hazard and Risk Assessment for the Pentachlorophenol Reregistration Eligibility Decision (RED) Document, dated September 18, 2008. This document is located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

c. Hexachlorobenzene

Currently there are no FIFRA guideline studies for the micro-contaminant HCB, since it is not currently registered, and data on the ecological effects of HCB are relatively limited. Scientific literature indicates that HCB has a limited potential to adversely affect aquatic organisms in the short-term, primarily due to its very low solubility in surface water. Release of HCB from pentachlorophenol treated wood into terrestrial or aquatic environments at a concentration of 6 ug/L is not expected to result in adverse acute or chronic effects to non-target or listed species of birds, mammals or aquatic animals. However, reviewed literature indicates that HCB may have potential to adversely affect both aquatic and terrestrial organisms due to its persistence in the environment and its ability to readily accumulate in the aquatic and terrestrial food webs. No honey bee toxicity data are available for HCB.

HCB concentrations in the tissues of aquatic organisms equilibrate very slowly with concentrations in the water. As a result, the chronic toxicity tests for fish species (e.g., rainbow trout and fathead minnows) may not have been of sufficient duration to allow for the full equilibration of HCB in fish tissue with surface water concentrations. Also, due to the tendency of HCB to bioaccumulate in the aquatic food web, there is the potential for adverse effects to higher-trophic level organisms from exposure to HCB in their diet.

Once in birds, HCB is excreted into the eggs, which results in uptake by the embryos. HCB concentrations measured in the eggs of sea birds and raptors from a number of locations around the world approach those associated with reduced embryo weights in herring gulls (1.5 mg/kg), suggesting that HCB has the potential to harm embryos of avian species. For mammals, a sensitive endpoint for chronic HCB exposure is the reduction of birth weight and increased mortality in mink offspring exposed to 1 ppm HCB (0.16 mg/kg BW-day) for 47 weeks. This observation is ecologically significant because field studies have observed HCB concentrations in fish tissue at a number of sites worldwide that are within an order of magnitude of the dietary toxicity level of 1 ppm. This suggests that HCB has the potential to cause adverse effects in mink and perhaps other fish-eating mammals, especially given HCBs tendency to bioaccumulate. The contribution of HCB from pentachlorophenol uses vs. non-pesticidal sources in aquatic and terrestrial environments is a large uncertainty.

3. Risks to Listed Species

Section 7 of the Endangered Species Act (ESA), 16 U.S.C. Section 1536(a)(2), requires that federal agencies consult with the National Marine Fisheries Service (NMFS) for marine and andronomus listed species, or with the United States Fish and Wildlife Services (FWS) for listed wildlife and freshwater organisms, if proposing an "action" that may affect listed species or their designated habitat. Each federal agency is required under the Act to insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. To jeopardize the continued existence of a listed species is to "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of the species." 50 CFR §402.02.

To comply with subsection (a)(2) of the ESA, EPA's Office of Pesticide Programs has established procedures to evaluate whether a proposed registration action may directly or indirectly appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of any listed species (U.S. EPA 2004). If any of the Listed Species LOC Criteria are exceeded for either direct or indirect effects in the Agency's screening-level risk assessment, the Agency identifies any listed or candidate species that may occur spatially and temporally in the footprint of the proposed use. Further biological assessment is undertaken to refine the risk. The extent to which any species may be at risk determines the need to develop a more comprehensive consultation package as required by the ESA.

An environmental risk assessment to CDDs and CDFs to listed species has not been conducted at this time; however, there are potential acute and chronic risks to birds and chronic risks to mammals from CDDs and CDFs resulting from pentachlorophenol treated wood. The results of the environmental risk assessment indicate that threatened and endangered species would not be expected to be adversely affected directly by exposure to the micro-contaminant HCB present in pentachlorophenol. However, as discussed above, the strong tendency of CDDs, CDFs, and HCB to persist and bioaccumulate could lead to secondary adverse effects to higher trophic level organisms, or direct effects to organisms exposed to CDDs, CDFs, and HCB from pentachlorophenol use over longer periods of time. Sensitive animals, such as endangered and threatened species may also be at risk; however, it is important to note that pentachlorophenol is not the only source of HCB, CDDs and CDFs in the environment. They are one of many making it difficult to quantify the portion of the environmental risk from HCB, CDDs and CDFs that is attributable to pentachlorophenol wood treatment uses.

Based on the use patterns for pentachlorophenol, there is potential for pentachlorophenol wood treatment uses to overlap with listed species and a more refined assessment may be warranted. This assessment would include direct, indirect and habitat effects, and the refined assessment should involve clear delineation of the action area associated with pentachlorophenol wood treatment uses and best available information on the temporal and spatial co-location of listed species with respect to the action area. This analysis has not been conducted for this assessment. An endangered species effect determination will not be made at this time.

For detailed discussions of all aspects of the environmental risk assessment, see the *Ecological Hazard and Environmental Risk Assessment RED Chapter for Pentachlorophenol*, dated February 26, 2008; *Ecological Hazard and Environmental Risk Assessment RED Chapter for Chlorinated Dibenzo Dioxins and Chlorinated Dibenzo Furans (CDDs and CDFs) – Supplement to the Pentachlorophenol RED*, dated February 26, 2008; and, *Ecological Hazard and Environmental Risk Assessment RED Chapter for Hexachlorobenzene (HCB) – Supplement to the Pentachlorophenol RED*, dated February 26, 2008; located on the Federal Government Public Docket website at www.regulations.gov (Docket ID #EPA-HQ-OPP-2004-0204).

IV. Reregistration Eligibility and Risk Management Decisions

A. Reregistration Eligibility Decision

Section 4(g)(2)(A) of FIFRA calls for EPA to determine, after submission of relevant data concerning an active ingredient, whether or not products containing the active ingredient are eligible for reregistration. EPA has previously identified and required the submission of the generic (i.e., active ingredient-specific) data required to support reregistration of wood preservative products containing pentachlorophenol as an active ingredient. The Agency has reviewed these generic data, and has determined that the data are sufficient to support a reregistration eligibility decision for the wood preservative uses of pentachlorophenol (see Appendix B).

EPA considered the available information and, after a thorough evaluation of the risks and benefits associated with each use, has determined that the wood preservative uses of pentachlorophenol presented in Appendix A will not pose unreasonable risks to humans or the environment provided that (1) all risk mitigation measures are implemented, (2) label amendments are made as described in Section V, and (3) confirmatory data requirements are satisfied. Accordingly, should a registrant fail to implement any of the conditions and requirements for reregistration identified in this document, the Agency may take regulatory action to address the potential risk concerns from the use of pentachlorophenol.

1. Regulatory Rationale

The Agency has determined that wood preservative uses of pentachlorophenol are eligible for reregistration provided that the registrants implement the conditions and requirements in this RED including amended labeling and submission of additional data. With amended labeling, EPA believes that the uses presented in Appendix A will not present risks inconsistent with FIFRA and that the benefits of pentachlorophenol to society outweigh the remaining risks. A summary of EPA's rationale for reregistering and managing risks associated with continued use is presented below.

a. Summary of Risks

As discussed in Section III of this document, EPA acknowledges the complexity and uncertainties associated with assessing potential risk from exposure to pentachlorophenol and its micro-contaminants, dioxin/furans and hexachlorobenzene. Therefore, the risks presented in this document may overestimate actual risk. Notwithstanding, EPA identified the following risk estimates of concern associated with the continued use of wood preservatives containing pentachlorophenol:

- Potential occupational cancer and non-cancer risk from dermal exposure to pentachlorophenol.

- Potential environmental risk from exposure to dioxin/furan resulting from pentachlorophenol use.

- Without the adoption of additional protective measures to reduce exposure to pentachlorophenol and its micro-contaminants continued use would not meet the "no unreasonable adverse effects" criteria of FIFRA.

b. Summary of Benefits and Alternatives

A detailed discussion of pentachlorophenol benefits and alternatives is presented in the document entitled, "A Qualitative Economic Impact Assessment of Alternatives to Pentachlorophenol as a Wood Preservative" dated April 14, 2008.

Chemical alternatives to pentachlorophenol wood preservatives include chromated arsenicals, creosote, copper and zinc naphthenates, ammoniacal/alkaline copper quaternary (ACQ), copper azole (CBA), sodium borates (SBX), and copper HDO (CX-A). Non-chemical alternatives include virgin vinyl, plastic wood composites, high density polyethylene, rubber lumber, concrete, fiberglass, steel, naturally resistant wood poles, and glass.

Although many chemical and non-chemical alternatives exist for wood treated with pentachlorophenol, many are not truly interchangeable due to safety, environmental, efficacy, and/or economic considerations. In the case of utility poles, for example, the material selected can affect the maintenance personnel's safety. Although steel utility poles may result in less human or environmental exposure to pentachlorophenol, they also increase the likelihood of electrocution for workers. For poles treated with chemical alternatives, certain alternatives make poles more slippery and therefore harder to climb which may also affect worker safety. Although the risk of electrocution and slippage cannot be compared quantitatively to potential environmental exposure, the Agency considers direct and indirect safety consequences as a result of its decisions.

Alternatives also vary in their potential effects on the environment. The potential short- and long-term environmental impacts of many chemical and non-chemical alternatives are unknown. Pentachlorophenol, on the other hand, has been the subject of numerous toxicity, exposure, environmental fate, and ecological effects studies. Because there are varying amounts of information on each alternative, it is difficult to quantitatively or qualitatively estimate the potential environmental impacts of alternatives; however, the potential environmental impacts of pentachlorophenol and its micro-contaminants are relatively well understood compared to certain chemical and non-chemical alternatives.

Chemical and non-chemical alternatives also vary in efficacy. In many cases, efficacy is the determining factor for selecting the preservative and/or material used. For example, pentachlorophenol treated crossarms are less likely to warp, crack, twist (causing stress on the wires), or drip then some of the alternatives. In addition, utility and other public works companies require products proven to be capable of withstanding extreme conditions for long periods of time. In the short-term, a product treated with an alternative preservative may offer comparable efficacy compared to a product treated with a pentachlorophenol; however, comparable efficacy may or may not be observed over the entire expected lifespan of the product (e.g., a utility pole may require replacement much sooner than if it had been treated with

pentachlorophenol). Because certain alternatives do not offer the same level of efficacy and because the end products themselves (e.g., utility poles) may not last as long as pentachlorophenol, they also cannot be considered as direct replacements.

Finally, economic considerations almost always impact decisions regarding project materials. Included in economic considerations are initial costs (e.g., cost of wood treatment), lifespan and maintenance costs of the product, and disposal costs. Although many exceptions exist, pentachlorophenol generally offer lower initial costs than many alternatives, offer documented and predictable lifespan, and in many cases can be disposed of in municipal landfills. Because certain alternatives, although lower in initial costs, do not offer the same resistance and/or do not last as long as pentachlorophenol treated products, they also cannot be considered as direct replacements. Economic considerations are particularly relevant to utility and other public works uses because increased costs are frequently passed on to the public.

c. Risk/Benefit Finding

In its risk assessments, EPA identified potential risks of concern for workers exposed to pentachlorophenol at wood treatment plants. Notwithstanding, eliminating these uses could result in reliance on products with greater safety risks, increased adverse effects on the environment, reduced effectiveness, and higher costs that could be passed on to the general public (e.g., public works entities). Therefore, after a thorough evaluation of the risk estimates and benefits, EPA has determined that certain uses of wood preservative uses of pentachlorophenol will not pose unreasonable risks to humans or the environment provided that (1) all risk mitigation measures are implemented, (2) label amendments are made as described in Section V, and (3) current data gaps and confirmatory data requirements are satisfied.

2. Endocrine Disruptor Effects

EPA is required under the FFDCA, as amended by FQPA, to develop a screening program to determine whether certain substances (including all pesticide active and other ingredients) "may have an effect in humans that is similar to an effect produced by a naturally occurring estrogen, or other endocrine effects as the Administrator may designate." Following recommendations of its Endocrine Disruptor Screening and Testing Advisory Committee (EDSTAC), EPA determined that there was a scientific basis for including, as part of the program, the androgen and thyroid hormone systems, in addition to the estrogen hormone system. EPA also adopted EDSTAC's recommendation that EPA include evaluations of potential effects in wildlife. For pesticides, EPA will use its authorities under FIFRA and/or the FFDCA to require any necessary data on endocrine-related effects. As the science develops and resources allow, screening for additional hormone systems may be added to the Endocrine Disruptor Screening Program (EDSP).

3. Cumulative Risks

Risks summarized in this document are those that result only from the use of pentachlorophenol. The Food Quality Protection Act (FQPA) requires that, when considering whether to establish, modify, or revoke a tolerance, the Agency consider "available information"

concerning the cumulative effects of a particular pesticide's residues and "other substances that have a common mechanism of toxicity." Unlike other pesticides for which EPA has followed a cumulative risk approach based on a common mechanism of toxicity, EPA has not made a common mechanism of toxicity finding as to pentachlorophenol. EPA has not assumed that the pentachlorophenol share a common mechanism of toxicity with other compounds.

4. Public Comments and Response

Through EPA's public participation process, EPA worked with stakeholders and the public to reach the regulatory decisions for pentachlorophenol. During the 60-day public comment period ending on June 16, 2008, the Agency received comments on the revised risk assessments from several respondents: Parents for a Safer Environment, California Regional Water Quality Control Board, Pentachlorophenol Task Force, Chlorine Chemistry Division of the American Chemistry Council, Beyond Pesticides et al., Utility Solid Waste Activities Group, as well as several concerned consumers. All comments and EPA's comment response documents are available at http://www.regulations.gov in docket number EPA-HQ-OPP-2004-0402.

B. Risk Management Decision

The Agency has concluded that continued use of wood preservatives containing pentachlorophenol would not meet the "no unreasonable adverse effects" criteria of FIFRA unless the mitigation measures and associated label changes presented in Table 5 and Table 7, respectively, are implemented and confirmatory data are submitted. Information is not currently available to quantify the amount of risk reduction; however, implementing these risk reduction measures will reduce potential worker exposure as well as potential environmental exposure to pentachlorophenol and its micro-contaminants. Additional PPE and engineering controls are needed to help reduce potential exposure and risk to workers, and the addition of a final vacuum is needed to help reduce potential environmental exposure and risk. The Agency will require confirmatory monitoring data to ensure that the measures below are protective.

Although the measures below are required at this time, in the future, registrants may request that EPA remove or reduce certain restrictions or mitigation measures based upon submission of acceptable toxicity and exposure studies that demonstrate risk exposure to pentachlorophenol is below EPA's level of concern.

Table 5 discusses the risk mitigation measures for wood preservatives containing pentachlorophenol. Engineering controls are specific to thermal and/or ambient treatments of pentachlorophenol. Additional mitigation measures are being implemented for thermal pentachlorophenol due to the potential for increased inhalation exposure.

Table 5. Risk Mitigation Measures for Wood Preservatives Containing Pentachlorophenol

Risk Estimates of Concern	Mitigation Measure(s)	Required Label Language
Occupational cancer and non-cancer risk estimates from inhalation exposure to pentachlorophenol	After treatment, personnel must not be located within 15 feet of the cylinder opening until the cylinder is ventilated and the door is completely open	"At the conclusion of the treatment, the cylinder must be ventilated by purging the post-treatment cylinder through fresh air exchange. The ventilation process is considered complete after a minimum of 2 volume exchanges based on the empty treatment cylinder volume. The exhaust pipe of the vacuum system or any air moving device utilized in conducting the air purge must terminate into a containment vessel such as a treating solution work tank or water/effluent tank. The ventilation process may be accomplished by one of the following methods: 1) activating an air purge system that operates while the cylinder door remains closed; or 2) using a device to open and hold open the cylinder door (no more than 6 inches) to allow adequate ventilation and activating the vacuum pump. If the second method is utilized, at the conclusion of the treatment, no personnel may be located within 15 feet of the cylinder when open (cracked) until the cylinder has been ventilated. In the event of equipment malfunction, or to place the spacer to hold the door open during venting, only personnel wearing specified PPE are permitted within 15 feet of the cylinder opening prior to ventilation. After ventilation is complete, the cylinder door may be completely opened."
Occupational cancer and non-cancer risk estimates from dermal exposure to pentachlorophenol	The treatment process must include a final vacuum to remove excess preservative from the wood	"The treatment process must include a final vacuum to remove excess preservative from the wood. The final vacuum must attain a vacuum equal to or greater than the initial vacuum. This vacuum must be held for an appropriate time period based on wood species, retention levels, and commodity treated to remove excess preservative from the wood."
	Automatic opening, closing, and locking devices (Elevated Temperature	"As of December 31, 2013, for elevated temperature pressure treatment with pentachlorophenol, automatic, remotely operated devices must be used to open, close, lock, and unlock cylinder doors."

Risk Estimates of Concern	Mitigation Measure(s)	Required Label Language
	Pentachlorophenol)	
	Lock/unlock cylinder doors using automatic locking devices (Ambient Temperature Pentachlorophenol)	"As of December 31, 2013, for ambient temperature pressure treatment with pentachlorophenol, an automatic locking/unlocking device must be used to accomplish locking and unlocking of the cylinder door."
	Allow excess preservative to drain before removing charges from the treatment cylinder and prior to shipment	"After treatment, wood must be moved to a drip pad capable of recovering excess preservative until the wood is drip free."
Occupational cancer and non-cancer risk estimates from dermal exposure to pentachlorophenol	Personnel must wear personal protective equipment when handling treated wood/equipment, when cleaning the cylinder, and approaching cylinder prior to ventilation	"All personnel handling treated wood or handling treating equipment (including poles/hooks used to retrieve charge cables) that has come in contact with preservative must wear the following PPE: * washable or disposable coveralls or long-sleeved shirt and long pants, * chemical resistant gloves, and * socks plus industrial grade safety work boots with chemical resistant soles. All personnel cleaning or maintaining the treatment cylinder gasket/equipment or working with concentrate or wood treatment preservative must wear the following PPE: * washable or disposable coveralls or long-sleeved shirt and long pants, * chemical resistant gloves, * socks plus industrial grade safety work boots with chemical resistant soles, and * a full face shield. In the event of equipment malfunction, or for door spacer placement, all personnel located within 15 feet of the cylinder opening prior to cylinder ventilation must wear the following PPE: * washable or disposable coveralls over long-sleeved shirt and long pants, * chemical resistant gloves, * socks plus industrial grade safety work boots with chemical resistant soles, and * a properly fitting half mask elastomeric respirator with appropriate

Risk Estimates of Concern	Mitigation Measure(s)	Required Label Language
		cartridges and/or filters. Entry to confined spaces is regulated by Federal and/or State Occupational Safety and Health Programs. Compliance is mandated by law. Individuals who enter pressure treatment cylinders or other related equipment that is contaminated with the wood treatment preservative (e.g.,cylinders that are not free of the treatment preservative or preservative storage tanks) must wear protective clothing and/or equipment as required by Federal and/or State Occupational Safety and Health Compliance laws."
Occupational cancer and non-cancer risk estimates from dermal exposure to pentachlorophenol	Cylinder openings and door pits	"Cylinder openings and door pits must use grating and additional measures such as sumps, dams or other devices which prevent or remove spillage of the preservative."
	Personnel must not retrieve charge cables by hand	"Personnel must not directly handle the charge cables, poles or hooks used to retrieve charge cables, or other equipment that has contacted the preservative without wearing chemical resistant gloves."
	Personnel must not place or remove bridge rails by hand	"As of December 31, 2013, mechanical methods must be used to place/remove bridge rails."
	Personnel must not eat, drink, or smoke in work areas	"Eating, drinking, and smoking is prohibited in the treatment cylinder load-out area, drip pad area, and engineering control room of wood treatment facilities. EXCEPTION: Where treating operator control rooms are isolated from the treating cylinders, drip pad, and work tanks, eating, drinking, and smoking (depending on local restrictions) are permitted."
	Work clothing must be left at the treatment facility	"Personnel must leave aprons, protective coveralls, chemical resistant gloves, work footwear, and any other material contaminated with preservative at the treatment facility."
Aquatic organisms acute and chronic risk estimates from exposure to	Double vacuum for wood used in aquatic and other sensitive environments	"For treated wood that will be used in marine or other aquatic or sensitive environments, a double vacuum must be used. Following the pressure period and once the pentachlorophenol has been pumped back to the work tank, a vacuum shall be applied for a minimum of one and a half hours at not less than 22 inches of Hg (560 KPa) (adjusted for elevation) of vacuum to recover excess preservative. Then, depending on plant equipment: 1) vacuum for a minimum of one and a half hours at not less than 22 inches of Hg (560 KPa) (adjusted for elevation); or 2) steam material for one hour minimum and then pull not less than 22 inches of

Risk Estimates of Concern	Mitigation Measure(s)	Required Label Language
		Hg (560 KPa) (adjusted for elevation) vacuum for a minimum of one and a half hours. Maximum temperature during steaming shall not exceed 240 degrees F (115.5 degrees C), as specified in the Best Management Practices (Aug. 2006) issued by the Western Wood Preservers Association, Southern Pressure Treaters' Association, Timber Piling Council, and Wood Preservation Canada."

1. Dioxin/Furan Reduction

Label modifications stipulating use of a final vacuum for all pentachlorophenol treated wood and a double vacuum for wood used in aquatic and other sensitive environments will reduce the amount of pentachlorophenol, CDDs and CDFs on the surface of the treated wood, thus reducing the amount of chemical that can leach into the environment. In addition the Agency is requiring that a terrestrial field dissipation study be submitted to confirm the dioxin levels leaching to the soil, and plant and organisms around pentachlorophenol treated utility poles.

The Pentachlorophenol Task Force has submitted information outlining changes in pentachlorophenol manufacturing process. These changes have been made in an effort to lower the concentrations of CDDs, CDFs as contaminants in pentachlorophenol.

The Agency has conducted a preliminary review of these data and determined that there is potential for a reduction in the amount of CDDs and CDFs in the pentachlorophenol. However, the laboratory data analysis is incomplete, and the data submitted does not detail the methodology, including, the concentrations of each congener (C); fraction of each congener (R); and methods used to calculate TEQ.

Based on incomplete information concerning the manufacturing process, the Agency cannot quantify the reduction in the amount of CDDs and CDFs available for release from pentachlorophenol-treated wood. Therefore, the Agency is requiring additional data regarding the manufacturing process for pentachlorophenol. The data needs are identified in Section V of this document.

2. Management of Pentachlorophenol-treated Materials

The Agency is aware that materials such as utility poles or railroad ties may be sold for reuse after their original intended use has ended. The typical lifespan for a utility pole or railroad tie depends on climate, setting and other factors. These materials are often sold into a secondary market where they may be installed in residential settings for garden borders, etc. Because the lifespan of these treated materials is fairly long, the Agency believes that the pentachlorophenol leaching from the treated material is significantly less than when it was originally placed into service. The Agency has not conducted a risk assessment of these secondary uses of pentachlorophenol treated materials but has begun to evaluate these uses and has found that other options such as disposing of these materials in a landfill, or incinerating these materials for energy generation are also currently practiced. Further evaluation of the potential risks and benefits associated with these secondary uses of pentachlorophenol treated materials will be conducted during the Registration Review process for this active ingredient.

3. Registration Review of Pentachlorophenol

Through this reregistration action, the Agency is implementing mitigation measures discussed above to reduce exposure to workers in wood treatment facilities. In an effort to determine if these mitigation measures are effective in reducing exposure, the Agency is requiring that exposure monitoring studies be conducted at wood treatment facilities. In addition, the Agency may shorten the Registration Review cycle from the current 15 year time-frame. The Agency plans on conducting Registration Review for pentachlorophenol once the submission and review of new data is complete.

V. What Registrants Need to Do

The Agency has determined that wood preservative products containing pentachlorophenol are eligible for reregistration provided that the conditions and requirements for reregistration identified in this RED are implemented (see Section IV). The registrants will also need to amend product labeling for each product.

The database supporting the reregistration of pentachlorophenol wood preservatives has been reviewed and determined to be adequate to support a reregistration eligibility decision. However, additional confirmatory data are required to support continued registration.

A. Manufacturing Use Products

1. Generic Data Requirements

The generic databases supporting the reregistration of pentachlorophenol for currently registered wood preservative uses has been reviewed and determined to be adequate to support a reregistration eligibility decision. However, the confirmatory data presented in Table 9 are required. Generally, registrants will have 90 days from receipt of a generic data call-in (GDCI) to complete and submit response forms or request time extensions and/or waivers with a full written justification. Timeframes for submitting generic data will be presented in the GDCI.

Table 6. Generic Data Required to Support Pentachlorophenol Wood Preservative Registrations

EPA Guideline Number	Requirement Name
GLN 830.1550	Product Identity and Composition
GLN 830.1600	Description of Materials Used to Produce the Products
GLN 830.1620	Description of Production Process
GLN 830.1650	Description of Formulation Process
GLN 830.1670	Discussion of Formation of Impurities
GLN 835.6100	Terrestrial Field Dissipation (potential dioxin exposure in substrate and organism sampling around treated utility poles)
GLN 875.1100	Dermal Outdoor Exposure
GLN 875.1200	Dermal Indoor Exposure
GLN 875.1300	Inhalation Outdoor Exposure
GLN 875.1400	Inhalation Indoor Exposure
GLN 875.1600	Applicator Exposure Monitoring Data Reporting
GLN 875.1700	Product Use Information

For pentachlorophenol technical grade active ingredient products, the registrant needs to submit the following items:

Within 90 days from receipt of the generic data call-in (DCI):

1. Completed response forms to the generic DCI (i.e., DCI response form and requirements status and registrant's response form); and

2. Submit any time extension and/or waiver requests with a full written justification.

Within the time limit specified in the generic DCI:

1. Cite any existing generic data which address data requirements or submit new generic data responding to the DCI.

Please contact Diane Isbell at (703) 308-8154 with questions regarding generic reregistration.

By US mail:
Document Processing Desk
Diane Isbell
Office of Pesticide Programs (7510P)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460-0001

By express or courier service:
Document Processing Desk
Diane Isbell
Office of Pesticide Programs (7510P)
U.S. Environmental Protection Agency
One Potomac Yard, Room S-4900
2777 South Crystal Drive
Arlington, VA 22202

B. End-Use Products

1. Product Specific Data Requirements

Section 4(g)(2)(B) of FIFRA calls for the Agency to obtain any needed product-specific data regarding the pesticide after a determination of eligibility has been made. The registrant must review previous data submissions to ensure that they meet current EPA acceptance criteria and if not, commit to conduct new studies. If a registrant believes that previously submitted data meet current testing standards, then the study MRID numbers should be cited according to the instructions in the Requirement Status and Registrants Response Form provided for each product. The Agency intends to issue a separate product-specific data call-in (PDCI) outlining specific data requirements.

Generally, registrants will have 90 days from receipt of a PDCI to complete and submit response forms or request time extensions and/or waivers with a full written justification. Registrants will have eight months to submit product-specific data.

For wood preservative end-use products containing the active ingredient pentachlorophenol, the registrants need to submit the following items for each product.

Within 90 days from the receipt of the product-specific data call-in (PDCI):

1. Completed response forms to the PDCI (i.e., PDCI response form and requirements status and registrant's response form); and

2. Submit any time extension or waiver requests with a full written justification.

Within eight months from the receipt of the PDCI:

1. Two copies of the confidential statement of formula (EPA Form 8570-4);

2. A completed original application for reregistration (EPA Form 8570-1). Indicate on the form that it is an "application for reregistration";

3. Five copies of the draft label incorporating all label amendments outlined in Table 10 of this document;

4. A completed form certifying compliance with data compensation requirements (EPA Form 8570-34);

5. If applicable, a completed form certifying compliance with cost share offer requirements (EPA Form 8570-32); and

6. The product-specific data responding to the PDCI.

Please contact Adam Heyward at (703) 308-6422 with questions regarding product reregistration and/or the PDCI. All materials submitted in response to the PDCI should be addressed as follows:

By US mail:
Document Processing Desk
Adam Heyward
Office of Pesticide Programs (7510P)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460-0001

By express or courier service:
Document Processing Desk
Adam Heyward
Office of Pesticide Programs (7510P)
U.S. Environmental Protection Agency
Room S-4900, One Potomac Yard
2777 South Crystal Drive
Arlington, VA 22202

2. Labeling for End-Use Products

To be eligible for reregistration, labeling changes are necessary to implement measures outlined in Section IV. Specific language to incorporate these changes is presented in Table 10. Generally, conditions for the distribution and sale of products bearing old labels/labeling will be established when the label changes are approved. However, specific existing stocks time frames will be established case-by-case, depending on the number of products involved, the number of label changes, and other factors.

Amended product labeling must be submitted no later than March 31, 2009. Registrants may generally distribute and sell products bearing old labels/labeling for 26 months from the date of the issuance of this Reregistration Eligibility Decision document. Persons other than the registrant may generally distribute or sell such products for 52 months from the approval of labels reflecting the mitigation described in this RED. However, existing stocks time frames will be established case-by-case, depending on the number of products involved, the number of label changes, and other factors. Refer to "Existing Stocks of Pesticide Products; Statement of Policy," *Federal Register*, Volume 56, No. 123, June 26, 1991.

Table 7. Required Label Changes for Manufacturing and End-Use Wood Preservative Products Containing Pentachlorophenol

Description	Pentachlorophenol: Required Labeling Language	Placement on Label
	Manufacturing-Use Products	
For all Manufacturing Use Products	"Only for formulation as a preservative for the following use(s) [fill blank only with those uses that are being supported by MP registrant]."	Directions for Use
One of these statements may be added to a label to allow reformulation of the product for a specific use or all additional uses supported by a formulator or user group.	"This product may be used to formulate products for specific use(s) not listed on the MP label if the formulator, user group, or grower has complied with U.S. EPA submission requirements regarding support of such use(s)." "This product may be used to formulate products for any additional use(s) not listed on the MP label if the formulator, user group, or grower has complied with U.S. EPA submission requirements regarding support of such use(s)."	Directions for Use
Environmental Hazards Statements Required by the RED and PR Notice 93-10 and 95-1	"Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or other waters unless in accordance with the requirements of a National Pollution Discharge Elimination System (NPDES) permit and the permitting authority have been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA."	Precautionary Statements

Description	Pentachlorophenol: Required Labeling Language	Placement on Label
	End-Use Products	
PPE Requirements Established by the RED	"Personal Protective Equipment (PPE)" "All personnel handling treated wood or handling treating equipment (including poles/hooks used to retrieve charge cables) that has come in contact with preservative must wear the following PPE: * washable or disposable coveralls or long-sleeved shirt and long pants, * chemical resistant gloves, and * socks plus industrial grade safety work boots with chemical resistant soles. All personnel cleaning or maintaining the treatment cylinder gasket/equipment or working with concentrate or wood treatment preservative must wear the following PPE: * washable or disposable coveralls or long-sleeved shirt and long pants, * chemical resistant gloves, * socks plus industrial grade safety work boots with chemical resistant soles, and * a full face shield. In the event of equipment malfunction, or for door spacer placement, all personnel located within 15 feet of the cylinder opening prior to cylinder ventilation must wear the following PPE: * washable or disposable coveralls over long-sleeved shirt and long pants, * chemical resistant gloves, * socks plus industrial grade safety work boots with chemical resistant soles, and * a properly fitting half mask elastomeric respirator with appropriate cartridges and/or filters. Entry to confined spaces is regulated by Federal and/or State Occupational Safety and Health Programs. Compliance is mandated by law. Individuals who enter pressure treatment cylinders or other related equipment that is contaminated with the wood treatment preservative (e.g.,cylinders that are not free of the treatment preservative or preservative storage tanks) must wear protective clothing and/or equipment as required by Federal and/or State Occupational Safety and Health Compliance laws."	Immediately following/below Precautionary Statements: Hazards to Humans and Domestic Animals

Description	Pentachlorophenol: Required Labeling Language	Placement on Label
User Safety Requirement	"Personnel must leave aprons, protective coveralls, chemical resistant gloves, work footwear, and any other material contaminated with preservative at the treatment facility." "Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry." "Discard clothing and other absorbent material that have been drenched or heavily contaminated with the product's concentrate. Do not reuse them." "Eating, drinking, and smoking are prohibited in the treatment cylinder load-out area, drip pad area, and engineering control room of the wood treatment facilities." EXCEPTION: Where treating operator control rooms are isolated from the treating cylinders, drip pad, and work tanks, eating, drinking, and smoking (depending on local restrictions) are permitted."	Precautionary Statements: Hazards to Humans and Domestic Animals Immediately following the PPE requirements
User Safety Recommendations	"USER SAFETY RECOMMENDATIONS" "Users should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet." "Users should remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing." "Users should remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing."	Precautionary Statements: Hazards to Humans and Domestic Animals immediately following Engineering Controls (Must be placed in a box.)

Description	Pentachlorophenol: Required Labeling Language	Placement on Label
Other Application Restrictions (Risk Mitigation)	"At the conclusion of the treatment, the cylinder must be ventilated by purging the post-treatment cylinder through fresh air exchange. The ventilation process is considered complete after a minimum of 2 volume exchanges based on the empty treatment cylinder volume. The exhaust pipe of the vacuum system or any air moving device utilized in conducting the air purge must terminate into a containment vessel such as a treating solution work tank or water/effluent tank. The ventilation process may be accomplished by one of the following methods: 1) activating an air purge system that operates while the cylinder door remains closed; or 2) using a device to open and hold open the cylinder door (no more than 6 inches) to allow adequate ventilation and activating the vacuum pump. If the second method is utilized, at the conclusion of the treatment, no personnel may be located within 15 feet of the cylinder when open (cracked) until the cylinder has been ventilated. In the event of equipment malfunction, or to place the spacer to hold the door open during venting, only personnel wearing specified PPE are permitted within 15 feet of the cylinder opening prior to ventilation. After ventilation is complete, the cylinder door may be completely opened."	Directions for Use
Other Application Restrictions (Risk Mitigation)	"After treatment, wood must be moved to a drip pad capable of recovering excess preservative until the wood is drip free."	Directions for Use
Other Application Restrictions (Risk Mitigation)	"The treatment process must include a final vacuum to remove excess preservative from the wood. The final vacuum must attain a vacuum equal to or greater than the initial vacuum. This vacuum must be held for an appropriate time period based on wood species, retention levels, and commodity treated to remove excess preservative from the wood."	Directions for Use

Description	Pentachlorophenol: Required Labeling Language	Placement on Label
Other Application Restrictions (Risk Mitigation)	"For treated wood that will be used in marine or other aquatic or sensitive environments, a double vacuum must be used. Following the pressure period and once the pentachlorophenol has been pumped back to the work tank, a vacuum shall be applied for a minimum of one and a half hours at not less than 22 inches of Hg (560 KPa) (adjusted for elevation) of vacuum to recover excess preservative. Then, depending on plant equipment: 1) vacuum for a minimum of one and a half hours at not less than 22 inches of Hg (560 KPa) (adjusted for elevation); or 2) steam material for one hour minimum and then pull not less than 22 inches of Hg (560 KPa) (adjusted for elevation) vacuum for a minimum of one and a half hours. Maximum temperature during steaming shall not exceed 240 degrees F (115.5 degrees C), as specified in the Best Management Practices (Aug. 2006) issued by the Western Wood Preservers Association, Southern Pressure Treaters' Association, Timber Piling Council, and Wood Preservation Canada."	Directions for Use
Other Application Restrictions (Risk Mitigation)	"As of December 31, 2013, for elevated temperature pressure treatment with pentachlorophenol, automatic, remotely operated devices must be used to open, close, lock, and unlock cylinder doors."	Directions for Use
Other Application Restrictions (Risk Mitigation)	"As of December 31, 2013, for ambient pentachlorophenol treatments, an automatic locking/unlocking device must be used to accomplish locking and unlocking of the cylinder door."	Directions for Use
Other Application Restrictions (Risk Mitigation)	"Cylinder openings and door pits must use grating and additional measures such as sumps, dams or other devices which prevent or remove spillage of the preservative."	Directions for Use
Other Application Restrictions (Risk Mitigation)	"Personnel must not directly handle the charge cables, poles or hooks used to retrieve charge cables, or other equipment that has contacted the preservative without wearing chemical resistant gloves."	Directions for Use
Other Application Restrictions (Risk Mitigation)	"As of December 31, 2013, mechanical methods must be used to place/remove bridge rails."	Directions for Use

Appendix A: Use patterns Eligible for Reregistration
Pentachlorophenol

Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
(10) **Wood preservatives**				
(Exterior use only) Lumber, timber's, posts, poles, and other wooden members	Ready to use Reg: 61483-1 Reg: 61483-58 Reg: 61483-59	Pressure treatment In a commercial vessel capable of physically impregnating the wood and providing adequate penetration and retention	If temperature or time is used as the treating parameter, treat for 12 to 48 hours or until effective penetration is achieved	**Restricted use pesticide** *Due to fetotoxicity and oncogenicity in laboratory animals* For retail sale and use only by certified applicators or by persons under their direct supervision and only for those uses covered by certified applicator's certification This product is intended for exterior use. Is not intended for home and farm use, must not be used for pressure or thermal treated logs used in the construction of log homes except laminated beams or building components which are in ground contact and are subject to decay or insect infestation and where two coats of an appropriate sealer are applied. Urethane,
(Exterior use only) Lumber, timber's, posts, poles, and other wooden members	Soluble Concentrate Reg: 61483-62 Reg: 61483-2 Reg: 61483-3	Pressure treatment In a commercial vessel capable of physically impregnating the wood and providing adequate penetration and retention	Add one part of product to nine parts of fuel oil, kerosene, or other hydrocarbon with the desired volatility, and mix well If temperature or time is used as the treating parameter, treat for 12 to 48 hours or until effective penetration is achieved	**Restricted use pesticide** *Due to fetotoxicity and oncogenicity in laboratory animals* For retail sale and use only by certified applicators or by persons under their direct supervision and only for those uses covered by certified applicator's certification This product is intended for exterior use. Is not intended for home and farm use, must not be used for pressure or thermal treated logs used in the construction of log homes except laminated beams or building components which are in ground contact andare subject to decay or insect infestation and where two coats of an appropriate sealer are applied. Urethane, shellac, latex, epoxy, enamel and varnish are acceptable sealers for pentachlorophenol treated wood

APPENDIX B: Pentachlorophenol Case (2505)

Appendix B lists the **generic** (not product specific) data requirements which support the re-registration of Pentachlorophenol. These requirements apply to Pentachlorophenol in all products, including data requirements for which a technical grade active ingredient is the test substance. The data table is organized in the following formats:

1. **Data Requirement** (Columns 1 and 2). The data requirements are listed by Guideline Number. The first column lists the new Part 158 Guideline numbers, and the second column lists the old Part 158 Guideline numbers. Each Guideline Number has an associated test protocol set forth in the Pesticide Assessment Guidance, which are available on the EPA website.

2. **Guideline Description** (Column 3). Identifies the guideline type.

3. **Use Pattern** (Column 4). This column indicates the standard Antimicrobial Division use patterns categories for which the generic (not product specific) data requirements apply. The number designations are used in Appendix B.

   (1) Agricultural premises and equipment
   (2) Food handling/ storage establishment premises and equipment
   (3) Commercial, institutional and industrial premises and equipment
   (4) Residential and public access premises
   (5) Medical premises and equipment
   (6) Human water systems
   (7) Materials preservatives
   (8) Industrial processes and water systems
   (9) Antifouling coatings
   (10) Wood preservatives
   (11) Swimming pools
   (12) Aquatic areas

3. **Bibliographic Citation** (Column 5). If the Agency has data in its files to support a specific generic Guideline requirement, this column will identity each study by a "Master Record Identification (MRID) number. The listed studies are considered "valid" and acceptable for satisfying the Guideline requirement. Refer to the Bibliography appendix for a complete citation of each study.

DATA REQUIREMENT				CITATION(S)
New Guideline Number	**Old Guideline Number**	**Study Title**	**Use Pattern**	**MRID Number**
PRODUCT CHEMISTRY				
830.1550	61-1	Product Identity and Composition		Open Literature
830.1600	61-2	Description of Beginning Materials and Manufacturing Process		41002701
830.1670	61-3	Discussion of Formation of Impurities		41002701
830.1600 830.1620 830.1650	61-2a	Starting Materials and Manufacturing Process		Open Literature
830.1670	61-2b	Formation of Impurities		Open Literature
830.1700	62-1	Preliminary Analysis		40999402, 41002702
830.1750	62-2	Certification of Limits		40999402, 41002702
830.1800	62-3	Analytical Method		41002702
830.6300	63-0	Reports of Multiple phys/chem Characteristics		40999403, 41002703
830.6302	63-2	Color		Open Literature
830.6303	63-3	Physical State		Open Literature
830.6304	63-4	Odor		Open Literature
830.7200	63-5	Melting Point		Open Literature
830.7220	63-6	Boiling Point		Open Literature
830.7300	63-7	Density		Open Literature
830.7840 830.7860	63-8	Solubility		Open Literature
830.7950	63-9	Vapor Pressure		Open Literature

DATA REQUIREMENT				CITATION(S)
New Guideline Number	**Old Guideline Number**	**Study Title**	**Use Pattern**	**MRID Number**
830.7550 830.7560 830.7570	63-11	Partition Coefficient (Octanol/Water)		Open Literature
830.7000	63-12	pH		Open Literature
830.6313	63-13	Stability		Open Literature
830.6314	63-14	Oxidizing/Reducing Action		Open Literature
830.6315	63-15	Flammability		Open Literature
830.6316	63-16	Explodability		Open Literature
830.6317	63-17	Storage Stability		Open Literature
830.6319	63-19	Miscibility		Open Literature
ECOLOGICAL EFFECTS				
850.4400	122-2	Aquatic plant growth		42633704, 42633705, 42633706
850.4400	123-2	Aquatic vascular plant dose-response toxicity- *Lemna* sp.		42633704, 42633705, 42633706
850.220	71-2	Avian Dietary Toxicity		42633702
TOXICOLOGY				
870.1100	81-1	Acute Oral - Rat		00101715
870.1200	81-2	Acute Dermal - Rabbit		00101715
870.1300	81-3	Acute Inhalation - Rat		waiver
870.2400	81-4	Primary Eye Irritation - Rabbit		00101715
870.2500	81-5	Primary Dermal Irritation - Rabbit		00101715
870.2600	81-6	Dermal Sensitization		42594301
870.3250	82-3	Sub chronic Dermal Toxicity		43091702

DATA REQUIREMENT				CITATION(S)
New Guideline Number	**Old Guideline Number**	**Study Title**	**Use Pattern**	**MRID Number**
870.4100	83-1 (a)	Chronic Toxicity		43982701
870.4200	83-2(a)	Carcinogenicity in Mice		NTP, 1989
870.4300		Combined Chronic Toxicity / Carcinogencity in Rats		NTP, 1999
870.3700	83-3	Developmental Toxicity in Rabbits		43091701, 43091702
870.3700	83-3	Developmental Toxicity -Rat		43091702
870.3800		2-Genaration Reproduction Toxicity in Rats		44464101
870.5265		Salmonella thyphimurium reverse mutation assay		NTP study
870.5395		Erythrocyte micronucleus assay		43911301
870.6200		Neurotoxicity screening battery		Open literature
870.8700		Immunotoxicity		Open literature

Appendix C. Technical Support Documents

Additional documentation in support of this RED is maintained in the OPP docket, located in Room 119, Crystal Mall #2, 1801 Bell Street, Arlington, VA. It is open Monday through Friday, excluding legal holidays, from 8:30 am to 4 pm.

OPP public docket is located in Room S-4400, One Potomac Yard (South Building), 2777 South Crystal Drive, Arlington, VA, 22202 and is open Monday through Friday, excluding Federal holidays, from 8:30 a.m. to 4:00 p.m.

The docket initially contained the August 26, 2004 preliminary risk assessment and the related documents. EPA then considered comments on these risk assessments (which are posted to the e-docket) and revised the risk assessments. The revised risk assessments will be posted in the docket at the same time as the RED.

All documents, in hard copy form, may be viewed in the OPP docket room or downloaded or viewed via the Internet at www.regulations.gov

These documents include:

- Pentachlorophneol Preliminary Risk Assessment; Notice of Availability, 11/30/2004

Preliminary Risk Assessment and Supporting Science Documents:

- Pentachlorophenol: Preliminary Risk Assessment for the Reregistration Eligibility Decision, PC Code 063001, Case 2505, Antimicrobials Division, 11/19/2004
- Product Chemistry Science Chapter on Pentachlorophenol PC Code 063001, Case 2505, Antimicrobials Division, 11/19/2004.
- Pentachlorophenol Toxicology Disciplinary Chapter for the Reregistration Eligibility Decision Document, PC Code 063001, Case 2505, Antimicrobials Division, 11/19/2004, Timothy F. McMahon, Ph.D.
- Pentachlorophenol Dietary Exposure Assessments for the Reregistration Eligibility Decision. PC Code 063001, Case 2505, Antimicrobials Division 11/19/2004
- Pentachlorolphenol Occupational/Residential Exposure Assessment. PC Code 063001, Case 2505, Antimicrobials Division, 11/19/2004, Siroos Mostaghini, PhD. Senior Scientist
- Environmental Fate Assessment of Pentachlorlophenol for the Reregistration Eligibility Decision (RED). PC Code 063001, Case 2505, Antimicrobials Division, 11/19/2004
- Ecological Hazard and Environmental Risk Assessment:Pentachlorophenol PC Code 063001, Case2505, Antimicrobials Division, 11/19/2004, Richard C. Petrie Argonomist, Team Leader 3

Revised Risk Assessment and Supporting Science Documents (RED Supporting Documents):

- Pentachlorophenol: Revised Risk Assessment for the Reregistration Eligibility Decision, PC Code 063001, Case 2505, Antimicrobials Division 8/29/2008 Timothy F. McMahon, Ph.D. Senior Toxicologist/Risk Assessor
- Product Chemistry Science Chapter on Pentachlorophenol PC Code 063001, Case 2505, Antimicrobials Division, 11/19/2004.
- Pentachlorophenol Toxicology Disciplinary Chapter for the Reregistration Eligibility Decision Document, PC Code 063001, Case 2505, Antimicrobials Division, 3/16/2008, Timothy F. McMahon, Ph.D.
- Pentachlorophenol Dietary Exposure Assessments for the Reregistration Eligibility Decision. PC Code 063001, Case 2505, Antimicrobials Division 11/19/2004
- Pentachlorolphenol Occupational/Residential Exposure Assessment. PC Code 063001, Case 2505, Antimicrobials Division, 11/19/2004, Siroos Mostaghini, PhD. Senior Scientist
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- Ecological Hazard and Environmental Risk Assessment:Pentachlorophenol PC Code 063001, Case2505, Antimicrobials Division, 11/19/2004, Richard C. Petrie Argonomist, Team Leader 3.

Appendix D. Citations Supporting the Reregistration Eligibility Decision (Bibliography)

GUIDE TO APPENDIX D

1. CONTENTS OF BIBLIOGRAPHY. This bibliography contains citations of all studies considered relevant by EPA in arriving at the positions and conclusions stated elsewhere in the Pentachlorophenol Reregistration Eligibility Decision Document. Primary sources for studies in this bibliography have been the body of data submitted to EPA and its predecessor agencies in support of past regulatory decisions. Selections from other sources including the published literature, in those instances where they have been considered, are included.

2. UNITS OF ENTRY. The unit of entry in this bibliography is called a "study." In the case of published materials, this corresponds closely to an article. In the case of unpublished materials submitted to the Agency, the Agency has sought to identify documents at a level parallel to the published article from within the typically larger volumes in which they were submitted. The resulting "studies" generally have a distinct title (or at least a single subject), can stand alone for purposes of review and can be described with a conventional bibliographic citation. The Agency has also attempted to unite basic documents and commentaries upon them, treating them as a single study.

3. IDENTIFICATION OF ENTRIES. The entries in this bibliography are sorted numerically by Master Record Identifier, or "MRID" number. This number is unique to the citation, and should be used whenever a specific reference is required. It is not related to the six-digit "Accession Number" which has been used to identify volumes of submitted studies (see paragraph 4(d)(4) below for further explanation). In a few cases, entries added to the bibliography late in the review may be preceded by a nine character temporary identifier. These entries are listed after all MRID entries. This temporary identifying number is also to be used whenever specific reference is needed.

4. FORM OF ENTRY. In addition to the Master Record Identifier (MRID), each entry consists of a citation containing standard elements followed, in the case of material submitted to EPA, by a description of the earliest known submission. Bibliographic conventions used reflect the standard of the American National Standards Institute (ANSI), expanded to provide for certain special needs.

a. Author. Whenever the author could confidently be identified, the Agency has chosen to show a personal author. When no individual was identified, the Agency has shown an identifiable laboratory or testing facility as the author. When no author or laboratory could be identified, the Agency has shown the first submitter as the author.

b. Document date. The date of the study is taken directly from the document. When the date is followed by a question mark, the bibliographer has deduced the date from the evidence contained in the document. When the date appears as (1999), the Agency was unable to determine or estimate the date of the document.

c. Title. In some cases, it has been necessary for the Agency bibliographers to create or enhance a document title. Any such editorial insertions are contained between square brackets.

d. Trailing parentheses. For studies submitted to the Agency in the past, the trailing parentheses include (in addition to any self-explanatory text) the following elements describing the earliest known submission:

(1) Submission date. The date of the earliest known submission appears immediately following the word "received."

(2) Administrative number. The next element immediately following the word "under" is the registration number, experimental use permit number, petition number, or other administrative number associated with the earliest known submission.

(3) Submitter. The third element is the submitter. When authorship is defaulted to the submitter, this element is omitted.

(4) Volume Identification (Accession Numbers). The final element in the trailing parentheses identifies the EPA accession number of the volume in which the original submission of the study appears. The six-digit accession number follows the symbol "CDL," which stands for "Company Data Library." This accession number is in turn followed by an alphabetic suffix which shows the relative position of the study within the volume.

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3. Other Supporting Documents

Citation

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Appendix E. Generic Data Call-In

The Agency intends to issue a Generic Data Call-In at a later date. See Chapter V of the Pentachlorophenol RED for a list of studies that the Agency plans to require.

Appendix F. Product Specific Data Call-In

The Agency intends to issue a Product Specific Data Call-In at a later date for:

Pentachlorophneol (Case 2505) PC Code: 063001

Appendix G. Batching of Pentachlorophenol Products for Meeting Acute Toxicity Data Requirements for Reregistration

Appendix H. List of All Registrants Sent the Data Call-In

A list of registrants sent the data call-in will be posted at a later date.

"Cusher, Annette" <Cusher@adeq.state.ar.us> July 1, 2010 11:45 AM
To: 'Grish' <ccgrish@gmail.com>
Cc: "curt@grish.org" <curt@grish.org>, "Kilburn, Dianna" <KILBURN@adeq.state.ar.us>, "Egan, Marilyn" <EGAN@adeq.state.ar.us>, "Hynum, Tammie" <HYNUM@adeq.state.ar.us>, "Sanchez.Carlos@epamail.epa.gov" <Sanchez.Carlos@epamail.epa.gov>, "Ghose.Shawn@epamail.epa.gov" <Ghose.Shawn@epamail.epa.gov>, "Rich, Jay" <RICH@adeq.state.ar.us>
RE: Arkwood Superfund Site

Mr. Grisham,

I apologize for using an abbreviation without defining it. I normally do not overlook that. "PRP lead site" means the potential responsible party (PRP) is funding and implementation of the clean up efforts. A potential responsible party can include but not limited to the owner or operator of a contaminated site.

The "remedial goal" is the same for ADEQ as EPA. The document that sets the remedial goal is the Record of Decision.

Regards,
Annette Cusher

-----Original Message-----
From: Grish [mailto:ccgrish@gmail.com]
Sent: Thursday, July 01, 2010 11:13 AM
To: Cusher, Annette
Cc: curt@grish.org; Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay
Subject: Re: Arkwood Superfund Site

Dear Ms. Cusher.

Thank you very much for this timely & complete response.

Two questions, please:

- Could you explain to me the meaning of the phrase "PRP lead site" used in your reply?
- Is the "remedial goal" exactly the same for ADEQ as it is for the EPA?

Sincerely,

Curt Grisham

On Jul 1, 2010, at 6:53, "Cusher, Annette" <Cusher@adeq.state.ar.us> wrote:

> Mr. Grishom,
>
> Thank you for your comments and concerns regarding the Arkwood Superfund Site. The 2009 Annual Report and the ADEQ letter to EPA regarding the 2009 Annual Report are attached. ADEQ would be happy to forward you all future monthly reports. As noted in the report the discharge into the creek is at or below the remedial goal for the site, however the water from the spring is above the remedial goal requiring further treatment prior to discharge into the creek.

EPA has not delegated regulatory authority to any state for Superfund oversight. EPA and ADEQ do have an agreement detailing how Superfund sites are addressed in Arkansas. EPA will consider ADEQ's opinions with regards to Ready for Reuse determinations for EPA lead or PRP lead sites. Arkwood is a PRP lead site with EPA as the main regulatory authority. As such, all Ready for Reuse issues should be coordinated through EPA.

If you have any further questions, or I can be of any more assistance, please contact me at 501-682-0841 or cusher@adeq.state.ar.us.

Regards,
Annette Cusher, P.E.
Remedial/Corrective Action Engineer Supervisor
Technical Branch
Hazardous Waste Division
ADEQ

<Arkwood 2009 Annual Report.pdf>

<EPA-Arkwood 6-8-10.pdf>

"Cusher, Annette" <Cusher@adeq.state.ar.us> July 16, 2010 7:52 AM
To: 'grish' <ccgrish@gmail.com>
Cc: "Kilburn, Dianna" <KILBURN@adeq.state.ar.us>, "Egan, Marilyn" <EGAN@adeq.state.ar.us>, "Hynum, Tammie" <HYNUM@adeq.state.ar.us>, "Sanchez.Carlos@epamail.epa.gov" <Sanchez.Carlos@epamail.epa.gov>, "Ghose.Shawn@epamail.epa.gov" <Ghose.Shawn@epamail.epa.gov>, "Rich, Jay" <RICH@adeq.state.ar.us>
RE: Arkwood Superfund Site

Mr. Grisham,

My apologies for not getting back to you sooner, I mistakenly thought I had.

The drinking water standards are Federal levels upheld by Arkansas as well. Drinking water standards would be applied to the wells sampled. For PCP the Maximum Contaminant Level is 1.0 ug/l. Arkansas has jurisdiction relative to surface water and the springs. The remediation goals for New Cricket Spring are calculated according to the equations in APC&EC Regulation 2. Based upon Reg. 2, 2007, the levels are 9.3ug/l for the monthly average and 18.7ug/l for a daily maximum.

54 springs were identified within 1.5 miles of the site and 13 were sampled during the remedial investigation. Only two of the 13 had detectible concentrations of PCP, New Cricket Spring and the railroad tunnel. It was only detected in the railroad tunnel once. Levels at New Cricket Spring exceeded the Arkansas water quality standards and a treatment system was installed at the spring. This system continues to function treating the spring water prior to discharge back into the stream channel. These are the sample points noted in the analytical data supplied to you. Analytical data should be shown in micrograms per liter (ug/l).

35 drinking water wells were identified within a 1.5 mile radius of the site. 15 of these were sampled during the remedial investigation. The municipal water line was extended to residences downgradient of the site in the early 1990's. No site related contamination was found in any of the wells and sampling of drinking water wells was discontinued.

The physical location of the springs and wells are identified in the Remedial Investigation/ Feasibility Study Report completed in May 1990 by Mass Merchandisers, Inc.(MMI)/ McKesson Corp.

If you have any further questions, please don't hesitate to ask.

Regards,
Annette Cusher

-----Original Message-----
From: grish [mailto:ccgrish@gmail.com]
Sent: Friday, July 02, 2010 12:28 PM
To: Cusher, Annette
Cc: Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay
Subject: Re: Arkwood Superfund Site

Dear Ms. Cusher,

I am trying to understand the exact testing scenario wherein the "remedial goal" for New Cricket Spring will have been met by both EPA and ADEQ standards. In reading the Record of Decision (ROD) dated 09/28/1990 as it appears on the EPA website, the section headed "The Selected Remedy" part B. "Groundwater" states in part:

"THIS REMEDY WAS SELECTED BECAUSE NEW CRICKET SPRING IS NOT HIGHLY CONTAMINATED, ECOLOGICAL DAMAGE FROM THE SITE IS NOT APPARENT, AND NATURAL ATTENUATION MAY OCCUR QUICKLY FOLLOWING THE REMOVAL OF THE SOURCE OF CONTAMINATION AT THE SITE."

The abstract for that documents states in part:

"THE SELECTED GROUNDWATER REMEDY IS;
* MONITOR AREA SPRINGS DURING, AND TWO YEARS AFTER THE SOILS REMEDIATION TO DETERMINE THE DEGREE TO WHICH NATURAL ATTENUATION IS TAKING AFFECT,
* IF PENTACHLOROPHENOL LEVELS ARE ABOVE STATE OF ARKANSAS WATER QUALITY STANDARDS AFTER A POST-REMEDIAL MONITORING PERIOD OF TWO YEARS, ERECT A WATER TREATMENT SYSTEM AT NEW CRICKET SPRING TO TREAT TO STATE OF ARKANSAS WATER QUALITY STANDARDS,
* TREAT NEW CRICKET SPRING UNTIL LEVELS FALL BELOW STATE STANDARDS.
* MONITOR SELECTED DRINKING WATER WELLS FOR 30 YEARS.
* PROVIDE SELECTED WELL WATER USERS WITH CITY WATER LINES TO REMOVE ANY UNCERTAINTY IN THEIR WATER SUPPLY."

It does seem to me from reading this portion of the ROD that the "State of Arkansas water quality standards" for this remedy are the determining measure for attaining the "remedial goal."

Could you please clarify for me the actual technical measurement levels (expressed in the same units of measure used in the historical test data contained in the reports you provided me) that would meet "State of Arkansas water quality standards" so that I may understand how close we are to attaining the remedial goal?

Also, could you tell me what, if any, "selected drinking water wells" referred to above were actually selected for 30-year monitoring?

Thank you very much.

Sincerely,

Curt Grisham

On Thu, Jul 1, 2010 at 11:45 AM, Cusher, Annette <Cusher@adeq.state.ar.us> wrote:
Mr. Grisham,

I apologize for using an abbreviation without defining it. I normally do not overlook that. "PRP lead site" means the potential responsible party (PRP) is funding and implementation of the clean up efforts. A potential responsible party can include but not limited to the owner or operator of a contaminated site.

The "remedial goal" is the same for ADEQ as EPA. The document that sets the remedial goal is the Record of Decision.

Regards,
Annette Cusher

-----Original Message-----
From: Grish [mailto:ccgrish@gmail.com]
Sent: Thursday, July 01, 2010 11:13 AM
To: Cusher, Annette
Cc: curt@grish.org; Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay
Subject: Re: Arkwood Superfund Site

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Thank you very much for this timely & complete response.

Two questions, please:

- Could you explain to me the meaning of the phrase "PRP lead site" used in your reply?
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On Jul 1, 2010, at 6:53, "Cusher, Annette" <Cusher@adeq.state.ar.us> wrote:

> Mr. Grishom,
>
> Thank you for your comments and concerns regarding the Arkwood Superfund Site. The 2009 Annual Report and the ADEQ letter to EPA regarding the 2009 Annual Report are attached. ADEQ would be happy to forward you all future monthly reports. As noted in the report the discharge into the creek is at or below the remedial goal for the site, however the water from the spring is above the remedial goal requiring further treatment prior to discharge into the creek.
>
> EPA has not delegated regulatory authority to any state for Superfund oversight. EPA and ADEQ do have an agreement detailing how Superfund sites are addressed in Arkansas. EPA will consider ADEQ's opinions with regards to Ready for Reuse determinations for EPA lead or PRP lead sites. Arkwood is a PRP lead site with EPA as the main regulatory authority. As such, all Ready for Reuse issues should be coordinated through EPA.
>
> If you have any further questions, or I can be of any more assistance, please contact me at 501-682-0841 or cusher@adeq.state.ar.us.
>
> Regards,
> Annette Cusher, P.E.
> Remedial/Corrective Action Engineer Supervisor
> Technical Branch
> Hazardous Waste Division
> ADEQ

<Arkwood 2009 Annual Report.pdf>

<EPA-Arkwood 6-8-10.pdf>

Grish <ccgrish@gmail.com> July 2, 2010 10:28 AM

To: "Cusher, Annette" <Cusher@adeq.state.ar.us>
Cc: "Kilburn, Dianna" <KILBURN@adeq.state.ar.us>, "Egan, Marilyn" <EGAN@adeq.state.ar.us>, "Hynum, Tammie" <HYNUM@adeq.state.ar.us>, "Sanchez.Carlos@epamail.epa.gov" <Sanchez.Carlos@epamail.epa.gov>, "Ghose.Shawn@epamail.epa.gov" <Ghose.Shawn@epamail.epa.gov>, "Rich, Jay" <RICH@adeq.state.ar.us>
Bcc: Bill Doshier <bfdoshier@cox.net>
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Sent: Thursday, July 01, 2010 11:13 AM
To: Cusher, Annette
Cc: curt@grish.org; Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay
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Regards,

Annette Cusher, P.E.

Remedial/Corrective Action Engineer Supervisor

Technical Branch

Hazardous Waste Division

ADEQ

<Arkwood 2009 Annual Report.pdf>

<EPA-Arkwood 6-8-10.pdf>

Grish <ccgrish@gmail.com> July 24, 2010 3:48 AM

To: "Cusher, Annette" <Cusher@adeq.state.ar.us>
Cc: "Kilburn, Dianna" <KILBURN@adeq.state.ar.us>, "Egan, Marilyn" <EGAN@adeq.state.ar.us>, "Hynum, Tammie" <HYNUM@adeq.state.ar.us>, "Sanchez.Carlos@epamail.epa.gov" <Sanchez.Carlos@epamail.epa.gov>, "Ghose.Shawn@epamail.epa.gov" <Ghose.Shawn@epamail.epa.gov>, "Rich, Jay" <RICH@adeq.state.ar.us>, williams.donald@epamail.epa.gov, williams.donald@epa.gov
Bcc: Bill Doshier <bfdoshier@cox.net>
Re: Arkwood Superfund Site

Dear Ms. Cusher,

I am studying the document titled "ARKANSAS POLLUTION CONTROL AND ECOLOGY COMMISSION REGULATION NO. 2 - REGULATION ESTABLISHING WATER QUALITY STANDARDS FOR SURFACE WATERS OF THE STATE OF ARKANSAS - Adopted by the Arkansas Pollution Control and Ecology Commission on (October 26,2007)" as it appears on the ADEQ website, to which you directed me.

Searching the entire 125-page PDF document, I find only one reference to "Pentachlorophenol." That reference is under Reg. 2.508 "Toxic Substances," which states in part:

"Toxic substances shall not be present in receiving waters, after mixing, in such quantities as to be toxic to human, animal, plant or aquatic life or to interfere with the normal propagation, growth and survival of the indigenous aquatic biota. Acute toxicity standards may not be exceeded outside the zone of initial dilution. Within the ZID acute toxicity standards may be exceeded but acute toxicity may not occur. Chronic toxicity and chronic numeric toxicity standards shall not be exceeded at, or beyond, the edge of the mixing zone. Permitting of all toxic substances shall be in accordance with the toxic implementation strategy found in the Continuing Planning Process. For non permit issues and as a guideline for evaluating toxic substances not listed in the following tables, the Department may consider No Observed Effect Concentrations (NOECs) or other literature values as appropriate. For the substances listed below, the following standards shall apply:"

Thereafter a table follows titled:

"ALL WATERBODIES - AQUATIC LIFE CRITERIA"

The column headings are

"Substance"

"Acute Values (µg/l) (Never to Exceed)"

"Chronic Values (µg/l) (24-hr Average)"

The sole reference I can find to Pentachlorophenol in the entirety of APC&EC Regulation No. 2 appears in this table, wherein the following value is given for Pentachlorophenol in the "Acute Values" column:

e[1.005(pH)-4.869]

The following value is given for Pentachlorophenol in the "Chronic Values" column:

e[1.005(pH)-5.134]

On July 16, 2010, you wrote to me stating in part:

"The remediation goals for New Cricket Spring are calculated according to the equations in APC&EC Regulation 2. Based upon Reg. 2, 2007, the levels are 9.3ug/l for the monthly average and 18.7ug/l for a daily maximum."

Please help me to understand how you derive the values in your above statement and why the standards for Pentachlorophenol are expressed in this cryptic fashion, whereas the standards for all of the eleven (11) other substances listed in the table are expressed simply as a decimal number.

Finally, most notably to my mind, I find no reference whatever to (and therefore no standard for) Pentachlorophenol under the next table in this regulation, which table is titled "ALL WATERBODIES - HUMAN HEALTH CRITERIA".

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1) What proof is there that operation of the Pilot Water Injection System on the Arkwood site is actually effective at reducing concentrations of Pentachlorophenol in New Cricket Spring?

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Thank you again for your attention to my concerns.

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"Cusher, Annette" <Cusher@adeq.state.ar.us> July 28, 2010 9:12 AM
To: 'grish' <ccgrish@gmail.com>
Cc: "Kilburn, Dianna" <KILBURN@adeq.state.ar.us>, "Egan, Marilyn" <EGAN@adeq.state.ar.us>, "Hynum, Tammie" <HYNUM@adeq.state.ar.us>, "Sanchez.Carlos@epamail.epa.gov" <Sanchez.Carlos@epamail.epa.gov>, "Ghose.Shawn@epamail.epa.gov" <Ghose.Shawn@epamail.epa.gov>, "Rich, Jay" <RICH@adeq.state.ar.us>, "williams.donald@epa.gov" <williams.donald@epa.gov>
RE: Arkwood Superfund Site

Mr. Grisham,

Responses to your comments and question are below the comments/questions in blue. Once again thank you for your interest in the Arkwood Superfund Site and if you have any further questions, just let us know.

Regards,
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Cc: Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay; williams.donald@epamail.epa.gov; williams.donald@epa.gov
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ADEQ's Water Quality Standards for toxics in Regulation No. 2 are adopted from EPA's National Recommended Water Quality Criteria. The folloing website is a table of these Criteria. Please see line 53 for Pentachlorophenol. http://www.epa.gov/waterscience/criteria/wqctable/
The toxicity criteria for PCP are pH dependent, and are therefore represented by the equations. Using the monthly average and daily maximum values respectively, and given that Arkansas Water Quality Standards require pH to be between 6.0 -9.0, values are calculated.
For any substance whose level of concentration in surface water is pH or hardness dependent, an equation given in the regulations is used to calculate the value.
Finally, most notably to my mind, I find no reference whatever to (and therefore no standard for) Pentachlorophenol under the next table in this regulation, which table is titled "ALL WATERBODIES - HUMAN HEALTH CRITERIA".
At this time, ADEQ has not adopted the Human Health Criteria in EPA's National Recommended Water Quality Criteria for Pentachlorophenol.
Further questions I have are regarding the reports you forwarded me on July 1, 2010, especially concerning data contained in the PDF file titled "Arkwood 2009 Annual Report.pdf":
1) What proof is there that operation of the Pilot Water Injection System on the Arkwood site is actually effective at reducing concentrations of Pentachlorophenol in New Cricket Spring?
The sampling data over time (1998-present), since removal of the contaminated soil, have shown a decrease in the level of PCP at the spring. There were spikes in the data and in 2005 additional treatment was set up at the source/ sink hole to treat the remaining soil and groundwater prior to the groundwater discharge at New Cricket Spring.
2) Do the data gathered during the periods of time when the Pilot Water Injection System on the Arkwood site was not fully operational provide evidence that the system is not effective at reducing concentrations of Pentachlorophenol in New Cricket Spring?
Not necessarily. Natural flow levels and precipitation levels also influence the effectiveness. Overall effectiveness will be evaluated again at the next 5 year review, which should begin this fall.
3) Is there evidence that the concentrations of Pentachlorophenol at New Cricket Spring would actually be *lower* if operation of the Pilot Water Injection System on the Arkwood site were *halted*?
No, again spikes in the level of PCP can occur following periods of heavy precipitation due to the precipitation flushing the PCP out of the soil into the groundwater. Treatment at the source by the injection system appears most effective at keeping the levels of PCP low at the spring. This in turn can make the treatment at the spring more effective.

Thank you again for your attention to my concerns.
Sincerely,
Curt Grisham

United States
Environmental Protection
Agency

Office of Water
(4304T)

EPA-822-R-02-012
November 2002

National Recommended Water Quality Criteria: 2002

Human Health Criteria Calculation Matrix

Notices

This document contains information regarding the calculation of the human health criteria contained in the document entitled, *National Recommended Water Quality Criteria: 2002*. This document provides: cancer potency factors (q1*s); reference doses (RfDs); relative source contributions (RSCs); fish intake values; and equations used to derive the human health criteria in the aforementioned compilation.

This document is not a regulation and cannot substitute for the Clean Water Act or Environmental Protection Agency (EPA) regulations. Thus, the criteria in the calculation matrix cannot impose legally binding requirements on EPA, states, authorized tribes or the regulated community.

NRWQC: HUMAN HEALTH CRITERIA CALCULATION MATRIX (November 2002)

Priority Pollutants

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
1	Antimony 77440 36 0	RfD = 4E-4 BCF = 1 FI = 6.5	14/4300	IRIS 02/01/91	RfD = 4E-4 RSC= 40% [a] BCF = 1 FI = 17.5	2000	5.6/640	IRIS 02/01/91
2	Arsenic 7440 38 2	q1* = 1.75 [9] BCF = 44 (for oysters) FI = 6.5	0.018/.14	57FR60848	q1* used = 1.75 [9] BCF = 44 FI = 6.5	1980	0.018/0.14	57FR60848
3	Berylium 7440 41 7	q1* = 4.3 BCF = 19	------	IRIS 09/01/92	----	NA	-----	------
4	Cadmium 7440 43 9	RfD = 0.001(food) RfD= 0.0005(water)	------	IRIS 02/01/94	RfD = 1E-3 (food) RfD= 0.0005(water) RSC = 25%	NA	-------	------
5	Chromium (III) 16065 83 1	RfD withdrawn BCF = 16	------	IRIS 03/01/88	1.5E+0	NA	-------	-------
5a	Chromium (VI) 18540 29 9	RfD = 5E-3 BCF = 16	------	IRIS 12/01/96	3E-3	NA	------	-------
6	Copper 7440508	WQC based on DW Action level BCF = 36	1300/ --	AWQC ADDENDUM 1989 DRAFT final lead/copper rule 57 FR 26460	AWQC ADDENDUM 1989 DRAFT final lead/copper rule 57 FR 26460	Drinking water regulation	1,300/ --	WQC based on DW Action level

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
7	Lead 7439921	WQC based on old Drinking water MCL	-------	Lead/Copper Rule 57 FR 26460	------	NA	-------	-------
8	Mercury 7439976	RfD = 1E-4 BCF = 3760-9000 (PBCF = 7342.6) FI = 18.7	0.050/0.051	62 FR42160	Methylmercury CAS No. 22967926 RfD = 1E-4 ng/kg BW-day RSC = 2.7E-5 mg/kg BW-day (subtracted from RfD to account for marine fish consumption) FI = 17.5	2000	0.3 mg/kg	EPA 823-R-01-001
9	Nickel	RfD = 2E-2 BCF = 47 FI = 6.5	610/4600	IRIS 12/01/96 for Nickel, soluble salts used	RfD = 2E-2 BCF = 47 FI = 6.5	1980 (Undergoing Major reassessment, no revision)	610/4,600	IRIS12/01/96
10	Selenium 7782492	RfD = 5E-3 BCF =4.8 (1988 Addendum used) FI = 6.5	170/11,000[12]	IRIS 09/01/91	RfD = 5E-3 BCF =4.8 (1988 Addendum used) FI = 17.5	2000	170/4,200	IRIS 09/01/91
11	Silver 7440224	RfD = 5E-3 BCF = 0.5	------	IRIS 12/01/96	RfD = 5E-3 BCF = 0.5	NA	------	-------
12	Thallium[5] 7440280	RfD = 6.8E-5[6] (RFD LISTED IS FOR THALLIUM SULFATE) BCF = 116 FI = 6.5	1.7/6.3	IRIS 09/01/90	RfD = 6.8E-5 [6,10,b] (RFD LISTED IS FOR THALLIUM (I) SULFATE 7446-18-6) BCF = 116 RSC = 20% (not used) FI = 6.5	1980	1.7/6.3	IRIS 09/01/90
13	Zinc 7440666	RfD = 3E-1 BCF = 47 FI = 6.5	9100/69,000[12]	IRIS 10/01/92	RfD = 3E-1 BCF = 47 FI = 17.5	2000	7,400/26,000	IRIS 10/01/92

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14	Cyanide 57125	RfD = 2E-2 BCF = 1 FI = 6.5	700/220,000	IRIS 02/01/93	RfD = 2E-2[10] BCF = 1 RSC = 20% ‘ (not used) FI = 6.5	1980	700/220,000	IRIS 02/01/93
15	Asbestos 1332214	Based on drinking water MCL	7 million Fibers/L	DW MCL 56 FR 3526 1/30/91	Based on drinking water MCL		7 million Fibers/L	DW MCL 56 FR 3526 01/30/91
16	2,3,7,8-TCDD(Dioxin) 1746016	q1* = 1.56E+5 BCF = 5000 (q1* no longer listed on IRIS) FI = 6.5	1.3E-8/ 1.4E-8	1984 AWQC Document EPA 440/5-84-007	q1* = 1.56E+5 BCF = 5000 (q1* no longer listed on IRIS) FI = 17.5	2000	5.0E-9/5.1E-9	1984 AWQC Document EPA 440/5-84-007 + 2000 Methodology
17	Acrolein 107028	ADI = 15.6 ug/kg/day BCF = 215 FI = 6.5	320/780	1980 AWQC document EPA 440/5-80-016	ADI = 15.6 ug/kg/day (or 0.0156 mg/kg/day) BCF = 215 FI = 17.5	2000	190/290	1980 AWQC document EPA 440/5-80-016
18	Acrylonitrile 107131	q1* = 5.4E-1 BCF = 30 FI = 6.5	0.059/0.66	IRIS 01/01/91	q1* = 5.4E-1 BCF = 30 FI = 17.5	2000	0.051/0.25	IRIS 01/01/91
19	Benzene 71432	q1* = 2.9E-2 BCF = 5.2 FI = 6.5	1.2/71	IRIS 02/01/94	q1* = 1.5E-2 to 5.5E-2 BCF = 5.2 FI = 17.5	2000	0.61 - 2.2/14 - 51	IRIS 01/19/00
20	Bromoform 75252	q1* = 7.9E-3 BCF = 3.75 based on chloroform FI = 6.5	4.3/360	IRIS 01/01/91	q1* = 7.9E-3 BCF = 3.75 (based on chloroform) FI = 17.5	2000	4.3/140	IRIS 01/01/91
21	Carbon Tetrachloride 56235	q1* = 1.3E-1 BCF = 18.75 FI = 6.5	0.25/4.4	IRIS 06/01/91	q1* = 1.3E-1 BCF = 18.75 FI = 17.5	2000	0.23/1.6	IRIS 06/01/91

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
22	Chlorobenzene 108907	RfD = 2E-2 BCF = 10.3 FI = 6.5	680/21,000	IRIS 07/01/93	RfD = 2E-2[10] BCF = 10.3 RSC = 20 % [d] (not used) FI =6.5	1980	680/21,000	IRIS 07/01/93
23	Chlorodi-bromomethane 124481	q1* = 8.4E-2 BCF = 3.75 based on chloroform FI = 6.5	0.41/34	IRIS 01/01/92	q1* = 8.4E-2[11] RfD = 2E-2 (not used) BCF = 3.75 (based on chloroform) RSC = 80% [k] (not used) FI = 17.5	2000	0.40/13	IRIS 01/01/92
24	Chloroethane 75003	-------	--------	----------	------	NA-	------	------
25	2-Chloroethyl-vinyl Ether 110758	-------	---------	----------	---------	NA	-------	-------
26	Chloroform 67663	q1* = 6.1E-3 BCF = 3.75 FI = 6.5	5.7/470	IRIS 03/01/91	q1* = 6.1E-3 BCF = 3.75 FI = 6.5 (RfD = 1E-2; IRIS 10/19/01-not used)[4]	1980 (Undergoing Major reassessment, no revision)	5.7/470	IRIS 03/01/91
27	Dichloro-bromomethane 75274	q1* = 6.2E-2 BCF = 3.75 FI = 6.5	0.56/46	IRIS 03/01/93	q1* = 6.2E-2 BCF = 3.75 FI = 17.5	2000	0.55/17	IRIS 03/01/93
28	1,1-Dichloro-ethane 75343	q1* = 9.1	------	-----	--------	NA	------	-----
29	1,2-Dichloro-ethane 107062	q1* = 9.1E-2 BCF = 1.2 FI = 6.5	0.38/99	IRIS 01/01/91	q1* = 9.1E-2 BCF = 1.2 FI = 17.5	2000	0.38/37	IRIS 01/01/91

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
30	1,1-Dichloro-ethylene 75354	q1* = 6E-1 RfD = 9E-3 BCF = 5.6 FI = 6.5	0.057/3.2	IRIS 02/01/98	q1* = 6E-1[10] FI = 6.5 BCF = 5.6 (RfD = 5E-2 IRIS 08/13/02-not used) RSC = 20 % [e] (not used)	2000	0.057/3.2	IRIS 02/01/98
31	1,2-Dichlor-propane 78875	q1* = 6.7E-2 BCF = 4.1 (q1* not on IRIS, but verified at 6.7E-2) FI = 6.5	0.52/39	Draft IRIS Coversheet; DW reg. 56 FR 3526 1/30/91	q1* = 6.7E-2 BCF = 4.1 (q1* not on IRIS, but verified at 6.7E-2) FI = 17.5	2000	0.50/15	Draft IRIS Coversheet; DW reg. 56 FR 3526 1/30/91
32	1,3-Dichloro-propylene 542756	RfD = 3E-4 (low) BCF = 1.9 FI = 6.5	10 /1700	IRIS 10/01/90	RfD = 3E-4 [10] BCF = 1.9 FI = 6.5 (q1* = 0.1/ RfD = 3E-2 IRIS 05/25/00-not used)	1980	10/1,700	IRIS 10/01/90
33	Ethyl-benzene 100414	RfD = 1E-1 (low) BCF = 37.5 FI = 6.5	3100/29,000	IRIS 06/01/91	RfD = 1E-1 [10] BCF = 37.5 RSC = 20% [f] (not used) FI =6.5	1980	3,100/29,000	IRIS 06/01/91
34	Methyl-Bromide 74839	RfD = 1.4E-3 BCF = 3.75 Chloroform BCF used FI = 6.5	48/4000	IRIS 07/01/91	RfD = 1.4E-3 BCF = 3.75 (Chloroform BCF used) FI = 17.5	2000	47/1,500	IRIS 07/01/91
35	Methyl-Chloride 74873	q1* = 6.1E-3 (chloroform q1* and BCF used) BCF = 3.75 FI = 6.5	-----	IRIS 03/01/91	-------	--------	--------	------

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
36	Methylene-Chloride 75092	q1* = 7.5E-3 BCF = 0.9 FI = 6.5	4.7/1600	IRIS 02/01/95	q1* = 7.5E-3 BCF = 0.9 FI = 17.5	2000	4.6/590	IRIS 02/01/95
37	1,1,2,2-Tetrachloro-ethane 79345	q1* = 2E-1 BCF = 5 FI = 6.5	0.17/11	IRIS 02/01/94	q1* = 2E-1 BCF = 5 FI = 17.5	2000	0.17/4.0	IRIS 02/01/94
38	Tetrachloro-ethylene 127184	q1* = 3.98E-2 BCF = 30.6 FI = 6.5	0.8/8.85	1980 AWQC DOCUMENT EPA 440/5-80-073	q1* = 3.98E-2 BCF = 30.6 FI = 17.5	2000	0.69/3.3	1980 AWQC DOCUMENT EPA 440/5-80-073 & 2000 FI
39	Toluene 108883	RfD = 2E-1 BCF = 10.7 FI = 6.5	6800/200,000	IRIS 04/01/94	RfD = 2E-1[10] BCF = 10.7 RSC = 20% [g] (not used) FI = 6.5	1980	6,800/200,000	IRIS 04/01/94
40	1,2-Trans-Dichloro-ethylene 156605	RfD = 2E-2 BCF = 1.58 FI = 6.5	700/140,000	IRIS 01/01/89	RfD = 2E-2[10] BCF = 1.58 RSC = 20% [h] (not used) FI = 6.5	1980	700/140,000	IRIS 01/01/89
41	1,1,1-Tri-chloroethane 71556	RfD = 9E-2 BCF = 5.6 RfD withdrawn 08/01/91	--------	IRIS 09/01/90	------	NA	-------	------
42	1,1,2-Trichloro-ethane 79005	q1* = 0.057 RfD = 0.004 BCF = 4.5 FI = 6.5	0.60/42	IRIS 07/01/94	q1* = 0.057[11] RfD = 4E-3 BCF = 4.5 RSC = 20% [i] FI = 17.5	2000 (based on q1* even though RSC and RfD are are available)	0.59/16	IRIS 02/01/1994
43	Trichloro-ethylene 79016	q1* = 1.26E-2 BCF = 10.6 RfD under rev q1* withdrawn FI = 6.5	2.7/81	1980 AWQC DOCUMENT EPA 440/5-80-077	q1* = 1.26E-2 BCF = 10.6 FI = 17.5	1980 AWQC DOCUMENT EPA 440/5-80-077 & 2000 FI	2.5/30	1980 AWQC DOCUMENT EPA 440/5-80-077 & 2000 FI

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
44	Vinyl Chloride 75014	q1* = 1.74E-2 BCF = 1.17 FI = 6.5	2.0/525	1980 AWQC DOCUMENT EPA 440/5-80-078	q1* = 1.74E-2[10] (q1* = 1.4 LMS exposure from birth/RfD = 3E-3 IRIS 08/07/00- not used) BCF = 1.17 FI = 6.5	1980	2.0/530	1980 AWQC DOCUMENT EPA 440/5-80-078
45	2-Chlorophenol 95578	RfD = 5E-3 BCF = 134 FI = 6.5	120/400	IRIS 07/01/93	RfD = 5E-3 BCF = 134 FI = 17.5	2000	81/150	IRIS 07/01/93
46	2,4-Dichloro-phenol 120832	RfD = 3E-3 BCF = 40.7 FI = 6.5	93/790	IRIS 06/30/88	RfD = 3E-3 BCF = 40.7 FI = 17.5	2000	77/290	IRIS 06/30/88
47	2,4-Dimethyl-phenol 105679	RfD = 2E-2 BCF = 93.8 FI = 6.5	540/2300	IRIS 11/01/90	RfD = 2E-2 BCF = 93.8 FI = 17.5	2000	380/850	IRIS 11/01/90
48	2-Methyl-4,6-Dinitro-phenol (cresol) 534521	(0.039 mg/kg/day)/100 BCF = 5.5 FI = 6.5	13.4/765	1980 AWQC DOCUMENT EPA 440/5-80-063	(0.039 mg/kg/day)/100 BCF = 5.5 FI = 17.5	2000	13/280	1980 AWQC DOCUMENT EPA 440/5-80-063
49	2,4-Dinitro-phenol 51285	RfD = 2E-3 BCF = 1.5 FI = 6.5	70/14,000	IRIS 07/01/91	RfD = 2E-3 BCF = 1.5 FI = 17.5	2000	69/5,300	IRIS 07/01/91
50	2-Nitrophenol 88755	BCF = 2.33	----------	----------	---------	NA	------	-----
51	4-Nitrophenol 100027	BCF = 3.31	----------	----------	------	NA	-------	------
52	3-Methyl-4-Chlorophenol 59507	RfD = 3E-2 (medium) q1* = 1.2E-1	----------	IRIS MAY 1995	RfD = 3E-2 (medium) q1* = 1.2E-1	NA	-------	------

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
53	Pentachloro-phenol 87865	q1* = 0.12 BCF = 11 FI = 6.5	0.28/8.2	IRIS 07/01/93	q1* = 0.12 RfD = 3E-2 (not used) BCF = 11 FI = 17.5	2000	0.27/3.0	IRIS 07/01/93
54	Phenol 108952	RfD = 6E-1 BCF = 1.4 FI = 6.5	21,000/ 4,600,000	IRIS 02/01/90	RfD = 6E-1 BCF = 1.4 FI = 17.5	2000	21,000/1,700,000	IRIS 02/01/90
55	2,4,6-Trichlor-phenol 88062	q1* = 0.011 BCF = 150 FI = 6.5	2.1/6.5	IRIS 02/01/94	q1* = 0.011 BCF = 150 FI = 17.5	2000	1.4/2.4	IRIS 02/01/94
56	Acenaphthene 83329	RfD = 6E-2 BCF = 242 FI = 6.5	1200/2700	IRIS 04/01/94	RfD = 6E-2 BCF = 242 FI = 17.52	2000	670/990	IRIS 04/01/94
57	Acenaphthylene 208968	benzo (a) pyrene (BaP) q1* and BCF used	----------	1980 AWQC document EPA/5-80-069	--------	NA	-------	------
58	Anthracene 120127	RfD = 3E-1 BCF = 30 (BaP BCF used) FI = 6.5	9600/110,000	IRIS 07/01/93	RfD = 3E-1 BCF = 30 (BaP BCF used) FI = 17.5	2000	8,300/40,000	IRIS 07/01/93
59	Benzidine 92875	q1* = 230 BCF = 87.5 FI = 6.5	0.00012/ 0.00054	IRIS 02/01/95	q1* = 230 RfD = 3E-3 (not used) BCF = 87.5 FI = 17.5	2000	0.000086/0.00020	IRIS 02/01/95
60	Benzo(a)-Anthracene 56553	q1* = 7.3E+0 (BaP q1* used) BCF =30 FI = 6.5	0.0044/0.049	IRIS 11/01/94 for CAS # 205992 was used	q1* = 7.3E+0 (BaP q1* used) BCF =30 FI = 17.5	2000	0.0038/0.018	IRIS 11/01/94 for CAS # 205992 was used
61	Benzo(a)-Pyrene 50328	q1* = 7.3E+0 BCF = 30 FI = 6.5	0.0044/0.049	IRIS 11/01/94	q1* = 7.3E+0 BCF = 30 FI = 17.5	2000	0.0038/0.018	IRIS 11/01/94

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
62	Benzo(b)-Fluoranthene 205992	q1* = 7.3E+0 (BaP q1* used) BCF =30 FI = 6.5	0.0044/0.049	IRIS 11/01/94 for CAS # 205992 was used	q1* = 7.3E+0 (BaP q1* used) BCF =30 FI = 17.5	2000	0.0038/0.018	IRIS 11/01/94 for CAS # 205992 was used
63	Benzo(ghi)-Perylene 191242	BCF = 30 (BaP =7.3E+0, BCF)	----------	----------	------	NA	-------	-------
64	Benzo(k)-Fluoranthene 207089	q1* = 7.3E+0 (BaP q1* used) BCF =30 FI = 6.5	0.0044/0.049	IRIS 11/01/94 for CAS # 205992 was used	q1* = 7.3E+0 (BaP q1* used) BCF =30 FI = 17.5	2000	0.0038/0.018	IRIS 11/01/94 for CAS # 205992 was used
65	Bis(2-Chloro-ethoxy)-Methane 111911	BCF = 0.64	----------	IRIS 3/1/91	------	NA	------	IRIS 3/1/91
66	Bis(2-Chloro-ethyl) Ether 111444	q1* = 1.1 BCF = 6.9 FI = 6.5	0.031/1.4	IRIS 02/01/94	q1* = 1.1 BCF = 6.9 FI = 17.5	2000	0.030/0.53	IRIS 02/01/94
67	Bis(2-Chloro-isopropyl)-Ether 108-60-1 (changed from 3963829)	RfD = 4E-2 BCF = 2.47 FI = 6.5	1400/170,000	IRIS 08/01/90	RfD = 4E-2 BCF = 2.47 FI = 17.5	2000	1,400/65,000	IRIS 08/01/90
68	Bis(2-Ethylhexyl)-Phthalate 117817	q1* = 0.014 BCF = 130 FI = 6.5	1.8/5.9	IRIS 02/01/93	q1* = 0.014 BCF = 130 FI = 17.5	2000	1.2/2.2	IRIS 02/01/93
69	4-Bromo-phenyl Phenyl-Ether 101553	BCF = 1640	--------		------	NA	------	-------
70	Butylbenzyl phthalate 85687	RfD = 2E-1 BCF = 414 FI = 6.5	3000/5200	IRIS 02/01/93	RfD = 2E-1 BCF = 414 FI = 17.5		1,500/1,900	IRIS 02/01/93

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
71	2-Chloro-naphthalene 91587	RFD = 8E-2 BCF = 202 FI = 6.5	1700/4300	IRIS 11/01/90	RFD = 8E-2 BCF = 202 FI = 17.5	2000	1,000/1,600	IRIS 11/01/90
72	4-Chloro-Phenyl Phenyl Ether 7005723	BCF = 1200	---------	----------	-------	NA	------	------
73	Chrysene 218019	q1* = 7.3E+0 (BaP q1* used) BCF =30 FI = 6.5	0.0044/0.049	IRIS 11/01/94 for CAS # 205992 was used	q1* = 7.3E+0 (BaP q1* used) BCF =30 FI = 17.5	2000	0.0038/0.018	IRIS 11/01/94 for CAS # 205992 was used
74	Dibenzo(a,h) Anthracene 53703	q1* = 7.3E+0 (BaP q1* used) BCF =30 FI = 6.5	0.0044/0.049	IRIS 11/01/94 for CAS # 205992 was used	q1* = 7.3E+0 (BaP q1* used) BCF =30 FI = 17.5	2000	0.0038/0.018	IRIS 11/01/94 for CAS # 205992 was used
75	1,2-Dichloro-benzene 95501	RfD = 9E-2 BCF = 55.6 FI = 6.5	2700/17,000	IRIS 03/01/91	RfD = 9E-2[10] BCF = 55.6 RSC = 20% [j] (not used) FI = 6.5	1980	2,700/17,000	IRIS 03/01/91
76	1,3-Dichloro-benzene 541731	ADI = 1.34E-2 (ADI for 1,2-DCB used) BCF = 55.6 FI = 6.5	400/2600	1980 AWQC DOC EPA 440/5-80-039	ADI = 1.34E-2 (ADI for 1,2-DCB used) BCF = 55.6 FI = 17.5	2000	320/960	1980 AWQC DOC EPA 440/5-80-039
77	1,4-Dichloro-benzene 106467	ADI = 1.34E-2 (ADI for 1,2-DCB used) BCF = 55.6 FI = 6.5	400/2600	1980 AWQC DOCUMENT EPA 440/5-80-039	ADI = 1.34E-2[10] (ADI for 1,2-DCB used) BCF = 55.6 RSC = 20% [j] (not used) FI = 6.5	1980	400/2,600	1980 AWQC DOCUMENT EPA 440/5-80-039
78	3,3'-Dichloro-benzidine 91941	q1* = 0.45 BCF = 312 FI = 6.5	0.04/0.077	IRIS 07/01/93	q1* = 0.45 BCF = 312 FI = 17.5	2000	0.021/0.028	IRIS 07/01/93

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
79	Diethyl Phthalate 84662	RfD = 8E-1 BCF = 73 FI = 6.5	23,000/ 120,000	IRIS 02/01/93	RfD =8E-1 BCF = 73 FI = 17.5	2000	17,000/44,000	IRIS 02/01/93
80	Dimethyl Phthalate 131113	ADI = 10 BCF = 36 FI = 6.5	313,000/ 2,900,000	1980 AWQC document EPA 440/5-80-067	ADI = 10 BCF = 36 FI = 17.5	2000	270,000/1,100,000	1980 AWQC document EPA 440/5-80-067 & 2000 FI
81	Di-n-Butyl Phthalate 84742	RfD = 1E-1 BCF = 89 FI = 6.5	2700/12,000	IRIS 08/01/90	RfD = 1E-1 BCF = 89 FI = 17.5	2000	2,000/4,500	IRIS 08/01/90
82	2,4-Dinitro-toluene 121142	q1* = 3.11E-1 BCF = 3.8 FI = 6.5	0.11/9.1	1980 AWQC document EPA 440/5-80-045	q1* = 3.11E-1[11] RfD = 2E-3 (not used) BCF = 3.8 FI = 17.5	2000	0.11/3.4	1980 AWQC document EPA 440/5-80-045 & 2000 FI
83	2,6-Dinitro-toluene 606202	----------	--------	----------	-------	NA	------	-----
84	Di-n-Octyl Phthalate 117840	----------	--------	----------	--------	NA	-------	------
85	1,2-Diphenyl-hydrazine 122667	q1* = 0.8 BCF = 24.9 FI = 6.5	0.040/0.54	IRIS 01/01/91	q1* = 0.8 BCF = 24.9 FI = 17.5	2000	0.036/0.20	IRIS 01/01/91
86	Fluoranthene 206440	RfD = 4E-2 BCF = 1150 FI = 6.5	300/370	IRIS 07/01/93	RfD = 4E-2 BCF = 1150 FI = 17.5	2000	130/140	IRIS 07/01/93
87	Fluorene 86737	RfD = 4E-2 BCF = 30 BaP BCF used FI = 6.5	1300/14,000	IRIS 11/01/90	RfD = 4E-2 BCF = 30 (BaP BCF used) FI = 17.5	2000	1,100/5,300	IRIS 11/01/90

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
88	Hexachloro-benzene 118741	q1* = 1.6 BCF = 8690 FI = 6.5	0.00075/ 0.00077	IRIS 11/01/96	q1* = 1.6[11] RfD = 8E-4 (not used) BCF = 8690 FI = 17.5	2000	0.00028/0.00029	IRIS 11/01/96
89	Hexachloro-butadiene 87683	q1* = 0.078 BCF = 2.78 FI = 6.5	0.44/50	IRIS 04/01/91	q1* = 0.078 BCF = 2.78 FI = 17.5	2000	0.44/18	IRIS 04/01/91
90	Hexachloro-cyclo-pentadiene 77474	RfD = 7E-3 BCF = 4.34 FI = 6.5	240/17,000	IRIS 09/01/90	RfD = 7E-3[10] BCF = 4.34 RSC = 20% [a] (not used) FI = 6.5 (RfD = 6E-3 IRIS 07/05/01-not used)	1980	240/17,000	IRIS 09/01/90
91	Hexachloro-ethane 67721	q1* = 0.014 BCF = 86.9 FI = 6.5	1.9/8.9	IRIS 02/01/94	q1* = 0.014 RfD = 1E-3 (not used) BCF = 86.9 FI = 17.5	2000	1.4/3.3	IRIS 02/01/94
92	Indeno(1,2,3-cd) Pyrene 193395	q1* = 7.3E+0 (BaP q1* used) BCF = 30 FI = 6.5	0.0044/0.049	IRIS 11/01/94 for CAS # 205992 was used	q1* = 7.3E+0 (BaP q1* used) BCF = 30 FI = 17.5	2000	0.0038/0.018	IRIS 11/01/94 for CAS # 205992 was used
93	Isophorone 78591	q1* = 9.5E-4 BCF = 4.38 FI = 6.5	36/2600	IRIS 11/01/92	q1* = 9.5E-4[11] RfD = 2E-1 (not used) BCF = 4.38 FI = 17.5	2000	35/960	IRIS 11/01/92
94	Naphthalene 91203	BCF = 10.5	----------	----------	-------	NA	--------	-------
95	Nitrobenzene 98953	RfD = 5E-4 BCF = 2.89 FI = 6.5	17/1900	IRIS 01/01/91	RfD = 5E-4 BCF = 2.89 FI = 17.5	2000	17/690	IRIS 01/01/91

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
96	N-Nitrosodi-methylamine 62759	q1* = 51 BCF = 0.026 FI = 6.5	0.00069/8.1	IRIS 07/01/93	q1* = 51 BCF = 0.026 FI = 17.5	2000	0.00069/3.0	IRIS 07/01/93
97	N-Nitrosodi-n-Propylamine 621647	q1* = 7.0 BCF = 1.13 FI = 6.5	0.005/1.4	IRIS 07/01/93	q1* = 7.0 BCF = 1.13 FI = 17.5	2000	0.0050/0.51	IRIS 07/01/93
98	N-Nitrosodi-phenylamine 86306	q1* = 0.0049 BCF = 136 FI = 6.5	5.0/16	IRIS 07/01/93	q1* = 0.0049 BCF = 136 FI = 17.5	2000	3.3/6.0	IRIS 07/01/93
99	Phenanthrene 85018	No RfD listed No q1* listed	---------	---------	---------	NA	--------	--------
100	Pyrene 129000	RfD = 3E-2 BCF = 30 (BaP BCF used) FI = 6.5	960/11,000	IRIS 07/01/93	RfD = 3E-2 BCF = 30 (BaP BCF used) FI = 17.5	2000	830/4,000	IRIS 07/01/93
101	1,2,4-Trichloro-benzene 120821	RfD = 1E-2 BCF = 114 FI = 6.5	260/940[12]	IRIS 11/01/96	RfD = 1E-2[10] BCF = 114 RSC = 20% [a] (not used) FI = 6.5	1980	260/940	IRIS 11/01/96
102	Aldrin 309002	q1* = 17 BCF = 4670 FI = 6.5	0.00013/ 0.00014	IRIS 07/01/93	q1* = 17[11] RfD = 3E-5 (not used) BCF = 4670 FI = 17.5	2000	0.000049/0.000050	IRIS 07/01/93
103	alpha-BHC 319846	q1* = 6.3 BCF = 130 FI = 6.5	0.0039/0.013	IRIS 07/01/93	q1* = 6.3 BCF = 130 FI = 17.5	2000	0.0026/0.0049	IRIS 07/01/93
104	beta-BHC 319857	q1* = 1.8 BCf = 130 FI = 6.5	0.014/0.046	IRIS 01/01/91	q1* = 1.8 BCf = 130 FI = 17.5	2000	0.0091/0.017	IRIS 07/01/1993

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
105	gamma-BHC 58899 lindane	q1* = 1.3 (Not listed on IRIS) BCF = 130 FI = 6.5	0.019/0.063	1980 AWQC DOCUMENT EPA 440/5-80-054	q1* = 1.3 (Not listed on IRIS)[10] BCF = 130 FI = 6.5 (RfD = 3E-4 IRIS 03/01/88-not used) RSC = 20% [1] (not used)	1980	0.019/0.063	1980 AWQC DOCUMENT EPA 440/5-80-054
106	delta-BHC 319868	BCF = 130	----------	----------	--------	NA	--------	------
107	Chlordane 57749	q1* = 3.5E-1 BCF = 14100 FI = 6.5	0.0021/0.0022	IRIS 02/07/98	q1* = 3.5E-1[11] RfD = 5E-4 (not used) BCF = 14100 FI = 17.5	2000	0.00080/0.00081	IRIS 02/07/98
108	4,4'-DDT 50293	q1* = 0.34 BCF = 53600 (one BCF applies for DDT, DDE and DDE) FI = 6.5	0.00059/ 0.00059	IRIS 05/01/91	q1* = 0.34[11] RfD = 5E-4 (not used) BCF = 53600 (one BCF applies for DDT, DDE and DDE) FI = 17.5	2000	0.00022/0.00022	IRIS 05/01/91
109	4,4'-DDE 72559	q1* = 0.34 BCF = 53600 FI = 6.5	0.00059/ 0.00059	IRIS 08/22/88	q1* = 0.34 BCF = 53600 (one BCF applies for DDT, DDE and DDE) FI = 17.5	2000	0.00022/0.00022	IRIS 08/22/88
110	4,4'-DDD 72548	q1* = 0.24 BCF = 53600 FI = 6.5	0.00083/ 0.00084	IRIS 08/22/88	q1* = 0.24 BCF = 53600 FI = 17.5	2000	0.00031/0.00031	IRIS 08/22/88
111	Dieldrin 60571	q1* = 16 BCF = 4670 FI = 6.5	0.00014/ 0.00014	IRIS 01/01/91	q1* = 16[11] RfD = 5E-5 (not used) BCF = 4670 FI = 17.5	2000	0.000052/0.000054	IRIS 07/01/1993

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
112	alpha-Endosulfan 959988	BCF = 270 RfD = 6E-3 RfD for endosulfan used FI = 6.5	110/240	IRIS 10/1/94 ENDOSULFAN #115297 WAS USED	RfD = 6E-3 (RfD for endosulfan used) BCF = 270 FI = 17.5	2000	62/89	IRIS 10/1/94 ENDOSULFAN #115297 WAS USED
113	beta-Endosulfan 33213659	RfD = 6E-3 (RfD for endosulfan used) BCF = 270 FI = 6.5	110/240	IRIS 10/01/94 ENDOSULFAN #115297 WAS USED	RfD = 6E-3 (RfD for endosulfan used) BCF = 270 FI = 17.5	2000	62/89	IRIS 10/01/94 ENDOSULFAN #115297 WAS USED
114	Endosulfan Sulfate 1031078	RfD = 6E-3 (RfD for endosulfan used) BCF = 270 FI = 6.5	110/240	IRIS 10/1/94 ENDOSULFAN #115297 WAS USED	RfD = 6E-3 (RfD for endosulfan used) BCF = 270 FI = 17.5	2000	62/89	IRIS 10/01/94 ENDOSULFAN #115297 WAS USED
115	Endrin 72208	RfD = 3E-4 BCF = 3970 FI = 6.5	0.76/0.81	IRIS 09/07/88	RfD = 3E-4 [10] BCF = 3970 RSC = 20% [b] (not used) FI = 6.5	1980	0.76/0.81	IRIS 04/01/1991
116	Endrin Aldehyde 7421934	RfD = 3E-4 (RfD for Endrin used) BCF = 3970 FI = 6.5	0.76/0.81	IRIS 04/01/91 for CAS # 72208 was used	RfD = 3E-4 (RfD for Endrin used) BCF = 3970 FI = 17.5	2000	0.29/0.30	IRIS 04/01/91 for CAS # 72208 was used
117	Heptachlor 76448	q1* = 4.5 BCF = 11200 FI = 6.5	0.00021/ 0.00021	IRIS 07/01/93	q1* = 4.5[11] RfD = 5E-4 (not used) BCF = 11200 FI = 17.5	2000	0.000079/0.000079	IRIS 07/01/93
118	Heptachlor Epoxide 1024573	q1* = 9.1 BCF = 11200 (heptachor BCF used) FI = 6.5	0.00010/ 0.00011	IRIS 07/01/93	q1* = 9.1[11] RfD = 1.3E-5 (not used) BCF = 11200 (heptachor BCF used) FI = 17.5	2000	0.000039/0.000039	IRIS 07/01/93

	Chemical (CAS number)	Basis for 1998 nrwqc: q1* or RfD/ADI and BCF	1998 nrwqc (ug/l) w +o/ o only	Reference Cite[3]	Basis for 2002 nrwqc: q1*/ RfD/ADI, RSC and BCF[1,7,8]	Methodology: 2000 or 1980[2]	2002 nrwqc (ug/l) For Consumption of : Water + organism/ Organism Only	Reference Cite[3]
119	PCBs	q1* =2 (total PCBs/congener/ isomer) BCF = 31200 FI = 6.5	0.00017/ 0.00017	IRIS 06/01/97 for CASRN 1336-36-3	q1* = 2 (total PCBs/ congener/isomer) BCF = 31200 FI = 17.5	2000	0.000064/0.000064	IRIS 06/01/97 for CASRN 1336-36-3
120	Toxaphane 8001352	q1* = 1.1 BCF = 13100 FI = 6.5	0.00073/ 0.00075	IRIS 01/01/91	q1* = 1.1 BCF = 13100 FI = 17.5	2000	0.00028/0.00028	IRIS 01/01/91

FOOTNOTES :

1. IRIS values as of May 17, 2002 are presented. IRIS information is presented in some cases even though it may not be used to calculate criteria. All units are as follows: q1* = per mg/kg-day; RfD = mg/kg-d; BCF = L/kg; and FI = 17.5 g/day (unless otherwise noted).

2. Calculations are based on the following methodologies: *Guidelines and Methodologies Used in the Preparation of Health Effects Assessment Chapters of the Consent Decree Water Criteria Documents* (45FR79347) and *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health* (2000), EPA-822-B-00-004, October 2000).

3. Reference cite refers to an IRIS coversheet, AWQC criterion document or other document which serves as the basis for the criterion.

4. Although a new RfD is available in IRIS, the surface water criteria will not be revised until the National Primary Drinking Water Regulations: Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR) is completed, since public comment on the relative source contribution (RSC) for chloroform is anticipated.

5. In IRIS, EPA has listed thallium sulfate, not thallium alone. The thallium RfD included in the matrix is based on: NOAL = 0.25 mg TL_2SO_4/kg-d; UF = 3000; fraction TL in TL_2SO_4 = 0.81.

6. Original 1980 ADIs were expressed as mg/day. These have been converted to mg/kg-day to make them comparable to present day RfDs. All q1*s are in kg-day/mg or per mg/kg-day.

7. The fish tissue bioconcentration factor (BCF) from the 1980 criteria documents was retained unless otherwise noted. No BAFs were derived for this effort.

8. Criteria based on carcinogenicity (q1*), reflect 10^{-6} risk.

9. The q1* of 1.75 mg/kg-d was derived from the risk per unit concentration in drinking water from IRIS: $5x10^{-5}$ risk per ug/L in drinking water.

10. This criterion was not revised as part of this effort. EPA has published revisions for this criterion in the **Federal Register** and is soliciting scientific views on the revised value.

11. Although a q1* and RfD are available in IRIS, the q1*was used to derive the criterion because it resulted in the more stringent criterion.

12. These criteria were not published or promulgated in the NTR or CTR. These criteria were calculated based on the RfD presented in IRIS.

References for Relative Source Contribution (RSC)

a. FR 57 (138), July 17, 1992
b. FR 55 (143), July 25, 1990
c. Cyanide Health Advisory, March 31, 1987.
d. FR 56 (20), January 30, 1991
e. 1,1-dichloroethylene Health Advisory, March 31, 1987
f. Ethylbenzene Health Advisory, March 31, 1987
g. Toluene (Draft) Health Advisory, October 1993
h. FR 54 (97), May 22, 1989
i. 1,1,2-trichloroethane Health Advisory, September 1, 1989
j. Ortho-, meta- and para-dichlorobenzenes Health Advisory, March 31, 1987
k. FR 59 (145) July 29, 1994
l. Lindane Health Advisory, March 31, 1987.

1980 Methodology Calculations

Using cancer potency, q1*:

For consumption of water and organisms:

$$\text{AWQC } [\mu g/L] = \frac{10^{-6} \bullet 70 \text{ kg} \bullet 1000\ \mu g/mg}{q1^* [\text{kg-d/mg}]\ (2 \text{ L/d} + (0.0065 \text{ kg/d} \bullet \text{BCF } [\text{L/kg}]))}$$

For consumption of organisms only:

$$\text{AWQC } [\mu g/L] = \frac{10^{-6} \bullet 70 \text{ kg} \bullet 1000\ \mu g/mg}{q1^* [\text{kg-d/mg}] \bullet 0.0065 \text{ kg/d} \bullet \text{BCF } [\text{L/kg}]}$$

Using Reference Dose:

For consumption of water and organisms:

$$\text{AWQC } [\mu g/L] = \frac{\text{RfD } [\text{mg/kg-d}] \bullet 70 \text{ kg} \bullet 1000\ \mu g/mg}{2 \text{ L/d} + (0.0065 \text{ kg/d} \bullet \text{BCF } [\text{L/kg}])}$$

For consumption of organisms only:

$$\text{AWQC } [\mu g/L] = \frac{\text{RfD } [\text{mg/kg-d}] \bullet 70 \text{ kg} \bullet 1000\ \mu g/mg}{0.0065 \text{ kg/d} \bullet \text{BCF } [\text{L/kg}]}$$

AWQC = Ambient water quality criteria = national recommended water quality criteria
q1* = Cancer potency factor kg-d/mg or per mg/kg-day
RfD = Reference dose mg/kg-d
DI = Drinking water intake 2 L/day
BW = Human body weight 70 kg
FI = Fish intake 0.0065 kg/day
BCF = Bioconcentration factor L/kg

2000 Methodology Calculations

Linear Approach

Using cancer potency, q1*:

For consumption of water and organisms:

$$\text{AWQC [µg/L]} = \frac{(10^{-6}/q1^*) \bullet 70\text{ kg} \bullet 1000\ \mu\text{g/mg}}{(2\text{ L/d} + (0.0175\text{ kg/d} \bullet \text{BCF [L/kg]}))}$$

For consumption of organisms only:

$$\text{AWQC [µg/L]} = \frac{(10^{-6}/q1^*) \bullet 70\text{ kg} \bullet 1000\ \mu\text{g/mg}}{0.0175\text{ kg/d} \bullet \text{BCF [L/kg]}}$$

Using Reference Dose:

For consumption of water and organisms:

$$\text{AWQC [µg/L]} = [\text{ RfD [mg/kg-d]} \bullet \text{RSC} * (70\text{ kg/ } 2\text{ L/d} + (0.0175\text{ kg/d} \bullet \text{BCF [L/kg]})] \bullet 1000\ \mu\text{g/mg}$$

or (- RSC)

For consumption of organisms only:

$$\text{AWQC [µg/L]} = [\text{RfD [mg/kg-d]} \bullet \text{RSC} \bullet (70\text{ kg/ } (0.0175\text{ kg/d} \bullet \text{BCF [L/kg]}))] \bullet 1000\ \mu\text{g/mg}$$

(- RSC)

Nonlinear Approach (Presented for information only- no criteria in matrix based on nonlinear approach currently)

For consumption of water and organisms:

AWQC [ug/L] = POD/UF ● RSC ● (BW/DI + (FI ● BCF)

For consumption of organisms only:

AWQC [ug/L] = POD/UF ● RSC ● * (BW/(FI ●BCF)

AWQC = Ambient water quality criteria = national recommended water quality criteria
q1* = Cancer potency factor kg-d/mg or per mg/kg-day
RSD = Risk specific dose 10^{-6} /q1* mg/kg-day
RfD = Reference dose mg/kg-d
DI = Drinking water intake 2 L/day
BW = Human body weight 70 kg
FI = Fish intake 0.0175 kg/day
BCF = Bioconcentration factor L/kg
UF = Uncertainty factor (unitless)
RSC = Relative source contribution (percentage of subtraction)
POD = Point of departure mg/kg-day

NRWQC: HUMAN HEALTH CRITERIA CALCULATION MATRIX (November 2002)

NON PRIORITY POLLUTANTS

	Chemical (CAS number)	Gold Book or Criteria Document Value (ug/L) w + o/ o only	Basis (q1* or RfD/ADI) and BCF	1998 nrwqc (ug/L) w + o/o	Reference Cite	Basis (q1* or RfD/ADI) and BCF[1,2]	Methodology 2000 or 1980	2002 nrwqc (ug/L) w + o/ o only	Reference Cite[3]
6	Barium	1,000/---	RfD = 7E-2 (08/01/90) not used	1,000/---	Gold Book	RfD = 7E-2 (01/20/1999) not used	pre-1980	1,000/---	Gold Book
10	Chlorophenoxy Herbicide (2,4,5,-TP) 93721	10,---	RfD = 8E-3 (09/07/88) not used	10/---	Gold Book	RfD = 8E-3 (09/07/88) not used RSC = 20% [a]	pre-1980	10/---	Gold Book
11	Chlorophenoxy herbicide (2,4-D) 94757	100/---	RfD = 1E-2 (05/05/88)	100/---	Gold Book	RfD = 1E-2 (05/05/88) RSC = 20% [b]	pre-1980	100/---	Gold Book
15	Ether, Bis (Chloromethyl) 542881	0.00000376/ 0.00184 (based on q1* = 9299.8)	q1* = 2.2E+2 BCF = 63 FI = 6.5	0.00013/ 0.00078	IRIS 01/01/91	q1* = 2.2E+2 BCF = 63 FI = 17.5	2000	0.00010/ 0.00029	IRIS 01/01/91
20	Iron 7439896	300/---	---	300/---	Gold Book	----	pre-1980	300/---	Gold Book
22	Manganese 7439965	50/100	RfD = 1.4E-1 (01/01/93) not used	50/100	Gold Book	RfD = 1.4E-1 (05/01/1996) not used	pre-1980	50/100	Gold Book
23	Methoxychlor 72435	100/---	RfD = 5E-3 (08/01/91) not used	100/---	Gold Book	RfD = 5E-3 (08/01/91) RSC = 20 % [c,d] (not used)	pre-1980	100	Gold Book
25	Nitrates 14797558	10,000/---	1.6E+0 (10/01/91) not used	10,000/---	Gold Book	RfD = 1.6E+0 (10/01/91) not used	pre-1980	10,000/---	Gold Book
26	Nitrosamines	0.0008/1.24	B_H = 43.46 BCF = 0.20 (q1* = 1.5E+2 07/01/93 not used)	0.0008/1.24	EPA 440/5-80-064	B_H = 43.46 BCF = 0.20 (q1* = 1.5E+2 07/01/93 not used)	pre-1980	0.0008/1.24	EPA 440/5-80-064

	Chemical (CAS number)	Gold Book or Criteria Document Value (ug/L) w + o/ o only	Basis (q1* or RfD/ADI) and BCF	1998 nrwqc (ug/L) w + o/o	Reference Cite	Basis (q1* or RfD/ADI) and BCF[1,2]	Methodology 2000 or 1980	2002 nrwqc (ug/L) w + o/ o only	Reference Cite[3]
27	Dinitrophenols 25550587	70/14,300	BCF = 1.51 RfD = 0.002 FI = 6.5	70/14,300	EPA 440/5-80-063	BCF = 1.51 RfD = 2E-3 FI = 17.5	2000	69/5,300	EPA 440/5-80-063 & 2000 FI
28	Nitrosodibutylamine,N 924163	0.0064/0.587	q1* = 5.43 BCF = 3.38 FI = 6.5	0.0064/0.587	EPA 440/5-80-064	q1* = 5.43 BCF = 3.38 FI = 17.5	2000	0.0063/0.22	EPA 440/5-80-064 & 2000 FI
29	Nitrosodiethylamine,N 55185	0.0008/1.24	B_H = 43.46 BCF = 0.20 (q1* = 1.5E+2 07/01/93 not used)	0.0008/1.24	EPA 440/5-80-064	B_H = 43.46 BCF = 0.20 (q1* = 1.5E+2 07/01/93 not used)	pre-1980	0.0008/1.24	EPA 440/5-80-064
30	Nitrosopyrrolidine,N 930552	0.016/91.9	q1* = 2.13 BCF = 0.055 FI = 6.5	0.016/91.9	EPA 440/5-80-064	q1* = 2.13 BCF = 0.055 FI = 17.5	2000	0.016/34	EPA 440/5-80-064 & 2000 FI
34	Pentachlorobenzene 608935	74/85 (based on ADI = 1.17)	RfD = 8E-4 BCF = 2,125 FI = 6.5	3.5/4.1	IRIS 03/01/88	RfD = 8E-4 BCF = 2,125 FI = 17.5	2000	1.4/1.5	IRIS 03/01/88
38	Solids Dissolved and Salinity	250,000/---	---	250,000/---	Gold Book	-----	pre-1980	250,000/---	Gold Book
43	Tetrachlorobenzene, 1,2,4,5- 95943	38/48 (based on ADI = 0.35)	RfD = 3E-4 BCF = 1,125 FI = 6.5	2.3/2.9	IRIS 03/01/91	RfD = 3E-4 BCF = 1,125 FI = 17.5	2000	0.97/1.1	IRIS 03/01/91
45	Trichlophenol,2,4,5 95954	2,600/9800 (based on ADI = 7)	RfD = 1E-1 BCF = 110 FI = 6.5	2,600/9800	IRIS 03/01/88	RfD = 1E-1 BCF = 110 FI = 17.5	2000	1,800/3,600	IRIS 03/01/88

FOOTNOTES:

1. Criteria based on carcinogenicity (q1*), reflect 10^{-6} risk.
2. The fish tissue bioconcentration factor (BCF) from the 1980 criteria documents was retained unless otherwise noted. No BAFs were derived for this effort.
3. Reference cite refers to an IRIS coversheet, AWQC criterion document or other document which serves as the basis for the criterion.

References for Relative Source Contribution (RSC)

a. Silvex (2,4,5-TP) Health Advisory 1988
b. 2,4-dichlorophenoxyacetic acid (2,4-D) Health Advisory, March 31, 1987
c. FR 56 (20), January 30, 1991
d. Methoxychlor Health Advisory, March 31, 1987

ADEQ

ARKANSAS
Department of Environmental Quality

TO: **Marcus C. Devine, Director**
FROM: **Ellen Carpenter, Legal Division Chief**
DATE: **July 12, 2005**
SUBJECT: **Ground Water Remediation Level Interim Policy and Technical Guidance**

The Policy Review Committee (PRC) have reviewed the two documents referenced above and attached to this memo. The PRC recommends adoption of these documents on an Interim basis with a request that the Media Divisions implementing the documents collect certain information (identified below) in order to evaluate the Interim Policy over the next year. Each Media Division will collect this information over the twelve (12) months, beginning August 1, 2005, and then submit a summary of the information to the Chairperson of the Policy Review Committee.

We feel that the Interim Policy and associated Technical Guidance will provide the means to establish more consistent ground waster remediation levels across the Divisions and establish strong defensible criteria in the event the remediation levels are challenged.

Evaluation Information

- # of suspected & actual GW contamination events (projects) identified)
- # suspected events positively confirmed vs # suspected events negatively confirmed
- average length of time GW investigation (start to Plume identification complete)
- # GW Strategies Proposed
  - # using MCLs as remediation goal
  - # using TI
  - # using institutional or engineering controls
  - # using risk management to establish remediation goals
  - # with identified surface water interface
- Summary of problems encountered using Interim Policy & / or Guidelines & how they were resolved
- Suggestions for improvement
- Training needs identified

Approved : /s/ July 13, 2005
Date

Attachments: Interim Ground Water Remediation Levels
Technical Guidance, Development of Ground Water Remediation Levels

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY
INTERIM POLICY
GROUND WATER REMEDIATION LEVELS

Background

The Divisions responsible for oversight of ground water remediation activities within the Department should use consistent methods for establishing ground water remediation levels regardless of the media Division having principal responsibility for the action.

Policy (INTERIM)

This policy shall apply to ground water remediation conducted under the jurisdiction of ADEQ. *The goal shall be to protect, enhance, and restore ground water conditions to the maximum beneficial use to the extent technically and economically feasible while maintaining conditions that are protective of human health and the environment.*

Until final regulations are promulgated by the Arkansas Pollution Control and Ecology Commission that are specific to the establishment of ground water remediation levels, such levels will be established on a case-by-case basis. The technical guidance for ***"Development of Ground Water Remediation Levels"***, attached hereto, shall be utilized as the implementation tool to guide the development of ground water levels in a consistent manner.

The levels or goals for ground water remediation shall be established following:

1. Plume characterization,
2. Determination of source control measures / best management practices to be employed, and
3. Evaluation of risk to human health and the environment.

Consideration will be given to the current and reasonably anticipated future land use (ground water usage).

A proposed site remediation plan (including ground water levels / goals) shall be made available for a thirty (30) day public review and comment period. The proposed site remediation plan may be incorporated as part of a permit decision, enforcement agreement, or similar document. The content of the proposed remediation plan shall include the results of the site investigation, including the ground water plume characterization, identification and summary of source control measures, and the basis for the establishment of the proposed ground water remediation levels. In addition to the public notice typically required (publication in the newspaper of largest circulation in the county) for permitting decisions pursuant to APC&EC Reg. No. 8, a good faith effort shall be made to provide a direct notice to all land owners and tenants that own or lease property that is impacted by the groundwater contamination plume.

Divisions will require that the party responsible for the ground water contamination bear the responsibility and costs of all investigation, remedial feasibility studies, public participation, and remedial implementation when such parties can be identified.

TECHNICAL GUIDANCE

DEVELOPMENT OF GROUND WATER REMEDIATION LEVELS

I. Statement of Purpose

This document provides for the application of a consistent process for the establishment of ground water remediation levels or goals. ADEQ will utilize this process unless modified by the Director based on the best interest of the citizens of Arkansas. This document outlines the basic components ADEQ will require during the investigation and remediation of ground water contamination regardless of the source of the contamination.

II. Definitions

- **Best Management Practices (BMPs)** – Schedules of activities, prohibited activities, maintenance procedures and management practices that prevent or reduce pollution of waters of the state.
- **Ecological Hazard Quotient** – A quotient used to assess risk in which protective assumptions are used. Generally, the numerator is the reasonable worst-case constituent concentration at the point of exposure (e.g., Exposure Estimate), and the denominator is the no-adverse effects-based toxicity reference value (e.g., Effects Benchmark).
- **Engineering Controls** – Engineered structures, such as a clay cap, French drain, or slurry wall that is designed and installed to contain or minimize contaminated ground water migration.
- **Extent of Contamination** – The maximum horizontal and vertical limits of ground water pollution as defined by the concentration of chemical constituents above background concentrations.
- **Ground Water Contamination** – Pollution [as defined at A.C.A. § 8-4-102 (6)] of any waters of the state below the surface of the ground.
- **Hazard Index (HI)** – The sum of hazard quotients used in the evaluation of non-cancer human health risk.
- **Hazard Quotient (HQ)** – Non-cancer human health risk expression based on the calculated exposure of a single contaminant in a single medium divided by the reference dose.
- **Institutional Controls (IC)** – Non-engineered instruments, such as administrative and/or legal controls that minimize the potential for human exposures to contamination by limiting land or resource use.
- **Maximum Beneficial Ground Water Use** – The maximum (or highest) beneficial ground water, within the range of reasonably expected uses.
- **Maximum Contaminant Levels (MCLs)** – Federally promulgated and enforceable standards that set forth the maximum permissible level of a contaminant in water which delivered to any user of a public water system.
- **Maximum Contaminant Level Goals (MCLGs)** – Non-enforceable public health goals which establish the maximum level of a contaminant in drinking water at which no known or anticipated adverse human health effect would occur, and which allows for an adequate margin of safety.
- **Point of Compliance** – The point or boundary at which ground water should be monitored for quality and where ground water remediation levels are to be achieved. The vertical surface, extending downward to the

uppermost aquifer, located horizontally and, hydraulically down gradient of the contaminant source. (Note: Multiple points of compliance may be established when responding to complex or extensive ground water contamination events, e.g. when short-term protection goals or interim measures are incorporated into a remediation plan.)

- **Remediation Criteria** – All site specific response objectives including details of remediation, e.g. soil cleanup levels, institutional controls, engineering controls, surface water discharge requirements, ground water cleanup levels, etc.

- **Source Control** – Any remedial action, interim measure, or institutional control designed to prevent, eliminate, or contain the migration of pollution from its initial point of disposal or entry into the environment.

III. Process

1) The goal for the use of this guidance shall be to *protect, enhance, and restore* ground water conditions to the maximum beneficial use to the extent technically and economically feasible while maintaining conditions that are protective of human health and the environment. It is the policy of ADEQ that, until final regulations are promulgated by the Arkansas Pollution Control and Ecology Commission that are specific to the establishment of ground water cleanup standards, the cleanup levels or goals will be established on a case-by-case basis in a consistent manner. To this end, the process set forth below shall be utilized by ADEQ:

(a) Plume characterization

The ground water pollution (contamination) plume shall be fully characterized as to:

1. The extent of contamination,
2. The contamination source(s),
3. Ground water flow direction,
4. Ground water gradient,
5. Ground water velocities,
6. Hydrogeologic units or formations impacted, and
7. Hydrologic connectivity between units.

(b) Source Control Measures / Best Management Practices

Technological, chemical, or biological methods (or combinations thereof) must be implemented to control the continued migration of pollution from the source. The following hierarchy shall be utilized, to the extent practicable, when selecting appropriate source control measures / practices:

1. Removal (excavation),
2. Physical barriers
3. *In situ* treatment

(Note: All source control measures / best management practices must be implemented with appropriate and adequate follow-on monitoring to determine the effectiveness of the measures.)

(c) Ground Water Cleanup Strategy

The ground water remediation levels shall be established following:

1. Plume characterization,
2. Determination of source control measures / BMPs to be employed, and
3. Evaluation of risk to human health and the environment.

Consideration will be given to the current and reasonably anticipated future land use (including ground water usage).

The party implementing the response to a ground water contamination event shall prepare a proposed site remediation plan for ADEQ review. Following determination of technical adequacy by ADEQ, a proposed site remediation plan (including all remediation criteria to be applied to the site) shall be made available for public review and comment. Content of the proposed remediation plan shall include:

1. The results of the site investigation, including the ground water plume characterization,
2. Identification, and summary of source control measures / BMPs,
3. The basis for the establishment of the proposed remediation criteria, and
4. The minimum frequency for ADEQ monitoring of the progress and effectiveness of the remediation.

The proposed site remediation plan may be incorporated as a part of a permit decision, enforcement agreement, or other similar document. The public notice of the proposed site remediation plan shall follow the procedures typically required for ADEQ permitting actions (publication in the newspaper of largest circulation in the county). In addition, a good faith effort shall be made to provide a direct notice to all land owners and tenants that own or lease property that is impacted by the ground water contamination plume.

ADEQ shall consider all relevant comments submitted during the comment period, revise the remediation plan as appropriate, prepare a Response to Comments, and issue a final decision regarding the site remediation plan.

2) Ground Water Remediation Criteria Establishment

Remediation criteria for protection of human health should use existing regulatory standards (e.g., drinking water standards) when such are available and necessary to protect a current or reasonably anticipated future ground water use. Other factors that must be considered when developing site-specific ground water remediation criteria include:

- **Background Ground Water Quality** – the quality of the ground water in proximity to the site that is unaffected by the release.
- **Maximum Beneficial Ground Water Use** – within the range of reasonably expected uses, the maximum (or highest) beneficial ground water use warrants the most stringent ground water cleanup levels.
- **Ground Water Use Designation** – use designation as established by the Arkansas Soil and Water Conservation Commission and / or the APC&EC.
- **Actual Ground Water Use** – use(s) of ground water being employed in the immediate vicinity of the site or study area.
- **Maximum Contaminate Levels (MCLs) / Maximum Contaminate Level Goals (MCLGs)**
- **Ground Water Discharge to Surface Water**
- **Best Management Practices**
- **Technical Feasibility** – achievement of the proposed cleanup levels / goals practicable from an engineering perspective.
- **Human Health and Environmental Risk** – actual and potential relative risk to human health and ecosystems based on exposure pathway(s) and constituents available for exposure.
- **Point of Compliance**

3) Acceptable Risk Range

This guidance does not require the use of a specific risk assessment methodology. However, any risk assessment approach that is utilized must:

1. Identify the Constituents of Concern (CoCs);

2. Establish the toxicity of each CoC;
3. Identify and evaluate all potential and actual Exposure Pathways;
4. Identify all potential and actual Receptors (human health and ecological); and
5. Evaluate the potential and actual effects or CoC exposures on each receptor.

Remediation levels for protection of human health should use existing regulatory standards (e.g., drinking water standards) when such are available and necessary to protect a current or reasonably anticipated future ground water use. If promulgated standards are not utilized for establishing the remediation criteria, a risk assessment will be conducted or utilized to evaluate and establish acceptable risk management-based remediation criteria.

In the absence of existing, promulgated standards or in cases where the designated use differs from the actual or reasonably anticipated use; the remediation standard may be based on an acceptable risk range. The acceptable risk range shall be based on protection of human health and the environment.

Remediation levels established for **human health** protection will be based on concentrations that represent an excess upper bound lifetime risk (for known or suspected carcinogens) between 10^{-4} and 10^{-6}. In addition, non-cancer risk shall be based on levels of contaminants that are equal to or below a HQ of 1; or, for sites with multiple contaminants, a HI equal to or below 1.

Remediation levels established for **ecological** protection will be based on concentrations that represent an ecological risk characterization above an ecological HQ ratio. Typically, a HQ or HI should be less than 0.25. This level is conservatively chosen to account for exposures due to background conditions (i.e., naturally occurring substances like metals and sources of regional pollution). If the HQ or HI is greater than 0.25, a more detailed ecological risk assessment may be needed to better define the potential risk, if any.

IV. Tracking and Monitoring

All remedies that establish ground water levels or goals above background quality shall be reviewed by the ADEQ Division overseeing the ground water remediation (at a minimum) once every five (5) years from the date of remedy implementation. The purpose of these reviews is to determine if remedy / ground water cleanup levels remain protective of human health and the environment. The review will also document the status of any IC required by the remedy selection.

All ICs that are implemented as part of a remedy selection will be recorded in a data base (to be established or identified). Until such time as an IC Tracking data base is established, each Division conducting or overseeing ground water remediation shall document, at a minimum, the following information:

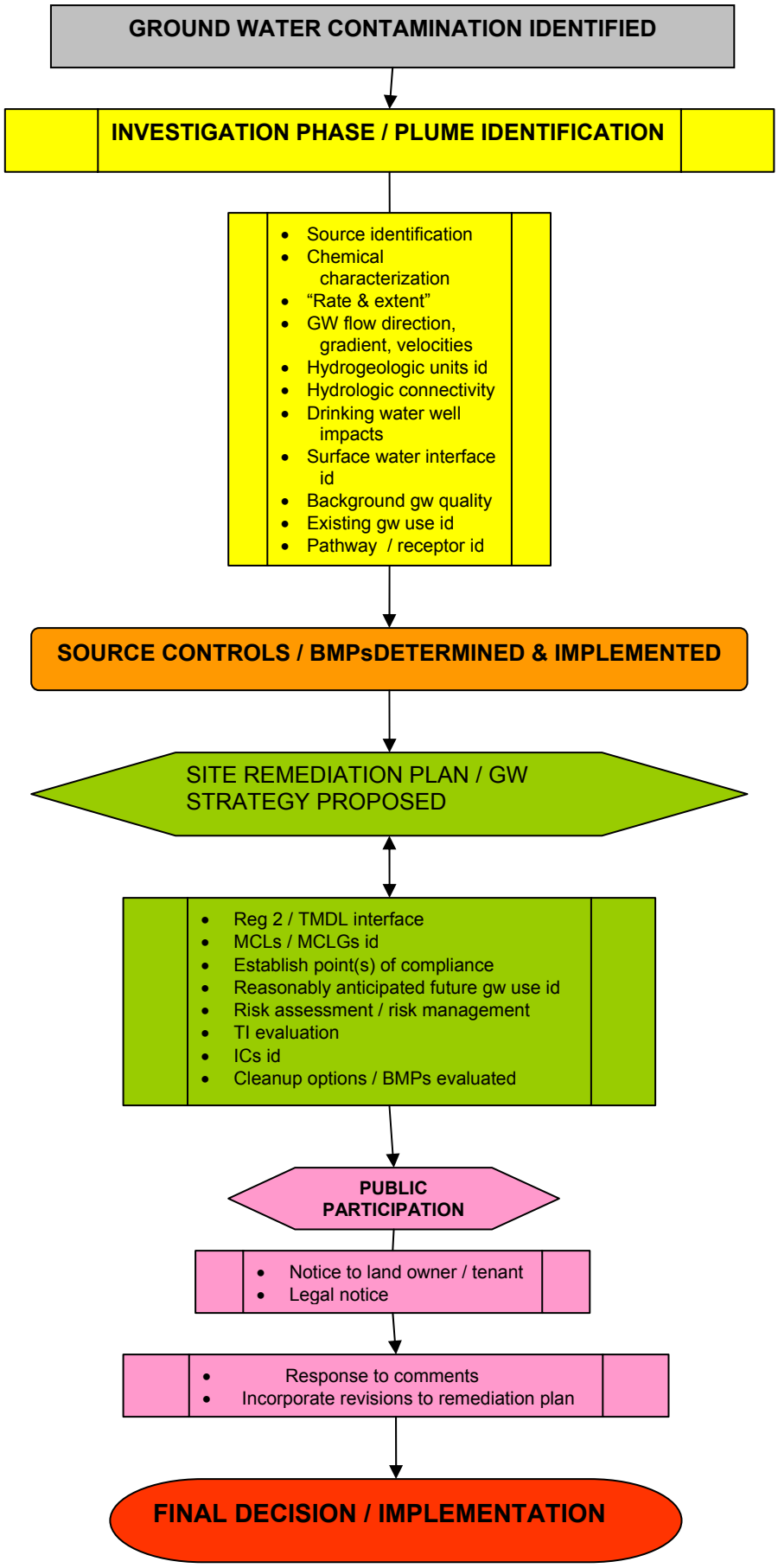
- Site or Project Name
- Legal Description (including latitude / longitude coordinates)
- AFIN
- Constituents of Concern
- Type of IC Required
- Party responsible for maintaining the IC

V. Inter- / Intra-Agency Coordination

The establishment of ground water remediation levels or goals is a process that must be highly coordinated due to the layers of authorities and jurisdictional issues. All ADEQ Divisions charged with the oversight and / or response to issues of ground water contamination shall communicate and coordinate with the appropriate

ADEQ Division(s) and / or other State Agencies to insure that appropriate and legally defensible levels are established. Below is a summary to be used as a guide for proper coordination on ground water remediation levels issues:

- Arkansas Soil and Water Commission – Ground water use designation, non-point source issues.
- Arkansas Department of Health – Human-health exposures.
- ADEQ Water Division – Water quality, discharge criteria.
- ADEQ Hazardous Waste Division – Hazardous substance / hazardous waste issues, risk assessment / risk management assistance.
- ADEQ Regulated Storage Tank Division – Petroleum only ground water contamination issues.
- ADEQ Environmental Preservation Division – Review of all environmental projects (including remedy decisions).


GROUND WATER CONTAMINATION IDENTIFIED
INVESTIGATION PHASE / PLUME IDENTIFICATION
Source identification
Chemical characterization
"Rate & extent"
GW flow direction, gradient, velocities
Hydrogeologic units id
Hydrologic connectivity
Drinking water well impacts
Surface water interface id
Background gw quality
Existing gw use id
Pathway / receptor id
SOURCE CONTROLS / BMPsDETERMINED & IMPLEMENTED
SITE REMEDIATION PLAN / GW STRATEGY PROPOSED
Reg 2 / TMDL interface
MCLs / MCLGs id
Establish point(s) of compliance
Reasonably anticipated future gw use id
Risk assessment / risk management
TI evaluation
ICs id
Cleanup options / BMPs evaluated
PUBLIC PARTICIPATION
Notice to land owner / tenant
Legal notice
Response to comments
Incorporate revisions to remediation plan
FINAL DECISION / IMPLEMENTATION

From: Grish [ccgrish@gmail.com]
Sent: Friday, July 16, 2010 3:00 PM
To: Cusher, Annette
Cc: Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay
Subject: Re: Arkwood Superfund Site

Ms. Cusher:

Quick question: what is

"APC&EC Regulation 2"

referred to below, and where can I get a copy of that regulation?

Thanks,
Curt Grisham

On Jul 16, 2010, at 7:52, "Cusher, Annette" <Cusher@adeq.state.ar.us> wrote:

Mr. Grisham,

My apologies for not getting back to you sooner, I mistakenly thought I had.

The drinking water standards are Federal levels upheld by Arkansas as well. Drinking water standards would be applied to the wells sampled. For PCP the Maximum Contaminant Level is 1.0 ug/l. Arkansas has jurisdiction relative to surface water and the springs. The remediation goals for New Cricket Spring are calculated according to the equations in APC&EC Regulation 2. Based upon Reg. 2, 2007, the levels are 9.3ug/l for the monthly average and 18.7ug/l for a daily maximum.

54 springs were identified within 1.5 miles of the site and 13 were sampled during the remedial investigation. Only two of the 13 had detectible concentrations of PCP, New Cricket Spring and the railroad tunnel. It was only detected in the railroad tunnel once. Levels at New Cricket Spring exceeded the Arkansas water quality standards and a treatment system was installed at the spring. This system continues

to function treating the spring water prior to discharge back into the stream channel. These are the sample points noted in the analytical data supplied to you. Analytical data should be shown in micrograms per liter (ug/l).

35 drinking water wells were identified within a 1.5 mile radius of the site. 15 of these were sampled during the remedial investigation. The municipal water line was extended to residences downgradient of the site in the early 1990ís. No site related contamination was found in any of the wells and sampling of drinking water wells was discontinued.

The physical location of the springs and wells are identified in the Remedial Investigation/ Feasibility Study Report completed in May 1990 by Mass Merchandisers, Inc.(MMI)/ McKesson Corp.

If you have any further questions, please donít hesitate to ask.

Regards,

Annette Cusher

-----Original Message-----
From: grish [mailto:ccgrish@gmail.com]
Sent: Friday, July 02, 2010 12:28 PM
To: Cusher, Annette
Cc: Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay
Subject: Re: Arkwood Superfund Site

Dear Ms. Cusher,

I am trying to understand the exact testing scenario wherein the "remedial goal" for New Cricket Spring will have been met by both EPA

and ADEQ standards. In reading the Record of Decision (ROD) dated 09/28/1990 as it appears on the EPA website, the section headed "The Selected Remedy" part B. "Groundwater" states in part:

"THIS REMEDY WAS SELECTED BECAUSE NEW CRICKET SPRING IS NOT HIGHLY CONTAMINATED, ECOLOGICAL DAMAGE FROM THE SITE IS NOT APPARENT, AND NATURAL ATTENUATION MAY OCCUR QUICKLY FOLLOWING THE REMOVAL OF THE SOURCE OF CONTAMINATION AT THE SITE."

The abstract for that documents states in part:

"THE SELECTED GROUNDWATER REMEDY IS;
* MONITOR AREA SPRINGS DURING, AND TWO YEARS AFTER THE SOILS REMEDIATION TO DETERMINE THE DEGREE TO WHICH NATURAL ATTENUATION IS TAKING AFFECT,
* IF PENTACHLOROPHENOL LEVELS ARE ABOVE STATE OF ARKANSAS WATER QUALITY STANDARDS AFTER A POST-REMEDIAL MONITORING PERIOD OF TWO YEARS, ERECT A WATER TREATMENT SYSTEM AT NEW CRICKET SPRING TO TREAT TO STATE OF ARKANSAS WATER QUALITY STANDARDS,
* TREAT NEW CRICKET SPRING UNTIL LEVELS FALL BELOW STATE STANDARDS.
* MONITOR SELECTED DRINKING WATER WELLS FOR 30 YEARS.
* PROVIDE SELECTED WELL WATER USERS WITH CITY WATER LINES TO REMOVE ANY UNCERTAINTY IN THEIR WATER SUPPLY."

It does seem to me from reading this portion of the ROD that the "State of Arkansas water quality standards" for this remedy are the determining measure for attaining the "remedial goal."

Could you please clarify for me the actual technical measurement levels (expressed in the same units of measure used in the historical test data contained in the reports you provided me) that would meet "State of Arkansas water quality standards" so that I may understand how close we are to attaining the remedial goal?

Also, could you tell me what, if any, "selected drinking water wells" referred to above were actually selected for 30-year monitoring?

Thank you very much.

Sincerely,

Curt Grisham

On Thu, Jul 1, 2010 at 11:45 AM, Cusher, Annette <Cusher@adeq.state.ar.us> wrote:

Mr. Grisham,

I apologize for using an abbreviation without defining it. I normally do not overlook that. ìPRP lead siteî means the potential responsible party (PRP) is funding and implementation of the clean up efforts. A potential responsible party can include but not limited to the owner or operator of a contaminated site.

The ìremedial goalî is the same for ADEQ as EPA. The document that sets the remedial goal is the Record of Decision.

Regards,

Annette Cusher

-----Original Message-----
From: Grish [mailto:ccgrish@gmail.com]
Sent: Thursday, July 01, 2010 11:13 AM
To: Cusher, Annette
Cc: curt@grish.org; Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay
Subject: Re: Arkwood Superfund Site

Dear Ms. Cusher.

Thank you very much for this timely & complete response.

Two questions, please:

ï Could you explain to me the meaning of the phrase "PRP lead site" used in your reply?

ï Is the "remedial goal" exactly the same for ADEQ as it is for the EPA?

Sincerely,

Curt Grisham

On Jul 1, 2010, at 6:53, "Cusher, Annette" <Cusher@adeq.state.ar.us> wrote:

Mr. Grishom,

Thank you for your comments and concerns regarding the Arkwood Superfund Site. The 2009 Annual Report and the ADEQ letter to EPA regarding the 2009 Annual Report are attached. ADEQ would be happy to forward you all future monthly reports. As noted in the report the discharge into the creek is at or below the remedial goal for the site, however the water from the spring is above the remedial goal requiring further treatment prior to discharge into the creek.

EPA has not delegated regulatory authority to any state for Superfund oversight. EPA and ADEQ do have an agreement detailing how Superfund sites are addressed in Arkansas. EPA will consider ADEQís opinions with regards to Ready for Reuse determinations for EPA lead

or PRP lead sites. Arkwood is a PRP lead site with EPA as the main regulatory authority. As such, all Ready for Reuse issues should be coordinated through EPA.

If you have any further questions, or I can be of any more assistance, please contact me at 501-682-0841 or cusher@adeq.state.ar.us.

Regards,

Annette Cusher, P.E.

Remedial/Corrective Action Engineer Supervisor

Technical Branch

Hazardous Waste Division

ADEQ

<Arkwood 2009 Annual Report.pdf>

<EPA-Arkwood 6-8-10.pdf>

ADEQ
ARKANSAS
Department of Environmental Quality

April 4, 2011

Certified Mail: 7006 3450 0003 4067 6533

U.S. Environmental Protection Agency
Attn: Mr. Shawn Ghose (6SF-RA)
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202

Subject: Arkwood, Inc. Comments to the Draft Third Five Year Review
AFIN: 05-00003; EPA ID Number ARD084930148

Dear Mr. Ghose:

The Arkansas Department of Environmental Quality-Hazardous Waste Division (ADEQ) has completed our review of the Draft Third Five Year Review for the former Arkwood Wood Treating facility in Omaha, Arkansas. ADEQ has noted the following items which will need to be addressed in the Five Year Review:

1) **Title Page:** Please remove the extra character in "Boone County".
2) **Summary of Five Year Review Findings, page ii:** On line eight, insert after "...residual contamination." Information relative to the soils with contaminant levels below the remedial objectives were left on site and covered with clean fill (six inches to 6.3 feet).
3) **Actions Needed, page ii:** To date the property owner has not filed a deed restriction for the property. The draft deed restriction as it has been provided to the ADEQ contains several deficiencies including, but not limited to, a restriction on groundwater use with the exception of the currently active remedial system, a no-dig restriction in the remediated area, an accurate identification of the soil cap area, a statement limiting the site to industrial use only (zoning requirements are not considered a long term solution due to the ability to change them), and protection of the current remedial system by ensuring the employment of appropriate engineering controls. Remove all reference to commercial use. These changes will need to be reflected in all areas of the report in which the deed restriction is mentioned.

   The remedial objectives as outlined in the Record of Decision (ROD), effectively met the industrial screening standards at the time of remediation. The Remedial Objectives (ROs) specify values of pentachlorophenol (PCP) at 300 mg/kg, dioxin at 0.002 mg/kg, and benzo-a-pyrene at 6.0 mg/kg. These values exceed the present industrial soil screening values as determined in the EPA Region VI Regional Screening Table, November 2010. New values specify that industrial soils be Regulated as follows: Pentachlorophenol is 2.7 mg/kg, dioxin as 2,3,7,8 TCDD is 1.8E-5 mg/kg, and benzo-a-pyrene is 0.21 mg/kg. All soils which exceed these levels and would not be contained in

the no-dig restriction area, as it is currently defined, would need to be protected by a no-dig restriction as well.

4) **Executive Summary, Groundwater Remediation, page viii, paragraph 1:** Please clarify that the residual contaminated soils in the subsurface fractures and channels exceed the protection of groundwater Regional Screening Levels (RSLs) and therefore continue to source to the groundwater.
5) **Five Year Review Summary Form, page ix:** Please correct the EPA ID number to ARD084930148.
6) **Five Year Review Summary Form, Recommendations and Follow-up Actions, page x:** Revise this section to include the requirements for the deed restriction. pH values should be taken at the discharge point over the weir. APC&EC Reg.2.508 Toxic Substances Specific Standards, as revised, effective January 23, 2011 require that pH values remain between 6.0 and 9.0.
7) **Introduction, page 1, paragraph 4:** add "the" before second five-year report.
8) **Section III Background, Sub-section A. Location, page 3:** The route of highway 65 has been altered since the last 5 year review. The site is situated west of old highway 65 and east of the current course of highway 65. Please amend this section to reflect these changes. Include an updated site location map.
9) **Section III Background, Sub-section A. Location, page 3:** The vegetation is referred to as sparse in this section. In all other areas of the report the vegetative cap is reported as good. Please change this statement to match the remainder of the report.
10) **Section IV Remedial Actions, Sub-Section B Remedy Implementation, heading c, Groundwater Remediation, Sampling of Springs, page 9, third sentence:** Please change the name of New Cricket Creek to New Cricket Spring.
11) **Section IV. Remedial Actions, Sub-Section B Remedy Implementation, heading a Soil Remediation, page 7, paragraph 2:** Please add that excavation in the area of the sinkhole was up to 6.3 feet.
12) **Section IV Remedial Actions, Sub-Section B. Remedy Implementation, heading b. Site Closure Activities, page 8, paragraph 2:** Change the tense to indicate present day as inspections are currently conducted.
13) **Table 2, Spring Samples 1996-2010, page 9:** Include the appropriate units for PCP on this table.
14) **Table 3, New Cricket Spring, page 17:** Indicate that the units represented in the table are in gallons per minute.
15) **Section VI Five Year Review Findings, Sub-section A. Interviews, page 23:** The EPA provides guidelines for community involvement. Requirements for community involvement and interviews of the 5 year review team may be found in the EPA 540-R-01-007, OSWER No. 9355.7-03B-P, section 3.4, page 3-2. Ensure that this report conforms to these guidelines. Interviews and copies of community notices should be included in the final report. Add a reference to the appropriate appendix with interview forms.
16) **Section VI Five-Year Review Findings, Sub-Section C Risk Information Review, page 24:** Under the Federal standards please add EPA RSL tables. A table with the Site ROs for soil and the RSLs for Industrial direct contact soil and the protection of groundwater values would be appropriate here.
17) **Section VI Five-Year Review Findings, Sub-Section C Risk Information Review, page 24:** For State standards please change the reference from ADEQ to APC&EC Regulation 2. Ensure that this correction is made in all sections of the report.
18) **Section VI Five Year Review Findings:** This section should include identification of

five-year review team members.

19) **Section VII. Assessment, Question A, page 25, paragraph 2:** Clarify that the majority of the source area for groundwater impacts have been removed. Residuals above protection of groundwater levels remain in subsurface fractures and channels. Change ADEQ to APC&EC in the last sentence.
20) **Section VII. Assessment, Question B, paragraph 1, page 25:** Add changes to the Regional screening levels which may affect assumptions used at the time of remedy selection. See comment 3. In addition, original values established for the daily and monthly discharge limits of PCP were calculated based on a water station distant from the site. APC&EC Reg. 2.508 provides the accurate methodology to be employed at the site. In addition, permitting requirements have changed under the State of Arkansas Continuing Planning Process, Updated and Revised January 2000 (CPP). The revised Monthly average should be 17.38 µg/l and the revised Daily Maximum value should be 34.86 µg/l. Additional information regarding these changes can be located in the attachment.
21) **Section VII. Assessment, Question B, paragraph 3, page 25:** Note that the Regional Screening Levels have changed, but as long as the Site cap remains undisturbed, engineering controls remain in place, the groundwater treatment system at the spring continues to function properly, and the modified deed restriction is implemented, the Site remedy is protective of human health and the environment.
22) **Section VII, Assessment, System Operation and Maintenance, page 25:** EPA guidelines specify that annual operations and maintenance costs should be included in the five year review. Additional information Regarding this requirement can be located in EPA 540-R-01-007, OSWER No. 9355.7-03B-P, Section 3.0 Components of the 5 Year Review Process, Sub-Section 3.3 How Should I Establish a Review?, page 3-1; Exhibit 3-1Potential Members of the 5 Year Review Team, page 3-2; Exhibit 3-3 Contents of a 5 Year Review Report, page 3-6&7 ; and Appendix F, Sample 5 Year Review Report, page F-1.
23) **Section VIII. Deficiencies, page 26:** Please add the necessary additions to the deed restriction, as listed in comment 3 to this section. pH values should be taken at the discharge point over the weir. APC&EC Reg.2.508 Toxic Substances Specific Standards, as revised, effective January 23, 2011 require that pH values remain between 6.0 and 9.0. Additionally review of the January 30, 1998 letter establishing guidelines for the site specific discharge limits, identifies these limits as well. This change will need to be reflected in all appropriate areas of the report.
24) **Section VIII. Deficiencies, page 26:** APC&EC Reg. 2.505 requires that dissolved oxygen (D.O.) levels meet or exceed 6.0 mg/l. During the months of March, April, and May, when discharge levels at the weir exceed 15 CFS the D.O. standard is 6.5 mg/l.
25) **Section IX. Recommendations and Follow-up Actions, page 26:** Add all of the deed restriction requirements listed in comment 3. Add information regarding the pH, dissolved oxygen, and temperature collection in this section. Include information on the parties responsible for implementation, agencies with oversight authority, and a schedule for implementation and completion of these items as listed in the Comprehensive 5 Year Review Guidance Document.
26) **Section IX. Recommendations and Follow-up Actions, page 26:** The PRP is responsible for sampling all PCP levels at the site. The ADEQ recommends that verification samples be collected to support MMI's laboratory findings.

27) **Section X. Protectiveness Statements, Sub-Section Soil Remedy, page 26:** Zoning is not considered an institutional control. Please amend this section to state that a deed restriction will be put into place restricting the site to industrial use only.
28) **Section X. Protectiveness Statements, Sub-Section Groundwater Remedy, page 26:** Correct the reference to ADEQ to APC&EC Regulation 2 water quality standards. Edit the last sentence to read "Since the majority of the affected soil at the Site has been removed, the PCP level in groundwater should continue to decrease under application of the ozone treatment at the spring mouth."
29) **Figure 2a, page 15:** Correct the title of the header and table to read average PCP concentrations.
30) **Attachment 1, Arkansas Water Quality Standard Calculations:** As stated in comment 20, original values established for the daily and monthly discharge limits were calculated based on a water station distant from the site. Please see the attached explanation for determining surface water values. This information should be included in Attachment 1 as needed.

General Comments:

1) The section on Progress Since the Last Five-Year Review is missing.
2) Additional photo logs are attached please feel free to use these as fit for the report.

If you have any questions or comments regarding this review, please feel free to contact me at (501) 682-0789 or by e-mail at egan@adeq.state.ar.us.

Sincerely

Marilyn Egan, BS
Geologist, Hazardous Waste

cc: Jean Mescher, McKesson Corporation, One Post Street 34th Floor, San Francisco, CA 94104

encl: pentachlorophenol calculations, site photos

Pentachlorophenol Calculations for Surface Discharge

Per Reg. 2.508, the Pentachlorophenol aquatic life water quality standards (WQS) are as follows:

Acute	Chronic
$e^{[1.005(pH)-4.869]}$	$e^{[1.005(pH)-5.134]}$

pH = 7.84 s.u.

The pH used in calculating the standards, 7.84 s.u., is the average pH taken at monitoring station WHI0071 from 2004 – 2009.

Acute Standard

$e^{[1.005(7.84)-4.869]} = 20.29\ \mu g/l$

Chronic Standard

$e^{[1.005(7.84)-5.134]} = 15.57\ \mu g/l$

Reasonable potential for water quality violations is determined by comparing the effluent data to the WQS without taking into account a background flow because the 7Q10 of the receiving stream is 0 cfs. In accordance with the procedures outlined in the Continuing Planning Process (CPP), the highest effluent test result is compared to the water quality standards because over twenty data points exist. The highest effluent test result is 20 µg/l which occurred on July 10, 2008. It is important to note that higher test results occurred on October 22, 2007, and July 7, 2008. Those test results, 53.7 µg/l and189 µg/l, respectively, were not used because it appears as though those results were not representative of the effluent.

Comparison with Acute Standard

20 µg/l < 20.29 µg/l

Comparison with Chronic Standard

20 µg/l > 15.57 µg/l

Reasonable potential for exceedances of the WQS exists because the effluent test result is greater than the chronic water quality standard. Permit limits are calculated as follows in accordance with the CPP. The most stringent Long Term Average (LTA) will be used to calculate the final permit limits.

Since 7Q10 = 0 cfs, Waste Load Allocation (WLA) = WQS

$LTA_{acute} = 0.57 * WLA_{acute}$ [1]

$LTA_{acute} = 0.57 * 20.29\ \mu g/l = 11.57 \mu g/l$

$LTA_{chronic} = 0.72 * WLA_{chronic}$ [1]

$LTA_{chronic} = 0.72 * 15.57 = 11.21\ \mu g/l$

The chronic LTA is more stringent than the acute LTA. Therefore, the chronic LTA will be used to calculate the permit limits.

Average Monthly Limit = LTA * 1.55 = 11.21 µg/l * 1.55 = 17.38 µg/l [2]

Daily Maximum Limit = LTA * 3.11 = 11.21 µg/l * 3.11 = 34.86 µg/l [2]

[1] Values may be located in the State of Arkansas Continuing Planning Process Document, Update and Revisions January, 2000. Appendix D Implemtation of Toxic Substances, page D-37. http://www.adeq.state.ar.us/water/pdfs/cpp.pdf

[2] Values may be located in the State of Arkansas Continuing Planning Process Document, Update and Revisions January, 2000. Appendix D Implemtation of Toxic Substances, page D-38. http://www.adeq.state.ar.us/water/pdfs/cpp.pdf

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY

Official Photographic Log

SITE NAME: Arkwood, Inc.	**PHOTO # 1**	**DISK # PHOTO #**
SITE LOCATION: Omaha, Arkansas		
EPA ID#: ARD084930148		
PHOTOGRAPHER: Marilyn Egan	**WITNESS: Dianna Kilburn, Shawn Ghose**	
DATE: February 23, 2011	**CAMERA:**	
DIRECTION: West		
SUBJECT: Injection well points, depression to the right of the injection stick up is the cover for the injection well control.		

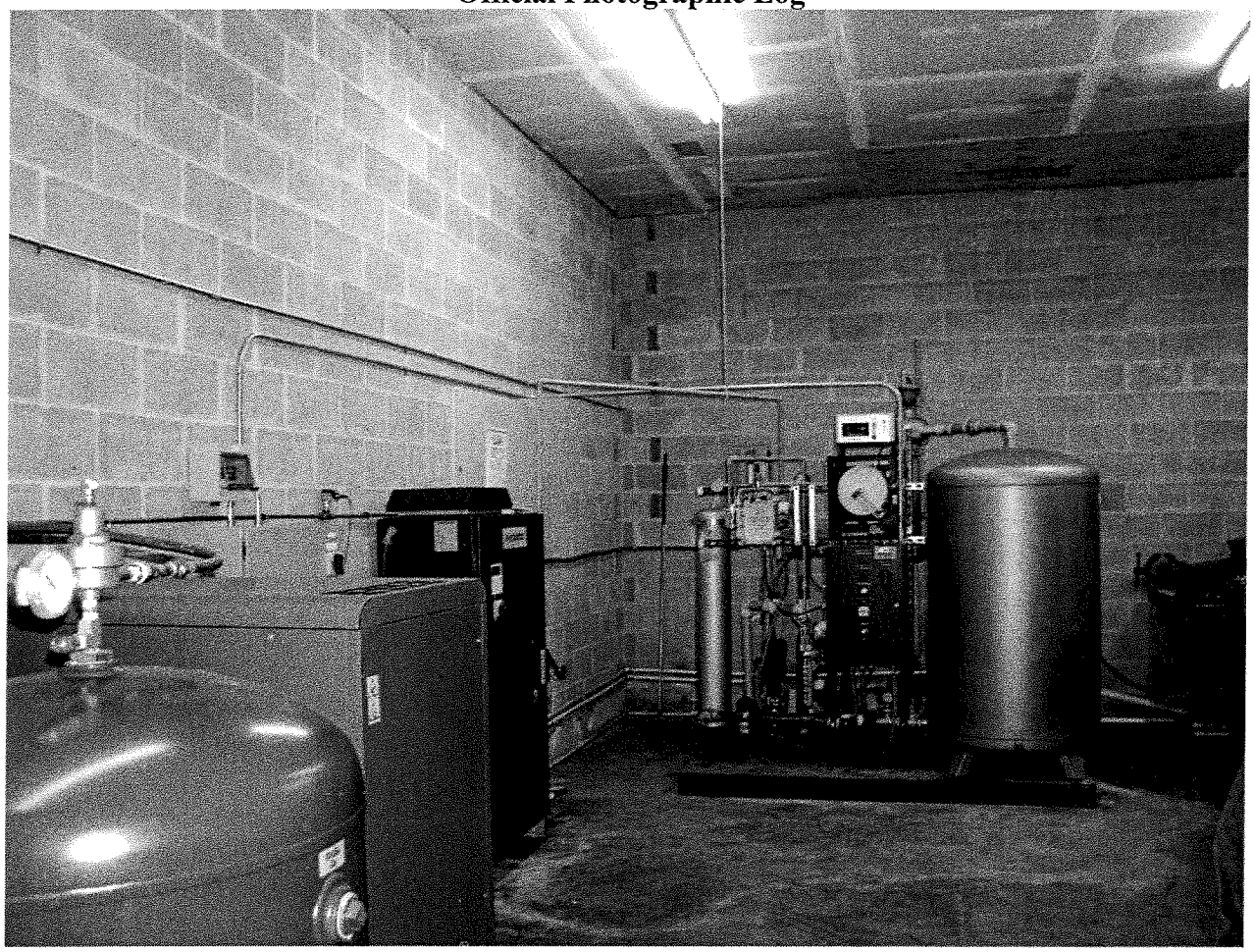
ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY

Official Photographic Log

SITE NAME: Arkwood, Inc.	**PHOTO # 2**	**DISK # PHOTO #**
SITE LOCATION: Omaha, Arkansas		
EPA ID#: ARD084930148		
PHOTOGRAPHER: Marilyn Egan	**WITNESS: Dianna Kilburn, Shawn Ghose**	
DATE: February 23, 2011	**CAMERA:**	
DIRECTION:		
SUBJECT: Storage silos used during remediation, the middle one now houses the groundwater injection system.		

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY

Official Photographic Log



SITE NAME: Arkwood, Inc.	PHOTO # 3	DISK # PHOTO #
SITE LOCATION: Omaha, Arkansas		
EPA ID#: ARD084930148		
PHOTOGRAPHER: Marilyn Egan	WITNESS: Dianna Kilburn, Shawn Ghose	
DATE: February 23, 2011	CAMERA:	
DIRECTION:		
SUBJECT: Groundwater injection pump house and former ozone injection system		

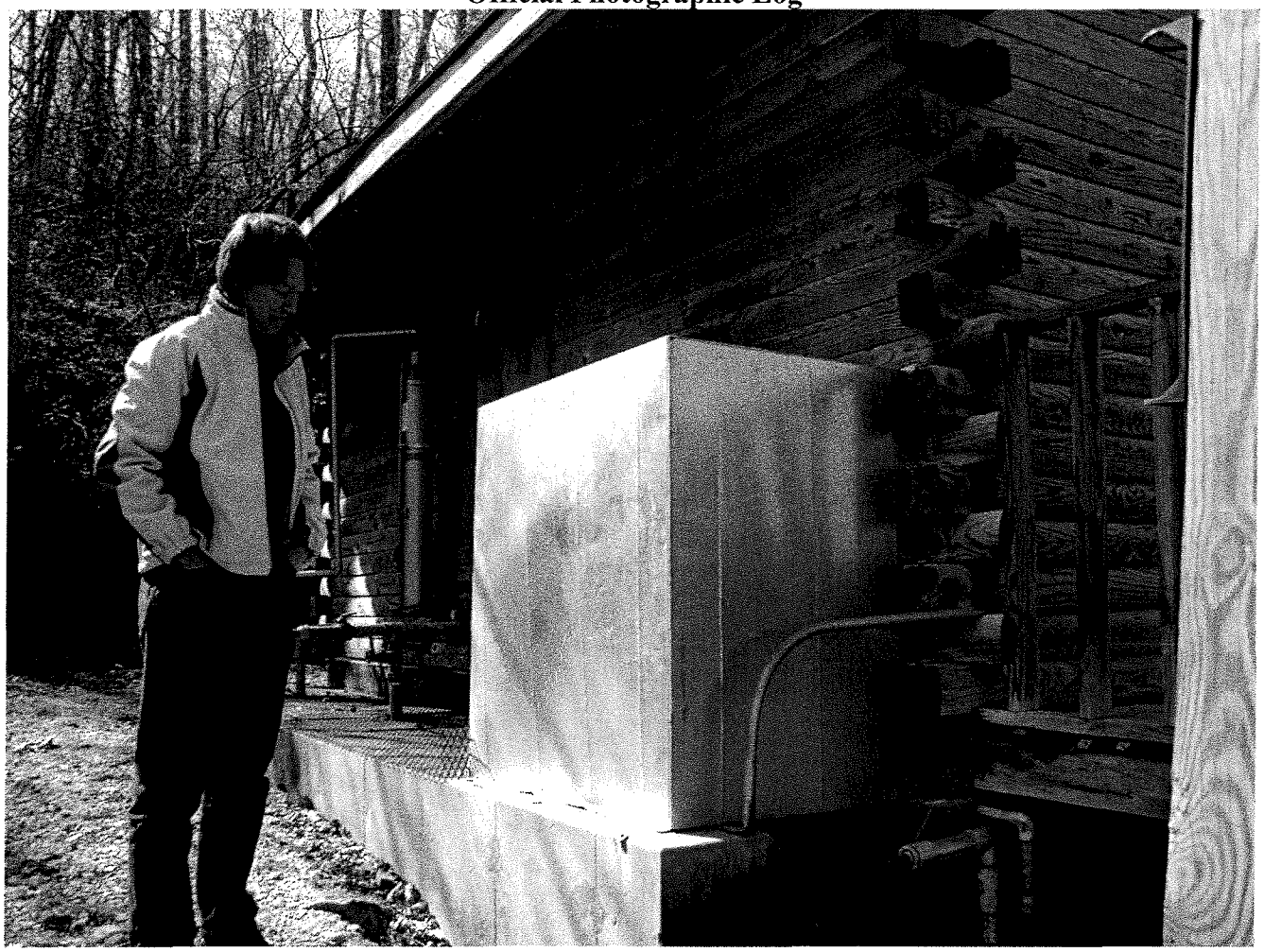
ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY

Official Photographic Log

SITE NAME: Arkwood, Inc.	**PHOTO # 4**	**DISK # PHOTO #**
SITE LOCATION: Omaha, Arkansas		
EPA ID#: ARD084930148		
PHOTOGRAPHER: Marilyn Egan	**WITNESS: Dianna Kilburn, Shawn Ghose**	
DATE: February 23, 2011	**CAMERA:**	
DIRECTION:		
SUBJECT: Mouth of the New Cricket Spring		

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY

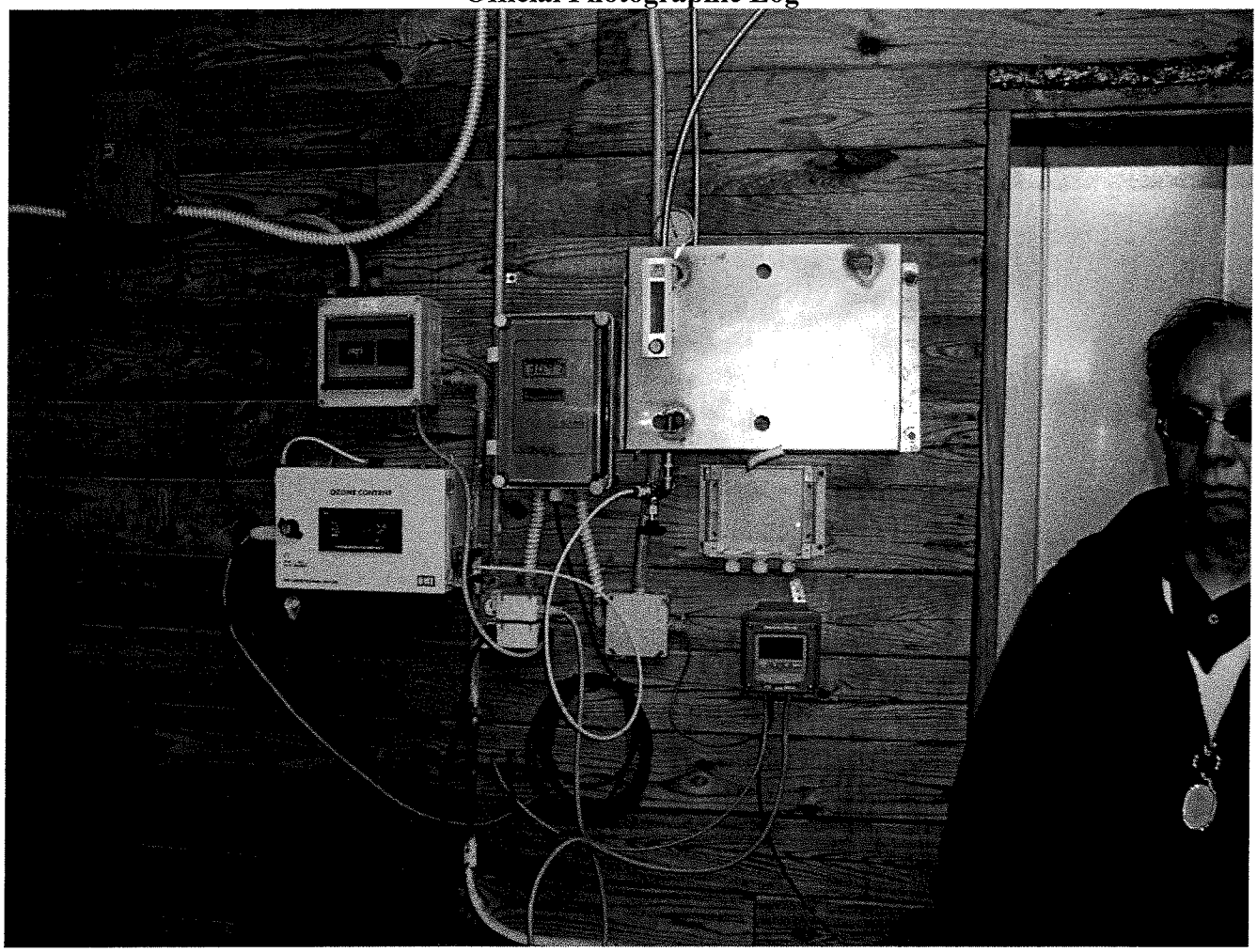
Official Photographic Log



SITE NAME: Arkwood, Inc.	**PHOTO # 5**	**DISK # PHOTO #**
SITE LOCATION: Omaha, Arkansas		
EPA ID#: ARD084930148		
PHOTOGRAPHER: Marilyn Egan	**WITNESS: Dianna Kilburn**	
DATE: February 23, 2011	**CAMERA:**	
DIRECTION: Northwest		
SUBJECT: Exterior of cabin housing ozone treatment system and exterior baffling system discharging through the weir		

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY

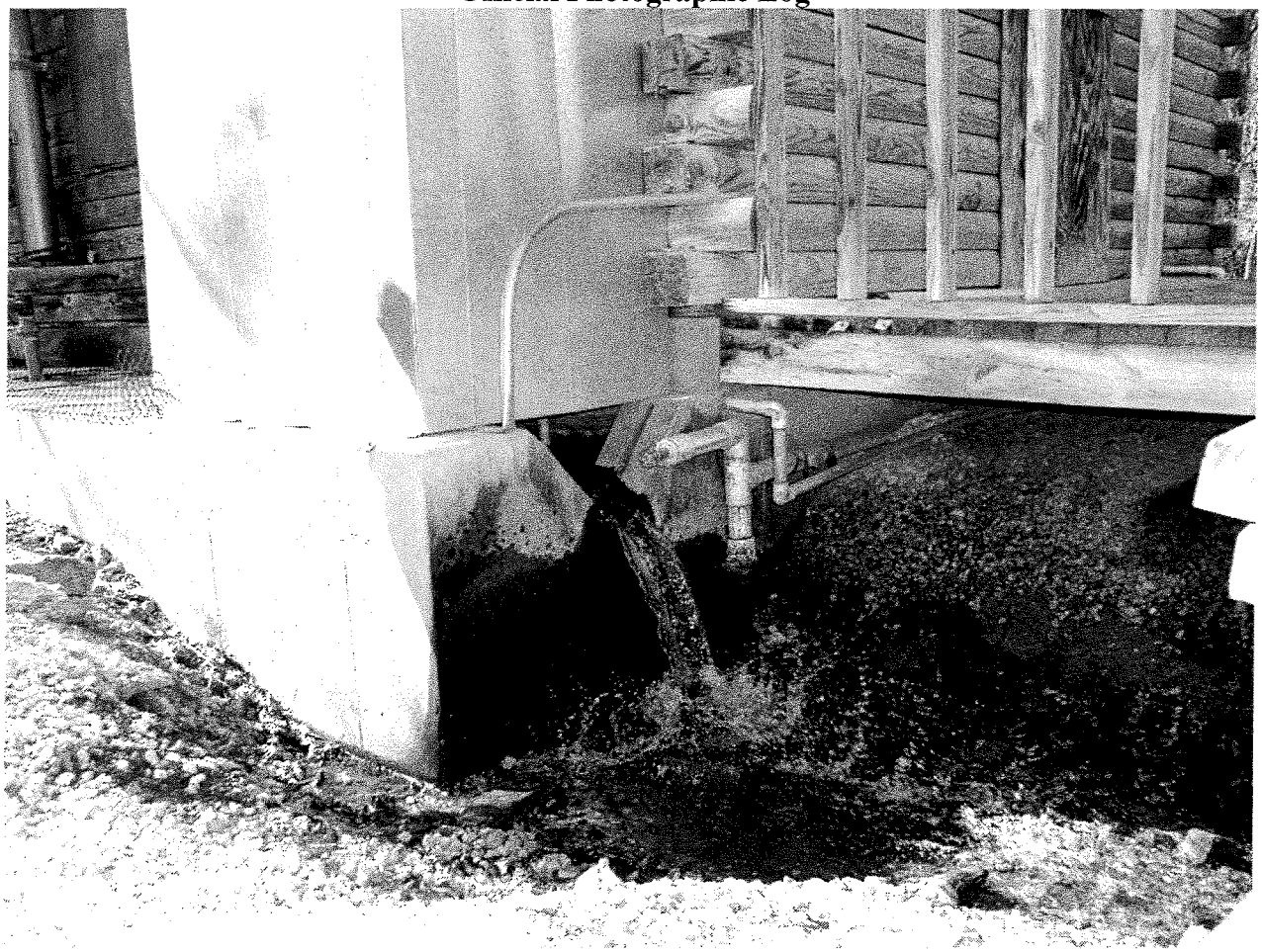
Official Photographic Log



SITE NAME: Arkwood, Inc.	PHOTO # 6	DISK # PHOTO #
SITE LOCATION: Omaha, Arkansas		
EPA ID#: ARD084930148		
PHOTOGRAPHER: Marilyn Egan	WITNESS: Dianna Kilburn, Shawn Ghose	
DATE: February 23, 2011	CAMERA:	
DIRECTION:		
SUBJECT: Ozone injection monitoring system inside cabin treatment building		

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY

Official Photographic Log



SITE NAME: Arkwood, Inc.	**PHOTO # 7**	**DISK # PHOTO #**
SITE LOCATION: Omaha, Arkansas		
EPA ID#: ARD084930148		
PHOTOGRAPHER: Marilyn Egan	**WITNESS: Dianna Kilburn, Shawn Ghose**	
DATE: February 23, 2011	**CAMERA:**	
DIRECTION:		
SUBJECT: Treated water outfall over the weir – after final treatment with ozone (discharge point to New Cricket Creek)		

ADEQ

A R K A N S A S
Department of Environmental Quality

HAZARDOUS WASTE DIVISION ROUTING SLIP

[03/23/2011]

Subject: Arkwood Wood Treaters

From: Marilyn Egan ME

Route in turn to:	*Action Needed*		*Initials*	*Date*
M. Moix	☒ Concurrence	☒ Review	MM	~~3-24-11~~ 4-1-11 w/comments #25
A. Cusher	☒ Concurrence	☒ Review	AC	3/25/11
J. Rich	☒ Concurrence	☒ Review		4-1-11
D. Kilburn	☒ Concurrence	☒ Review		3/25/11
T. Hynum	☒ Concurrence	☒ Review	TH	4/1/11
C. Rhodes	☒ Concurrence	☒ Review		04/04/11

Note: Marking the Concurrence box indicates the individual agrees with the applicable text as it relates to their individual discipline and Work Section (e.g., Engineer; Risk Assessor; Geology; Compliance; Policy/Management), as applicable. Marking the Review box indicates the individual has read the document.

DISPOSITION:

Return to Marilyn

COMMENTS: Arkwood 5 Year Review

ARKANSAS POLLUTION CONTROL AND ECOLOGY COMMISSION

FILED
Ark. REGISTER DIV.
11 SEP 16 PM 3:34
MARK HUCKABEE
SECRETARY OF STATE
STATE OF ARKANSAS
BY_____

REGULATION NO. 2

REGULATION ESTABLISHING WATER QUALITY STANDARDS FOR SURFACE WATERS OF THE STATE OF ARKANSAS

Adopted by the Arkansas Pollution Control and Ecology Commission on (August 26, 2011)

Arkansas Pollution Control and Ecology Commission
Regulation No. 2, As Amended

Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas

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ARKANSAS
POLLUTION CONTROL
AND ECOLOGY COMMISSION

Regulation No. 2, As Amended

Regulation Establishing
Water Quality Standard for Surface Waters
of the State of Arkansas

CHAPTER 1: AUTHORITY, GENERAL PRINCIPLES, AND COVERAGE

Reg. 2.101 Authority

Pursuant to the provisions of SubChapter 2 of the Arkansas Water and Air Pollution Control Act (Act 472 of the Acts of Arkansas for 1949, as amended; Ark. Code Ann. 8-4-101 et seq, and in compliance with the requirements of the Federal Water Pollution Control Act, as amended, the Arkansas Pollution Control and Ecology Commission, (hereinafter referred to as "Commission") hereby promulgates this Regulation No. 2, as amended, establishing water quality standards for all surface waters, interstate and intrastate, of the State of Arkansas.

Reg. 2.102 Purpose

The water quality standards herein set forth are based upon present, future and potential uses of the surface waters of the State and criteria developed from statistical evaluations of past water quality conditions and a comprehensive study of least-disturbed, ecoregion reference streams. The standards are designed to enhance the quality, value and beneficial uses of the water resources of the State of Arkansas, to aid in the prevention, control and abatement of water pollution, to provide for the protection and propagation of fish and wildlife and to provide for recreation in and on the water. In establishing these standards, the Commission has taken into consideration the use and value of the streams for public water supplies, commercial, industrial and agricultural uses, aesthetics, recreational purposes, propagation of fish and wildlife, other beneficial uses, and views expressed at public hearings. The State of Arkansas has an exceptionally large volume of high quality water. With few exceptions the streams and lakes of Arkansas contain waters of a quality suitable for all legitimate uses without the necessity of unreasonable water treatment. Where man-made pollution exists, substantial progress has been made in abatement. It is the purpose of these regulations to preserve and protect the quality of this water so that it shall be reasonably available for all beneficial uses and thus promote the social welfare and economic well-being of the people of the State. It is further the purpose of these regulations to designate the uses for which the various waters of the State shall be maintained and protected; to prescribe the water quality standards required to sustain the designated uses; and to prescribe regulations necessary for implementing, achieving and maintaining the prescribed water quality.

Reg. 2.103 Commission Review

The water quality standards herein established will be reviewed by the Commission at least once each three-year period beginning as of October 18, 1972. Revisions may be made to take into account changing technology of waste production, treatment and removal, advances in knowledge of water quality requirements, and other relevant factors.

Reg. 2.104 Policy for Compliance

It shall be the policy of the Department to provide, on a case-by-case basis, a reasonable time for an existing facility to comply with new or revised water quality based effluent limits. Consequently, compliance schedules may be included in NPDES permits at the time of renewal to require compliance with new water quality standards at the earliest practicable time; but not to exceed three years from effective date of permit.

Reg. 2.105 Environmental Improvement Projects

The Commission may, after consideration of the information provided pursuant to Appendix B, grant modifications to the General and Specific Standards (Chapters 4 and 5, herein) or establish a subcategory(ies) of use(s) (Reg. 2.307, herein) for completion of long-term Environmental Improvement Projects (EIP), as provided by Act 401 of 1997, codified at A.C.A. § 8-5-901 et seq.

Reg. 2.106 Definitions

304(a) Guidance: Refers to Section 304(a) of the Clean Water Act which requires the Environmental Protection Agency to publish and periodically update ambient water quality criteria which will be protective of human health and the environment.

Abatement: The reduction in degree or intensity of pollution.

Act: Clean Water Act, as amended (33 U.S.C. 1251, et. seq.)

Acute toxicity: A statistically significant difference (at the 95 percent confidence level) in mortality or immobilization between test organisms and a control measured during a specified period of time which is normally less than 96 hours.

Algae: Simple plants without roots, stems or leaves which contain chlorophyll and are capable of photosynthesis.

All Flows: Takes into account all flows and data collected throughout the year, including elevated flows due to rainfall events.

Aquatic biota: All those life forms which inhabit the aquatic environment.

Base Flows: That portion of the stream discharge that is derived from natural storage (i.e., outflow from groundwater or swamps), or sources other than recent rainfall that creates surface runoff. Also called sustaining, normal, dry weather, ordinary, or groundwater flow.

Chronic Toxicity: A statistically significant difference (at the 95 percent confidence level) in mortality or immobilization, reduced reproduction or limited growth between test organisms and a control measured during a substantial segment of the life span of the test organism.

Commission: The Arkansas Pollution Control and Ecology Commission.

Continuing Planning Process (CPP): A document which describes the principal processes of the State's water quality management programs. The CPP is not a regulation.

Critical flows: The flow volume used as background dilution flows in calculating concentrations of pollutants from permitted discharges. These flows may be adjusted for mixing zones. The following critical flows are applicable:

For a seasonal fishery - 1 cfs minus the design flow of any point source discharge (may not be less than zero).

For human health criteria - harmonic mean flow or long term average flow.

For minerals criteria - harmonic mean flow or 4 cfs, except in those waters listed in Reg. 2.511. Those waters in Reg. 2.511 which are noted with an asterisk will have a critical flow of 4 cfs. (Also see minerals implementation procedure in CPP)

For all others - the critical flow will be Q7-10.

Critical season: That period of the year when water temperatures exceed 22°C. This is normally the hot, dry season and after the majority of the fish spawning activities have ceased. This season occurs during a different time frame in different parts of the state, but normally exists from about mid-May to mid-September.

Cumulative: Increasing by successive additions.

Department: The Arkansas Department of Environmental Quality (ADEQ).

Degradation: The act or process of causing any decrease in quality.

Design Flow: A facility discharge flow of process wastewater that is authorized in a NPDES permit

Designated Uses: Those uses specified in the water quality standards for each waterbody or stream segment whether or not they are being attained.

Discharge: A discrete point source of waste or wastewater entering into waters of the State.

Dissolved oxygen (DO): A measure of the concentration of oxygen in solution in a liquid.

Ecoregion: A large area of landscape with relatively homogenous physical, chemical and biological characteristics.

Escherichia coli: a rod shaped gram negative bacillus (0.5 – 3-5 microns) abundant in the large intestines of mammals.

Endemic: Native to and confined to a specific region.

Existing Uses: Those uses listed in Section 303 (c)(2) of the Act (i.e., public water supplies, propagation of fish and wildlife, recreational uses, agricultural and industrial water supplies and navigation) which were actually attained in the waterbody on or after November 28, 1975, whether or not they are included in the water quality standards.

Fecal coliform bacteria: Gram-negative nonspore-forming rods that ferment lactose in 24 ± 2 hours at 44.5 ± 0.2°C with the production of gas in a multiple-tube procedure or produce acidity with blue colonies in a membrane filter procedure. For the purpose of this regulation, the genus *Klebsiella* is not included in this definition.

Fishable/swimmable: Refers to one of the national goals of the Clean Water Act as stated in Section 101(a)(2), "...provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water."

Fishery: The designated use of a waterbody determined by the fish community and other associated aquatic life.

Hardness: A measure of the sum of multivalent metallic cations expressed as calcium carbonate ($CaCO_3$).

Harmonic Mean Flow: The reciprocal of the mean of the reciprocals of daily flow measurements.

Headwater: The source of a stream.

Heavy metals: A general name given to the ions of metallic elements heavier than iron, such as cadmium, lead, mercury, copper, zinc and chromium.

Human Health Criteria: Levels of toxicants in ambient water which will not manifest adverse health effects in humans.

Hypolimnion: That portion of a thermally stratified lake or reservoir below the zone in which the rate of temperature change is greatest. An area of minimal circulation and mixing.

Impairment: Exceedences of the water quality standards by a frequency and/or magnitude which results in any designated use of a waterbody to fail to be met as a result of physical, chemical or biological conditions.

Indicator species: Species of fish which may not be dominant within a species group and may not be limited to one area of the state, but which, because of their presence, are readily associated

with a specific ecoregion. All indicator species need not be present to establish a normal or representative fishery.

Indigenous: Produced, growing or living naturally in a particular region or environment.

Interstate: Of, connecting, or existing between two or more states.

Intrastate: Existing or occurring within a state.

Ionizing radiation: Gamma rays and x-rays; alpha and beta particles, high speed electrons, neutrons, protons and other nuclear particles; but not sound or radio waves, or visible, infrared or ultraviolet light.

Key species: Fishes which are normally the dominant species (except for some ubiquitous species) within the important groups such as fish families or trophic feeding levels. All specified key species need not be present to establish a normal or representative fishery.

Long Term Average Flow: An average annual stream flow based on a period of record which reflects the typical annual variability.

Milligrams per liter (mg/l): The concentration at which one milligram is contained in a volume of one liter; one milligram per liter is equivalent to one part per million (ppm) at unit density.

Mixing zone: An area where an effluent discharge undergoes mixing with the receiving waterbody. For toxic discharges a zone of initial dilution, (ZID) may be allowed within the mixing zone.

Mouth: The point of confluence where a stream enters a larger body of water.

Natural background: Ambient conditions or concentrations of a parameter due to non-anthropogenic sources; natural background does not typically interfere with support of designated uses nor the level of aquatic life expected to occur naturally at the site.

Naturally occurring excursions: Temporary deviation from natural background due to natural events such as severe storm events, drought, temperature extremes, etc.

Nonpoint source: A contributing factor to water pollution that is not confined to an end-of-the-pipe discharge, i.e., stormwater runoff, agricultural or silvicultural runoff, irrigation return flows, etc.

NTU (Nephelometric Turbidity Unit): A measure of turbidity based upon a comparison of the intensity of light scattered by a sample of water under defined conditions with the intensity of light scattered by a standard reference suspension; NTU are considered comparable to the previously reported JTU (Jackson Turbidity Units). May also be reported as FTU (Formazin Turbidity Units) in equivalent units.

Nuisance species: Those organisms capable of interfering with the beneficial use of water.

Nutrient: Any substance assimilated by an organism which promotes growth and replacement of cellular constituents. The usual nutrient components of water pollution are nitrogen, phosphorus and carbon.

Objectionable algal densities: Numbers of total algae which would interfere with a beneficial use.

Persistent: Degraded only slowly by the environment.

pH: The negative logarithm of the effective hydrogen-ion concentration in gram equivalents per liter.

Picocurie: One trillionth (10^{-13}) of a curie which is a unit of quantity of any radioactive nuclide in which 3.7×10^{10} disintegrations occur per second.

Point source: A discharge from a discrete point.

Q7-10: A flow volume equal to or less than the lowest mean discharge during 7 consecutive days of a year which, on the average, occurs once every 10 years.

Primary season: That period of the year when water temperatures are 22°C or below. This includes the major part of the year from fall through spring, including the spawning season of most fishes. It normally occurs from about mid-September to mid-May.

Primary Season Critical flow: A flow volume equal to the lowest mean discharge during 7 consecutive days during the period when stream flows increase substantially and water temperatures are cooler and, on the average, occurs once in every 10 years. In streams with watersheds less than 10 mi^2 this flow is one (1) CFS minus the design flow of any point source discharge.

Regulated-flow stream: Those streams restricted by structures which have the ability to control stream flow.

Seasonal fishery: The designated fishery use that occurs in some waterbodies only during the period when stream flows increase substantially and water temperatures are cooler. This is normally during the months of December through May.

Surface water: That water contained on the exterior or upper portion of the earth's surface as opposed to groundwater.

Synergism: Cooperative action of discrete agents such that the total effect is greater than the sum of the effects taken independently.

Total dissolved solids (TDS): The total soluble organic and inorganic material contained in water; includes those materials, both liquid and solid, in solution and otherwise, which pass through a standard glass fiber filter disk and are not volatilized during drying at 180°C.

Trout fishery: Water which is suitable for the growth and survival of trout, usually characterized as high quality water having a maximum summer temperature of 68°F or less.

Use attainability analysis: A structured scientific assessment of the factors affecting the attainment of the fishable/swimmable use which may include physical, chemical, biological and economic factors.

Waterbodies, waterways, waters: In this document, refers to surface waters of the state as described in Act 472.

Water Effects Ratio (WER): A specific pollutant's acute or chronic value measured from a specific site ambient water, divided by the respective acute or chronic toxicity of the same pollutant in laboratory water.

Zone of Initial Dilution (ZID): An area within the mixing zone where a toxic effluent discharge initiates mixing in the receiving waterbody. This is an area where acute water quality criteria may be exceeded, but acute toxicity may not occur.

CHAPTER 2: ANTIDEGRADATION POLICY

Reg. 2.201 Existing Uses

Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

Reg. 2.202 High Quality Waters

Where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that (1) there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and (2) that the provisions of the Arkansas Water Quality Management Plan be implemented with regard to nonpoint sources.

Reg. 2.203 Outstanding Resource Waters

Where high quality waters constitute an outstanding state or national resource, such as those waters designated as extraordinary resource waters, ecologically sensitive or natural and scenic waterways, those uses and water quality for which the outstanding waterbody was designated shall be protected by (1) water quality controls, (2) maintenance of natural flow regime, (3) protection of instream habitat, and (4) encouragement of land management practices protective of the watershed. It is not the intent of the ERW designated use definition to imply that ERW status dictates regulatory authority over private land within the watershed, other than what exists under local, state, or federal law. The Arkansas Natural Resources Commission has responsibility for the regulation of the withdrawal of water from streams and reservoirs, and such withdrawals are not within the jurisdiction of this regulation.

Reg. 2.204 Thermal Discharges

In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with Section 316 of the Act.

CHAPTER 3: WATERBODY USES

Reg. 2.301 Introduction

Substantially all the waters of the State have been designated for specific uses as shown in Appendix A. In those instances where waters are classified for multiple uses and different criteria are specified for each use, the criteria to protect the most sensitive use shall be applicable.

Reg. 2.302 Designated Uses

The designated uses are defined as follows:

(A) Extraordinary Resource Waters - This beneficial use is a combination of the chemical, physical and biological characteristics of a waterbody and its watershed which is characterized by scenic beauty, aesthetics, scientific values, broad scope recreation potential and intangible social values.

(B) Ecologically Sensitive Waterbody - This beneficial use identifies segments known to provide habitat within the existing range of threatened, endangered or endemic species of aquatic or semi-aquatic life forms.

(C) Natural and Scenic Waterways - This beneficial use identifies segments which have been legislatively adopted into a state or federal system.

(D) Primary Contact Recreation - This beneficial use designates waters where full body contact is involved. Any streams with watersheds of greater than 10 mi^2 are designated for full body contact. All streams with watersheds less than 10 mi^2 may be designated for primary contact recreation after site verification.

(E) Secondary Contact Recreation - This beneficial use designates waters where secondary activities like boating, fishing or wading are involved.

(F) Fisheries - This beneficial use provides for the protection and propagation of fish, shellfish and other forms of aquatic life. It is further subdivided into the following subcategories:

(1) <u>Trout</u> - water which is suitable for the growth and survival of trout (Family: Salmonidae).

(2) <u>Lakes and Reservoirs</u> - water which is suitable for the protection and propagation of fish and other forms of aquatic

life adapted to impounded waters. Generally characterized by a dominance of sunfishes such as bluegill or similar species, black basses and crappie. May include substantial populations of catfishes such as channel, blue and flathead catfish and commercial fishes including carp, buffalo and suckers. Forage fishes are normally shad or various species of minnows. Unique populations of walleye, striped bass and/or trout may also exist.

(3) Streams - water which is suitable for the protection and propagation of fish and other forms of aquatic life adapted to flowing water systems whether or not the flow is perennial.

(a) Ozark Highlands Ecoregion - Streams supporting diverse communities of indigenous or adapted species of fish and other forms of aquatic life. Fish communities are characterized by a preponderance of sensitive species and normally dominated by a diverse minnow community followed by sunfishes and darters. The community may be generally characterized by the following fishes:

Key Species	**Indicator Species**
Duskystripe, Bleeding or Cardinal shiner	Banded sculpin
Northern hogsucker	Ozark madtom
Slender madtom	Southern redbelly dace
"Rock" basses	Whitetail shiner
Rainbow and/or Orangethroat darters	Ozark minnow
Smallmouth bass	

(b) Boston Mountains Ecoregion - Streams supporting diverse communities of indigenous or adapted species of fish and other forms of aquatic life. Fish communities are characterized by a major proportion of sensitive species; a diverse, often darter-dominated community exists but with nearly equal proportions of minnows and sunfishes. The community may be generally characterized by the following fishes:

Key Species	Indicator Species
Bigeye shiner	Shadow bass
Black redhorse	Wedgespot shiner
Slender madtom	Longnose darter
Longear sunfish	Fantail darter
Greenside darter	
Smallmouth bass	

(c) Arkansas River Valley Ecoregion - Streams supporting diverse communities of indigenous or adapted species of fish and other forms of aquatic life. Fish communities are characterized by a substantial proportion of sensitive species; a sunfish- and minnow-dominated community exists but with substantial proportions of darters and catfishes (particularly madtoms). The community may be generally characterized by the following fishes:

Key Species	Indicator Species
Bluntnose minnow	Orangespotted sunfish
Golden redhorse	Blackside darter
Yellow bullhead	Madtoms
Longear sunfish	
Redfin darter	
Spotted bass	

(d) Ouachita Mountains Ecoregion - Streams supporting diverse communities of indigenous or adapted species of fish and other forms of aquatic life. The fish community is characterized by a major proportion of sensitive species; a minnow-sunfish-dominated community exists, followed by darters. The community may be generally characterized by the following fishes:

Key Species	Indicator Species
Bigeye shiner	Shadow bass
Northern hogsucker	Gravel chub
Freckled madtom	Northern studfish
Longear sunfish	Striped shiner
Orangebelly darter	
Smallmouth bass	

(e) Typical Gulf Coastal Ecoregion - Streams supporting diverse communities of indigenous or adapted species of fish and other forms of aquatic life. Fish communities are characterized by a limited proportion of sensitive species; sunfishes are distinctly dominant followed by darters and minnows. The community may be generally characterized by the following fishes:

Key Species	**Indicator Species**
Redfin shiner	Pirate perch
Spotted sucker	Flier
Yellow bullhead	Spotted sunfish
Warmouth	Dusky darter
Slough darter	Creek chubsucker
Redfin pickerel	Banded pygmy sunfish

(f) Springwater-influenced Gulf Coastal Ecoregion - Streams supporting diverse communities of indigenous or adapted species of fish and other forms of aquatic life. Fish communities are characterized by a substantial proportion of sensitive species; sunfishes normally dominate the community and are followed by darters and minnows. The community may be generally characterized by the following fishes:

Key Species	**Indicator Species**
Redfin shiner	Pirate perch
Blacktail redhorse	Golden redhorse
Freckled madtom	Spotted bass
Longear sunfish	Scaly sand darter
Creole darter	Striped shiner
Redfin pickerel	Banded pygmy sunfish

(g) Least-altered Delta Ecoregion - Streams supporting diverse communities of indigenous or adapted species of fish and other forms of aquatic life. Fish communities are characterized by an insignificant proportion of sensitive species; sunfishes are distinctly dominant followed by minnows. The community may be generally characterized by the following fishes:

Key Species	Indicator Species
Ribbon shiner	Pugnose minnow
Smallmouth buffalo	Mosquitofish
Yellow bullhead	Pirate perch
Bluegill	Tadpole madtom
Bluntnose darter	Banded pygmy sunfish
Largemouth bass	

(h) Channel-altered Delta Ecoregion - Streams supporting diverse communities of indigenous or adapted species of fish and other forms of aquatic life. Fish communities are characterized by an absence of sensitive species; sunfishes and minnows dominate the population followed by catfishes. The community may be generally characterized by the following fishes:

Key Species	Indicator Species
Blacktail shiner	Mosquitofish
Drum	Gizzard shad
Carp	Emerald shiner
Channel catfish	
Green sunfish	
Spotted gar	

(G) Domestic Water Supply - This beneficial use designates water which will be protected for use in public and private water supplies. Conditioning or treatment may be necessary prior to use.

(H) Industrial Water Supply - This beneficial use designates water which will be protected for use as process or cooling water. Quality criteria may vary with the specific type of process involved and the water supply may require prior treatment or conditioning.

(I) Agricultural Water Supply - This beneficial use designates waters which will be protected for irrigation of crops and/or consumption by livestock.

(J) Other Uses - This category of beneficial use is generally used to designate uses not dependent upon water quality, such as hydroelectric power generation and navigation.

Reg. 2.303 Use Attainability Analysis

(A) A use attainability analysis must be conducted to justify the following conditions:

(1) Removing a fishable/swimmable designated use, which is not an existing use, from a waterbody; or

(2) To identify a subcategory of a fishable/swimmable use which requires less stringent criteria.

(B) In order to remove a designated fishable/swimmable use which is not an existing use, or identify subcategories of a fishable/swimmable use which require less stringent criteria, it must be demonstrated that the designated use is not attainable because:

(1) naturally occurring pollutant concentrations prevent the attainment of the use; or

(2) natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or

(3) human caused conditions or sources of pollution prevent attainment of the use and cannot be remedied or would cause more environmental damage to correct than leave in place; or

(4) dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

(5) physical conditions related to the natural features of a water body, such as lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or

(6) controls more stringent than those required by Section 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

The scope of a use attainability analysis shall be in direct proportion to the project involved and the resource value of the receiving stream. Methods for conducting a use attainability analysis

may be found in the November 1983 EPA publication entitled *Technical Support Manual: Waterbody Surveys and Assessments for Conducting Use Attainability Analyses*. Other scientific methods, including the use of existing technical data, may be used for justifying the removal of a designated use; provided the methods are agreed upon prior to the study. Such other methods may include the use of information previously gathered through technical studies and/or use attainability analysis. Use attainability analysis procedures may be found in the State of Arkansas Continuing Planning Process document (CPP). Any waterbody on which a use attainability analysis is approved shall be so listed in Appendix A with appropriate criteria.

Reg. 2.304 Physical Alteration of Habitat

(A) Significant physical alterations of the habitat within extraordinary resource waters, ecologically sensitive waterbodies or natural and scenic waterways are not allowed. For the purposes of this subsection, the Director may determine that a proposed physical alteration of the habitat is not significant if it is demonstrated that:

(1) the proposed physical alteration of habitat (a) will not impair water quality; (b) will not impair the natural flow regime; and (c) will not impair the habitat of fish, shellfish or other forms of aquatic life; and.
(2) there is no feasible alternative to the proposed project.

A request under this subsection for a determination that a proposed physical alteration of habitat is not significant shall be submitted to the Director in accordance with the procedures set forth in Appendix D.

(B) In other waters, where significant physical alterations of the habitat are proposed, the Department must be assured that no significant degradation of any existing use or water quality necessary to protect that use will occur. In order to make such determinations, the Department may require an evaluation of all practicable alternatives to the project including: an environmental assessment of the impacts of each alternative, an engineering and economic analysis, and a socio-economic evaluation of the project in the local area.

Reg. 2.305 Short Term Activity Authorization

The Director may authorize, with whatever conditions deemed necessary and without public notice, short term activities which might cause a violation of the Arkansas Water Quality Standards. This authorization is subject to the provisions that such activity is essential to the protection or promotion of the public interest and that no permanent or long-term impairment of beneficial uses is likely to result from such activity. Nothing herein shall be intended to supersede existing state and federal permitting processes or requirements.

Activities eligible for authorization include, but are not limited to:

(A) wastewater treatment facility maintenance;

(B) fish eradication projects;

(C) mosquito abatement projects;

(D) algae and weed control projects;

(E) dredge and fill projects;

(F) construction activities; or

(G) activities which result in overall enhancement or maintenance of beneficial uses.

The Director shall specify the degree of variance from the standards, the time limit of activity and restoration procedures where applicable.

Such authorization shall not be granted for activities which result in the adverse impact on any federally threatened or endangered species or on critical habitat of such species.

Reg. 2.306 Procedures for Removal of Any Designated Use Except Fishable/Swimmable, Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway, and Modification of Water Quality Criteria not Related to These Uses

This procedure is applicable in those cases where the Commission chooses to establish less stringent water quality criteria without affecting a fishable/swimmable use or the designated use of Extraordinary Resource Water or Ecologically Sensitive Waterbody or Natural and Scenic Waterway, or when the Commission chooses to remove a use which is not an existing use other than fishable/swimmable, Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway.

The Commission may allow a modification of the water quality criteria or the removal of a use which is not a fishable/swimmable use or designated use of Extraordinary Resource Water or Ecologically Sensitive Waterbody or Natural and Scenic Waterway to accommodate important economic or social development in a local area, if existing uses are maintained and protected fully and the requirements for public participation in the Continuing Planning Process are met. As a minimum, the following information shall be submitted to the Director before initiation of the public participation process:

(A) Technological or economic limits of treatability.

(B) Economic analysis of the impact on the local area.

(C) Documentation that the use being removed is not an existing use and that all other designated uses will be protected.

Modifications made pursuant to this section may be required to be rejustified for continued support. As community water needs change, or technological advancement, including long-term environmental improvement projects, make treatment options more practicable, the Commission may reevaluate the need for the reestablishment of the more stringent water quality criteria or the removed use.

Any waterbody on which such alterations are approved will be so listed in Appendix A with the applicable changes noted.

Reg. 2.307 Use Subcategories

The Commission may adopt sub-categories of a use and set the appropriate criteria to reflect varying needs of such sub-categories of uses; for instance, to differentiate between cold and warm water fisheries or agricultural and domestic water supply.

Reg. 2.308 Site Specific Criteria

In establishing criteria:

(A) Establish numerical criteria values based on:

(1) 304(a) Guidance; or

(2) 304(a) Guidance modified to reflect site conditions [WER] or

(3) other scientifically defensible methods;

(B) Establish narrative criteria or criteria based upon biomonitoring methods where numerical criteria cannot be established or to supplement numerical criteria.

Reg. 2.309 Temporary Variance

A temporary variance to the water quality standards may be allowed for an existing permitted discharge facility. The variance will be for specified constituents and shall be no longer than a three year period. A variance must be approved by the Arkansas Pollution Control and Ecology Commission and the U.S. Environmental Protection Agency. A variance will be considered when it is determined that a standard, including designated use, can ultimately be attained or when preliminary evidence indicates that a site specific amendment of the standards may be appropriate. A variance may be granted only to the applicant and will not apply to other discharges into the specified waterbody.

Reg. 2.310 Procedure for the Removal of the Designated Use of Extraordinary Resource Water, or Ecologically Sensitive Waterbody, or Natural and Scenic Waterway for the Purpose of Constructing a Reservoir on a Free Flowing Waterbody to Provide A Domestic Water Supply.

(A) An extraordinary resource water, ecologically sensitive waterbody, or natural and scenic waterway designated use may be removed from a free flowing waterbody for the purpose of constructing a reservoir to provide a domestic water supply, if it can be demonstrated that:

(1) the sole purpose for the funding and construction of the reservoir is to provide a domestic water supply; and

(2) there is no feasible alternative to constructing a reservoir in order to meet the domestic water needs of the citizens of the State of Arkansas.

The limitation in Subsection A(1) of this section does not prohibit incidental uses of the reservoir that are consistent with the use of domestic water supply.

(B) A petition to initiate rulemaking to remove an Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway designated use from a free flowing waterbody in order to construct a reservoir to provide a domestic water supply may be submitted to the Commission by a regional water distribution district, public facilities board, public water authority, or other public entity engaged in providing water to the public. Such petition, at a minimum, shall include:

(1) A map depicting the location of the proposed project and the area to be impounded;
(2) A description of the proposed project, including detailed design plans;
(3) A certification that the proposed structure to impound the free flowing stream shall be funded and constructed solely for the purpose of providing a domestic water supply;
(4) An evaluation of all alternatives to the proposed project, including:
    (i) an environmental assessment of the impacts of each alternative on the instream and downstream water quality, the instream habitat, and the habitat and plant and animal life in the area upstream, downstream, and to be inundated by the proposed project;
    (ii) the costs associated with, and an economic analysis for, each alternative;
    (iii) an engineering analysis for each alternative; and
    (iv) a socio-economic evaluation of the project to the local area and to the State as a whole; and
(5) Information and supporting documentation which address the criteria set forth in Appendix E;
(6) A recommendation to the Commission from the Director on whether or not the designated use should be maintained based upon a review of the information and supporting documentation required to be considered in Appendix E. The Director shall provide the petitioner with the Director's recommendation within 180 days of the Department's receipt of the petitioner's Appendix E submittal. If the Director does not deliver a recommendation to the petitioner within the 180 day time period, the petitioner may file its petition under this section without including a recommendation from the Director. The Director may submit a recommendation to the Commission at any time not less than 30 days prior to the Commission's final decision on the petition.
(7) A description of any proposed mechanisms for protecting the domestic water supply, including but not limited to prohibitions to be placed on commercial and residential development along the proposed shoreline of the impoundment, the controls to be placed on public access to the water supply, and the legal authority for establishing and maintaining these domestic water supply protections; and
(8) Any other submittals required by Regulation No. 8 for a petition to initiate rulemaking.

(C) The Commission, as part of its rulemaking decision, shall determine whether or not a feasible alternative to constructing a reservoir is available to meet the domestic water needs of the citizens of the State of Arkansas. The Commission shall set forth the reasons for its

determination in writing. The designated use of Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway shall not be removed by the Commission if a feasible alternative to constructing a reservoir is available to meet the domestic water needs of the citizens of the State of Arkansas.

(D) The Commission, as part of its rulemaking, shall determine whether or not the sole purpose for the funding and construction of the reservoir is to provide a domestic water supply. The Commission shall set forth the reasons for its determination in writing. The designated use of Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway shall not be removed by the Commission if the purpose for the funding and construction of the reservoir is other than to provide a domestic water supply. In no circumstance, shall the designated use of Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway be removed by the Commission from a free flowing waterbody in order to construct a reservoir for recreational, flood control, or economic purposes other than providing a domestic water supply.

(E) The Commission, as part of its rulemaking decision, shall determine whether or not the designated use of Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway of a given waterbody should be maintained. The Commission shall set forth the reasons for its determination in writing, after considering the Director's recommendation referenced in Subsection (B)(6) of this section and reviewing the information and supporting documentation which address the criteria set forth in Appendix E.

Reg. 2.311 Procedure for the Addition of the Designated Use of Extraordinary Resource Water, or Ecologically Sensitive Waterbody, or Natural and Scenic Waterway to a Waterbody or Segment of a Waterbody.

(A) Any waters of the State may be nominated for designation as an Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway by submitting a petition to initiate rulemaking to the Arkansas Pollution Control and Ecology Commission. Such petition shall include, at a minimum, the following:

(1) Name of petitioner;
(2) Petitioner's mailing address and telephone number;
(3) Name and location description of the waterbody or segment proposed for designation;
(4) A map depicting the waterbody or segment proposed for designation;
(5) Petitioner's interest in the proposed action;
(6) Statement of potential benefits and impacts of the proposed action, including economic benefits and impacts;
(7) Evidence of requests for resolution(s) by appropriate local government(s) regarding the nomination of the waterbody as an Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway;
(8) Supporting documentation for the designation, including information which addresses the factors listed in Appendix F, I (A) through (P);
(9) Recommended language change necessary to affect this proposed change to any Commission regulation; and

(10) Any other submittals required by Regulation No. 8 for a petition to initiate rulemaking.

(B) The Commission, as part of its rulemaking, shall set forth in writing the reasons for its final decision.

CHAPTER 4: GENERAL STANDARDS

Reg. 2.401 Applicability

The general standards outlined below are applicable to all surface waters of the State at all times. They apply specifically with regard to substances attributed to discharges, nonpoint sources or instream activities as opposed to natural phenomena. Waters may, on occasion, have natural background levels of certain substances outside the limits established by these criteria, in which case these criteria do not apply.

Reg. 2.402 Nuisance Species

All waters shall be free from substances attributed to man-caused point or nonpoint source discharges in concentrations that produce undesirable aquatic life or result in the dominance of nuisance species.

Reg. 2.403 Methods

The methods of sample collection, preservation, measurements and analyses shall be in accordance with the EPA's *Guidelines Establishing Test Procedures for the Analysis of Pollutants* (40 CFR, Part 136) or other proven methods acceptable to the Department.

Reg. 2.404 Mixing Zones

Mixing zones are allowed for all parameters not specifically excluded in Reg. 2.404 and the effects of wastes on the receiving stream shall be determined after the wastes have been thoroughly mixed with the mixing zone volume. Outfall structures should be designed to minimize the extent of mixing zones to ensure rapid and complete mixing.

For aquatic life toxic substances in larger streams,(those with Q7-10 flows equal to or greater than 100 cfs), the zone of mixing shall not exceed 1/4 of the cross-sectional area and/or critical flow volume of the stream. The remaining 3/4 of the stream shall be maintained as a zone of passage for swimming and drifting organisms, and shall remain of such quality that stream ecosystems are not significantly affected. In the smaller streams, (Q7-10 flows less than 100 cfs), because of varying local physical and chemical conditions and biological phenomena, a site-specific determination shall be made on the percentage of river width necessary to allow passage of critical free-swimming and drifting organisms so that negligible or no effects are produced on their populations. As a guideline, no more than 2/3 of the cross-sectional area and/or critical flow volume of smaller streams should be devoted to mixing zones thus leaving at least 1/3 of the cross-sectional area free as a zone of passage.

Mixing zones are not allowed for the parameters of bacteria or oil and grease, or where the background flow is less than the critical flow or where the background concentration of a waste parameter exceeds the specific criteria for that waste parameter.

In lakes and reservoirs the size of mixing zones shall be defined by the Department on an individual basis, and the area shall be kept at a minimum.

Mixing zones shall not prevent the free passage of fish or significantly affect aquatic ecosystems.

A mixing zone shall not include any domestic water supply intake.

Reg. 2.405 Biological Integrity

For all waters with specific fisheries use designated in Appendix A, aquatic biota should not be impacted. Aquatic biota should be representative of streams that have the ability to support the designated fishery, taking into consideration the seasonal and natural variability of the aquatic biota community under naturally varying habitat and hydrological conditions; the technical and economic feasibility of the options available to address the relevant conditions; and other factors. An aquatic biota assessment should compare biota communities that are similar in variety and abundance, based upon either an in-stream study including an upstream and downstream comparison, a comparison to a reference water body within the same ecoregion, or a comparison to community characteristics from a composite of reference waters. The reference stream should have similar habitat and hydrologic conditions. Such a comparison should consider the seasonal and natural variability of the aquatic biota community. It is the responsibility of the Department to collect and evaluate the data for an aquatic biota assessment and such data will not be used to develop or impose permit limits.

Reg. 2.406 Color

True color shall not be increased in any waters to the extent that it will interfere with present or projected future uses of these waters.

Reg. 2.407 Taste and Odor

Taste and odor producing substances shall be limited in receiving waters to concentrations that will not interfere with the production of potable water by reasonable water treatment processes, or impart unpalatable flavor to food, fish or result in offensive odors arising from the waters or otherwise interfere with the reasonable use of the water.

Reg. 2.408 Solids, Floating Material and Deposits

Receiving waters shall have no distinctly visible solids, scum or foam of a persistent nature, nor shall there be any formation of slime, bottom deposits or sludge banks.

Reg. 2.409 Toxic Substances

Discharges shall not be allowed into any waterbody which, after consideration of the zone of initial dilution, the mixing zone and critical flow conditions, will cause toxicity to human, animal, plant or aquatic life or interfere with normal propagation, growth, and survival of aquatic biota.

Reg. 2.410 Oil and Grease

Oil, grease or petrochemical substances shall not be present in receiving waters to the extent that they produce globules or other residue or any visible, colored film on the surface or coat the banks and/or bottoms of the waterbody or adversely affect any of the associated biota.

CHAPTER 5: SPECIFIC STANDARDS

Reg. 2.501 Applicability

The following specific standards shall apply to all surface waters of the state at all times except during periods when flows are less than the applicable critical flow. Streams with regulated flow will be addressed on a case-by-case basis to maintain designated instream uses. These standards apply outside the applicable mixing zone. Waters may, on occasion have natural background levels of certain substances outside the limits established by these criteria, in which case these criteria do not apply to the naturally occurring excursions.

Reg. 2.502 Temperature

Heat shall not be added to any waterbody in excess of the amount that will elevate the natural temperature, outside the mixing zone, by more than 5°F (2.8°C) based upon the monthly average of the maximum daily temperatures measured at mid-depth or three feet (whichever is less) in streams, lakes or reservoirs. Maximum allowable temperatures from man-induced causes in the following waters are:

Waterbodies	**Limit °C (°F)**
Streams	
Ozark Highlands	29 (84.2)
Boston Mountains	31 (87.8)
Arkansas River Valley	31 (87.8)
Ouachita Mountains	30 (86.0)
Springwater-influenced Gulf Coastal	30 (86.0)
Typical Gulf Coastal	30 (86.0)
Least-Altered Delta	30 (86.0)
Channel-Altered Delta	32 (89.6)
White River (Dam #1 to mouth)	32 (89.6)
St.Francis River	32 (89.6)
Mississippi River	32 (89.6)
Arkansas River	32 (89.6)
Ouachita River (L. Missouri R.to state line)	32 (89.6)
Red River	32 (89.6)
Lakes and Reservoirs	32 (89.6)
Trout waters	20 (68.0)

Temperature requirements shall not apply to off-stream privately-owned reservoirs constructed primarily for industrial cooling purposes and financed in whole or in part by the entity or successor entity using the lake for cooling purposes.

Reg. 2.503 Turbidity

There shall be no distinctly visible increase in turbidity of receiving waters attributable to municipal, industrial, agricultural, other waste discharges or instream activities. Specifically, in no case shall any such waste discharge or instream activity cause turbidity values to exceed the base flows values listed below. Additionally, the non-point source runoff shall not result in the exceedance of the in stream all flows values in more than 20% of the ADEQ ambient monitoring network samples taken in not less than 24 monthly samples.

Waterbodies	Base Flows Values (NTU)	All Flows Values (NTU)
Streams		
Ozark Highlands	10	17
Boston Mountains	10	19
Arkansas River Valley	21	40
Ouachita Mountains	10	18
Springwater-influenced Gulf Coastal	21	32
Typical Gulf Coastal	21	32
Least-Altered Delta	45	84
Channel-Altered Delta	75	250
Arkansas River	50	52
Mississippi River	50	75
Red River	50	150
St. Francis River	75	100
Trout	10	15
Lakes and Reservoirs	25	45

Reg. 2.504 pH

As a result of waste discharges, the pH of water in streams or lakes must not fluctuate in excess of 1.0 unit over a period of 24 hours and pH values shall not be below 6.0 or above 9.0.

Reg. 2.505 Dissolved Oxygen

In streams with watersheds of less than 10 mi^2, it is assumed that insufficient water exists to support a fishery during the critical season. During this time, a D.O. standard of 2 mg/l will apply to prevent nuisance conditions. However, field verification is required in areas suspected of having significant groundwater flows or enduring pools which may support unique aquatic biota. In such waters the critical season standard for the next size category of stream shall apply.

All streams with watersheds of less than 10 mi^2 are expected to support a fishery during the primary season when stream flows, including discharges, equal or exceed 1 cubic foot per second (CFS); however, when site verification indicates that a fishery exists at flows below 1 CFS, such fishery will be protected by the primary standard.

Also, in these streams with watersheds of less than 10 mi^2, where waste discharges are 1 CFS or more, they are assumed to provide sufficient water to support a perennial fishery and, therefore, must meet the dissolved oxygen standards of the next size category of streams.

For purposes of determining effluent discharge limits, the following conditions shall apply:

(A) The primary season dissolved oxygen standard is to be met at a water temperature of 22°C (71.5°F) and at the minimum stream flow for that season. At water temperatures of 10°C (50°F), the dissolved oxygen standard is 6.5 mg/l.

(B) During March, April and May, when background stream flows are 15 CFS or higher, the D.O. standard is 6.5 mg/l in all areas except the Delta Ecoregion, where the primary season D.O. standard will remain at 5 mg/l.

(C) The critical season dissolved oxygen standard is to be met at maximum allowable water temperatures and at Q7-10 flows. However, when water temperatures exceed 22°C (71.6°F), a 1 mg/l diurnal depression will be allowed below the applicable critical standard for no more than 8 hours during any 24-hour period.

The following dissolved oxygen standards must be met:

Waterbodies	**Limit (mg/l)**	
Streams	Primary	Critical
Ozark Highlands		
<10 mi^2 watershed	6	2
10 to 100 mi^2	6	5
>100 mi^2 watershed	6	6
Boston Mountains		
<10 mi^2 watershed	6	2
>10 mi^2 watershed	6	6
Arkansas River Valley		
<10 mi^2 watershed	5	2
10 mi^2 to 150 mi^2	5	3
151 mi^2 to 400 mi^2	5	4
>400 mi^2 watershed	5	5
Ouachita Mountains		
<10 mi^2 watershed	6	2
>10 mi^2 watershed	6	6
Typical Gulf Coastal		

Waterbodies	Limit (mg/l)	
<10 mi^2 watershed	5	2
10 mi^2 to 500 mi^2	5	3
>500 mi^2 watershed	5	5
Springwater-influenced Gulf Coastal		
All size watersheds	6	5
Delta (least-altered and channel altered)		
<10 mi^2 watershed	5	2
10 mi^2 to 100 mi^2	5	3
>100 mi^2 watershed	5	5
Trout Waters		
All size watersheds	6	6

Lakes and Reservoirs

Specific dissolved oxygen standards for lakes and reservoirs shall be 5 mg/l. Effluent limits for oxygen-demanding discharges into impounded waters are promulgated in Regulation #6 of the Arkansas Pollution Control and Ecology Commission. However, the Commission may, after full satisfaction of the intergovernmental coordination and public participation provisions of the state's continuing planning process, establish alternative limits for dissolved oxygen in lakes and reservoirs where studies and other relevant information can demonstrate that predominant ecosystem conditions may be more accurately reflected by such alternate limits; provided that these limits shall be compatible with all designated beneficial uses of named lakes and reservoirs.

Reg. 2.506 Radioactivity

The Rules and Regulations for the Control of Sources of Ionizing Radiation of the Division of Radiological Health, Arkansas Department of Health, limits the maximum permissible levels of radiation that may be present in effluents to surface waters in uncontrollable areas. These limits shall apply for the purposes of these standards, except that in no case shall the levels of dissolved radium-226 and strontium-90 exceed 3 and 10 picocuries/liter, respectively, in the receiving water after mixing, nor shall the gross beta concentration exceed 1000 picocuries/liter.

Reg. 2.507 Bacteria

The Arkansas Department of Health has the responsibility of approving or disapproving surface waters for public water supply and of approving or disapproving the suitability of specifically delineated outdoor bathing places for body contact recreation, and it has issued rules and regulations pertaining to such uses.

For the purposes of this regulation, all streams with watersheds less than 10 mi^2 shall not be designated for primary contact unless and until site verification indicates that such use is attainable. No mixing zones are allowed for discharges of bacteria.

(A) Primary Contact Waters - Between May 1 and September 30, the maximum allowable fecal coliform criteria, calculated as a geometric mean, shall be 200 col/100 ml and the single-sample maximum shall be 400 col/100 ml. Alternatively, in these waters, the maximum allowable *Escherichia coli* criteria, calculated as a geometric mean, shall be 126 col/100 ml and the single-sample maximum shall be 298 col/100 ml in lakes, reservoirs, Extraordinary Resource Waters ("ERW"), Ecologically Sensitive Waterbodies ("ESW"), and Natural and Scenic Waterways ("NSW") or 410 col/100 ml in all other rivers and streams. During the remainder of the calendar year, these criteria may be exceeded, but at no time shall these counts exceed the level necessary to support secondary contact recreation (below).

(B) Secondary Contact Waters – The maximum allowable fecal coliform criteria, calculated as a geometric mean, shall be 1000 col/100 ml and the single-sample maximum shall be 2000 col/100 ml. Alternatively, the maximum allowable *E. coli* criteria, calculated as a geometric mean, shall be 630 col/100 ml and the single-sample maximum shall be 1490 col/100 ml for lakes, reservoirs, ERWs, ESWs, and NSWs or 2050 col/100 ml for all other rivers and streams.

(C) For assessment of ambient waters as impaired by bacteria, the above listed applicable values for *E. coli* shall not be exceeded in more than 25% of samples in no less than eight (8) samples taken during the primary contact season or during the secondary contact season.

Reg. 2.508 Toxic Substances

Toxic substances shall not be present in receiving waters, after mixing, in such quantities as to be toxic to human, animal, plant or aquatic life or to interfere with the normal propagation, growth and survival of the indigenous aquatic biota. Acute toxicity standards may not be exceeded outside the zone of initial dilution. Within the ZID acute toxicity standards may be exceeded but acute toxicity may not occur. Chronic toxicity and chronic numeric toxicity standards shall not be exceeded at, or beyond, the edge of the mixing zone. Permitting of all toxic substances shall be in accordance with the toxic implementation strategy found in the Continuing Planning Process. For non permit issues and as a guideline for evaluating toxic substances not listed in the following tables, the Department may consider No Observed Effect Concentrations (NOECs) or other literature values as appropriate. For the substances listed below, the following standards shall apply:

ALL WATERBODIES - AQUATIC LIFE CRITERIA

Substance	Acute Values (µg/l) (Never to Exceed)	Chronic Values (µg/l) (24-hr Average)
PCBs		0.0140
Aldrin	3.0	
Dieldrin	2.5	0.0019
DDT (& metabolites)	1.1	0.0010
Endrin*	0.18	0.0023
Toxaphene	0.73	0.0002
Chlordane	2.4	0.0043
Endosulfan*	0.22	0.056
Heptachlor	0.52	0.0038
Hexachlorocyclohexane*	2.0	0.080
Pentachlorophenol	$e^{[1.005(pH)-4.869]}$	$e^{[1.005(pH)-5.134]}$
Chlorpyrifos	0.083	0.041

* Total of all isomers

DISSOLVED METALS *

	Acute Criteria (CMC) - µg/L(ppb)		Chronic Criteria (CCC) - ug/L(ppb)	
Substance	Formula	X Conversion	Formula	X Conversion
Cadmium	$e^{[1.128(lnhardness)]-3.828}$	(a)	$e^{[0.7852(lnhardness)]-3.490}$	(c)
Chromium(III)	$e^{[0.819(lnhardness)]+3.688}$	0.316	$e^{[0.8190(lnhardness)]+1.561}$	0.860
Chromium (VI)	16	0.982	11	0.962
Copper	$e^{[0..9422(lnhardness)]-1.464}$	0.960	$e^{[0.8545(lnhardness)]-1.465}$	0.960
Lead	$e^{[1.273(lnhardness)]-1.460}$	(b)	$e^{[1.273(lnhardness)]-4.705}$	(b)
Mercury**	2.4	0.85	0.012**	NONE
Nickel	$e^{[0.8460(lnhardness)]+3.3612}$	0.998	$e^{[0.8460(lnhardness)]+1.1645}$	0.997
Selenium**	20	NONE	5	NONE
Silver	$e^{[1.72(lnhardness)]-6.52}$	0.85	----------	NONE

	Acute Criteria (CMC) - μg/L(ppb)		Chronic Criteria (CCC) - ug/L(ppb)	
Substance	**Formula**	**X Conversion**	**Formula**	**X Conversion**
Zinc	$e^{[0.8473(\ln hardness)]+0.8604}$	0.978	$e^{[0.8473(\ln hardness)]+0.7614}$	0.986
Cyanide**	22.36	NONE	5.2	NONE

* These values may be adjusted by a site specific Water Effects Ratio(WER) as defined in 40 CFR Part 31.36 (c).

(a) Calculated as: 1.136672 - [(ln hardness)(0.041838)]

(b) Calculated as: 1.46203 - [(ln hardness)(0.145712)]

(c) Calculated as: 1.101672 - [(ln hardness)(0.041838)]

* * Expressed as total recoverable. Mercury based on bioaccumulation of residues in aquatic organisms, rather than toxicity.

ALL WATERBODIES - HUMAN HEALTH CRITERIA

Substance	Criteria (ng/l)*
Dioxin (2,3,7,8 TCDD)	0.001
Chlordane	5.0
PCBs (polychlorinated biphenyls)	0.4
alpha Hexachlorocyclohexane	37.3
Beryllium	4000**
Dieldrin	1.2
Toxaphene	6.3

* Criteria based on a lifetime risk factor of 10^{-5}.

** 4000 ng/l is also represented as 4.0 ug/l, which is the Maximum contaminant level (MCL) under the EPA Safe Drinking Water Act [42 U.S.C. s/s 300f et seq. (1974)]

The permittee shall have the option to develop site-specific numerical standards for toxic substances using EPA approved bioassay methodology and guidance. Such guidance may include but may not be limited to *Water Quality Standards Handbook*; *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* (August, 1994); *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms* (EPA 600/4-90/027F. 5th ed. December 2002); *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/600/4-91/002. 4th ed. October 2002) or most recent update thereof.

Only ambient water quality data for dissolved metals generated or approved by ADEQ after March 1, 1993 will be considered in the documentation of background concentrations for the purpose of developing permit limitations.

Reg. 2.509 Nutrients

Materials stimulating algal growth shall not be present in concentrations sufficient to cause objectionable algal densities or other nuisance aquatic vegetation or otherwise impair any designated use of the waterbody. Impairment of a waterbody from excess nutrients are dependent on the natural waterbody characteristics such as stream flow, residence time, stream slope, substrate type, canopy, riparian vegetation, primary use of waterbody, season of the year and ecoregion water chemistry. Because nutrient water column concentrations do not always correlate directly with stream impairments, impairments will be assessed by a combination of factors such as water clarity, periphyton or phytoplankton production, dissolved oxygen values, dissolved oxygen saturation, diurnal dissolved oxygen fluctuations, pH values, aquatic-life community structure and possibly others. However, when excess nutrients result in an impairment, based upon Department assessment methodology, by any established, numeric water quality standard, the waterbody will be determined to be impaired by nutrients.

All point source discharges into the watershed of waters officially listed on Arkansas' impaired waterbody list (303d) with phosphorus as the major cause shall have monthly average discharge permit limits no greater than those listed below. Additionally, waters in nutrient surplus watersheds as determined by Act 1061 of 2003 Regular Session of the Arkansas 84th General Assembly and subsequently designated nutrient surplus watersheds may be included under this Reg. if point source discharges are shown to provide a significant phosphorus contribution to waters within the listed nutrient surplus watersheds.

Facility Design Flow – mgd	Total Phosphorus discharge limit – mg/L
= or > 15	Case by case
3 to <15	1.0
1 to <3	2.0
0.5 to <1.0	5.0
<0.5	Case by Case

For discharges from point sources which are greater than 15 mgd, reduction of phosphorus below 1 mg/L may be required based on the magnitude of the phosphorus load (mass) and the type of downstream waterbodies (e.g., reservoirs, Extraordinary Resource Waters). Additionally, any discharge limits listed above may be further reduced if it is determined that these values are causing impairments to special waters such as domestic water supplies, lakes or reservoirs or Extraordinary Resource Waters.

Reg. 2.510 Oil and Grease

Oil, grease or petrochemical substances shall not be present in receiving waters to the extent that they produce globules or other residue or any visible, colored film on the surface, or coat the

banks and/or bottoms of the watercourses or adversely affect any of the associated biota. As a guideline, oil and grease shall not exceed 10 mg/l average or 15 mg/l maximum when discharging to surface waters. No mixing zones are allowed for discharges of oil and grease.

Reg. 2.511 Mineral Quality

(A) Site Specific Mineral Quality Criteria

Mineral quality shall not be altered by municipal, industrial, other waste discharges or instream activities so as to interfere with designated uses. The following limits apply to the streams indicated, and represent the monthly average concentrations of chloride (Cl^-), sulfate ($SO_4^=$) and total dissolved solids (TDS).

Stream	Concentration-mg/L		
	Cl	$SO_4^=$	TDS
Arkansas River Basin			
Arkansas River (Mouth to L&D #7)	250	100	500
Bayou Meto (Rocky Branch to Bayou Two Prairie)	64*	ER	ER
Bayou Meto (mouth to Bayou Two Prairie)	95**	45**	ER
Bayou Two Prairie (mouth to Rickey Branch)	95**	45**	ER
Rocky Branch Creek	64*	ER	ER
Little Fourche Creek (Willow Springs Branch to Fourche Creek)	ER	ER	179
Willow Springs Branch (McGeorge Creek to Little Fourche Creek)	ER	112	247
McGeorge Creek (headwaters to Willow Springs Branch)	ER	250	432
Arkansas River (L&D #7 to L&D #10)	250	100	500
Cadron Creek	20	20	100
Arkansas River (L&D #10 to Oklahoma line, including Dardanelle Reservoir)	250	120	500
James Fork	20	100	275
Illinois River	20	20	300
Poteau River from Business Hwy 71 to Stateline	120	60	500
Unnamed trib at Waldron	150	70	660
White River Basin			
White River (Mouth to Dam #3)	20	60	430
Big Creek	20	30	270
Unnamed trib from Frit Ind.	ER	48*	ER
Cache River	20	30	270
Bayou DeView (from Mouth to AR Hwy 14)	48	37.3	411.3
Bayou Deview (from AR Hwy 14 to Whistle Ditch)	48	38	411.3
Big Creek (from Whistle Ditch to mouth of Unnamed trib)	58	49	ER
Unnamed trib to Big Creek	71	60	453
Lost Creek Ditch	20	30	270

Stream	Concentration-mg/L		
	Cl	$SO_4^{=}$	TDS
Little Red River (including Greers Ferry Reservoir)	20	30	100
Black River	20	30	270
Strawberry River	20	30	270
Spring River	20	30	290
Eleven Point River	20	30	270
Stennitt Creek	ER	ER	456*
South Fork Spring River	20	30	270
Myatt Creek	20	30	270
Current River	20	30	270
White River (Dam #3 to Missouri line, including Bull Shoals Reservoir)	20	20	180
Buffalo River	20	20	200
Crooked Creek	20	20	200
White River (Missouri line to headwaters, including Beaver Reservoir)	20	20	160
Kings River	20	20	150
West Fork White River	20	20	150
St. Francis River Basin			
St. Francis River (Mouth to 36° N. Lat.)	10	30	330
L'Anguille River	20	30	235
Tyronza River (headwaters to Ditch No. 6 confluence)	20	30	350
Ditch No. 27	ER	480	1200
Ditch No. 6 (mouth to Ditch No. 27 confluence)	ER	210	630
Tyronza River (mouth to Ditch No. 6 confluence)	20	60	350
Little River	20	30	365
Pemiscot Bayou	20	30	380
St. Francis River (36° N. Lat. to 36° 30' N. Lat.)	10	20	180
Ouachita River Basin			
Bayou Bartholomew	50	20	500
Chemin-A-Haut Creek	50	20	500
Overflow Creek	20	30	170
Bayou Macon	30	40	330
Boeuf River	90	30	460
Big Cornie Creek	230	30	500
Little Cornie Creek	200	10	400
Three Creeks	250	10	500
Little Cornie Bayou	200	20	500
Unnamed trib from GLCC 003	538*	35*	519*
Unnamed trib to Little Cornie Bayou	305*	ER	325*
Little Cornie Bayou from unnamed trib to State Line	215*	25*	500*
Walker Branch	180*	ER	970*
Gum Creek	104*	ER	311*
Bayou de L'Outre above Gum Creek	250	90	500

Stream	Concentration-mg/L		
	Cl	$SO_4^{=}$	TDS
Bayou de L'Outre below Gum Creek	250	90	750
Ouachita River (Louisiana line to Camden)	160	40	350
Saline River	20	40	120
Saline River east bifurcation at Holly Creek	ER	250	500
Hurricane Cr above Hurricane Lake Dam	20	250	500
Hurricane Cr from Hurricane Lk. Dam to Ben Ball Brdg	125	730	1210
Hurricane Cr from Ben Ball Bridge to Hwy.270	125	700	1200
Hurricane CR from Hwy 270 to Saline River	100	500	1000
Alcoa unnamed tribs to Hurricane Cr.	125	700	1100
Dry Lost Creek and tribs	ER	560	880
Lost Creek to Little Lost Creek	ER	510	820
Lost Creek below Little Lost Creek	ER	300	550
Holly Creek	30	860	1600
Moro Creek	30	20	260
Smackover Creek	250	30	500
Unnamed trib A to Flat Creek from mouth of EDCC 001 ditch to confluence with Flat Creek	16*	80*	315*
Confluence with unnamed trib A to Flat Creek	23*	125*	475*
Bayou de L'Outre Creek above Loutre Creek	180	ER	970
Unnamed trib UT004 from GLCC	014*	ER	311*
Unnamed trib UT002 from GLCC	278*	90*	500*
Loutre Creek- from Hwy 15 South to the confluence of Bayou de Loutre	256*	997*	1756*
Bayou de Loutre – from Loutre Creek to the discharge for the City of El Dorado - South facility	264*	635*	1236*
Bayou de Loutre – from the discharge for the City of El Dorado-South downstream to the mouth of Gum Creek	250*	431*	966*
Bayou de Loutre – from the mouth of Gum Creek downstream to the mouth of Boggy Creek	250*	345*	780*
Boggy Creek - from the discharge for Clean Harbors El Dorado LLC to the confluence of Bayou de Loutre	631*	63*	1360*
Bayou de Loutre- from the mouth of Boggy Creek downstream to the mouth of Hibank Creek	250*	296*	750*
Bayou de Loutre – from the mouth of Hibank Creek downstream to the mouth of Mill Creek	250*	263*	750*
Bayou de Loutre – from the mouth of Mill Creek downstream to the mouth of Buckaloo Branch	250*	237*	750*
Bayou de Loutre- from the mouth of Buckaloo Branch downstream to the mouth of Bear Creek	250*	216*	750*
Bayou de Loutre – from the mouth of Bear Creek	250*	198*	750*

Stream	Concentration-mg/L		
	Cl	$SO_4^{=}$	TDS
downstream to the final segment of Bayou de Loutre			
Bayou de Loutre (Final segment) – from the mouth of Bear Creek to the Arkansas/Louisiana State Line	250*	171*	750*
Ouachita River (Camden to Carpenter Dam)	50	40	150
Town Creek below Acme tributary	ER	200	700
Unnamed trib from Acme	ER	330	830
Little Missouri River	10	90	180
Muddy Fork Little Missouri	ER	250	500
Bluff Creek and unnamed trib.	ER	651*	1033*
Garland Creek	250	250	500
South Fork Caddo	ER	60	128
Back Valley Creek	ER	250	500
Wilson Creek from its mouth upstream approx. 1.7 miles at the UMETCO property line	56	250	500
Ouachita River (Carpenter Dam to Headwaters, including Lake Ouachita tributaries)	10	10	100
Red River Basin			
Bayou Dorcheat	100	16*	250
Albemarle unnamed trib (AUT) to Horsehead Creek	137*	ER	383*
Horsehead Creek from AUT to mouth	85*	ER	260*
Cypress Creek	250	70	500
Crooked Creek	250	10	500
Dismukes Creek	26	ER	157
Big Creek from Dismukes to Bayou Dorcheat	20	ER	200
Bois d'Arc Creek from Caney Creek to Red River	113*	283*	420*
Caney Creek	113*	283*	420*
Bodcau Creek	250	70	500
Poston Bayou	120	40	500
Kelley Bayou	90	40	500
Red River from Oklahoma to confluence with Little River	250	200	850
Red River from Little River to Louisiana	250	200	500
Sulphur River	120	100	500
Days Creek	250	250	500
McKinney Bayou	180	60	480
Little River	20	20	100
Saline River	20	10	90
Mine Creek from Hwy 27 to Millwood Lake	90	65	700
Cossatot River	10	15	70
Upper Rolling Fork	20	20	100
Rolling Fork from unnamed trib A to DeQueen Lake	130	70	670
Unnamed tribs A and A1 at Grannis	135	70	700
Mountain Fork	20	20	110

Stream	Concentration-mg/L		
	Cl	$SO_4^{=}$	TDS
Mississippi River (Louisiana line to Arkansas River)	60	150	425
Mississippi River (Arkansas River to Missouri line)	60	175	450

ER - ecoregion standard
* - based on critical background flow of 4 cfs
** - These limits shall apply to all tributaries of Bayou Meto and Bayou Two Prairie listed in Appendix A
Any modification of these values must be made in accordance with Reg. 2.306.

(B) Ecoregion Reference Stream Minerals Values

The following values determined from Arkansas' least-disturbed ecoregion reference streams are considered to be the maximum naturally occurring levels. For waterbodies not listed above, any discharge which results in instream concentrations more than 1/3 higher than these values for Cl and $SO_4^{=}$ or more than 15 mg/l, whichever is greater, is considered to be a significant modification of the water quality. Similarly, such modification exists if the following TDS values are exceeded after being increased by the sum of the increases to Cl and SO_4. Such modifications may be made only in accordance with Reg. 2.306.

CALCULATED ECOREGION REFERENCE STREAM VALUES (mg/l)

Ecoregion	Chlorides	Sulfates	TDS
Ozark Highlands	17.3	22.7	250
Boston Mountains	17.3	15	95.3
Arkansas River Valley	15	17.3	112.3
Ouachita Mountains	15	20	142
Gulf Coastal Plains	18.7	41.3	138
Delta	48	37.3	411.3

(C) Domestic Water Supply Criteria

In no case shall discharges cause concentrations in any waterbody to exceed 250, 250 and 500 mg/l of chlorides, sulfates and total dissolved solids, respectively, or cause concentrations to exceed the applicable limits in the streams to which they are a tributary, except in accordance with Reg. 2.306.

Reg. 2.512 Ammonia

Total ammonia nitrogen (N) shall not exceed those values and frequency of occurrence established in the following tables:

(A) The one-hour average concentration of total ammonia nitrogen shall not exceed, more than once every three years on the average, the acute criterion as shown in the following table:

pH-Dependent Values of the CMC (Acute Criterion)- mg/L

pH	Salmonids* Present	Salmonids Absent
6.5	32.6	48.8
6.6	31.3	46.8
6.7	29.8	44.6
6.8	28.1	42.0
6.9	26.2	39.1
7.0	24.1	36.1
7.1	22.0	32.8
7.2	19.7	29.5
7.3	17.5	26.2
7.4	15.4	23.0
7.5	13.3	19.9
7.6	11.4	17.0
7.7	9.65	14.4
7.8	8.11	12.1
7.9	6.77	10.1
8.0	5.62	8.40
8.1	4.64	6.95
8.2	3.83	5.72
8.3	3.15	4.71
8.4	2.59	3.88
8.5	2.14	3.20
8.6	1.77	2.65
8.7	1.47	2.20
8.8	1.23	1.84
8.9	1.04	1.56
9.0	0.885	1.32

* Family of fishes which includes trout

(B) The thirty-day average concentration of total ammonia nitrogen shall not exceed those values shown as the chronic criterion in the following tables:

Temperature and pH-Dependent Values of the CCC (Chronic Criterion) for Fish Early Life Stages Present – mg/L

	Temperature, °C									
pH	**0**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**
6.5	6.67	6.67	6.06	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	6.57	6.57	5.97	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	6.44	6.44	5.86	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	6.29	6.29	5.72	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	6.12	6.12	5.56	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	5.91	5.91	5.37	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	5.67	5.67	5.15	4.53	3.98	3.50	3.08	2.70	2.38	2.09
7.2	5.39	5.39	4.90	4.31	3.78	3.33	2.92	2.57	2.26	1.99
7.3	5.08	5.08	4.61	4.06	3.57	3.13	2.76	2.42	2.13	1.87
7.4	4.73	4.73	4.30	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	4.36	4.36	3.97	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.98	3.98	3.61	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	3.58	3.58	3.25	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	3.18	3.18	2.89	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.80	2.80	2.54	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	2.43	2.43	2.21	1.94	1.71	1.50	1.32	1.16	1.02	0.897
8.1	2.10	2.10	1.91	1.68	1.47	1.29	1.14	1.00	0.879	0.773
8.2	1.79	1.79	1.63	1.43	1.26	1.11	0.973	0.855	0.752	0.661
8.3	1.52	1.52	1.39	1.22	1.07	0.941	0.827	0.727	0.639	0.562
8.4	1.29	1.29	1.17	1.03	0.906	0.796	0.700	0.615	0.541	0.475
8.5	1.09	1.09	0.990	0.870	0.765	0.672	0.591	0.520	0.457	0.401
8.6	0.920	0.920	0.836	0.735	0.646	0.568	0.499	0.439	0.386	0.339
8.7	0.778	0.778	0.707	0.622	0.547	0.480	0.422	0.371	0.326	0.287
8.8	0.661	0.661	0.601	0.528	0.464	0.408	0.359	0.315	0.277	0.244
8.9	0.565	0.565	0.513	0.451	0.397	0.349	0.306	0.269	0.237	0.208
9.0	0.486	0.486	0.442	0.389	0.342	0.300	0.264	0.232	0.204	0.179

Temperature and pH-Dependent Values of the CCC (Chronic Criterion) for Fish Early Life Stages Absent – mg/L

	Temperature, °C									
pH	**0-7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15***	**16***
6.5	10.8	10.1	9.51	8.92	8.36	7.84	7.35	6.89	6.46	6.06
6.6	10.7	9.99	9.37	8.79	8.24	7.72	7.24	6.79	6.36	5.97
6.7	10.5	9.81	9.20	8.62	8.08	7.58	7.11	6.66	6.25	5.86
6.8	10.2	9.58	8.98	8.42	7.90	7.40	6.94	6.51	6.10	5.72
6.9	9.93	9.31	8.73	8.19	7.68	7.20	6.75	6.33	5.93	5.56
7.0	9.60	9.00	8.43	7.91	7.41	6.95	6.52	6.11	5.73	5.37
7.1	9.20	8.63	8.09	7.58	7.11	6.67	6.25	5.86	5.49	5.15
7.2	8.75	8.20	7.69	7.21	6.76	6.34	5.94	5.57	5.22	4.90
7.3	8.24	7.73	7.25	6.79	6.37	5.97	5.60	5.25	4.92	4.61
7.4	7.69	7.21	6.76	6.33	5.94	5.57	5.22	4.89	4.59	4.30
7.5	7.09	6.64	6.23	5.84	5.48	5.13	4.81	4.51	4.23	3.97
7.6	6.46	6.05	5.67	5.32	4.99	4.68	4.38	4.11	3.85	3.61
7.7	5.81	5.45	5.11	4.79	4.49	4.21	3.95	3.70	3.47	3.25
7.8	5.17	4.84	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89
7.9	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89	2.71	2.54
8.0	3.95	3.70	3.47	3.26	3.05	2.86	2.68	2.52	2.36	2.21
8.1	3.41	3.19	2.99	2.81	2.63	2.47	2.31	2.17	2.03	1.91
8.2	2.91	2.73	2.56	2.40	2.25	2.11	1.98	1.85	1.74	1.63
8.3	2.47	2.32	2.18	2.04	1.91	1.79	1.68	1.58	1.48	1.39
8.4	2.09	1.96	1.84	1.73	1.62	1.52	1.42	1.33	1.25	1.17
8.5	1.77	1.66	1.55	1.46	1.37	1.28	1.20	1.13	1.06	0.990
8.6	1.49	1.40	1.31	1.23	1.15	1.08	1.01	0.951	0.892	0.836
8.7	1.26	1.18	1.11	1.04	0.976	0.915	0.858	0.805	0.754	0.707
8.8	1.07	1.01	0.944	0.885	0.829	0.778	0.729	0.684	0.641	0.601
8.9	0.917	0.860	0.806	0.756	0.709	0.664	0.623	0.584	0.548	0.513
9.0	0.790	0.740	0.694	0.651	0.610	0.572	0.536	0.503	0.471	0.442

* At 15 C and above, the criterion for fish ELS absent is the same as the criterion for fish ELS present.

(C) The highest four-day average within a 30-day period should not exceed 2.5 times the chronic values shown above.

(D) For permitted discharges, the daily maximum or 7-day average permit limit shall be calculated using the four-day average value described above as an instream value, after mixing and based on a season when fish early life stages are present and a season when fish early life stages are absent. Temperature values used will be 14° C when fish early life stages are absent and the ecoregion temperature standard for the season when fish early life stages are present. The pH values will be the ecoregion mean value from least-disturbed stream data.

CHAPTER 6: EFFECTIVE DATE

This regulation is effective ten (10) days after filing with the Secretary of State, The State Library, and the Bureau of Legislative Research.

ARKANSAS POLLUTION CONTROL AND ECOLOGY COMMISSION

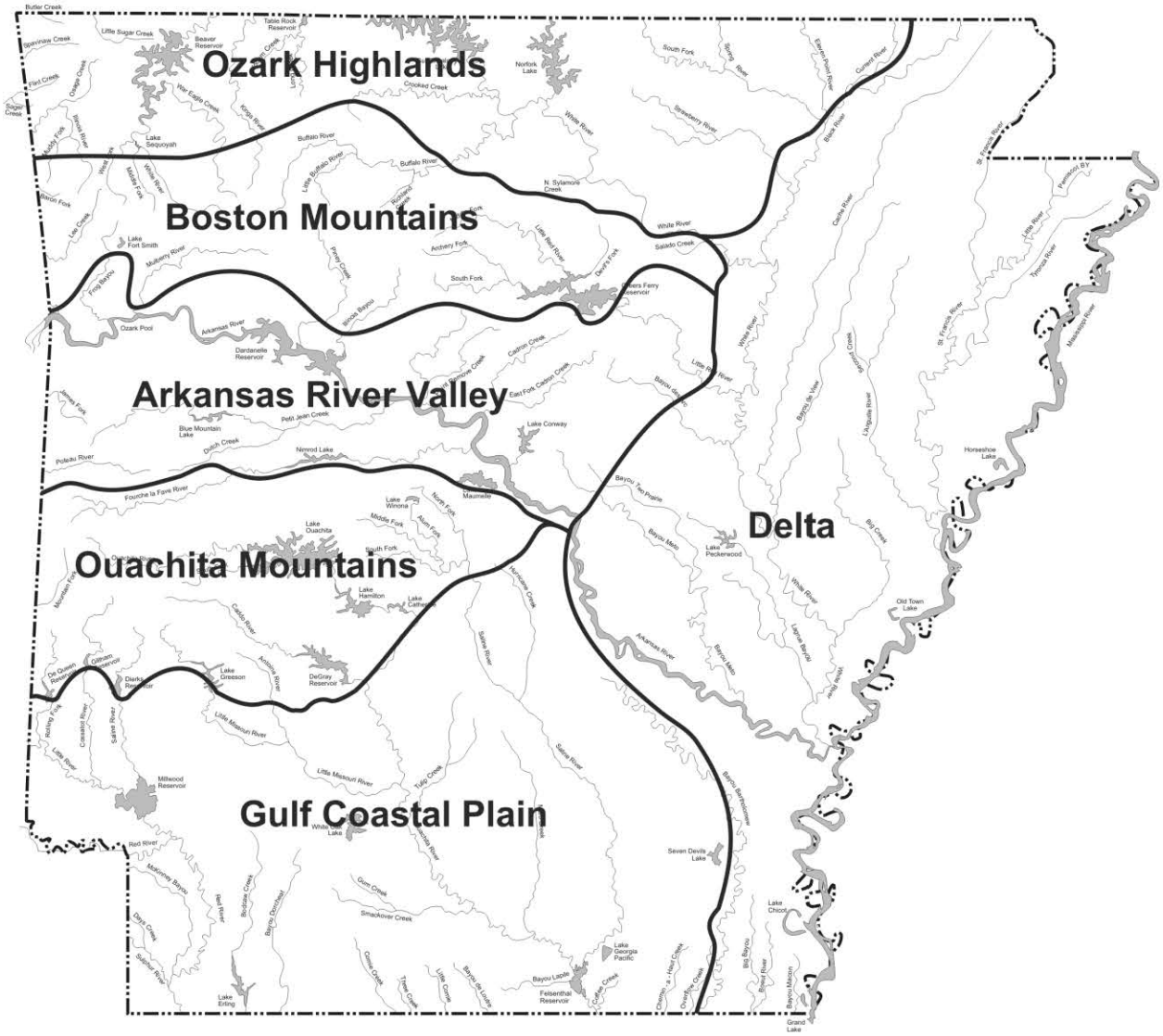
REGULATION NO. 2

APPENDIX A

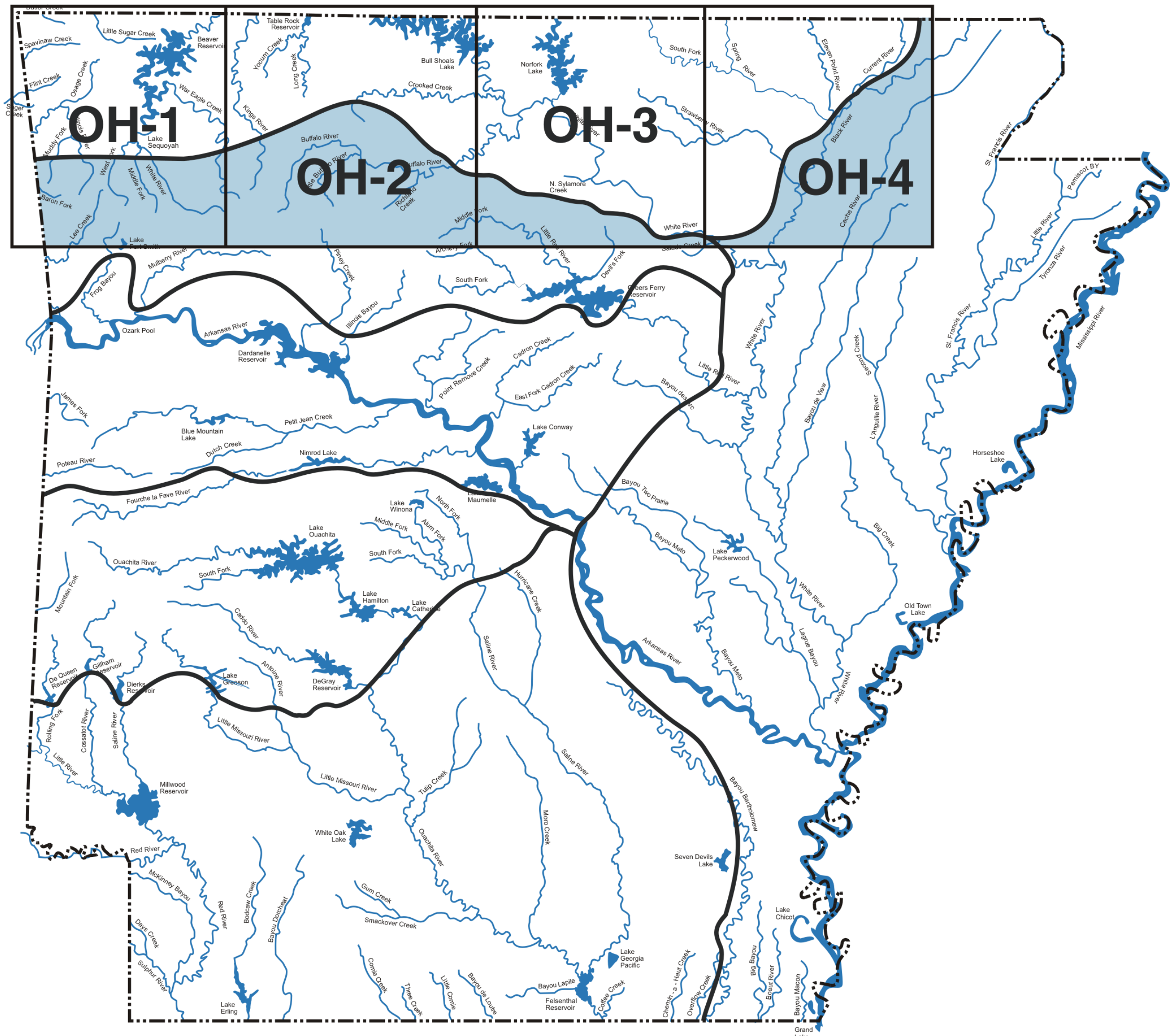
Designated Uses, Specific Standards and Maps of Waters of the State by Ecoregions

(September 24, 2010)

APPENDIX A: MAP OF ECOREGIONS OF ARKANSAS



Index to Plates of the Ozark Highlands



DESIGNATED USES: OZARK HIGHLANDS ECOREGION
(Plates OH-1, OH-2, OH-3, OH-4)

Extraordinary Resource Waters
Current River (OH-4)
Eleven Point River (OH-4)
Strawberry River (OH-3, OH-4)
Spring River, including its tributaries: Field Creek, Big Creek, English Creek, Gut Creek and Myatt Creek (OH-4)
South Fork Spring River (OH-3, OH-4)
North Sylamore Creek (OH-3)
Buffalo River (OH-2, OH-3)
Kings River (OH-2)
Bull Shoals Reservoir (OH-2, OH-3)

Natural and Scenic Waterways
Strawberry River from headwaters to Sharp-Izard County Line (OH-3, OH-4)
Kings River - that segment in Madison County (OH-2)
Buffalo River (OH-2, OH-3)
North Sylamore Creek (OH-3)*

Ecologically Sensitive Waterbodies
Numerous springs and spring-fed tributaries which support southern cavefish, Ozark cavefish, Arkansas darter, least darter, Oklahoma salamander, cave snails, cave crawfish and unique invertebrates (OH-1, OH-2, OH-3)
Strawberry River - location of Strawberry River darter (OH-3, OH-4)
Spring River - snuffbox and pink mucket mussels; Ozark hellbender (OH-4)
Eleven Point River - location of Ozark hellbender (OH-4)
Current River - location of flat floater and pink mucket mussels (OH-4)
Illinois River - Neosho mucket (OH-1)

Primary Contact Recreation - all streams with watersheds of greater than 10 mi^2 and all lakes/reservoirs

Secondary Contact Recreation - all waters

Domestic, Industrial and Agricultural Water Supply - all waters

Fisheries

Trout
Bull Shoals Reservoir - lower portion (OH-2)
White River from Bull Shoals Dam to Dam #3 (OH-3)
North Fork White River (OH-3)
Spring River from Mammoth Springs to South Fork Spring River (OH-4)
Upper White River from Beaver Dam to State Line (OH-1)

Lakes and Reservoirs - all

Streams
Seasonal Ozark Highlands fishery - all streams with watersheds of less than 10 mi^2 except as otherwise provided in Reg. 2.505
Perennial Ozark Highlands fishery - all streams with watersheds of 10 mi^2 and larger and those waters where discharges equal or exceed 1 CFS

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* As designated in the National Wild and Scenic Rivers System

Use Variations Supported by UAA or Other Investigations
Railroad Hollow Creek - no fishable/swimmable uses (OH-1, #1)
Columbia Hollow Creek - seasonal fishery March-June (OH-1, #2)
Curia Creek - below first waterfall, perennial fishery (OH-4, #3)
Moccasin Creek - below Highway 177, perennial fishery (OH-3, #4)
Stennitt Creek- from Brushy Creek to Spring River, no domestic water supply use (OH-4)

SPECIFIC STANDARDS: OZARK HIGHLANDS ECOREGION
(Plates OH-1, OH-2, OH-3, OH-4)

	Streams		Lakes and Reservoirs
Temperature °C (°F)*	29 (84.2)		32 (89.6)
Trout waters	20 (68)		
Turbidity (NTU) (base/all)	10/17		25/45
Minerals	see Reg. 2.511		see Reg. 2.511
Dissolved Oxygen**	Pri.	Crit	see Reg. 2.505
<10 mi^2 watershed	6	2	
10 to 100 mi^2	6	5	
>100 mi^2 watershed	6	6	
Trout waters	6	6	

All other standards (same as statewide)

Variations Supported by UAA
Railroad Hollow Creek: from headwaters to Spavinaw Creek - year-round dissolved oxygen - 2 mg/l (OH-1, #1)
Curia Creek - below first waterfall, critical season D.O. 6 mg/l (OH-4, #3)
Moccasin Creek - below Highway 177, critical season D.O. 5mg/l (OH-3, #4)
SWEPCO Reservoir - maximum temperature 54°C (limitation of 2.8°C above natural temperature does not apply) (OH-1, #5)
Stennitt Creek - from Brushy Creek to Spring River, TDS = 456 mg/l (OH-4, #6)

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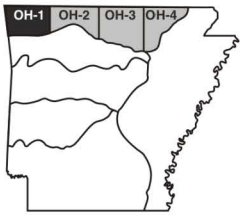
* Increase over natural temperatures may not be more than 2.8°C (5°F).

** At water temperatures ≤10°C or during March, April and May when stream flows are 15 CFS and greater, the primary season D.O. standard will be 6.5 mg/l. When water temperatures exceed 22°C, the critical season D.O. standard may be depressed by 1 mg/l for no more than 8 hours during a 24-hour period.

Plate OH-1 (Ozark Highlands)



LEGEND

- Ecologically Sensitive Waterbodies
- * Trout * - Trout Waters
- Extraordinary Resource Waters
- Natural and Scenic Waterways
- Variation by UAA

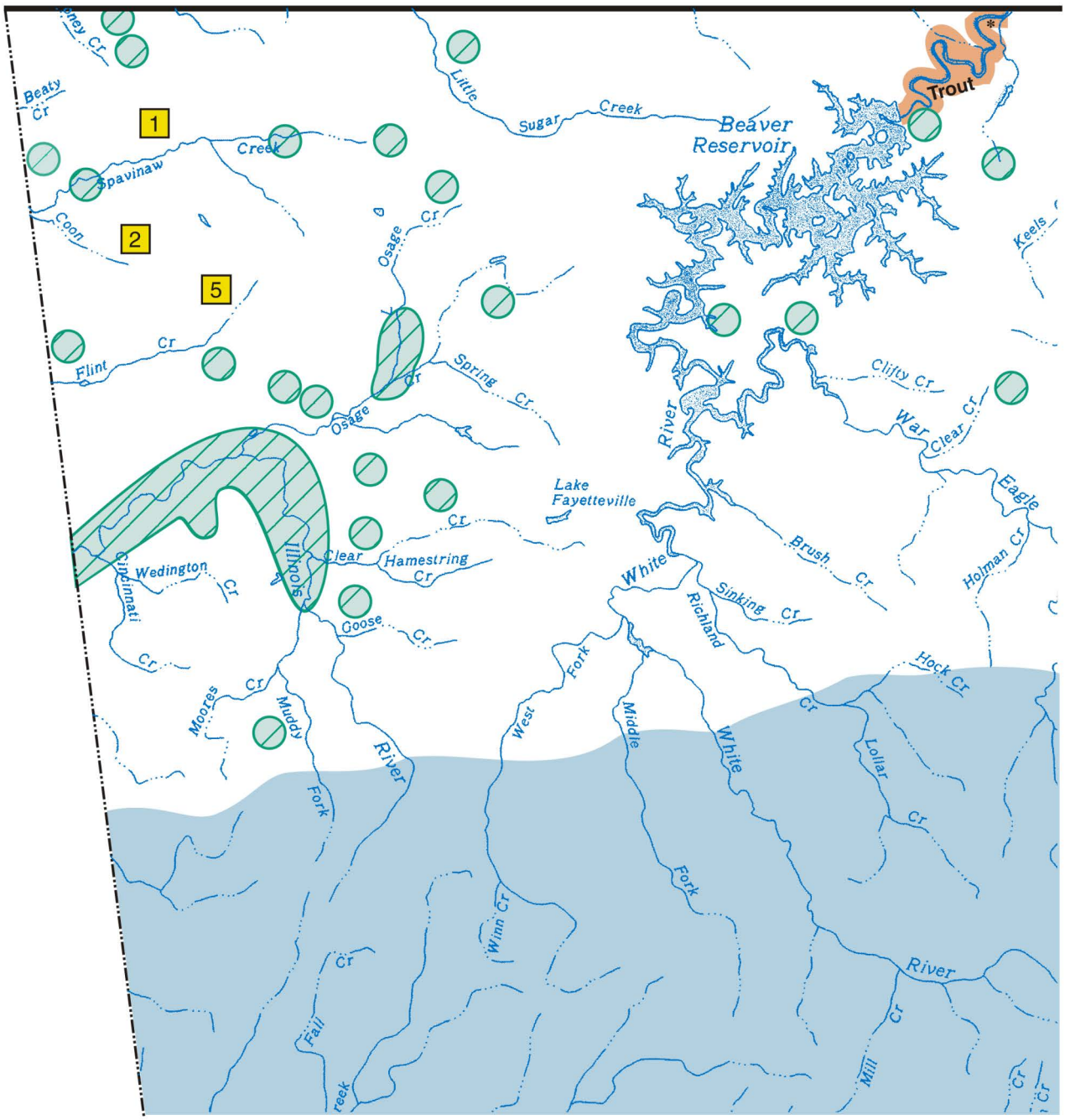
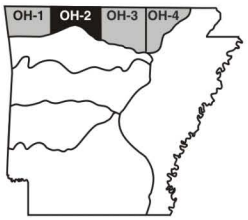


Plate OH-2 (Ozark Highlands)



LEGEND

- Ecologically Sensitive Waterbodies
- * Trout * - Trout Waters
- Extraordinary Resource Waters
- Natural and Scenic Waterways
- Variation by UAA

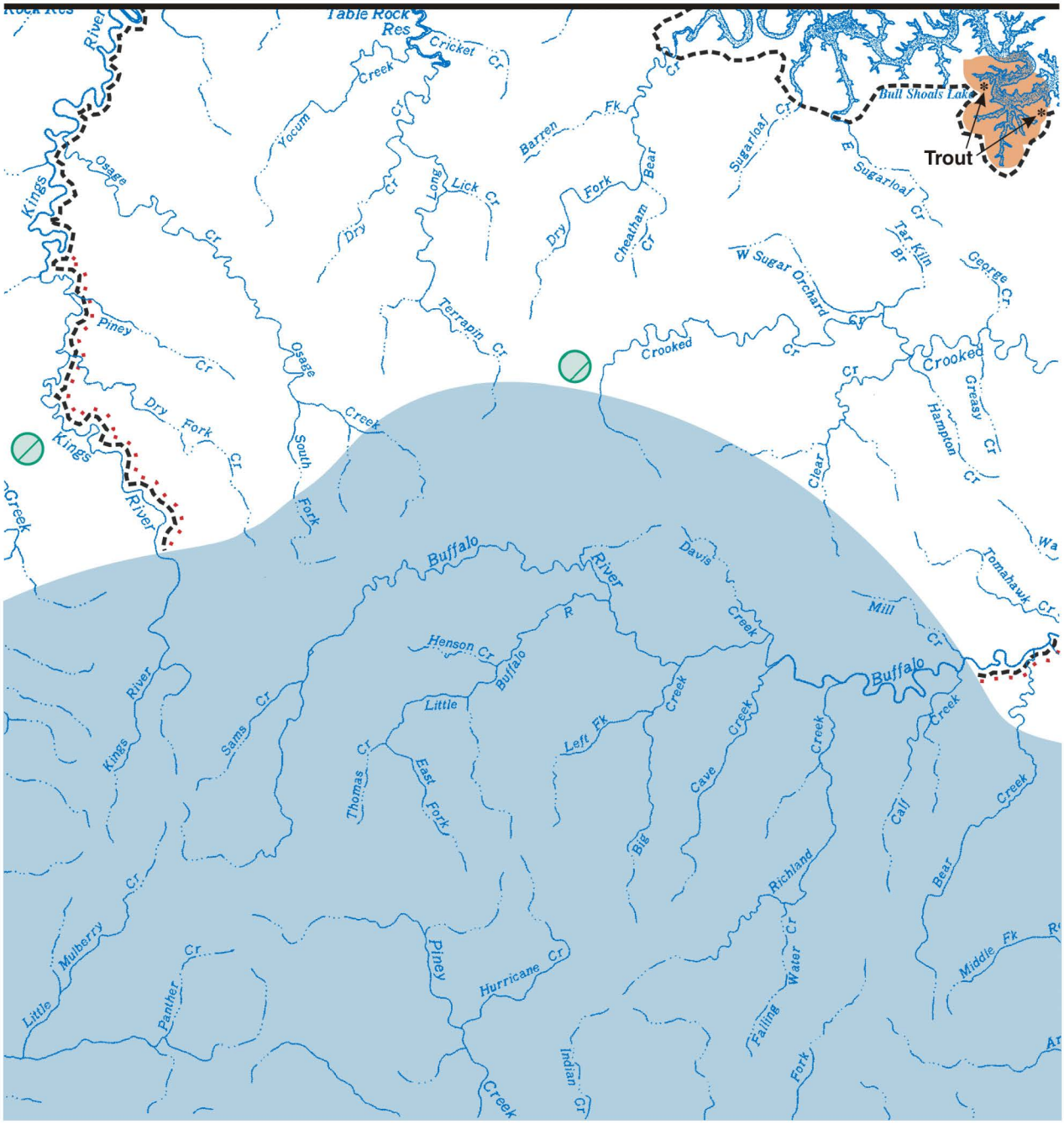


Plate OH-3 (Ozark Highlands)

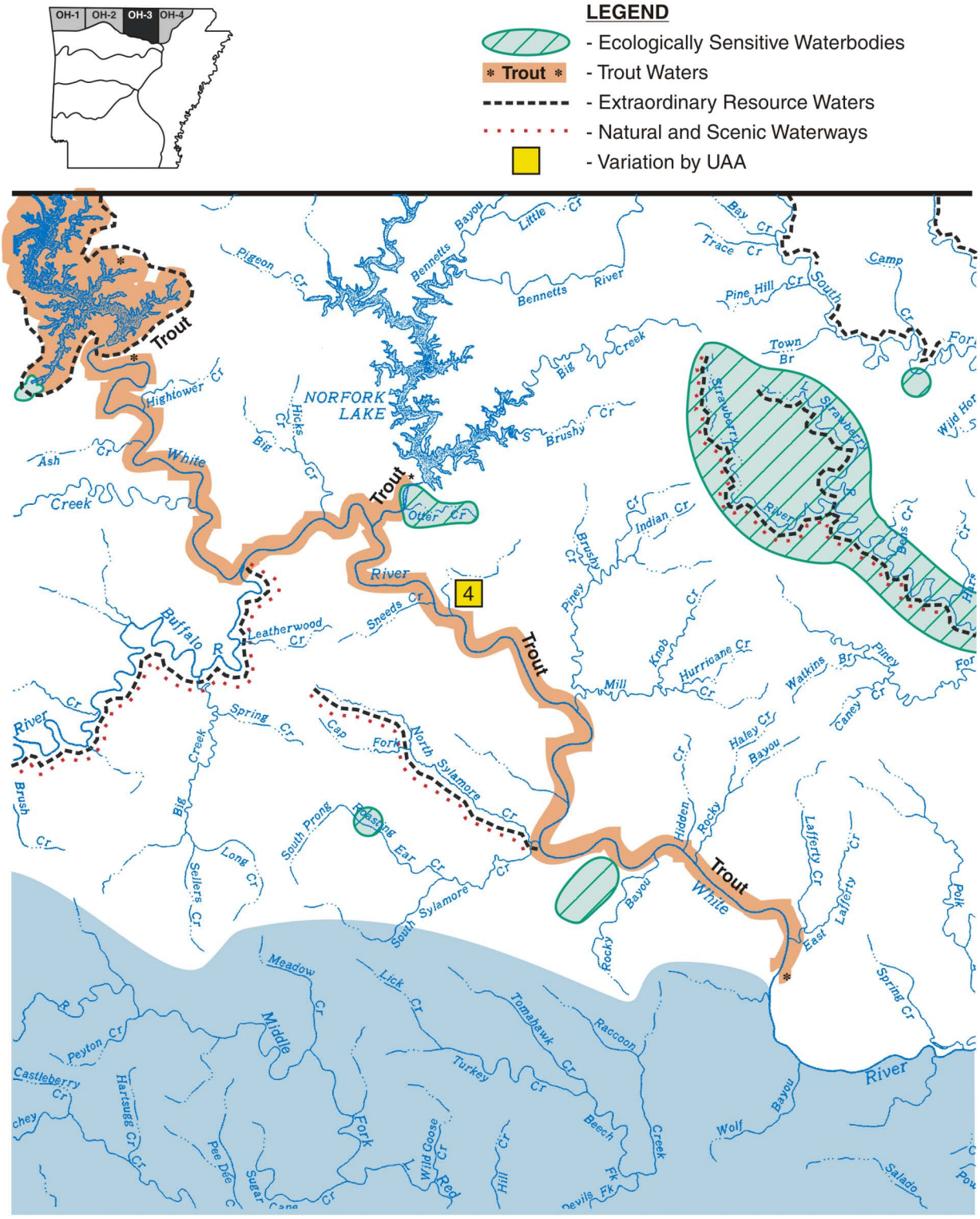
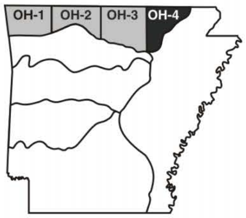
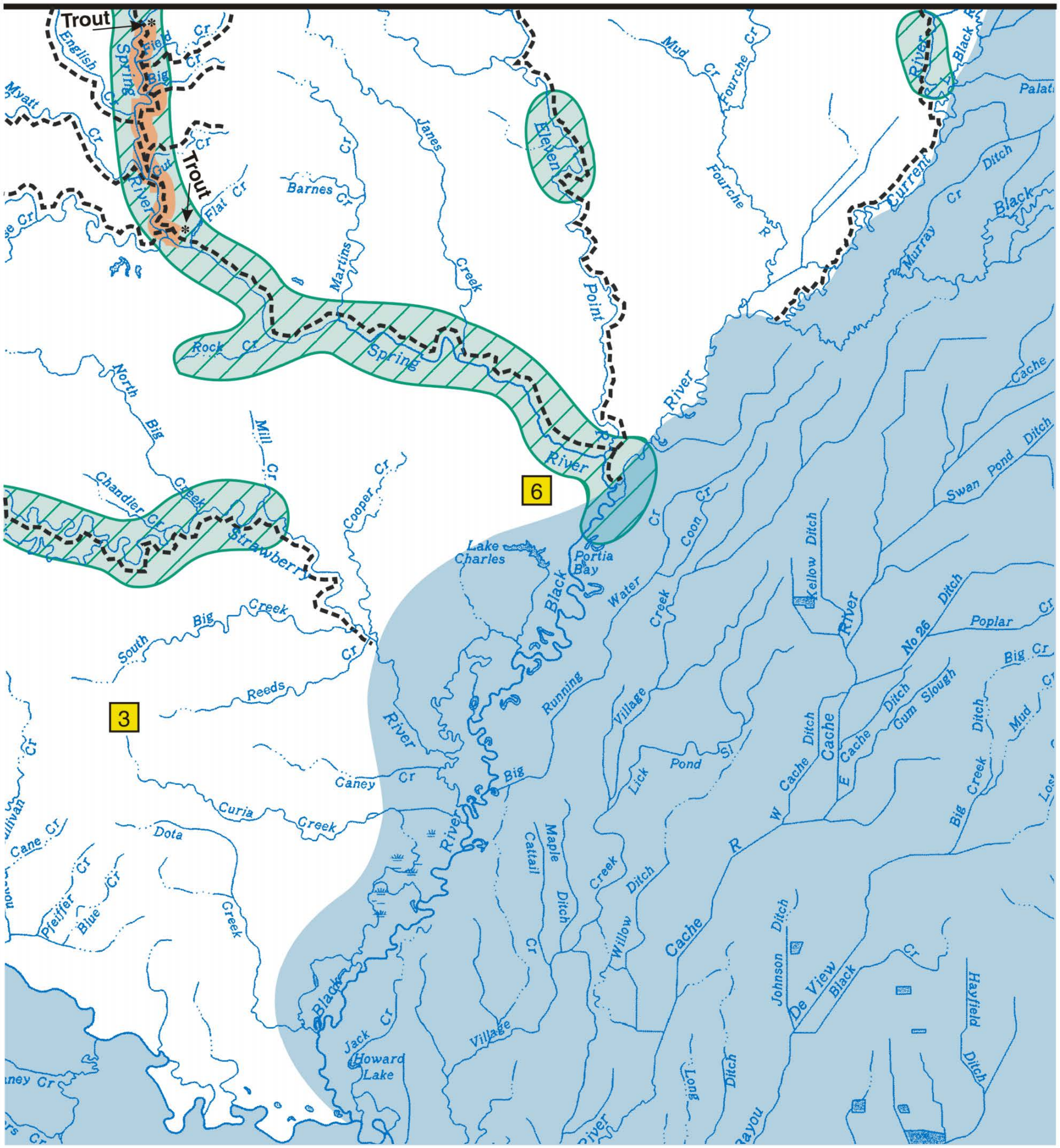


Plate OH-4 (Ozark Highlands)



LEGEND

- Ecologically Sensitive Waterbodies
- Trout Waters
- Extraordinary Resource Waters
- Natural and Scenic Waterways
- Variation by UAA



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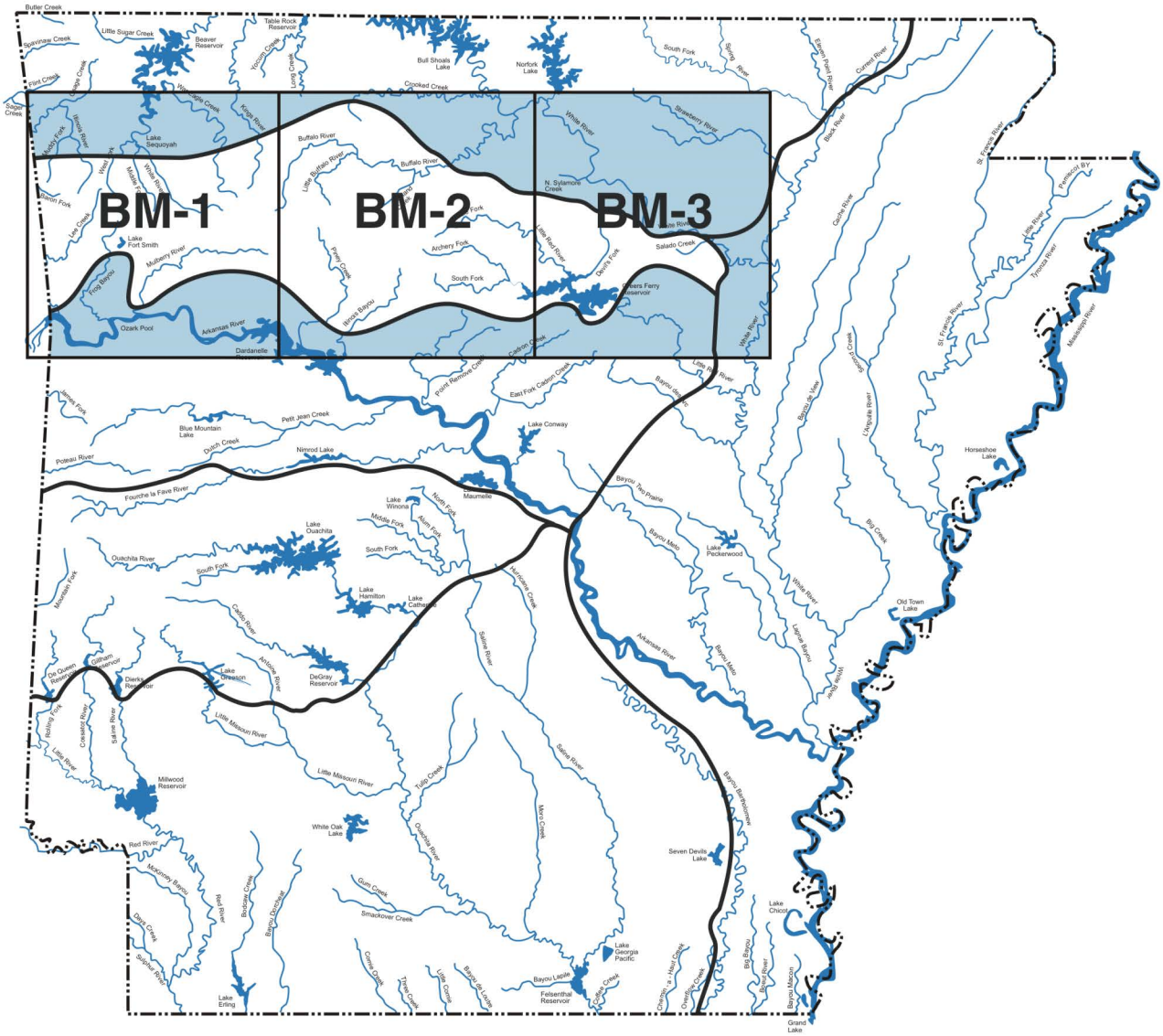

DESIGNATED USES: BOSTON MOUNTAINS ECOREGION

(Plates BM-1, BM-2, BM-3)

Extraordinary Resource Waters

Devils Fork of Little Red River including Beech Creek, Tomahawk Creek, Turkey Creek, Lick Creek and Racoon Creek (BM-3)
Middle Fork of Little Red River above Greers Ferry Reservoir (BM-2, BM-3)
Archey Creek from headwaters to confluence with South Fork Little Red River (BM-2)
Illinois Bayou including North, Middle and East Forks (BM-2)
Piney Creek (BM-2)
Hurricane Creek (BM-2)
Mulberry River (BM-1, BM-2)
Lee Creek from state line upstream to headwaters (BM-1)
Salado Creek (BM-3)
Kings River (BM-1)
Richland Creek and Falling Water Creek (BM-2)
Buffalo River (BM-1, BM-2)

Natural and Scenic Waterways

Mulberry River (BM-1, BM-2)
Buffalo River (BM-1, BM-2)
Kings River (BM-1)
Big Piney Creek (BM-2)*
Hurricane Creek (BM-2)*
Richland Creek (BM-2)*

Ecologically Sensitive Waterbodies

Devils, Middle and South Forks of Little Red River and Archey Creek above Greers Ferry Reservoir - location of endemic yellowcheek darter and endangered speckled pocketbook mussel (except Devils Fork) (BM-2, BM-3)
Foshee Cave - location of aquatic cave snail (BM-3)
Upper White River - location of longnose darter (BM-1)

Primary Contact Recreation - all streams with watersheds of greater than 10 mi^2 and all lakes/reservoirs

Secondary Contact Recreation - all waters

Domestic, Industrial and Agricultural Water Supply - all waters

Fisheries

Trout

Greers Ferry Reservoir below Narrows (BM-3)
Little Red River below Greers Ferry Dam (BM-3)

Lakes and Reservoirs – all

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* As designated in the National Wild and Scenic Rivers System

Streams

Seasonal Boston Mountain fishery - all waters with watersheds of less than 10 mi^2 except as otherwise provided in Reg.2.505

Perennial Boston Mountain fishery - all waters with 10 mi^2 watershed or larger and those waters where discharges equal or exceed 1 CFS

Use Variations Supported by UAA

None

SPECIFIC STANDARDS: BOSTON MOUNTAINS ECOREGION

(Plates BM-1, BM-2, BM-3)

	Streams		Lakes and Reservoirs
Temperature °C (°F)*	31 (87.8)		32 (89.6)
Trout waters	20 (68)		
Turbidity (NTU) (base/all)	10/19		25/45
Minerals	see Reg. 2.511		see Reg. 2.511
Dissolved Oxygen (mg/l) **	Pri.	Crit	see Reg. 2.505
<10 mi^2 watershed	6	2	
10 mi^2 and greater	6	6	
Trout waters	6	6	
All other standards	(same as statewide)		

Variations Supported by UAA

None

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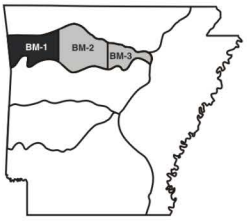
* Increase over natural temperatures may not be more than 2.8°C (5°F).

** At water temperatures ≤10°C or during March, April and May when stream flows are 15 CFS and greater, the primary season D.O. standard will be 6.5 mg/l. When water temperatures exceed 22°C, the critical season D.O. standard may be depressed by 1 mg/l for no more than 8 hours during a 24-hour period.

Plate BM-1 (Boston Mountains)



LEGEND

- Ecologically Sensitive Waterbodies
- * Trout * - Trout Waters
- Extraordinary Resource Waters
- Natural and Scenic Waterways
- Variation by UAA

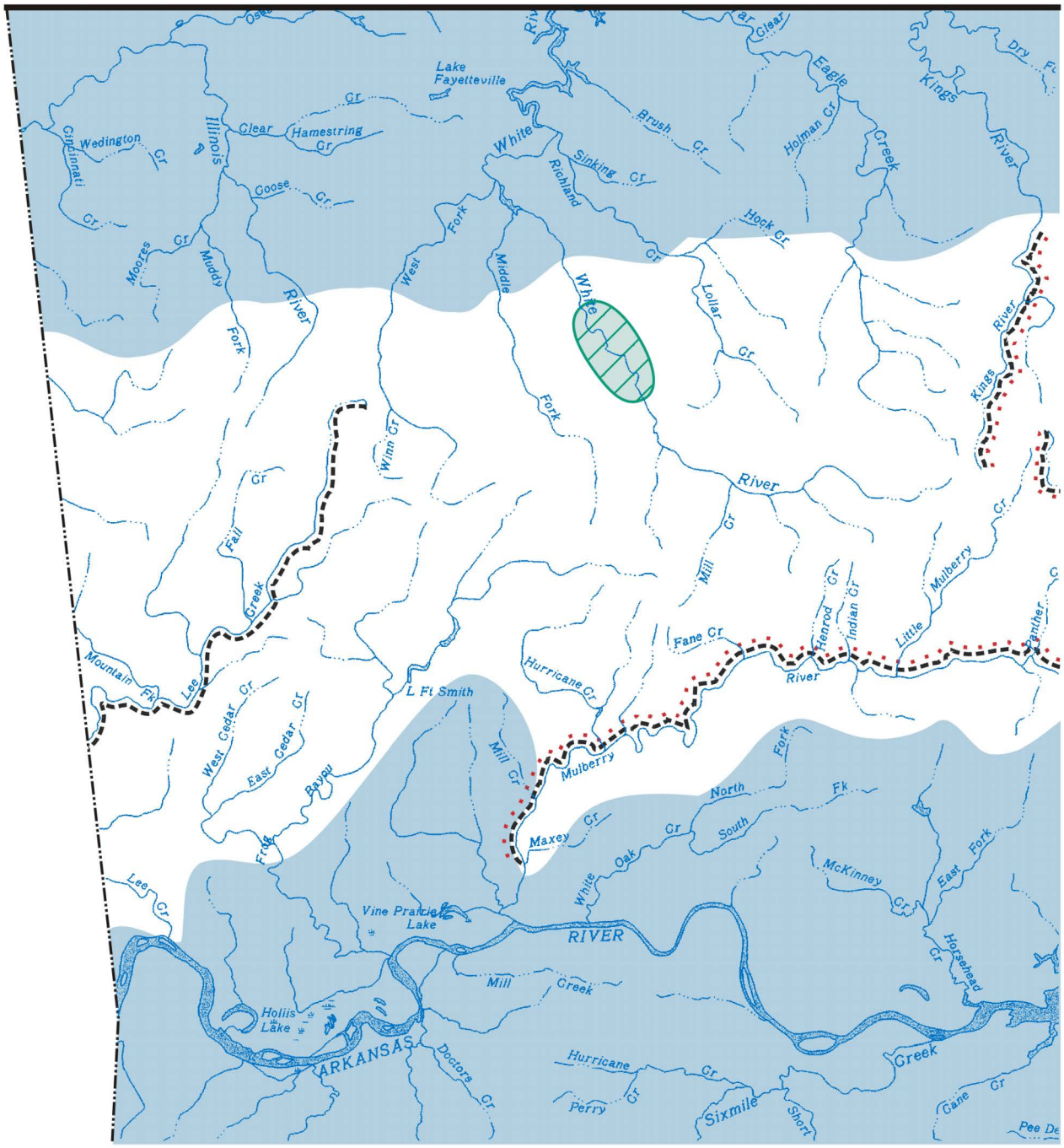
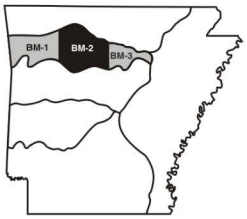


Plate BM-2 (Boston Mountains)



LEGEND

- Ecologically Sensitive Waterbodies
- * Trout * - Trout Waters
- Extraordinary Resource Waters
- Natural and Scenic Waterways
- Variation by UAA

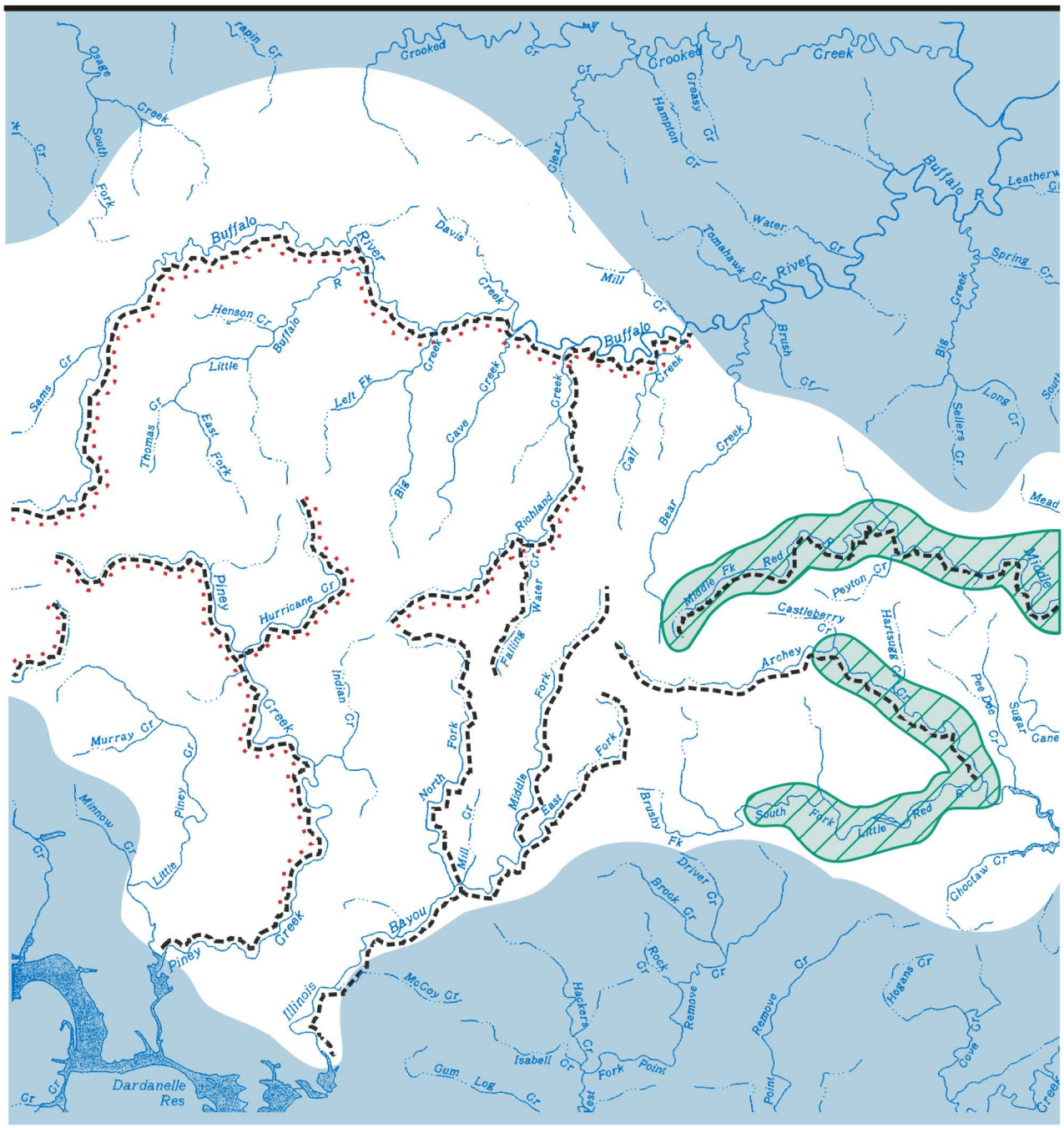
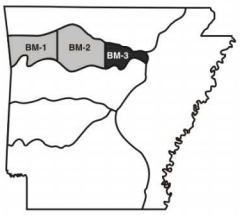
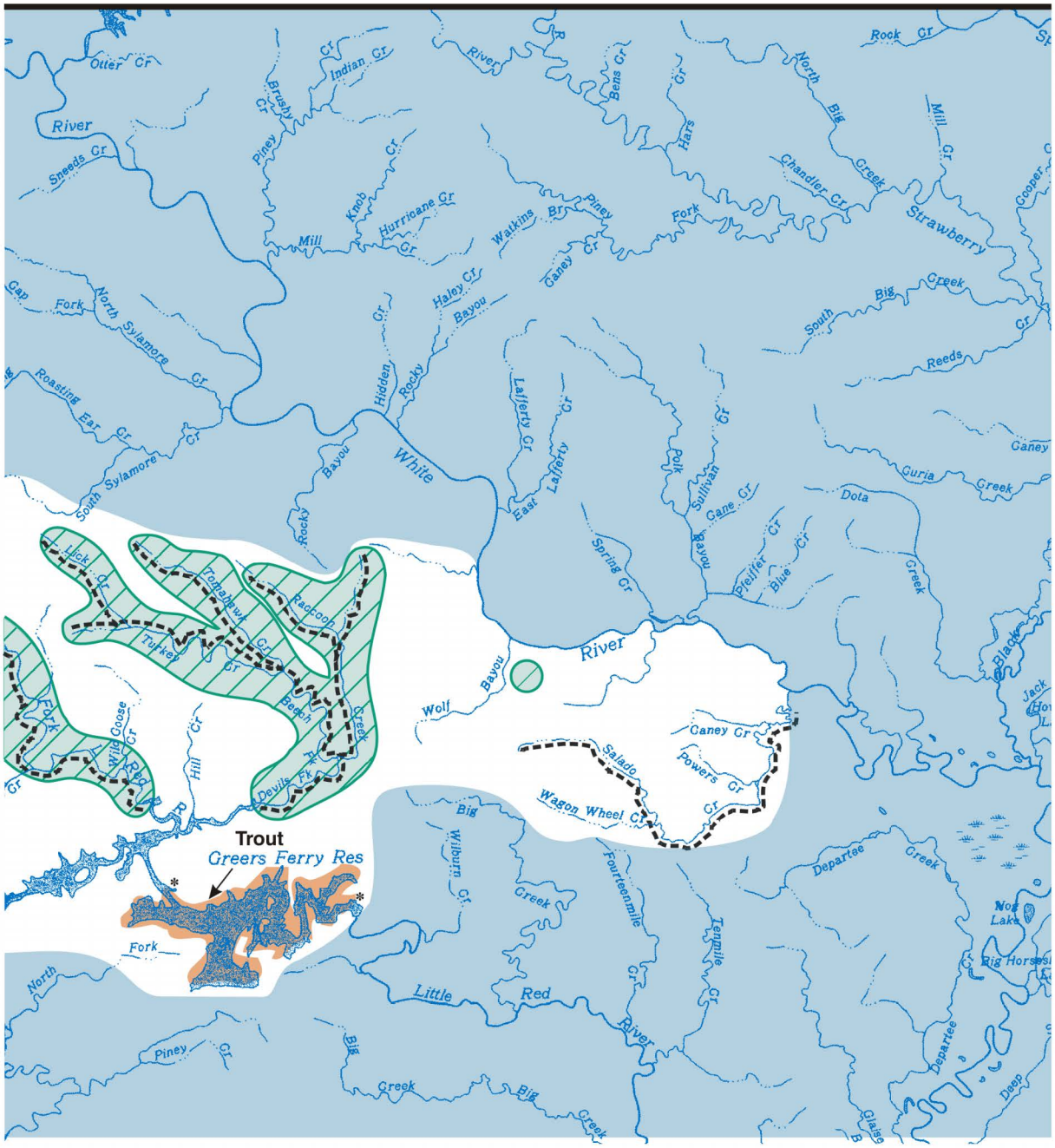


Plate BM-3 (Boston Mountains)



LEGEND

- Ecologically Sensitive Waterbodies
- * Trout * - Trout Waters
- Extraordinary Resource Waters
- Natural and Scenic Waterways
- Variation by UAA



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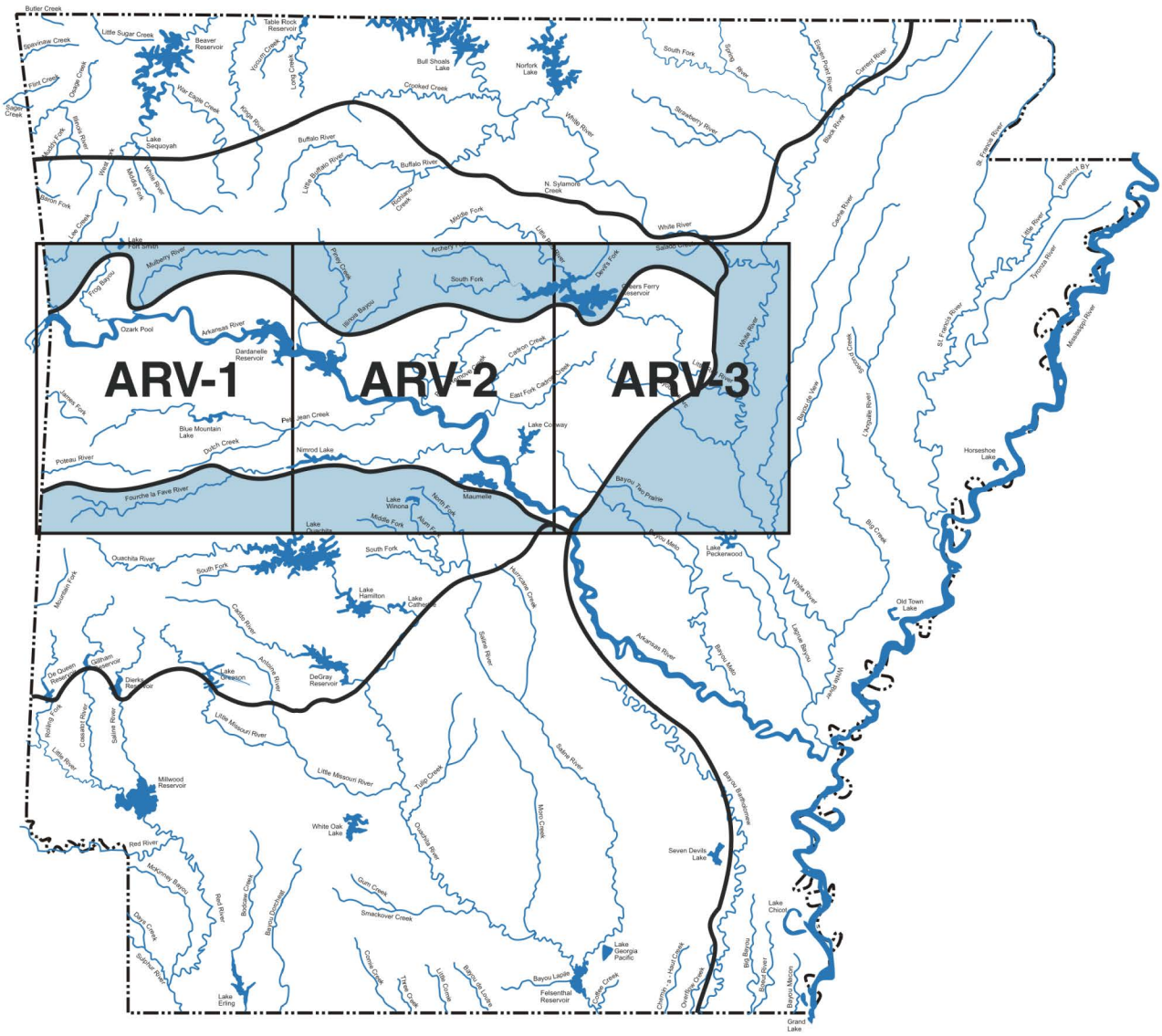

DESIGNATED USES: ARKANSAS RIVER VALLEY ECOREGION

(Plates ARV-1, ARV-2, ARV-3)

Extraordinary Resource Waters
Cadron Creek including North Fork and East Fork (ARV-2, ARV-3)
Mulberry River (ARV-1)
Big Creek adjacent to natural areas (ARV-3)

Natural and Scenic Waterway
Mulberry River (ARV-1)

Ecologically Sensitive Waterbodies

Primary Contact Recreation - all streams with watersheds of greater than 10 mi^2 and all lakes/reservoirs

Secondary Contact Recreation - all waters

Domestic, Industrial and Agricultural Water Supply - all waters

Fisheries

Trout

Little Red River below Greers Ferry Dam to Searcy (ARV-3)

Lakes and Reservoirs - all

Streams

Seasonal Arkansas River Valley fishery - all streams with watersheds of less than 10 mi^2 except as otherwise provided in Reg. 2.505

Perennial Arkansas River Valley fishery - all streams with watersheds of 10 mi^2 or larger and those waters where discharges equal or exceed 1 CFS

Use Variations Supported by UAA
Poteau River from Business Highway 71 to Stateline - no domestic water supply use(ARV-1,#2)
Unnamed tributary to Poteau River at Waldron - no domestic water supply use(ARV-1,#3)

SPECIFIC STANDARDS: ARKANSAS RIVER VALLEY ECOREGION

(Plates ARV-1, ARV-2, ARV-3)

	Streams		Lakes and Reservoirs
Temperature °C (°F)*	31 (87.8)		32 (89.6)
Trout waters	20 (68)		
Arkansas River	32 (89.6)		
Turbidity(NTU) (base/all)	21/40		25/45
Arkansas River)(base/all)	50/52		
Minerals	see Reg. 2.511		see Reg. 2.511
Dissolved Oxygen (mg/l)**	Pri.	Crit.	see Reg. 2.505
<10 mi^2 watershed	5	2	
10 to 150 mi^2	5	3	
151 mi^2 to 400 mi^2	5	4	
>400 mi^2 watershed	5	5	
Trout waters	6	6	
All other standards	(same as statewide)		

Variations Supported by UAA

Dardanelle Reservoir - maximum temperature 35°C (95°F) (limitation of 2.8°C above natural temperature does not apply) (ARV-2, #1)

Poteau River from Business Highway 71 to Stateline - chlorides - 120 mg/l; sulfates - 60 mg/l; TDS - 500 mg/l (ARV-1, #2)

Unnamed tributary to Poteau River at Waldron - chlorides 150 mg/l; sulfates - 70 mg/l; TDS - 660 mg/l (ARV-1, #3)

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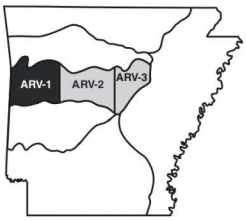
* Increase over natural temperatures may not be more than 2.8°C (5°F).

** At water temperatures ≤10°C or during March, April and May when stream flows are 15 CFS and greater, the primary season D.O. standard will be 6.5 mg/l. When water temperatures exceed 22°C, the critical season D.O. standard may be depressed by 1 mg/l for no more than 8 hours during a 24-hour period.

Plate ARV-1 (Arkansas River Valley)



LEGEND

- Ecologically Sensitive Waterbodies
- * Trout * - Trout Waters
- Extraordinary Resource Waters
- Natural and Scenic Waterways
- Variation by UAA

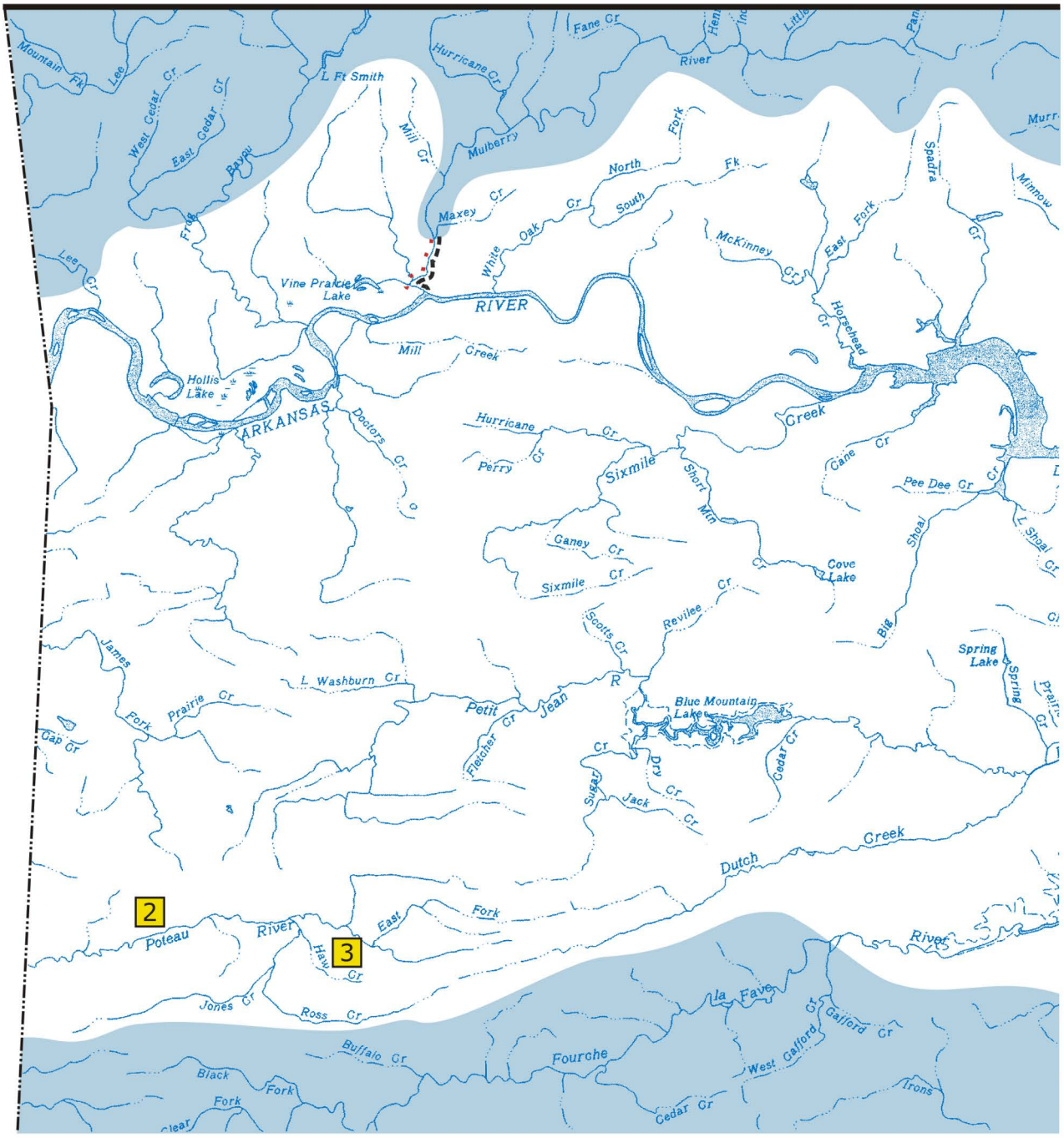
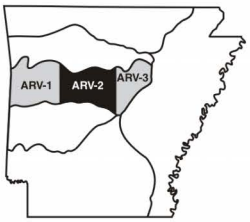


Plate ARV-2 (Arkansas River Valley)



LEGEND

- Ecologically Sensitive Waterbodies
- * Trout * - Trout Waters
- Extraordinary Resource Waters
- Natural and Scenic Waterways
- Variation by UAA

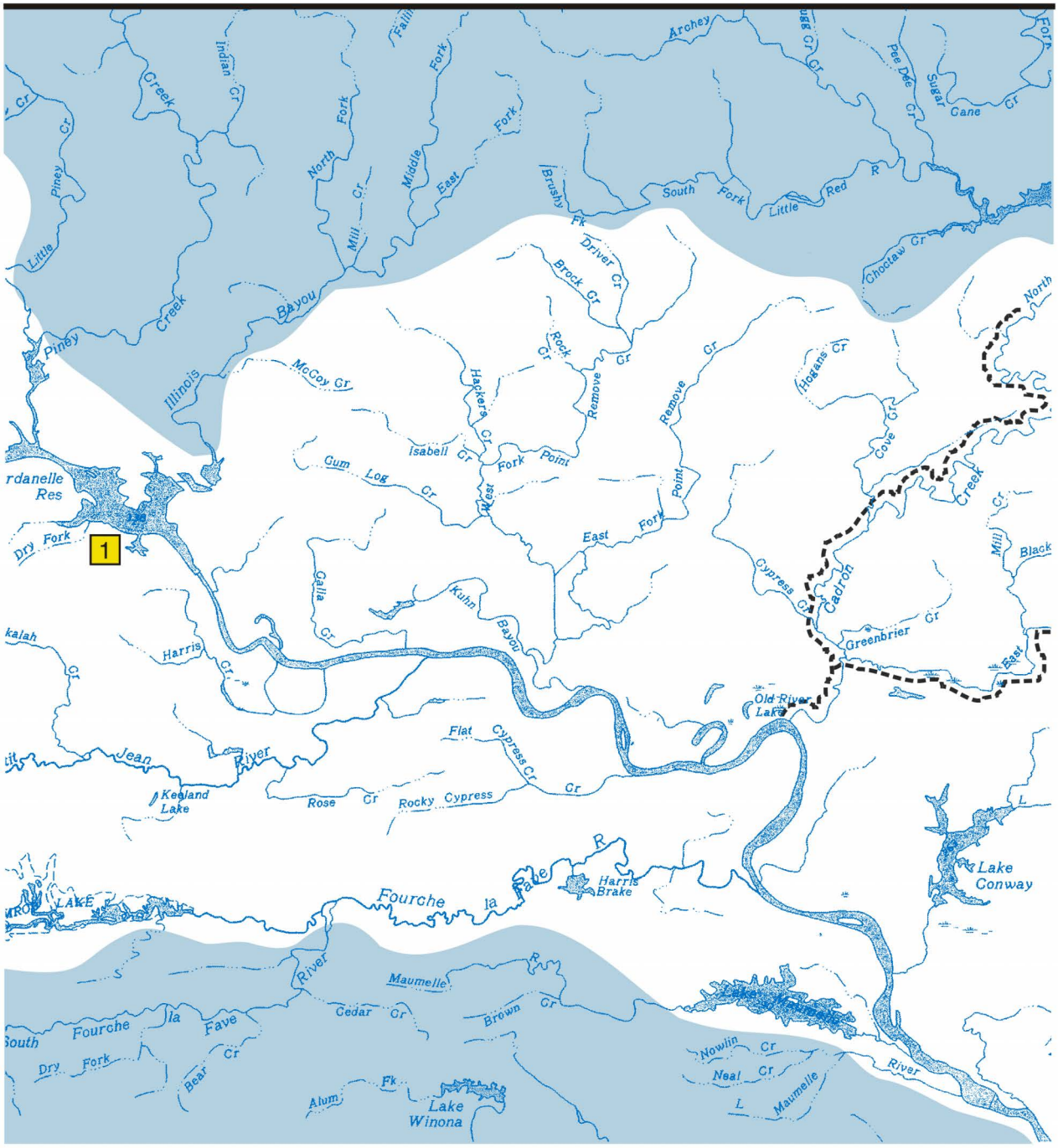
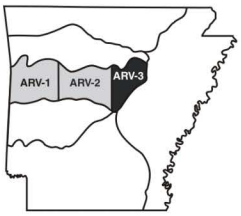
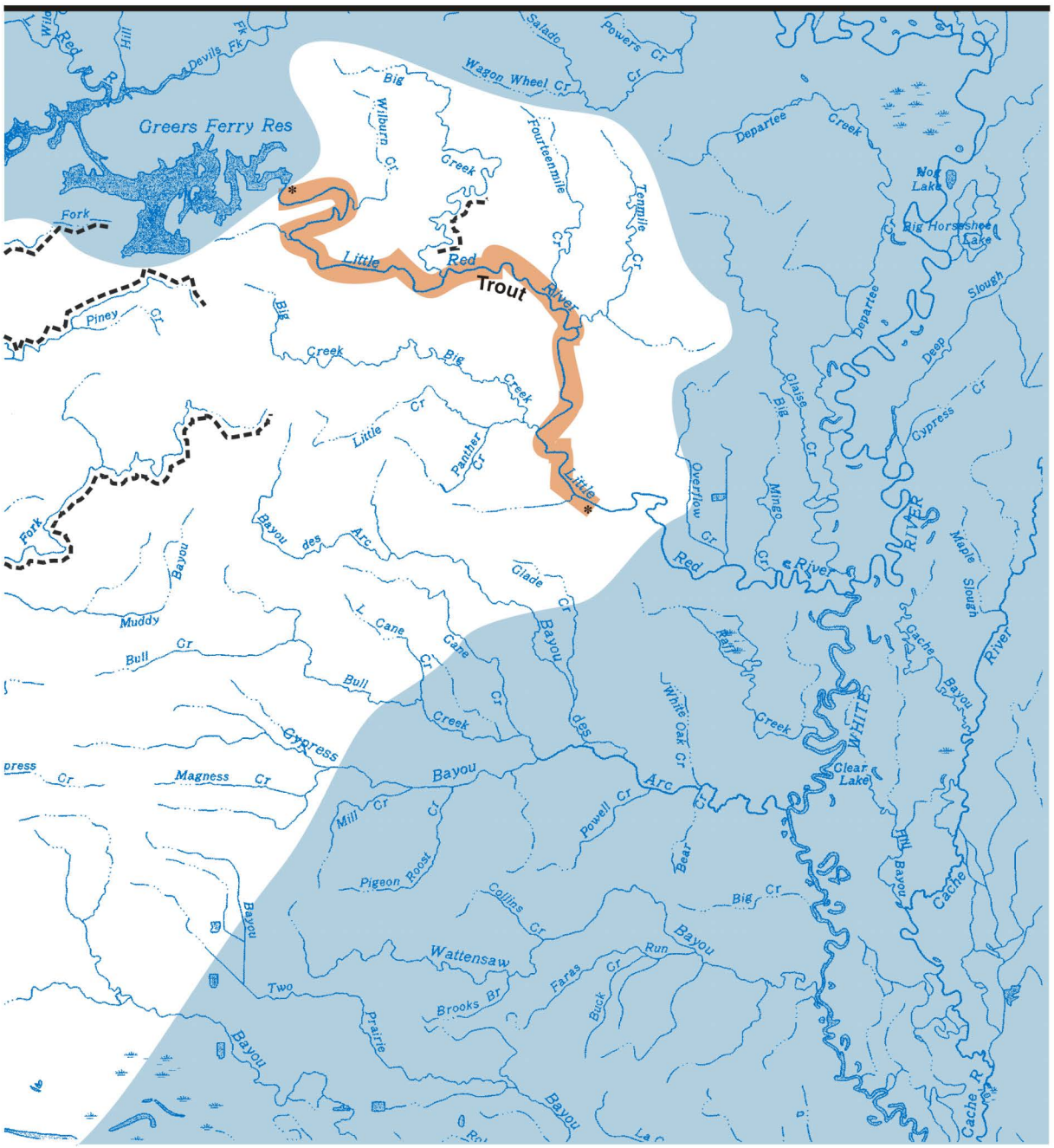


Plate ARV-3 (Arkansas River Valley)



LEGEND

- Ecologically Sensitive Waterbodies
- * Trout * - Trout Waters
- Extraordinary Resource Waters
- Natural and Scenic Waterways
- Variation by UAA



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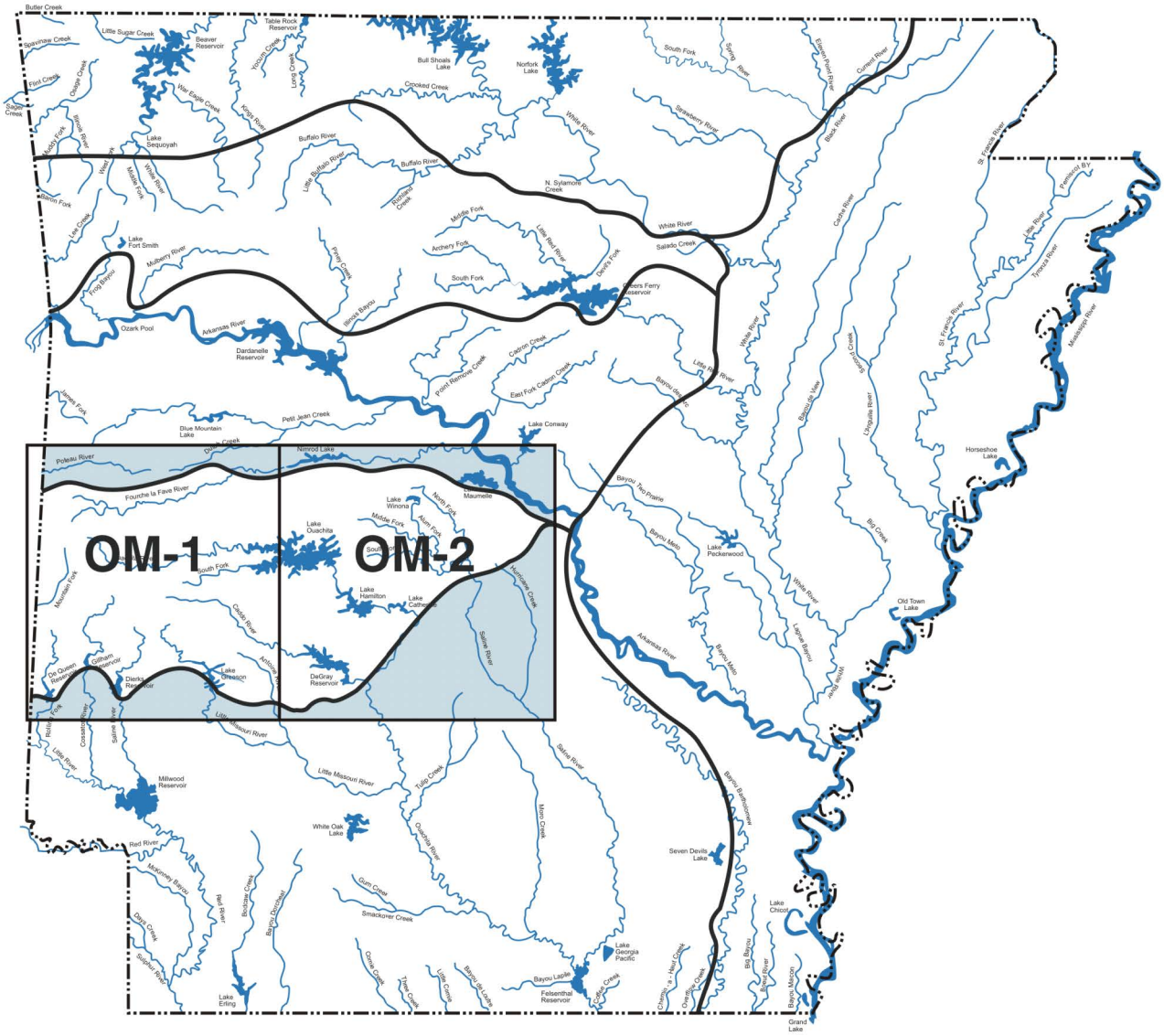

DESIGNATED USES: OUACHITA MOUNTAIN ECOREGION

(Plates OM-1, OM-2)

Extraordinary Resource Waters

Lake Ouachita (OM-1, OM-2)
DeGray Reservoir (OM-2)
Saline River - entire segment including North, Alum, Middle and South Forks (OM-2)
Caddo River - above DeGray Reservoir (OM-1, OM-2)
South Fork Caddo River (OM-1)
Cossatot River - above Gillham Reservoir (OM-1)
Caney Creek (OM-1)
Little Missouri River - above Lake Greeson (OM-1)
Mountain Fork River (OM-1)
Big Fork Creek - adjacent to natural area (OM-1)

Natural and Scenic Waterway

Cossatot River above Gillham Reservoir (OM-1)
Little Missouri River above Lake Greeson (OM-1)
Brushy Creek (OM-1)*

Ecologically Sensitive Waterbodies

Ouachita River above Lake Ouachita - location of Caddo madtom, longnose darter, peppered shiner and threatened Arkansas Fatmucket Mussel (OM-1)
South Fork Ouachita River - location of Arkansas fat mucket mussel and Caddo madtom (OM-1)
Caddo River and all tributaries above DeGray Reservoir - location of endemic paleback darter, Caddo madtom and threatened Arkansas Fatmucket Mussel (OM-1, OM-2)
Mountain Fork River - location of threatened leopard darter (OM-1)
Cossatot River above Gillham Reservoir - location of threatened leopard darter (OM-1)
Saline River including Alum, Middle, North and South Forks, and Ten Mile Creek - location of endemic Ouachita madtom and threatened Arkansas Fatmucket Mussel (except South fork and Ten Mile Creek)(OM-2)
Little Missouri River above Lake Greeson - location of Caddo madtom
Mayberry Creek (tributary to Hallman's Creek) - location of paleback darter (OM-2)
Robinson Creek - location of threatened leopard darter (OM-1)

Primary Contact Recreation - all streams with watersheds of greater than 10 mi^2 and all lakes/reservoirs

Secondary Contact Recreation - all waters

Domestic, Industrial and Agricultural Water Supply - all waters

Fisheries

Trout

Lake Ouachita (lower portion) (OM-2)
Ouachita River from Blakely Mt. Dam to Hwy. 270 bridge (OM-2)

Lakes and Reservoirs – all

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* As designated in the National Wild and Scenic Rivers System

Fisheries

Streams

Seasonal Ouachita Mountain Ecoregion fishery - all streams with watersheds of less than 10 mi^2 except as otherwise provided in Reg. 2.505

Perennial Ouachita Mountain Ecoregion fishery - all streams with watershed of 10 mi^2 or larger and those waters where discharges equal or exceed 1 CFS

Use Variations Supported by UAA

Rolling Fork from unnamed tributary A at Grannis to DeQueen Reservoir - no domestic water supply use (OM-1, #2)

Unnamed tributaries A and A1 at Grannis - no domestic water supply use (OM-1, #3)

SPECIFIC STANDARDS: OUACHITA MOUNTAIN ECOREGION

(Plates OM-1, OM-2)

	Streams		Lakes and Reservoirs
Temperature °C (°F)*	30 (86)		32 (89.6)
Trout waters	20 (68)		
Turbidity (NTU) (base/all)	10/18		25/45
Minerals	see Reg. 2.511		see Reg. 2.511
Dissolved Oxygen (mg/l) **	Pri.	Crit	see Reg. 2.505
<10 mi^2 watershed	6	2	
10 mi^2 and greater	6	6	
Trout waters	6	6	
All other standards	(same as statewide)		

Variations Supported by UAA

Prairie Creek: from headwaters to confluence with Briar Creek, critical season dissolved oxygen - 4 mg/l (OM-1, #1)

Rolling Fork from unnamed tributary A to DeQueen Reservoir - chlorides 130 mg/l; sulfates - 70 mg/l; TDS - 670 mg/l (OM-1, #2)

Unnamed tributaries A and A1 at Grannis - chlorides - 135 mg/l; sulfates - 70 mg/l; TDS - 700 mg/l (OM-1, #3)

South Fork Caddo River - sulfates 60 mg/1 (OM-1, #4)

Back Valley Creek - sulfates 250 mg/l; total dissolved solids 500 mg/l (OM-1,#5)

Wilson Creek from a point approximately 0.85 mile upstream of Outfall 001 to UMETCO Outfall 001 – chlorides 56 mg/L; sulfates 250 mg/L; TDS 500 mg/L (OM-2, #6)

Wilson Creek downstream of UMETCO Outfall 001 to its mouth – chlorides 56 mg/L; sulfates 250 mg/L; TDS 500 mg/L (OM-2, #7)

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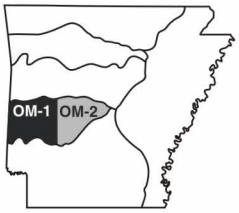
* Increase over natural temperatures may not be more than 2.8°C (5°F).

** At water temperatures ≤10°C or during March, April and May when stream flows are 15 CFS and greater, the primary season D.O. standard will be 6.5 mg/l. When water temperatures exceed 22°C, the critical season D.O. standard may be depressed by 1 mg/l for no more than 8 hours during a 24-hour period.

Plate OM-1 (Ouachita Mountains)



LEGEND

- Ecologically Sensitive Waterbodies
- * Trout * - Trout Waters
- Extraordinary Resource Waters
- Natural and Scenic Waterways
- Variation by UAA

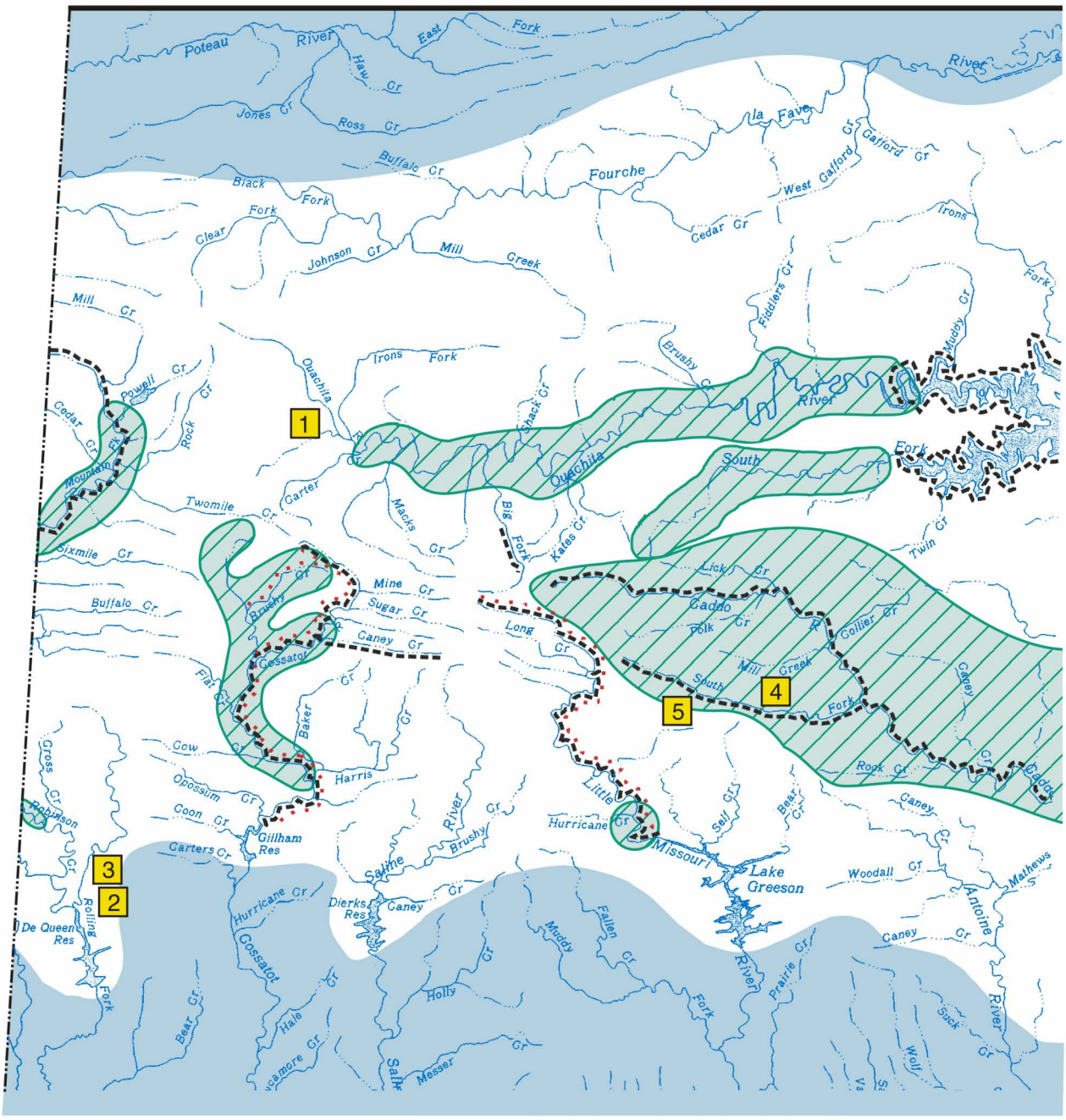
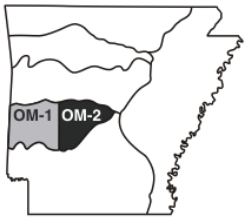
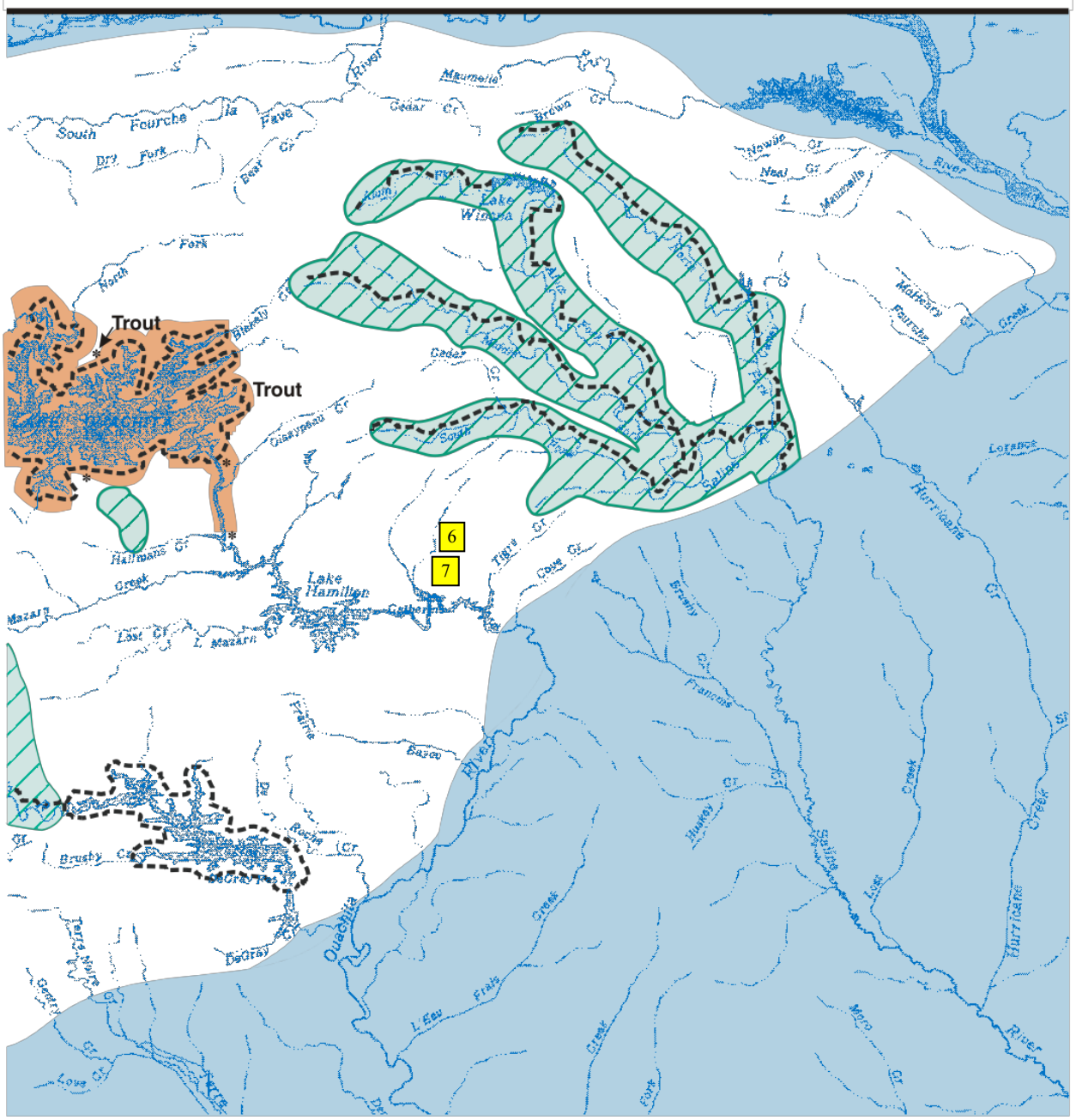


Plate OM-2 (Ouachita Mountains)

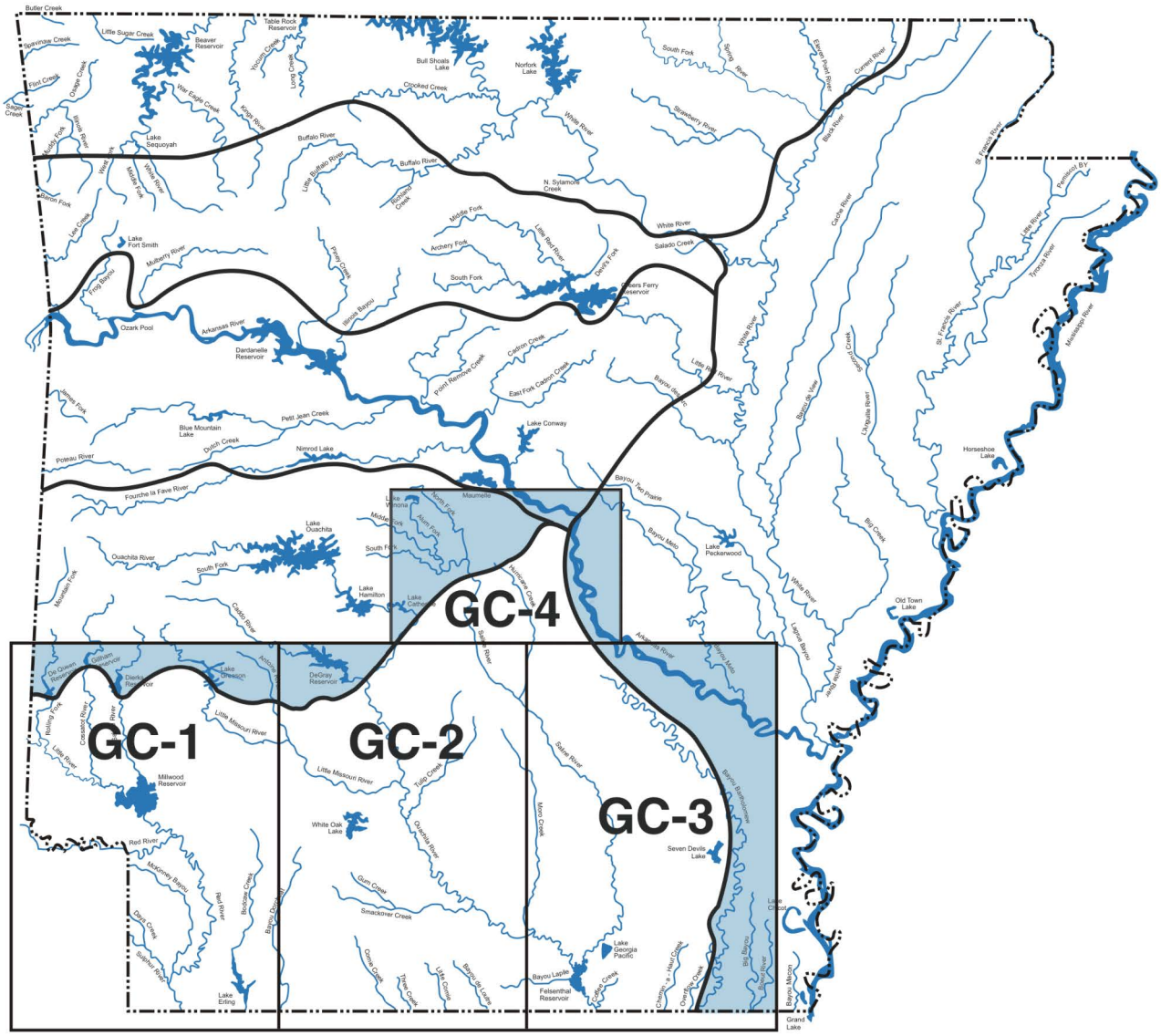


LEGEND

- Ecologically Sensitive Waterbodies
- * Trout * - Trout Waters
- Extraordinary Resource Waters
- Natural and Scenic Waterways
- Variation by UAA



Index to Plates of the Gulf Coastal Plain



DESIGNATED USES: GULF COASTAL ECOREGION

(Plates GC-1, GC-2, GC-3, GC-4)

Extraordinary Resource Waters
Saline River (GC-3, GC-4)
Moro Creek - adjacent to natural area (GC-3)

Natural and Scenic Waterways
Saline River from the Grant-Saline County line to mouth (GC-3)

Ecologically Sensitive Waterbodies
Little River above Millwood Reservoir - location of Ouachita rock pocketbook and pink mucket mussels (GC-1)
Grassy Lake and Yellow Creek below Millwood Reservoir - unique ecosystem and biota (GC-1) Lower Little Missouri River - location of peppered shiner and longnose darter (GC-2)
Lower Saline River - location of peppered shiner, crystal darter and goldstripe darter (GC-3)
Ouachita River near Arkadelphia - location of flat floater, Ouachita rock pocketbook and pink mucket mussels (GC-2)

Streams with Substantial Springwater Influence
L'Eau Frais (GC-4)
Cypress Creek (GC-4)
East and West Fork Tulip Creeks (GC-4)
Others to be determined

Primary Contact Recreation - all streams with watersheds greater than 10 mi^2 and all lakes/reservoirs

Secondary Contact Recreation - all waters

Domestic, Industrial and Agricultural Water Supply - all waters

Fisheries

Trout

Little Missouri River from Narrows Dam to confluence with Muddy Fork (GC-1)

Lakes and Reservoirs - all

Streams

Seasonal Gulf Coastal fishery - all streams with watersheds of less than 10 mi^2 except as otherwise provided in Reg. 2.505
Perennial Gulf Coastal fishery - all streams with watersheds of 10 mi^2 or larger and those waters where discharges equal or exceed 1 CFS

Use Variations Supported by UAA
Loutre Creek - perennial fishery, except seasonal from railroad bridge to mouth (GC-2, #1)
Unnamed tributary to Smackover Creek - no fishable/swimmable uses (GC-2, #2)
Unnamed tributary to Flat Creek - no fishable/swimmable uses (GC-2, #4)
Dodson Creek - perennial fishery (GC-4, #5)
Jug Creek - perennial fishery (GC-2, #6)
Lick Creek - seasonal fishery; no primary contact (GC-1, #7)
Coffee Creek and Mossy Lake - no fishable/swimmable or domestic water supply uses (GC-3, #8)
Red River from Oklahoma to confluence with Little River - No domestic water supply use (GC-1, #9)
Bluff Creek and unnamed tributary - no domestic water supply use(GC-1,#10)
Mine Creek from Highway 27 to Millwood Lake - no domestic water supply use (GC-1, #11)
Caney Creek - no domestic or industrial water supply use(GC-1,#12)

Use Variations Supported by UAA

Bois d'Arc Creek from Caney Creek to Red River - no domestic or industrial water supply use(GC-1,#13)
Town Creek below Acme tributary - no domestic water supply(GC-4,#14)
Unnamed trib. from Acme - no domestic water supply(GC-4,#14)
Gum Creek - no domestic water supply use(GC-2,#15)
Bayou de Loutre from Gum Creek to State line - no domestic water supply use(GC-2,#16)
Walker Branch - no domestic water supply use(GC-2,#17)
Little Cornie Bayou from Walker Branch to State line - no domestic water supply use(GC-2,#18)
Alcoa unnamed trib to Hurricane Cr.and Hurricane Cr. - no domestic water supply use(GC-4,#19)
Holly Creek - no domestic water supply use(GC-4,#20)
Dry Lost Creek and Tribs. - no domestic water supply use(GC-4.#21)
Lost Creek - no domestic water supply use(GC-4,#22)
Albemarle unnamed trib (AUT) to Horsehead Creek - no domestic water supply use(GC-2,#27)
Horsehead Creek from AUT to mouth - no domestic water supply use(GC-2,#27)
Dismukes Creek and Big Creek to Bayou Dorcheat – no domestic water supply
Boggy Creek from the discharge from Clean Harbors El Dorado LCC downstream to the confluence of Bayou de Loutre - no domestic water supply use
Unnamed tributary to Flat Creek from EDCC Outfall 001 d/s to confluence with unnamed tributary A to Flat Creek - no domestic water supply use (GC-2, #37)
Unnamed tributary A to Flat Creek from mouth of EDCC 001 ditch to confluence with Flat Creek - no domestic water supply use (GC-2, #38)
Flat Creek from mouth of UTA to confluence with Haynes Creek - no domestic water supply use (GC-2, #39)
Haynes Creek from mouth of Flat Creek to confluence with Smackover Creek - no domestic water supply use (GC-2, #40)

SPECIFIC STANDARDS: GULF COASTAL ECOREGION

(Plates GC-1, GC-2, GC-3, GC-4)

	Typical Streams		Spring Water Streams	Lakes and Reservoirs
Temperature °C (°F)*	30 (86)		30 (86)	32 (89.6)
Ouachita River (state line to Little Missouri River)	32 (89.6)			
Red River	32 (89.6)			
Turbidity (NTU) (base/all)	21/32		21/32	25/45
Red River (base/all)	50/150			
Minerals	see Reg. 2.511			see Reg. 2.511
Dissolved Oxygen (mg/l) **	Pri.	Crit.		see Reg. 2.505
<10 mi^2 watershed	5	2		
10 mi^2 - 500 mi^2	5	3		
>500 mi^2 watershed	5	5		
All sizes	6	5		
All other standards	(same as statewide			

* Increase over natural temperatures may not be more than 2.8°C (5°F).

** At water temperatures ≤10°C or during March, April and May when stream flows are 15 CFS and greater, the primary season D.O. standard will be 6.5 mg/l. When water temperatures exceed 22°C, the critical season D.O. standard may be depressed by 1 mg/l for no more than 8 hours during a 24-hour period

Variations Supported by UAA

Loutre Creek - from headwaters to railroad bridge, critical season D.O. standard - 3 mg/l; primary season - 5 mg/l; from railroad bridge to mouth, critical season D.O. - 2 mg/l (GC-2, #1)

Unnamed tributary to Smackover Creek - headwaters to Smackover Creek, year round D.O. criteria - 2 mg/l (GC-2, #2)

Unnamed tributary to Flat Creek - from headwaters to Flat Creek, year round D.O. criteria - 2 mg/l (GC-2, #4)

Dodson Creek - from headwaters to confluence with Saline River, critical season D.O. standard - 3 mg/l (GC-4, #5)

Jug Creek - from headwaters to confluence with Moro Creek, critical season D.O. standard - 3 mg/l (GC-2, #6)

Lick Creek - from headwaters to Millwood Reservoir, critical season D.O. standard - 2 mg/l (GC-1, #7)

Coffee Creek and Mossy Lake - exempt from Reg. 2.406 and Chapter Five (GC-3, #8)

Red River from Oklahoma to confluence with Little River - total dissolved solids - 850 mg/l (GC-1, #9)

Bluff Creek and unnamed trib. - sulfates 651 mg/l; total dissolved solids 1033 mg/l(GC-1,#10)

Muddy Fork Little Missouri River - sulfates 250 mg/l; total dissolved solids 500 mg/l(GC-1,#24)

Little Missouri River - sulfates 90 mg/l; total dissolved solids 180 mg/l(GC-1,#25)

Mine Creek from Highway 27 to Millwood Lake - chlorides - 90 mg/l; sulfates - 65 mg/l; TDS - 700 mg/l (GC-1, #11)

Caney Creek - chlorides 113 mg/l; sulfates 283 mg/l; total dissolved solids 420 mg/l(GC-1,#12)

Bois d'Arc Creek from Caney Creek to Red River - chlorides 113 mg/l; sulfates 283 mg/l; dissolved solids 420 mg/l(GC-1,#13)

Town Creek below Acme tributary - sulfates 200 mg/l; TDS 700 mg/l(GC-4,#14)

Unnamed trib. from Acme - sulfates 330 mg/l; TDS 830 mg/l(GC-4,#14)

Gum Creek - chlorides 104 mg/L; TDS 311 mg/L(GC-2,#15)

Bayou de Loutre from Gum Creek to State line - Chlorides 250 mg/l; TDS solids 750 mg/l(GC-2,#16)

Walker Branch - chlorides 180 mg/l; total dissolved solids 970 mg/l(GC-2,#17)

Ouachita River - from Ouachita River mile(ORM) 223 to the Arkansas-Louisiana border(ORM 221.1),site specific seasonal D.O.criteria: 3 mg/L June and July; 4.5 mg/L August; 5 mg/L September through May. These seasonal criteria may be unattainable during or following naturally occurring high flows,(i.e., river stage above 65 feet measured at the lower gauge at the Felsenthal Lock and Dam, Station No.89-o, and also for the two weeks following the recession of flood waters below 65 feet), which occurs from May through August. Naturally occurring conditions which fail to meet criteria should not be interpreted as violations of these criteria (GC-3, #26)

Alcoa unnamed trib. to Hurricane Cr. And Hurricane Cr. - see Reg. 2.511(CG-4. #19)

Holly Creek - See Reg. 2.511(CG-4, #20)

Saline River bifurcation - see Reg. 2.511(GC-4, #23)

Dry Lost Creek and tributaries - see Reg. 2.511(GC-4, #21)

Lost Creek - see Reg. 2.511(GC-4, #22)

Albemarle unnamed trib (AUT) to Horsehead Creek - chlorides 137 mg/l; TDS 383 mg/l (GC-2,#27)

Horsehead Creek from AUT to mouth - chlorides 85 mg/l; TDS 260 mg/l(GC-2,#27)

Bayou Dorcheat - sulfates 16 mg/l (GC-2,#27)

Dismukes Creek – chlorides 26 mg/L; TDS 157 mg/L (GC-2, #28)

Big Creek from Dismukes to Bayou Dorcheat – chlorides 20 mg/L; TDS 200 mg/L (GC-2, #28)

Bayou de Loutre from Chemtura outfall to Loutre Creek – maximum water temperature 96°F (GC-2, #29)

Unnamed tributary of Lake June below Entergy Couch Plant to confluence with Lake June – maximum water temperature 95 degrees F (limitation of 5 degrees above natural temperature does not apply) (GC-1, #30).

Unnamed tributary from Great Lakes Chemical Company Outfall 002 to Bayou de Loutre-chloride 65, sulfate 35 mg/L, TDS 141 mg/L (GC-2, #31)

Unnamed tributary from Great Lakes Chemical Company Outfall 004 to Bayou de Loutre-chloride 239 mg/L., TDS 324 mg/L (GC-2, #32)

Bayou de Loutre from mouth of UT004 to mouth of Loutre Creek, chloride 278 mg/L (GC-2, #33)

Unnamed tributary from Great Lakes Chemical Company Outfall 003 (UT003) downstream to unnamed tributary to Little Cornie Bayou – chloride 538 mg/L, sulfate 35 mg/L, and TDS 519 mg/L (GC-2, #34)

Unnamed tributary of Little Cornie Bayou to confluence with Little Cornie Bayou – chloride 305 mg/L and TDS

325 mg/L (GC-2, #35)

Little Cornie Bayou from mouth UTA to state line- chloride 215mg/L,sulfate 25mg/L and TDS 500mg/L. (GC-2, #36)

Unnamed tributary to Flat Creek from EDCC Outfall 001 d/s to confluence with unnamed tributary A to Flat Creek Chloride 23 mg/L, Sulfate 125 mg/L, TDS 475 mg/L, (GC-2, #37)

Unnamed tributary A to Flat Creek from mouth of EDCC 001 ditch to confluence with Flat Creek, Chloride 16 mg/L, Sulfate 80 mg/L, TDS 315 mg/L, (GC-2, #38)

Loutre Creek from Hwy 15 South to the confluence of Bayou de Loutre Chloride, 256mg/l; Sulfate 997mg/l, TDS, 1756* (GC-3. #41)

Bayou de Loutre from Loutre Creek to the discharge for the City of El Dorado South facility Chloride, 264mg/l; Sulfate 635mg/l, TDS, 1236* (GC-3. #42)

Bayou de Loutre from the discharge from the City of El Dorado-South downstream to the mouth of Gum Creek. Chloride, 250mg/l; Sulfate 431mg/l, TDS, 966 (GC-3. #43)

Bayou de Loutre from the mouth of Gum Creek downstream to the mouth of Boggy Creek Chloride, 250mg/l; Sulfate 345mg/l, TDS, 780 (GC-3. #44)

Bayou de Loutre from the mouth of Boggy Creek downstream to the mouth of Hibank Creek Chloride, 250mg/l; Sulfate 296mg/l, TDS, 750 (GC-3. #45)

Bayou de Loutre from the mouth of Hibank Creek downstream to the mouth of Mill Creek Chloride, 250mg/l; Sulfate 263mg/l, TDS, 750 (GC-3. #46)

Bayou de Loutre from the mouth of Mill Creek downstream to the mouth of Buckaloo Branch Chloride, 250mg/l; Sulfate 237mg/l, TDS, 750 (GC-3. #47)

Bayou de Loutre from the mouth of Buckaloo Branch downstream to the mouth of Bear Creek Chloride, 250mg/l; Sulfate 216mg/l, TDS, 750 (GC-3. #48)

Bayou de Loutre from the mouth of Bear Creek to the final segment of Bayou de Loutre. Chloride, 250mg/l; Sulfate 198mg/l, TDS, 750(GC-3. #49)

Bayou de Loutre (Final Segment) to the Arkansas / Louisiana State Line. Chloride, 250mg/l; Sulfate 171 mg/l, TDS, 750(GC-3. #50)

Boggy Creek from the discharge from Clean Harbors El Dorado LCC downstream to the confluence of Bayou de Loutre. Chloride, 631mg/l; Sulfate, 63 mg/l, TDS, 1360; Selenium, 15.6 u/l

McGeorge Creek (headwaters to Willow Springs Branch) Sulfate, 250 mg/L; TDS, 432 mg/L (GC-4. #52)

Willow Springs Branch (McGeorge Creek to Little Fourche Creek) Sulfate, 112 mg/L; TDS 247 mg/L (GC-4. #53)

Little Fourche Creek (Willow Springs Branch to Fourche Creek) TDS, 179 mg/L (GC-4. #54)

Variations Supported by EIP

Holly Creek; Selenium, Chronic Standard, 17µg/l (GC-4, #1)

Plate GC-1 (Gulf Coastal Plain)

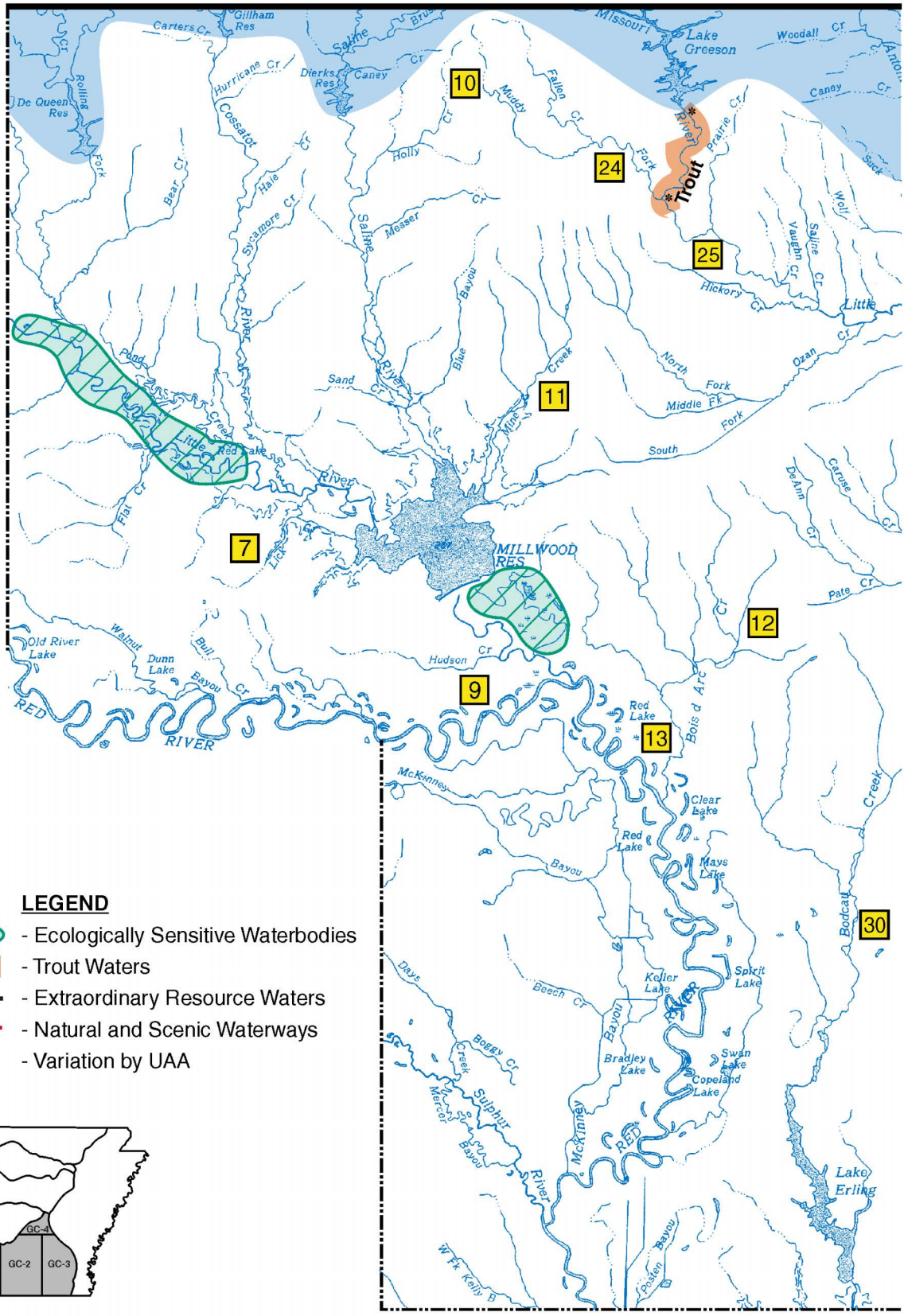
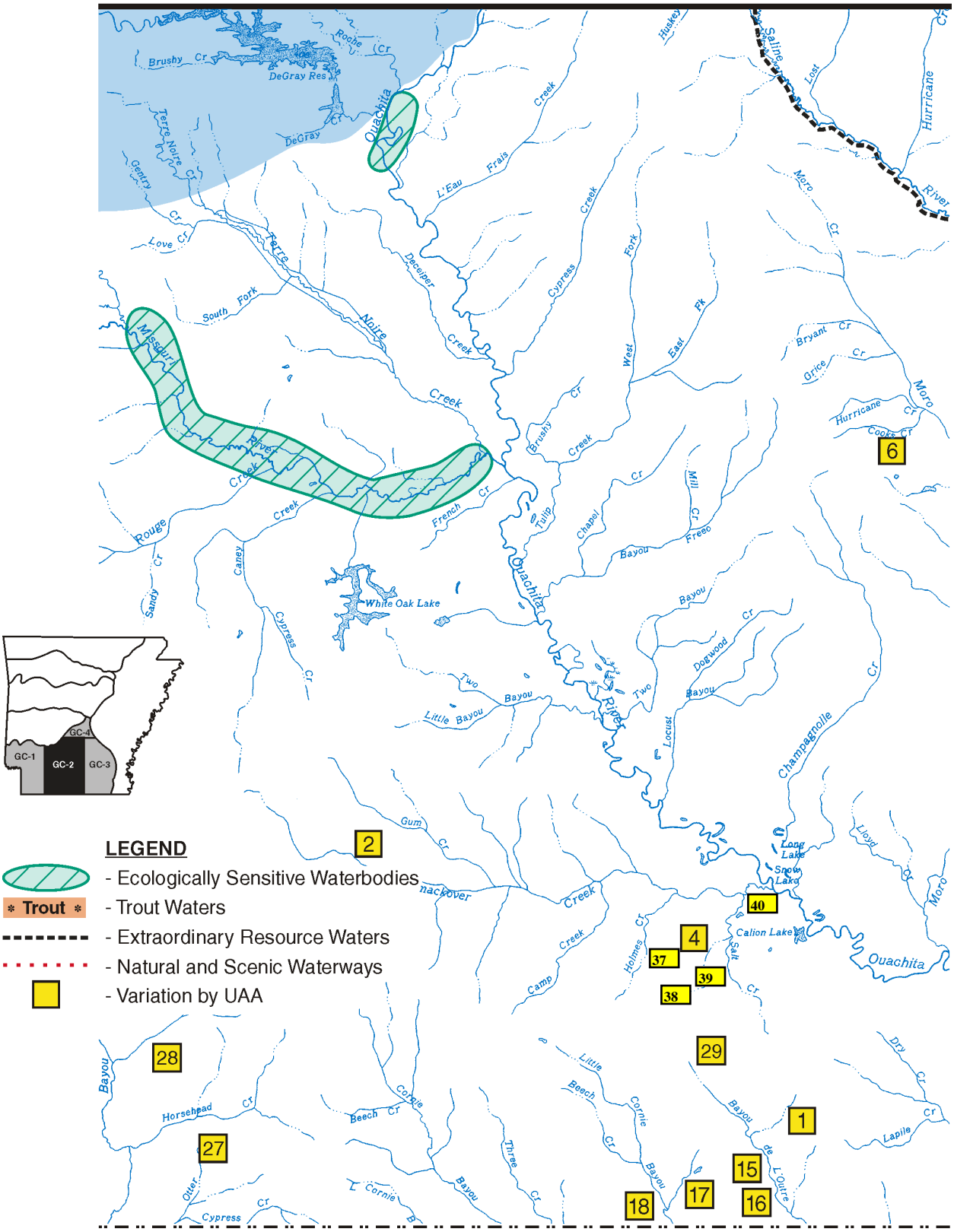


Plate GC-2 (Gulf Coastal Plain)



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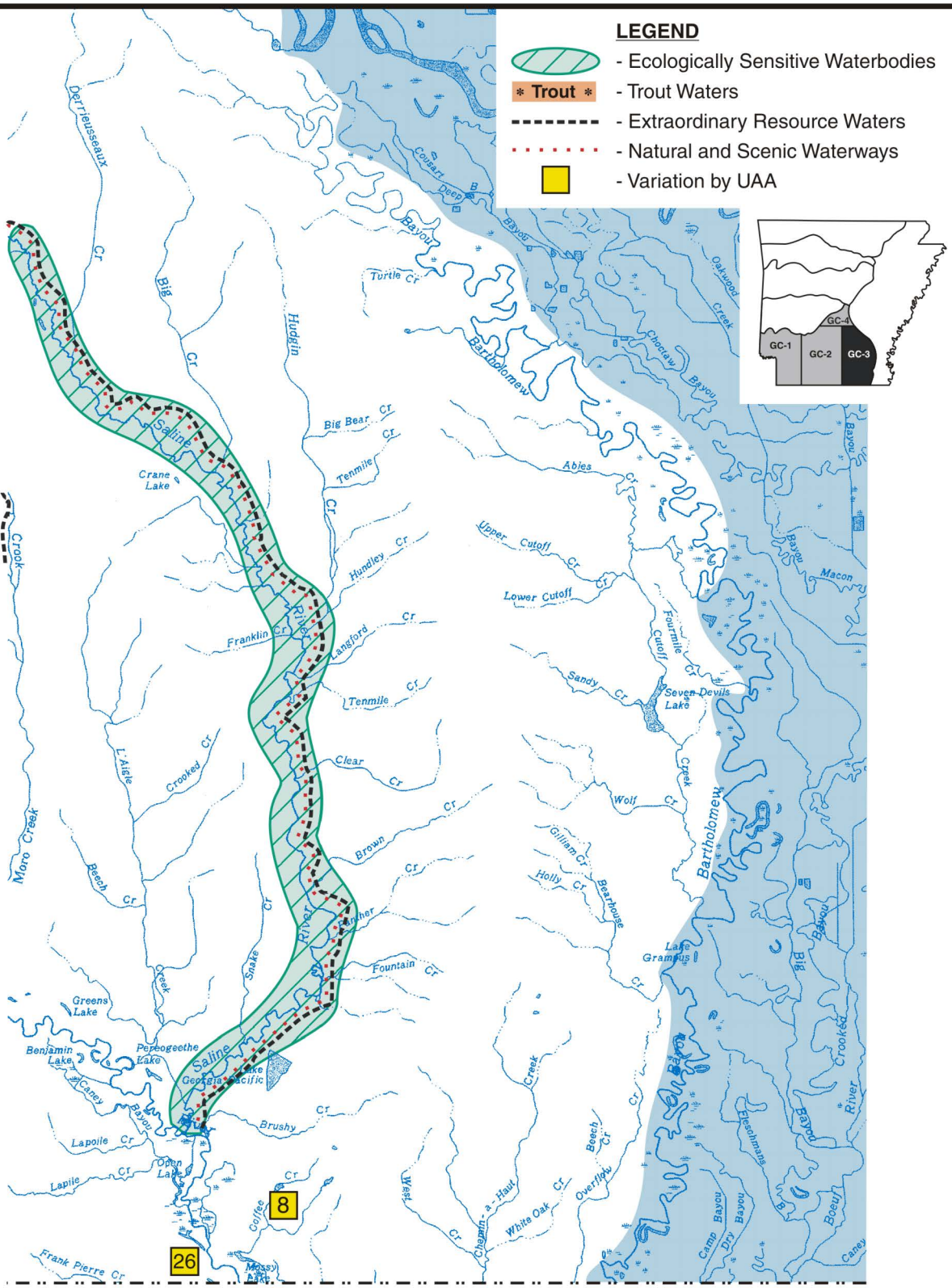

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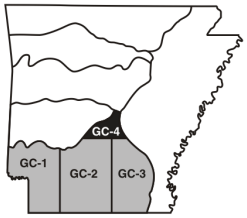
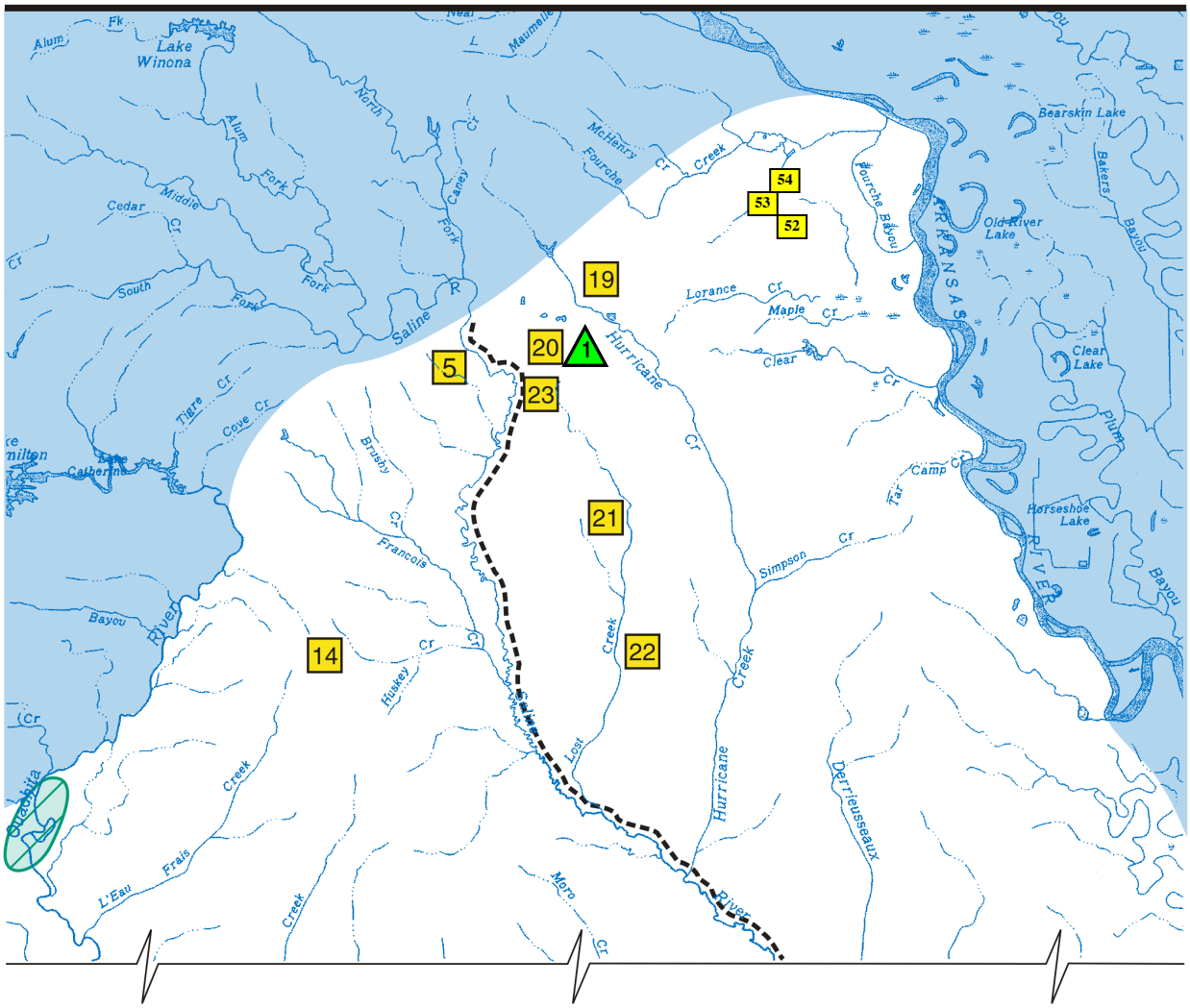


LEGEND

- Ecologically Sensitive Waterbodies
- * Trout * - Trout Waters
- Extraordinary Resource Waters
- Natural and Scenic Waterways
- Variation by UAA
- Variation by EIP



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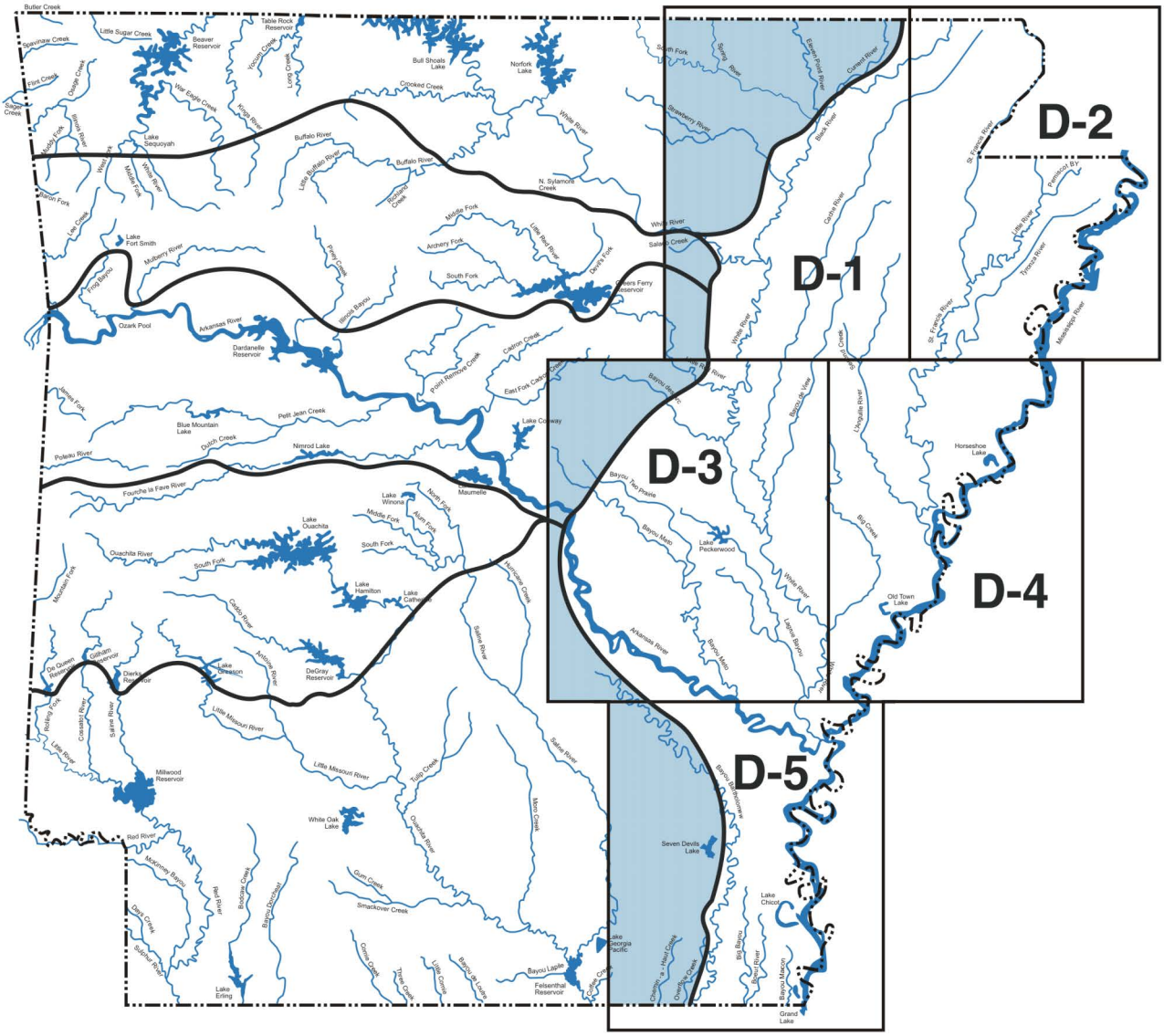

DESIGNATED USES: DELTA ECOREGION

(Plates D-1, D-2, D-3, D-4, D-5)

Extraordinary Resource Waters
Second Creek (D-4)
Cache River above Cache Bayou - adjacent to natural areas (D-3)
Arkansas River below Dam #2 (D-5)
Strawberry River (D-1)
Two Prairie Bayou adjacent to natural areas (D-3)

Natural and Scenic Waterways
None

Ecologically Sensitive Waterbodies
Lower St. Francis River and lower 10 miles of Straight Slough - location of fat pocketbook mussel (D-2, D-4)
Right Hand Chute at confluence with St. Francis River - location of fat pocketbook mussel (D-2)
Departee Creek - location of flat floater mussel (D-1)
Black River at mouth of Spring River - location of pink mucket mussel (D-1)

Channel-altered Delta Ecoregion Streams - These include the majority of the streams in this ecoregion and are characterized by substantial alteration of the morphology of their main-stream channel as well as their tributary streams. Such alteration of the tributaries of these streams significantly affects the water quality and hydrology of the streams and their watersheds. Most of the upper segments of these waters have been dredged and straightened into ditches. Additionally most of the tributaries of these streams have been straightened, ditched and, in some cases, rerouted to quickly move water off the agriculture fields and into the major streams. In the lower segments of these waters, channel realignment is less expansive but most of these channels have been "snagged" to remove any in-stream obstructions (brush, logs, and other debris) and the stream channel and banks have been dredged to uniform depths and cleared of any obstructions. These include Cache River, Bayou DeView, Village Creek, Blackfish Bayou and others to be determined by the Department on a case by case basis.

Primary Contact Recreation - all streams with watersheds of greater than 10 mi^2 and all lakes/reservoirs

Secondary Contact Recreation - all waters

Domestic, Industrial and Agricultural Water Supply - all waters

Fisheries

Trout - none

Lakes and Reservoirs - all

Streams

Seasonal Delta fishery - all streams with watersheds of less than 10 mi^2 except as otherwise provided in Reg. 2.505

Perennial Delta fishery - all streams with watersheds 10 mi^2 or larger and those waters where discharges equal or exceed 1 CFS

Use Variation Supported by UAA
Unnamed ditch to Little Lagrue Bayou - perennial Delta fishery (D-3, #1)
Little Lake Bayou - seasonal Delta fishery; no primary contact (D-5, #2)
Coon Creek and unnamed tributary from Frit Ind. - no domestic water supply use (D-1, #3)
Rocky Branch Creek and Bayou Meto from Rocky Branch Creek to Bayou Two Prairie - no domestic water supply use (D-3 #4)
Ditch No. 27 – no domestic water supply use (D-2, #5)
Ditch No. 6 – no domestic water supply use (D-2, #6)

SPECIFIC STANDARDS: DELTA ECOREGION

(Plates D-1, D-2, D-3, D-4, D-5)

	Least-Altered Streams		Channel-Altered Streams		Lakes and Reservoirs
Temperature °C (°F)*	30 (86)		32 (89.6)		32 (89.6)
White River	32 (89.6)				
St. Francis River	32 (89.6)				
Mississippi River	32 (89.6)				
Arkansas River	32 (89.6)				
Turbidity(NTU) (base/all)	45/84		75/250		25/45
Arkansas River (base/all)	50/52				
Mississippi River (base/all)	50/75				
St. Francis River (base/all)	75/100				
Minerals	see Reg. 2.511		see Reg. 2.511		see Reg. 2.511
Dissolved Oxygen (mg/l)**	Pri	Crit	Pri	Crit.	see Reg. 2.505
<10 mi^2 watershed	5	2	5	2	
10 mi^2 to 100 mi^2	5	3	5	3	
>100 mi^2 watershed	5	5	5	5	
All other standards	(same as statewide)				

Variations Supported by UAA

Unnamed ditch to Little Lagrue Bayou - from headwaters to confluence with Little Lagrue Bayou, critical season D.O. standard - 3 mg/l (D-3, #1)
Little Lake Bayou - critical season D.O. standard - 2 mg/l (D-5, #2)
Unnamed tributary from Frit Ind, to Coon Creek - sulfates 48 mg/l (D-1, #3)
Rocky Branch Creek- chlorides 64 mg/l (D-3, #4)
Bayou Meto from Rocky Branch Creek to Bayou Two Prairie – chlorides 64 mg/ l (D-3, #4)
Bayou Meto from mouth to Bayou Two Prairie- chlorides 95 mg/l; sulfates 45 mg/l (D-3, #4)
Ditch No. 27 – sulfates 480 mg/l; TDS 1,200 mg/l; maximum water temperature 95°F (D-2, #5)
Ditch No. 6 from Ditch No. 27 confluence to its mouth – sulfates 210 mg/l; TDS 630 mg/l (D-2, #6)
Tyronza River from Ditch No. 6 confluence to its mouth – sulfates 60 mg/l – see Reg. 2.511 (D-2, #7)
Long Pond Slough – chlorides 95 mg/l; sulfates 45 mg/l
Castor Bayou – chlorides 95 mg/l; sulfates 45 mg/l
Cross Bayou – chlorides 95 mg/l; sulfates 45 mg/l
Bayou Two Prairie (mouth to Rickey Branch) – chlorides 95 mg/l; sulfates 45 mg/l
Little Bayou Meto – chlorides 95 mg/l; sulfates 45 mg/l
Bakers Bayou – chlorides 95 mg/l; sulfates 45 mg/l
Wabbaseka Bayou – chlorides 95 mg/l; sulfates 45 mg/l
Indian Bayou – chlorides 95 mg/l; sulfates 45 mg/l
Flat Bayou – chlorides 95 mg/l; sulfates 45 mg/l
Shumaker Branch – chlorides 95 mg/l; sulfates 45 mg/l
Skinner Branch – chlorides 95 mg/l; sulfates 45 mg/l
White Oak Branch – chlorides 95 mg/l; sulfates 45 mg/l
Caney Creek – chlorides 95 mg/l; sulfates 45 mg/l
Salt Bayou – chlorides 95 mg/l; sulfates 45 mg/l
Snow Bayou – chlorides 95 mg/l; sulfates 45 mg/l
Fish Trap Slough – chlorides 95 mg/l; sulfates 45 mg/l
Ricky Branch – chlorides 95 mg/l; sulfates 45 mg/l

Blue Point Ditch- – chlorides 95 mg/l; sulfates 45 mg/l
Big Ditch – chlorides 95 mg/l; sulfates 45 mg/l
Main Ditch – chlorides 95 mg/l; sulfates 45 mg/l
Plum Bayou– chlorides 95 mg/l; sulfates 45 mg/l
Crooked Creek Ditch – chlorides 95 mg/l; sulfates 45 mg/l
Indian Bayou Ditch – chlorides 95 mg/l; sulfates 45 mg/l
Caney Creek Ditch – chlorides 95 mg/l; sulfates 45 mg/l
Salt Bayou Ditch – chlorides 95 mg/l; sulfates 45 mg/l
Bradley Slough – chlorides 95 mg/l; sulfates 45 mg/l
Tupelo Bayou – chlorides 95 mg/l; sulfates 45 mg/l
Dennis Slough – chlorides 95 mg/l; sulfates 45 mg/l
Buffalo Slough – chlorides 95 mg/l; sulfates 45 mg/l
Flynn Slough – chlorides 95 mg/l; sulfates 45 mg/l
Boggy Slough – chlorides 95 mg/l; sulfates 45 mg/l
Bear Bayou – chlorides 95 mg/l; sulfates 45 mg/l
Bubbling Slough – chlorides 95 mg/l; sulfates 45 mg/l
Five Forks Bayou – chlorides 95 mg/l; sulfates 45 mg/l
Government Cypress Slough – chlorides 95 mg/l; sulfates 45 mg/l
Brushy Slough – chlorides 95 mg/l; sulfates 45 mg/l
Tipton Ditch – chlorides 95 mg/l; sulfates 45 mg/l
Hurricane Slough – chlorides 95 mg/l; sulfates 45 mg/l
Newton Bayou – chlorides 95 mg/l; sulfates 45 mg/l
West Bayou – chlorides 95 mg/l; sulfates 45 mg/l
Brownsville Branch– chlorides 95 mg/l; sulfates 45 mg/l
Eagle Branch– chlorides 95 mg/l; sulfates 45 mg/l
Unnamed tributary to Big Creek — chlorides 71 mg/I, sulfates 60 mg/1, TDS 453 mg/1 (D-1, # 38)
Big Creek from Whistle Ditch to mouth of unnamed trib — chloride 58 mg/1, sulfates 49 mg/1 (D-I I. # 39)
Bayou DeView from AR Hwy 14 to Whistle Ditch — chloride 48 mg/1, sulfates 38 mg/1, TDS 411.3 mg/I (D-1, #40)
Bayou DeView from mouth to AR Hwy 14 — chloride 48 mg/I, sulfates 37.3 mg/1, TDS 411.3 (D-1. # 41)

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* Increase over natural temperatures may not be more than 2.8°C (5°F).

** When water temperatures exceed 22°C, the critical season D.O. standard may be depressed by 1 mg/l for no more than 8 hours during a 24-hour period.

Plate D-1 (Delta)

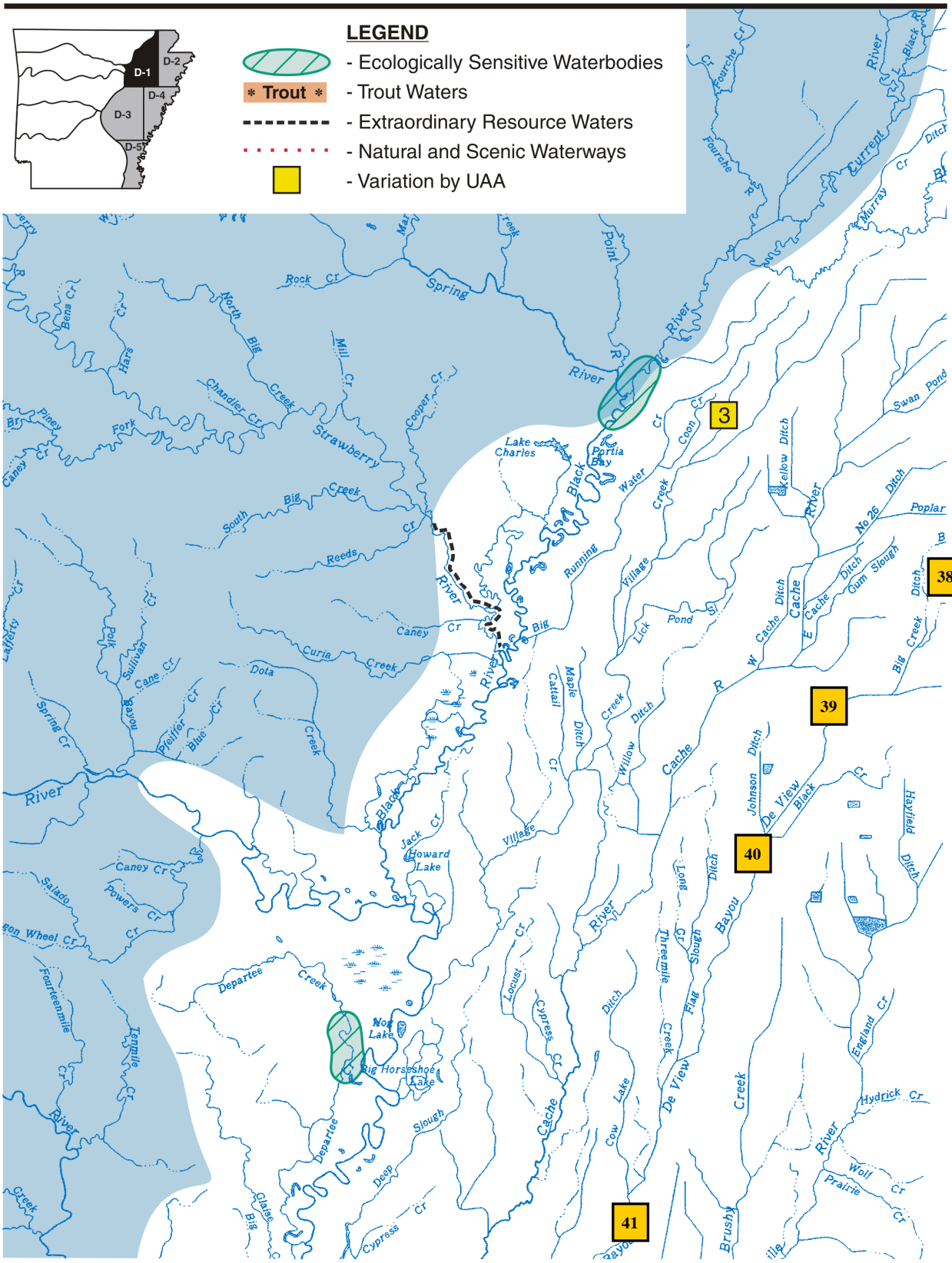


Plate D-2 (Delta)

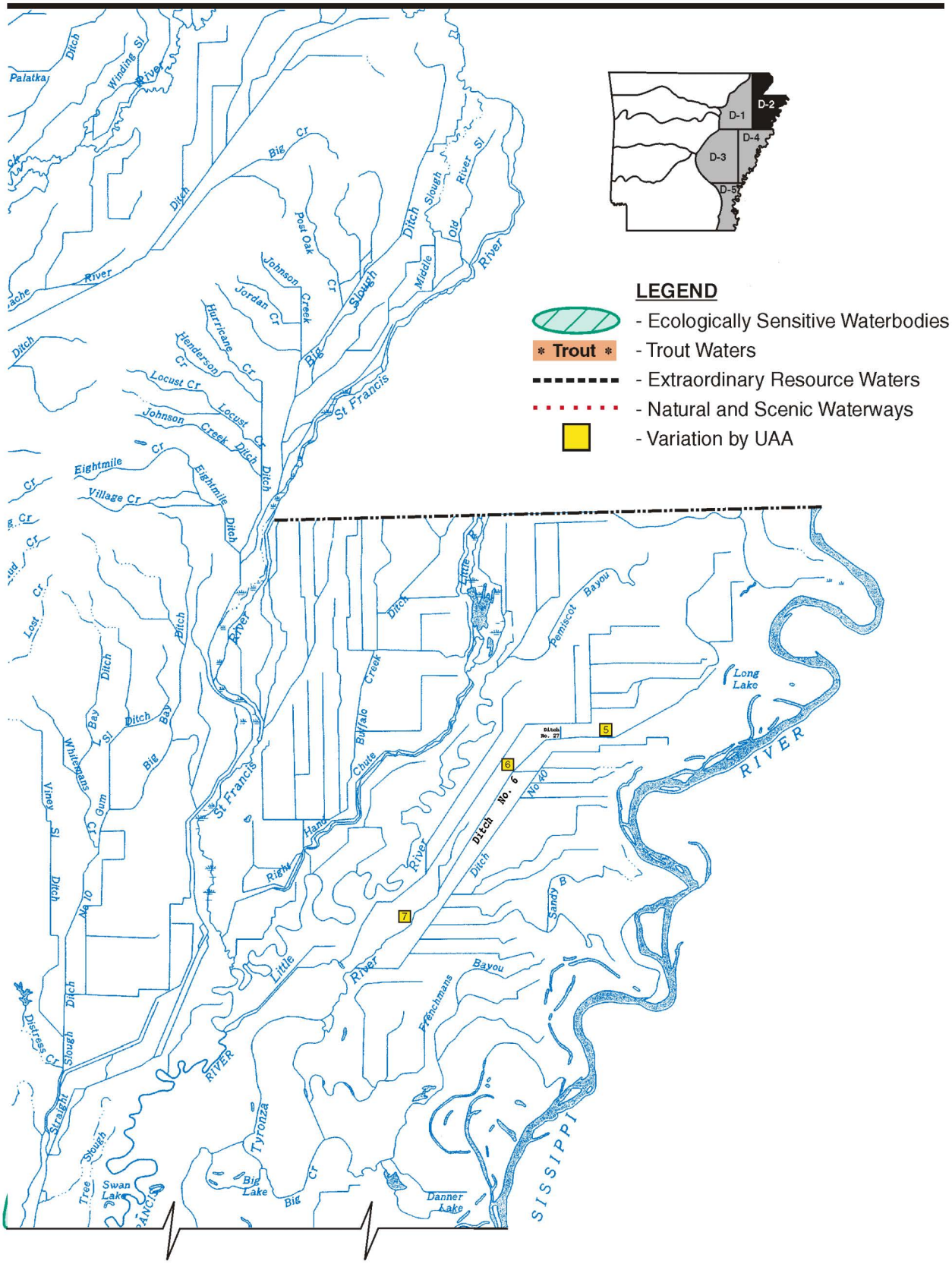


Plate D-3 (Delta)

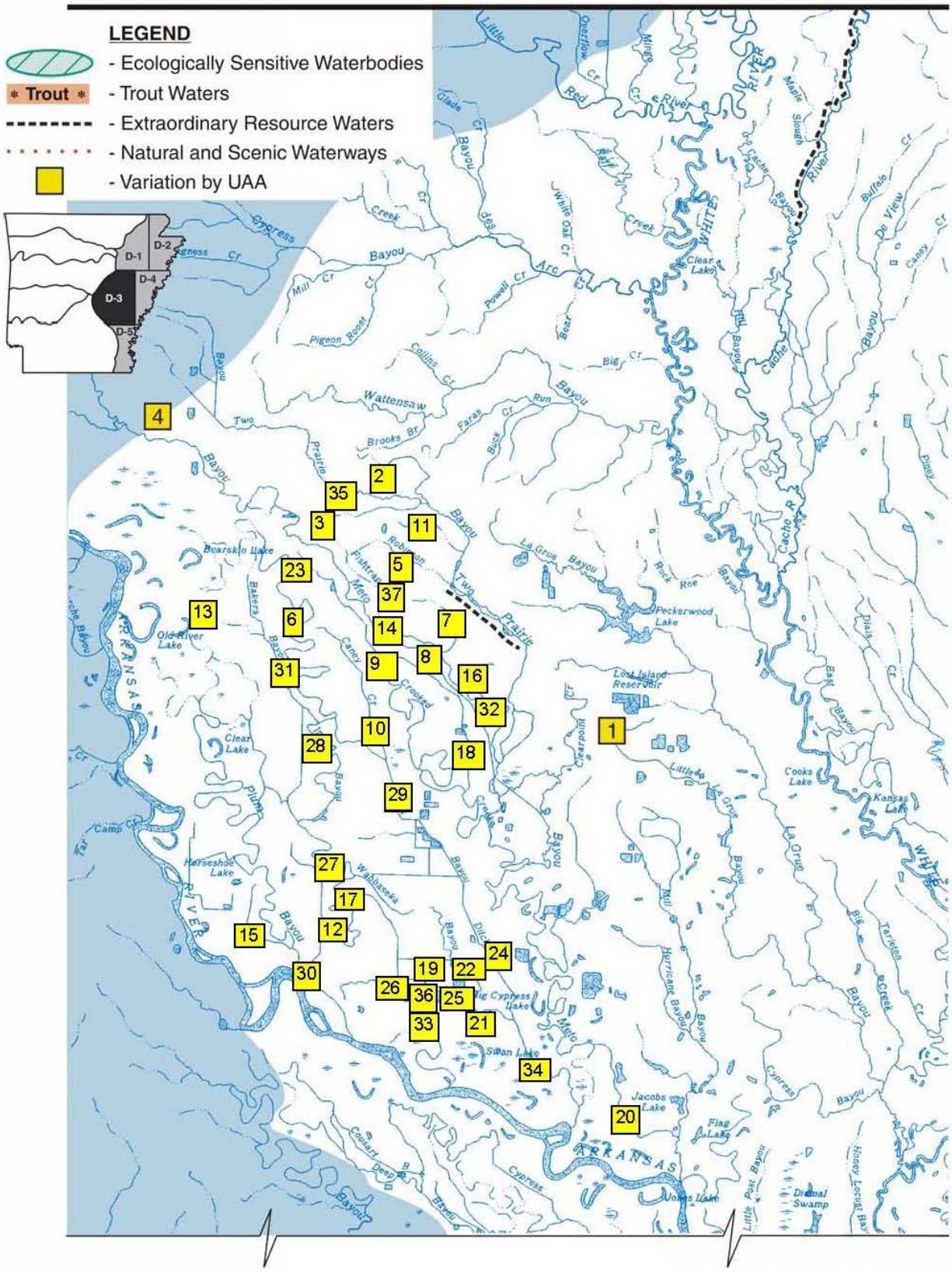


Plate D-4 (Delta)

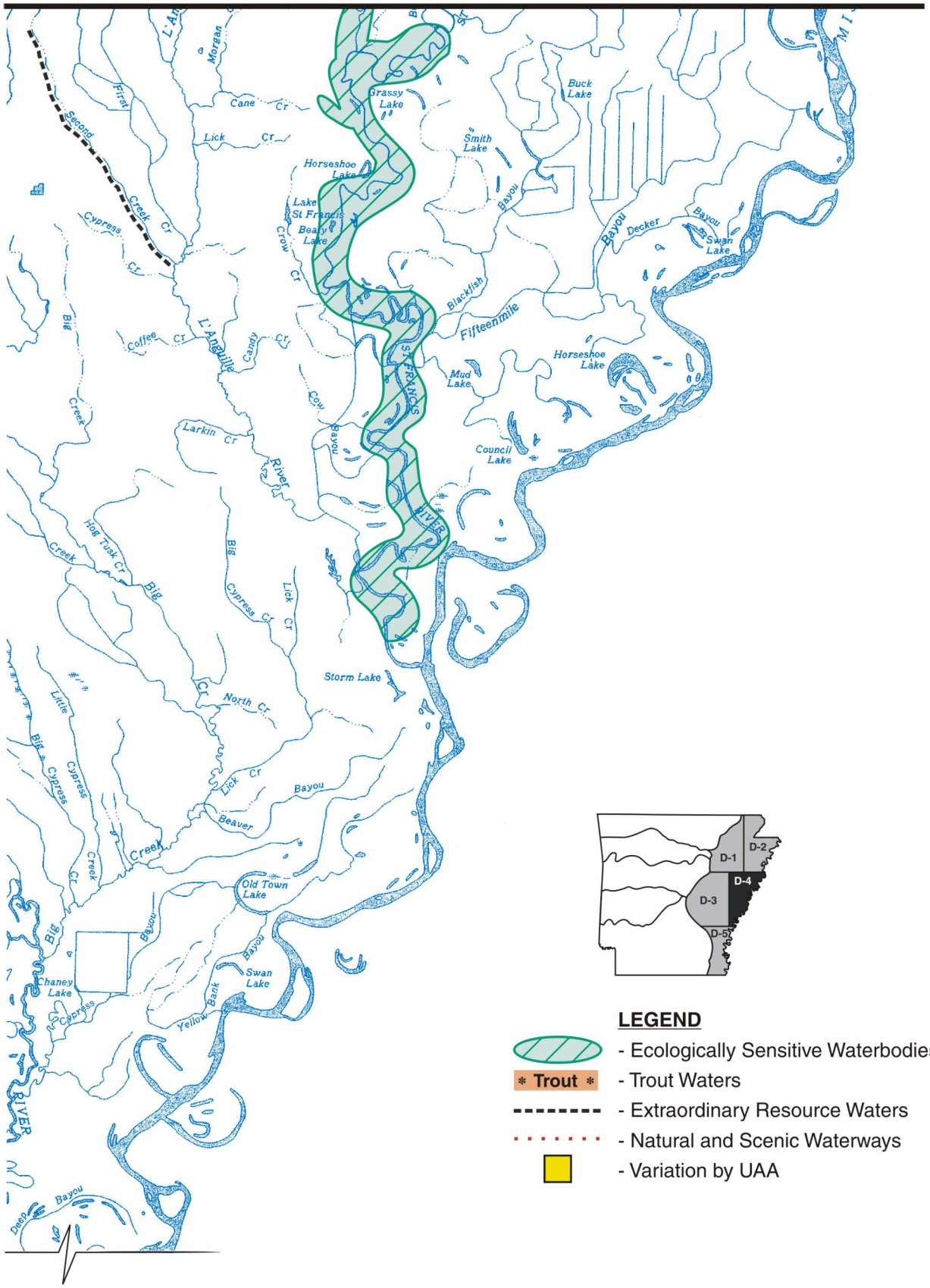
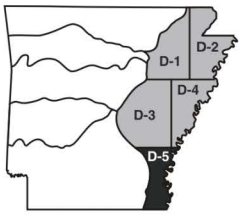
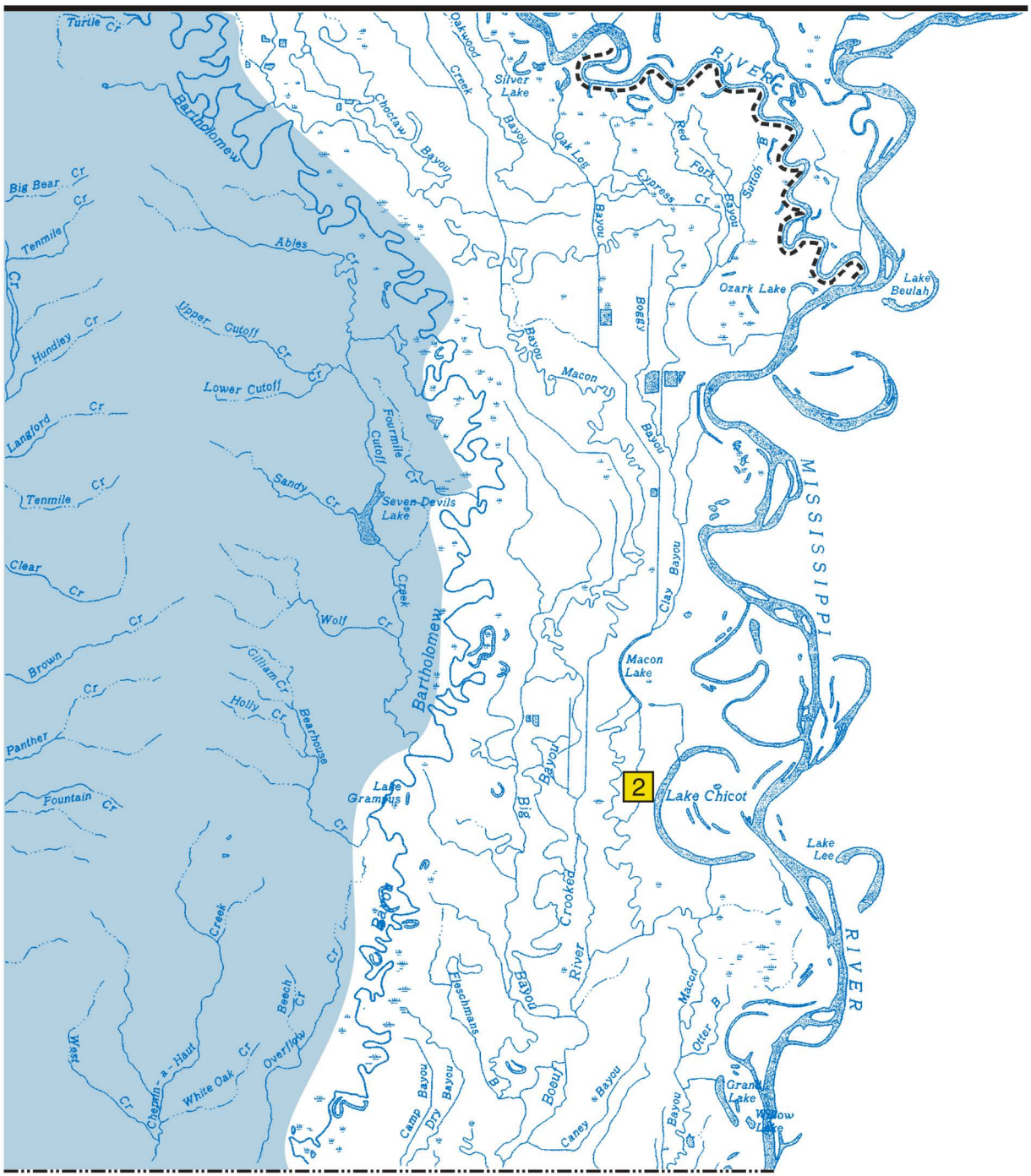


Plate D-5 (Delta)



LEGEND

- Ecologically Sensitive Waterbodies
- * Trout * - Trout Waters
- Extraordinary Resource Waters
- Natural and Scenic Waterways
- Variation by UAA



REGULATION NO. 2

APPENDIX B

Environmental Improvement Project

(September 28, 2007*)*

1

APPENDIX B: ENVIRONMENTAL IMPROVEMENT PROJECT

Stricken language would be deleted from present law. Underlined language would be added to present law

State of Arkansas *As Engrossed: S2/21/97*

81st General Assembly **A Bill** ACT 401 OF 1997

Regular Session, 1997 HOUSE BILL 1563

By: Representatives Sheppard, Wallis, Lancaster, Johnson, and Horn

By: Senator Mahony

For An Act To Be Entitled

"AN ACT TO ENCOURAGE LONG-TERM ENVIRONMENTAL PROJECTS; AND FOR OTHER PURPOSES."

Subtitle

"AN ACT TO ENCOURAGE LONG-TERM ENVIRONMENTAL PROJECTS."

BE IT ENACTED BY THE GENERAL ASSEMBLY OF THE STATE OF ARKANSAS:

SECTION 1. Legislative Findings and Intent.

The General Assembly hereby finds that many areas of the state would benefit from long-term environmental remediation projects that significantly improve the effects caused by industrial or extractive activities. However, commitments by private enterprise to remedy such damages are discouraged by the prospect of civil liability based upon rigid application of state water quality standards to the enterprises activities. The purpose of this act is to preserve the states approach to establishing water quality standards, while also encouraging private enterprises to make significant improvements to closed or abandoned sites that are of such magnitude that more than three (3) years will be required to complete the project.

SECTION 2. Definitions and Applicability.

For the purposes of this act:

(1) "Long-term Improvement Project" or "Project" means any remediation or reclamation project at closed or abandoned:

(A) Mineral Extraction Sites;

(B) Solid Waste Management Units as defined pursuant to the Arkansas Hazardous Waste Management Act;

(C) Oil and Gas Extraction Sites;

(D) Brownfield Sites as defined in Act 125 of 1995 or as may be amended; and

(E) Hazardous Substance Sites listed on the National Priority List (42 U.S.C. Section 9605), or State Priority List (Arkansas Code 8-7-509(e), or as may be amended.

(2) "Water Quality Standard" means standards developed through administrative rulemaking by the Commission;

(3) "Commission" means the Arkansas Pollution Control and Ecology Commission; and

(4) "Department" means the Arkansas Department of Pollution Control and Ecology.

SECTION 3. Procedures for approval of environmental projects, contents of applications, and public notice.

(a) A petitioner seeking approval of a change in water quality standards to accommodate a long-term environmental improvement project shall file with the Department a Notice of Intent, which includes as a minimum:

(1) A description of the water body or stream segment affected by the project;

(2) The existing ambient water quality for the use of criteria at issue;

(3) The affected water quality standard;

(4) The modifications sought;

(5) The proposed remediation activities;

(6) A proposed Remediation Plan, which shall contain:

(A) A description of the existing conditions, including identification of the conditions limiting the attainment of the water quality standards;

(B) A description of the proposed water quality standard modification, both during and post project;

(C) A description of the proposed remediation plan; and

(D) The anticipated collateral effects, if any, of the Remediation Plan; and

(7) A schedule for implementing the Remediation Plan that ensures that the post project water quality standards are met as soon as reasonably practicable.

(b) The department shall cause notice of the proposed project and associated water quality standard changes described in subsection (a) to be published for public notice and comment in the same manner as provided for permit applications in Arkansas Code 8-4-203(b), and shall advise the public that the details of the proposed project are available for public review.

(c) After considering comments from the public, the department shall notify the petitioner as to whether the proposed project is approved or denied. The department may deny approval of a project if it reasonably concludes that the plan is not complete, the plan is not technically sound, the schedule is unrealistic, the plan will not have an overall beneficial effect for the environment, or other appropriate reasons. Any department determination on the approval or denial of a project is subject to the appeal procedures applicable to permitting decisions set out in Arkansas Code 8-4-205.

(d) Upon approval of the project for further development, the petitioner shall prepare documentation required for third-party rulemaking by Arkansas Code 8-4-202 and established in administrative procedures.

SECTION 4. Modification of Water Quality Standards.

(a) The commission may approve a modification where the water quality standard is not being maintained due to conditions which may, in part or in whole, be corrected through the implementation of long-term measures. The commission shall establish such subcategory of use and modify such general and specific standards as it deems appropriate to reflect such modification while ensuring that the fishable/swimmable use is maintained. In all water quality standard changes associated with long-term environmental projects, the remedial action plan described in subsection (a) of Section 3 of this act shall be incorporated by reference in the statement of basis and purpose of the rule and shall be considered an essential condition of the modified water quality standard.

(b) Once the commission approves a water quality standard modification, the department shall ensure that conditions and limitations designed to achieve compliance with the plan are established in applicable discharge permits, consent administrative orders, or such other enforcement measures deemed appropriate by the department. The department may allow modifications by the petitioner to the remediation plan and schedule as is deemed appropriate, provided that any such modifications to the original remedial action plan shall not render the project significantly less protective of the applicable use subcategory. Should the department find that the petitioner is not acting in good faith to complete the project in accordance with the approved plan, applicable and appropriate enforcement authority may be exercised subject to appeal to the commission.

(c) The department or the petitioner shall report annually to the commission on the progress of the project.

SECTION 5. Project Completion.

At the end of the project the post project water quality standards shall be in full force and effect.

SECTION 6.All provisions of this act of a general and permanent nature are amendatory to the Arkansas Code of 1987 Annotated and the Arkansas Code Revision Commission shall incorporate the same in the Code.

SECTION 7. If any provision of this act or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of the act which can be given effect without the invalid provision or application, and to this end the provisions of this act are declared to be severable.

SECTION 8. All laws and parts of laws in conflict with this act are hereby repealed.

/s/Sheppard et al

APPROVED:3-07-97

1

ARKANSAS POLLUTION CONTROL AND ECOLOGY COMMISSION

REGULATION NO. 2

APPENDIX C

Scientific Names of Fishes

(September 28, 2007)

APPENDIX C: SCIENTIFIC NAMES OF FISHES

Common Name	Species	Family
Banded sculpin	*Cottus carolinae*	Cottidae
Banded pygmy sunfish	*Elassoma zonatum*	Elassomatidae
Bigeye shiner	*Notropis boops*	Cyprinidae
Black redhorse	*Moxostoma duquesnei*	Catostomidae
Blackside darter	*Percina maculata*	Percidae
Blacktail redhorse	*Moxostoma poecilurum*	Catostomidae
Blacktail shiner	*Notropis venustus*	Cyprinidae
Bleeding shiner	*Luxilus zonatus*	Cyprinidae
Bluegill	*Lepomis macrochirus*	Centrarchidae
Bluntnose minnow	*Pimephales notatus*	Cyprinidae
Bluntnose darter	*Etheostoma chlorosomum*	Percidae
Cardinal shiner	*Luxilus cardinalus*	Cyprinidae
Carp	*Cyprinus carpio*	Cyprinidae
Channel catfish	*Ictalurus punctatus*	Ictaluridae
Creek chubsucker	*Erimyzon oblongus*	Catostomidae
Creole darter	*Etheostoma collettei*	Percidae
Current River darter	*Etheostoma uniporum*	Percidae
Drum	*Aplodinotus grunniens*	Sciaenidae
Dusky darter	*Percina sciera*	Pericidae
Duskystripe shiner	*Luxilus pilsbryi*	Cyprinidae
Emerald shiner	*Notropis atherinoides*	Cyprinidae
Fantail darter	*Etheostoma flabellare*	Percidae
Flier	*Centrarchus macropterus*	Centrarchidae
Freckled madtom	*Noturus nocturnus*	Ictaluridae
Gizzard shad	*Dorosoma cepedianum*	Clupeidae
Golden redhorse	*Moxostoma erythrurum*	Catostomidae
Redfin pickerel	*Esox americanus*	Esocidae
Gravel chub	*Hybopsis punctata*	Cyprinidae
Green sunfish	*Lepomis cyanellus*	Centrarchidae
Greenside darter	*Etheostoma blennioides*	Percidae
Largemouth bass	*Micropterus salmoides*	Centrarchidae
Longear sunfish	*Lepomis megalotis*	Centrarchidae
Longnose darter	*Percina nasuta*	Percidae
Madtoms	*Noturus sp.*	Ictaluridae
Mosquitofish	*Gambusia affinis*	Poeciliidae
Northern hogsucker	*Hypentelium nigricans*	Catostomidae
Northern studfish	*Fundulus catenatus*	Cyprinodontidae
Orangebelly darter	*Etheostoma radiosum*	Percidae
Orangespotted sunfish	*Lepomis humilis*	Centrarchidae
Orangethroat darter	*Etheostoma spectabile*	Percidae
Ozark madtom	*Noturus albater*	Ictaluridae

Common Name	**Species**	**Family**
Ozark minnow	*Notropis nubilus*	Cyprinidae
Pirate perch	*Aphredoderus sayanus*	Aphredoderidae
Pugnose minnow	*Notropis emiliae*	Cyprinidae
Rainbow darter	*Etheostoma caeruleum*	Percidae
Redfin darter	*Etheostoma whipplei*	Percidae
Redfin shiner	*Lythrurus umbratilis*	Cyprinidae
Ribbon shiner	*Lythrurus fumeus*	Cyprinidae
"Rock basses"	*Ambloplites sp.*	Centrarchidae
Scaly sand darter	*Ammocrypta vivax*	Percidae
Shadow bass	*Ambloplites ariommus*	Centrarchidae
Slender madtom	*Noturus exilis*	Ictaluridae
Slough darter	*Etheostoma gracile*	Percidae
Smallmouth bass	*Micropterus dolomieu*	Centrarchidae
Smallmouth buffalo	*Ictiobus bubalus*	Catostomidae
Southern redbelly dace	*Phoxinus erythrogaster*	Cyprinidae
Spotted bass	*Micropterus punctulatus*	Centrarchidae
Spotted sucker	*Minytrema melanops*	Catostomidae
Spotted sunfish	*Lepomis punctatus*	Centrarchidae
Spotted gar	*Lepisosteus oculatus*	Lepisosteidae
Strawberry River darter	*Etheostoma fragi*	Percidae
Striped shiner	*Notropis chrysocephalus*	Cyprinidae
Tadpole madtom	*Noturus gyrinus*	Ictaluridae
Warmouth	*Lepomis gulosus*	Centrarchidae
Wedgespot shiner	*Notropis greenei*	Cyprinidae
Whitetail shiner	*Notropis galacturus*	Cyprinidae
Yellow bullhead	*Ameiurus natalis*	Ictaluridae

ARKANSAS POLLUTION CONTROL AND ECOLOGY COMMISSION

REGULATION NO. 2.

APPENDIX D

PROCEDURES FOR OBTAINING DIRECTOR'S DETERMNATION ON THE PROPOSED PHYSICAL ALTERATION OF AN EXTRAORDINARY RESOURCE WATERS, ECOLOGICALLY SENSITIVE WATERBODY, OR NATURAL AND SCENIC WATERWAY

(September 28, 2007)

APPENDIX D: PROCEDURES FOR OBTAINING DIRECTOR'S DETERMINATION ON THE PROPOSED PHYSICAL ALTERATION OF AN EXTRAORDINARY RESOURCE WATERS, ECOLOGICALLY SENSITIVE WATERBODY, OR NATURAL AND SCENIC WATERWAY

I. CONTENTS OF REQUEST FOR DETERMINATION

Any person may submit a written request to the Department seeking a determination on whether or not a proposed project will constitute a significant physical alteration of the habitat of an extraordinary resource water, ecologically sensitive waterbody, or natural and scenic waterbody. Such request shall include, at a minimum:

(A) A map depicting the location of the proposed project and the area to be altered by the project;
(B) A description of the project, including detailed design plans;
(C) An analysis of alternatives to the proposed project, including: an environmental assessment of the impacts of each alternative, the costs associated with each alternative, an engineering and economic analysis, and a socio-economic evaluation of the project to the local area; and
(D) A technical report containing supporting documentation to demonstrate that the proposed project:
(1) will not impair water quality;
(2) will not impair the natural flow regime; and
(3) will not impair the habitat of fish, shellfish, or other forms of aquatic life

II. DEPARTMENT REVIEW OF REQUEST

(A) Upon receipt of the request and supporting documentation identified above, the Department shall review the alternatives analysis referenced in Appendix D, I (C). The Department may consult with professionals, as necessary, in reviewing the report. The Department shall review the alternatives analysis in order to:
(1) ensure that the alternatives analysis is complete;
(2) evaluate whether the analysis adequately addresses the environmental, social, and economic costs and impacts of each alternative; and
(3) determine whether any feasible alternatives exist for the proposed project.

(B) Following review of the alternatives analysis, the Department will review the technical report referenced in Appendix D, I (D). The Department may consult with professionals, as necessary, in reviewing the report. The Department shall review the technical report to evaluate the impacts of the proposed project on water quality, instream flow, and aquatic habitat. The Department will develop guidelines for drafting the technical report and identifying issues to be addressed.

III. DIRECTOR'S DETERMINATION

(a) Upon completing its review of the written request and supporting information, the Director shall issue a draft determination. The Director's draft determination shall include a written statement setting out the reasons for the determination and provide a draft decision on the proposed project which shall either:

1) authorize, with conditions as necessary, the alteration of the habitat because the proposed project does not constitute a significant alteration of the habitat and no feasible alternatives exist to the proposed project; or
2) deny the request to alter the habitat because:
   (i) the proposed project constitutes a significant alteration of the habitat which is prohibited by Reg. 2.304(a); or
   (ii) feasible alternatives to the proposed project exist.

(b) Public notice, notice of a public comment period, and notice of any public hearing on the Director's draft determination shall be provided in the same manner as that provided for a draft permit decision in Regulation No. 8. Thereafter, the Director shall issue a final determination. The final determination shall be issued and notice provided in the same manner as that provided for the issuance and notice of a final permitting decision in Regulation No. 8. The Director's determination may be appealed to the Commission in the same manner as permit appeals are provided for in Regulation No. 8.

IV. REQUIREMENT FOR SHORT TERM ACTIVITY AUTHORIZATION

If the Director authorizes the alteration of the habitat of an extraordinary resource water, ecologically sensitive waterbody, or natural and scenic waterway, then the party requesting the Director's Determination shall submit to the Department a request for a short term activity authorization in accordance with the requirements of Reg. 2.305.

V. OTHER REQUIRED PERMITS NOT WAIVED

Nothing contained herein shall be construed to relieve the petitioner of the requirements to obtain any other permit for the proposed project required by state or federal law.

A RKANSAS POLLUTION CONTROL AND ECOLOGY COMMISSION

REGULATION NO. 2.

APPENDIX E

Criteria to be Considered in Determining Whether the Designated Use of Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway Should be Maintained

(September 28, 2007)

APPENDIX E: CRITERIA TO BE CONSIDERED IN DETERMINING WHETHER THE DESIGNATED USE OF EXTRAORDINARY RESOURCE WATER, ECOLOGICALLY SENSITIVE WATERBODY, OR NATURAL AND SCENIC WATERWAY SHOULD BE MAINTAINED

The determination of whether a designated use of Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway should be maintained in a given waterbody must be made on a case by case basis. At least 180 days prior to filing any petition authorized under Section 2.310 to initiate rulemaking with the Commission to remove the designated use of Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway from a free flowing waterbody for the purpose of constructing a reservoir to provide a domestic water supply, the petitioner shall submit to the Department information and supporting documentation which address each of the following:

(A) Describe generally and specifically the state of the existing water quality;
(B) Identify the presence of key and indicator species of fish adapted to flowing water systems and state the extent to which these species are present in the waterbody;
(C) Describe the extent to which water quality and physical habitat, including wetlands, support other plant or animal life and identify the species;
(D) Identify the presence of, and state the extent to which, other wildlife uses are dependent upon the waterbody;
(E) State the extent to which water quality and physical habitat support threatened, endangered, or endemic aquatic or semi-aquatic species and identify those species;
(F) Specify the extent to which the waterbody supports a high diversity of aquatic species and identify the presence and frequency of the species;
(G) Describe and identify the extent to which physical or chemical characteristics of the waterbody provide an unusual or uncommon aquatic habitat;
(H) Describe the extent to which physical or chemical characteristics give the waterbody unusual or unique aesthetic attributes;
(I) Specify the extent of the use of the waterbody for recreation in or on the water, such as fishing, swimming, and boating (including but not limited to canoeing, kayaking, or rafting), or use of the waterbody for commercial activity, including tourism;
(J) Identify and describe the intangible social values associated with the free flowing characteristics of the waterbody;
(K) Identify the presence and location of gorges, rapids, waterfalls, or other significant geologic features;
(L) Identify the presence and location of scenic areas and sites potentially impacted by the reservoir;

(M) Identify the presence and location of rare and/or irreplaceable natural areas potentially impacted by the reservoir;
(N) Identify the presence and location of known archeological sites potentially impacted by the reservoir;
(O) Identify the presence and location of historic resources potentially impacted by the reservoir;
(P) Delineate the extent to which the waterbody is located within the boundaries of, flows through, or is adjacent to state or federal forest land, parks, natural areas, nature preserves, refuges, or wildlife management areas;
(Q) Describe the extent to which the waterbody is used for educational, scientific, or research purposes;
(R) Identify the waterbody's use or potential use as an ecoregion reference stream;
(S) Describe the land uses, and the geographical extent of each, occurring within the watershed;
(T) Identify the presence and location of all permitted point sources discharging to the waterbody;
(U) Identify the presence and location of existing alterations, diversions or man-made impoundments; and
(V) Provide the frequency of occasions when there is no natural flow in the waterbody, and the 7Q10 flow values for the waterbody.

ARKANSAS POLLUTION CONTROL AND ECOLOGY COMMISSION

REGULATION NO. 2.

APPENDIX F

Factors Considered In Adding the Designated Use of Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway to a Waterbody or Waterbody Segment

(September 28, 2007)

APPENDIX F: FACTORS CONSIDERED IN ADDING THE DESIGNATED USE OF EXTRAORDINARY RESOURCE WATER, ECOLOGICALLY SENSITIVE WATERBODY, OR NATURAL AND SCENIC WATERWAY TO A WATERBODY OR WATERBODY SEGMENT

The Commission shall consider the following supporting documentation in determining whether a waterbody should be designated as an Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway:

(A) Location – The waterbody is within the boundaries of or flows through or is adjacent to state or federal forest land, parks, natural areas, nature preserves, refuges, or wildlife management areas, or the watershed may include remote, primitive, or relatively undeveloped areas;
(B) Existing water quality – pristine, naturally-occurring, or unique;
(C) Ecological value – The presence of water quality and physical habitat that supports threatened, endangered, or sensitive species, the presence of any threatened, endangered, or sensitive species, and/or water quality that supports an exceptional high diversity of aquatic species (fish or benthic macroinvertebrates) as categorized by an appropriate index of biological integrity (IBI) protocol;
(D) Presence of physical or chemical characteristics that provide an unusual or uncommon aquatic habitat;
(E) Special attributes of the waterbody that make it an outstanding resource, including but not limited to the presence of archeological sites, historical sites, or rare or valuable wildlife habitat;
(F) Aesthetic Value- the presence of scenic areas or sites or scenic beauty resulting from natural features of the basin such as flow, topography, geology, ecology, physiography (i.e., waterfalls, gorges, rapids, or other special features), or the presence of characteristics giving the waterbody unique or unusual attributes;
(G) Recreational Value- Use of the waterbody for:
  (1) Fishing, rafting, kayaking, camping, family outings, backpacking, bird watching, etc.,
  (2) Presence of hiking trails or scenic road or highway alongside, and
  (3) Attracting tourism;
(H) Use of the waterbody for educational, scientific, or research purposes;
(I) Presence of rare and/or irreplaceable natural areas; and
(J) Impacts the designation may have on current uses, upstream users, downstream users, and potential future uses of the waterbody or waterbody segment.

ARKANSAS REGISTER

Transmittal Sheet

Charlie Daniels
Secretary of State
State Capitol Room 026
Little Rock, Arkansas 72201-1094
(501) 682-3527

For Office Use Only: Effective Date _____ Code Number _____

Name of Agency: Arkansas Pollution Control & Ecology Commission

Department: Arkansas Department of Environmental Quality

Contact: Steve Drown E-mail: drown@adeq.state.ar.us Phone: (501) 682-0655

Statutory Authority for Promulgating Rules: A.C.A. § 8-1-203 et seq

Rule Title: Regulation No. 2; Unocal Minerals Corporation Third Party Rulemaking; Docket No. 10-005-R; Minute Order No. 11-24

Intended Effective Date

- [ ] Emergency
- [x] 10 Days After Filing
- [ ] Other _____

	Date
Legal Notice Published	06/30/10
Final Date for Public Comment	09/20/10
Reviewed by Legislative Council	08/26/11
Adopted by State Agency	08/26/11

- [x] Electronic Copy of Rule Provided on disk or CD (per Act 1478 of 2003)
- [ ] Electronic Copy of Rule e-mailed from: _____

Contact Person — Email Address — Date

CERTIFICATION OF AUTHORIZED OFFICER

I Hereby Certify That The Attached Rules Were Adopted In Compliance with Act 434 of 1967 As Amended.

Signature

(501) 682-7890 — charles.moulton@arkansasag.gov

Phone Number — E-mail Address

Administrative Hearing Officer

Title

09/16/11

Date

FILED
Ark. REGISTER DIV.
11 SEP 16 PM 3:35
MARK MARTIN
SECRETARY OF STATE
STATE OF ARKANSAS
BY

Rev. 04

ARKANSAS POLLUTION CONTROL & ECOLOGY COMMISSION
101 EAST CAPITOL
SUITE 205
LITTLE ROCK, ARKANSAS 72201
PHONE: (501) 682-7890
FAX: (501) 682-7891

RECEIVED
SEP 16 2011
BUREAU OF
LEGISLATIVE RESEARCH

September 16, 2011

Ms. Donna Davis
Administrative Rules and Regulations Committee
Room 433, State Capitol Building
Little Rock, Arkansas 72201

RE: Regulation No. 2, Umetco Minerals Corporation Third-Party Rulemaking; Docket No. 10-005-R - **FINAL FILING**.

Dear Ms. Davis:

I am enclosing the following for filing with your office:

1. Two (2) hard copies of the amendment to Regulation No. 2, Umetco Minerals Corporation Third-Party Rulemaking.
2. Two (2) copies of Commission Minute Order No. 11-24
3. Two (2) copies of the Financial Impact Statement.

Please provide written confirmation of your receipt of these materials by file-marking the enclosed copy of this letter and returning it to me.

Thank you for your assistance in this matter.

Respectfully,

Charles Moulton
Administrative Hearing Officer

Enclosures

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For Office Use Only

Effective Date: **Classification Number:**

Name of Agency: Arkansas Department of Environmental Quality

Contact Person: Steve Drown **Telephone:** (501) 682-0655

Statutory Authority for Promulgating Rules: A. C. A. § 8-1-203 et seq.

Title of Rule: Regulation No 2, Umetco Minerals Corporation Third-Party Rulemaking; Docket No 10-005-R; Minute Order No. 11-24.

Rule Status	Effective Date Status	Effective Date
☐ New Rule/Regulation	☐ Emergency	
☒ Amended Rule/Regulation	☒ 10 Days after filing	September 26, 2011
☐ Repealed Rule/Regulation	☐ Other	
☐ Order	☐ Repealed	
☐ Emergency Rule/Regulation	Adopted by State Agency	

☐ Rule above is proposed and will be replaced by final version

☒ Financial and/or Fiscal Impact Statement Attached

Certification of Authorized Officer

I hereby certify that the attached rules were adopted in compliance with Act 434 of 1967 as amended.

Signature: Chris E. Mann Date: September 16, 2011

Title: Administrative Hearing Officer

On June 14, 2010, UMETCO Minerals Corporation filed its petition with the Arkansas Pollution Control and Ecology Commission ("Commission") to initiate Third-Party Rulemaking to amend Regulation No. 2. The Commission authorized the initiation of rulemaking by Minute Order No. 23 dated June 25, 2010. A public hearing was held on August 6, 2010, and the public comment period ended on September 20, 2010.

In accordance with Regulation No. 8, an Amended Statement of Basis and Purpose and a Responsiveness Summary to the public comments received was submitted to the Commission by UMETCO Minerals Corporation and by the Arkansas Department of Environmental Quality ("ADEQ").

IT IS, THEREFORE, ORDERED:

1. That the rule proposed by UMETCO Minerals Corporation for modification of the Water Quality Standards for Wilson Creek is as follows:

(1) Wilson Creek from a point approximately 0.85 mile upstream of Outfall 001 to Outfall 001:

TDS from 142 mg/L to 500 mg/L
Sulfate from 20 mg/L to 250 mg/L
Chloride from 15 mg/L to 56 mg/L

(2) Wilson Creek downstream of Outfall 001 to its mouth:

TDS from 142 mg/L to 500 mg/L
Sulfate from 20 mg/L to 250 mg/L
Chloride from 15 mg/L to 56 mg/L

2. That the Amended Statement of Basis and Purpose and the Responsiveness Summary as submitted by UMETCO Minerals Corporation and as submitted by ADEQ are adopted by the Commission as part of this rulemaking proceeding.

3. That the ADEQ staff is directed to make these changes to Regulation No. 2.

PROMULGATED THIS 26th DAY OF AUGUST, 2011, BY ORDER OF THE ARKANSAS POLLUTION CONTROL AND ECOLOGY COMMISSION

By: _____
John Chamberlin, Chair

ATTEST: _____
Teresa Marks, Director

COMMISSIONERS

J. Bates	**J. Shannon**
L. Bengal	**L. Sickel**
S. Henderson	**J. Simpson**
D. Hendrix	**W. Thompson**
S. Jorgensen	**B. White**
D. Samples	**R. Young**

_____ **SUBMITTED BY:** **William A. Eckert** **PASSED:** **August 26, 2011**
J. Chamberlin, Chair

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL RISK MANAGEMENT RESEARCH LABORATORY
GROUND WATER AND ECOSYSTEMS RESTORATION DIVISION
P.O. Box 1198 Ada,OK 74820

June 27, 2012

OFFICE OF
RESEARCH AND DEVELOPMENT

MEMORANDUM

SUBJECT: Arkwood Superfund Site (12-R06-002)

FROM: Scott G. Huling, Environmental Engineer
Applied Research and Technical Support Branch

TO: Stephen L. Tzhone, Remedial Project Manager
Superfund Division
EPA Region 6, Dallas TX

A technical review was conducted on documents pertaining to the ground water remediation efforts at the Arkwood Superfund Site (Omaha, AR). The primary focus was on the document entitled, "2011 Annual Report Arkwood, Inc. (Omaha, AR)". Comments and recommendations are included below. If I can be of assistance to you, please call me at (580) 436-8610.

cc: Linda Fiedler (5203P)
Terry Burton, Region 6
Gregory Lyssy, Region 6
Vince Malott, Region 6
Chris Villarreal, Region 6

Technical Review Comments and Recommendations:

General Comments

1. It was reported that,

> " A pilot water injection system was installed in late 2005 at the Site. The pilot system was designed to inject groundwater or ozonated groundwater into the subsurface beneath the Arkwood Site to a depth of approximately 25 feet to maintain adequate flow through the spring and to treat residual concentrations of PCP that impact New Cricket Spring."

The primary objective of the Arkwood site ozone treatment system is unclear. In general, the use of ozone in engineered systems is a good oxidant to use to treat PCP and PAH wastes resulting from wood preserving operations. However, the extraction of ground water at the Arkwood site (from the source area), ozonation, and subsequent injection into the subsurface is likely (1) to have good impact on contaminants in the extracted/treated water, but (2) is projected to have limited impact on the treatment of contaminants in the subsurface in the source area. Once injected, ozone depletion in the injected water is rapid and will occur within a very short transport distance from where it is injected. Ozone would therefore have a strong influence over a very short distance from where it was injected (perhaps a few feet, or less), but would have limited/negligible impact beyond this very narrow radial influence. This conceptual model is proposed based on the very high reactivity of ozone, the abundance of reactants in subsurface systems, and the relatively limited mass of ozone that can be dissolved in the water (and subsequently injected). This matter is covered in detail in the following US EPA *Issue Paper* that can be downloaded from the EPA GWERD website (http://www.epa.gov/nrmrl/gwerd/publications.html#oxidation).

> Huling, S.G. and B. Pivetz. 2006. "In-Situ Chemical Oxidation – Engineering Issue". US Environmental Protection Agency, National Risk Management Research Laboratory, R.S. Kerr Environmental Research Center, Ada, OK. EPA/600/R-06/072.

Assuming the treatment objective was to achieve significant contaminant mass reductions in the Arkwood source area, other more aggressive remedial technologies, including in-situ chemical oxidation (ISCO) is recommended. This would require a focused feasibility study to identify and select a remedial technology capable of achieving the treatment objectives.

In the correspondence from the Arkansas DEQ (letter dated April 4, 2011), it was reported that the EPA Region 6 screening table indicates that the concentration of PCP in soil at industrial sites is 2.7 mg/kg. Assuming PCP concentrations at the Arkwood site are greater than this level, additional treatment at the site may be required and a more aggressive approach is needed (as suggested above).

2. It is assumed that the clean up goal is to treat water that emanates from New Cricket spring only using ozone and to release the treated water to Cricket Creek. It is proposed, but clearly not confirmed, that PCP-contaminated ground water, emanating from the contamination

site, is not captured by New Cricket Spring and migrates beyond New Cricket Spring in the ground water. Assuming this is acceptable to EPA Region 6 and the Arkansas DEQ, additional work is not recommended. However, if contaminated ground water bypassing New Cricket Spring represents unacceptable exposure pathways and risk, it is recommended that additional site characterization and a fate and transport investigation be conducted to assess the extent to which this condition may be occurring.

3. An assessment of the ground water quality at New Cricket Spring as a function of (1) ozone treated and injected water at the Arkwood site, (2) untreated injected water at the Arkwood site, and (3) no treatment or injection of water at the Arkwood site, is a complex matter. One approach to assess this issue would be to compare PCP concentrations in the ground water emanating at New Cricket Spring during the years when ozone treatment was being performed (2005-2011), relative to the recent untreated periods (2011-2012), and before 2005 when no treatment or injected water was occurring. Due to fluctuations in the flow at New Cricket Spring, variability in PCP concentrations at New Cricket Spring, variation in rainfall, variability in the direct hydraulic connection between the two locations (TBD), and several other significant fate and transport factors/parameters, this analysis will be difficult and definitive conclusions doubtful. The use of intermediate ground water monitoring wells located between the New Cricket Spring and the Arkwood site where the treated/untreated water is injected (or not injected), could provide insight on this matter. A critical analysis of this issue would also benefit from other site characterization tools including a tracer testing, aquifer testing, etc.

Specific Comments

1. Based on data included in Appendix A, there does not appear to be a correlation between the flow rate in the New Cricket Spring during 2011 and the concentration of PCP that is measured in the water at New Cricket Spring. However, Table 4.1 indicates that there is long term average flow rate data, and presumably PCP ground water data for New Cricket Spring that can be contrasted to assess a potential correlation. It is recommended that such an analysis be performed and include mass flux computations (flow rate × concentration) and other potential correlations.

2. Based on the area encompassed by the Arkwood site (Figure 1) and the downgradient location of the New Cricket Spring, it is doubtful that all the water that passes through/under the Arkwood site emanates (captured) in the New Cricket Spring. Consequently, contaminated water may be bypassing New Cricket Spring and discharging to Cricket Spring elsewhere. In conjunction with general comment no. 2 above, it is recommended that this issue be investigated further.

Arkwood, Inc. Superfund Site
Groundwater Remediation Summary
June 2012

Site History/Record of Decision

The Arkwood, Inc. Superfund Site (Arkwood Site or Site) is a former wood treating site where wood treating fluids contaminated the soil and groundwater. The Site is located in Omaha, AR. The Site was developed in the 1950's when a railroad company excavated about 40 to 50 feet below natural grade to obtain fill dirt for constructing a railroad embankment. Arkwood, Inc. began wood treating operations at the Site in 1962 using creosote and pentachlorophenol (PCP) in its process.

In 1973, the site owner leased the wood-treating facility to Mass Merchandisers, Inc. (MMI). MMI continued to operate the Arkwood plant until June 1984. Subsequently, the remaining inventory was sold or removed from the site. In January 1985, MMI's lease expired and was not renewed. The owner dismantled the plant in 1986.

In 1985, EPA proposed that the Site be added to the National Priorities List (NPL). The Site was formally added to the NPL on March 31, 1989.

With EPA oversight, MMI conducted a Remedial Investigation and Feasibility Study (RI/FS) between 1987 and 1990 pursuant to an Administrative Order on Consent (AOC). The Regional Administrator of EPA Region VI approved the Record of Decision (ROD) for the Site on September 28, 1990.

The 1990 ROD documented that the principle threat from the Site was direct contact with soils contaminated above health-based levels. In addition, the 1990 ROD stated that these soils posed a long-term threat to groundwater. Site soils were affected with pentachlorophenol (PCP), polynuclear aromatic hydrocarbons (PNAs), and dioxin. Affected materials were defined as "all Site materials that contain greater than 300 mg/kg PCP, greater than 20 µg/kg dioxin as 2,3,7,8-TCDD equivalents (dioxin), or greater than 6.0 mg/kg carcinogenic polynuclear aromatic hydrocarbons (c-PNAs) as benzo-a-pyrene equivalents". The groundwater exits at New Cricket Spring which is located about one-quarter mile downgradient of the wood treating area. New Cricket Spring contained concentrations of PCP above the Arkansas Water Quality Standard.

In April 1991, a Consent Decree (CD) was entered between the United States of America, on behalf of the USEPA, and MMI to remediate the Site. The CD includes the ROD and a Statement of Work (SOW) as Appendices A and B, respectively, (collectively the Consent Decree). A corrected CD was entered on September 23, 1992, including the same attachments.

The soil remedy was implemented in 1994 and 1995. The remediation area is fenced with signs and locked gates.

695115

Post Soil Remediation Spring Sampling

As set forth in the CD and based on the results of a Dye Tracing Study, spring sampling was conducted quarterly for two years after the soil remediation was completed (Table 1).

Table 1
Post Soil Remediation Spring Sampling

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (ug/L)
7/2/1996	112	688
10/11/1996	2	651
1/20/1997	34	681
3/16/1997	34	330
7/18/1997	2	775
9/30/1997	50	560

New Cricket Spring Treatment System

Since the PCP concentration at New Cricket Spring exceeded the cleanup level for PCP of 9.3 micrograms per liter (µg/l or ppb) monthly average and 18.7 µg/l daily average set by Arkansas Department of Pollution Control & Ecology (ADPCE), an ozone pilot system was installed in April 1997. Data was collected during varying flow events and equipment settings. Based on the results, the treatment system was upgraded during November 1997 through January 1998 and a new, higher capacity system was installed during October through December 1999. The upgraded system continued to operate and to meet ADPCE requirements. Regular evaluation of the analytical data indicated the concentrations observed at the New Cricket Spring had plateaued at between approximately 75-150 ppb by 2004 (Table 2).

Table 2
New Cricket Spring Remediation Sampling (1998-2004)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (ug/L)
1/20/1998	42	561
5/7/1998	65	196
7/23/1998	3	561
11/4/1998	8	570
1/29/1999	60	288
7/12/1999	42	ND
3/8/2000	5	284
5/15/2000	2	272
6/23/2000	75	389
7/28/2000	3	627

8/20/2000	2	424
9/25/2000	1	577
10/26/2000	1	114
11/27/2000	25	632
2/26/2001	3	338
3/13/2001	3	376
4/27/2001	3	349
5/27/2001	2	388
7/27/2001	48	560
8/27/2001	6	372
9/27/2001	2	895
10/22/2001	6	275
11/30/2001	28	441
12/22/2001	60	114
1/28/2002	12	373
2/21/2002	15	372
3/8/2002	22	318
3/22/2002	42	226
4/22/2002	22	79
5/28/2002	70	71
6/26/2002	17	259
8/2/2002	17	231
8/27/2002	12	178
9/25/2002	10	95
10/28/2002	8	461
12/7/2002	2	398
12/29/2002	35	218
2/3/2003	7	340
3/7/2003	35	228
4/8/2003	12	274
6/4/2003	42	147
7/7/2003	9	220
8/7/2003	10	221
8/28/2003	6	71
9/29/2003	2	534
10/28/2003	24	200
12/10/2003	21	150
1/3/2004	26	139
2/3/2004	29	144
3/3/2004	28	84
4/3/2004	30	85

5/5/2004	65	115
5/15/2004	20	102
6/9/2004	12	300
6/30/2004	30	222
9/3/2004		43
10/4/2004	12	
11/3/2004	94	155
11/14/2004	26	75
11/22/2004	28	75
12/1/2004	35	72
12/21/2004	9	253

Injection of Ozonated Water

An ozone injection pilot study was installed and began operation in December 2005 to evaluate the potential for accelerating reduction of residual PCP in the subsurface between the Site and New Cricket Spring. Injection points were located in the vicinity of the sinkhole since it is hydraulically connected to New Cricket Spring through subsurface fractures. The system operated between December 2005 and August 2009. The ozone injection system was discontinued due to equipment failures and the inability to obtain replacement parts. Significant reductions in concentration at New Cricket Spring were observed during the injection period but were stabilizing prior to the equipment failure (Table 3). The approximate average PCP concentration observed in New Cricket Springs during the operation of the injection system was 116 ppb in 2005, 36 ppb in 2006, 96 ppb in 2007, 64 ppb in 2008, and 16 ppb in 2009.

Table 3
New Cricket Spring Remediation Sampling (2005-2009)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (µg/L)
1/3/2005	10	279
2/3/2005	12	155
3/1/2005	34	208
4/4/2005	9	148
4/25/2005	6	121
5/3/2005	9	150
6/2/2005	3	151
6/20/2005	2	55
7/13/2005	2	95
8/3/2005	12	85
10/3/2005	27	63
11/3/2005	6	278

11/14/2005	6	15
11/28/2005	8	47
12/20/2005	27	7
12/26/2005	27	11
1/2/2006	21	42
1/9/2006	20	32
1/16/2006	28	32
1/23/2006	33	16
1/30/2006	41	34
2/6/2006	38	<5.10
2/13/2006	34	24
2/20/2006	21	6
2/27/2006	26	20
3/6/2006	16	25
3/13/2006	57	107
3/20/2006	48	26
3/27/2006	27	4.09J
4/3/2006	24	11
4/10/2006	16	39
4/17/2006	22	8
4/24/2006	16	7
4/27/2006	50	11
4/29/2006	193	28
5/1/2006	94	23
5/8/2006	59	52
5/15/2006	22	15
5/22/2006	16	<5.00
5/30/2006	17	6
6/7/2006	3	253
6/12/2006	2	LE
6/19/2006	17	52
6/26/2006	17	75
7/5/2006	22	10
7/17/2006	17	22
8/7/2006	17	24
8/14/2006	17	<5.00
9/5-6/2006	23	7
9/18/2006	24	6
10/2/2006	24	17
10/16/2006	41	40
10/16/2006	81	92

10/18/2006	27	118
11/7/2006	41	53
11/20/2006	24	57
11/30/2006	636	<50.0
12/4/2006	59	<54.3
12/6/2006	37	<52.6
12/18/2006	21	24
1/8/2007	21	17
1/22/2007	79	35
2/5/2007	27	26
2/19/2007	47	20
3/5/2007	27	<5.00
3/19/2007	25	NA
4/9/2007	23	<5.00
4/23/2007	30	7
5/7/2007	21	2.90J
5/21/2007	20	4.36J
6/4/2007	20	<5.00
6/18/2007	21	10
7/9/2007	20	15
7/23/2007	18	9
8/6/2007	1	191
9/10/2007	23	217
9/24/2007	18	16
10/10/2007	18	6
10/22/2007	18	1190
11/5/2007	18	209
11/19/2007	18	20
12/3/2007	18	20
12/17/2007	32	87
1/7/2008	23	<5.00
1/21/2008	23	58
2/4/2008	24	52
2/18/2008	83	57
3/3/2008	580	<5.00
3/17/2008	44	11
4/7/2008	78	10
4/12/2008	240	7
4/13/2008	100	7
4/14/2008	78	8
5/10/2008	68	75

5/27/2008	18	189
6/9/2008	30	77
6/23/2008	580	6
7/7/2008	80	194
7/10/2008	140	254
7/21/2008	42	477
8/4/2008	22	108
8/18/2008	36	31
9/1/2008	25	32
9/22/2008	40	22
10/6/2008	21	20
10/20/2008	21	13
11/3/2008	24	<5.00
11/17/2008	30	28
12/1/2008	24	12
12/22/2008	24	<5.00
1/5/2009	32	7
1/26/2009	27	<5.00
2/9/2009	90	<5.00
2/23/2009	31	6
3/9/2009	30	6
3/23/2009	30	<5.00
4/6/2009	38	6
4/20/2009	243	9
5/4/2009	343	8
5/18/2009	51	6
6/8/2009	38	<5.00
6/29/2009	25	9
7/20/2009	47	39
8/10/2009	24	31
9/13/2009	22	8
10/12/2009	104	21
11/9/2009	45	<50
12/7/2009	28	8

Injection of Non-Ozonated Water

After equipment issues caused the discontinuation of ozone generation at the sinkhole area, non-ozonated water injection was continued. The rationale for continuing with injection of non-ozonated water was to improve operations at New Cricket Spring by maintaining a higher average water flow rate and by providing water to flush PCP concentrations. During the water injection processes, flow rates at New Cricket Spring were increased by approximately 20

gallons per minute (gpm). During low flow periods of the year, typically mid-summer and early winter, flow rates would often dwindle to less than two gpm resulting in higher ozone concentrations recirculating in the treatment equipment and accelerated decomposition of gaskets and o-rings. Maintaining the New Cricket Spring flow rate at greater than 20 gpm significantly reduced degradation of the treatment system components (Table 4).

Table 4
New Cricket Spring Remediation Sampling (2010-March 2011)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (µg/L)
1/10/2010	42	13
2/15/2010	87	11
3/15/2010	35	<5.00
4/15/2010	40	10
5/17/2010	180	11
6/13/2010	43	15
7/8/2010	33	66
8/19/2010	17	16
9/21/2010	33	28
10/18/2010	20	15
11/20/2010	21	5
12/16/2010	24	6
1/18/2011	22.83	3.39
2/9/2011	26.76	10.4
3/17/2011	49.03	14.2

During the period of April 2011 through November 2011, the non-ozonated water injection process was halted to evaluate spring concentrations without the impact of the non-ozonated water injection process (Table 5). The non-ozonated water injection process was re-started in November 2011 in response to a request from the EPA.

Table 5
New Cricket Spring Remediation Sampling (April 2011-Nov 2011)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (ug/L)
4/19/2011	57.55	12.5
5/2/2011	310	11
5/3/2011	271	8.92
5/4/2011	156	10.8
5/4/2011	123	15.8
5/5/2011	83	18
5/9/2011	33.91	43.8

6/9/2011	6.8	52.4
7/18/2011	0.575	18.6
8/15/2011	1.004	38.9
9/13/2011	0.132	<5.00
10/18/2011	23.71	52.4
11/16/2011	29.64	30.6

After re-starting the non-ozonated water injection process, analytical concentrations at New Cricket Spring returned to concentration levels approaching the ADPCE standards (Table 6).

Table 6
New Cricket Spring Remediation Sampling (Dec 2011-April 2012)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (µg/L)
12/19/2011	60.25	11.5
1/19/2012	31.82	<5.00
2/14/2012	40.38	<5.00
3/29/2012	50.81	7.95
4/18/2012	22.54	20
5/23/12	18	10.9

Conclusions and Recommendations

It is recommended that the treatment system located at New Cricket Spring continue to operate until the PCP concentration in the spring water achieves ADEQ standards. Based on the data, it appears that the pilot injection system successfully enhanced the degradation of the residual PCP in the source area resulting in reduced concentrations emanating from New Cricket Spring. Since the current PCP concentrations are approaching the cleanup standard for PCP, it is recommended that the injection of non-ozonated water be discontinued for the next six months. During this period, make-up water can be routed from municipal or deep groundwater sources to the treatment system, as necessary, to maintain efficient treatment system operations during low flow conditions. It is recommended that analytical sampling at the mouth of New Cricket Spring continue on a monthly basis during the next six months to monitor for potential rebound effects. Based on the updated cleanup standard for PCP presented by ADEQ in their April 4, 2011, the monthly average concentration limit is 17.38 µg/L and the daily maximum limit is 34.86 µg/L. If the analytical data indicates limited rebound (reported concentrations of less than 34.86 µg/L in any given month), monitoring would change to quarterly sampling. If analytical results measure concentrations in excess of 34.86 µg/L, injection of non-ozonated water may be reinitiated to enhance flushing operations. A summary of data and a recommendation will be submitted to the EPA at the end of the six-month period.

The need for treatment at New Cricket Spring will be evaluated, at a minimum, in the Annual Report. At such time that it is considered that the ADEQ standard has been met, MMI will submit a request to the EPA for discontinuation of treatment operations.

ADEQ
ARKANSAS
Department of Environmental Quality

July 13, 2012

U.S. EPA Region 6
Attn: Mr. Stephen Tzhone
Mail Code: 6SF
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

RE: Groundwater Remediation Summary June 2012, Arkwood Superfund Site, Omaha, Arkansas; EPA ID No. ARD084930148; AFIN: 05-00003

Dear Mr. Tzhone:

The Arkansas Department of Environmental Quality – Hazardous Waste Division & Water Division (ADEQ) have reviewed the **Groundwater Remediation Summary** dated **June 2012**. The ADEQ concurs with the summary document with the following comments:

1) **Conclusions and Recommendations, p.9:** In February 2012, ADEQ sent to EPA a letter with recalculated water quality standards for New Cricket Spring. These limits should be referenced in the proposed recommendations. The text describes these values as cleanup standards. ADEQ recommends in the sixth sentence of this section "Based on the Arkansas Pollution Control and Ecology Commission's water quality standard for penta-chlorophenol (PCP) presented by ADEQ in their February 14, 2012 letter, the chronic standard of 15.57 ug/l is the appropriate standard for the Arkwood Site." The appropriate standard for this stream is the chronic standard 15.57 µg/L. The organisms in the receiving stream experience long term exposure to PCP; therefore the chronic standard is most appropriate. ADEQ also recommends monthly monitoring of PCP for the next five year period. Because of the typically large fluctuation in flow at the spring, quarterly sampling may not be an adequate representation of the PCP level in the short term. Because the spring is now physically restricted from contact, any proposal to remove this barrier may need to be reevaluated for potential risk as a drinking water source.

2) The attached letter also includes a request for measuring additional parameters during each monthly sampling event at the mouth of the spring. These parameters include the temperature, pH and dissolved oxygen of the spring water.

Please proceed with the recommendations and send ADEQ a revised summary report with the above revisions. If you have any comments or questions, please contact me at 501-682-0852 or via e-mail moix@adeq.state.ar.us.

Sincerely,

for Annette Cusher

Mark Moix
Engineer, PE
Technical Branch
Hazardous Waste Division
Attachment

ADEQ
ARKANSAS
Department of Environmental Quality

February 14, 2012

USEPA REGION 6
Attn: Mr. Shawn Ghose
Mail Code: 6SF
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

RE: New Cricket Spring Water Quality Standards, Arkwood Superfund Site, Omaha, Arkansas; EPA ID No. ARD084930148; AFIN: 05-00003

Dear Mr. Ghose:

Arkwood is a Superfund site under the direct authority of EPA. The surface water regulations, Arkansas Pollution Control and Ecology Commission (APC&EC) Regulation No. 2 would be an applicable or relevant and appropriate requirement (ARAR). Water Quality Standards and the basis for calculating a specific standard are given in APC&EC Regulation 2. Definitions for all terms used are also in the Regulation.

Because the State Water Quality Standard is pH based, surface water sample(s) proximal to the site are used to determine if the standard should be changed. A review of APC&EC Regulation 2 indicates that the equation for the calculation has not changed since the ROD was issued. In addition, pH data should be included in the weir discharge sample to ensure it falls between 6.0 and 9.0 pH.

The pH data from the nearest ADEQ Water quality monitoring station (WHI0071) for the period 2004-2009 was averaged for use in the calculation. Periodic updates may be made based on more recent or site specific data. This would be done with each five year review of the NPL site at a minimum. Pentachlorophenol Calculations for Surface Discharge, Per Reg. 2.508, the Pentachlorophenol aquatic life water quality standards (WQS) are as follows:

Acute	Chronic
e[1.005(pH)-4.869]	e[1.005(pH)-5.134]
pH = 7.84 s.u.	

The pH used in calculating the standards, 7.84 s.u., is the average pH taken at monitoring station WHI0071 from 2004 – 2009.
Acute Standard
e[1.005(7.84)-4.869] = 20.29 μg/l
Chronic Standard
e[1.005(7.84)-5.134] = 15.57 μg/l

Reasonable potential for water quality violations is determined by comparing the effluent data to the WQS without taking into account a background flow because the 7Q10 of the receiving stream is 0 cfs. In accordance with the procedures outlined in the Continuing Planning Process (CPP), the highest effluent test result is compared to the water quality standards because over twenty data points exist. The highest effluent test result is 20 µg/l which occurred on July 10, 2008. It is important to note that higher test results occurred on October 22, 2007, and July 7, 2008. Those test results, 53.7 µg/l and 189 µg/l respectively, were not used because it appears as though those results were not representative of the effluent.

Comparison with Acute Standard
20 µg/l < 20.29 µg/l
Comparison with Chronic Standard
20 µg/l > 15.57 µg/l

Organisms in the effluent discharge stream experience chronic exposure, therefore; the chronic standard of 15.57µg/l is the appropriate standard for the Arkwood Site. With respect to the previously calculated values, the monthly average would be 15.57 µg/l and the daily maximum would be 20.29 µg/l.

In addition to measuring pH at the sample points, temperature and dissolved oxygen data should be collected. APC&EC Regulation 2.505 requires that dissolved oxygen (D.O.) levels meet or exceed 6.0 mg/l. During the months of March, April, and May, when discharge levels at the weir exceed 15 CFS, the D.O. standard is 6.5 mg/l.

If you have any questions, please contact me at 501-682-0660 or via e-mail at clem@adeq.state.ar.us.

Sincerely,

Sarah Clem
ADEQ Branch Manager
Water Quality Planning, Water Division

cc: M. Moix, Engineer P.E., Hazardous Waste Division, ADEQ

ADEQ

ARKANSAS
Department of Environmental Quality

HAZARDOUS WASTE DIVISION ROUTING SLIP

June 21, 2012

Subject: Arkwood, Inc. CERCLA Superfund Site

From: Mark Moix MM 6-21-2012 29 (2nd draft) 7-3-2012 (3rd draft)

Route in turn to:	***Action Needed***		***Initials***	***Date***
Grant Kneebone	☑ Concurrence	☑ Review (by DK)	GK	6-25-12
Dianna Kilburn	☑ Concurrence	☑ Review	DK	6/22/12 w/comment
Jay Rich	☑ Concurrence	☑ Review	JR	7-11-12
Annette Cusher	☑ Concurrence	☑ Review	AC	6/25/12
Shane Byrum	☐ Concurrence	☑ Review	SB	6/26/12
Sarah Clem	☑ Concurrence	☑ Review	SC	7-2-12 7-5-12
Mo Shafii	☑ Concurrence	☑ Review	MS	7-2-12
Tammie Hynum	☑ Concurrence	☑ Review	TH	7/11/12 comments 7/3/12 comments 7/11/12
Ryan Benefield	☑ Concurrence	☑ Review	RB	7/12/12

Note: Marking the Concurrence box indicates the individual agrees with the applicable text as it relates to their individual discipline and Work Section (e.g., Engineer; Risk Assessor; Geology; Compliance; Policy/Management), as applicable. Marking the Review box indicates the individual has read the document.

DISPOSITION:

Return to Mark Moix 682-0852

COMMENTS: *Approval letter with comments for the Arkwood, Inc. Groundwater Remediation Summary dated June 2012*

McKesson Corporation
One Post Street, 34th Floor
San Francisco, CA 94104
608.848.4134 Tel

Jean A. Mescher
Director, Environmental Services

McKESSON
Empowering Healthcare

Certified Mail

August 9, 2012

Mr. Stephen Tzhone, Superfund Remedial Project Manager
Superfund AR/LA Enforcement Section (6SF-RA)
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202

Subject: Groundwater Remediation Summary
Response to Comments

Dear Mr. Tzhone:

This letter provides responses to the USEPA and ADEQ comments on the Groundwater Remediation Summary dated June 2012 prepared by McKesson for the Arkwood, Inc. Superfund Site. The agency comments are presented below followed by McKesson's responses in italics. A revised Groundwater Remediation Summary is attached in redline and clean versions which incorporate agency comments as appropriate.

A conference call was held on August 1, 2012 to discuss the comments and to provide background information to those who only recently became involved in this project. Some of the comments were addressed by providing this background information and further clarifications about the Arkwood site as detailed in our responses below.

ADEQ Comments dated July 13, 2012:

1) **Conclusions and Recommendations, p.9**: In February 2012, ADEQ sent to EPA a letter with recalculated water quality standards for New Cricket Spring. These limits should be referenced in the proposed recommendations. The text describes these values as cleanup standards. ADEQ recommends in the sixth sentence of the section "Based on the Arkansas Pollution Control and Ecology Commission's water quality standard for pentachlorophenol (PCP) presented by ADEQ in their February 14, 2012 letter, the chronic standard of 15.57 µg/l is the appropriate standard for the Arkwood Site." The appropriate standard for this steam is the chronic standard 15.57 µg/l. The organisms in the receiving stream experience long term exposure to PCP; therefore the chronic standard is most appropriate. ADEQ also recommends monthly monitoring of PCP for the next five year period. Because of the typically large fluctuation in the flow at the spring, quarterly sampling may not be an adequate representation of the PCP level in the short term. Because the spring is now physically restricted from contact, any proposal to remove this barrier may need to be reevaluated for potential risk as a drinking water source.

695115

***Response**: The recommended change to the sixth sentence of the Summary will be made. As discussed in our conference call on August 1, 2012, monthly monitoring for five years may be excessive; however, McKesson will continue conducting monthly monitoring of New Cricket Spring and the treatment system effluent for at least a year, at which time McKesson will provide a summary of data and may petition for a change in frequency or discontinuation of monitoring. To clarify the status of the current physical restriction to the spring, McKesson owns the spring and adjacent property and does not currently propose to remove the barrier around New Cricket Spring and the treatment building.*

2) The attached letter also includes a request for measuring additional parameters during each monthly sampling event at the mouth of the spring. These parameters include the temperature, pH and dissolved oxygen of the spring water.

***Response**: McKesson agrees to collect temperature, pH and dissolved oxygen measurements at New Cricket Spring during monthly sampling events for at least a year, at which time McKesson will provide a summary of data and may petition for a change in frequency or discontinuation of such monitoring.*

USEPA Comments dated June 27, 2012:
Technical Review Comments and Recommendations
General Comments

1. It was reported that,

   "A pilot water injection system was installed in late 2005 at the Site. The pilot system was designed to inject groundwater or ozonated groundwater into the subsurface beneath the Arkwood Site to a depth of approximately 25 feet to maintain adequate flow through the spring and to treat residual concentrations of PCP that impact New Cricket Spring."

The primary objective of the Arkwood site ozone treatment system is unclear. In general, the use of ozone in engineered systems is a good oxidant to use to treat PCP and PAH wastes resulting from wood preserving operations. However, the extraction of ground water at the Arkwood site (from the source area), ozonation, and subsequent injection into the subsurface is likely (1) to have good impact on contaminants in the extracted/treated water, but (2) is projected to have limited impact on the treatment of contaminants in the subsurface in the source area. Once injected, ozone depletion in the injected water is rapid and will occur within a very short transport distance from where it is injected. Ozone would therefore have a strong influence over a very short distance from where it was injected (perhaps a few feet, or less), but would have limited/negligible impact beyond this very narrow radial influence. This conceptual model is proposed based on the very high reactivity of ozone, the abundance of reactants in the subsurface systems, and the relatively limited mass of ozone that can be dissolved in the water (and subsequently injected). This matter is covered in detail in the following US EPA Issue Paper

that can be downloaded from the EPA GWERD website (http://www.epa.gov/nrmrl/gwerd/publications.html#oxidation).

Huling, S.G. and B. Pivetz. 2006. "In-Situ Chemical Oxidation – Engineering Issue". US Environmental Protection Agency, National Risk Management Research Laboratory, R.S. Kerr Environmental Research Center, Ada, OK. EPA/600/R-06/072.

Assuming the treatment objective was to achieve significant contaminant mass reductions in the Arkwood source area, other more aggressive remedial technologies, including in-situ chemical oxidation (ISCO) is recommended. This would require a focused feasibility study to identify and select a remedial technology capable of achieving the treatment objectives.

In the correspondence from the Arkansas DEQ (letter dated April 4, 2011), it was reported that the EPA Region 6 screening table indicates that the concentration of PCP in the soil at industrial sites is 2.7 mg/kg. Assuming PCP concentrations at the Arkwood site are greater than this level, additional treatment at the site may be required and a more aggressive approach is needed (as suggested above).

***Response**: It appears that Dr. Huling, who authored the USEPA comments dated June 27, 2012, made his comments based on the 2011 Annual Report and may not have had the "Arkwood, Inc. Superfund Site Groundwater Remediation Summary" dated June 2012 at his disposal to aid in his review. A copy of this latter report (revised as a redline and a clean version) is attached for reference. As noted in that Summary, the primary objective of the pilot ozone treatment system was to expedite cleanup of New Cricket Spring. Similarly, the Third Five-Year Review issued by EPA in July 2011 notes that "An ozone injection pilot study was operated from December 2005 through August 2009 with the goal of accelerating the reduction of residual PCP in the subsurface beneath the Site and New Cricket Spring." This objective of the pilot ozone injection system was discussed further in the August 1, 2012 conference call between ADEQ, EPA and McKesson representatives. As discussed, McKesson proposed and volunteered to conduct this pilot injection system. The pilot injection system was operated as an addition to the main treatment system located at the mouth of New Cricket Spring. As required by the Record of Decision (ROD), the main treatment system was installed at the mouth of New Cricket Spring in 1997 and continues to operate in compliance with Arkansas treatment standards.*

It was also clarified during the August 1, 2012 conference call that the water used for pilot injection is extracted from a deep (>500 feet) onsite well, was ozonated (until 2009), and is-injected on the main Site near the former sinkhole area. While Dr. Huling's concerns regarding the potential for rapid ozone depletion within a short distance would be valid at many sites, the hydraulic flow characteristics for the Arkwood Site indicate that flow occurring between the Site and New Cricket Spring occurs mainly via conduit flow through the fracture system. As a result, during operation of the pilot ozone injection system, ozone was detected emanating from the mouth of New Cricket Spring under certain operating conditions, confirming it was not subject to the rapid depletion of concern to Dr. Huling. Thus, the goal of the pilot injection system, to distribute ozone to the subsurface fracture system as a means of oxidizing and reducing residual PCP concentrations that may be present in the fractures due to varying flow conditions, was accomplished.

2. It is assumed that the cleanup goal is to treat water that emanates from New Cricket Spring only using ozone and to release the treated water to Cricket Creek. It is proposed, but clearly not confirmed, that PCP-contaminated ground water, emanating from the contaminated site, is not captured by New Cricket Spring and migrates beyond New Cricket Spring in the ground water. Assuming this is acceptable to EPA Region 6 and the Arkansas DEQ, additional work is not recommended. However, if contaminated ground water bypassing New Cricket Spring represents unacceptable exposure pathways and risk, it is recommended that additional site characterization and a fate and transport investigation be conducted to access the extent to which this condition may be occurring.

***Response**: A dye tracing study was completed for the Site in 1991 (Final Report, Groundwater Tracing Investigation, Arkwood, Inc. Site, Omaha, AR dated September 21, 1992). Based on the Remedial Investigation and dye study results, three private wells (W-9, W-11A and W-11B) and four springs (New Cricket Spring, Cricket Creek Spring, Railroad Tunnel Spring and Walnut Creek Spring) were selected for monitoring. Since no dye and no PCP were detected in the private wells, these wells were later removed from the monitoring program when the municipal water line was installed. A request to eliminate sampling of Cricket Creek Spring, Railroad Tunnel Spring and Walnut Creek Spring was submitted in 2000 since no PCP was detected in any of the three springs after January 1997. Water from New Cricket Spring continues to be monitored and treated before being released. Although a portion of the water that flows beneath the Arkwood Site may not flow through New Cricket Spring, no detectable PCP concentrations are measurable at other potential discharge locations.*

3. An assessment of the ground water quality at New Cricket Spring as a function of (1) ozone treated and injected water at the Arkwood site, (2) untreated injected water at the Arkwood site, and (3) no treatment or injection of water at the Arkwood site, is a complex matter. One approach to assess this issue would be to compare PCP concentrations in the ground water emanating at New Cricket Spring during the years when ozone treatment was being performed (2005-2011), relative to the recent untreated periods (2011-2012), and before 2005 when no treatment or injected water was occurring. Due to fluctuations in the flow at New Cricket Spring, variability in PCP concentrations at New Cricket Spring, variation in rainfall, variability in the direct hydraulic connection between the two locations (TBD), and several other significant fate and transport factors/parameters, this analysis will be difficult and definitive conclusions doubtful. The use of intermediate ground water wells located between New Cricket Spring and the Arkwood Site where the treated/untreated water is injected (or not injected), could provide insight on this matter. A critical analysis of this issue would also benefit from other site characterization tools including a tracer testing, aquifer testing, etc.

***Response:** We believe that the questions raised by Dr. Huling in this comment were addressed during our August 1, 2012 conference call and with the additional data provided, including the dye tracing study. For reference, the ROD states, "Shallow ground water on the site is contaminated with PCP. Only one spring in the area, New Cricket Spring, which lies approximately 1,000 feet northwest of the site, has consistently shown contamination with PCP. No drinking water wells have been shown [to be affected by] the presence of site contaminants.*

The area is underlain by karst geology which prevents the use of monitor wells as a method of predicting contaminant movement, or recovery wells as a method of remediation. Therefore, ground water remediation focuses on New Cricket Spring." ROD, Declaration, p.2. We agree that it is impossible to determine with any precision the impact of the pilot injection system operations on the residual PCP due to the significant variations in flow at New Cricket Spring and the complexity of karst geology; however, it is undisputed that the concentration of PCP at New Cricket Spring has decreased significantly from 1989 (when it exceeded 1,000 µg/l) to the concentrations measured in the more recent years (5-50 µg/l range), which approach the Arkansas chronic standard of 15.57 µg/l. McKesson believes this reduction is at least partially attributable to the years when ozone treatment was being performed (2005-2009), as confirmed by the generally decreasing approximate annual average PCP concentration trend between 2005-09 (116 ppb to 16 ppb) noted in the Groundwater Remediation Summary (p. 4).

Specific Comments

1. Based on data included in Appendix A, there does not appear to be a correlation between flow rate in the New Cricket Spring during 2011 and the concentration of PCP that is measured in the water at New Cricket Spring. However, Table 4.1 indicates that there is long term average flow rate data, and presumably PCP ground water data for New Cricket Spring that can be contrasted to assess a potential correlation. It is recommended that such an analysis be performed and include mass flux computations (flow rate x concentration) and other potential correlations.

***Response**: We agree that the PCP concentrations measured at New Cricket Spring continue to exhibit a certain amount of variability while overall concentrations have been reduced significantly. It is our recommendation that the pilot injection program be discontinued so that natural spring flow and unaffected PCP concentrations and variability can be measured at New Cricket Spring.*

2. Based on the area encompassed by the Arkwood site (Figure 1) and the downgradient location of New Cricket Spring, it is doubtful that all the water that passes through/under the Arkwood site emanates (captured) in the New Cricket Spring. Consequently, contaminated water may be bypassing New Cricket Spring and discharging to Cricket Spring elsewhere. In conjunction with general comment no. 2 above, it is recommended that this issue be investigated further.

***Response**: As stated above, we agree that a portion of the flow that passes beneath the Arkwood Site may not discharge to New Cricket Spring; however, no detectable PCP concentrations are measurable at other potential discharge locations. This issue was evaluated during the RI and dye tracing study. Accordingly, we do not believe further investigation is necessary.*

I certify that the information contained in or accompanying this submission is true, accurate, and complete to the best of my knowledge, information and belief, and that I, as project coordinator, have made reasonable inquiry into its veracity.

If you have any questions regarding these responses to comments, please do not hesitate to contact me at (608) 848-4134.

Sincerely,

Jean A. Mescher, Project Coordinator
Director, Environmental Services

Enclosure

Copy:

- Dianna Kilburn, ADEQ*
- EPA Assistant Regional Counsel (6C-WA)* (w/o enclosure)
- Chief, Superfund Enforcement Branch (6H-E)* (w/o enclosure)

*** CERTIFIED MAIL**

Arkwood, Inc. Superfund Site
Groundwater Remediation Summary
June 2012 (Revised August 2012)

Site History/Record of Decision

The Arkwood, Inc. Superfund Site (Arkwood Site or Site) is a former wood treating site where wood treating fluids contaminated the soil and groundwater. The Site is located in Omaha, AR. The Site was developed in the 1950's when a railroad company excavated about 40 to 50 feet below natural grade to obtain fill dirt for constructing a railroad embankment. Arkwood, Inc. began wood treating operations at the Site in 1962 using creosote and pentachlorophenol (PCP) in its process.

In 1973, the site owner leased the wood-treating facility to Mass Merchandisers, Inc. (MMI). MMI continued to operate the Arkwood plant until June 1984. Subsequently, the remaining inventory was sold or removed from the site. In January 1985, MMI's lease expired and was not renewed. The owner dismantled the plant in 1986.

In 1985, EPA proposed that the Site be added to the National Priorities List (NPL). The Site was formally added to the NPL on March 31, 1989.

With EPA oversight, MMI conducted a Remedial Investigation and Feasibility Study (RI/FS) between 1987 and 1990 pursuant to an Administrative Order on Consent (AOC). The Regional Administrator of EPA Region VI approved the Record of Decision (ROD) for the Site on September 28, 1990.

The 1990 ROD documented that the principle threat from the Site was direct contact with soils contaminated above health-based levels. In addition, the 1990 ROD stated that these soils posed a long-term threat to groundwater. Site soils were affected with pentachlorophenol (PCP), polynuclear aromatic hydrocarbons (PNAs), and dioxin. Affected materials were defined as "all Site materials that contain greater than 300 mg/kg PCP, greater than 20 µg/kg dioxin as 2,3,7,8-TCDD equivalents (dioxin), or greater than 6.0 mg/kg carcinogenic polynuclear aromatic hydrocarbons (c-PNAs) as benzo-a-pyrene equivalents". The groundwater exits at New Cricket Spring which is located about one-quarter mile downgradient of the wood treating area. New Cricket Spring contained concentrations of PCP above the Arkansas Water Quality Standard.

In April 1991, a Consent Decree (CD) was entered between the United States of America, on behalf of the USEPA, and MMI to remediate the Site. The CD includes the ROD and a Statement of Work (SOW) as Appendices A and B, respectively, (collectively the Consent Decree). A corrected CD was entered on September 23, 1992, including the same attachments.

The soil remedy was implemented in 1994 and 1995. The remediation area is fenced with signs and locked gates.

Post Soil Remediation Spring Sampling

As set forth in the CD and based on the results of a Dye Tracing Study, spring sampling was conducted quarterly for two years after the soil remediation was completed (Table 1).

Table 1
Post Soil Remediation Spring Sampling

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (ug/L)
7/2/1996	112	688
10/11/1996	2	651
1/20/1997	34	681
3/16/1997	34	330
7/18/1997	2	775
9/30/1997	50	560

New Cricket Spring Treatment System

Since the PCP concentration at New Cricket Spring exceeded the cleanup level for PCP of 9.3 micrograms per liter (µg/l or ppb) monthly average and 18.7 µg/l daily average set by Arkansas Department of Pollution Control & Ecology (ADPCE) at that time, an ozone pilot system was installed in April 1997. Data was collected during varying flow events and equipment settings. Based on the results, the treatment system was upgraded during November 1997 through January 1998 and a new, higher capacity system was installed during October through December 1999. The upgraded system continued to operate and to meet ADPCE requirements. Regular evaluation of the analytical data indicated the concentrations observed at the New Cricket Spring had plateaued at between approximately 75-150 ppb by 2004 (Table 2).

Table 2
New Cricket Spring Remediation Sampling (1998-2004)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (ug/L)
1/20/1998	42	561
5/7/1998	65	196
7/23/1998	3	561
11/4/1998	8	570
1/29/1999	60	288
7/12/1999	42	ND
3/8/2000	5	284
5/15/2000	2	272
6/23/2000	75	389
7/28/2000	3	627

8/20/2000	2	424
9/25/2000	1	577
10/26/2000	1	114
11/27/2000	25	632
2/26/2001	3	338
3/13/2001	3	376
4/27/2001	3	349
5/27/2001	2	388
7/27/2001	48	560
8/27/2001	6	372
9/27/2001	2	895
10/22/2001	6	275
11/30/2001	28	441
12/22/2001	60	114
1/28/2002	12	373
2/21/2002	15	372
3/8/2002	22	318
3/22/2002	42	226
4/22/2002	22	79
5/28/2002	70	71
6/26/2002	17	259
8/2/2002	17	231
8/27/2002	12	178
9/25/2002	10	95
10/28/2002	8	461
12/7/2002	2	398
12/29/2002	35	218
2/3/2003	7	340
3/7/2003	35	228
4/8/2003	12	274
6/4/2003	42	147
7/7/2003	9	220
8/7/2003	10	221
8/28/2003	6	71
9/29/2003	2	534
10/28/2003	24	200
12/10/2003	21	150
1/3/2004	26	139
2/3/2004	29	144
3/3/2004	28	84
4/3/2004	30	85

5/5/2004	65	115
5/15/2004	20	102
6/9/2004	12	300
6/30/2004	30	222
9/3/2004		43
10/4/2004	12	
11/3/2004	94	155
11/14/2004	26	75
11/22/2004	28	75
12/1/2004	35	72
12/21/2004	9	253

Injection of Ozonated Water

An ozone injection pilot study was installed and began operation in December 2005 to evaluate the potential for accelerating reduction of residual PCP in the subsurface between the Site and New Cricket Spring. Injection points were located in the vicinity of the sinkhole since it is hydraulically connected to New Cricket Spring through subsurface fractures. The system operated between December 2005 and August 2009. The ozone injection system was discontinued due to equipment failures and the inability to obtain replacement parts. Significant reductions in concentration at New Cricket Spring were observed during the injection period but were stabilizing prior to the equipment failure (Table 3). The approximate average PCP concentration observed in New Cricket Springs during the operation of the injection system was 116 ppb in 2005, 36 ppb in 2006, 96 ppb in 2007, 64 ppb in 2008, and 16 ppb in 2009.

Table 3
New Cricket Spring Remediation Sampling (2005-2009)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (µg/L)
1/3/2005	10	279
2/3/2005	12	155
3/1/2005	34	208
4/4/2005	9	148
4/25/2005	6	121
5/3/2005	9	150
6/2/2005	3	151
6/20/2005	2	55
7/13/2005	2	95
8/3/2005	12	85
10/3/2005	27	63
11/3/2005	6	278

11/14/2005	6	15
11/28/2005	8	47
12/20/2005	27	7
12/26/2005	27	11
1/2/2006	21	42
1/9/2006	20	32
1/16/2006	28	32
1/23/2006	33	16
1/30/2006	41	34
2/6/2006	38	<5.10
2/13/2006	34	24
2/20/2006	21	6
2/27/2006	26	20
3/6/2006	16	25
3/13/2006	57	107
3/20/2006	48	26
3/27/2006	27	4.09J
4/3/2006	24	11
4/10/2006	16	39
4/17/2006	22	8
4/24/2006	16	7
4/27/2006	50	11
4/29/2006	193	28
5/1/2006	94	23
5/8/2006	59	52
5/15/2006	22	15
5/22/2006	16	<5.00
5/30/2006	17	6
6/7/2006	3	253
6/12/2006	2	LE
6/19/2006	17	52
6/26/2006	17	75
7/5/2006	22	10
7/17/2006	17	22
8/7/2006	17	24
8/14/2006	17	<5.00
9/5-6/2006	23	7
9/18/2006	24	6
10/2/2006	24	17
10/16/2006	41	40
10/16/2006	81	92

10/18/2006	27	118
11/7/2006	41	53
11/20/2006	24	57
11/30/2006	636	<50.0
12/4/2006	59	<54.3
12/6/2006	37	<52.6
12/18/2006	21	24
1/8/2007	21	17
1/22/2007	79	35
2/5/2007	27	26
2/19/2007	47	20
3/5/2007	27	<5.00
3/19/2007	25	NA
4/9/2007	23	<5.00
4/23/2007	30	7
5/7/2007	21	2.90J
5/21/2007	20	4.36J
6/4/2007	20	<5.00
6/18/2007	21	10
7/9/2007	20	15
7/23/2007	18	9
8/6/2007	1	191
9/10/2007	23	217
9/24/2007	18	16
10/10/2007	18	6
10/22/2007	18	1190
11/5/2007	18	209
11/19/2007	18	20
12/3/2007	18	20
12/17/2007	32	87
1/7/2008	23	<5.00
1/21/2008	23	58
2/4/2008	24	52
2/18/2008	83	57
3/3/2008	580	<5.00
3/17/2008	44	11
4/7/2008	78	10
4/12/2008	240	7
4/13/2008	100	7
4/14/2008	78	8
5/10/2008	68	75

5/27/2008	18	189
6/9/2008	30	77
6/23/2008	580	6
7/7/2008	80	194
7/10/2008	140	254
7/21/2008	42	477
8/4/2008	22	108
8/18/2008	36	31
9/1/2008	25	32
9/22/2008	40	22
10/6/2008	21	20
10/20/2008	21	13
11/3/2008	24	<5.00
11/17/2008	30	28
12/1/2008	24	12
12/22/2008	24	<5.00
1/5/2009	32	7
1/26/2009	27	<5.00
2/9/2009	90	<5.00
2/23/2009	31	6
3/9/2009	30	6
3/23/2009	30	<5.00
4/6/2009	38	6
4/20/2009	243	9
5/4/2009	343	8
5/18/2009	51	6
6/8/2009	38	<5.00
6/29/2009	25	9
7/20/2009	47	39
8/10/2009	24	31
9/13/2009	22	8
10/12/2009	104	21
11/9/2009	45	<50
12/7/2009	28	8

Injection of Non-Ozonated Water

After equipment issues caused the discontinuation of ozone generation at the sinkhole area, non-ozonated water injection was continued. The rationale for continuing with injection of non-ozonated water was to improve operations at New Cricket Spring by maintaining a higher average water flow rate and by providing water to flush PCP concentrations. During the water injection processes, flow rates at New Cricket Spring were increased by approximately 20

gallons per minute (gpm). During low flow periods of the year, typically mid-summer and early winter, flow rates would often dwindle to less than two gpm resulting in higher ozone concentrations recirculating in the treatment equipment and accelerated decomposition of gaskets and o-rings. Maintaining the New Cricket Spring flow rate at greater than 20 gpm significantly reduced degradation of the treatment system components (Table 4).

Table 4
New Cricket Spring Remediation Sampling (2010-March 2011)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (µg/L)
1/10/2010	42	13
2/15/2010	87	11
3/15/2010	35	<5.00
4/15/2010	40	10
5/17/2010	180	11
6/13/2010	43	15
7/8/2010	33	66
8/19/2010	17	16
9/21/2010	33	28
10/18/2010	20	15
11/20/2010	21	5
12/16/2010	24	6
1/18/2011	22.83	3.39
2/9/2011	26.76	10.4
3/17/2011	49.03	14.2

During the period of April 2011 through November 2011, the non-ozonated water injection process was halted to evaluate spring concentrations without the impact of the non-ozonated water injection process (Table 5). The non-ozonated water injection process was re-started in November 2011 in response to a request from the EPA.

Table 5
New Cricket Spring Remediation Sampling (April 2011-Nov 2011)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (ug/L)
4/19/2011	57.55	12.5
5/2/2011	310	11
5/3/2011	271	8.92
5/4/2011	156	10.8
5/4/2011	123	15.8
5/5/2011	83	18
5/9/2011	33.91	43.8

6/9/2011	6.8	52.4
7/18/2011	0.575	18.6
8/15/2011	1.004	38.9
9/13/2011	0.132	<5.00
10/18/2011	23.71	52.4
11/16/2011	29.64	30.6

After re-starting the non-ozonated water injection process, analytical concentrations at New Cricket Spring returned to concentration levels approaching the ADPCE standards (Table 6).

Table 6
New Cricket Spring Remediation Sampling (Dec 2011-April 2012)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (µg/L)
12/19/2011	60.25	11.5
1/19/2012	31.82	<5.00
2/14/2012	40.38	<5.00
3/29/2012	50.81	7.95
4/18/2012	22.54	20
5/23/12	18	10.9

Conclusions and Recommendations

It is recommended that the treatment system located at New Cricket Spring continue to operate until the PCP concentration in the spring water achieves ADEQ standards. Based on the data, it appears that the pilot injection system successfully enhanced the degradation of the residual PCP in the source area resulting in reduced concentrations emanating from New Cricket Spring. Since the current PCP concentrations are approaching the cleanup standard for PCP, it is recommended that the injection of non-ozonated water be discontinued for the next six months. During this period, make-up water can be routed from municipal or deep groundwater sources to the treatment system, as necessary, to maintain efficient treatment system operations during low flow conditions. It is recommended that analytical sampling at the mouth of New Cricket Spring continue on a monthly basis during the next ~~six months~~year to monitor for potential rebound effects. ~~Based on the updated cleanup standard for PCP presented by ADEQ in their April 4, 2011, the monthly average concentration limit is 17.38 µg/L and the daily maximum limit is 34.86 µg/L.~~ Based on the Arkansas Pollution Control and Ecology Commission's water quality standard for pentachlorophenol (PCP) presented by ADEQ in their February 14, 2012 letter, the chronic standard of 15.57 µg/l is the appropriate standard for the Arkwood Site. ~~If the analytical data indicates limited rebound (reported concentrations of less than 34.86 µg/L in any given month), monitoring would change to quarterly sampling. If analytical results measure concentrations in excess of 34.86 µg/L, injection of non-ozonated water may be reinitiated to enhance flushing operations.~~ A summary of data and a recommendation will be submitted to the EPA at the end of the ~~six-month~~year period.

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The need for treatment at New Cricket Spring will be evaluated, at a minimum, in the Annual Report. At such time that it is considered that the ADEQ chronic standard has been met, MMI will submit a request to the EPA for discontinuation of treatment operations.

Arkwood, Inc. Superfund Site
Groundwater Remediation Summary
June 2012 (Revised August 2012)

Site History/Record of Decision

The Arkwood, Inc. Superfund Site (Arkwood Site or Site) is a former wood treating site where wood treating fluids contaminated the soil and groundwater. The Site is located in Omaha, AR. The Site was developed in the 1950's when a railroad company excavated about 40 to 50 feet below natural grade to obtain fill dirt for constructing a railroad embankment. Arkwood, Inc. began wood treating operations at the Site in 1962 using creosote and pentachlorophenol (PCP) in its process.

In 1973, the site owner leased the wood-treating facility to Mass Merchandisers, Inc. (MMI). MMI continued to operate the Arkwood plant until June 1984. Subsequently, the remaining inventory was sold or removed from the site. In January 1985, MMI's lease expired and was not renewed. The owner dismantled the plant in 1986.

In 1985, EPA proposed that the Site be added to the National Priorities List (NPL). The Site was formally added to the NPL on March 31, 1989.

With EPA oversight, MMI conducted a Remedial Investigation and Feasibility Study (RI/FS) between 1987 and 1990 pursuant to an Administrative Order on Consent (AOC). The Regional Administrator of EPA Region VI approved the Record of Decision (ROD) for the Site on September 28, 1990.

The 1990 ROD documented that the principle threat from the Site was direct contact with soils contaminated above health-based levels. In addition, the 1990 ROD stated that these soils posed a long-term threat to groundwater. Site soils were affected with pentachlorophenol (PCP), polynuclear aromatic hydrocarbons (PNAs), and dioxin. Affected materials were defined as "all Site materials that contain greater than 300 mg/kg PCP, greater than 20 μg/kg dioxin as 2,3,7,8-TCDD equivalents (dioxin), or greater than 6.0 mg/kg carcinogenic polynuclear aromatic hydrocarbons (c-PNAs) as benzo-a-pyrene equivalents". The groundwater exits at New Cricket Spring which is located about one-quarter mile downgradient of the wood treating area. New Cricket Spring contained concentrations of PCP above the Arkansas Water Quality Standard.

In April 1991, a Consent Decree (CD) was entered between the United States of America, on behalf of the USEPA, and MMI to remediate the Site. The CD includes the ROD and a Statement of Work (SOW) as Appendices A and B, respectively, (collectively the Consent Decree). A corrected CD was entered on September 23, 1992, including the same attachments.

The soil remedy was implemented in 1994 and 1995. The remediation area is fenced with signs and locked gates.

Post Soil Remediation Spring Sampling

As set forth in the CD and based on the results of a Dye Tracing Study, spring sampling was conducted quarterly for two years after the soil remediation was completed (Table 1).

Table 1
Post Soil Remediation Spring Sampling

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (ug/L)
7/2/1996	112	688
10/11/1996	2	651
1/20/1997	34	681
3/16/1997	34	330
7/18/1997	2	775
9/30/1997	50	560

New Cricket Spring Treatment System

Since the PCP concentration at New Cricket Spring exceeded the cleanup level for PCP of 9.3 micrograms per liter (µg/l or ppb) monthly average and 18.7 µg/l daily average set by Arkansas Department of Pollution Control & Ecology (ADPCE) at that time, an ozone pilot system was installed in April 1997. Data was collected during varying flow events and equipment settings. Based on the results, the treatment system was upgraded during November 1997 through January 1998 and a new, higher capacity system was installed during October through December 1999. The upgraded system continued to operate and to meet ADPCE requirements. Regular evaluation of the analytical data indicated the concentrations observed at the New Cricket Spring had plateaued at between approximately 75-150 ppb by 2004 (Table 2).

Table 2
New Cricket Spring Remediation Sampling (1998-2004)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (ug/L)
1/20/1998	42	561
5/7/1998	65	196
7/23/1998	3	561
11/4/1998	8	570
1/29/1999	60	288
7/12/1999	42	ND
3/8/2000	5	284
5/15/2000	2	272
6/23/2000	75	389
7/28/2000	3	627

8/20/2000	2	424
9/25/2000	1	577
10/26/2000	1	114
11/27/2000	25	632
2/26/2001	3	338
3/13/2001	3	376
4/27/2001	3	349
5/27/2001	2	388
7/27/2001	48	560
8/27/2001	6	372
9/27/2001	2	895
10/22/2001	6	275
11/30/2001	28	441
12/22/2001	60	114
1/28/2002	12	373
2/21/2002	15	372
3/8/2002	22	318
3/22/2002	42	226
4/22/2002	22	79
5/28/2002	70	71
6/26/2002	17	259
8/2/2002	17	231
8/27/2002	12	178
9/25/2002	10	95
10/28/2002	8	461
12/7/2002	2	398
12/29/2002	35	218
2/3/2003	7	340
3/7/2003	35	228
4/8/2003	12	274
6/4/2003	42	147
7/7/2003	9	220
8/7/2003	10	221
8/28/2003	6	71
9/29/2003	2	534
10/28/2003	24	200
12/10/2003	21	150
1/3/2004	26	139
2/3/2004	29	144
3/3/2004	28	84
4/3/2004	30	85

5/5/2004	65	115
5/15/2004	20	102
6/9/2004	12	300
6/30/2004	30	222
9/3/2004		43
10/4/2004	12	
11/3/2004	94	155
11/14/2004	26	75
11/22/2004	28	75
12/1/2004	35	72
12/21/2004	9	253

Injection of Ozonated Water

An ozone injection pilot study was installed and began operation in December 2005 to evaluate the potential for accelerating reduction of residual PCP in the subsurface between the Site and New Cricket Spring. Injection points were located in the vicinity of the sinkhole since it is hydraulically connected to New Cricket Spring through subsurface fractures. The system operated between December 2005 and August 2009. The ozone injection system was discontinued due to equipment failures and the inability to obtain replacement parts. Significant reductions in concentration at New Cricket Spring were observed during the injection period but were stabilizing prior to the equipment failure (Table 3). The approximate average PCP concentration observed in New Cricket Springs during the operation of the injection system was 116 ppb in 2005, 36 ppb in 2006, 96 ppb in 2007, 64 ppb in 2008, and 16 ppb in 2009.

Table 3
New Cricket Spring Remediation Sampling (2005-2009)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (µg/L)
1/3/2005	10	279
2/3/2005	12	155
3/1/2005	34	208
4/4/2005	9	148
4/25/2005	6	121
5/3/2005	9	150
6/2/2005	3	151
6/20/2005	2	55
7/13/2005	2	95
8/3/2005	12	85
10/3/2005	27	63
11/3/2005	6	278

11/14/2005	6	15
11/28/2005	8	47
12/20/2005	27	7
12/26/2005	27	11
1/2/2006	21	42
1/9/2006	20	32
1/16/2006	28	32
1/23/2006	33	16
1/30/2006	41	34
2/6/2006	38	<5.10
2/13/2006	34	24
2/20/2006	21	6
2/27/2006	26	20
3/6/2006	16	25
3/13/2006	57	107
3/20/2006	48	26
3/27/2006	27	4.09J
4/3/2006	24	11
4/10/2006	16	39
4/17/2006	22	8
4/24/2006	16	7
4/27/2006	50	11
4/29/2006	193	28
5/1/2006	94	23
5/8/2006	59	52
5/15/2006	22	15
5/22/2006	16	<5.00
5/30/2006	17	6
6/7/2006	3	253
6/12/2006	2	LE
6/19/2006	17	52
6/26/2006	17	75
7/5/2006	22	10
7/17/2006	17	22
8/7/2006	17	24
8/14/2006	17	<5.00
9/5-6/2006	23	7
9/18/2006	24	6
10/2/2006	24	17
10/16/2006	41	40
10/16/2006	81	92

10/18/2006	27	118
11/7/2006	41	53
11/20/2006	24	57
11/30/2006	636	<50.0
12/4/2006	59	<54.3
12/6/2006	37	<52.6
12/18/2006	21	24
1/8/2007	21	17
1/22/2007	79	35
2/5/2007	27	26
2/19/2007	47	20
3/5/2007	27	<5.00
3/19/2007	25	NA
4/9/2007	23	<5.00
4/23/2007	30	7
5/7/2007	21	2.90J
5/21/2007	20	4.36J
6/4/2007	20	<5.00
6/18/2007	21	10
7/9/2007	20	15
7/23/2007	18	9
8/6/2007	1	191
9/10/2007	23	217
9/24/2007	18	16
10/10/2007	18	6
10/22/2007	18	1190
11/5/2007	18	209
11/19/2007	18	20
12/3/2007	18	20
12/17/2007	32	87
1/7/2008	23	<5.00
1/21/2008	23	58
2/4/2008	24	52
2/18/2008	83	57
3/3/2008	580	<5.00
3/17/2008	44	11
4/7/2008	78	10
4/12/2008	240	7
4/13/2008	100	7
4/14/2008	78	8
5/10/2008	68	75

5/27/2008	18	189
6/9/2008	30	77
6/23/2008	580	6
7/7/2008	80	194
7/10/2008	140	254
7/21/2008	42	477
8/4/2008	22	108
8/18/2008	36	31
9/1/2008	25	32
9/22/2008	40	22
10/6/2008	21	20
10/20/2008	21	13
11/3/2008	24	<5.00
11/17/2008	30	28
12/1/2008	24	12
12/22/2008	24	<5.00
1/5/2009	32	7
1/26/2009	27	<5.00
2/9/2009	90	<5.00
2/23/2009	31	6
3/9/2009	30	6
3/23/2009	30	<5.00
4/6/2009	38	6
4/20/2009	243	9
5/4/2009	343	8
5/18/2009	51	6
6/8/2009	38	<5.00
6/29/2009	25	9
7/20/2009	47	39
8/10/2009	24	31
9/13/2009	22	8
10/12/2009	104	21
11/9/2009	45	<50
12/7/2009	28	8

Injection of Non-Ozonated Water

After equipment issues caused the discontinuation of ozone generation at the sinkhole area, non-ozonated water injection was continued. The rationale for continuing with injection of non-ozonated water was to improve operations at New Cricket Spring by maintaining a higher average water flow rate and by providing water to flush PCP concentrations. During the water injection processes, flow rates at New Cricket Spring were increased by approximately 20

gallons per minute (gpm). During low flow periods of the year, typically mid-summer and early winter, flow rates would often dwindle to less than two gpm resulting in higher ozone concentrations recirculating in the treatment equipment and accelerated decomposition of gaskets and o-rings. Maintaining the New Cricket Spring flow rate at greater than 20 gpm significantly reduced degradation of the treatment system components (Table 4).

Table 4
New Cricket Spring Remediation Sampling (2010-March 2011)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (µg/L)
1/10/2010	42	13
2/15/2010	87	11
3/15/2010	35	<5.00
4/15/2010	40	10
5/17/2010	180	11
6/13/2010	43	15
7/8/2010	33	66
8/19/2010	17	16
9/21/2010	33	28
10/18/2010	20	15
11/20/2010	21	5
12/16/2010	24	6
1/18/2011	22.83	3.39
2/9/2011	26.76	10.4
3/17/2011	49.03	14.2

During the period of April 2011 through November 2011, the non-ozonated water injection process was halted to evaluate spring concentrations without the impact of the non-ozonated water injection process (Table 5). The non-ozonated water injection process was re-started in November 2011 in response to a request from the EPA.

Table 5
New Cricket Spring Remediation Sampling (April 2011-Nov 2011)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (ug/L)
4/19/2011	57.55	12.5
5/2/2011	310	11
5/3/2011	271	8.92
5/4/2011	156	10.8
5/4/2011	123	15.8
5/5/2011	83	18
5/9/2011	33.91	43.8

6/9/2011	6.8	52.4
7/18/2011	0.575	18.6
8/15/2011	1.004	38.9
9/13/2011	0.132	<5.00
10/18/2011	23.71	52.4
11/16/2011	29.64	30.6

After re-starting the non-ozonated water injection process, analytical concentrations at New Cricket Spring returned to concentration levels approaching the ADPCE standards (Table 6).

Table 6
New Cricket Spring Remediation Sampling (Dec 2011-April 2012)

Date	New Cricket Spring Flow Rate (GPM)	New Cricket Spring PCP Concentration (µg/L)
12/19/2011	60.25	11.5
1/19/2012	31.82	<5.00
2/14/2012	40.38	<5.00
3/29/2012	50.81	7.95
4/18/2012	22.54	20
5/23/12	18	10.9

Conclusions and Recommendations

It is recommended that the treatment system located at New Cricket Spring continue to operate until the PCP concentration in the spring water achieves ADEQ standards. Based on the data, it appears that the pilot injection system successfully enhanced the degradation of the residual PCP in the source area resulting in reduced concentrations emanating from New Cricket Spring. Since the current PCP concentrations are approaching the cleanup standard for PCP, it is recommended that the injection of non-ozonated water be discontinued for the next six months. During this period, make-up water can be routed from municipal or deep groundwater sources to the treatment system, as necessary, to maintain efficient treatment system operations during low flow conditions. It is recommended that analytical sampling at the mouth of New Cricket Spring continue on a monthly basis during the next year to monitor for potential rebound effects. Based on the Arkansas Pollution Control and Ecology Commission's water quality standard for pentachlorophenol (PCP) presented by ADEQ in their February 14, 2012 letter, the chronic standard of 15.57 µg/l is the appropriate standard for the Arkwood Site. A summary of data and a recommendation will be submitted to the EPA at the end of the year period.

The need for treatment at New Cricket Spring will be evaluated, at a minimum, in the Annual Report. At such time that it is considered that the ADEQ chronic standard has been met, MMI will submit a request to the EPA for discontinuation of treatment operations.

McKesson Corporation
One Post Street, 34th Floor
San Francisco, CA 94104
608.848.4134 Tel

Jean A. Mescher
Director, Environmental Services

McKESSON
Empowering Healthcare

Via Electronic and Certified Mail

December 18, 2012

Mr. Ruben Moya, Superfund Remedial Project Manager
Superfund AR/LA Enforcement Section (6SF-RA)
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202

Subject: Response to ADEQ Comments Dated November 6, 2012
Re: Monthly Progress Report – September 2012
Arkwood, Inc. Site, Omaha, Arkansas

Dear Mr. Moya:

The purpose of this letter is to offer clarifications and responses to the comments of ADEQ addressed to you dated November 6, 2012 regarding the Monthly Progress Report – September 2012 for the Arkwood, Inc. Site. The ADEQ's comments are presented below in italics followed by our responses.

1. *According to the email from Jean Mescher, McKesson, dated October 3, 2012 provided with the subject report, samples cannot be obtained 20 feet downstream from the weir as requested by ADEQ during periods of low flow since the effluent "sinks into the subsurface before reaching the culvert". This statement describes the effluent returning to a subsurface status and therefore returning to the state of groundwater. For this reason the Maximum Contaminant Level (MCL) for pentachlorophenol (PCP) of 1.0 µg/l should be used in lieu of the aquatic toxicity standard of 15.57 µg/l which is currently used.*

My responses were made based on my familiarity of the Site: 1) For clarification, the reason a sample cannot be collected 20 feet downstream from the weir is that there is only about 15 feet between the effluent discharge point and the entrance to the culvert. 2) During periods of moderate to high flow, a sample can be collected at the entrance to the culvert (about 15 feet from the discharge point). However, during periods of low flow, the effluent may not flow all the way to the culvert at a depth that allows for sampling. Perhaps I oversimplified the conditions of what happens to the water in the discharge ditch. 3) When earlier I said that it "sinks into the subsurface before reaching the culvert", I did not mean to infer that it became groundwater. The weir is approximately six feet from the fence line. At the point the effluent stream leaves the fenced area (goes offsite), the flow is aboveground and visible regardless of the spring flow rate. Offsite, under low flow conditions, the water in the ditch downgradient from the effluent discharge point spreads out within the gravel-lined ditch and is not deep enough to accommodate the 1-liter sampling container used to collect the water sample. At low flow rates, the discharge enters the rock-lined ditch and partially evaporates. That which remains disperses around the voids be-

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tween rocks and may be partially absorbed into the surface soil. A small depression was constructed at about 12-feet from the effluent discharge point to accommodate collection of the sample (it is not recommended to make a depression closer to the culvert due to concerns for undermining of the culvert). When we do not see flow reaching the culvert, it may be spreading and flowing in the gravel beneath the culvert. It is still considered to be a surface water discharge since the source of the water (New Cricket Spring) is surface water and the water is discharged at the surface and flows for some distance before it spreads between the rocks in the ditch lining where it may be partially absorbed into the surface materials. In accordance with Arkansas Regulation 2, "surface water" is defined as, "That water contained on the exterior or upper portion of the earth's surface as opposed to groundwater." Using this definition, the effluent discharge is appropriately categorized as surface water.

2. *Due to the concern discussed in Comment 1 above, a review was performed of past correspondence for clarification concerning applicable risk levels. During the review, it was noticed that the ADEQ water quality standard of 15.57 µg/l is apparently being used as the screening level for PCP in lieu of the MCL of 1.0 µg/l. However, this standard pertains to aquatic toxicity only and does not address potential human health concerns. Even as it is apparently assumed that the stream is not a source for potable water, the MCL of 1.0 µg/l should be the applicable screening level for the following reasons:*

   Much of the groundwater which rises from the spring and becomes surface water returns to groundwater and appears to migrate offsite, as groundwater.

   According to past correspondence, it appears the consensus of the EPA, ADEQ and McKesson, that some groundwater is circumventing the spring and migrating beyond the spring as groundwater.

Please see the response under Comment 1 above. There is constant movement between subsurface and surface water bodies as streams and lakes may be gaining or losing hydraulically at different portions of the water body, during various precipitation events and during different times of the year. However, this ongoing interaction between surface and groundwater does not mean that the defined distinctions between surface water and groundwater are eliminated. The dye tracing study conducted for the site demonstrated that the groundwater migrating offsite discharges detectable levels of pentachlorophenol at only one location: New Cricket Spring, which is treated by McKesson.

3. *Since the MCL for PCP is applicable for the potential risk evaluation, the minimum reporting limit for pentachlorophenol should be less than 1.0 µg/l and not the current reporting limit of 5.0 µg/l.*

Please see responses above. We can request that our laboratory, Arkansas Analytical, Inc., report "J" values between 1 µg/l and 5 µg/l with the recognition that a J value is an estimated concentration. In essence, there is not a drinking water EPA Method for PCP. The EPA Method 8270D from SW-846 lists the reporting limit for pentachlorophenol in groundwater as 50 µg/l (ppb). The method detection level (MDL) for Arkansas Analytical for PCP is 1 ppb. There is an

uncertainty as to quantitation for data falling below the lowest standard in the calibration curve. Arkansas Analytical's NELAC accreditation requires that if data lower than their lowest standard is reported, it must be qualified as estimated as a "J" value. The laboratory president states that a value between 1 ppb and 5 ppb will be an estimated value with a range of about -50% to +100% of the actual value - meaning an estimated value of 1 ppb is really somewhere in the range of 0.5 ppb to 2 ppb.

Jeff Reuhr of the ADEQ laboratory provided the following explanation in an email to Diana Kilburn of ADEQ on November 29, 2012:

> *"For Pentachlorophenol our low standard on the five point curve is 500ug/L. This we say is the lowest concentration we can see or report for that parameter. The next step is that we extract 500mL of sample which we concentrate done to 1mL. This is a 500 to 1 concentration so 500ug/L divided by 500 equals a 1ug/L MDL or Reporting limit in this case. On some of the Old Midland samples you will notice we only extracted 50mL or 5mL, so that was why the MDL and Reporting limits changed. For example 50mL extracted then conc to 1mL would result in a MDL of 500ug/L divided by 50 equals 10ug/L MDL or Reporting limit. I realize this is a flaw in our reports, because it is confusing for those reviewing them, but our LIMS requires us to input everything we do and then it does the math. The ADEQ report doesn't have a qualifier because the result is not estimated. It is based on the low standard so we have 100 % confidence in the results.*
>
> *We are able to see that low because you asked us to, and we were able to push/optimize the method to see those levels. Most labs can't or won't push their instruments down to those levels. The main reasons are; their instruments are older and can't, these low levels are very difficult to maintain thus needing almost constant recalibrations, and you end up needing to make more dilutions which screws with your QC.*
>
> *A 5ppb reporting limit for pentachlorophenol isn't that unusual for most Labs to report. They may be able to say they see 1ppb, but they are going to flag the result as estimated."*

We have requested that Arkansas Analytical report PCP values between 1-5 µg/l as a "J" value unless where noted. If further refinements in the analytical process can be made based on additional discussion between Arkansas Analytical and the ADEQ laboratory, we will inform the agencies at that time.

4. *It is noted the increase in concentration to 73.2 ppb PCP at the mouth of New Cricket Spring occurred after onsite injection of clean water ceased. The flow from the spring was 0.4 gpm at the time of sampling. It is recommended that monthly sampling and testing at the site continue as scheduled.*

Monthly sampling and testing at New Cricket Spring and the treatment effluent point will continue as requested.

I certify that the information contained in or accompanying this submission is true, accurate, and complete to the best of my knowledge, information and belief, and that I, as project coordinator, have made reasonable inquiry into its veracity.

If you have any questions regarding this letter, please do not hesitate to contact me at (608) 848-4134.

Sincerely,

Jean A. Mescher, Project Coordinator
Director, Environmental Services

Enclosure

Copy:

- Mark Moix, ADEQ*
- EPA Assistant Regional Counsel (6C-WA)* (w/o enclosure)
- Chief, Superfund Enforcement Branch (6H-E)* (w/o enclosure)

*** CERTIFIED MAIL**

ADEQ
A R K A N S A S
Department of Environmental Quality

CERTIFIED MAIL No. 91 7199 9991 7030 4901 5218
Return Receipt Requested

November 6, 2012

U.S. EPA Region 6
Attn: Mr. Ruben Moya
Mail Code: 6SF
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

RE: Monthly Progress Report–September 2012
Arkwood, Inc. Site, Omaha, Arkansas

Dear Mr. Moya:

The Arkansas Department of Environmental Quality - Hazardous Waste Division (ADEQ) has received the Monthly Progress Report–September 2012 for Arkwood, Inc. Site, Omaha, Arkansas dated October 10, 2012. After reviewing the report ADEQ has the following comments:

1. According to the email from Jean Mescher, McKesson, dated October 3, 2012 provided with the subject report, samples cannot be obtained 20 feet downstream from the weir as requested by ADEQ during periods of low flow since the effluent "sinks into the subsurface before reaching the culvert". This statement describes the effluent returning to a subsurface status and therefore returning to the state of groundwater. For this reason the Maximum Contaminant Level (MCL) for pentachlorophenol (PCP) of 1.0 ug/l should be used in lieu of the aquatic toxicity standard of 15.57 ug/l which is currently used.

2. Due to the concern discussed in Comment 1 above, a review was performed of past correspondence for clarification concerning applicable risk levels. During the review, it was noticed that the ADEQ water quality standard of 15.57 ug/l is apparently being used as the screening level for PCP in lieu of the MCL of 1.0 ug/l. However, this standard pertains to aquatic toxicity only and does not address potential human health concerns. Even as it is apparently assumed that the stream is not a source for potable water, the MCL of 1.0 ug/l should be the applicable screening level for the following reasons:

    - Much of the groundwater which rises from the spring and becomes surface water returns to groundwater and appears to migrate offsite, as groundwater.

    - According to past correspondence, it appears the consensus of the EPA, ADEQ and McKesson, that some groundwater is circumventing the spring and migrating beyond the spring as groundwater.

3. Since the MCL for PCP is applicable for potential risk evaluation, the minimum reporting limit for pentachlorophenol should be less than 1.0 ug/l and not the current reporting limit of 5.0 ug/l.

4. It is noted the increase in concentration to 73.2 ppb PCP at the mouth of New Cricket Spring occurred after onsite injection of clean water ceased. The flow from the spring was 0.4 gpm at the time of sampling. It is recommended that monthly sampling and testing at the site continue as scheduled.

To address concerns discussed above, a minimum PCP reporting limit equal to or less than 1.0 ug/l is recommended for a mutually agreed upon limited period of time by the parties involved or may be used seasonally during low-flow conditions. If you have any comments or questions, please contact me at 501-682-0852 or via e-mail moix@adeq.state.ar.us.

Sincerely,

Mark Moix

Mark Moix
Engineer, PE
Technical Branch
Hazardous Waste Division

cc: Jean Mescher, McKesson Corporation

ITEM FOR AGENDA - ARKWOOD H2O REMEDIAL GOAL

Please see the below email message from me to Don Williams, EPA Region 6 dated March 24, 2011, on which both Tammie Hynum and Carlos Sanchez were visibly copied; the email text is found at the very bottom of this document.

I am attaching this document to the original email of March 24, 2011 referenced above, with that email's original attachments plus the attachments cited below, and forwarding it all together for completeness.

I pointed out then --- and do so again now --- that EPA's Frank T. Sanders, Director, Antimicrobials Division, in the Reregistration Eligibility Decision for Pentachlorophenol (September 28, 2008 EPA 739-R-08-008, attached) states:

"Surface water runoff from pentachlorophenol treated utility poles may be a possible source for pentachlorophenol or its transformation products in drinking water or in foods. Estimated Environmental Concentrations (EECs) for surface water have been calculated by the Agency. **Drinking water levels of concern (DWLOCs) for acute and chronic dietary risk from drinking water were calculated. DWLOCs calculated for surface water for pentachlorophenol were 10,465 ppb for adult males and females and 2,990 ppb for children ages 1-6.**" (emphasis added)

[Note: 2,990 ppb = 2986.588411 ug/l]

- In a letter (attached) dated January 30, 1998 from Masoud Arjmandi to Jean Mescher, ADEQ **originally set** the Arkwood water cleanup criteria (18.17 ug/l "Daily Maximum", 9.3 ug/l "Monthly Average, pH between 6.0-9.0)

- ADEQ then **revised** the Arkwood water cleanup criteria by letter (attached) dated February 14, 2012 from Sarah Clem, ADEQ Branch Manager, Water Quality Planning, Water Division, ADEQ to Shawn Ghose, EPA RPM for Arkwood, which states in part:

  > **"Organisms in the effluent discharge stream experience chronic exposure, therefore; the chronic standard of 15.57 ug/l is the appropriate standard for the Arkwood Site."**

- In a letter (attached) dated July 13, 2012 from Mark Moix, Engineer, PE, Technical Branch, Hazardous Waste Division, ADEQ to Stephen L. Tzhone, Remedial Project Manager, EPA Superfund Region 6, Mr. Moix states in part:

"The Arkansas Department of Environmental Quality - Hazardous Waste Division & Water Division (ADEQ) have reviewed the Groundwater Remediation Summary dated June 2012. The ADEQ concurs with the summary document with the following comments:

"1) Conclusions and Recommendations, p.9: In February 2012, ADEQ sent to EPA a letter with recalculated water quality standards for New Cricket Spring. These limits should be referenced in the proposed recommendations. The text describes these values as cleanup standards. ADEQ recommends in the sixth sentence of this section 'Based on the Arkansas Pollution Control and Ecology Commission's water quality standard for pentachlorophenol (PCP) presented by ADEQ in their February 14, 2012 letter, the chronic standard of 15.57 ug/l is the appropriate standard for the Arkwood Site.' The appropriate standard for this stream is the chronic standard 15.57 ug/l"

- In a certified letter (attached) dated November 6, 2012 — also from Mark Moix, less than four months later — to Ruben Moya, RPM Superfund, EPA Region 6, Mr. Moix states in part:

"The Arkansas Department of Environmental Quality - Hazardous Waste Division (ADEQ) has received the Monthly Progress Report - September 2012 for Arkwood, Inc. Site, Omaha, Arkansas dated October 10, 2012. After reviewing the report ADEQ has the following comments:

" • According to the email from Jean Mescher, McKesson, dated October 3, 2012 provided with the subject report, samples cannot be obtained 20 feet downstream from the weir as requested by ADEQ during periods of low flow since the effluent "sinks into the subsurface before reaching the culvert". This statement describes the effluent returning to a subsurface status and therefore returning to the state of groundwater. For this reason the Maximum Contaminant Level (MCL) for pentachlorophenol (PCP) of 1.0 ug/l should be used in lieu of the aquatic toxicity standard of 15.57 ug/l which is currently used.

" • Due to the concern discussed in Comment 1 above, a review was performed of past correspondence for clarification concerning applicable risk levels. During the review, it was noticed that the ADEQ water quality standard of 15.57 ug/l is apparently being used as the screening level for PCP in lieu of the MCL of 1.0 ug/l. However, this standard pertains to aquatic toxicity only and does not address potential human health concerns. Even as it is apparently assumed that the stream is not a source for potable water, the MCL of 1.0 ug/l should be the applicable screening level for the following reasons:

" • Much of the groundwater which rises from the spring and becomes surface water returns to groundwater and appears to migrate offsite, as groundwater.

" • According to past correspondence, it appears the consensus of the EPA, ADEQ and McKesson, that some groundwater is circumventing the spring and migrating beyond the spring as groundwater."

- In our telephone conversation of August 22, 2013, Tammie Hynum, Technical Branch Manager, Hazardous Waste Division, ADEQ, Ms. Hynum confirmed that ADEQ had adopted the EPA Maximum Contaminant Level of 1.0 ug/l of pentachlorophenol (PCP) for drinking water and that "a whole group" at ADEQ had formally concurred with Mr. Moix's certified letter of November 6, 2012.

I find it highly disingenuous and objectionable for Mr. Moix to have claimed in his certified letter dated November 6, 2012 (speaking with authority for the whole of ADEQ) that "**...it was noticed that the ADEQ water quality standard of 15.57 ug/l is apparently being used as the screening level for PCP in lieu of the MCL of 1.0 ug/l.**"

This statement (with its awkward use of the passive voice) implies that ADEQ was blithely unaware of these facts. That is patently not the case.

Again, ADEQ **sets** the standard, it doesn't just happen to notice it. ADEQ is **responsible** for it and has been for at least fifteen (15) years.

Mr. Moix's certified letter dated November 6, 2012 feigning ignorance of these facts — which are part of the public record — misleads both the EPA

and the public. I find this ploy furtive and offensive. I would like to have an explanation from ADEQ management.

Questions for ADEQ management:

- **Why did ADEQ formally attempt to disavow knowledge of the water cleanup standard that was being used at Arkwood prior to November 6, 2012, (going so far as to send a certified letter to EPA, a measure I do not recall having seen before in ADEQ communication with EPA?)**

•Other than Ms. Mescher's anecdotal, unscientific statement, to what statements, tests or other objectively-verifiable evidence is Mr. Moix referring when he claims that affected surface water returns underground and "appears" to migrate offsite?

•Does ADEQ always rely on hearsay subjective “statements” in forming policy, as it has done here?

•Has ADEQ ever performed primary research, data-gathering, or other original scientific investigation first-hand at Arkwood? If so, when and with what result?

•Did ADEQ ever formally communicate to EPA the new ADEQ standard of 1.0 ug/l prior to Mark Moix’s letter of November 6, 2012? If so, when and how?

•To exactly which organisms does Ms. Clem refer in her letter of February 14, 2012, referenced above? What scientific evidence does ADEQ have to establish the existence of such organisms in the affected waters at Arkwood or of their chronic exposure to PCP? I have asked these last two questions of ADEQ in writing years ago, which is a matter of record, but was not answered.

•What is the definition of “groundwater/ surface water interception,” a term Ms. Hynum used in our telephone conversation of August 22, 2013? When I questioned that usage, Ms. Hynum advised me that she is not a professional hydrogeologist.

In Mr. Moix’s eight-paragraph letter of November 6, 2012 Mr. Moix uses some form of the verb "to appear" four times as follows:

“...is apparently being used...”
“...it is apparently assumed...”

"...and appears to migrate offsite..."
"...it appears the consensus of the EPA, ADEQ and McKesson..."

I would submit that all stakeholders should be dealing in ***facts, not appearances,*** especially where a highly-technical and scientifically complex project such as Arkwood is concerned, and most especially where peoples lives and livelihoods are at stake, such as those of my elderly parents and those of our citizens in Boone County, Arkansas who need the jobs this site could provide when reused.

Ms. Mescher addressed the issues raised in Mr. Moix's certified letter of November 6, 2012 in her letter (attached) to Mr. Moya dated December 18, 2012 (cc'd to Mr. Moix) which states in part:

"In accordance with Arkansas Regulation 2, "surface water" is defined as, 'That water contained on the exterior or upper portion of the earth's surface as opposed to groundwater.' Using this definition, the effluent discharge is appropriately categorized as surface water."

Please see EPA website page (printout attached) regarding "Basic Information about Pentachlorophenol in Drinking Water" found at http://water.epa.gov/drink/contaminants/basicinformation/pentachlorophenol.cfm which states in part with regard to pentachlorophenol:

"Maximum Contaminant Level (MCL) = 0.001 milligrams per Liter (mg/L) or 1 part per billion (ppb)
"Maximum Contaminant Level Goal (MCLG) = zero"

Questions for EPA and ADEQ:

- Is the above EPA-published information that upon which ADEQ is relying in its decision to require that Arkwood affected waters be cleaned to a MCL of 1.0 ug/l?

- Will EPA ratify that the above EPA-published information is in fact that upon which ADEQ **should be** relying in its decision to require that Arkwood affected waters be cleaned to a MCL of 1.0 ug/l?

Background for next question:

On July 28, 2010, Annette Cusher wrote to me in part:

ITEM FOR AGENDA - ARKWOOD H2O REMEDIAL GOAL

"At this time, ADEQ has not adopted the Human Health Criteria in EPA's National Recommended Water Quality Criteria for Pentachlorophenol."

Ms. Cusher was referring to the below:

National Recommended Water Quality Criteria: 2002, Human Health Criteria Calculation Matrix EPA Number: 822R02012
http://yosemite.epa.gov/water/owrccatalog.nsf/9da204a4b4406ef885256ae0007a79c7/b94d6802c925234285256caa00476de9!OpenDocument

Which states in part:

"This document contains information regarding the calculation of the human health criteria contained in the document entitled, National Recommended Water Quality Criteria: 2002. This document provides: cancer potency factors (q1*s); reference doses (RfDs); relative source contributions (RSCs); fish intake values; and equations used to derive the human health criteria in the aforementioned compilation. This document is not a regulation and cannot substitute for the Clean Water Act or Environmental Protection Agency (EPA) regulations. Thus, the criteria in the calculation matrix cannot impose legally binding requirements on EPA, states, authorized tribes or the regulated community."

Question for EPA and ADEQ:

- **What does above mean for Arkwood? Do these criteria apply or not?**

I would like ADEQ and EPA to address and resolve these discrepancies prior to our meeting scheduled for September 5, 2013.

At that time, I hope there will be firm and final agreement between EPA and ADEQ as to:

1. the actual toxicity/ risk to human health posed by pentachlorophenol in surface water, groundwater or drinking water

2. the appropriate remedial goal and testing scenario for PCP at New Cricket Spring --- the only water body to be in current remediation at Arkwood per the Record of Decision --- clearly stated such that, once met and

satisfied, the site can be appropriately closed out, deleted from the National Priorities List and returned to productive industrial use as required by law for the benefit of the local and regional economies in Arkansas.

Respectfully submitted,

Charles Curtis Grisham, Junior

BEGIN TEXT OF FORWARDED EMAIL MESSAGE REFERENCED ABOVE:

Begin forwarded message:
From: "grish.org" <curt@grish.org>
Subject: Arkwood - Pentachlorophenol | Pesticides | US EPA
Date: March 24, 2011 11:19:26 PM PDT
To: Donald Williams <Williams.Donald@epamail.epa.gov>
Cc: "grish.org" <curt@grish.org>, "Hynum, Tammie" <HYNUM@adeq.state.ar.us>, Sanchez.Carlos@epamail.epa.gov

Don,

Please see the attached EPA document, found at the following link:

http://www.epa.gov/oppsrrd1/reregistration/pentachlorophenol/

This is the most compelling evidence I have found that the water issue at Arkwood is in fact a red-herring non-issue, and an exceedingly expensive one at that.

1) Pentachlorophenol for use as a pesticide was re-registered by the EPA in 2008.

Here is an excerpt from the attached EPA "Reregistration Eligibility Decision for Pentachlorophenol (List B Case 2505)" approved by Frank T. Sanders, Director, Antimicrobials Division, on September 28, 2008:

"Surface water runoff from pentachlorophenol treated utility poles may be a possible source for pentachlorophenol or its transformation products in drinking water or in foods. Estimated Environmental Concentrations (EECs) for surface water have been calculated by the Agency. Drinking water levels of concern (DWLOCs) for acute and chronic dietary risk from drinking water were calculated. DWLOCs calculated for surface water for pentachlorophenol

were 10,465 ppb for adult males and females and 2,990 ppb for children ages 1-6." (emphasis added)

2) The Arkansas standard as derived via unknown methodology in 1998 by Masoud Arjmandi, staff engineer at Arkansas Department of Environmental Quality (then called the Arkansas Department of Pollution Control and Ecology), requires concentrations of pentachlorophenol in New Cricket Spring to be less than 9.3 ppb (see attached letter which was included in Mr. Ghose's draft 3rd Five-Year Review).

3) The yearly averages of pentachlorophenol concentrations in New Cricket Spring (according to data presented by Mr. Ghose in his draft 3rd Five-Year Review) range between a high of 670 ppb (1996, the first year of sampling, based upon two samples for the whole year) and a low of 13 ppb (2009).

The highest concentration of pentachlorophenol in New Cricket Spring ever recorded for any single sample was the extremely anomalous reading of 1190 ppb from October 22, 2007. This reading was 548% higher than the next-highest reading for all of 2007 (217 ppb, also anomalous within the dataset) and therefore of dubious reliability.

Even so, this highest-ever recorded concentration of pentachlorophenol in New Cricket Spring is less than one-eighth of the EPA drinking water level of concern for adults and less than one-half the drinking water level of concern for children ages 1-6 for acute and chronic dietary risk from drinking water as expressed in the 2008 EPA reregistration document cited above.

4) New Cricket Spring has never been a source of drinking water. Pentachlorophenol from the Arkwood site has never impacted any source of drinking water.

Thank you,

Curt Grisham

ADEQ
ARKANSAS
Department of Environmental Quality

CERTIFIED MAIL No. 91 7199 9991 7030 4901 5218
Return Receipt Requested

November 6, 2012

U.S. EPA Region 6
Attn: Mr. Ruben Moya
Mail Code: 6SF
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

RE: Monthly Progress Report–September 2012
Arkwood, Inc. Site, Omaha, Arkansas

Dear Mr. Moya:

The Arkansas Department of Environmental Quality - Hazardous Waste Division (ADEQ) has received the Monthly Progress Report–September 2012 for Arkwood, Inc. Site, Omaha, Arkansas dated October 10, 2012. After reviewing the report ADEQ has the following comments:

1. According to the email from Jean Mescher, McKesson, dated October 3, 2012 provided with the subject report, samples cannot be obtained 20 feet downstream from the weir as requested by ADEQ during periods of low flow since the effluent "sinks into the subsurface before reaching the culvert". This statement describes the effluent returning to a subsurface status and therefore returning to the state of groundwater. For this reason the Maximum Contaminant Level (MCL) for pentachlorophenol (PCP) of 1.0 ug/l should be used in lieu of the aquatic toxicity standard of 15.57 ug/l which is currently used.

2. Due to the concern discussed in Comment 1 above, a review was performed of past correspondence for clarification concerning applicable risk levels. During the review, it was noticed that the ADEQ water quality standard of 15.57 ug/l is apparently being used as the screening level for PCP in lieu of the MCL of 1.0 ug/l. However, this standard pertains to aquatic toxicity only and does not address potential human health concerns. Even as it is apparently assumed that the stream is not a source for potable water, the MCL of 1.0 ug/l should be the applicable screening level for the following reasons:

    - Much of the groundwater which rises from the spring and becomes surface water returns to groundwater and appears to migrate offsite, as groundwater.

    - According to past correspondence, it appears the consensus of the EPA, ADEQ and McKesson, that some groundwater is circumventing the spring and migrating beyond the spring as groundwater.

9383907

3. Since the MCL for PCP is applicable for potential risk evaluation, the minimum reporting limit for pentachlorophenol should be less than 1.0 ug/l and not the current reporting limit of 5.0 ug/l.

4. It is noted the increase in concentration to 73.2 ppb PCP at the mouth of New Cricket Spring occurred after onsite injection of clean water ceased. The flow from the spring was 0.4 gpm at the time of sampling. It is recommended that monthly sampling and testing at the site continue as scheduled.

To address concerns discussed above, a minimum PCP reporting limit equal to or less than 1.0 ug/l is recommended for a mutually agreed upon limited period of time by the parties involved or may be used seasonally during low-flow conditions. If you have any comments or questions, please contact me at 501-682-0852 or via e-mail moix@adeq.state.ar.us.

Sincerely,

Mark Moix

Mark Moix
Engineer, PE
Technical Branch
Hazardous Waste Division

cc: Jean Mescher, McKesson Corporation

STATE OF ARKANSAS
DEPARTMENT OF POLLUTION CONTROL & ECOLOGY
HAZARDOUS WASTE DIVISION
8001 NATIONAL DRIVE, P.O. BOX 8913
LITTLE ROCK, ARKANSAS 72219-8913
PHONE: (501)682-0744 FAX: 682-0880

January 30, 1998

RECEIVED
FEB 0 9 RECD
ENV. & ENG SERVICES

Jean Mescher, Project Coordinator
Director, Environmental Services
McKesson Corporation
One Post Street
San Francisco, CA 94104-5296

RE: New Cricket Spring
Arkwood Superfund Site, Omaha, Arkansas

Dear Ms. Mescher:

Based on pH of 7.38 for the nearest station to the New Cricket Spring (Station WHI67), the State Water Quality Standards for pentachlorophenol (PCP) at the point of discharge are as follows:

1. Monthly average: 9.3 μg/l
2. Daily Maximum: 18.7 μg/l

Moreover, pH values of the treated water of the New Cricket Spring shall not be below 6.0 or above 9.0

If you have any questions, please call me at (501) 682-0852.

Sincerely,

Masoud Arjmandi
Engineer II, Superfund Branch

cc: Mike Bates, Chief, HWD
Jean Koeninger, Superfund Branch Manager, HWD
Kin Siew, Engineer Supervisor, Superfund Branch, HWD
Mo Shafii, Engineer II, NPDES Branch, WD
Cynthia J. Kaleri, Project Manager, EPA Region 6 (6SF-LP)

From: Kilburn, Dianna
Sent: Friday, July 02, 2010 2:40 PM
To: Barnett, Mary
Cc: Egan, Marilyn; Cusher, Annette; Hynum, Tammie
Subject: Surface water standards for PCP

Mary,

I need to pick your brain for a minute. I am reviewing the remedial goals for a superfund site. The groundwater discharges to a spring so the remedial goals for groundwater are set to comply with Arkansas water quality standards. The last review listed 9.3 ug/l monthly average and 18.7ug/l daily maximum for pentachlorophenol with a pH of 7.38 (must meet >6.0 <9.0 pH limit). This was in 2005. Reg 2 was updated in 2007. Were the equations for calculation of PCP limits changed at that time? Are the equations for calculation of PCP limits proposed for change at this time?

Thanks for your help.

Dianna

Dianna Kilburn, P.G.

Geologist Supervisor

ADEQ, Hazardous Waste Division

5301 Northshore Drive

North Little Rock, AR 72118-5317

501-682-0844

kilburn@adeq.state.ar.us

From: Kilburn, Dianna
Sent: Tuesday, July 06, 2010 10:27 AM
To: Cusher, Annette
Cc: Hynum, Tammie
Subject: FW: Arkwood Superfund Site

Please rephrase as needed. For consistency, you should remain the poc for the FOIA. Please cc all of the previously listed persons. I have not heard back from water, but it does not appear that the equations have changed. Will check again.

The drinking water standards are Federal levels upheld by Arkansas as well. Drinking water standards would be applied to the wells sampled. For PCP the Maximum Contaminant Level is 1.0 ug/l. Arkansas has jurisdiction relative to surface water and the springs. The remediation goals for New Cricket Spring are calculated according to the equations in APC&EC Regulation 2. Based upon Reg. 2, 2007, the levels are 9.3ug/l for the monthly average and 18.7ug/l for a daily maximum.

54 springs were identified within 1.5 miles of the site and 13 were sampled during the remedial investigation. Only two of the 13 had detectible concentrations of PCP, New Cricket Spring and the railroad tunnel. It was only detected in the railroad tunnel once. Levels at New Cricket Spring exceeded the Arkansas water quality standards and a treatment system was installed at the spring. This system continues to function treating the spring water prior to discharge back into the stream channel. These are the sample points noted in the analytical data supplied to you. Analytical data should be shown in micrograms per liter (ug/l).

35 drinking water wells were identified within a 1.5 mile radius of the site. 15 of these were sampled during the remedial investigation. The municipal water line was extended to residences downgradient of the site in the early 1990ís. No site related contamination was found in any of the wells and sampling of drinking water wells was discontinued.

The physical location of the springs and wells are identified in the Remedial Investigation/ Feasibility Study Report completed in May 1990 by Mass Merchandisers, Inc.(MMI)/ McKesson Corp.

Dianna Kilburn, P.G.

Geologist Supervisor

ADEQ, Hazardous Waste Division

5301 Northshore Drive

North Little Rock, AR 72118-5317

501-682-0844

kilburn@adeq.state.ar.us

-----Original Message-----
From: grish [mailto:ccgrish@gmail.com]
Sent: Friday, July 02, 2010 12:28 PM
To: Cusher, Annette
Cc: Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay
Subject: Re: Arkwood Superfund Site

Dear Ms. Cusher,

I am trying to understand the exact testing scenario wherein the "remedial goal" for New Cricket Spring will have been met by both EPA and ADEQ standards. In reading the Record of Decision (ROD) dated 09/28/1990 as it appears on the EPA website, the section headed "The Selected Remedy" part B. "Groundwater" states in part:

"THIS REMEDY WAS SELECTED BECAUSE NEW CRICKET SPRING IS NOT HIGHLY CONTAMINATED, ECOLOGICAL DAMAGE FROM THE SITE IS NOT APPARENT, AND NATURAL ATTENUATION MAY OCCUR QUICKLY FOLLOWING THE REMOVAL OF THE SOURCE OF CONTAMINATION AT THE SITE."

The abstract for that documents states in part:

"THE SELECTED GROUNDWATER REMEDY IS;
* MONITOR AREA SPRINGS DURING, AND TWO YEARS AFTER THE SOILS REMEDIATION TO DETERMINE THE DEGREE TO WHICH NATURAL ATTENUATION IS TAKING AFFECT,
* IF PENTACHLOROPHENOL LEVELS ARE ABOVE STATE OF ARKANSAS WATER QUALITY STANDARDS AFTER A POST-REMEDIAL MONITORING PERIOD OF TWO YEARS, ERECT A WATER TREATMENT SYSTEM AT NEW CRICKET SPRING TO TREAT TO STATE OF ARKANSAS WATER QUALITY STANDARDS,
* TREAT NEW CRICKET SPRING UNTIL LEVELS FALL BELOW STATE STANDARDS.
* MONITOR SELECTED DRINKING WATER WELLS FOR 30 YEARS.
* PROVIDE SELECTED WELL WATER USERS WITH CITY WATER LINES TO REMOVE ANY UNCERTAINTY IN THEIR WATER SUPPLY."

It does seem to me from reading this portion of the ROD that the "State of Arkansas water quality standards" for this remedy are the determining measure for attaining the "remedial goal."

Could you please clarify for me the actual technical measurement levels (expressed in the same units of measure used in the historical test data contained in the reports you provided me) that would meet "State of Arkansas water quality standards" so that I may understand how close we are to attaining the remedial goal?

Also, could you tell me what, if any, "selected drinking water wells" referred to above were actually selected for 30-year monitoring?

Thank you very much.

Sincerely,

Curt Grisham

On Thu, Jul 1, 2010 at 11:45 AM, Cusher, Annette
<Cusher@adeq.state.ar.us> wrote:

Mr. Grisham,

I apologize for using an abbreviation without defining it. I normally do not overlook that. ìPRP lead siteî means the potential responsible party (PRP) is funding and implementation of the clean up efforts. A potential responsible party can include but not limited to the owner or operator of a contaminated site.

The ìremedial goalî is the same for ADEQ as EPA. The document that sets the remedial goal is the Record of Decision.

Regards,

Annette Cusher

-----Original Message-----
From: Grish [mailto:ccgrish@gmail.com]
Sent: Thursday, July 01, 2010 11:13 AM
To: Cusher, Annette
Cc: curt@grish.org; Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay
Subject: Re: Arkwood Superfund Site

Dear Ms. Cusher.

Thank you very much for this timely & complete response.

Two questions, please:

ï Could you explain to me the meaning of the phrase "PRP lead site" used in your reply?

ï Is the "remedial goal" exactly the same for ADEQ as it is for the EPA?

Sincerely,

Curt Grisham

On Jul 1, 2010, at 6:53, "Cusher, Annette" <Cusher@adeq.state.ar.us> wrote:

Mr. Grishom,

Thank you for your comments and concerns regarding the Arkwood Superfund Site. The 2009 Annual Report and the ADEQ letter to EPA regarding the 2009 Annual Report are attached. ADEQ would be happy to forward you all future monthly reports. As noted in the report the discharge into the creek is at or below the remedial goal for the site, however the water from the spring is above the remedial goal requiring further treatment prior to discharge into the creek.

EPA has not delegated regulatory authority to any state for Superfund oversight. EPA and ADEQ do have an agreement detailing how Superfund sites are addressed in Arkansas. EPA will consider ADEQís opinions with regards to Ready for Reuse determinations for EPA lead or PRP lead sites. Arkwood is a PRP lead site with EPA as the main regulatory authority. As such, all Ready for Reuse issues should be coordinated through EPA.

If you have any further questions, or I can be of any more assistance, please contact me at 501-682-0841 or cusher@adeq.state.ar.us.

Regards,

Annette Cusher, P.E.

Remedial/Corrective Action Engineer Supervisor

Technical Branch

Hazardous Waste Division

ADEQ

<Arkwood 2009 Annual Report.pdf>

<EPA-Arkwood 6-8-10.pdf>

From: Barnett, Mary
Sent: Wednesday, July 07, 2010 12:45 PM
To: Kilburn, Dianna
Subject: RE: Surface water standards for PCP

Diana,

Sorry I was out of the office on Friday and Tuesday.

I looked at the 2004 Reg. 2, the 2007 Reg. 2, and the draft 2010 Reg. 2 and the pentachlorophenol equations are the same in all three documents.

Mary Barnett

ADEQ - Water Planning

(501) 682-0666

-----Original Message-----
From: Kilburn, Dianna
Sent: Friday, July 02, 2010 2:40 PM
To: Barnett, Mary
Cc: Egan, Marilyn; Cusher, Annette; Hynum, Tammie
Subject: Surface water standards for PCP

Mary,

I need to pick your brain for a minute. I am reviewing the remedial goals for a superfund site. The groundwater discharges to a spring so the remedial goals for groundwater are set to comply with Arkansas water quality standards. The last review listed 9.3 ug/l monthly average and 18.7ug/l daily maximum for pentachlorophenol with a pH of 7.38 (must meet >6.0 <9.0 pH limit). This was in 2005. Reg 2 was updated in 2007. Were the equations for calculation of PCP limits changed at that time? Are the equations for calculation of PCP limits proposed for change at this time?

Thanks for your help.

Dianna

Dianna Kilburn, P.G.

Geologist Supervisor

ADEQ, Hazardous Waste Division

5301 Northshore Drive

North Little Rock, AR 72118-5317

501-682-0844

kilburn@adeq.state.ar.us

MessageFrom: Barnett, Mary
Sent: Wednesday, July 28, 2010 9:29 AM
To: Kilburn, Dianna
Subject: RE: Arkwood Superfund Site

Diana,

My revisions are in green. So sorry I didnít send this to you yesterday. I started on it and I guess I deleted my e-mail instead of sending it.

Mary Barnett

ADEQ - Water Planning

(501) 682-0666

-----Original Message-----
From: Kilburn, Dianna
Sent: Monday, July 26, 2010 11:53 AM
To: Barnett, Mary
Cc: Cusher, Annette
Subject: FW: Arkwood Superfund Site

Mary,

I need some help from you regarding a superfund site in Omaha, Arkansas. As with all superfund sites, they have "permit like" requirements with regards to surface water. We have been answering questions about this site to the gentleman listed in the e-mail below. I have crafted responses, but would like you to review and expound if needed on my responses in part I which deals with appropriate Reg. 2 issues. My draft responses are in blue.

Thanks for your assistance,

Dianna

-----Original Message-----
From: grish [mailto:ccgrish@gmail.com]

Sent: Saturday, July 24, 2010 5:49 AM
To: Cusher, Annette
Cc: Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay; williams.donald@epamail.epa.gov; williams.donald@epa.gov
Subject: Re: Arkwood Superfund Site

Dear Ms. Cusher,

I am studying the document titled "ARKANSAS POLLUTION CONTROL AND ECOLOGY COMMISSION REGULATION NO. 2 - REGULATION ESTABLISHING WATER QUALITY STANDARDS FOR SURFACE WATERS OF THE STATE OF ARKANSAS - Adopted by the Arkansas Pollution Control and Ecology Commission on (October 26,2007)" as it appears on the ADEQ website, to which you directed me.

Searching the entire 125-page PDF document, I find only one reference to "Pentachlorophenol." That reference is under Reg. 2.508 "Toxic Substances," which states in part:

"Toxic substances shall not be present in receiving waters, after mixing, in such quantities as to be toxic to human, animal, plant or aquatic life or to interfere with the normal propagation, growth and survival of the indigenous aquatic biota. Acute toxicity standards may not be exceeded outside the zone of initial dilution. Within the ZID acute toxicity standards may be exceeded but acute toxicity may not occur. Chronic toxicity and chronic numeric toxicity standards shall not be exceeded at, or beyond, the edge of the mixing zone. Permitting of all toxic substances shall be in accordance with the toxic implementation strategy found in the Continuing Planning Process. For non permit issues and as a guideline for evaluating toxic substances not listed in the following tables, the Department may consider No Observed Effect Concentrations (NOECs) or other literature values as appropriate. For the substances listed below, the following standards shall apply:"

Thereafter a table follows titled:

"ALL WATERBODIES - AQUATIC LIFE CRITERIA"

The column headings are

"Substance"

"Acute Values (µg/l) (Never to Exceed)"

"Chronic Values (µg/l) (24-hr Average)"

The sole reference I can find to Pentachlorophenol in the entirety of APC&EC Regulation No. 2 appears in this table, wherein the following

value is given for Pentachlorophenol in the "Acute Values" column:

e[1.005(pH)-4.869]

The following value is given for Pentachlorophenol in the "Chronic Values" column:

e[1.005(pH)-5.134]

On July 16, 2010, you wrote to me stating in part:

"The remediation goals for New Cricket Spring are calculated according to the equations in APC&EC Regulation 2. Based upon Reg. 2, 2007, the levels are 9.3ug/l for the monthly average and 18.7ug/l for a daily maximum."

Please help me to understand how you derive the values in your above statement and why the standards for Pentachlorophenol are expressed in this cryptic fashion, whereas the standards for all of the eleven (11) other substances listed in the table are expressed simply as a decimal number.

ADEQís Water Quality Standards for toxics in Regulation No. 2 are adopted from EPAís National Recommended Water Quality Criteria. The folloing website is a table of these Criteria. Please see line 53 for Pentachlorophenol. http://www.epa.gov/waterscience/criteria/wqctable/

The toxicity criteria for PCP are pH dependent, and are therefore represented by the equations. Using the monthly average and daily maximum values respectively, and given that Arkansas Water Quality Standards require pH to be between 6.0 -9.0, values are calculated.

For any substance whose level of concentration in surface water is pH or hardness dependent, an equation given in the regulations is used to calculate the value.

Finally, most notably to my mind, I find no reference whatever to (and therefore no standard for) Pentachlorophenol under the next table in this regulation, which table is titled "ALL WATERBODIES - HUMAN HEALTH CRITERIA".

At this time, ADEQ has not adopted the Human Health Criteria in EPAís National Recommended Water Quality Criteria for Pentachlorophenol. Further questions I have are regarding the reports you forwarded me on July 1, 2010, especially concerning data contained in the PDF file titled ìArkwood 2009 Annual Report.pdfî:

1) What proof is there that operation of the Pilot Water Injection System on the Arkwood site is actually effective at reducing concentrations of Pentachlorophenol in New Cricket Spring?

2) Do the data gathered during the periods of time when the Pilot Water Injection System on the Arkwood site was not fully operational provide evidence that the system is not effective at reducing concentrations of Pentachlorophenol in New Cricket Spring?

3) Is there evidence that the concentrations of Pentachlorophenol at New Cricket Spring would actually be lower if operation of the Pilot Water Injection System on the Arkwood site were halted?

Thank you again for your attention to my concerns.

Sincerely,

Curt Grisham

MessageFrom: Kilburn, Dianna
Sent: Wednesday, July 28, 2010 10:35 AM
To: Cusher, Annette
Subject: FW: Arkwood Superfund Site

Importance: High

Annette,
please amend the responses below for part 1. Mary edited what I sent her so use the blue and green text. :) Questions, please let me know. Between the three of us, I think we have this one done. So, until next time...

Dianna
-----Original Message-----
From: Barnett, Mary
Sent: Wednesday, July 28, 2010 9:29 AM
To: Kilburn, Dianna
Subject: RE: Arkwood Superfund Site

Diana,

My revisions are in green. So sorry I didnít send this to you yesterday. I started on it and I guess I deleted my e-mail instead of sending it.

Mary Barnett

ADEQ - Water Planning

(501) 682-0666

-----Original Message-----
From: Kilburn, Dianna
Sent: Monday, July 26, 2010 11:53 AM
To: Barnett, Mary
Cc: Cusher, Annette
Subject: FW: Arkwood Superfund Site

Mary,

I need some help from you regarding a superfund site in Omaha, Arkansas. As with all superfund sites, they have "permit like"

requirements with regards to surface water. We have been answering questions about this site to the gentleman listed in the e-mail below. I have crafted responses, but would like you to review and expound if needed on my responses in part I which deals with appropriate Reg. 2 issues. My draft responses are in blue.

Thanks for your assistance,

Dianna

-----Original Message-----
From: grish [mailto:ccgrish@gmail.com]
Sent: Saturday, July 24, 2010 5:49 AM
To: Cusher, Annette
Cc: Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay; williams.donald@epamail.epa.gov; williams.donald@epa.gov
Subject: Re: Arkwood Superfund Site

Dear Ms. Cusher,

I am studying the document titled "ARKANSAS POLLUTION CONTROL AND ECOLOGY COMMISSION REGULATION NO. 2 - REGULATION ESTABLISHING WATER QUALITY STANDARDS FOR SURFACE WATERS OF THE STATE OF ARKANSAS - Adopted by the Arkansas Pollution Control and Ecology Commission on (October 26,2007)" as it appears on the ADEQ website, to which you directed me.

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shall apply:"

Thereafter a table follows titled:

"ALL WATERBODIES - AQUATIC LIFE CRITERIA"

The column headings are

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"Acute Values (µg/l) (Never to Exceed)"

"Chronic Values (µg/l) (24-hr Average)"

The sole reference I can find to Pentachlorophenol in the entirety of APC&EC Regulation No. 2 appears in this table, wherein the following value is given for Pentachlorophenol in the "Acute Values" column:

e[1.005(pH)-4.869]

The following value is given for Pentachlorophenol in the "Chronic Values" column:

e[1.005(pH)-5.134]

On July 16, 2010, you wrote to me stating in part:

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Please help me to understand how you derive the values in your above statement and why the standards for Pentachlorophenol are expressed in this cryptic fashion, whereas the standards for all of the eleven (11) other substances listed in the table are expressed simply as a decimal number.

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The toxicity criteria for PCP are pH dependent, and are therefore represented by the equations. Using the monthly average and daily maximum values respectively, and given that Arkansas Water Quality Standards require pH to be between 6.0 -9.0, values are calculated.

For any substance whose level of concentration in surface water is pH or hardness dependent, an equation given in the regulations is used

to calculate the value.

Finally, most notably to my mind, I find no reference whatever to (and therefore no standard for) Pentachlorophenol under the next table in this regulation, which table is titled "ALL WATERBODIES - HUMAN HEALTH CRITERIA".

At this time, ADEQ has not adopted the Human Health Criteria in EPAís National Recommended Water Quality Criteria for Pentachlorophenol. Further questions I have are regarding the reports you forwarded me on July 1, 2010, especially concerning data contained in the PDF file titled ìArkwood 2009 Annual Report.pdfî:

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2) Do the data gathered during the periods of time when the Pilot Water Injection System on the Arkwood site was not fully operational provide evidence that the system is not effective at reducing concentrations of Pentachlorophenol in New Cricket Spring?

3) Is there evidence that the concentrations of Pentachlorophenol at New Cricket Spring would actually be lower if operation of the Pilot Water Injection System on the Arkwood site were halted?

Thank you again for your attention to my concerns.

Sincerely,

Curt Grisham

MessageFrom: Rhodes, Clyde
Sent: Friday, August 13, 2010 2:52 PM
To: Hynum, Tammie
Cc: Kilburn, Dianna
Subject: FW: Arkwood analyses

Please see message belowÖ.letís develop a response to Mr. Grisham letting him know we are developing a response to his questions (if we have not already)Ö.thanks

Clyde Rhodes

Chief, Hazardous Waste Division

5301 Northshore Drive

North Little Rock, AR 72118-5317

(501) 682-0831

From: Szenher, Doug
Sent: Friday, August 13, 2010 1:57 PM
To: Drown, Steve; Shafii, Mo; Rhodes, Clyde; Cassat, Dick
Cc: Hemann, Chris; Robinson, Kelly
Subject: FW: Arkwood analyses

The e-mail below, with attachments, apparently was sent to several ADEQ recipients last week. Mr. Grisham called me today and said he's not received any answers to his questions, nor an acknowledgement that anyone here has seen his original message.

I have not heard anything about this matter until today, so I don't

know whether one or more divisions may already be working on a response or not. As you can see, there are numerous questions and issues involved. I have acknowledged receipt of Mr. Grisham's e-mail to me and informed him that I am making appropriate ADEQ staff aware of it. Obviously, any response is going to have to involve input from several different areas here.

(I have also asked Mr. Grisham for clarification regarding the three attachments beginning with "ATT...", as none of them will open for me. I suspect, since they show up as being from a C-Drive (presumably on Mr. Grisham's computer), that they are duplicate designations for the three PDF attachments which can be opened. If they are intended to be separate documents, I've asked him to re-send them in a format that can be opened at this end.)

-----Original Message-----
From: Grish [mailto:ccgrish@gmail.com]
Sent: Friday, August 13, 2010 1:29 PM
To: Szenher, Doug
Subject: Fwd: Arkwood analyses

Dear Mr. Szenher,

If I can get answers for any of the below questions from public information, please let me know the process to do so.

Thank you,

Curt Grisham

Begin forwarded message:

From: grish <ccgrish@gmail.com>
Date: August 5, 2010 22:56:45 PDT
To: rhodesc@adeq.state.ar.us, almand@adeq.state.ar.us, wilson@adeq.state.ar.us, healeyr@adeq.state.ar.us, pearson@adeq.state.ar.us, hemann@adeq.state.ar.us, shafii@adeq.state.ar.us, fleming@adeq.state.ar.us, bassett@adeq.state.ar.us, benefield@adeq.state.ar.us, carpenter@adeq.state.ar.us, pond-mayo@adeq.state.ar.us
Subject: Fwd: FW: Arkwood analyses

FYI

Thank you,

Curt Grisham

---------- Forwarded message ----------
From: grish <ccgrish@gmail.com>
Date: Thu, Aug 5, 2010 at 3:05 PM
Subject: Fwd: FW: Arkwood analyses
To: clem@adeq.state.ar.us
Cc: marks@adeq.state.ar.us, drown@adeq.state.ar.us, guthrie@adeq.state.ar.us, "williams.donald" <williams.donald@epamail.epa.gov>, "Cusher, Annette" <Cusher@adeq.state.ar.us>, "Rich, Jay" <RICH@adeq.state.ar.us>, "Moix, Mark" <MOIX@adeq.state.ar.us>, "Jones, Rita" <JONESR@adeq.state.ar.us>, "Kilburn, Dianna" <KILBURN@adeq.state.ar.us>, "Egan, Marilyn" <EGAN@adeq.state.ar.us>, "Hynum, Tammie" <HYNUM@adeq.state.ar.us>, "Sanchez.Carlos@epamail.epa.gov" <Sanchez.Carlos@epamail.epa.gov>, "Ghose.Shawn@epamail.epa.gov" <Ghose.Shawn@epamail.epa.gov>

Dear Ms. Clem,

I forward to you the below email message and attached file as a starting point for this follow-up to my email of July 28, 2010, in which I asked for your focus on the issues I have raised concerning the conduct of groundwater testing and treatment at New Cricket Spring in Boone County, Arkansas in connection with the Arkwood Superfund site.

Please bear with me, as I will attempt to articulate all my issues here in order to minimize future back-and-forth communications for all involved.

In her July 20, 2010 message to Ms. Marilyn Egan and Ms. Dianna Kilburn of the Arkansas Department of Environmental Quality (ADEQ), Jean A. Mescher of McKesson Corporation states:

"We are using a different analytical laboratory since Mmet has not successfully repaired their equipment."

A search on the website for the State of Missouri Secretary of State shows that MMET, Inc. (also known as Middleton Microbiological & Environmental Testing Laboratory) is a "close corporation" created on May 15, 1997 and located at 3889 N. 20th Street, Ozark, Missouri. The agent of record is Wayne A. Middleton.

My questions regarding Ms. Mescher's July 20, 2010 statement:

a.. When did Ms. Mescher first become aware of problems with the equipment used by Middleton Microbiological & Environmental Testing Laboratory (also known as MMET, Inc.,) of Ozark, Missouri?

b.. During what period of time was MMET, Inc. using equipment that was not in good repair while it continued to serve as the source of analytical data for the monthly and annual reports prepared by R2P5 Environmental Remediations, Inc. of San Jose, California, upon which ADEQ and EPA relied to make their determinations regarding this site?

c.. Have the results of analysis produced by MMET, Inc. ever been independently verified by ADEQ or EPA?

d.. Was the laboratory facility used by MMET, Inc. ever visited or inspected by ADEQ or EPA?

e.. Was the scientific methodology used by MMET, Inc. ever reviewed or questioned by ADEQ or EPA?

f.. Were the qualifications or credentials of MMET, Inc. or its staff ever checked or verified by ADEQ or EPA?

g.. Is the integrity of some or all data supplied by MMET, Inc. for the reports upon which ADEQ and EPA relied now in question?

The attachment Ms. Mescher included with her July 20, 2010 message to Ms. Egan and Ms. Kilburn (attached here, file name "49268.pdf") contains a ten-page document, including a cover letter dated July 19, 2010, which is signed by Clifford J. Baker, Technical Manager and Christy Shirack, Project Manager, both of Continental Analytical Services, Inc. of Salina, Kansas and addressed to James Fleer of Oxford Environmental and Safety, Inc. of Overland Park, Kansas. This cover letter refers to water samples taken on July 8, 2010. The other nine pages of this document contain the laboratory report of these

samples' collection, testing and analysis.

My questions about the July 19, 2010 document prepared by Continental Analytical Services, Inc.:

a.. When was Continental Analytical Services, Inc. first engaged by Jean A. Mescher of McKesson Corporation to replace MMET, Inc?

b.. Are there further reports from Continental Analytical Services, Inc. for water samples taken at New Cricket Spring on dates other than July 8, 2010?

c.. Who is James Fleer of Oxford Environmental and Safety, Inc., to whom the July 19, 2010 report refers as "Client"?

d.. The Chain of Custody Record in this report show James Fleer as the person who collected the samples on July 8, 2010 and delivered them to Continental Analytical Services, Inc. Is it standard practice on such a project for the "client" to be also the collector of samples?

e.. A search on the State of Kansas Business Entity Database shows that Oxford Environmental and Safety, Inc. was originally formed on February 12, 2010 and lists Linda Fleer as the resident agent. Their address at 14348 Nieman Road, Overland Park, Kansas 66221 is in a residential neighborhood, as shown by Google Maps Streetview. Will Oxford Environmental and Safety, Inc. now replace R2P5 Environmental Remediations, Inc. of 3042 Fruitdale Avenue, San Jose, California 95128 (also located in a residential neighborhood per Streetview) as the vendor hired by Jean A. Mescher of McKesson Corporation to prepare monthly and annual reports for submission to ADEQ and EPA?

f.. Has ADEQ or EPA ever verified the qualifications or credentials of R2P5 Environmental Remediations, Inc., Continental Analytical Services, Inc. or Oxford Environmental and Safety, Inc.?

On April 26, 2010 Jean A. Mescher, Project Coordinator and Director, Environmental Services at McKesson Corporation wrote to Shawn Ghose, EPA Project Coordinator a letter with the subject "Monthly Progress Report - March 2010 and 2009 Annual Report, Arkwood Site, Omaha, Arkansas" (attached here). In section IV. "Problems Encountered or Anticipated," Ms. Mescher states:

"The analytical laboratory experienced some equipment problems that delayed the sample analyses. The samples were extracted within the appropriate holding time but not analyzed until April 18, 2010."

The laboratory reports that accompanied Ms. Mescher's April 26, 2010 statement show that the samples to which she refers were collected on March 15, 2010 and analyzed on April 18, 2010.

My questions about Ms. Mescher's letter and reports of April 26, 2010:

a.. Is it true that a lapse of some thirty-four (34) days between sample collection and laboratory analysis is "within the appropriate holding time" as Ms. Mescher states?

b.. Were the "equipment problems" to which Ms. Mescher refers on April 26, 2010 the same as or related to the problems with MMET, Inc. to which she refers on July 20, 2010?

c.. Is the reliability of the water analysis data produced by MMET, Inc. between at least as early as March 15, 2010 and the date upon which MMET, Inc. was replaced by Continental Analytical Services, Inc. now in question?

d.. Did Ms. Mescher alert ADEQ or EPA to any problems with the vendors she employed for testing and reporting on New Cricket Spring water quality at any times other than the two referenced above (April 26, 2010 and July 20, 2010)?

I refer now to the First Five-Year Review Report for Arkwood, Inc. Site, Boone County, Omaha, Arkansas (attached). On page fifteen (p. 15) of this document appears the statement:

"ADPCE Regulation 2 sets a water quality standard for PCP based on pH. Based on ADEQ Regulation 2 and as calculated by Masoud Arjmandi, Arkwood Project Manager for ADEQ (see Attachment 1), the State Water Quality Standards for pentachlorophenol at the point of discharge are currently 9.3 :g/I and 18.7 :g/I for monthly averages and daily maximums, respectively."

Amendment 1 to the First Five-Year Review Report, which is the actual letter written by Masoud Arjmandi, Arkwood Project Manager for ADEQ to Ms. Mescher of McKesson Corporation, states:

"Based on pH of 7.38 for the nearest station to the New Cricket Spring (Station WHI67), the State Water Quality Standards for pentachlorophenol (PCP) at the point of discharge are as follows:

1. Monthly average: 9.3 :g/l

2. Daily Maximum: 18.7 :g/l

Moreover, pH values of the treated water of the New Cricket Spring

shall not be below 6.0 or above 9.0"

On July 16, 2010, Annette Cusher of ADEQ wrote to me in response to my inquiries:

"Arkansas has jurisdiction relative to surface water and the springs. The remediation goals for New Cricket Spring are calculated according to the equations in APC&EC Regulation 2. Based upon Reg. 2, 2007, the levels are 9.3ug/l for the monthly average and 18.7ug/l for a daily maximum."

As I pointed out to Ms. Cusher in my email of July 24, 2010, there is only one mention of Pentachlorophenol in the ARKANSAS POLLUTION CONTROL AND ECOLOGY COMMISSION REGULATION NO. 2 – REGULATION ESTABLISHING WATER QUALITY STANDARDS FOR SURFACE WATERS OF THE STATE OF ARKANSAS ("ADEQ Regulation 2") as this document appears on the ADEQ website.

That reference is under Reg. 2.508 "Toxic Substances" which states:

"Toxic substances shall not be present in receiving waters, after mixing, in such quantities as to be toxic to human, animal, plant or aquatic life or to interfere with the normal propagation, growth and survival of the indigenous aquatic biota. Acute toxicity standards may not be exceeded outside the zone of initial dilution. Within the ZID acute toxicity standards may be exceeded but acute toxicity may not occur. Chronic toxicity and chronic numeric toxicity standards shall not be exceeded at, or beyond, the edge of the mixing zone. Permitting of all toxic substances shall be in accordance with the toxic implementation strategy found in the Continuing Planning Process. For non permit issues and as a guideline for evaluating toxic substances not listed in the following tables, the Department may consider No Observed Effect Concentrations (NOECs) or other literature values as appropriate. For the substances listed below, the following standards shall apply:"

Thereafter a table follows titled:

"ALL WATERBODIES - AQUATIC LIFE CRITERIA"

The column headings are

"Substance"

"Acute Values (µg/l) (Never to Exceed)"

"Chronic Values (µg/l) (24-hr Average)"

The sole reference I can find to Pentachlorophenol in the entirety of APC&EC Regulation No. 2 appears in this table, wherein the following formula is given for Pentachlorophenol in the 'Acute Values' column:

"e[1.005(pH)-4.869]"

The following formula is given for Pentachlorophenol in the 'Chronic Values' column:

"e[1.005(pH)-5.134]"

My questions regarding the First Five-Year Review Report, Ms. Cusher's statement of July 16, 2010, "ADEQ Regulation No. 2" and Mr. Arjmandi's letter:

a.. If "Arkansas has jurisdiction relative to surface water and the springs," does the responsibility for the treatment, accurate testing and, ultimately, declaring the New Cricket Spring groundwater cleanup effort complete, successful and concluded also rest with the State of Arkansas as represented by ADEQ?

b.. Is there any evidence that, at present or at any other time, Pentachlorophenol existed in New Cricket Spring in concentrations that violate the stipulation of Reg. 2.508 that "Toxic substances shall

not be present in receiving waters, after mixing, in such quantities as to be toxic to human, animal, plant or aquatic life or to interfere with the normal propagation, growth and survival of the indigenous aquatic biota"?

c.. For the purpose of New Cricket Spring groundwater cleanup, how did ADEQ define the following terms contained within Reg. 2.508: "receiving waters, after mixing;" "indigenous aquatic biota;" "zone of initial dilution;" and "edge of the mixing zone."

d.. Is groundwater cleanup at New Cricket Spring considered a "non permit issue" by ADEQ for the purposes of Reg. 2.508?

e.. If groundwater cleanup at New Cricket Spring is considered a "non permit issue" by ADEQ for the purposes of Reg. 2.508, did ADEQ "consider No Observed Effect Concentrations (NOECs) or other literature values as appropriate" as provided by this Regulation?

f.. Why does Mr. Arjmandi calculate standards for "monthly averages and daily maximums" when ADEQ Reg. 2.508 specifies "Acute Values (µg/l) (Never to Exceed)" and "Chronic Values (µg/l) (24-hr Average)" with no mention of "monthly averages"?

g.. How do the formulae mentioned above resolve to the decimal values Mr. Arjmandi certifies? I.e. could you please show me the how the calculations work?

h.. Did the analytical laboratories standardize testing methodologies to adjust the pH variable to Mr. Arjmandi's baseline of 7.38? If so, where does that variable appear in the reports?

i.. Why has the treatment of water from New Cricket Spring, which is not a source of drinking water, been compelled when ADEQ Regulation 2 standards apply for aquatic life only and, as Ms. Cusher stated to me on July 28, 2010: "At this time, ADEQ has not adopted the Human Health Criteria in EPAís National Recommended Water Quality Criteria for Pentachlorophenol"

Please forgive me for the length of this communication. I hope you can understand why it is so important to me to validate the assumptions underlying the burdensome requirement for testing and treatment of the groundwater exiting New Cricket Spring.

This is particularly true for me in light of the following three statements, the first two of which (Wright, Knudson) seem to stand in total contradiction of the third (Mescher):

"Assuming the water has 1.05 parts per million for chronic exposure if a person were to consume 2 liters of the water every day of their lives for seventy (70) years at a level exceeding 1.05 ppm they would stand a one in a million improved chance of contracting cancer and that's what the standards are based on." - Larry Wright, EPA Director, Hazardous Waste Division, Region 6 from transcript of videotaped public meeting held February 2, 1987 in Omaha, Arkansas.

"However, cleanup of the groundwater New Cricket Spring, is anticipated soon. As soon as this happens EPA plans to delist the site from the NPL and return it to productive use." - Myron O. Knudson, P.E., Director, Superfund Division, EPA Region 6 in letter of November 4, 1989 to Honorable Dale Wagner, Boone County Judge.

"Degradation of these contaminants to acceptable levels allowing for use of the Site is not estimated to occur for possibly hundreds of years. McKesson is willing to consider purchase of the Site to simplify Site interactions; however, this has little value to the company since our existing Settlement Agreement ensures appropriate Site management." - Jean A. Mescher, Director, Environmental Services, McKesson in letter of April 9, 2010 to Bud Grisham.

In conclusion:

1) I believe it is not clear that treatment of New Cricket Spring and the related groundwater treatment activities on the Arkwood Superfund site are or ever were required by law as embodied by APC&EC Regulation No. 2.

2) I request that groundwater testing and treatment at New Cricket Spring and the Arkwood Superfund site be immediately and permanently discontinued and that McKesson Corporation be released from liability in the matter, allowing the Arkwood site to be deleted from the EPA National Priorities List and to proceed into the EPA "Ready for Reuse" program without further delay.

Thank you for your kind attention.

Sincerely,

Curt Grisham

---------- Forwarded message ----------
From: Egan, Marilyn <EGAN@adeq.state.ar.us>
Date: Mon, Aug 2, 2010 at 10:38 AM
Subject: FW: Arkwood analyses
To: "Cusher, Annette" <Cusher@adeq.state.ar.us>, "Moix, Mark" <MOIX@adeq.state.ar.us>, "Jones, Rita" <JONESR@adeq.state.ar.us>, "(bdoshier@hiscoinc.com)" <bdoshier@hiscoinc.com>, "ccgrish@gmail.com" <ccgrish@gmail.com>
Cc: "Kilburn, Dianna" <KILBURN@adeq.state.ar.us>

Marilyn Egan, BS

ADEQ

Geologist / Hazardous Waste

Ph. (501) 682-0789

Fax (501) 682-0565

-----Original Message-----
From: Mescher, Jean [mailto:Jean.Mescher@McKesson.com]
Sent: Tuesday, July 20, 2010 3:55 PM
To: Kilburn, Dianna; Egan, Marilyn
Cc: baritchie@sbcglobal.net; jfleer@oxfordeands.com; Ghose.Shawn@epamail.epa.gov
Subject: Arkwood analyses

Dianna and Marilyn,

Please see attached analytical results for the Arkwood site: 66 ppb PCP at the mouth and <2 ppb PCP at the weir. We are using a different analytical laboratory since Mmet has not successfully repaired their equipment.

Jean

-------- Original Message --------
Subject: 8306**49268
From: "Jo White - CAS" <jowhite@cas-lab.com>
Date: Mon, July 19, 2010 3:21 pm
To: "James Fleer" <jfleer@oxfordeands.com>

If you have questions regarding this email please contact your Continental Project Manager.

CONFIDENTIAL NOTICE

The documents accompanying this telecopy transmission may contain information belonging to the sender which is legally privileged, confidential, and exempt from disclosure. The information is intended only for the use of the individual or entity named above. If you are not the intended recipient, the employee of the intended recipient, or the agent responsible for delivering this message, you are hereby notified that any disclosure, copying, distribution, or the taking of any action in reliance on the contents of this telecopied information is strictly prohibited. If you have received this telecopy in error, please contact us by telephone to arrange for return of the original documents to us.

From: Grish [ccgrish@gmail.com]
Sent: Thursday, July 01, 2010 11:13 AM
To: Cusher, Annette
Cc: curt@grish.org; Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov; Rich, Jay
Subject: Re: Arkwood Superfund Site

Dear Ms. Cusher.

Thank you very much for this timely & complete response.

Two questions, please:

ï Could you explain to me the meaning of the phrase "PRP lead site" used in your reply?

ï Is the "remedial goal" exactly the same for ADEQ as it is for the EPA?

Sincerely,

Curt Grisham

On Jul 1, 2010, at 6:53, "Cusher, Annette" <Cusher@adeq.state.ar.us> wrote:

Mr. Grishom,

Thank you for your comments and concerns regarding the Arkwood Superfund Site. The 2009 Annual Report and the ADEQ letter to EPA regarding the 2009 Annual Report are attached. ADEQ would be happy to forward you all future monthly reports. As noted in the report the discharge into the creek is at or below the remedial goal for the site, however the water from the spring is above the remedial goal requiring further treatment prior to discharge into the creek.

EPA has not delegated regulatory authority to any state for Superfund oversight. EPA and ADEQ do have an agreement detailing how

Superfund sites are addressed in Arkansas. EPA will consider ADEQís opinions with regards to Ready for Reuse determinations for EPA lead or PRP lead sites. Arkwood is a PRP lead site with EPA as the main regulatory authority. As such, all Ready for Reuse issues should be coordinated through EPA.

If you have any further questions, or I can be of any more assistance, please contact me at 501-682-0841 or cusher@adeq.state.ar.us.

Regards,

Annette Cusher, P.E.

Remedial/Corrective Action Engineer Supervisor

Technical Branch

Hazardous Waste Division

ADEQ

<Arkwood 2009 Annual Report.pdf>
<EPA-Arkwood 6-8-10.pdf>

Dear Mr. Grisham:
The nature of your e-mail can most efficiently be addressed by insertion of the responses within your comments. Please note responses will be italicized in blue type. The following link is to the EPA Region 6 web page and the NPL site summaries. http://www.epa.gov/region6/6sf/6sf-ar.htm

If you have additional questions or if ADEQ can provide copies of documents, please let us know.

Sincerely,
Dianna Kilburn
501/682-0844

MessageFrom: grish [ccgrish@gmail.com]
Sent: Thursday, August 05, 2010 5:05 PM
To: Clem, Sarah
Cc: Marks, Teresa; Drown, Steve; Guthrie, Dawn; williams.donald; Cusher, Annette; Rich, Jay; Moix, Mark; Jones, Rita; Kilburn, Dianna; Egan, Marilyn; Hynum, Tammie; Sanchez.Carlos@epamail.epa.gov; Ghose.Shawn@epamail.epa.gov
Subject: Fwd: FW: Arkwood analyses

attached documents: 49268.pdf (301 KB); Arkwood 2009 Annual Report.pdf (1 MB); Arkwood1stFiveYearReview.pdf (152 KB)

Dear Ms. Clem,

I forward to you the below email message and attached file as a starting point for this follow-up to my email of July 28, 2010, in which I asked for your focus on the issues I have raised concerning the conduct of groundwater testing and treatment at New Cricket Spring in Boone County, Arkansas in connection with the Arkwood Superfund site.
The prescribed treatment/ remedy for the Arkwood National Priority Site (NPL) is stated in the Record of Decision (ROD). EPA has an agreement to work with ADEQ in determining the remedial actions, but Arkansas is not authorized for the CERCLA (Superfund) program. EPA is the authority of signature on these issues.

Please bear with me, as I will attempt to articulate all my issues here in order to minimize future back-and-forth communications for all involved.

In her July 20, 2010 message to Ms. Marilyn Egan and Ms. Dianna Kilburn of the Arkansas Department of Environmental Quality (ADEQ), Jean A. Mescher of McKesson Corporation states:

"We are using a different analytical laboratory since Mmet has not successfully repaired their equipment."

A search on the website for the State of Missouri Secretary of State shows that MMET, Inc. (also known as Middleton Microbiological & Environmental Testing Laboratory) is a "close corporation" created on May 15, 1997 and located at 3889 N. 20th Street, Ozark, Missouri. The agent of record is Wayne A. Middleton.

My questions regarding Ms. Mescher's July 20, 2010 statement:

a.. When did Ms. Mescher first become aware of problems with the equipment used by Middleton Microbiological & Environmental Testing Laboratory (also known as MMET, Inc.,) of Ozark, Missouri?

The first incident of equipment problems was brought to the attention of EPA and ADEQ in the March 2010 monthly report. The only other incident resulted in a delay in analyzing the samples collected in May 2010.

b.. During what period of time was MMET, Inc. using equipment that was not in good repair while it continued to serve as the source of analytical data for the monthly and annual reports prepared by R2P5 Environmental Remediations, Inc. of San Jose, California, upon which ADEQ and EPA relied to make their determinations regarding this site?

The two incidents noted above are the only problems noted with the MMET lab.

c.. Have the results of analysis produced by MMET, Inc. ever been independently verified by ADEQ or EPA?

This is an issue to be evaluated during the 5 year review.

d.. Was the laboratory facility used by MMET, Inc. ever visited or inspected by ADEQ or EPA?

EPA has a lab certification program as does ADEQ. Documentation of the EPA accreditation is included in the Continental lab report on page 4. The information needed to obtain certification and a list of Arkansas Certified labs is available on the ADEQ web site.

e.. Was the scientific methodology used by MMET, Inc. ever reviewed or questioned by ADEQ or EPA?

The regulations are specific as to allowable analytical methods. SW846 methods or their equivalents are the only allowable methods. A link to these methods is listed here. http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm

f.. Were the qualifications or credentials of MMET, Inc. or its staff ever checked or verified by ADEQ or EPA?

Again, this would be part of the certification process.

g.. Is the integrity of some or all data supplied by MMET, Inc. for the reports upon which ADEQ and EPA relied now in question?

No. As long as the appropriate methods were used and the required protocol was followed, no.

The attachment Ms. Mescher included with her July 20, 2010 message to Ms. Egan and Ms. Kilburn (attached here, file name "49268.pdf") contains a ten-page document, including a cover letter dated July 19, 2010, which is signed by Clifford J. Baker, Technical Manager and Christy Shirack, Project Manager, both of Continental Analytical Services, Inc. of Salina, Kansas and addressed to James Fleer of Oxford Environmental and Safety, Inc. of Overland Park, Kansas. This cover letter refers to water samples taken on July 8, 2010. The other nine pages of this document contain the laboratory report of these samples' collection, testing and analysis.

My questions about the July 19, 2010 document prepared by Continental Analytical Services, Inc.:

a.. When was Continental Analytical Services, Inc. first engaged by Jean A. Mescher of McKesson Corporation to replace MMET, Inc?

As noted in the July 19, 2010 lab report, the samples were collected on July 8, 2010. This is the first lab report submitted to us from Continental Analytical Services, Inc.

b.. Are there further reports from Continental Analytical Services, Inc. for water samples taken at New Cricket Spring on dates other than July 8, 2010?

Sampling is conducted once a month and we have not received the August results as of today.

c.. Who is James Fleer of Oxford Environmental and Safety, Inc., to whom the July 19, 2010 report refers as "Client"?

Mr. Fleer is an employee of Oxford Environmental and Safety, Inc. who has been retained by McKesson to collect the water samples at Arkwood.

d.. The Chain of Custody Record in this report show James Fleer as the person who collected the samples on July 8, 2010 and delivered them to Continental Analytical Services, Inc. Is it standard practice on such a project for the "client" to be also the collector of samples?

Mr. Fleer collected the water samples and submitted them to Continental Analytical Services, Inc. for analysis. Because he collected the samples, he became the "client". The lab will report the results to Mr. Fleer. The data is then forwarded to McKesson who in turn forwards it to EPA and ADEQ.

e.. A search on the State of Kansas Business Entity Database shows that Oxford Environmental and Safety, Inc. was originally formed on February 12, 2010 and lists Linda Fleer as the resident agent. Their address at 14348 Nieman Road, Overland Park, Kansas 66221 is in a residential neighborhood, as shown by Google Maps Streetview. Will Oxford Environmental and Safety, Inc. now replace R2P5 Environmental Remediations, Inc. of 3042 Fruitdale Avenue, San Jose, California 95128 (also located in a residential neighborhood per Streetview) as the vendor hired by Jean A. Mescher of McKesson Corporation to prepare monthly and annual reports for submission to ADEQ and EPA?

ADEQ has not been informed that Oxford Environmental and Safety will be producing the annual reports. The monthly reports are prepared by McKesson and include data provided by the analytical laboratory.

f.. Has ADEQ or EPA ever verified the qualifications or credentials of R2P5 Environmental Remediations, Inc., Continental Analytical Services, Inc. or Oxford Environmental and Safety, Inc.?

Because EPA has authorization for the Superfund program, they will also approve the analytical lab used for analysis or any other subcontractor selected by the Responsible Party (McKesson).

On April 26, 2010 Jean A. Mescher, Project Coordinator and Director, Environmental Services at McKesson Corporation wrote to Shawn Ghose, EPA Project Coordinator a letter with the subject "Monthly Progress Report - March 2010 and 2009 Annual Report, Arkwood Site, Omaha, Arkansas" (attached here). In section IV. "Problems Encountered or Anticipated," Ms. Mescher states:

"The analytical laboratory experienced some equipment problems that delayed the sample analyses. The samples were extracted within the appropriate holding time but not analyzed until April 18, 2010."

The laboratory reports that accompanied Ms. Mescher's April 26, 2010 statement show that the samples to which she refers were collected on March 15, 2010 and analyzed on April 18, 2010.

My questions about Ms. Mescher's letter and reports of April 26, 2010:

a.. Is it true that a lapse of some thirty-four (34) days between sample collection and laboratory analysis is "within the appropriate holding time" as Ms. Mescher states?

For semi-volatile compounds, the extraction must be done within 7 days and the analysis within 40 days following.

b.. Were the "equipment problems" to which Ms. Mescher refers on April 26, 2010 the same as or related to the problems with MMET, Inc. to which she refers on July 20, 2010?

This is not known.

c.. Is the reliability of the water analysis data produced by MMET, Inc. between at least as early as March 15, 2010 and the date upon which MMET, Inc. was replaced by Continental Analytical Services, Inc. now in question?

The lab data is reviewed first by McKesson and then by EPA and ADEQ. Any irregularities in the data would be noted in correspondence and I am not aware of any.

d.. Did Ms. Mescher alert ADEQ or EPA to any problems with the vendors she employed for testing and reporting on New Cricket Spring water quality at any times other than the two referenced above (April 26, 2010 and July 20, 2010)?

No, not to my knowledge.