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."
Please note the units you have included are a typographical error. Mr. Arjmandi stated the units as micrograms per liter (ug/l), not grams per liter (g/l).
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"
Please note again the error in the unit measurements. The correct units are in your quote from Ms. Cusher below.

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?

Arkwood is a Superfund site under the direct authority of EPA. The surface water regulations, APC&EC Regulation No. 2 would be an applicable or relevant and appropriate requirement (ARAR). According to the ROD, McKesson is responsible for implementation of the required remedial activities you note above.

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"?

Prior to the pilot testing, levels of PCP in the spring exceeded the prescribed clean up goal in the ROD. That is what prompted implementation of the pilot test program. The most recent analytical data indicate that the level of PCP at the spring was 66 ppb (ug/l) which exceeds the daily maximum of 18.7 ug/l. Treatment prior to releasing the water back into the receiving stream reduced the concentration to <0.2ppb.

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."

Definitions for these terms can be found in APC&EC Regulation 2.106. The receiving waters would now be just after the weir where the water rejoins the original spring pathway.

d.. Is groundwater cleanup at New Cricket Spring considered a "non permit issue" by ADEQ for the purposes of Reg. 2.508?

Under CERCLA, as part of the paper reduction act, a CERCLA site must meet the intent of a permit, but an actual "permit" will not be required. In Regulation 2, because criteria have been established for PCP, it does not fall into the "non permit issue" category.

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?

Again, APC&EC Regulation 2 would be an ARAR and must be considered. Criteria for PCP are set forth in Regulation 2. These criteria are based upon a volume of NOEC and literature data considered sufficient by EPA to determine appropriate criteria.

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"?

The 24-hour average corresponds to the monthly average and the daily Maximum to the Acute Value.

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?

It is not clear to what you are referring. Please note as previously, that your comment included a typographiocal error with respect to the units of measure. Mr. Arjmandi's

letter to McKesson states the monthly average as 9.3 ug/l and the daily maximum as 18.7 ug/l with pH to be between 6.0 and 9.0.

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?

The pH baseline is from the site investigation and the numerous samples collected during that time. The applicability of this value should be re-evaluated by EPA at least during the 5 year review period.

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 EPA's National Recommended Water Quality Criteria for Pentachlorophenol"

All waters of the state are considered as potential drinking water sources unless designated otherwise. At this time, Arkansas has NOT designated any waters as non-potable.

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.

The current interpretation of comments made in the past by EPA will need to be addressed by EPA.

"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.

Comments made by McKesson will need to be addressed by McKesson.

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.
Any suggestions to cease monitoring and deletion of the site from the NPL or any issues of potential re-use of the property will need to be addressed by EPA.

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.

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Water Law in Arkansas

Arkansas Natural Resources Commission

Revised by the Arkansas Natural Resources Commission in 2011

Preface

The development of this publication is the continuation of a project entitled Arkansas State Laws, Policy and Programs Pertaining to Water and Related Land Resources first commenced in 1968. In 1981, Paul Douglas Mays wrote Arkansas Water Law, which was published and distributed by the Arkansas Soil and Water Conservation Commission, now known as the Arkansas Natural Resources Commission. Some aspects of the work of Mr. Mays served as the basis for the body of this work which was authored by Professor, now Circuit Judge, J. W. Looney. In 2011, Professor Looney's work was updated by Commission staff to include new developments in water issues.

Substantial parts of the current work are drawn from the following articles which provide more detail on the matters outlined here:

J.W. Dellapenna, "The Law of Water Allocation in the Southeastern States at the Opening of the Twenty First Century," 25 Univ. of Ark. Little Rock L. Rev. 9 (2002).

J.W. Looney, "Modification of Arkansas Water Law: Issues and Alternatives," 38 Arkansas Law Review 221 (1984).

J.W. Looney, "An Update on Arkansas Water Law: Is the Riparian Rights Doctrine Dead?" 43 Arkansas Law Review 573 (1990).

J.W. Looney, "Enhancing the Role of Water Districts in Ground Water Management and Surface Water Utilization in Arkansas," 48 Arkansas Law Review 643 (1995).

J.W. Looney, "Diffused Surface Water in Arkansas: Is It Time for a New Rule?" 18 UALR Law Journal 393 (1996).

Martha L. Noble and J.W. Looney, "The Emerging Legal Framework for Animal Agricultural Waste Management in Arkansas," 47 Arkansas Law Review 159 (1994).

Table of Contents

Introduction.....1

Chapter 1. Riparian rights to surface and ground water 3

Chapter 2. Reporting of water use 8

Chapter 3. Transfer of surface water.....9

Chapter 4. Allocation of surface water 12

Chapter 5. Critical ground water area designation.....18

Chapter 6. Construction of dams 22

Chapter 7. Water distribution.....25

Chapter 8. Diffused surface water 29

Chapter 9. Navigability questions: Public and private rights to use the stream surface and stream beds.....37

Chapter 10. Water quality 42

Chapter 11. State agencies and political subdivisions concerned with water resources.....45

Conclusion 55

Introduction

Water law in Arkansas is derived from a mixture of case law developed by the courts, legislation enacted by the General Assembly, and regulatory programs of a number of state agencies. Federal legislation and federal agency regulation also impact water law rules that apply in the state. In the early years of the state's development, water law evolved primarily as a matter of dispute resolution on a case-by-case basis before the courts. The Arkansas courts often looked to decisions from other states to assist in "finding" the proper rule of law to apply. As conflicts over water use have increased in recent years and as concerns for both water quality and water quantity have become matters of increased public concern, the legislature has become more actively involved in developing statutory programs to deal with a wide range of water use questions. To carry out the mandates of these legislative programs, state agencies have been called upon to implement the policies outlined in the state and federal legislation.

Historically, case-by-case resolution of disputes was a satisfactory method of handling water conflicts in Arkansas. However, when shortages result, as they do in drought conditions or as they develop in specific areas due to overuse and depletion of supplies, courts are not the most efficient institutional body for making the complex decisions that accompany such conflicts. These conflicts often involve public policy concerns as well as the interests of the particular parties that may be competing over available water. For example, a conflict over water in a particular stream involves not only the users of that water but also consideration of impacts to water quality, fish and wildlife protection, public use of the resource, navigation, and aesthetic values associated with the stream. It is the public interest associated with these values that compels legislative and administrative bodies to play an increasing role in decisions on water use. Most of the chapters in this publication will

discuss water responsibilities handled by state agencies, particularly those handled by the Arkansas Natural Resources Commission.

One way of examining water law is to consider the type of water involved. The rules involving surface water (water in streams and lakes) differ from those involving ground water. Rules involving diffused surface water (water not yet in a watercourse) are different from those involving flood waters escaping from a watercourse. Rules involving water developed in a public facility, such as a public water supply reservoir, may vary greatly from those applied to water in a free-flowing stream.

Another way of looking at water law is to consider the nature of the conflict. One set of rules will determine the public's rights to use water for recreational purposes while another set may apply to the use for consumption purposes. Water rights run with the land and may vary depending on whether the user is located next to the stream or is taking the water to another location. Rules regarding water quality may vary depending on whether the water is in a large stream such as the Arkansas River or in an "extraordinary resource[1]" stream. The rights of landowners to take gravel from the stream bed or make other use of the stream bed may vary depending on whether the stream is navigable or non-navigable and whether special rules have been enacted to reduce water pollution potential from such activities on a particular stream.

The purpose of this publication is to outline in general terms some of the water law rules that apply in these varying situations. Not all are covered in detail, but the intent is to provide a basic guideline to Arkansas water law so that individuals may better understand how any potential conflicts over use of this valuable resource will be resolved.

[1] Arkansas Department of Environmental Quality Regulation No. 2, Section 2.302(A).

Chapter 1. Riparian right to use surface and ground water

The method of allocation of water recognized in the eastern states is the "riparian rights system." Only riparians, or those persons owning land abutting a waterway, have rights to use the water within the waterway. Under the riparian rights doctrine, a water right arises as an incident of ownership of riparian land or land overlying a ground water source of water. The riparian land limitation also means that water can only be used on riparian land. Nonriparian uses can be enjoined if harm or injury to riparian owners results.

These riparian water rights are further limited in amount and purpose by what is determined reasonable after giving due consideration to the rights of other riparian owners with property on the waterway. Under the "reasonable use" limitation, reasonableness is determined by comparing a given use with uses by other riparians. Domestic uses are frequently given preference. The question of whether a particular use is reasonable can only be determined after the use has commenced. This problem leads to uncertainty because a right is always subject to modification by implementation of new uses by other riparians.

Originally, Arkansas followed the basic concepts of the riparian rights system with regard to the allocation of surface water from rivers, lakes, and streams. Although ground water and surface water are interconnected, the two types of water are often managed differently. Surface water issues were first brought to the attention of the Arkansas courts. When ground water issues developed and became the subject of court cases, judges often looked to existing surface water cases to come up with a solution.

The Arkansas Supreme Court has partially defined the nature of the riparian right in several situations, but not all questions concerning the nature of the right have been before the court. In some cases, the court has referred to the rights as vested property rights which "inhere in the owner

of the soil." However, the right has been limited by the generally accepted rule that a riparian owner cannot exercise his rights in derogation of the rights of another.

In 1940, a noted water law authority, Wells A. Hutchins, described this right as follows:

> The use of water on tract 'G' may have begun fifty years ago and may have been continuous, and valuable improvements may have been made which will be seriously [impaired] if the tract is deprived of the use of a substantial part of the stream flow; yet the owner of tract 'E' may begin use today and lawfully demand his share of the flow, with the result that tract 'G' will hereafter be entitled to only a partial use of the stream. The riparian right does not depend upon use and is not lost by non-use. This is in direct conflict with the appropriative right, which may be declared forfeited if non-use of the water continues for a period prescribed by statute and which can be lost instantly by abandonment of the right.[2]

Arkansas formally adopted the riparian rights concept of reasonable use in 1955 in Harris v. Brooks.[3] The court clarified several aspects of the scope and extent of the riparian right and stated a number of general rules and principles applicable in Arkansas:

> (a) The right to use water for strictly domestic purpose-such as for household use-is superior to many other uses of water-such as for fishing, recreation and irrigation.
> (b) Other than the use mentioned above, all other lawful uses of water are equal. Some of the lawful uses of water recognized by this state are: fishing, swimming, recreation and irrigation.
> (c) When one lawful use of water is destroyed by another lawful use the latter must yield, or it may be enjoined.
> (d) When one lawful use of water interferes with or detracts from another lawful use, then a question arises as to whether, under all the facts and circumstances of that particular case, the interfering use shall be declared unreasonable and as such enjoined, or whether a reasonable and equitable adjustment should be made, having due regard to the reasonable rights of each.[4]

A basic feature of the riparian concept of reasonable use is that the water right can vary over time in response to changed conditions. It is conceivable that a use considered reasonable at one point in time may become unreasonable due to substantial changes in water use patterns, stream flow variations, or other factors. The exercise of dormant rights by riparian owners of previously undeveloped riparian property may require adjustment in previous uses.

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[2] Quoted in Thomas v. LaCotts, 222 Ark. 171-178, 257 S.W.2d 936 at 940 (1953).
[3] 225 Ark. 436, 283 S.W.2d 129 (1955).
[4] 225 Ark. At 444-45, 283 S.W.2d at 134 (1955).

The riparian rights doctrine limits the right to use water to those who are riparian landowners and limits use to land within the same watershed. With regard to the definition of riparian land, a basic requirement is physical contact with the stream. The Arkansas Supreme Court has never had the occasion to determine precisely which land is considered to be riparian. Two different tests have been used to resolve the question when it has arisen in other states. Under the "source of title" test, only land held as a single tract throughout its chain of title retains riparian characteristics. Any tracts that are severed lose their riparian status, and the rights do not reattach even if the land is later reacquired by a riparian owner. Under the second test – the "unity of title" test – any contiguous tracts in the same ownership have riparian status regardless of when the title was acquired.

The so-called "watershed restriction" of the riparian rights system, along with the rule restricting use to riparian land, has been generally accepted as a means of protecting the rights of riparian owners who might wish to commence use in the future. The flow would be available if needed by future riparian users. The Arkansas Supreme Court has indicated that the appropriate time for an evaluation of the relative rights of riparian owners is when one riparian owner's use "harmfully invades" another's interest in his use. The court has referred to the "incompatibility of interest between the two parties" as raising "immediately a question" as to the permissibility of the use.[5]

These basic concepts have meant that courts must allocate available water in disputes between riparian owners regardless of when uses commenced. In Arkansas, Harris v. Brooks illustrates the necessity of such determinations. There the conflict was between a lessee of riparian land who conducted a commercial boating and fishing enterprise on a privately owned non-navigable lake and a rice farmer who used water from the lake for irrigation purposes. Because of the unusually dry conditions in the early 1950s, the water level of the lake was below normal. The court determined that the irrigator's continued pumping unreasonably interfered with another lawful

[5] 225 Ark. At 446, 283 S.W.2d 129 (1955) (quoting Restatement of Torts § 852c).

use even though the irrigation use had been underway for over twenty years before the boat docks were constructed.

When competition over uses occurs, as in Harris v. Brooks, resolution through adjudication is generally inefficient and costly. Moreover, because of the delay inherent in the resolution of conflicts through the courts, this method is particularly unsuited to situations involving water use. This is one of the major criticisms of the riparian rights system. As a result, one of the first steps away from the riparian rights system is the adoption of an alternative decision-making process for water allocation.

In the mid-fifties, the Arkansas courts applied riparian rights —at least that portion of it dealing with reasonable use—to ground water. The Arkansas Supreme Court made this application in the 1957 case, Jones v. Oz-Ark-Val Poultry Co., in which it quoted from the Restatement of Torts:

> Therefore, each possessor's rights and privileges with respect to the use of subterranean waters are qualified rather than absolute for the same reasons that each riparian proprietor's rights and privileges with respect to the use of water in the watercourse or lake are qualified and not absolute.[6]

By adopting this approach, the Arkansas court accepted what might be called a version of the "correlative rights doctrine" for ground water. This doctrine uses an approach similar to that of the surface water "reasonable use" rule to determine common rights to water.

In Jones, the Arkansas Supreme Court quoted from a California case:

> Where two or more persons own different tracts of land, underlaid by porous material extending to and communicating with them all, which is saturated with water moving with more or less freedom therein, each has a common and correlative right to the use of this water upon his land, to the full extent of his needs, if the supply is sufficient, and to the extent of reasonable share thereof, if the supply is so scant that the use by one will affect the supply of the others.[7]

[6] 228 Ark. 76, 82, 306 S.W.2d 111, 115 (1957).
[7] 228 Ark. 76 at 81.

Thus, the Arkansas position is that the limitation on the scope of the water right is similar for both surface water and ground water in that both are subject to modification by the implementation of new uses by other riparian landowners or other users of ground water.

The court has also dealt with the right to transfer water away from the "riparian land" in ground water cases. In Lingo v. City of Jacksonville,[8] the court indicated that it would be permissible for a "riparian" owner to remove subterranean and percolating water and either use or sell it away from the tract from which it was pumped, if this use did not injure the common supply of the riparian owners.

Arkansas's initial movement away from a pure riparian rights doctrine occurred in 1957. That year the General Assembly indicated approval of the reasonable use concept, but adopted legislation authorizing the Arkansas Natural Resources Commission (ANRC) to allocate available stream water during periods of shortage.[9] In 1991, the General Assembly addressed ground water issues by adopting the "Arkansas Ground Water Protection and Management Act," (AGPMA).[10] Arkansas has continued to move away from traditional case-by-case adjudication and has adopted a significant amount of administrative law to resolve water conflicts or potential conflicts.

A noted water law scholar characterized Arkansas's system as "regulated riparianism," remarking that "the administrative permit process proceeds on essentially riparian principles and that the new system is a regulation of--rather than a taking of--riparian rights."[11] The chapters that follow will describe these administrative developments in more detail.

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[8] 258 Ark. 63, 522 S.W.2d 403 (1975).
[9] 1957 Ark. Acts 81 (codified as Ark. Code Ann. § 15-22-201 et seq.)
[10] 1991 Ark. Acts 154 and 342 (codified at Ark. Code Ann. § 15-22-901 et seq.).
[11] J.W. Dellapenna, "The Law of Water Allocation in the Southeastern States at the Opening of the Twenty First Century," 25 Univ. of Ark. Little Rock L. Rev. 9, page 33 (2002).

Chapter 2. Reporting of water use

Generally, Arkansans must report usage of water diverted from streams, lakes, or ponds to the Arkansas Natural Resources Commission. Because the Commission is charged with the duty to make various determinations concerning water supply and demand, it is critically important that the Commission have some mechanism for receiving water usage information. For example, the ANRC must determine the water needs of agriculture, "taking into account the decreasing ground water tables and the resulting future needs for surface water to augment ground water supplies…."[12] The only means by which the ANRC can fulfill this, and related duties, is to have a system in place for determining the nature and extent of water use in the state.

Persons diverting less than 325,900 gallons (1 acre-foot) of water in any water year or diverting from natural lakes or ponds in the exclusive ownership of one person are exempt from registration.[13] Water users must annually report source of the water, point of diversion, purpose of the use of the water, quantity diverted, location of use, and times of the year when diversion is proposed.[14] Persons diverting less than 325,900 gallons (1 acre-foot) of water in any water year are exempt from registration.

Users of ground water must also submit annual reports to ANRC. However, the following wells are exempt from reporting: household wells exclusively for domestic use and wells with potential flow rates less than 50,000 gallons.[15] Reporting requirements include information on the number and size of wells, crops and acreage irrigated, and the locations of wells and water use.[16]

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[12] Ark. Code Ann.§ 15-22-301.
[13] 1969 Ark. Acts 180 (codified at Ark. Code Ann. § 15-22-215).
[14] ANRC Rules § 302 and Ark. Code Ann. § 15-22-215.
[15] Ark. Code Ann. § 15-22-302.
[16] ANRC Rules § 402.

Chapter 3. Transfer of surface water

If a person does not already possess a riparian right to use a stream, how does that person acquire a water right? Before approving a non-riparian application, the Arkansas Natural Resources Commission must first determine that excess surface water exists.[17]

Excess surface water

What is excess surface water and how was it calculated? In 1985, the General Assembly defined "excess surface water" to be twenty-five percent of the amount of water left over after calculating the amount of water required for specific needs. These needs included existing riparian rights as of June 28, 1985; water needs of federal water projects existing on June 28, 1985; the firm yield of all reservoirs in existence on June 28, 1985; maintenance of minimum streamflows for fish and wildlife, water quality, aquifer recharge requirements and navigation; and future water needs of the basin of origin as projected in the Arkansas Water Plan.[18]

The Arkansas Water Plan refers to the comprehensive program for orderly development and management of the state's water and related land resources that is maintained by the Commission. When the Arkansas Water Plan was revised in 1990, the Commission completed and adopted its calculations of excess surface water for each of the five major basins of the state.[19] These calculations were based on projected riparian uses, minimum streamflow requirements for fish and wildlife, and navigation needs to the year 2030. These needs were subtracted from the average annual flow, and the mandated twenty-five percent figure was used to calculate the "excess." Using that procedure, the Ouachita Basin has some 725,000 acre-feet per year of excess water; the Red

[17] 1983 Ark. Acts 1051 (codified at Ark. Code Ann. §§ 15-22-301 et seq.).
[18] Ark. Code Ann. § 15-22-304.
[19] ANRC Rule 305.1.

River Basin 1,100,000 acre-feet; the White River Basin 1,700,000 acre-feet; the Arkansas River Basin 2,700,000 acre-feet; and the Delta Basin 4,100,000 acre-feet.[20]

Each time a non-riparian applies to the Commission for a water right, the Commission must take the numbers generated in 1990 and subtract out all reported water use for that stream segment to make sure that the 1990 calculations of excess surface water have not been exceeded.

Nonriparian permits

The ANRC Rules for the Utilization of Surface Water[21] provide a mechanism for nonriparian owners to divert excess surface water to nonriparian land upon approval of the ANRC if the water will be applied to reasonable and beneficial use and the diversion will cause no significant adverse environmental impact.[22] The procedure for issuance of a nonriparian permit depends on whether the transfer is considered to be within or between basins, with interbasin transfers being more restrictive. Nonriparian intrabasin transfers are subordinate to riparian diversions but have a higher preference than nonriparian interbasin transfers. Out-of-state transfers are last in the order of preference.

When the transfer is interbasin, the ANRC also must take into account the protection of the watershed of the basin of origin and insure against an adverse impact of the transfer on other lawful water users. In addition, the legislation places restrictions on the transportation and use of water outside the state by requiring a study by the ANRC and a recommendation to the General Assembly as to whether the transfer would be in the public's best interest.[23] The General Assembly's approval and, in some cases an interstate compact, are required in order to carry out such transfers.

For either interbasin or intrabasin transfer, the permit may be canceled if the water is used for purposes other than that stated in the permit or if more water than authorized is diverted. The applicant may be given up to two years from the date of the issuance of the permit to develop the

[20] ANRC, Arkansas Water Plan, Executive Summary at p. 25.
[21] ANRC Rules for the Utilization of Surface Water.
[22] ANRC Rules 304.1 and 305.7.
[23] Ark. Code Ann. § 15-22-303.

ability to make the water transfer. Surface water transfer permits may be issued for a fixed period of up to fifty years. When the use is for irrigation, the permits are considered to run with the land and can be assigned only to a subsequent owner or lessee of the land. The permits also may not be sold separate and apart from the land itself. If the Commission declares a shortage and initiates allocation, the permit holder's right to withdraw will be subject to further restriction.

Current developments

The most noteworthy proposed intrabasin transfer to date is the project under construction by the White River Regional Irrigation Water Distribution District. This District was created to develop a pumping station and transfer excess surface water to farms within Arkansas, Prairie, and Monroe Counties. Concerns about the effect of this transfer led to the addition of a special provision in 1995 that prevents White River Basin transfers from exceeding fifty percent (50%) of the monthly average of each individual month of excess surface water."[24]

Development of the Fayetteville Shale has led to many applications for nonriparian intrabasin transfer permits. Between 1985 and 2007, the Commission issued 16 non-riparian permits for municipal, agricultural, and industrial use. As of March 3, 2010, the Commission had received 726 applications from gas companies. Gas companies develop gas wells by pumping fluid into a well at a rate sufficient to increase pressure downhole and thereby expand the rock below to open pockets and allow travel of natural gas. The companies use surface water and, in most cases, are required to get nonriparian permits since most usage will be off the riparian tract of land. Depending on the method, disposal of excess water is regulated by the Arkansas Oil and Gas Commission and Arkansas Department of Environmental Quality.

[24] Ark. Code Ann. § 15-22-304(e).

Chapter 4. Allocation of surface water

This chapter addresses allocation of water during times of shortage. Whenever a shortage of water in any stream or part of a stream exists to the extent that there is insufficient water to meet the requirements of all water needs, the Arkansas Natural Resources Commission may allocate available water among the competing water uses so that each use obtains an equitable apportion of the amount of water available. The Commission will allocate among water uses subject to the following order of preference: (1) sustaining life, (2) maintaining health, and (3) increasing wealth.[25]

This process may also be initiated by a third party. A third party, deprived of usage or fearful that competing water users may impair his usage, may petition the Commission for allocation of available water supplies for a specific stream. To date, the Commission has received no allocation requests and has not initiated any allocation procedures.

Prior to allocation, the Commission must determine that a water shortage exists or is imminent. This condition of stream shortage is also known as the "allocation level" because this is the stream stage that triggers the Commission's power to apportion the water among users. Once the Commission determines that a water shortage exists or is imminent, water users on the stream subject to shortage will be instructed to withdraw no more than the allocation levels previously assigned by the Commission, or if no levels have been assigned, the Commission will go through the hearing process described in Section 309.1- 309.8 to establish levels for all users. The Commission has never declared a period of shortage.

[25] Ark. Code Ann. § 15-22-217.

Waters and uses not subject to allocation

Before beginning an allocation process, ANRC must first eliminate waters and uses that are excluded from the process by rule and law. One category consists of "waters useable without allocation." These include:

(a) Diversions by any persons of less than 325,900 gallons (1 acre-foot) of water in any water year.
(b) Water captured by tailwater recovery systems.
(c) Water diverted from lakes, ponds, reservoirs or springs in the exclusive ownership of one person.
(d) Water previously captured whether transmitted by ditch, channel, or pipe.
(e) Water diverted from intermittent streams.
(f) Diffused surface water.
(g) Water captured by instream pit reservoirs, dams constructed pursuant to a lawful permit, or low water weirs and water stored in federal impoundments.
(h) Non-consumptive usage.[26]

These particular water sources were excluded because the quantity of waters consumed by the source was considered insignificant or the source would be too difficult to measure.

Additionally, ANRC defines certain uses and needs as "reserved water uses" and also excludes these waters from the amount available for allocation. "Reserved uses," include: (1) domestic and municipal-domestic, (2) minimum streamflow, and (3) federal water rights.

The first reserved use, "domestic and municipal-domestic" addresses drinking water. Commission rules define "domestic uses" to include "ordinary household purposes including human consumption, washing, the watering of domestic livestock, poultry and animals and the watering of home gardens for consumption by the household."[27] "Municipal-domestic use" recognizes distribution of domestic water by a central distribution system and defines the use to include "human consumption, laundry, bathroom facilities, fire protection, and the watering of home gardens."[28]

[26] ANRC Rules § 307.2.
[27] ANRC Rules § 301.3 (Q).
[28] ANRC Rules § 301.3 (X).

The second reserved use, "minimum streamflow," refers to the quantity of water necessary to support interstate compacts, navigation, fish and wildlife, water quality, and aquifer recharge."[29] Because of significant differences between streams in different eco-regions, minimum streamflows are developed on a site-specific basis since a given percentage of flow would not be appropriate for all streams. Before establishing minimum streamflows for any stream, ANRC must first notify and accept comments from the Arkansas Game and Fish Commission, the Arkansas Pollution Control and Ecology Commission, and any other interested state boards and commissions.[30] ANRC will then follow its usual statutory rulemaking procedures. In 2009, the Commission adopted minimum streamflow rules for the main stem of the White River. Minimum streamflows have not been calculated for any other river segments.

The category of "federal water rights," the final reserved use, is not defined by statute. The ANRC rules, however, recognize "[t]here may be some water over which the United States has a preemptive right that is superior to rights of others."[31] The effort to recognize federal water rights was an attempt to meet any demands of the federal government for those uses traditionally associated with the federal government, such as interstate compacts and navigation. Another possible category of "federal right," the right to acquire and use water stored in a federal government reservoir, was already recognized in existing legislation. The original 1957 legislation granted, "to the full extent that the State of Arkansas can grant that right," the right to acquire absolute title to water stored in reservoirs created by federal agencies such as the Corps of Engineers.[32]

Allocation preference

After separating out the reserved water uses and the water amounts too insignificant to quantify, the Commission will allocate water subject to the following order of preference: (1)

[29] Ark. Code Ann. § 15-22-202 (6).
[30] Ark. Code Ann. § 15-22-222.
[31] ANRC Rules § 307.7.
[32] Ark. Code Ann. § 15-22-218.

agriculture, (2) industry, (3) hydropower, and (4) recreation.[33] The ANRC rules on allocation also attempt to establish a priority of diversions by granting riparian uses a higher priority than nonriparian uses. Riparian diversions take priority during an allocation over all nonriparian diversions even if the nonriparian use was of a higher preference in the "order of uses." For example, a riparian recreational use would apparently be of higher priority than a nonriparian agricultural use, even though "agriculture" is designated as first in the "order of uses."

The list below summarizes how allocation would occur. One would give absolute priority to the reserved uses. The reserved uses are repeated below:

<u>Reserved Uses Prior to Allocation</u>

- domestic and municipal-domestic
- minimum streamflow
    - interstate compacts
    - navigation
    - fish and wildlife
    - water quality
    - aquifer recharge
- federal water rights

The remaining uses would receive allocations in the following order:

1. <u>Riparian (registered)</u>
   agriculture
   industry
   hydropower
   recreation

2. <u>Riparian (nonregistered, but previously used)</u>

3. <u>Nonriparian Intrabasin Transfer</u>
   agriculture
   industry
   hydropower
   recreation

4. <u>Nonriparian Interbasin Transfer</u>
   agriculture
   industry
   hydropower
   recreation

[33] ANRC Rule 307.4.

5. Interstate Transfer
   agriculture
   industry
   hydropower
   recreation

6. Riparian (not registered, not previously used) (probably at this level)

Allocation procedure

ANRC will express each individual allocation as a percentage of available water under varying levels of flow on a daily basis. Each diverter will be assigned an allocation based on allowable daily pumping expressed both as a percentage and as a quantitative measure with appropriate reference to a gauge at the point of diversion. Under normal flow conditions, if minimum daily pumping allocations are not exceeded, no restrictions apply to the time or rate of pumping.

No rights will be limited unless ANRC has completed an allocation exercise on the affected stream. To complete an allocation, ANRC must conduct water measurements on the individual stream and calculate water needs for the stream. Each diverter upon that stream must have a stream gauge at the diversion site. When the water level is within a range described to the diverter as the "green zone" or normal diversion level, riparian and nonriparian permittees may divert water. When the water drops to or below the level identified to the diverter as "yellow zone" or "allocation zone", then water can only be removed if considered (1) "usable without allocation,"[34] (2) if the water is lawfully diverted for a "reserved use,"[35] or (3) if the Commission has gone through an administrative process to allocate the water. When the water is at or below the "red zone" or the minimum streamflow level, all diversions except those for domestic and municipal-domestic uses must stop.

[34] ANRC Rules § 307.2.
[35] ANRC Rules § 307.3.

The procedure for allocation may be instituted by any person affected by the shortage or by ANRC on its own initiative.[36] The rules outline a detailed notification procedure with statutory requirement of notice and hearing. Once it has been established that the allocation is appropriate, the amount to be allocated is expressed as a percentage of available water on a daily basis under varying levels of flow. A streamflow gauge may be used at the point of diversion to indicate permissible levels, including an indication of the minimum streamflow below which diversions may not continue except for domestic or municipal-domestic use. In cases of emergency, ANRC may shorten the time frame for determination of allocation and may modify predetermined allocations for nonriparian transfers to minimize the effects on public health, safety, or welfare. ANRC offers an internal appeals process to affected individuals who may also obtain circuit court review of the ANRC rule, regulation, or order.[37]

The Commission may make advance allocation determinations prior to the development of a shortage condition, but no such determinations have yet been made.[38] Prior to allocating excess surface water among users, reserved uses, such as minimum streamflows, must be considered. No advance allocations have been completed.

Disputes over water use appear to be more common, especially in unusually dry years. These dry periods have been followed by rainfall close enough in time and intensity that shortage conditions have never been declared. However, as the number of water users and quantity of water used grows, it becomes more likely that shortage conditions will be reached and allocation triggered.

[36] ANRC Rules § 308.1 to 310.1.
[37] Ark. Code Ann. § 15-22-209.
[38] ANRC Rules § 304.14 (intrabasin) and § 305.18 (interbasin).

Chapter 5. Critical ground water area designation

The Arkansas Groundwater Protection and Management Act defines "critical ground water areas," provides an administrative process for identifying these areas, and also provides a process for initiation of regulation limiting ground water withdrawals within these areas. The legislation also authorizes ANRC to establish ground water criteria and standards,[39] implement a conservation education and information program to increase public awareness,[40] and introduced the concept of "grandfathered water rights."[41] Subsequent amendments require individuals with wells in certain aquifers to install meters to the well to more accurately compute water use.[42]

Critical ground water area designation

One of the most salient and least understood features of this legislation is that identification of critical ground water areas is a separate process from regulation. Before any regulatory program is implemented, the critical areas must be designated. ANRC must hold public hearings in each county within the proposed critical area before designation. Prior to these hearings, the ANRC must describe the proposed action, the reasons for the designation, and the recommended boundaries of the critical area.

The Commission has designated three critical ground water areas. The "South Arkansas Critical Ground Water Area" is composed of the Sparta aquifer in Columbia, Ouachita, Bradley, Union, and Calhoun Counties. Since the 1996 designation, education, conservation, and development and usage of excess surface water have caused levels within the areas to stabilize or rise.[43] The "Grand Prairie Critical Ground Water Area," designated in 1998, includes the alluvial and

[39] Ark. Code Ann. § 15-22-906.
[40] Ark. Code Ann. § 15-22-907.
[41] Ark. Code Ann. § 15-22-910.
[42] Ark. Code Ann. § 15-22-915.
[43] Arkansas Ground Water Protection and Management Report for 2006 at page 26.

Sparta aquifers within Jefferson, Arkansas, and Prairie Counties as well as parts of Pulaski, Lonoke and White Counties. Water level sampling data from this area continues to show declines. The Grand Prairie Irrigation Project, once in place, is expected to relieve unmet demands upon the aquifers.[44] The Cache Critical Ground Water Area, designated in 2009, includes the alluvial and Sparta aquifers within portions of Clay, Craighead, Cross, Greene, Poinsett, St. Francis, and Lee Counties lying west of Crowley's Ridge.

Water level data collected by the Commission, the United States Geological Survey, and the Natural Resources Conservation Service of the United States Department of Agriculture suggests that there are more areas experiencing significant water level declines that may qualify for critical ground water designation. A critical ground water area designation can benefit landowners within the area because tax credits are available for conversion from ground water to surface water, with the highest amount of credit going to surface water conversions by individuals owning land in critical ground water areas.[45] However, many affected persons have resisted designation in fear of regulation and loss of economic advantage.

Initiation of regulatory authority

Even when an area is formally designated as a critical ground water area, this designation alone does not provide the ANRC with the authority to immediately implement a regulatory program affecting ground water withdrawal in the designated area. The Commission must next determine that the initiation of regulatory authority within a critical area is necessary and follow outlined procedures.[46] This declaration must be made in accordance with procedures outlined in the Arkansas Administrative Procedure Act and must follow public hearings in each county within the proposed area. Any difference in boundaries from the previously designated critical areas must be described in the proposal, as well as the reasons for any such changes. No regulatory program may

[44] Arkansas Ground Water Protection and Management Report for 2006 at page 32-36.
[45] Ark. Code Ann. § 26-51-1007 and § 26-51-1008.
[46] Ark. Code Ann. § 15-22-909.

be initiated until this procedure for declaration of necessity has been followed. To date, the Commission has not sought regulatory authority in any of the designated areas.

Regulation of withdrawals

Once the ANRC has made a declaration of necessity, a regulatory program may be implemented through a system based on the issuance of "water rights."[47] Like surface water rights, ground water rights will also be prioritized by type of usage: sustaining life, maintaining health, and increasing wealth.[48] No regulation of withdrawal is authorized for either low volume wells (fewer than 50,000 gallons per day) or individual household wells used exclusively for domestic use.[49] Users of ground water from wells existing at the time the regulatory program is implemented must apply for issuance of a "water right" within one year of initiation of regulation. Such a right is fully recognized based on the average quantity withdrawn, applied to beneficial use, and reported during the past three years. Some flexibility exists to allow earlier reports to be used in calculating the three-year average where the amount of reported use is "significantly below normal use levels."[50] In addition, any new wells constructed during the first year of initiation of the regulatory program are likewise "grandfathered" based on the amount requested. Failure to apply for a water right within one year of regulatory authority creates a conclusive presumption of abandonment of use. This means that the Commission can identify the landowner's right to use the water as abandoned regardless of whether the well is being used.

These "grandfathered rights" provisions, read in conjunction with the limitations on the Commission's powers, indicate that reduction or limitation of withdrawals by users of wells existing at the time the regulatory program is implemented could occur only in limited circumstances. First, there must be an alternative surface water supply available. In the alluvial aquifer, surface water

[47] Ark. Code Ann. § 15-22-910.
[48] Ark. Code Ann. § 15-22-910.
[49] Ark. Code Ann. § 15-22-905.
[50] Ark. Code Ann. § 15-22-910(a)(1).

must be available and the cost of usage of that water must be no greater than the operating costs of using the alluvial wells. Reductions on withdrawals from a sustaining aquifer, such as the Sparta, may occur if alternative water supplies become available regardless of cost of operation.[51] Second, ANRC cannot limit withdrawal from an alluvial well if the user can demonstrate a reduction of 20% due to water conservation or conversion to surface water supplies. For sustaining wells, the Commission may consider voluntary reductions and conservation measures when determining reductions.

[51] Ark. Code Ann. § 15-22-905(1)(a) and (b).

Chapter 6. Construction of dams

Arkansas has legislation dating to the late 1800s governing the erection of dams in streams. While this legislation contemplated construction of milling equipment, the general provisions are broad enough that they might be applicable in other situations as well. The legislation declares "dams, stoppages and obstructions" not made according to law to be public nuisances.[52] A procedure is set out for approval of the erection of dams in non-navigable streams where the landowner owns the land on both sides.[53] This procedure requires a petition in circuit court if the dam is likely to overflow lands of other persons. The court will impanel a jury to visit the site and determine the amount of damage by "reason of inundation consequent upon the erection of the dam as proposed."[54] The jury will also consider to what extent ordinary navigation and the passage of fish will be obstructed and whether the "health of the neighborhood" will be "materially endangered" by the erection of the dam.[55] Furthermore, the jury will determine if any proprietor's "dwelling" or "outhouses, curtilages, or gardens" or "orchard" will be overflowed by the dam.[56] If the dam is authorized, the permit may be conditional on arrangements for passage of fish and payment of all damages and valuations made and assessed by the jury.

In 1957, the legislature granted ANRC the authority to issue permits for dam construction.[57] ANRC has permitted dams to create recreational lakes, flood control, sediment control, and water supply. With the exception of dams constructed and maintained by the Corps of Engineer, any person constructing a dam impounding fifty acre-feet or more of water or with a height of twenty-five feet or more must obtain a construction permit. A construction permit is not required if the dam height is at or below the high water mark on any stream. Regardless of size, upon petition by

[52] Ark. Code Ann. § 18-15-703.
[53] Ark. Code Ann. § 18-15-704 to 709.
[54] Ark. Code Ann. § 18-15-706(b)(1).
[55] Ark. Code Ann. § 18-15-706(b)(3), (4).
[56] Ark. Code Ann. § 18-15-706(b)(2).
[57] Ark. Code Ann. § 15-22-210 to -214.

persons affected and after notice and hearing, if the ANRC determines that a dam otherwise exempt would pose a significant threat to life or property, a construction permit will be required.

A dam construction permit can only be granted if specified conditions are met. A dam can only be constructed to impound "surplus surface waters" and to operate in such a way as to discharge a quantity of water (as fixed by ANRC) necessary to preserve the flow below the dam to protect the rights of any lower riparian owner and fish and wildlife dependent on the flow. Because the "lives and property" of persons downstream must be adequately protected, the dam must be constructed and maintained in such a way as to preserve the dam and reservoir for the permit period. Finally, the dam must be constructed and operated to impound water only on land owned by the permit applicant or on beds of streams owned by the state.[58]

Permits may be issued for a period necessary to permit amortization (cost recovery) of reasonable indebtedness incurred in connection with construction of the dam. This period is limited to fifty years. Permits are issued only after proper application, payment of the fee, notice, and public hearing (if requested).[59] Permits may be canceled or modified upon failure to maintain the dam adequately or to comply with conditions for dam operation.[60] ANRC representatives have a right of entry to inspect construction work, maintenance, and operation.[61]

Because many dams do not meet the height requirements or area impoundment limits for permits, the major restriction on construction and operation may be imposed by other legal rules. One of the conditions required before a dam permit can be issued is that it not affect downstream riparians or instream flow requirements.[62] The allocation rules, however, go beyond permitted dams; they grant a superior position to those taking water from streams where the water is captured

[58] Ark. Code Ann. § 15-22-210.
[59] Ark. Code Ann. § 15-22-210(4).
[60] Ark. Code Ann. § 15-22-213.
[61] Ark. Code Ann. § 15-22-210(2).
[62] Ark. Code Ann. § 15-22-210.

by "instream pit reservoirs" and "low water weirs."[63] These types of water capture can be constructed without a permit for dam construction.

A person may only construct dams to impound water on land owned by him or on beds of streams owned by the state.[64] If a permitted dam impounds water unlawfully on land not owned by the permit holder, the owner whose land is affected has an action at law for trespass damages and has the right to take water from the impoundment at a point on his land so long as the water is unlawfully impounded.[65] Similarly, a person whose land was affected by impounded water from a dam that was exempt from permit would have a cause of action for damages.

[63] ANRC Rules § 307.2(g).
[64] Ark. Code Ann. § 15-22-210(3).
[65] Ark. Code Ann. § 15-22-216.

Chapter 7. Water distribution

One of the primary objectives of a water allocation system is to facilitate application of water to its highest and best use. Beneficial uses of water may be desired at some point other than at a riparian location. Although some water is provided by non-governmental entities, most water associations are structured as political subdivisions. Some of these systems may have started out as nonprofits and since converted to quasi-governmental entities to obtain the authorities and benefits afforded to political subdivisions.

Public suppliers have special rules available to them to facilitate water transfer. For example, current law permits municipal suppliers to divert water for public use by using eminent domain to acquire lands for waterworks purposes.[66] The Arkansas Supreme Court has indicated that, in the absence of such an eminent domain proceeding, a city's riparian rights are the same as any other riparian owner. A city, like any other riparian landowner, could use water for purposes "incident to" the riparian acreage, and could not divert water from a stream and then sell the water commercially to city inhabitants without compensation to those whose rights were affected.[67]

For over a century, special governmental districts provided basic public services, including supply of water for both urban and agricultural uses. These districts flourished in the late 19th century due to limitations placed on county and local governments in the Arkansas Constitution of 1874. Such districts, described as "quasi-governmental," have special or limited powers.

California was one of the first states to use special governmental districts for water supply purposes. The Wright Act, adopted by California in 1887, sanctioned the formation of special water districts with the authority to issue bonds and levy compulsory property assessments against

[66] Ark. Code Ann. § 18-15-401.
[67] Harrell v. City of Conway, 224 Ark. 100, 271 S.W.2d 924 (1954).

property in the district that benefited, directly or indirectly, from the function of the district. Although the compulsory taxation feature of the Wright Act was challenged, the United States Supreme Court upheld the Wright Act, determining that such districts benefited the agricultural economy and, thus, the public generally.[68] The Court stated:

> To irrigate and thus bring into possible cultivation these large masses of otherwise worthless lands would seem to be a public purpose and a matter of public interest, not confined to the landowners, or even to any one section of the state. The fact that the use of the water is limited to the landowner is not therefore a fatal objection to this legislation. It is not essential that the entire community or even any considerable portion thereof should directly enjoy or participate in an improvement in order to constitute a public use.[69]

The Eighth Circuit described the quasi-governmental nature of special districts in Drainage District Number 2 v. Mercantile-Commerce Bank & Trust Co.,[70] which dealt with an Arkansas drainage district:

> [In Arkansas], 'local improvement districts and their commissioners are governmental agencies created as quasi public corporations deriving their powers directly from the Legislature and exercising them as the agent of the property owners in the district whose interests are affected by the duties they perform. They exercise no governmental powers except those expressly or impliedly granted by the Legislature. They are not political or civil divisions of the state like counties and municipal corporations created to aid in the general administration of the government.'[71]

Arkansas passed two legislative acts important to water distribution: the "Arkansas Irrigation, Drainage and Watershed Improvement District Act" and the "Regional Water Distribution District Act." In 1949, the Arkansas Irrigation, Drainage and Watershed Improvement District Act was approved.[72] This Act authorizes "the acquisition by purchase, lease, gift or condemnation of water rights and all other properties . . . and all other rights helpful in carrying out the purposes of

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[68] Fallbrook Irrigation District v. Bradley, 164 U.S. 112 (1896).
[69] 164 U.S. at 161.
[70] Drainage Dist. No. 7 of Poinsett County v. Hutchins, 69 F.2d 138 (8th Cir. 1934).
[71] 69 F.2d at 140 (quoting Drainage Dist. No. 7 of Poinsett County v. Hutchins, 184 Ark. 521, 529, 42 S.W.2d 996, 1000 (1931).
[72] 1949 Ark. Acts 329 (codified at Ark. Code Ann. §§ 14-117-101 to -427).

the organization of the district." The governing boards of such districts are authorized to make regulations for "the delivery of water owned or acquired by it to users. . ."[73]

The 1957 Regional Water Distribution District Act[74] was passed to make use of water supply in multipurpose reservoirs constructed by the Corps of Engineers and to create a nonprofit regional water distribution district with authority to participate in Congressional projects. These districts were originally used to supply water for municipal and industrial uses. However, this Act has been more frequently used to create districts for the specific purpose of supplying agricultural water. Districts created under this act have broad authority.

Regional Water Distribution Districts (RWDD) are authorized (1) to acquire absolute title to water from Corps of Engineers reservoirs and to use this water for any purpose; (2) to acquire water storage and withdrawal rights; (3) to transport, distribute, sell, furnish, and dispose of the water; (4) to regulate, define and control the rate and location of any withdrawal or transfer of water "owned, acquired, or developed by the district," and (5) to construct, purchase, lease, operate, sell or dispose of any facilities or property rights.[75] At present, approximately thirty RWDDs have been formed.

RWDDs also have broad powers to assist customers in preparation of their premises for the use of water and to deal with both real and personal property, including easements and rights-of-way. In addition, in connection with the acquisition, construction, improvement, operation, or maintenance of its transportation and distribution facilities, a district is authorized to use the bed of any stream, "without adversely affecting existing riparian rights." This right also extends to public property such as highways, rights-of-way or easements and tax-forfeited land. Presumably, such districts may exercise the power of eminent domain for acquiring water rights because the authorization for eminent domain power includes the purpose of acquiring rights of way "and other properties" necessary in the construction and operation of the district. The eminent domain power

[73] Ark. Code Ann. § 14-117-304(e).
[74] 1957 Ark. Acts 114 (codified at Ark. Code Ann. § 14-116-101 to -406).
[75] Ark. Code Ann. § 14-116-402.

may not be used "for the acquisition or construction of private on-farm irrigation reservoirs or natural watercourses."[76]

Because the primary purpose of this Act was water distribution, the only authorized source of district revenue was the sale and distribution of water. However, in 1995, the General Assembly authorized the districts to levy assessments. A district is now authorized to develop improvement project plans for improvement project areas within the district.[77] If the improvement plan is approved by the Commission, and by the circuit court which originally established the water district, an assessment of benefits accruing to land with the improvement project area is made and a tax may be levied against the benefited land to pay for the costs of works of improvement for the supplying of irrigation water.

[76] Ark. Code Ann. § 14-116-402 (10).
[77] 1995 Ark. Acts 838 (codified at Ark. Code Ann. § 14-116-501 to -801 and amending various other sections).

Chapter 8. Diffused surface water

Arkansas's riparian or regulated riparian system applies to surface water in watercourses, streams, and lakes. However, separate rules govern the rights of landowners to deal with diffused surface water. "Diffused surface water" means water occurring naturally on the surface of the ground other than water found in natural channels, lakes, or ponds.[78] Because the amount of diffused surface water is too minimal to calculate, the statutory modifications of the riparian doctrine in Arkansas carefully exclude diffused surface water from regulation.[79] Further, restrictions imposed by legislation which impose permitting requirements for dam construction also exclude many smaller dams designed to capture diffused surface water.[80]

It has been left to the courts in Arkansas to develop rules for determining when water is considered to be in a watercourse, and, consequently, to adopt rules dealing with diffused surface water. Issues related to these questions most often come up in the context of four activities: First, a landowner may wish to divert, collect, and use water on the surface of the land. Second, a landowner may wish to collect and remove excess water from the land or establish a drainage system for removal of water. Third, a landowner may wish to prevent water from coming onto the property by erecting a structure, such as a dike or levee, or otherwise preventing water from entering certain areas. Fourth, a landowner may be charged with responsibility for obstructing a watercourse through his failure to keep it clear so that water can flow naturally. In all such cases the extent to which the landowner may achieve the goals or incur liability is dependent on the answer to two basic questions: What is a watercourse? What rules apply to diffused surface water?

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[78] Ark. Code Ann. § 15-22-202(3).
[79] Rule 302.2(C) and 307(2)(E) and (F)
[80] See, Ark. Code Ann. § 15-22-214.

What is a watercourse?

The Restatement of Torts defines surface water as: "Waters from rain, springs or melting snow which lie or flow on the surface of the earth but which do not form part of a watercourse or lake."[81] Under this definition, it becomes necessary to determine whether a watercourse exists in order to define diffused surface water. The question of what is a watercourse could be asked conversely: What is diffused surface water? Water found on the surface of land is treated as diffused surface water if it is not yet in a watercourse.

The Arkansas courts have focused on this question in a variety of contexts. One of the first expressions of a workable definition of watercourse came in 1916 in Boone v. Wilson,[82] a dispute involving the accumulations of "drift, mud, weeds and other matter" which diverted the flow of water onto land of the plaintiffs. They claimed this was an obstruction of a watercourse and the defendants were responsible for resulting damage. While the court was not convinced that the drift was caused by any "act of commission or any failure[83]" on the part of the defendant, the court had to determine whether the area in question constituted a watercourse to reach its final result.

In determining that the water upon the Wilson land was within a natural watercourse, the court applied definitions of watercourse from an Idaho case and a California case. The Supreme Court of Idaho defined watercourse as:

> [A] stream of water flowing in a definite channel, having a bed and sides or banks, and discharging itself into some other stream or body of water. The flow of water need not be constant, but must be more than mere surface drainage occasioned by extraordinary causes. There must be substantial indications of the existence of a stream, which is ordinarily a moving body of water.[84]

The California Supreme Court described watercourses as:

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[81] Restatement of Torts (Second) § 846.
[82] 125 Ark. 364, 188 S.W. 1160 (1916).
[83] 125 Ark. 364, 371, 188 S.W. 1163.
[84] Id. At 368, 188 S.W. at 1162 (quoting Hutchinson v. Watson Slough Ditch Co., 16 Idaho 484, 101 P. 1059, 1061 (Idaho 1909).

> [A] running stream of water, a natural stream, including rivers, creeks, runs and rivulets. There must be a stream, usually flowing in a particular direction, though it need not flow continuously. It may sometimes be dry. It must flow in a definite channel, having a bed and banks, and usually discharges itself into some other stream or body of water. It must be something more than mere surface drainage over the entire face of the tract of land occasioned by unusual freshets or other extraordinary causes.[85]

These same definitions were used by the court in 1936 to address a "slough" across which the defendants had constructed a dam or levee.[86] The dam was located in an area described as a "draw, slash, depression or swale" known as "Raft Slough." It was apparently (but not within memory of the witness testifying) the channel or course of a stream but now acted more in the nature of a "long hole" or shallow "reservoir." The plaintiffs claimed it was a watercourse as defined in Boone v. Wilson. Water sometimes flowed in the opposite direction toward a drainage ditch which crossed the slough, and the evidence showed that Raft Slough would not operate as a drainage canal unless additional ditches were cut for flow of the water. A part of the bed of the depression was in cultivation. Given all these facts, the court was not convinced that the slough met the definition of watercourse.

The matter of watercourse determination was before the court again in the 1950s. In Turner v. Smith,[87] the defendant had constructed a rectangular reservoir some one and three-quarters of a mile long and a mile wide. The reservoir was constructed for duck-hunting. The levee around the reservoir was about three feet high and the plaintiffs claimed it obstructed natural watercourses. The court applied the definition from Boone v. Wilson to find that at least two natural watercourses had been obstructed by the levee. The north levee crossed "Short Bayou" which had a clearly visible channel at its point of entry. The bayou flattened out in the nearly level timberland but did "flow sluggishly" toward the southeast until it "reappeared" as a stream with well defined banks.

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[85] Id. At 368, 188 S.W. at 1162 (quoting Sanguinetti v. Pock, 136 Cal. 466, 69 P. 98 at 100 Cal. (1902).
[86] Leader v. Matthews, 192 Ark. 1049, 95 S.W.2d 1138 (1936).
[87] 217 Ark. 441, 231 S.W.2d 110 (1950).

Similarly, "Fish Lake Bayou" entered the property and temporarily "fingered out" to become a "marsh" or "scatters" before reappearing as a bayou. The court said:

> The fact that these streams temporarily flattened out and flowed without well defined banks did not destroy their character as watercourses, nor did this fact deprive the appellees of their right to insist that the water's flow be unimpeded.[88]

According to the court, a watercourse may at intervals "spread out and become sluggish" without being reduced to surface water.

In a 1953 case, an area contended to be a natural watercourse had been used for 14-15 years as a rice farm.[89] The area was described as "sway" but nearly flat. Drainage from higher land to the east converged to form a well-defined stream. However, when the stream reached the flat lands west of the ridge, it left its banks and spread over the flat lands. It followed the lowest portions eventually reaching the L'Anguille River after a well-defined channel reappeared. The "depression" was some 100-400 feet wide and 5000 feet long. The defendants had constructed a levee or dike which prevented any of the water from crossing their property.

The fact that the land had been used for 14-15 years for rice production "destroys the contention that it is a natural watercourse."[90] Quoting the lower court, the Arkansas Supreme Court reiterated that "the most that can be said is that in the case of overflows, or excessive rains, the water naturally follows the contour of the land, and if unobstructed would recede over this 'sway,' as indicated by plaintiffs' witness."[91]

Why does it matter whether surface water is considered to be in a watercourse? First, all rules for allocation and use of water under the riparian rights system are applicable to water within watercourses. This means that the rights of the owner of land next to the watercourse to use the water or others who use water from the watercourse will be determined by application of the riparian

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[88] Id. at 444, 231 S.W.2d at 112.
[89] Reddmann v. Reddmann, 221 Ark. 727, 255 S.W.2d 668 (1953).
[90] Id. At 732-33, 255 S.W.2d at 670. (citing Dent v. Alexander, 218 Ark. 277, 235 S.W.2d 953 (1951)).
[91] Id. At 733, 255 S.W.2d at 670.

rights concept of "reasonable use." Second, the state has imposed permit requirements for dam construction along with other statutory restrictions. Third, a number of prohibitions on what can be done in damming, filling, or otherwise preventing flow come into play. Particular statutes govern the responsibility of landowners in keeping watercourses open and free from obstructions.

Rules of liability

When one landowner takes action to deal with diffused surface water, either to prevent it from coming onto lower lying land or to remove excess water from the land, neighboring property owners may complain of damage to their property. To determine the liability arising from such actions, Arkansas courts have applied a modified version of what is called the "common enemy" rule. In its pure, unmodified formulation this property rule suggests that diffused surface water may be treated as a common enemy and a property owner may take whatever steps necessary to protect against it. The concept has its greatest validity in guarding against floodwaters or waters from the sea. It has less justification when applied to situations involving mere drainage of surface water but is still applied in some states, particularly in urban areas. Applied in its pure form, the rule would permit a landowner to construct dams, walls, levees or ditches to prevent water from coming onto the property and would allow a property owner to fill, level, and drain property without responsibility for resulting damage to neighboring property.

The pure common enemy rule was not long accepted by many courts because of the harshness of the result. A number of courts adopted the "common enemy" concept but also imposed liability if the landowner negligently protected his property and harm resulted to neighboring property. This modification permitted courts to evaluate the actions of the property owner to determine if he caused "unnecessary harm." Certainly, the collection and discharge of the water onto neighboring property through artificial means might be considered "negligent," and if it causes

"unnecessary harm," liability would be imposed. Acceleration of flow by means of ditches or other artificial means would appear to violate the principle.

In Arkansas, the liability for flow of water across lands was clearly addressed for the first time in Little Rock & Fort Smith Railway Co. v. Chapman,[92] an 1882 case involving the construction of an elevated embankment and roadway which caused water to stand on the premises of the plaintiff. In Chapman the court analyzed the conflicting rules for dealing with surface water, a matter which the court said had "never heretofore" been settled in the state. The court, then, proceeded to adopt a modified version of the common enemy doctrine.

The court next analyzed the approach in other states and concluded that the common enemy doctrine "clothed with qualifications" was the better rule since the unqualified right decisions did not "commend themselves to our sense of justice." While adopting a modification of the unqualified right, the court quoted from a prior source which suggested the test was whether in making improvements the owner acted "in good faith" and "with no purpose of abridging or interfering with any of their neighbor's rights." If the improvements "necessarily do damage" to the neighboring land, the maxim is not infringed.

When applied to the facts, the court felt the railroad had constructed the roadbed with insufficient drains. The resulting damage was "unnecessary, and was not the result of a fair and proper exercise of its franchise." The court said: "It was not reasonable that it should render so much property useless, when it might so easily have prevented it without detriment to its operations."[93]

The Chapman case established the basic rule for the Arkansas courts. Future courts applied the Chapman approach to a variety of situations. For example, in Baker v. Allen,[94] the court applied the Chapman analysis to find that a levee established across a "slight, but broad, depression" along

[92] 39 Ark. 463 (1882).
[93] 39 Ark. 463, 481.
[94] 66 Ark. 271, 50 S.W. 511 (1899).

which surface water drained from lands of upper owners would not be grounds for damages if it was the "only practicable method of protecting the lands." Similarly, Jackson v. Keller[95] involved a lower proprietor who constructed a dam or levee across low "swaggy" places to protect his property from water he claimed the upper proprietor had collected in drainage ditches and sent to the lower land at greater volume than the natural drainage system provided. The court indicated that the upper proprietor had no right to concentrate the water and "throw it by ditches with greater force and volume than it otherwise would have gone." And, while the lower proprietor had a duty to control the water that came upon his land in natural flow by ditches instead of by the embankment if he "could have done so at reasonable expense" and if the ditches "could have been made as effectual" as the embankment, he was not liable for doing so in the "only practical method of protecting his land."

Some uncertainty regarding the application of the Chapman rule when dealing with floodwaters, as opposed to usual runoff from rainfall, arose in McCoy v. Board of Directors of Plum Bayou Levee District.[96] In McCoy, the court dealt with the question of whether a levee could be constructed across "depressions, swales, and low places" so as to prevent floodwater from a river from entering lowlands. The court also considered whether the landowners between the levee and river should be compensated for any damages resulting from the higher level of water caused by the levee. The court declined to identify the floodwater as surface water but said it was treated as a common enemy which could be defended against without liability "unless injury is unnecessarily inflicted upon another, which by reasonable effort and expense, could be avoided." In addition to Chapman, the court cited with approval cases from Mississippi, California, and Iowa, which suggested that floodwater should not be treated the same as surface water and that an unqualified common enemy approach would be appropriate.

[95] 95 Ark. 242, 129 S.W. 296 (1910).
[96] 95 Ark. 345, 129 S.W. 1097 (1910).

The right to fill to prevent the flow of water from surface water outside urban areas was reaffirmed in Timmons v. Clayton,[97] subject to the qualification that the lower proprietor acts "in good faith and is free of negligence." However, the court seemed to regard the same right in an urban area to be close to absolute. The court cited with approval the earlier case of Levy v. Nash,[98] maintaining that the owner has a right to fill lower property, to elevate it, to construct ditches or otherwise protect it against surface water of an adjoining lot as a "necessary incident to the ownership of such property." To find to the contrary would, according to the court, "operate against the advancement and progress of cities and towns" and would be "against public policy." Levy did not qualify the right to deal with surface water in urban areas. However, the court in Timmons seemed to suggest that the test of whether the landowner was acting negligently or in bad faith, should apply to activities in rural settings and, apparently, left the more absolute Levy approach intact for urban lands.

[97] 222 Ark. 327, 259 S.W.2d 501 (1953).
[98] 87 Ark. 41, 112 S.W. 173 (1908).

Chapter 9. Navigability questions: Public and private rights to use the stream surface and stream beds

The question of navigability is important in various respects: (1) it will determine the ownership of the stream bed and, thus, the riparian property owner's right to make use of the bed of the stream; (2) it will affect the riparian owner's right to make use of the surface for certain activities; (3) it will determine the public's rights of access to the stream for recreational uses; and (4) it may be relevant to the implementation of regulatory controls affecting either the use of the stream or the stream bed.

During the 1800s, the state legislature frequently designated streams or parts thereof as navigable. However, the determination of navigability for these purposes does not depend on designation by statute or regulation, although such designations would be conclusive. Even in the absence of a specific statute or regulation a court may evaluate the actual navigability of a particular stream for purposes of resolving any specific dispute. The test traditionally applied by courts in Arkansas, as well as in federal courts, was commercial usefulness. In 1822, the Arkansas Supreme Court adopted the criterion that navigability depended on the usefulness of the stream in its natural state as a public highway for carrying products of the fields or forests or transporting articles of commerce to the public.[99] The test of navigability of a lake is the same as for a stream or river.[100]

Navigability for title

The question of navigability determines the riparian landowner's rights to the stream bed. The state owns the stream bed of a navigable stream; the riparian owner's rights extend only to the high water mark—a point indicated by vegetation and the nature of the soil.[101] The riparian owner's

[99] Little Rock, Mississippi River & Texas Railway Co. v. Brooks, 39 Ark. 403 (1882).
[100] McGahhey v. McCollum, 207 Ark. 180, 179 S.W.2d 661 (1944).
[101] St. Louis, Iron Mountain & Southern Railway Co. v. Ramsey, 53 Ark. 314, 13 S.W. 931 (1890).

rights end at this mark and any use of the stream bed would be improper. While it is true that riparians may "wharf out" into the navigable stream by constructing piers and wharfs to make use of the surface, the right to do so is not concrete. In fact, the state may restrict this right (because of state ownership of the stream bed) or the federal government may prohibit it (under its power to regulate navigation).

The idea of state ownership of the beds of navigable streams (or lakes) derives from the common law of England. Under the common law, the Crown owned the beds of navigable water below the high water mark or those waters affected by the ebb and flow of the tide. This concept became part of the law of the original colonies and was later extended to newly admitted states. If a body of water was navigable, the state acquired ownership of the bed and banks to the high water mark upon statehood. Thus, if a lake or stream was navigable <u>at the time of statehood,</u> the bed belongs to the state.

The test of navigability for title purpose has been at issue in many cases before the United States Supreme Court. From those decisions it can be concluded that navigability for title purposeis determined by looking at the "natural and ordinary condition" of the waters at the time of statehood, and whether, in fact, they were used for "customary modes of trade or travel on water." This test is sometimes outlined as waters "susceptible of being used, in their ordinary condition, as highways for commerce." This suggests that even some smaller streams, if used for commercial trade (e.g., fur traders' canoes), could meet this test. Navigability in Arkansas dates back to stream conditions when Arkansas entered the Union in 1836.

If the water body is non-navigable, the riparian owner's rights extend to the middle thread or center of the stream unless the deed by which the property was acquired described the boundaries in some other, more specific way. Some states allow the riparian owners to assert rights to the center of the lake in "pie shaped" parcels. The general rule in Arkansas appears to be that the owners of the lands surrounding a non-navigable lake have title to the bed of the lake which extends to the center

of the lake.[102] This seems to be the case, in particular, where the boundaries were meandered by a United States Government Survey.[103]

Riparian right to use the surface

The riparian owner not only has the right to make reasonable use of the water itself, but also has a similar right to make reasonable use of the surface of the water. This right in non-navigable streams could easily be attributed to ownership of the bed lying underneath the stream or lake. Similarly, the riparian's right to make use of the surface of a navigable waterbody could easily be justified as no different from the right of any other member of the public. However, the individual's status as a riparian owner brings with it rights separate and apart from those of a stream bed owner or a member of the public, and allows riparian owners to use the surface in ways that others cannot. For example, a riparian owner of property along the shore of a non-navigable lake gains rights to use the entire surface of the lake but must share that right with other riparian owners. Some states have addressed these questions by legislation, but Arkansas has no applicable statutes. Of course, rules regarding use may be established by an appropriate agency if the lake is wholly artificial and constructed by that authority (for example, the U.S. Army Corps of Engineers). Again, the issue of navigability may be important to determine the relative rights of the parties.

Public rights to surface use

The right of the public to use the surface of a stream or lake also depends on a navigability test. This test, however, is not necessarily the same test as that applied to determine the question of stream bed ownership. Recreational use of water has led to greater recognition of public rights through a state test of navigability that may extend the concept beyond the traditional "commercial or trade" use.

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[102] Rhodes v. Cissel, 82 Ark. 367, 101 S.W. 758 (1907); Little v. Williams, 88 Ark. 37, 113 S.W. 340 (1908); McGahhey v. McCollum, 207 Ark. 180, 179 S.W.2d 66 (1944); Johnson v. Smith, 215 Ark. 247, 219 S.W.2d 926 (1949).

[103] Glassock v. National Box Co., 104 Ark. 154, 148 S.W.248 (1912).

In Arkansas, this concept was expanded in the 1980 case of Arkansas v. McIlroy.[104] The evidence introduced in the case showed that the Mulberry River had been used by the public for recreational purposes for many years, including fishing, swimming and canoeing. The court evaluated the "standard" definition of navigability but adopted what might be called the "pleasure boat" definition of navigability—one that bases the public's right to use a stream on its recreational value, not commercial adaptability in the traditional sense. For this purpose the court suggested that it is not necessary that the stream be floatable at all times; rather, it can be deemed navigable based on its capability during part of the year for use by flat-bottomed boats for fishing or canoes for floating – or both.

Regulatory controls

The federal government, through the commerce clause of the U.S. Constitution, has considerable power related to development activities within watercourses. These include the planning, construction and operation of flood control, irrigation, hydroelectric and water supply projects. The power to regulate interstate commerce is broad and easily encompasses these development activities.

In early cases, the courts focused on the question of whether the particular waterway was navigable as a means of determining whether the activity was within this federal power. The Congressional power to regulate commerce necessarily includes power over navigation. Thus, any exercise of state authority over navigable waters is subject to the overriding jurisdiction of the federal government. However, it is clear that congressional authority over water does not depend solely on the stream's navigability. The navigation power certainly gives that authority, but "interstate commerce" is much broader than navigation. As a result, more recent interpretations allow the extension of federal regulatory authority to both navigable streams and lakes and their non-

[104] State v. McIlroy, 268 Ark. 227, 595 S.W.2d 659 (1980).

navigable tributaries. Federal reclamation, hydroelectric projects, and federal water pollution control can be justified on grounds broader than navigation regulation.

The federal power may extend to activities on "waters" well beyond those that are navigable. For example, the Clean Water Act's expansive authority to control water pollution allows the U.S. Army Corps of Engineers to require what are called 404 permits for activities such as "dredging or filling" (e.g., dam construction, filling wetlands) in waters that would, under no definition, be considered navigable such as wetlands.

Chapter 10. Water quality

In 1972, Congress amended the Federal Water Pollution Control Act with an extensive focus on clean water. The sections dealing with control of water pollution were identified as the "Clean Water Act." Congress approved the Clean Water Act to "restore and maintain the chemical, physical, and biological integrity of the nation's waters."[105] The Act, which regulates or prohibits discharge of pollutants into the surface waters of the United States, divides water pollution sources into two general categories: point sources and nonpoint sources.

Point sources discharge to a water body from a particular, identifiable location such as a pipe. Point sources are regulated through the National Pollutant Discharge Elimination System (NPDES), a mandatory permit program. The Act provides that upon EPA approval, a state may administer NPDES permits in a manner no less strict than that provided for by federal regulation. In 1986, the EPA granted to Arkansas the authority to administer its NPDES program. This authority is implemented by programs of the Arkansas Department of Environmental Quality (ADEQ). Arkansas water pollution legislation supplements the federal law, often detailing procedures which are to be followed by ADEQ in carrying out its functions.[106] ADEQ develops pollution limits for Arkansas's waterways, basing the limits on each waterway's designated use. ADEQ's water division permits all sorts of activities, including wastewater treatment, storm water, industrial point source discharges, coal mining, land application of drilling fluids, and animal liquid waste management systems.

Nonpoint source pollution is harder to identify because it consists of natural and human-created pollutants that are picked up by water traveling over or through the ground and are eventually deposited into waterbodies. Examples of nonpoint source pollutants include fertilizers,

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[105] Clean Water Act, 33 U.S.C. § 1251 et seq.

[106] See, Arkansas Water and Air Pollution Control Act, 1949 Ark. Acts 472 (as amended and codified at Ark. Code Ann. § 8-4-101 et seq.).

insecticides, herbicides, oil, grease, sediment from improperly managed construction sites, and waste from septic systems. Nonpoint source pollution was not addressed by Congress until 1972.

One of the first goals of the Clean Water Act was to identify areas with substantial water quality control problems so that management plans for those areas could be developed.[107] These plans, also known as "Section 208 plans," included pollution from nonpoint sources. Congress gave EPA very little enforcement authority and federal funding for Section 208 management plans was abandoned in the 1980s.

The Water Quality Improvement Act of 1987[108] added the Section 319h nonpoint source management program to the Clean Water Act. This section added the following policy statement to the Clean Water Act's goals and policy provision:

> …it is the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this chapter to be met through the control of both point and nonpoint sources of pollution.[109]

Section 319 does not require states to implement mandatory regulatory controls. Instead, Section 319 provides grant money which supports a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects.

In Arkansas, the Arkansas Natural Resources Commission administers the Section 319 Nonpoint Source Management Program. Federal grant money is provided on a matching funds basis under which states must provide forty percent of the funds, and the federal government provides the remaining sixty percent. With the exception of areas designated by the General

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[107] 33 U.S.C. § 1288.
[108] Water Quality Act of 1987, Pub. L. No. 100-4, 101 Stat. 7 (1989) (codified at 33 U.S.C. § 1329).
[109] 33 U.S.C. § 1251(a).

Assembly as Nutrient Surplus Areas, the state's nonpoint pollution control program is non-regulatory and focuses on the development of voluntary best management practices.

In 2003, the Arkansas General Assembly assigned ANRC regulatory authority to oversee nutrient management of dry poultry litter. The General Assembly declared counties in western and northwestern Arkansas to have excessive amounts of two nutrients, phosphorus and nitrogen.[110] For decades, farmers applied nutrients available from locally abundant poultry litter to crops grown in rocky soil. Parts of the declared areas have also experienced unprecedented growth, becoming one of the fastest growing corridors in the United States. Regardless of how impacts to water quality occurred, the General Assembly has provided ANRC with authority to lessen the impacts and improve water quality.[111] ANRC programs collect poultry housing information statewide, provide certification for nutrient management planner and nutrient management applicators, and until funds are exhausted, provide up to $15 of cost share money for transporting litter out of nutrient surplus area watersheds. Within the Nutrient Surplus Areas, persons applying nutrients must follow ANRC rules designed to protect the watershed.[112]

[110] Ark. Code Ann. § 15-20-1104.
[111] Ark. Code Ann. §§ 15-20-901 et seq., 15-20-1001 et seq., 15-20-1101 et seq., and 15-20-1201 et seq.
[112] ANRC Title 22, Nutrient and Poultry Litter Application and Management Program

Chapter 11. State agencies and political subdivisions concerned with water resources

A number of state agencies and political subdivisions in Arkansas are involved in water resource matters. The authority of each is defined by statute and each develops its own policies or issues its own rules and regulations to implement the legislative mandate.

A. State agencies

Arkansas Natural Resources Commission (ANRC)

The Arkansas Natural Resources Commission (ANRC) has a wide range of responsibilities related to water resource planning and management. ANRC is responsible for preparing the Arkansas Water Plan. As a part of this process, ANRC must evaluate both water supplies and water needs. The agency must make a number of important decisions, including the establishment of minimum streamflows and the determination of whether excess surface water exists. ANRC also issues certificates for the registration of water diverted from streams and, during shortage, can allocate among persons taking water from streams. The agency conducts a ground water usage reporting program and, if it becomes necessary in the future, is authorized to regulate ground water rights within critical ground water areas. This regulatory authority has not been used.

ANRC also issues permits for construction of dams to impound water, coordinates the federal National Flood Insurance Program in Arkansas, and accredits floodplain managers.

ANRC administers various financing programs for water projects under state law. The Commission is authorized to negotiate interstate compacts with adjoining states regarding waters in interstate rivers. ANRC cooperates with local bodies such as levee and drainage districts, irrigation districts, and local soil and water conservation districts. ANRC is actively involved in promoting management plans for the reduction of water pollution from nonpoint sources. The Commission also sponsors, develops and operates mitigation banking programs for aquatic resources, including

wetlands, streams, and deep water aquatic habitats. The Commission also works with private landowners to encourage through tax credits restoration or creation of wetlands and riparian zones.

Arkansas Department of Environmental Quality

The Arkansas Department of Environmental Quality (ADEQ) implements policies set by the Pollution Control and Ecology Commission.[113] ADEQ is the state's delegated authority responsible for implementing the National Pollution Discharge Elimination System (NPDES) program. ADEQ also has responsibilities related to air pollution control, solid waste, and hazardous waste.

The Department develops and enforces surface water quality standards, licenses persons operating and maintaining wastewater systems, issues "no discharge" permits and salt water disposal system permits, and investigates citizen complaints regarding water pollution. While some of this authority derives from the federal Clean Water Act, Arkansas statutes on water pollution control govern many of the procedures to be followed by the Department in carrying out its functions.

Arkansas Waterways Commission

This seven-member commission is composed of two at-large members plus one member from each of Arkansas's five navigable stream basins.[114] The purpose of the Commission is to study and coordinate efforts to promote navigable streams for water transportation purposes. A part of that function is to assist other agencies in the coordination of planning any activities which would affect commercial navigation.

Arkansas Water Well Construction Commission

[113] Ark. Code Ann. § 8-1-201 et seq.
[114] Ark. Code Ann. § 15-23-201 et seq.

The Arkansas Water Well Construction Commission regulates the development of underground water supplies to provide safe water for public consumption.[115] The Commission licenses water well contractors and registers drillers, pump installers, and their apprentices. The seven-member Commission is composed of the Executive Director of the Arkansas Natural Resources Commission, the Director of the Health Department, a representative from the geothermal industry, and a driller member from each of Arkansas's four congressional districts. Investigative and administrative functions are carried out by staff members of the Arkansas Natural Resources Commission.

Arkansas Oil and Gas Commission

The purpose of the Arkansas Oil and Gas Commission is to prevent waste, encourage conservation, and protect the correlative rights of ownership associated with the production of oil, natural gas, brine and associated products.[116] One of its purposes is to encourage and aid in the development of plans for gathering, storing, impounding or otherwise disposing of salt water produced in the drilling or operation of wells. Their primary concern related to water resources is to prevent the flow of such water into the streams of the state and to protect the ground water resources of the state.

Arkansas Forestry Commission

The Arkansas Forestry Commission is charged with the development and operation of Arkansas's forestry industry.[117] This Commission has the power and authority to acquire and designate land as state forests to be administered, protected and developed for the purpose of

[115] Ark. Code Ann. § 17-50-101 et seq.
[116] Ark. Code Ann. § 15-71-101 et seq.
[117] Ark. Code Ann. §15-21-101 et seq.

watershed protection, erosion and flood control, and recreation, as well as forestation, re-forestation, and the production of forest crops.

Arkansas Geological Survey

Arkansas Geological Survey provides industry, the general public and agencies with information concerning the quantity and quality of water resources, as well as the presence of oil and gas and other mineral resources located within the state.[118] This agency works with the United States Geological Survey to conduct regional water resource investigations and supply the state with reports on its findings. Topographic maps, published by the U.S. Geological Commission, may be obtained from the Arkansas Geological Survey.

Arkansas Public Service Commission

This commission has jurisdiction over the rates and services offered by the few private utilities selling water to the public.[119] In 2011, the Public Service Commission regulated three drinking water utilities but no sewer utilities. The Commission does not regulate municipal utilities of cities, towns, improvement districts or any other public or quasi-public corporation created or organized under the Constitution or laws of the State of Arkansas. The Commission also does not regulate any facility with less than $200,000 per year in water or sewer revenues or any facility belonging to a property owners' association, enjoyed only by members of that association. The Arkansas Public Service Commission is also responsible for regulating navigable water crossings by a public service facility, such as an electric power line or a pipe line.[120]

[118] Ark. Code Ann. § 15-55-201 et seq.
[119] Ark. Code Ann. § 23-4-201 et seq.
[120] Ark. Code Ann. § 23-3-503.

Arkansas Department of Health

The Arkansas Department of Health administers various programs with county health departments for the safety of the public.[121] The Department tests water to determine safety of drinking water for human consumption and reviews permit applications for some wastewater systems. It also conducts environmental surveillance and monitoring of radioactive materials in water,

Arkansas Game and Fish Commission

Amendment 35 of the Constitution of the State of Arkansas vests control, management, restoration, conservation and regulation of birds, fish, game and wildlife resources, and the administration of the laws pertaining to these resources in the Arkansas State Game and Fish Commission. The Commission also has authority over hatcheries, sanctuaries, refuges, and reservations used for these purposes.

Arkansas Natural Heritage Commission

The Arkansas Natural Heritage Commission exists as a vehicle for the acquisition by gift or purchase of natural areas ("lands, waters, and interests therein") with special ecological characteristics.[122] For example, areas of unusual aesthetic or ecological quality along the banks of rivers, lakes, or streams are among the types of areas which might be included in the natural areas system. The Commission inventories such properties and advises other agencies concerning these areas but has no regulatory authority over property not actually acquired for the natural areas system.

[121] Ark. Code Ann. § 20-7-101 et seq.
[122] Ark. Code Ann. §15-20-305 et seq.

The Arkansas Natural Heritage Commission, also identifies high quality streams in Arkansas, and then works with river landowners to protect these streams. It also works with quorum courts and the state legislature to formulate and adopt adequate protective measures for each stream under consideration for addition to the Arkansas Natural and Scenic Rivers System.

Water Resources Research Center

Arkansas's Water Resources Research Center, located at the University of Arkansas, Fayetteville, administers the state water resources research program. Each state and United States territory has a corresponding institution operating under a federal-state partnership to resolve state and regional water problems. Each center coordinates, conducts, and arranges research to educate water scientists, engineers, technicians, water managers, and the public.

Arkansas-Oklahoma Arkansas River Compact Commission

This Commission[123] is composed of representatives of both Arkansas and Oklahoma. This compact provides for an equitable apportionment of the water of the Arkansas River between the States of Arkansas and Oklahoma, provides an entity for the administration of the water apportionment agreed to by the states concerned, describes which state may use specific waters, and promotes the orderly development of the river. The compact also encourages the maintenance of an active pollution abatement program in each of the two states and furthers the reduction of both natural and man-made pollution in the waters of the Arkansas River Basin. In addition, the compact facilitates cooperation between the water administration agencies of Arkansas and Oklahoma in the total development and management of water resources of the Arkansas River Basin.

[123] Ark. Code Ann. 15-23-401 et seq.

Red River Compact Commission

This commission includes Arkansas, Oklahoma, Texas, and Louisiana.[124] The purpose of the Red River Compact is to promote interstate comity and remove causes of controversy between each of the affected states by governing the use, control and distribution of the interstate water of the Red River and its tributaries. It is also intended to provide an equitable apportionment of water among the signatory states by defining reaches or subdivisions of the Red River.

The compact is designed to control and alleviate deterioration of the waters of the Red River Basin. It also provides an active program for the conservation of water, protection of lives and property from floods, improvement of water quality, and development of navigation and regulation of flows in the Red River Basin. It serves as a basis for state or joint state planning and action, because it identifies and apportions each state's share of interstate water in the Red River.

B. Political subdivisions

Conservation districts

Arkansas has 75 conservation districts[125] with borders approximating county boundaries. Each district was created by local land owners petitioning the Arkansas Natural Resources Commission. These districts were originally created to carry out preventive and control measures for flooding and to conserve, develop, and use soil and water resources. Conservation districts work with ANRC, U.S. Department of Agriculture, and land owners within the district.

[124] Ark. Code Ann. § 15-23-501 et seq.
[125] Ark. Code Ann. § 14-125-101 et seq.

Regional water distribution districts

Regional Water Distribution Districts are public, nonprofit organizations created to furnish water.[126]These districts are discussed in greater detail in Chapter 7.

Irrigation, drainage and watershed improvement districts

Irrigation, drainage and watershed improvement districts are created by circuit court order.[127] These districts are discussed in greater detail in Chapter 7.

Levee districts

Historically, some parts of our state are subject to overflow from flood waters. Levee districts have been created to combat these problems through special acts of the General Assembly or pursuant to statutory law. [128] These districts provide for the construction of a levee or a system of levees for the protection of lands from overflowing streams, rivers and tributaries.

Each levee district board is composed of three elected directors. If land lies within two or more counties and is subject to overflow from the same river, and can be protected by the same levee or system of levees, several districts may consolidate into one district for the whole region, with the approval of the respective county judges.

Levee districts may assess taxes against benefited lands and may acquire land by condemnation if necessary. If necessary, a levee district may cooperate with any similar district in another state to complete and maintain a system of levees.

[126] Ark. Code Ann. § 14-116-101 et seq.
[127] Ark Code Ann. § 14-117-101 et seq.
[128] Ark. Code Ann. § 14-123-201 et seq.

Deferred maintenance, imposition of stringent new federal requirements, and inadequate money to perform repairs maintenance are some of the challenges Arkansas currently faces regarding its levee systems.

Drainage districts

Drainage districts are created to plan and construct a system of drainage for landowners in the district.[129] Districts may issue bonds, assess benefits upon lands within the district, levy taxes, condemn property, and secure aid from the federal government and other agencies.

Even though some drainage districts in Arkansas may be formed by special act, these districts are usually created by the circuit court where the land is within a single district or wholly within one county. If the boundary of a proposed drainage district crosses county lines, the circuit court of the county wherein the largest portion of the land lies is the proper court to form the district. The governing body of such a district is composed of three commissioners appointed by the court wherein it was created.

Combination levee and drainage districts

Levee and drainage districts may combine into one district to prevent duplication of work and decrease expenses.[130] In constructing flood control work, the levee districts, drainage districts or levee and drainage districts, or federal agencies may exercise the right of eminent domain through condemnation proceedings under the laws of the United States and the State of Arkansas, even though the districts must make proper compensation for the lands taken in order to complete said districts.[131]

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[129] Ark. Code Ann. § 14-117-401 et seq.
[130] Ark. Code Ann. § 14-120-310.
[131] Ark. Code Ann. § 14-120-306.

Improvement districts for rivers and tributaries

When Congress enacts any law adopting and authorizing a project for the improvement of any river, tributary, or stream bordering Arkansas, an improvement district within the area embraced by the project may be established by petitioning the circuit court having jurisdiction of the area involved.[132] When created, a district has all the rights, powers and privileges of drainage districts. However, the district is limited to the purposes of complying with the requirements made of the local interest of drainage, levee or flood control projects, which are approved or authorized by the Congress of the United States and constructed by a federal agency in the district. The Interstate Watershed Cooperation Act extended the authority for the improvement district for rivers and tributaries and should be consulted.[133]

Metropolitan port authorities

A metropolitan port authority may be created by any municipality or county or any combination of one or more municipalities in one or more counties, when they lie within or near a navigable watercourse.[134] These authorities develop and maintain harbors, ports, river-rail terminals, barge terminals, and industrial parks. In order to organize and establish a metropolitan port authority, the circuit court must be petitioned and an order issued.

[132] Ark. Code Ann. § 14-118-101 et seq.
[133] Ark Code Ann. § 14-115-101 et seq.
[134] Ark. Code Ann. § 14-185-101 et seq.

Conclusion

Generally, water law changes very slowly. However, one can anticipate a few potential alterations in the near future. Beginning in 2011, the Arkansas Natural Resources Commission will begin a comprehensive update of the Arkansas Water Plan. The planning process will update our understanding of water resource challenges in the years ahead and will provide direction to state agencies carrying out state water policy.

Federal law and regulation, such as Total Maximum Daily Load (TMDL) implementation, will increasingly drive the allocation of efforts and financial resources. Likewise, actions of sister states through regulation in the form of water quality standards and litigation will help determine where we spend our time, effort, and money.

New water needs from developing industries, such as the natural gas drilling in the Fayetteville Shale Play will require novel responses by state government.

As always, the State will continue to pursue conservation, education, and the efficient use of surface water to ensure an abundant supply of clean water in a healthy environment for all.

"Cusher, Annette" <Cusher@adeq.state.ar.us> July 1, 2010 6:53 AM
To: "'curt@grish.org'" <curt@grish.org>
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>
Arkwood Superfund Site

2 Attachments, 1.9 MB

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 20...pdf (1.9 MB)

ADEQ
ARKANSAS
Department of Environmental Quality

June 8, 2010

U.S. Environmental Protection Agency
Attn: Mr. Shawn Ghose (6SF-RA)
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202

Subject: Arkwood, Inc. 2009 Annual Report
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 2009 Annual Report for the Arkwood, Inc. facility in Omaha, Arkansas. We are in concurrence with the information and recommendations contained in the report. Operations and site maintenance activities should continue as planned.

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

for Marilyn Egan, BS
Geologist, Hazardous Waste

cc: Jean Mescher, McKesson Corporation, One Post Street, San Francisco, CA 94104

CC Grisham <grish@me.com>

August 22, 2013 3:00 PM

To: Stephen Tzhone <tzhone.stephen@epa.gov>, Tammie Hynum <HYNUM@adeq.state.ar.us>
Cc: CC Grisham <grish@me.com>, Carlos Sanchez <sanchez.carlos@epa.gov>
Fwd: Arkwood - Pentachlorophenol | Pesticides | US EPA

9 Attachments, 5 MB

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:

"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

1. 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 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

pentachloro…red (1.1 MB)

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 09 REC'D
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)

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8/22/13 8:30 AM

http://water.epa.gov/drink/contaminants/basicinformation/pentachlorophenol.cfm

EPA United States Environmental Protection Agency

Water: Basic Information about Regulated Drinking Water Contaminants

You are here: Water » Drinking Water » Drinking Water Contaminants » Basic Information about Regulated Drinking Water Contaminants » Basic Information about Pentachlorophenol in Drinking Water

Basic Information about Pentachlorophenol in Drinking Water

EPA regulates pentachlorophenol in drinking water to protect public health. Pentachlorophenol may cause health problems if present in public or private water supplies in amounts greater than the drinking water standard set by EPA.

- What is pentachlorophenol?
- Uses for pentachlorophenol.
- What are pentachlorophenol's health effects?
- What are EPA's drinking water regulations for pentachlorophenol?
- How does pentachlorophenol get into my drinking water?
- How will I know if pentachlorophenol is in my drinking water?
- How will pentachlorophenol be removed from my drinking water?
- How do I learn more about my drinking water?

Pentachlorophenol at a Glance

Maximum Contaminant Level (MCL) = 0.001 milligrams per Liter (mg/L) or 1 part per billion (ppb)

Maximum Contaminant Level Goal (MCLG) = zero

Health Effects
Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys and may have an increased risk of getting cancer.

Drinking Water Health Advisories provide more information on health effects

Chemical Abstract Service Registry Number
87-86-5

Sources of Contamination
Discharge from wood-preserving factories

List of all Regulated Contaminants (PDF) (6 pp, 396K, About PDF)

What is pentachlorophenol?
Pentachlorophenol is a white organic solid with needle-like crystals and a phenolic odor.

Uses for pentachlorophenol.
The greatest use of pentachlorophenol is as a wood preservative (fungicide). Though once widely used as an herbicide, it was banned in 1987 for these and other uses, as well as for any over-the-counter sales.

If you are concerned about pentachlorophenol in a private well, please visit:

- EPA's private drinking water wells Web site
- Water Systems Council Web site EXIT Disclaimer

What are pentachlorophenol's health effects?
Some people who drink water containing pentachlorophenol well in excess of the maximum contaminant level (MCL) for many years could experience problems with their liver or kidneys and may have an increased risk of getting cancer.

This health effects language is not intended to catalog all possible health effects for pentachlorophenol. Rather, it is intended to inform consumers of some of the possible health effects associated with pentachlorophenol in drinking water when the rule was finalized.

What are EPA's drinking water regulations for pentachlorophenol?
In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur. These non-enforceable health goals, based solely on possible health risks and exposure over a lifetime with an adequate margin of safety, are called maximum contaminant level goals (MCLG). Contaminants are any physical, chemical, biological or radiological substances or matter in water.

The MCLG for pentachlorophenol is zero. EPA has set this level of protection based on the best available science to prevent potential health problems. EPA has set an enforceable regulation for pentachlorophenol, called a maximum contaminant level (MCL), at 0.001 mg/L or 1 ppb. MCLs are set as close to the health goals as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The Phase IIB Rule, the regulation for pentachlorophenol, became effective in 1993. The Safe Drinking Water Act requires EPA to periodically review the national primary drinking water regulation for each contaminant and revise the regulation, if appropriate. EPA reviewed pentachlorophenol as part of the Six Year Review and determined that the zero MCLG and 0.001 mg/L or 1 ppb MCL for pentachlorophenol are still protective of human health.

- More information on the Six Year Review of Drinking Water Standards.

States may set more stringent drinking water MCLGs and MCLs for pentachlorophenol than EPA.

How does pentachlorophenol get into my drinking water?
The major source of pentachlorophenol in drinking water is discharge from wood-preserving factories.

A federal law called the Emergency Planning and Community Right to Know Act (EPCRA) requires facilities in certain industries, which manufacture, process, or use significant amounts of toxic chemicals, to report annually on their releases of these chemicals. For more information on the uses and releases of chemicals in your state, contact the Community Right-to-Know Hotline: (800) 424-9346.

- EPA's Toxics Release Inventory (TRI) Web site provides information about the types and amounts of toxic chemicals that are released each year to the air, water, and land.

How will I know if pentachlorophenol is in my drinking water?
When routine monitoring indicates that pentachlorophenol levels are above the MCL, your water supplier must take steps to reduce the amount of pentachlorophenol so that it is below that level. Water suppliers must notify their customers as soon as practical, but no later than 30 days after the system learns of the violation. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

- See EPA's public notification requirements for public water systems.

If your water comes from a household well, check with your health department or local water systems that use ground water for information on contaminants of concern in your area.

- For more information on wells, go to EPA's Web site on private wells.

How will pentachlorophenol be removed from my drinking water?
The following treatment method(s) have proven to be effective for removing pentachlorophenol to below 0.001 mg/L or 1 ppb: granular activated carbon.

How do I learn more about my drinking water?
EPA strongly encourages people to learn more about their drinking water, and to support local efforts to protect the supply of safe drinking water and upgrade the community water system. Your water bill or telephone book's

government listings are a good starting point for local information.

Contact your water utility. EPA requires all community water systems to prepare and deliver an annual consumer confidence report (CCR) (sometimes called a water quality report) for their customers by July 1 of each year. If your water provider is not a community water system, or if you have a private water supply, request a copy from a nearby community water system.

- The CCR summarizes information regarding sources used (i.e., rivers, lakes, reservoirs, or aquifers), detected contaminants, compliance and educational information.
- Some water suppliers have posted their annual reports on EPA's Web site.

Other EPA Web sites

- Find an answer or ask a question about drinking water contaminants on EPA's Question and Answer Web site or call EPA's Safe Drinking Water Hotline at (800) 426-4791
- EPA's Integrated Risk Information System
- EPA's Substance Registry System

Last updated on Monday, May 21, 2012

http://water.epa.gov/drink/contaminants/basicinformation/pentachlorophenol.cfm

2002_12_30...df (422 KB)

20130822...item (102 KB)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1445 Ross Avenue
Dallas, TX 75202

August 22, 2012

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Ms. Jean A. Mescher, Project Coordinator
Director Environmental Services
McKesson Corporation
One Post Street, 34th Floor
San Francisco, CA 94104

RE: Groundwater Remediation
Arkwood, Inc. Superfund Site

Dear Ms. Mescher,

This letter provides the U.S. Environmental Protection Agency (EPA) direction for the path forward on groundwater remediation activities at the Arkwood, Inc. Superfund Site. From June 2012, comments on the status of groundwater remediation were solicited by EPA Region 6 and received from McKesson Corporation (McKesson), Arkansas Department of Environmental Quality (ADEQ), and EPA Office of Research and Development (ORD). These comments resulted in a joint McKesson-EPA-ADEQ conference call on August 1, 2012. Following this call, two additional responses were received and are enclosed with this letter.

The EPA direction for the path forward on groundwater remediation activities at the Arkwood, Inc. Superfund Site are as follows:

1) Operation of the pilot injection system is to be ceased in the month of September 2012. This cessation of operations is expected prior to any required monitoring in the month of September 2012.

2) Starting from September 2012, required monitoring is to continue on a monthly basis, with additional collection of temperature, pH, and dissolved oxygen measurements. Monitoring will continue until EPA, with ADEQ consultation, deems that such monitoring will no longer be needed.

3) EPA has continued concerns on the fate and transport of Pentachlorophenol (PCP) contaminated groundwater from the site. These concerns (detailed in Enclosure 2) arise from the review of the previous 1991 dye tracing study, as well as the lack of

groundwater monitoring other than at the mouth and weir at New Cricket Spring. McKesson is directed to submit a proposal in September 2012 that details the steps that will be taken to alleviate these concerns.

I look forward to continued efforts to bring site groundwater remediation activities to conclusion. If there are any questions, please feel free to contact me by telephone at 214.665.2755, or via email at moya.ruben@epa.gov.

Sincerely,

Ruben Moya
Remedial Project Manager

Enclosures (2)

Enclosure (1): Arkwood 8-9-2012-Responses to Comments
Enclosure (2): 2012_8_15_Dye Tracer Test_Critical Review_2012

cc: Mark Moix, ADEQ

	Priority Pollutant	CAS Number	Freshwater		Saltwater		Human Health for the consumption of		FR Cite / Source
			CMC [1] (acute) (µg/L)	CCC [1] (chronic) (µg/L)	CMC [1] (acute) (µg/L)	CCC [1] (chronic) (µg/L)	Water + Organism (µg/L)	Organism Only (µg/L)	
46	2,4-Dichlorophenol	120832					77 B,U	290 B,U	65 FR 66443
47	2,4-Dimethylphenol	105679					380 B	850 B,U	65 FR 66443
48	2-Methyl-4,6Dinitrophenol	534521					13	280	65 FR 66443
49	2,4-Dinitrophenol	51285					69 B	5,300 B	65 FR 66443
50	2-Nitrophenol	88755							
51	4-Nitrophenol	100027							
52	3-Methyl-4-Chlorophenol	59507					U	U	
53	Pentachlorophenol	87865	19 F,K	15 F,K	13 bb	7.9 bb	0.27 B,C	3.0 B,C,H	65 FR 31682
54	Phenol	108952					10,000 ll,U	860,000 ll,U	74 FR 27535
55	2,4,6-Trichlorophenol	88062					1.4 B,C	2.4 B,C,U	65 FR 66443
56	Acenaphthene	83329					670 B,U	990 B,U	65 FR 66443
57	Acenaphthylene	208968							65 FR 66443
58	Anthracene	120127					8,300 B	40,000 B	65 FR 66443
59	Benzidine	92875					0.000086 B,C	0.00020 B,C	65 FR 66443
60	Benzo(a) Anthracene	56553					0.0038 B,C	0.018 B,C	65 FR 66443
61	Benzo(a) Pyrene	50328					0.0038 B,C	0.018 B,C	65 FR 66443
62	Benzo(b) Fluoranthene	205992					0.0038 B,C	0.018 B,C	65 FR 66443
63	Benzo(ghi) Perylene	191242							65 FR 66443
64	Benzo(k) Fluoranthene	207089					0.0038 B,C	0.018 B,C	65 FR 66443

Ozark UNDERGROUND LABORATORY 1572 Aley Lane • Protem, MO 65733 • (417) 785-4289 • fax (417) 785-4290 • contact@ozarkundergroundlab.com

October 11, 2012

Jean A. Mescher
McKesson Corporation
One Post Street, 34th Floor
San Francisco, CA 94104

Re: Arkwood, Inc. Superfund Site

Dear Ms. Mescher:

I have reviewed the Arkwood, Inc. Superfund Site Groundwater Remediation Summary dated June 2012 (Revised August 2012) and the August 9 2012 letter from you to Mr. Stephen Tzhone of EPA. I have also reviewed a substantial amount of existing site information including the 1992 "Groundwater Tracing Investigation" (Aley 1992) that I conducted at and around the site. Based on this information and comments raised by EPA, I have identified three issues I wish to address. They are:

1. The possibility that the 1991-1992 groundwater tracing study did not adequately identify all flow paths for contaminants derived from the Arkwood site.
2. The nature of the groundwater flow system existing between the former sinkhole area and New Cricket Spring, and the likelihood that intermediate monitoring wells could intercept such flow and yield useful data.
3. The appropriateness of the enhanced ozone treatment strategy for this hydrogeologic setting.

A copy of my resume is attached in Appendix B. I am nationally certified as a hydrogeologist by the American Institute of Hydrology and have extensive experience in the hydrology of karst areas in the Ozarks and elsewhere. I am licensed as a Professional Geologist in Arkansas, Missouri, Kentucky, and Alabama. I have taught at least 20 professional short-courses with titles such as "Practical Karst Hydrogeology with Emphasis on Groundwater Monitoring", and have taught these for various professional organizations including the Association of Ground Water Scientists and Engineers (a professional division of the National Water Well Association). Finally, I am very familiar with the Arkwood site and with the hydrogeology of the geologic units present.

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Issue 1. The possibility that the 1991-1992 groundwater tracing study did not adequately identify all flow paths for contaminants derived from the Arkwood site.

There were two different dye introduction points for the groundwater tracing study. They were located 3,100 feet apart and bracketed the Arkwood site. The dye introduction points were designed to identify all points to which contaminated water from the Arkwood site would flow.

There were a total of 79 sampling stations used during this groundwater tracing study. Four of these were wells and 28 were springs. Four of the springs were in the railroad tunnel that is adjacent to and at an elevation lower than most of the Arkwood site. The sampling locations surrounded the Arkwood site.

Trace 91-01 was the Woodchip Pile Trace. This was the dye introduction point on the southeast end of the Arkwood site. The dye introduction point was within the Cricket Creek [J1]topographic basin. Dye introduced at this point was detected at a total of 12 sampling stations. These included all of the springs within the railroad tunnel (including water discharging from both ends of the tunnel) and in stream flow and springs easterly and downstream of the tunnel in Walnut Creek and in Barren Fork Creek downstream of the point where that stream receives water from Walnut Creek. All of these sampling stations were in the Walnut Creek topographic basin or received water from this basin.

Trace 91-02 was the New Cricket Spring Trace. This was the dye introduction point on the northwestern end of the Arkwood site. Dye introduced at this point was detected at a total of 14 sampling stations, all of which were in the Cricket Creek topographic basin. The dye introduction point was within the Cricket Creek topographic basin.

Both Cricket Creek and Walnut Creek are gaining (rather than losing) streams once one gets a very short distance downstream of the Arkwood site. This greatly minimizes the possibility that water derived from the Arkwood site would move into groundwater supplies outside of these two topographic basins.

Given the above conditions it is my conclusion that the dye tracing study identified all potential receptor sites for contaminants yielded from the Arkwood site[J2].

Issue 2. The nature of the groundwater flow system existing between the former sinkhole area and New Cricket Spring, and the likelihood that intermediate monitoring wells could intercept such flow and yield useful data.

The Arkwood site is underlain by the Boone Formation and the St. Joe Formation (ERM 1989). The area in the immediate vicinity of where most of the wood treating was conducted is mapped as Boone Formation, and New Cricket Spring discharges from the St. Joe Formation. The St. Joe Formation in Arkansas has often been considered to be a unit of the Boone Formation. Both formations are predominantly limestone with chert being less abundant in the St. Joe Formation.

An epikarstic zone is routinely found in the upper 15 to 20 feet of the Boone and St. Joe Formations. The epikarstic zone exists immediately below the overlying residuum. All soil was removed from the Arkwood site to allow for use of the site for wood treating. The epikarstic zone consists of a very irregular bedrock surface with numerous solutional openings in the rock, many of which are partially to almost completely filled with fine sediments.

Both the Boone and St. Joe Formations are cavernous karst units where groundwater flow is along solutionally-widened joints and bedding planes. Groundwater flow along fractures that have not been solutionally enlarged is negligible, so this should be viewed as a karst aquifer rather than as a fractured rock aquifer. Karst aquifers have been solutionally modified by the passing water to create a hydrologically integrated flow system to transport groundwater in a down-gradient direction. In contrast, fractured rock aquifers have not been modified by the passing water and do not provide this integrated flow system.

The extent of water transport through this epikarstic aquifer to New Cricket Spring is well demonstrated by the flow rate data from this spring provided in the "Arkwood, Inc. Superfund Site Groundwater Remediation Summary June 2012 (Revised August 2012)". Those data show the following:

- There are 229 flow rate measurements made between July 2, 1996 and May 23, 2012.
- Flow rates range from 0.132 gallons per minute (gpm) to 636 gpm. The peak observed flow is 3.5 orders of magnitude greater than the minimum observed flow. Such a wide range in flow rates is typical of small and well integrated eipkarstic aquifers.
- 86% of the flow rate measurements are less than 10% of the peak observed flow rate. This also demonstrates a well-integrated karst aquifer.
- Flow rates recede rapidly after a peak flow event; this is shown by the following flow rates in 2006.
    - 11/30 flow 636 gpm
    - 12/4 flow 59 gpm
    - 12/6 flow 37 gpm
    - 12/18 flow 21 gpm

Attached as Appendix A is a short publication on groundwater tracing in the epikarst (Aley 1997) that will hopefully be helpful to the reader. It groups epikarstic zones into (1) rapidly draining, (2) seasonally saturated, and (3) perennially saturated zones. Based upon my experience and the flow data from New Cricket Spring, the Arkwood site is underlain by a rapidly draining epikarstic zone.

A sinkhole existed adjacent to the area used for treating wood with creosote and pentachlorophenol (PCP). The sinkhole was capped with concrete during remediation work. This sinkhole existed because water had dissolved the soluble bedrock and developed an integrated system of natural conduits that conveyed water to New Cricket Spring, a straight-line distance of about 1,200 feet. Sinkholes such as this also convey sediment and other materials into the karst aquifer and toward receiving springs. In the case of this sinkhole the materials introduced into it included sediment, sawdust, wood waste, and contaminants including PCP.

The sinkhole functioned as a major introduction point for PCP into the epikarstic zone. While dye has never been introduced into the sinkhole or any of the wells into which ozone was injected, in my experience such dye introductions would likely first reach New Cricket Spring within a day or less. The residual PCP that has been treated during remediation efforts was detained within the epikarstic zone and is slowly discharging from cavities and especially from sediments within the epikarstic zone.

Given the nature of the karst aquifer, monitoring New Cricket Spring for PCP provides far more useful and credible data than would be obtained from monitoring wells located between the capped sinkhole and the spring. The aquifer is highly heterogeneous and anisotropic and there is no reason to believe that any well or group of wells would yield representative data. In contrast, the spring provides a point that realistically samples for contaminants discharging from groundwater beneath the site. The spring also provides a very fortuitous location for capture and treatment of contaminated waters derived from the site.

Issue 3. The appropriateness of the enhanced ozone treatment strategy for this hydrogeologic setting.

The enhanced ozone treatment was used in addition to the planned treatment at New Cricket Spring. The rationale for the treatment was three-fold. First, that make-up water was often needed for proper operation of the treatment equipment at New Cricket Spring. Second, that adding the make-up water to the contaminated karst aquifer could help flush contaminated water to the spring where it could be treated and would thus speed up site remediation. Third, that introducing ozonated water into the aquifer near the source of contamination would provide some in-situ treatment and thus enhance site remediation.

The enhanced ozone treatment approach was as follows:

- Groundwater was extracted from a deep aquifer that was not impacted from any of the past or present activities at the Arkwood site. The contaminated shallow epikarstic aquifer was incapable of producing a dependable yield of 20 gallons per minute, and this was the volume needed to ensure desirable operating conditions for treatment at New Cricket Spring.
- Using an ozone generation system, ozone was dissolved in the water and then conveyed to shallow injection wells that injected the ozonated water into the epikarstic aquifer. A total of nine injection wells with depths of 16 feet or less were constructed, but only five of them proved capable of injecting water at a rate of up to 35 gpm. The wells were located in an area a short distance west of the capped sinkhole.
- Wells used for injecting the ozonated water were wells A, B, C, D, and I. From 2007 to 2009, they were used on a rotating basis.

The EPA comment letter expressed concern that the ozone treatment would treat only a small area. That would be true if this were, for example, an alluvial or sandstone aquifer. It is not. It is a karst aquifer where groundwater movement is preferentially along solutionally-dissolved conduits, and where travel rates are often on the order of tens to hundreds of feet per hour. In a few cases, ozone treated water was detected at New Cricket Spring, about 1,200 feet from the injection site. As a result, the enhanced ozone treatment strategy for this site was both

reasonable and prudent. It represented an excellent adaptation to the hydrogeologic conditions existing at the site.

Summary

In June 1990, EPA issued a "Proposed Plan of Action" for the Arkwood Site. On pages 8 and 9 are the following statements:

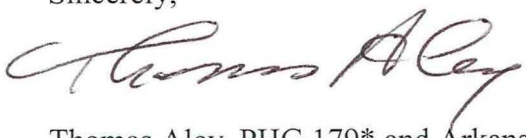
"Because of the high degree of uncertainty in aquifer flow in a karst terrain, routine methods for determining where contamination is spreading, such as ground water monitor wells and modeling are of little practical use at the Arkwood site. The geology of the area also prevents the use of traditional ground water remediation techniques such as pumping and treating. For these reasons a dye tracing study has been initiated in the site area. A dye tracing study will determine as accurately as possible where the ground water goes after it leaves the site. This study should be completed this summer, with the results available several months later. The results will be used to evaluate the remedial alternative for the groundwater, and will be used in the design phase of the remediation to ensure public health is protected. While the results of this study will not be available before a decision is made on this Proposed Plan of Action, the study results will be used to assess any additional action on the groundwater that may be necessary."

In September 1990, EPA issued a "Superfund Record of Decision" for the Arkwood Site. On page 2 are the following statements:

"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."

In this letter I have addressed three issues raised by the recent EPA comments. My comments demonstrate that, since a karst aquifer underlies the site, investigations and strategies relevant to a karst aquifer were appropriate for the site and were appropriately implemented. Work for the past 22 years at this site has been based upon this hydrogeologic recognition and there are no data to suggest that any different strategies should now be considered.

Sincerely,



Thomas Aley, PHG 179* and Arkansas PG 1646
President and Senior Hydrogeologist
Ozark Underground Laboratory, Inc.

* Professional Hydrogeologist #179, certified by American Institute of Hydrology.

References

Aley, Thomas. 1992. Final report: Groundwater tracing investigation Arkwood, Inc. site, Omaha, Arkansas. Volumes 1 and 2. Ozark Underground Laboratory contract report to ERM-Southwest, Inc. 84p. + appendixes and analytical graphs.

Aley, Thomas. 1997. Groundwater tracing in the epikarst. IN: *The Engineering Geology and Hydrogeology of Karst Terranes; Proc. 6th Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst*. A.A. Balkema, Rotterdam, pp. 207-211.

ERM-Southwest, Inc. 1990. Remedial investigation report Arkwood, Inc. Site. Vol. 1. ERM-Southwest contract report for Mass Merchandisers, Inc. 350p. approx.

APPENDIX A

"Groundwater Tracing in the Epikarst"

The Engineering Geology and Hydrogeology of Karst Terranes, Beck & Stephenson (eds)
© 1997 Balkema, Rotterdam. ISBN 90 5410 867 3

Groundwater tracing in the epikarst

THOMAS ALEY Ozark Underground Laboratory, Protem, Mo., USA

ABSTRACT

The epikarst is the dissolutionally weathered upper portion of the bedrock in carbonate landscapes. Its thickness is commonly on the order of 10 meters (33 feet), but may be appreciably thicker or thinner. At many waste sites in karst settings the majority of the contaminants are localized and detained within the epikarst.

Epikarstic Dye Introduction Points (EDIPs) provide a cost effective and hydrologically appropriate method for introducing tracer dyes into the epikarst. Tracer dyes introduced into EDIPs are routinely recovered at monitoring wells and springs at sites where the water table is within the epikarstic zone. Dye tracing tests in the epikarst have often failed due to the use of inappropriate dyes, an insufficient quantity of dye and/or water, and the absence of a good study design utilizing quantitative dye analysis methods. Dye tracing in the epikarst is routinely essential and can be effectively conducted.

INTRODUCTION

The epikarstic zone is the dissolutionally weathered upper portion of the bedrock in carbonate landscapes; it has sometimes been called the subcutaneous layer. At many waste sites in karst settings the majority of the potential contaminants of concern are localized and detained within the epikarstic zone. As a result, appropriate site characterization must focus on the epikarstic zone and its hydrologic functioning.

Groundwater tracing with fluorescent dyes should be a routine component of site characterization work at karst sites. However, effective tracing in epikarstic zones is typically more complex than most of the groundwater tracing work reported upon in the scientific literature. As contrasted with the commonly published karst groundwater tracing reports, tracing in the epikarstic zone (especially in industrial settings) typically requires: (1) more detailed and quantitative characterization of background fluorescence characteristics, (2) more careful selection of dye types, (3) simultaneous use of multiple dyes with dye quantities and analytical approaches selected to minimize the chance that small dye recoveries of one dye are obscured by another dye, (4) much more extensive sampling and quantitative analysis, and (5) dye introductions at points other than sinkholes and losing streams.

This paper is designed for practicing professionals, and will hopefully be particularly useful for those considering having a groundwater tracing study of an epikarstic zone conducted. Classifications and generalities are designed for practical utility. The comments and conclusions in this paper are based upon the results of about 30,000 quantitative dye analysis samples (including both water and activated carbon samples) and about 1,000 positive groundwater traces. All of these traces have been partially to dominantly focused on characterizing flow through epikarstic zones, and all data are from tracing work conducted by the Ozark Underground Laboratory. Much of the individual site information is client confidential; for this and other reasons we have not identified any specific sites. The majority of the work has been conducted in temperate regions of the central and eastern United States, and most of the associated bedrock units have been Paleozoic limestones and dolomites. Bedding has ranged from nearly flat to nearly vertical; structural features at the sites have also varied dramatically.

SOME PHYSICAL CHARACTERISTICS OF THE EPIKARSTIC ZONE

The thickness of the epikarstic zone is commonly on the order of 10 meters, but can vary from essentially zero to 30 meters (100 feet) or more. Factors effecting the thickness of the epikarstic zone include climate, time since the last glaciation of the site, patterns and depth of groundwater circulation, characteristics of the bedrock, and the vegetational history of the area.

The intensity of epikarstic development, which can be expressed as a percent of the bedrock which has been removed by dissolution, is highly variable. It can vary from less than 1% to more than 50%. The percentage routinely decreases with increasing depth below the surface. In many epikarstic zones sediments partially or almost completely fill most or almost all of the voids within the bedrock; in other situations many or most of the voids are largely free of sediments. The percent of the bedrock void volume which is filled with sediment can range from less than 5% to more than 95%.

Permeability rates within the sediment fillings of the epikarstic zone are also highly variable. The permeability rates of the sediment fillings are often greater than might be anticipated from soils having similar textural characteristics. This is especially true when the fills are silts and silty clays that have been subjected at some time in the past (perhaps only during the 100 year or longer interval droughts) to some desiccation. Periods of desiccation commonly result in compaction of silts and silty clay sediments with associated development of compaction cracks within the sediments filling the voids. These compaction cracks, and other structural and textural features within the sediment fills, often provide matrixes with high permeability rates. The net result is that permeability rates through the sediment fills of the epikarstic zone are commonly orders of magnitude larger than those in the adjacent carbonate bedrock.

HYDROLOGICAL CLASSES OF EPIKARSTS

We have divided epikarstic zones into three hydrological types based upon their ability to store water; they are: (1) rapid draining epikarsts, (2) seasonally saturated epikarsts, and (3) perennially saturated epikarsts. This classification is useful in planning and designing groundwater tracing studies and is developed for this purpose. The quantities of tracer dyes needed and typical groundwater travel rates vary with the type of epikarstic system.

Especially in some thick epikarstic zones, but to some extent in all epikarstic zones, conditions typical of two or more of the hydrological classes of epikarsts may be present. As an example, a rapid draining epikarst may occur in the upper part of the zone while conditions typical of seasonally saturated epikarst or perennially saturated epikarst are found the lower part of the zone.

Rapid draining epikarsts are characterized by having little if any of the epikarstic zone saturated with water for more than a few hours at a time even following major storm events or snow melt periods. In these cases there is little water storage or detainment within the epikarstic zone. Dissolutional voids are typically relatively free of fine textured sediments. However, as is the case with all epikarstic zone drainage, waters entering the subsurface at a particular point may subsequently discharge from multiple points in multiple areas. Areas commonly characterized by rapid draining epikarst include: (1) many alpine karst areas, (2) areas with high topographic relief, and (3) areas where the soluble purity of the carbonate bedrock is high and external sediment sources are negligible; these conditions typically result in thin soils and minimal residuum.

Seasonally saturated epikarsts routinely store water seasonally or after major precipitation periods. This water storage may persist for periods of weeks or months. Dissolutional voids are commonly partially to almost completely filled with fine textured sediment; some preferential flow routes which contain appreciable air-filled void space typically exist. Lands commonly characterized by seasonally saturated epikarst include: (1) humid lands, (2) areas with moderate relief, (3) areas where the soluble purity of the carbonate bedrock has permitted the development of appreciable soil and residuum thicknesses, and (4) areas where most or all of the epikarstic zone is at elevations greater than the elevations of nearby perennial streams.

Perennially saturated epikarsts are characterized by most of the epikarstic zone being perennially saturated with water. This situation is common in: 1) humid lands, (2) areas with low to moderate relief, and (3) areas along perennial streams. Cavities within the bedrock are commonly mostly filled with fine textured sediments.

DESIGNING GROUNDWATER TRACING STUDIES IN EPIKARSTIC ZONES

General Applicability of the Literature

Most karst groundwater tracing reported in the technical literature has utilized dye introduction points that poorly characterize the functioning of the epikarstic zone. Dye introduction into a cave stream is a good illustration; except in rare situations, such a dye introduction yields little information about the hydrologic functioning of the epikarst. Sinkholes have been used as dye introduction points for hundreds of groundwater traces. If the sinkhole provides a direct and open connection to a major groundwater transport conduit (such as a cave stream), the sinkhole dye introduction provides little information about the functioning of the epikarstic zone. However, not all sinkholes provide direct and open connections to major groundwater transport conduits; some sinkholes are discrete water input points into the epikarstic zone and as such may be appropriate dye introduction points for characterizing flow through the epikarstic zone. In many cases it is difficult to determine from a surficial examination whether or not a particular sinkhole yields water to the epikarstic zone.

Losing (or sinking) streams have also been common sites for tracer dye introduction. As is the case with sinkholes, some of the sinking points provide direct and open connections to major groundwater transport conduits. These are often located at or near the downstream terminus of perennial or seasonal water flow in the surface stream. Other losing stream segments (and particularly those on very small surface water courses which have only occasional flow) recharge the epikarstic zone.

In addition, most groundwater tracing reported in the literature for karst areas has been conducted in areas relatively near springs. Such areas are typically remote from recharge area boundaries or areas that contribute to more than one spring. The extent of epikarstic development in the areas more remote from springs may be greater than, or at least different from, conditions in areas nearer the springs. Groundwater travel rates may often be lower in areas more remote from the springs than in the near-spring areas.

In summary, the groundwater tracing results and recommendations reported in the karst hydrology literature are skewed in favor of simple groundwater traces that typically are not reflective of groundwater flow conditions in epikarstic zones. It is relatively easy to conduct dye traces from points where surface water is naturally available, or from points where it can be introduced without any construction work; such sites often inadequately reflect typical conditions operating in regional epikarstic zones. Construction and hydrologic testing of points for introducing tracer dyes into the epikarst is more expensive and requires substantial expertise; as a

result, this approach is not routinely used for the studies reported upon in the published literature. Additionally, it is relatively easy to do groundwater tracing near the likely discharging springs since only a few sampling stations are needed and the sampling can be completed in a few days or weeks; results from such studies dominate the technical literature. Finally, the tracing results reported in the published literature are skewed in favor of groundwater traces where relatively unsophisticated sampling and analysis approaches were adequate; such approaches are seldom adequate for detailed epikarstic zone characterization.

It is not our intent to diminish the importance of the groundwater tracing which has been reported in the technical literature. However, the existing literature could lead one to a set of general conclusions (three of which we will discuss) which are not reflective of conditions typically encountered in tracing work in seasonally or perennially saturated epikarstic zones.

First, the existing literature could lead one to conclude that 20 to 50% of the introduced dyes should be expected to discharge from dye recovery sites, and that a number of different dyes can be successfully used. Based upon our experience in epikarstic tracing work, dye recovery rates are commonly 0.1% to 1% for the permanently saturated epikarstic zones, and from 1% to 10% for the seasonally saturated zones.

Second, dye recovery percentages calculated above are related only to the most mobile dyes; some dyes are unsuited for use in some epikarstic zones. The most mobile and stable dyes for tracing in epikarstic zones are fluorescein (Acid Yellow 73) and eosine (Acid Red 87). Dyes such as rhodamine WT (Acid Red 388) and sulforhodamine B (Acid Red 52) can be totally lost during tracing in epikarstic zones, especially in perennially saturated epikarsts. Other dyes such as the optical brighteners and Direct Yellow 96 are seldom suitable for tracing in seasonally or perennially saturated epikarst.

Third, the existing literature might lead one to conclude that groundwater travel rates in karst settings are routinely hundreds to thousands of meters (or for that matter, feet) per day. While this can be the case in rapid draining epikarst, much slower travel rates must be anticipated in seasonally or perennially saturated epikarstic zones, especially when the rates of concern are reflective of travel to monitoring or slow-rate pumping wells rather than to springs.

In a perennially saturated epikarstic zone tracing study dyes were recovered from 20 monitoring wells. The mean travel rate for first arrival of tracer dyes at the wells was 6.7 meters (22 feet) per day; the values ranged from 15 cm (0.5 feet) per day to 25.6 meters (84 feet) per day. The mean travel rate for the peak dye concentrations at these wells was 4.3 meters (14 feet) per day; the values ranged from 0.25 cm (0.1 feet) to 25.6 meters (84 feet) per day. The mean travel distance for wells with first dye arrival travel rates of less than 6.7 (22 feet) per day was 60.7 meters (199 feet); the mean travel distance for wells with first dye arrival travel rates greater than 6.7 meters (22 feet) per day was 213 meters (700 feet). This indicates that, in general, the greater the travel distance the more rapid the mean travel rate.

In a series of 50 traces in seasonally saturated epikarstic zones, the mean first arrival travel rate to monitoring wells was 60 meters (197 feet) per day. This is about an order of magnitude more rapid than those encountered in the perennially saturated epikarstic zone study. The mean peak dye arrival travel rate was 22.6 meters (74 feet) per day in this seasonally saturated epikarstic zone.

In summary, we urge readers concerned with groundwater movement through the epikarstic zone to view the technical karst hydrology literature with caution. If you are involved with seasonally or perennial saturated epikarstic zones, dye recoveries may be one or two orders of magnitude lower than the technical literature might suggest. Travel rates may be one or two orders of magnitude slower than the literature might suggest. Finally, some of the tracer dyes may be inappropriate for tracing in the epikarstic zone or else may have significant limitations.

Introducing Dyes into the Epikarstic Zone

Groundwater tracing is often needed to determine the point or points to which water moves from a particular point or particular small area. Introducing a tracer dye into a sinkhole or losing stream segment a hundred meters (300 feet) or more away from the point or area of concern may be irrelevant for answering the questions that need to be addressed. How, then, do we introduce tracer dyes to clearly address site-specific issues?

In some cases one can introduce tracer dyes in drainage ditches around features such as closed lagoons to address issues such as the points to which groundwaters move from the lagoon area. Multiple dyes can often be used to bracket such features. One of several disadvantages to this approach is that subsequent storms may flush residual tracer dyes downstream in the ditches and yield dye recoveries at points which do not receive groundwater from the area where the dye was initially placed.

If the top of the epikarstic zone is relatively near the surface a dye introduction trench can be constructed with a back-hoe and used for introducing a tracer dye. Typical trenches are on the order of 5 meters (16.4 feet) to 10 meters (32.8 feet) long, and are tested prior to dye introduction to insure that they recharge groundwater. A common specification is that an acceptable trench for dye introduction must lose a minimum of 1900 liters (500 gallons) of water to the subsurface at a rate of at least 6 liters (1.5 gallons) per minute (and preferably more). Additional trenches are constructed and tested until an adequate number of acceptable dye introduction trenches in appropriate areas have been constructed. Dyes and water are then introduced into the trenches and allowed to drain until there is little or no pooled water remaining in the trench. The trench is then back-filled with the soil that was previously excavated.

Dye introduction trenches which do not bottom in the epikarstic zone can be used in deeper soils and residuum if the infiltration rate is sufficiently great. Preferential flow routes (macropores) through soil and residuum are common in karst areas, and are an important part of the explanation for the rapid response to precipitation which characterizes many monitoring wells developed within epikarstic zones. Laboratory permeability rates for the associated soils and residuum are of little utility in assessing the extent

of macropore permeability. In many cases the most practical approach is to dig a trench or two, add about 1,900 liters (500 gallons) of water to each, and measure the rate of water loss. We have successfully used dye introduction trenches for a number of groundwater traces; these have included trenches which bottomed in the epikarstic zone and trenches which did not. Silty clay and clay soil and residuum thicknesses beneath successful dye introduction trenches have been as great as 18 meters (60 feet).

Dye introduction trenches which do not bottom in the epikarstic zone are likely to require the use of more dye than would be the case if the water and dye are introduced directly into the epikarstic zone. As a rule of thumb, dye introductions into trenches that do not bottom in the epikarstic zone require two to ten times more dye than would be required if dye introduction is directly into the epikarstic zone. Furthermore, some tracer dyes are subject to appreciable adsorption onto soil particles, and thus are poorly suited for use in dye introduction trenches.

We commonly construct Epikarstic Dye Introduction Points (EDIPs) when doing groundwater tracing studies at waste sites. EDIPs are constructed in a fashion similar to monitoring wells. They extend through the soil and residuum and about 1.5 meters (5 feet) into the bedrock. The reason for entering the bedrock is that the weathered top of the bedrock is often soft and tends to plug small openings. About 2 meters (6.5 feet) of pea gravel is placed in the bottom of the EDIP, and a 10 cm (4 inch) to 15 cm (6 inch) diameter casing is set and grouted in place with bentonite on top of the gravel. After completion, EDIPs are tested to insure that they will accept water at a reasonable rate. We commonly specify that they accept a total of 1,900 liters (500 gallons) of water at a rate of at least 19 liters (5 gallons) per minute. If this rate is not obtained, a second EDIP is constructed nearby and tested. If neither EDIP accepts 1,900 liters (500 gallons) of water at a rate of at least 19 liters (5 gallons) per minute, then the EDIP which has the higher rate of water acceptance is used if the rate is at least 7.5 liters (2 gallons) per minute. Our experience has been that about 75% of the EDIPs constructed meet the water acceptance criteria.

EDIPs are superior to most monitoring wells for dye introduction since they are specifically designed to introduce dye and water at the top of the epikarstic zone. This is the area that typically has the greatest lateral permeability. In contrast, while some monitoring wells may be screened into this zone, it has been our experience that most monitoring wells at waste sites have excluded the uppermost portion of the epikarst. In most cases we bracket a localized area of concern with two (or rarely three) EDIPs; the same type of tracer dye is introduced into each of the bracketing EDIPs.

Dye introductions into EDIPs are typically preceded by 380 liters (100 gallons) to 760 liters (200 gallons) of water and are followed with 5,700 liters (1,500 gallons) to 9,500 liters (2,500 gallons) of water introduced at a rate lower than the EDIP's ability to accept the water. This can be done from hydrants or portable tanks; the ability to control the flow rate is crucial.

Selection of Tracer Dyes

Fluorescein and eosine are generally the most appropriate tracer dyes for use in epikarstic zones; fluorescein is by far the better of the two. Rhodamine WT can commonly be used, but it is may suffer excessive adsorptive losses and biological decomposition. In some cases pyranine (D&C Green 8) can be used, but its use will necessitate appreciable analytical work. Sulforhodamine B has some limited utility. Other tracer dyes (and particularly those adsorbed onto cotton samplers) generally have limited utility in seasonally or perennially saturated epikarstic zones.

Sampling and Dye Analysis Strategy

Most groundwater tracing in epikarstic zones will include appreciable sampling for the dyes in non-pumping wells (such as monitoring wells) and to a lesser extent in slowly pumping wells. Areas with monitoring wells are typically waste sites, and various fluorescent compounds may be present in groundwater. In many cases the epikarstic zones laterally transport water along multiple flow routes to one or more surface streams; in such cases, multiple sampling stations will be needed on the streams to detect and localize dye discharge zones. All of these conditions require the use of good sampling and analysis strategies for detecting even small concentrations of the tracer dyes and for minimizing the chance of either false positive or false negative results. Typical approaches adequate for dye tracing from sinkholes to springs often lack the technical rigor needed for credible results in epikarstic zone groundwater tracing. In the following paragraphs we have identified some of the sampling and analysis approaches which we have found to be beneficial in groundwater tracing in epikarstic zones.

In most cases the most suitable dyes will be those which can be adsorbed onto activated carbon samplers. The dyes we most commonly use are fluorescein, eosine, and rhodamine WT. With careful selection of dye introduction points and the quantity of each dye used all three dyes can often be used concurrently at a site. Fluorescein is the dye typically selected for the most difficult or most critical trace. Rhodamine WT is the dye typically selected for the trace which is likely to be the easiest of the series; in some situations this dye will not function as an adequate groundwater tracing agent. Fluorescein and eosine can cause some fluorescence interference with each other; this is considered in selecting which dyes are introduced at which locations.

There are no equations which credibly determine the quantity of dye needed for tracing in epikarstic zones. Professional experience is essential; some generalizations may be useful. The thicker the epikarstic zone, the more dye will be needed. More dye is needed for tracing in perennially saturated epikarstic zones than in seasonally saturated epikarstic zones; rapid draining epikarst requires the least dye. Epikarstic zones where voids are abundant and are nearly filled with fine textured sediments require more dye than epikarstic zones where voids are less common or where the voids are less filled with sediments. Less dye is needed when EDIPs are used than when trenches that do not bottom in the epikarstic zone are used.

We place primary sampling reliance on activated carbon samplers which are typically collected, and new samplers placed, on a weekly schedule. This is particularly important at sites where other compounds are present which may adsorb onto the activated

carbon. Grab samples of water should be collected each time a sampling location is visited; if dyes are detected in an activated carbon sampler, the water sample can be analyzed to determine dye concentration at a particular point in time. Furthermore, the presence of both activated carbon and water samples provides a verification of the presence of the tracer dye since the wavelength of a emission fluorescence peak for a tracer dye is a function of the dye and its matrix.

A good quantitative characterization of background fluorescence is needed prior to the final selection of dye types and quantities for a groundwater tracing study. Prior to the introduction of any tracer dyes we routinely conduct about three rounds of sampling at most (and preferably all) of the locations where sampling is planned after dye introduction. Emission fluorescence peaks in or near the acceptable wavelength range of one or more of the tracer dyes are sometimes encountered during background sampling. All emission fluorescence peaks in or near the acceptable wavelength range for a particular dye are quantified as if they were that dye. Acceptable wavelength ranges are calculated from field-derived data, and are specific to the analytical instrument used, the dye, and the dye matrix. Criteria for a positive dye recovery at a sampling station include a provision that, after dye introduction, at least one sample must have a dye concentration at least 10 times greater than the maximum concentration found in background samples from that location. This criterion has proven very useful at waste sites.

Sampling for tracer dyes in monitoring wells can be conducted effectively by suspending an activated carbon sampler in the middle of the screened interval or, in the case of open-hole wells, in the middle of the saturated zone. Multiple samplers can be placed in wells with multiple screens or very long open-hole segments. A useful approach for placing the sampler is to attach it to the top of a dedicated bailer and lower that into the well. Disposable bailers are adequate for this purpose; the bailers also facilitate the collection of water samples. No pumping or purging of the monitoring wells is required.

The amount of activated carbon used in a sampler should be standardized, and should be no larger than the amount needed for laboratory analysis. Use of only part of the activated carbon placed in a monitoring well is, in our view, an undesirable approach for a well. When the total amount of dye in a well is small and water circulation in the well is minimal, the more charcoal used, the less dye is adsorbed on each unit weight of the charcoal. Furthermore, the recovery percentage of tracer dyes during elution increases as the dye concentration on the activated carbon increases.

The dye analysis approach used should be standardized by the laboratory doing the work. Among many factors, there should be standardization as to the amount of activated carbon used for analysis, the quantity and composition of the eluting solution used, and the duration of the elution period. There are many different solutions used to elute tracer dyes from activated carbon; most of them are quite adequate for at least some applications. Various laboratory studies have been conducted to assess the performance of different eluting solutions, but the relevance of this work to actual field conditions is limited. In reality, there are many suitable solutions. Suitable solutions will typically elute multiple dyes from a single sample, will yield good recoveries of all dyes present, will yield consistent results, and will minimize the magnitude of fluorescence peaks associated with background compounds. Some solutions may damage delicate laboratory equipment and for this reason are undesirable.

APPENDIX B

Resume of Thomas Aley

Resume of Thomas Aley

PERSONAL DATA

Born September 8, 1938 in Steubenville, Ohio. U.S. Citizen. Married, two adult children.

EDUCATION

University of California, Berkeley. B.S. in Forestry (1960).

University of California, Berkeley. M.S. in Forestry with emphasis in forest influences and wildland hydrology. (1962).

University of California, Berkeley. Department of Geography (1962-1963); emphasis in hydrology and geology.

University of Arizona, Tucson. Department of Watershed Management (1963-1964); emphasis in wildland hydrology.

Southern Illinois University, Carbondale. Department of Geography (1972-1973). Emphasis in hydrology and geology.

PROFESSIONAL CERTIFICATION & REGISTRATION

Professional Hydrogeologist, Certificate Number 179, American Institute of Hydrology, Board of Registration. Granted 1983.

Certified Forester, Society of American Foresters. Granted 1996.

Professional Geologist, State of Arkansas Registration Number 1646. Issued 1991.

Professional Geologist, State of Kentucky Registration Number 1541. Issued 1994.

Registered Geologist, State of Missouri Registration Number 0989. Issued 1998.

Professional Geologist, State of Alabama Registration Number 1089. Issued 2003.

PROFESSIONAL SOCIETY MEMBERSHIPS

American Institute of Hydrology
Association of Ground Water Scientists and Engineers
Society of American Foresters
Missouri Consulting Foresters Association
National Speleological Society

HONORS AND AWARDS

1960. Pack Prize in Forestry. University of California.
1961. Membership in Xi Sigma Pi, honorary forestry society.

1972. Award for outstanding performance, United States Forest Service.
1972. U.S. Forest Service nominee for the American Motors Conservation Award.
1973. Lester B. Dill Award for significant contributions to speleology. Mississippi Valley-Ozark Region of the National Speleological Society.
1977. Chairman's Conservation Award. Mississippi Valley-Ozark Region of the National Speleological Society.
1979. J Harlan Bretz Award for outstanding contributions to the study of speleology in the state of Missouri. Missouri Speleological Survey.
1981. Outstanding Service to Education Award. Phi Delta Kappa honorary educational fraternity for southwest Missouri.
1981. Fellow. National Speleological Society.
1988. In The Name of Science Award. Springfield, Missouri Public Schools. In recognition of outstanding service and dedication to science.
2012. Berry Commoner Science in Environmental Service Award. Missouri Coalition for the Environment.

EMPLOYMENT HISTORY

1973 to Present. Director and President, Ozark Underground Laboratory, Protem, Missouri. Conducts or directs consulting and contract studies in hydrogeology, cave and karst related issues, and natural resource management of karst regions.

1966 to 1973. Hydrologist, United States Forest Service. Winona, Missouri and Springfield, Missouri. Directed the Hurricane Creek Barometer Watershed study, which assessed the interactions of land use and ground water hydrology in a forested karst area. Directed Grey Hollow study. Conducted "trouble shooting work" in Missouri, Arkansas, Wisconsin, Utah, Illinois, and Indiana. Left government service as GS-12.

1964 to 1965. Chief Hydrologist, Toups Engineering, Inc., Santa Ana, California. Duties included basic data collection and analysis for plaintiffs in Santa Ana Basin adjudication and similar work for defendants in San Gabriel Basin adjudication; these were both ground water basin adjudication suits. Directed technical work on ground water basin management and artificial recharge.

1963 to 1964. Teaching Assistant, Department of Watershed Management, University of Arizona, Tucson. Aerial photogrammetry and photo interpretation.

1963. Researcher, grant from Office of Naval Research, U.S. Navy, through Department of Geography, University of California, Berkeley. Conducted field studies on the origin and hydrology of caves in Jamaica, Haiti, and the Dominican Republic. Responsible for all field work. Work resulted in 3 publications.

1960 to 1963. Teaching Assistant and Research Assistant, School of Forestry, University of California, Berkeley. Teaching in aerial photogrammetry, photo interpretation, and forest influences. Research assistant in the same fields.

SUMMARY OF EXPERIENCE

42 years of professional experience in ground water and surface water hydrology, pollution control investigations, and land management issues with particular emphasis on soluble rock landscapes. The following projects are representative examples.

1. Hydrologic studies for land management and spring protection with particular emphasis on soluble rock regions. Numerous studies of this type have been conducted for local, state, and federal agencies in Missouri, Arkansas, Alabama, Kentucky, Illinois, Tennessee, Alaska, and Wyoming.

2. Expert witness testimony on pollution potential of underground injection of hazardous wastes into deep-lying soluble rocks in Oklahoma.

3. Expert witness testimony in ground water and surface water hydrology in Missouri, Arkansas, Oklahoma, Kansas, California, Alabama, Maryland, and Indiana.

4. Expert witness testimony on riverbank stability problems in Missouri before U.S. Senate Committees at request of Senator John Danforth of Missouri.

5. Member of 6-member review panel on the adequacy of testing to determine radionuclide migration from a radioactive waste disposal site at the Idaho National Engineering Laboratory, Idaho. Served as the only hydrogeologist on the panel.

6. Member of 6-member expert hydrogeology panel on hydrological issues associated with the St. Louis Airport Radioactive Waste Site.

7. Chairman of a 4-member "blue ribbon" panel established by the U.S. Forest Service to assess the significance of cave and karst resources in southeastern Alaska. The panel also assessed the extent to which land management activities were adversely impacting the resources.

8. Hydrologic consultant to St. Charles County, Missouri on clean-up of radioactive wastes at Weldon Spring Site, a former Atomic Energy Commission processing facility. Advised on actions to protect county well field from radioactive contaminants dumped in an abandoned quarry.

9. Ground water tracing in soluble rock landscapes, and delineation of recharge areas for spring systems. Work conducted in Missouri, Arkansas, Oklahoma, Indiana, Illinois, Kentucky, Tennessee, Alabama, Florida, Georgia, Texas, Maryland, Pennsylvania, New York, West Virginia, Arizona, Oregon, California, Wyoming, and Alaska. Foreign work in Canada, Barbados, Australia, Indonesia, and Peru. Ground water tracing in fractured rock landscapes in New Hampshire, Alabama, New Mexico, Minnesota, Idaho, Utah, and Washington. Ground water tracing in unconsolidated geologic units in New York, Massachusetts, Florida, North Carolina, South Dakota, Missouri, Arkansas, California, Oregon, Washington, Alaska, and British Columbia (Canada).

10. Hydrogeologic investigations of groundwater impacts from pipeline corridors. Missouri, Oklahoma, and Texas.

11. Ground water tracing investigations at mines in Virginia, West Virginia, Pennsylvania, New York, Missouri, Utah, Colorado, Montana, Irian Jaya Indonesia, and Peru.

12. Hydrologic investigations to determine sources of pollutants which caused fish kills at commercial fish farms in Missouri and Arkansas.

13. Hydrogeologic site investigations (and sometimes testimony) on municipal landfills with emphasis on site suitability and probability of ground water contamination. 21 sites in Arkansas, Missouri, Wisconsin, and Alabama.

14. Hazardous waste remediation investigations with emphasis on hydrogeology. Sites in Missouri, Arkansas, Kentucky, Pennsylvania, Maryland, Alabama, Tennessee, and California. Second opinion review of projects in Missouri, Kansas, and New York.

15. Impacts of food processing wastes on surface and ground water quality. Various projects in Arkansas and Missouri.

16. Hydrologic investigations of petroleum pollution of wells. Multiple sites in Missouri, Arkansas, and North Carolina.

17. Assessment of the hydrologic impacts of proposed geothermal energy development on the Santa Clara Indian Reservation, New Mexico.

18. Investigations on the extent and sources of sewage contamination in about 100 springs at Eureka Springs, Arkansas. Work involved the delineation of recharge areas for most of these springs and the identification of sewer line segments which had the greatest leakage problems.

19. Hydrogeologic hazard area mapping for proposed sewer line corridors in a sinkhole plain area south of Mammoth Cave, Kentucky. Work included hydrologic recommendations for minimizing exfiltration and monitoring strategies.

20. Hydrogeologic mapping of Greene County, Missouri to identify areas where sinkhole flooding and serious ground water contamination could result from land development.

21. Assessment of impacts of proposed highways on springs, caves, and endangered cave-dwelling species, Arkansas, Missouri, Indiana, Virginia, West Virginia, and Alaska. Similar work for airports in Missouri and Arkansas, and for coal-fired power plants in Missouri and Arkansas.

22. Identification and delineation of rare, threatened, and endangered animal species' habitats in caves and ground water systems. Studies in Arkansas, Missouri, Oklahoma, Tennessee, Alabama, and Illinois.

23. Health and safety assessment of Harrison's Crystal Cave, Barbados.

24. Health and safety assessment of natural radiation as encountered in caves open to the public in the United States. Development of industry standards under OSHA Alliance Agreement.

25. Various microclimate, hydrologic, biologic, interpretive, and management investigations of caves in Missouri, Arkansas, Tennessee, Kentucky, New Mexico, Arizona, California, Wyoming, Oregon, Alaska, British Columbia, New Zealand, and Australia.

26. Evaluation of 19 sites for designation as National Natural Landmarks; sites are in Indiana, Missouri, Arkansas, Iowa, Ohio, and New Mexico.

27. Assessment of hydrologic impacts of rock quarries. Multiple sites in Missouri, Arkansas, Maryland, Illinois, Alabama, and Alaska.

28. Assessment of the impacts of deep mining on regional hydrology. Missouri.

29. Preparation of sole-source aquifer designation petition. Missouri.

30. Delineation of wellhead protection zones for public ground water supplies in Arkansas, Missouri, Alabama, South Dakota, New Hampshire, Maryland, and Florida.

31. Feasibility study for creation of a national-scale American Cave and Karst Museum.

32. Instructor in numerous professional short-courses. These have included:

1) over 20 four-day courses in karst hydrogeology and groundwater monitoring sponsored by the Association of Ground Water Scientists and Engineers and by Environmental Education Enterprises;

2) two courses on groundwater site investigation techniques for health department professionals in Washington State; and

3) courses on land management in karst terrains for resource managers in West Virginia, Indiana, Kentucky, Tennessee, Missouri, Arkansas, Utah, Idaho, Oregon, Washington, Alaska, and New Mexico.

PUBLICATIONS

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EPA United States Environmental Protection Agency

Water: Basic Information about Regulated Drinking Water Contaminants

You are here: Water » Drinking Water » Drinking Water Contaminants » Basic Information about Regulated Drinking Water Contaminants » Basic Information about Pentachlorophenol in Drinking Water

Basic Information about Pentachlorophenol in Drinking Water

EPA regulates pentachlorophenol in drinking water to protect public health. Pentachlorophenol may cause health problems if present in public or private water supplies in amounts greater than the drinking water standard set by EPA.

- What is pentachlorophenol?
- Uses for pentachlorophenol.
- What are pentachlorophenol's health effects?
- What are EPA's drinking water regulations for pentachlorophenol?
- How does pentachlorophenol get into my drinking water?
- How will I know if pentachlorophenol is in my drinking water?
- How will pentachlorophenol be removed from my drinking water?
- How do I learn more about my drinking water?

Pentachlorophenol at a Glance

Maximum Contaminant Level (MCL) = 0.001 milligrams per Liter (mg/L) or 1 part per billion (ppb)

Maximum Contaminant Level Goal (MCLG) = zero

Health Effects
Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys and may have an increased risk of getting cancer.

Drinking Water Health Advisories provide more information on health effects

Chemical Abstract Service Registry Number
87-86-5

Sources of Contamination
Discharge from wood-preserving factories

List of all Regulated Contaminants (PDF) (6 pp, 396K, About PDF)

What is pentachlorophenol?
Pentachlorophenol is a white organic solid with needle-like crystals and a phenolic odor.

Uses for pentachlorophenol.
The greatest use of pentachlorophenol is as a wood preservative (fungicide). Though once widely used as an herbicide, it was banned in 1987 for these and other uses, as well as for any over-the-counter sales.

If you are concerned about pentachlorophenol in a private well, please visit:

- EPA's private drinking water wells Web site
- Water Systems Council Web site EXIT Disclaimer

What are pentachlorophenol's health effects?
Some people who drink water containing pentachlorophenol well in excess of the maximum contaminant level (MCL) for many years could experience problems with their liver or kidneys and may have an increased risk of getting cancer.

This health effects language is not intended to catalog all possible health effects for pentachlorophenol. Rather, it is intended to inform consumers of some of the possible health effects associated with pentachlorophenol in drinking water when the rule was finalized.

What are EPA's drinking water regulations for pentachlorophenol?
In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur. These non-enforceable health goals, based solely on possible health risks and exposure over a lifetime with an adequate margin of safety, are called maximum contaminant level goals (MCLG). Contaminants are any physical, chemical, biological or radiological substances or matter in water.

The MCLG for pentachlorophenol is zero. EPA has set this level of protection based on the best available science to prevent potential health problems. EPA has set an enforceable regulation for pentachlorophenol, called a maximum contaminant level (MCL), at 0.001 mg/L or 1 ppb. MCLs are set as close to the health goals as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The Phase IIB Rule, the regulation for pentachlorophenol, became effective in 1993. The Safe Drinking Water Act requires EPA to periodically review the national primary drinking water regulation for each contaminant and revise the regulation, if appropriate. EPA reviewed pentachlorophenol as part of the Six Year Review and determined that the zero MCLG and 0.001 mg/L or 1 ppb MCL for pentachlorophenol are still protective of human health.

- More information on the Six Year Review of Drinking Water Standards.

States may set more stringent drinking water MCLGs and MCLs for pentachlorophenol than EPA.

How does pentachlorophenol get into my drinking water?
The major source of pentachlorophenol in drinking water is discharge from wood-preserving factories.

A federal law called the Emergency Planning and Community Right to Know Act (EPCRA) requires facilities in certain industries, which manufacture, process, or use significant amounts of toxic chemicals, to report annually on their releases of these chemicals. For more information on the uses and releases of chemicals in your state, contact the Community Right-to-Know Hotline: (800) 424-9346.

- EPA's Toxics Release Inventory (TRI) Web site provides information about the types and amounts of toxic chemicals that are released each year to the air, water, and land.

How will I know if pentachlorophenol is in my drinking water?
When routine monitoring indicates that pentachlorophenol levels are above the MCL, your water supplier must take steps to reduce the amount of pentachlorophenol so that it is below that level. Water suppliers must notify their customers as soon as practical, but no later than 30 days after the system learns of the violation. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

- See EPA's public notification requirements for public water systems.

If your water comes from a household well, check with your health department or local water systems that use ground water for information on contaminants of concern in your area.

- For more information on wells, go to EPA's Web site on private wells.

How will pentachlorophenol be removed from my drinking water?
The following treatment method(s) have proven to be effective for removing pentachlorophenol to below 0.001 mg/L or 1 ppb: granular activated carbon.

How do I learn more about my drinking water?
EPA strongly encourages people to learn more about their drinking water, and to support local efforts to protect the supply of safe drinking water and upgrade the community water system. Your water bill or telephone book's government listings are a good starting point for local information.

Contact your water utility. EPA requires all community water systems to prepare and deliver an annual consumer confidence report (CCR) (sometimes called a water quality report) for their customers by July 1 of each year. If your water provider is not a community water system, or if you have a private water supply, request a copy from a nearby community water system.

- The CCR summarizes information regarding sources used (i.e., rivers, lakes, reservoirs, or aquifers), detected contaminants, compliance and educational information.
- Some water suppliers have posted their annual reports on EPA's Web site.

Other EPA Web sites

- Find an answer or ask a question about drinking water contaminants on EPA's Question and Answer Web site or call EPA's Safe Drinking Water Hotline at (800) 426-4791
- EPA's Integrated Risk Information System
- EPA's Substance Registry System

Last updated on Monday, May 21, 2012

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

I. INTRODUCTION ..... - 1 -

II. CHEMICAL OVERVIEW ..... - 3 -

A. REGULATORY HISTORY ..... - 3 -
B. CHEMICAL IDENTIFICATION ..... - 4 -
C. USE PROFILE ..... - 5 -
D. METHODS AND RATES OF APPLICATION: ..... - 6 -
E. DISPOSAL INFORMATION ..... - 6 -
1. TREATED WOOD ..... - 6 -

III. SUMMARY OF RISK ASSESSMENTS ..... - 7 -

A. BACKGROUND ON WOOD PRESERVATIVE RISK ASSESSMENT ..... - 7 -
B. HUMAN HEALTH RISK ASSESSMENT ..... - 9 -
1. TOXICITY OF PENTACHLOROPHENOL ..... - 10 -
a. Acute Toxicity ..... - 10 -
b. Carcinogenicity ..... - 11 -
c. Toxicological Endpoints ..... - 12 -
2. TOXICITY OF DIOXIN/FURAN ..... - 13 -
a. Acute and Chronic Toxicity ..... - 13 -
b. Carcinogenicity ..... - 13 -
3. TOXICITY OF HEXACHLOROBENZENE ..... - 14 -
a. Acute and Chronic Toxicity ..... - 14 -
b. Carcinogenicity ..... - 14 -
c. Toxicological Endpoints ..... - 15 -
4. DIETARY EXPOSURE AND RISK FROM FOOD AND DRINKING WATER ..... - 17 -
a. Dietary and Drinking Water ..... - 17 -
b. Pentachlorophenol ..... - 18 -
c. Dioxins and Furans ..... - 18 -
d. Hexachlorobenzene ..... - 19 -
5. RESIDENTIAL POST-APPLICATION EXPOSURE AND RISK ..... - 20 -
a. Residential Post-application Non-cancer Exposure and Risk Using NHANE- 20 -
b. Residential Post-application Non-cancer Exposure and Risk Using CTEPP- 21 -
c. Residential Post-application Cancer Exposure and Risk Using NHANES and CTEPP ..... - 21 -
6. AGGREGATE RISK ASSESSMENT ..... - 22 -
7. OCCUPATIONAL EXPOSURE AND RISK ..... - 22 -
a. Pentachlorophenol Occupational Handler Exposure and Risk ..... - 24 -
b. Dioxin Occupational Handler Exposure and Risk ..... - 24 -
c. Hexachlorobenzene Handler Exposure and Risk ..... - 25 -
d. Pentachlorophenol Occupational Post-application Exposure and Risk ..... - 25 -
e. Dioxin/Furan Occupational Post-application Exposure and Risk ..... - 26 -
f. Hexachlorobenzene Post-application Exposure and Risk ..... - 26 -
8. PENTACHLOROPHENOL HUMAN INCIDENT DATA ..... - 27 -
D. ENVIRONMENTAL RISK ASSESSMENT ..... - 28 -

1. ENVIRONMENTAL FATE AND TRANSPORT ..... - 29 -
a. **Pentachlorophenol** ..... - 29 -
b. **Dioxins/Furans** ..... - 30 -
c. **Hexachlorobenzene** ..... - 31 -
2. TERRESTRIAL AND AQUATIC ORGANISM EXPOSURE AND RISK ..... - 31 -
a. **Pentachlorophenol** ..... - 31 -
b. **Dioxins/Furans** ..... - 31 -
c. **Hexachlorobenzene** ..... - 34 -
3. RISKS TO LISTED SPECIES ..... - 35 -

IV. REREGISTRATION ELIGIBILITY AND RISK MANAGEMENT DECISIONS - 37 -

A. REREGISTRATION ELIGIBILITY DECISION ..... - 37 -
1. REGULATORY RATIONALE ..... - 37 -
a. **Summary of Risks** ..... - 37 -
b. **Summary of Benefits and Alternatives** ..... - 38 -
c. **Risk/Benefit Finding** ..... - 39 -
2. ENDOCRINE DISRUPTOR EFFECTS ..... - 39 -
3. CUMULATIVE RISKS ..... - 39 -
4. PUBLIC COMMENTS AND RESPONSE ..... - 40 -
B. RISK MANAGEMENT DECISION ..... - 40 -
1. DIOXIN/FURAN REDUCTION ..... - 45 -
2. MANAGEMENT OF PENTACHLOROPHENOL-TREATED MATERIALS ..... - 45 -
3. REGISTRATION REVIEW OF PENTACHLOROPHENOL ..... - 46 -

V. WHAT REGISTRANTS NEED TO DO ..... - 47 -

A. MANUFACTURING USE PRODUCTS ..... - 47 -
1. GENERIC DATA REQUIREMENTS ..... - 47 -
B. END-USE PRODUCTS ..... - 48 -
1. PRODUCT SPECIFIC DATA REQUIREMENTS ..... - 48 -
2. LABELING FOR END-USE PRODUCTS ..... - 50 -

APPENDIX A: USE PATTERNS ELIGIBLE FOR REREGISTRATION PENTACHLOROPHENOL 56

APPENDIX B: PENTACHLOROPHENOL CASE (2505) 57

APPENDIX C. TECHNICAL SUPPORT DOCUMENTS 61

APPENDIX D. CITATIONS SUPPORTING THE REREGISTRATION ELIGIBILITY DECISION (BIBLIOGRAPHY) 63

APPENDIX E. GENERIC DATA CALL-IN 91

APPENDIX F. PRODUCT SPECIFIC DATA CALL-IN 92

APPENDIX G. BATCHING OF PENTACHLOROPHENOL PRODUCTS FOR MEETING ACUTE TOXICITY DATA REQUIREMENTS FOR REREGISTRATION 93

APPENDIX H. LIST OF ALL REGISTRANTS SENT THE DATA CALL-IN 94

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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

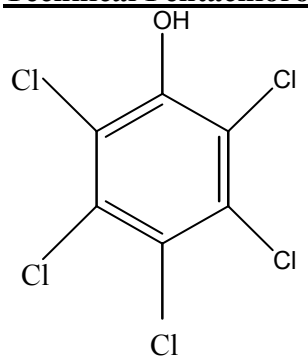

Figure #1. Molecular Structure of Pentachlorophenol

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
- 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.

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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<u>Citation</u>

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3. Other Supporting Documents

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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.

Water: The Six-Year Review

You are here: Water » Laws & Regulations » Regulatory Information » Regulation Development » Six-Year Review of Drinking Water Standards

Six-Year Review of Drinking Water Standards

The Safe Drinking Water Act (SDWA) requires EPA to review each National Primary Drinking Water Regulation (NPDWR) at least once every six years and revise them, if appropriate. The purpose of the review, called the Six-Year Review, is to identify those NPDWRs for which current health effects assessments, changes in technology, and/or other factors provide a health or technical basis to support a regulatory revision that will maintain or strengthen public health protection.

On this Page

- Statutory Requirements for the Six-Year Review
- Overview of the Six-Year Review Efforts
- Other Related Efforts

Other Related Links

- List of Contaminants & MCLs
- Contaminant Candidate List

Statutory Requirements for the Six-Year Review

Section 1412(b)(9) of the Safe Drinking Water Act states,

> *"The Administrator shall, not less often than every 6 years, review and revise, as appropriate, each national primary drinking water regulation promulgated under this title. Any revision of a national primary drinking water regulation shall be promulgated in accordance with this section, except that each revision shall maintain, or provide for greater, protection of the health of persons."*

Overview of the Six-Year Review Efforts

Since the 1996 SDWA Amendments were enacted, the Agency has completed two comprehensive reviews of existing National Primary Drinking Water Regulations. The links below provide more information about the first and second Six-Year Reviews.

- Six-Year Review 1 (SY1)
- Six-Year Review 2 (SY2)

Review of the Fluoride Drinking Water Regulation

On January 7, 2011, the Agency announced its intent to review the national primary and secondary drinking water regulations for fluoride. By initiating the current review, EPA is following up on a commitment made in the second Six Year Review (SY2), which was released in March 2010. In SY2, the Agency indicated that the Office of Water was in the process of updating its health and exposure assessments and that when the Agency finalized these assessments, it would review the existing drinking water regulation to determine whether revisions are appropriate.

The Agency released the new risk and exposure assessments on January 7, 2011. These assessments address recommendations made by the National Research Council (NRC) of the National Academies of Science (NAS).The NRC review was conducted at the request of the EPA in 2003 as part of the first Six Year Review, in which EPA found that new health and exposure data were available on orally ingested fluoride. In 2006, NRC published their evaluation in a report entitled Fluoride in Drinking Water: A Scientific Review of EPA's Standards. In this report, the NRC recommended that EPA update its fluoride risk assessment to include new data on health risks and better estimates of total exposure. Based on the new assessments, EPA will begin the process of reviewing the current drinking water standards for fluoride to decide whether revisions are appropriate.

- Fact sheet for more information about the results of the new risk assessments and EPA's next steps for evaluating the fluoride drinking water standard (PDF) (10 pp, 55 K, About PDF).

Other information or activities related to fluoride:

- Basic information about the existing regulations for fluoride
- Press release announcing release of risk and exposure assessments
- Information on CDC's community water fluoridation program

Other Related Efforts

In a related effort, SDWA includes a process that we must follow to identify and list unregulated contaminants which may require a national drinking water regulation in the future. EPA must publish this list of unregulated contaminants (called the Contaminant Candidate List or CCL) and decide whether to regulate at least five or more contaminants on the list (called Regulatory Determinations). EPA uses this list of unregulated contaminants to prioritize research and data collection efforts to help us determine whether we should regulate a specific contaminant.

- Drinking Water Contaminant Candidate List and Regulatory Determinations

Last updated on Tuesday, July 23, 2013

"Cusher, Annette" <Cusher@adeq.state.ar.us> July 16, 2010 1:07 PM
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,

APC&EC Regulation No. 2 is the Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas. It can be found at http://adeqweb/regs/default.htm. If the link does not work, access the ADEQ website www.adeq.state.ar.us, on the left side there is a section called APC&EC Commission, under that heading is a link for "Regulations". The most updated versions of ADEQ's Regulations can be accessed there.

Regards,
Annette

-----Original Message-----
From: Grish [mailto: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 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

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>

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.

9383008

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.

grish.org <curt@grish.org>
To: Gloria-Small Moran <Moran.Gloria-Small@epamail.epa.gov>
Cc: "grish.org" <curt@grish.org>
Request for guidance letter to ADEQ

May 5, 2012 1:44 PM

3 Attachments, 7.9 MB

Dear Gloria,

I have attached an excerpt from (as well as the complete version of) Arkansas Department of Environmental Quality's "**Arkwood, Inc. Comments to the Draft Third Five Year Review AFIN: 05-00003; EPA ID Number ARD084930148**" which was sent to EPA under cover letter dated April 4, 2011 from ADEQ's Marilyn Egan to EPA's Shawn Ghose, with a copy only to Jean Mescher of McKesson Corporation.

The excerpt contains the following ADEQ comment #20, which refers to Section VII of the draft Third Five-Year Review Report:

"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 i7.38 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."

This comment indicates clearly that:

a) since January 2000, Arkwood groundwater test results should have been evaluated based upon this revised "Regional screening level" and
b) the original values (see attached 1998 letter) were not calculated correctly in accordance with Arkansas Pollution & Ecology Commission's Regulation 2.508

Could you please write a letter to Tammera Harrelson, Legal Division Chief and Managing Attorney at ADEQ that would address:

1) the error of Ms. Harrelson's conviction that ADEQ "has no authority" in the Arkwood remediation because "it"s a Superfund site" and because "EPA is the lead agency," as Ms. Harrelson told me on the telephone Wednesday, May 2nd, 2012;
2) that the groundwater at Arkwood must be cleaned to the State's standard ("Regional screening levels" per ADEQ letter) first and foremost, even though EPA is "lead agency;"
3) the roles, responsibilities and authorities of EPA and ADEQ respectively in the Arkwood matter;
4) the need for ADEQ to set forth the exact set of criteria whereby, upon Arkwood's meeting those criteria, ADEQ would consider the ongoing groundwater remediation completed and ready for termination.

I attach also the 1998 letter from ADEQ (then Department of Pollution Control & Ecology) setting the State standard and remedial goal, which letter was carried forward, reincorporated with and attached to the finalized and concurred Third Five-Year Review Report by EPA without any discussion of ADEQ's comment #20 quoted here.

I believe EPA's Shawn Ghose allowed McKesson's Jean Mescher to suppress the revised information (of which she had reason to know) and to prevent its inclusion in the Third Five-Year Review Report, in part by allowing Mescher to control the authoring and revising of this key ratifying document: the Third Five-Year Review Report for Arkwood Superfund site.

I hope you can help bring clarity to the situation by writing to;

Tammera Harrelson
Legal Division Chief and Managing Attorney
ADEQ
5301 Northshore Drive
North Little Rock, AR 72118-5317

I believe it would be beneficial to copy Teresa Marks, Director of ADEQ, on the communication if you decide to send one.

Thank you,
Curt

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 09 REC'D
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)

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.

2011-04-0…final (7.6 MB)

Grish <ccgrish@gmail.com> July 28, 2010 11:31 AM

To: clem@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" <williams.donald@epamail.epa.gov>, "Cusher, Annette" <Cusher@adeq.state.ar.us>
Re: Arkwood Superfund Site

Dear Ms. Clem,

My name is Curt Grisham. I have been working with Annette Cusher on my issue (partially detailed below,) and she has been extraordinarily helpful, courteous, responsive and professional in all her communications. I commend her to you for this.

I'm forwarding the below fragment of our conversation to you as background, hoping you will be able to give me a call today.

My family owns the Arkwood superfund site connected with the New Cricket Spring water quality treatment project, which is ongoing. I am involving myself of my own volition in an attempt to get the matter finally resolved.

Since I have begun to study this, I have been most concerned of all by the realization, today, that apparently none of the water cleanup efforts at New Cricket Spring in Boone County, Arkansas have been for the purpose of meeting Human Health Criteria, as none exist in Regulation 2 for the substance Pentachlorophenol because, as Ms. Cusher stated today:

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

I ask that you please look into this matter and see if the burdensome water treatment operations at New Cricket Spring and adjacent Arkwood superfund site could be discontinued immediately and permanently, particularly since they are not even for the purpose of meeting Human Health Criteria.

Furthermore, I find no hard evidence that those water treatment operations are of any benefit to the purpose of reducing concentrations of Pentachlorophenol at the spring. Any reduction in Pentachlorophenol concentrations detected at the spring could be attributed to natural causes over time just as plausibly as to the artificial mechanical causes involved in the water treatment operation.

To my understanding, when the treatment system has been down due to mechanical failure, the data do not show any corresponding rise in concentrations of Pentachlorophenol at the spring.

I do not believe a direct cause-and-effect relationship between water treatment operations and reduced levels of Pentachlorophenol at the spring has been shown with scientific rigor.

I hope we can work together to bring this matter quickly to a conclusion favorable for all concerned.

Sincerely,

Curt Grisham
415-264-7400 direct

---------- Forwarded message ----------

From: **Cusher, Annette** <Cusher@adeq.state.ar.us>
Date: Wed, Jul 28, 2010 at 9:12 AM
Subject: RE: Arkwood Superfund Site
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>

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.

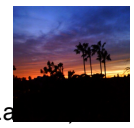
Thank you again for your attention to my concerns.

Sincerely,

Curt Grisham

Grish <ccgrish@gmail.com>

August 5, 2010 3:05 PM



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.a
"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>
Bcc: Bill Doshier <bfdoshier@cox.net>, "Charles Curtis Grisham Jr." <ccgrish@gmail.com>
Fwd: FW: Arkwood analyses

3 Attachments, 2.3 MB

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:

- 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?
- 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?
- Have the results of analysis produced by MMET, Inc. ever been independently verified by ADEQ or EPA?
- Was the laboratory facility used by MMET, Inc. ever visited or inspected by ADEQ or EPA?
- Was the scientific methodology used by MMET, Inc. ever reviewed or questioned by ADEQ or EPA?
- Were the qualifications or credentials of MMET, Inc. or its staff ever checked or verified by ADEQ or EPA?
- 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.:

- When was Continental Analytical Services, Inc. first engaged by Jean A. Mescher of McKesson Corporation to replace MMET, Inc?

- Are there further reports from Continental Analytical Services, Inc. for water samples taken at New Cricket Spring on dates other than July 8, 2010?
- Who is James Fleer of Oxford Environmental and Safety, Inc., to whom the July 19, 2010 report refers as "Client"?
- 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?
- 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?
- 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:

- 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?
- 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?
- 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?
- 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/l and 18.7 :g/l 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:

- 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?
- 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"?
- 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."*
- Is groundwater cleanup at New Cricket Spring considered a "non permit issue" by ADEQ for the purposes of Reg. 2.508?
- 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?
- 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"?
- 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?
- 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?
- 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 EPA's 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.
>
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49268.pdf (309 KB) Arkwood 20...pdf (1.9 MB) Arkwood1st...pdf (155 KB)

ADEQ

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

Certified Mail, Return Receipt Requested # 7006 3450 0003 4073 5605

November 3, 2008

U.S. Environmental Protection Agency
Attn: Mr. Shawn Ghose, EPA Project Coordinator
Superfund AR/LA Enforcement Section 6FF-RA
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202

Subject: Comments to the Monthly Progress Reports for the Months of July, August, September, and October 2008 at the Arkwood, Inc. Site, Omaha, Arkansas
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 monthly progress reports, for July, August, September, and October of 2008 for the Arkwood, Inc. facility in Omaha, Arkansas. Analysis of the data indicates that discharges from the weir into New Cricket Spring have exceeded the discharge limit set forth in the Record of Decision (ROD) during 5 (five) separate events since the system was upgraded in October of 2007. Based on these continued exceedences it is recommended that additional studies be conducted at the site, i.e. Site Characterization and Analysis Penatrometer System (SCAPS) survey. This will assist to further delineate areas of preferential ground water flow and residual Dense Non-aqueous Phase Liquid (DNAPL). Upon identification of these areas it is recommended that additional ozonation injection points be proposed or another remedial method be suggested to halt the discharge of pentachlorophenol (PCP) above the specified levels.

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, San Francisco, CA 94104;
U.S. Environmental Protection Agency, Attn: Don Williams, Deputy Associate Director
Mail Code: 6SFR, 1445 Ross Ave., Suite 1200, Dallas, TX 75202-2733;
US EPA Region 6, Attn: Carlos Sanchez, Chief, AR/TX Section, Mail Code: 6SFR, 1445 Ross Ave., Suite 1200, Dallas, TX 75202-2733

ADEQ

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

ROUTING SLIP

***Date:* Oct. 31, 2008**

***Subject*: Arkwood, Inc.**

From: M. Egan

Route in turn to:	***Action Needed***	***Initials***	***Date***
D. Kilburn	Review / Concur	DK	10/31/08
R. Mattox	Review / Concur	RM	10/31/08
A. Cusher	Review/ Concur	AC	10/31/08
J. Rich	Review / Concur	JR	10/31/08
T. Hynum	Review / Concur	[illegible]	10/31/08 w/comments
R. Benefield	Review / Concur	[illegible]	11/3/08

DISPOSITION:

Return to Marilyn Egan, HWD (682-0789) for reproduction, and distribution of copies, filing, and mailing.

SEPARATOR

05-00003

HAZ WASTE

COMPLIANCE

07/05/1995

NA

Devon

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

July 5, 1995

Mr. Devon Hobby
Superfund Programs Director
Arkansas Department of Pollution Control & Ecology
8001 National Drive
Little Rock, Arkansas 72209

RE: Arkwood, Inc. Superfund Site Explanation of Significant Differences Administrative Record

Dear Mr. Hobby:

The U.S. Environmental Protection Agency (EPA) is required by law to establish administrative records "at or near a facility at issue." This administrative record (AR) consists of information upon which the Agency based its decision to change the remediation plan (Explanation of Significant Differences) for the Arkwood, Inc. Superfund Site. By providing the public with greater access to this record, it is our hope that they will be better equipped to comment constructively on to understand the issues relating to the Explanation of Significant Differences.

We appreciate having your agency as the designated AR facility for the Arkwood, Inc. Superfund Site. **The enclosed record, along with any future documents relating to technical activities at the site should be available and easily accessible to the public to review. The record should be treated as a non-circulating reference - it should not be removed from the Agency.** The principal document compiled in this AR is the *Explanation of Significant Differences*.

To ensure the receipt of the AR, please complete the attached Document Transmittal Acknowledgment form and return it in the enclosed stamped self-addressed envelope. Again, I would like to thank you for your cooperation with the U.S. EPA in serving as a Field Repository. If you have any questions or comments, please contact me at (214) 655-6484.

Sincerely,

Mava Elliott

Mava Elliott
Administrative Records Coordinator

Enclosures

cc: DPRA File 6114.004-06A3 w/o Enclosures

JUL 06 1995
#9 Rmp

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JUN 2 2 2006
ADEQ Records
Management Section

Index

Prepared for

United States Environmental Protection Agency

Region 6

ADMINISTRATIVE RECORD

INDEX

EXPLANATION OF SIGNIFICANT DIFFERENCES

FOR

ARKWOOD, INC. SUPERFUND SITE
EPA ID No. ARD 084930148

ESS VI
Work Assignment No. ESS06014

Cynthia Kaleri
Remedial Project Manager
U.S. EPA Region 6

Prepared by

DPRA Incorporated
717 N. Harwood Street, Suite 1300
Dallas, Texas 75201

July 5, 1995
P. 6114.06A3

JUL 06 1995
#9 Cy

INTRODUCTION

Section 113(j)(1) of the Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA**), 42 U.S.C. Section 9613(j)(1), provides that judicial review of any issues concerning the adequacy of a response action shall be limited to the administrative record compiled for the site. CERCLA, as amended by the Superfund Amendments and Reauthorization Act (**SARA**), requires the U.S. Environmental Protection Agency (EPA) to compile documents which form the basis for the selection of the remedy under CERCLA and SARA response actions. These supporting documents form an "adminstrative record" (AR) which the Agency must provide for public review. The administrative records are maintained at relevant EPA Regional Offices as well as "at or near the facility at issue."

The following Administrative Record Index was compiled in accordance with OSWER Directive Number 9833.3A-1, "Final Guidance on Administrative Records for Decisions on Selection of CERCLA Response Actions" (December 3, 1990). Documents listed as bibliography sources in response decision documents may not be listed in the Administrative Record Index. The AR Index file is compiled as documents related to the response action are being generated. All documents which are clearly relevant and non-privileged are placed in the record file, entered into the index, and made available to the public as soon as possible. The documents included in the index are arranged in chronological order. EPA may send supplemental AR volumes and indexes to the designated repository. These supplements should be placed with the initial record file.

The AR Index helps readers locate and retrieve documents in the file. It also provides an overview of the response action history. The index includes the following information for each document:

- **AR Page No.** - The sequential numbers stamped on each page of the AR. The **six digit numbers** are located in the **upper right-hand corner** of each page.
- **Document Date** - The date the document was published and/or released. "Undated" means no date was recorded.
- **No. of Pages** - Total number of printed pages in the document, including attachments.
- **Author** - Name and title of the originator.
- **Company/Agency** - Originator's affiliation.
- **Recipient** - Name, title, and affiliation of the recipient.
- **Document Type** - General identification, e.g., correspondence, Remedial Investigation Report, Record of Decision, etc.
- **Document Title** - Descriptive title or synopsis.

ADMINISTRATIVE RECORD INDEX

ESD

SITE NAME: ARKWOOD, INC. SUPERFUND SITE
SITE NUMBER: ARD 084930148

DOCUMENT NUMBER: 000001 - 000133
DOCUMENT DATE: 01/16/92
NUMBER OF PAGES: 133
AUTHOR: Office of Emergency and Remedial Response
COMPANY/AGENCY: U.S. EPA Headquarters
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GUIDANCE ON PREPARING SUPERFUND DECISION DOCUMENTS

PRELIMINARY DRAFT

January 1992

Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, D.C. 20460

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000004

Table of Contents

List of Highlights vii

Preface ix

Acronyms Used in This Guidance x

Acknowledgements xii

1.0 INTRODUCTION 1

1.1 Purpose of This Guidance 1

1.2 Overview of the Superfund Remedial Process 2

1.2.1 The Pre-Remedial Stage 2
1.2.2 Determination of Lead and Support Agencies 2
1.2.3 Potentially Responsible Party(ies) (PRPs) 4
1.2.4 Remedial Investigation/Feasibility Study (RI/FS) 4
1.2.5 Preferred Alternative 5
1.2.6 Proposed Plan 5
1.2.7 Record of Decision (ROD) 5
1.2.8 Remedial Design (RD) 5
1.2.9 Remedial Action (RA) 5

1.3 Outline of this Guidance 7

2.0 THE PROPOSED PLAN 9

2.1 Purpose of the Proposed Plan 9

2.2 Writing the Proposed Plan 10

2.3 Section-by-Section Description of the Proposed Plan 13

2.3.1 Introduction 13
2.3.2 Site Background 13
2.3.3 Scope and Role of Operable Unit or Response Action 13
2.3.4 Summary of Site Risks 13
2.3.5 Summary of Alternatives 14
2.3.6 The Evaluation of Alternatives 14
2.3.7 Community Participation 16

Table of Contents (continued)

2.4 Formats for the Proposed Plan 18

2.4.1 Fact Sheet Format 18
2.4.2 Expanded Format 18

3.0 THE PROCESS FOR DEVELOPING THE PROPOSED PLAN 20

3.1 Overview 20

3.2 Roles and Responsibilities of the Lead Agency and Support Agency 20

3.2.1 Designation of Roles and Responsibilities 22
3.2.2 Lead and Support Agency Responsibilities 22
3.2.3 Management Review of the Proposed Plan 22
3.2.4 Support Agency Comment Period 23

3.3 Procedures for Resolving Disputes 23

3.4 Role of Other Federal Agencies 24

3.5 Role of Potentially Responsible Parties 25

4.0 THE NEWSPAPER NOTIFICATION OF AVAILABILITY OF THE PROPOSED PLAN AND THE PUBLIC COMMENT PERIOD 26

4.1 Statutory Requirements 26

4.2 Writing the Newspaper Notification 26

4.3 Public Comment Period 28

5.0 PRE-ROD CHANGES 30

5.1 Overview 30

5.2 Identifying Types of Pre-ROD Changes 30

5.2.1 Minor Changes 30
5.2.2 Significant Changes 30

5.3 Documenting Pre-ROD Changes 31

5.3.1 Documenting Minor Changes 31

000005

000006

Table of Contents (continued)

5.3.2 Documenting Significant Changes 31

6.0 WRITING THE RECORD OF DECISION 35

6.1 Introduction 35

6.1.1 Purpose of the Record of Decision 35
6.1.2 Statutory Requirements to Issue the Record of Decision 35
6.1.3 Major Components of the Record of Decision 36

6.2 Key Elements of the Declaration 36

6.2.1 Site Name and Location 36
6.2.2 Statement of Basis and Purpose 36
6.2.3 Assessment of the Site 38
6.2.4 Description of the Selected Remedy 38
6.2.5 Statutory Determinations 38
6.2.6 Signature and Support Agency Acceptance of the Remedy 39

6.3 Key Elements of the Decision Summary 41

6.3.1 Site Name, Location, and Description . . . . . .
6.3.2 Site History and Enforcement Activities 41
6.3.3 Highlights of Community Participation 42
6.3.4 Scope and Role of Operable Unit or Response Action 42
6.3.5 Summary of Site Characteristics 43
6.3.6 Summary of Site Risks 44
6.3.7 Description of Alternatives 50
6.3.8 Summary of the Comparative Analysis of Alternatives 57
6.3.9 The Selected Remedy 57
6.3.10 Statutory Determinations 60
6.3.11 Documentation of Significant Changes 65

6.4 The Responsiveness Summary 65

6.5 Submitting RODs to EPA Headquarters 70

7.0 THE PROCESS FOR DEVELOPING THE RECORD OF DECISION 71

7.1 Overview 71

7.1.1 State Preparation of the ROD 71
7.1.2 Remedy Selection for State-Lead Enforcement Actions 71
7.1.3 Roles and Responsibilities of Other Federal Agencies 72

Table of Contents (continued)

7.2 Roles and Responsibilities of Lead Agency and Support Agency 72
7.2.1 Lead Agency 72
7.2.2 Support Agency 72

7.3 Dispute Resolution 74

7.4 Role of Other EPA and State Program Offices 74

7.5 Role of Potentially Responsible Parties 74

7.6 Issuing Notice of Availability of the ROD 75

8.0 POST-ROD CHANGES 77

8.1 Evaluating Post-ROD Information 77

8.2 Types of Post-ROD Changes 77

8.3 Documenting Post-ROD Changes 79

8.3.1 Documenting Non-Significant Post-ROD Changes 79
8.3.2 Documenting Significant Post-ROD Changes: Explanation of Significant Differences (ESDs) 79
8.3.3 Documenting Fundamental Post-ROD Changes: ROD Amendment 79

9.0 DOCUMENTING NO ACTION, INTERIM ACTION, AND CONTINGENCY REMEDY DECISIONS 83

9.1 Documenting No Action Decisions 83

9.1.1 No Action Situation #1: Action Not Necessary for Protection 83
9.1.2 No Action Situation #2: No CERCLA Authority to Take Action . . . 84
9.1.3 No Action Situation #3: No Further Action Necessary 85

9.2 Documenting Interim Action Decisions 86

9.2.1 Interim Actions vs. Early Actions 86
9.2.2 Interim Action ROD Format 86

9.3 Documenting Contingency Remedies 89

400000

Table of Contents (continued)

Appendix A	Description of a Hypothetical Site	A-
Appendix B	Sample Proposed Plan	B-1
Appendix C	Worksheets for the Summary Comparative Analysis of Alternatives	C-1
Appendix D	Helpful Hints: How to Prepare and Submit Decision Documents to Headquarters	D-1
Appendix E	Sources of Information	E-1

List of Highlights

000009

Highlight Number	Title	Page
1	The Remedial Process	3
2	Goal and Expectations for Superfund Remedial Actions	6
3	Outline for the Proposed Plan	11
4	Mandatory Risk Language for Proposed Remedies	14
5	The Nine Remedial Evaluation Criteria	15
6	Hints for Preparing the Nine Criteria Analysis	17
7	Preparation of the Proposed Plan by the Lead Agency	21
8	Sample Newspaper Notification of Availability of the Proposed Plan	27
9	Changes That Significantly Affect Scope, Performance, and/or Cost	31
10	Pre-ROD Changes	32
11	Examples of Pre-ROD Changes	34
12	Outline for the Standard Record of Decision	36
13	Sample Declaration for the Record of Decision: Statutory Preference for Treatment As a Principal Element Is Met and Five-Year Site Review Is Not Required	37
14	Standard Language for the Statement of Basis and Purpose	38
15	Required Language for Assessment of the Site	38
16	Sample Declaration for the Record of Decision: Statutory Preference for Treatment As a Principal Element Is Not Met and Five-Year Site Review Is Required	40
17	Sample Language for Community Participation Activities	43
18	Sample Language for Scope and Role of Operable Unit Section	43
19	Sample Language for Human Health Risks Summary	45

List of Highlights (continued)

20 EPA Weight-of-Evidence Classification System for Carcinogenicity 46

21 Sample Language for Toxicity Assessment Summary 47

22 Sample Language for Risk Characterization Summary 48

23 Sample Language for Summary of Site Risks 50

24 Sample Summary of Site Risks Based on Current Land Use 51

25 Illustration of Components of Alternatives to be Described 52

26 Description of Details for Each Alternative 53

27 Sample Description of a Remedial Alternative 55

28 Examples of ARARs That May Apply to Superfund Remedial Actions 56

29 Sample Comparative Analysis 58

30 Sample Selected Remedy Section 61

31 Example Cost Summary for the Selected Remedy 62

32 Sample Language for TBCs 63

33 Sample Statutory Determinations Section 66

34 Three Examples of Documentation of Significant Changes 69

35 Lead Agency Responsibility in ROD Development Process 73

36 Sample Newspaper Notification of Availability of the Record of Decision 76

37 Post-ROD Changes 78

38 Sample Format for ESD 80

39 Sample Format for ROD Amendment 81

40 Situations Where No Action Decisions May Be Appropriate 83

41 Examples of Possible Interim and Early Actions 87

000911

Preface

This *Guidance on Preparing Superfund Decision Documents* is being issued to improve the quality and completeness of Records of Decision and related documents. This guidance benefited from a review of past Superfund Records of Decision and defines important items to be addressed in documenting site remediation decisions.

This guidance does not cover the selection of remedy process itself. This is addressed in a separate guidance, *A Guide to Selecting Superfund Remedial Actions* (OSWER Directive No. 9355.0-27FS, April 1990.)

000012

Acronyms Used in this Guidance

AA	Assistant Administrator
ACL	Alternate Concentration Limit
ARAR	Applicable or Relevant and Appropriate Requirement
BDAT	Best Demonstrated Available Technology
BPJ	Best Professional Judgment
CA	Cooperative Agreement
CAA	Clean Air Act
CDI	Chronic Daily Intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 19 as amended
CERCLIS	CERCLA Information System
CFR	Code of Federal Regulations
CWA	Clean Water Act
EP	Extraction Procedure
EPA	Environmental Protection Agency
ESD	Explanation of Significant Differences
FR	Federal Register
FS	Feasibility Study
FWQC	Federal Water Quality Criteria
HI	Hazard Index
HQ	Hazard Quotient
HRS	Hazard Ranking System
IAG	Interagency Agreement
LDRs	Land Disposal Restrictions
LSI	Listing Site Investigation
MCLs	Maximum Contaminant Levels
MCLGs	Maximum Contaminant Level Goals
MEP	Maximum Extent Practicable
MPRSA	Marine Protection Research and Sanctuaries Act
NAAQs	National Ambient Air Quality Standards
NAPLs	Nonaqueous Phase Liquids
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OERR	Office of Emergency and Remedial Response
O&M	Operation and Maintenance
OSC	On-Scene Coordinator
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
OWPE	Office of Waste Programs Enforcement
PA	Preliminary Assessment
PCBs	Polychlorinated Biphenyls
POTW	Publicly Owned Treatment Works
PRP	Potentially Responsible Party
RA	Regional Administrator or Remedial Action

000013

Acronyms Used in this Guidance (continued)

RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RD/RA	Remedial Design/Remedial Action
RfD	Reference Dose
ROD	Record of Decision
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
SF	Slope Factor
SIP	State Implementation Plan
SMOA	Superfund Memorandum of Agreement
SSC	State Superfund Contract
SSI	Screening Site Investigation
SWDA	Solid Waste Disposal Act
TBC	To Be Considered
TMV	Toxicity, Mobility, or Volume
TSCA	Toxic Substances Control Act

1.0 INTRODUCTION

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1.1 PURPOSE OF THIS GUIDANCE

This "Guidance on Preparing Superfund Decision Documents" (commonly referred to as the "ROD Guidance") has been developed to: (1) present standard formats for documenting Superfund remedial action decisions; (2) clarify the roles and responsibilities of the Environmental Protection Agency (EPA), states, and other federal agencies in developing and issuing decision documents; and (3) explain how to address changes made to proposed and selected remedies. The decision documents addressed by this guidance are the Proposed Plan, the Record of Decision (ROD), the Explanation of Significant Differences (ESD), and the ROD amendment.[1] Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), requires the issuance of these decision documents for remedial actions taken pursuant to sections 104, 106, 120, and 122.[2] The National Oil and Hazardous Substances Contingency Plan (NCP) incorporates the requirements and provisions of SARA.[3] This guidance has been prepared on the basis of SARA and the NCP, as promulgated on March 8, 1990 (55 FR 8666).

The first purpose of the ROD guidance is to standardize the format of the Proposed Plan, ROD, ROD Amendments, and Explanation of Significant Differences (ESDs). Standardized formats for these documents are necessary because the remedies selected in the Superfund program will be reviewed by the public on both national and local levels. Standardizing these decision documents should:

- Provide consistency among Regions, with respect to the organization and content of decision documents, as well as providing national consistency
- Ensure that all statutory and regulatory documentation requirements are met
- Promote clear and logical presentations of rationales for remedy selection decisions based on site-specific information and supporting analysis.

In addition to the emphasis on providing a standard format to document remedial action decisions, this guidance specifies the roles and responsibilities of EPA, the States, and other Federal agencies in developing and issuing Superfund decision documents. The emphasis on a larger state role in the remedial process is contained in CERCLA section 121(f)(1), which provides "for substantial and meaningful involvement of each State in the initiation, development, and selection of remedial response actions to be undertaken in that State." In addition, because Executive Order 12580 ("Superfund Implementation," January 23, 1987) delegates authority for certain CERCLA activities to other Federal agencies, this guidance also discusses the roles and responsibilities of these other agencies (e.g., the Departments of Defense, Energy, and the Interior) in the remedial process.

Finally, this guidance addresses the statutory requirement in CERCLA sections 117(b) and (d) to document significant changes made during the remedy selection process. For example, when significant changes are made to the Proposed Plan after its publication, certain activities should be undertaken to document these changes. In the event that significant changes are made to the selected remedy after the ROD is signed, specific documentation and public participation requirements should be met.

Procedures to fulfill these requirements are outlined in this guidance.

1.2 OVERVIEW OF THE SUPERFUND REMEDIAL PROCESS

This section describes the relationship between the decision documents addressed in this guidance and the overall Superfund remedial response process (see **Highlight 1**).

1.2.1 The Pre-Remedial Stage

The **Pre-Remedial Stage** encompasses the identification, investigation, and listing of a site on the National Priorities List (NPL). The pre-remedial stage consists of a three-part process for determining whether hazards at a site justify performing a CERCLA remedial action or whether the site can be cleaned up under some authority other than CERCLA. This process begins with a **Preliminary Assessment** (PA), during which existing information on the site is reviewed. If the results of the PA indicate that further investigation is warranted, either a **Screening Site Investigation** (SSI) or a **Listing Site Investigation** (LSI) is conducted. An LSI is performed to gather sufficient information to "score" the site using the **Hazard Ranking System** (HRS). The HRS is a site evaluation methodology that EPA uses to estimate the relative hazards posed by different sites. Those sites that score above the HRS cut-off score of 28.5 are eligible to be placed on the NPL.

1.2.2 Determination of Lead and Support Agencies

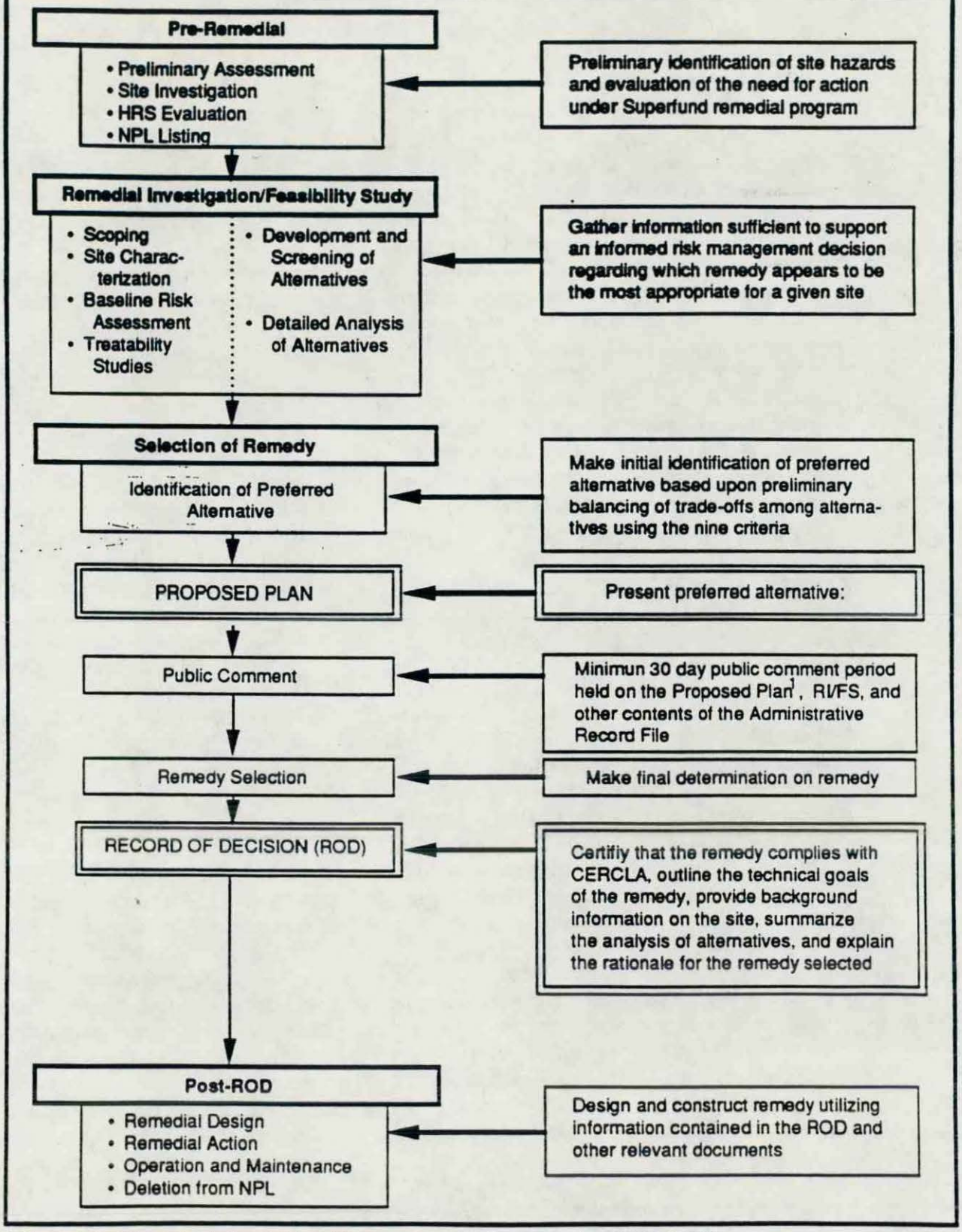
After a site is placed on the NPL, interagency negotiations are initiated to determine which agency should act as the **Lead Agency** in the remedial process and which as the **Support Agency**. These negotiations include EPA, States, and other Federal agencies. The lead agency, which is represented by the **Remedial Project Manager** (RPM), has the primary responsibility for coordinating a response action. Either EPA, a state environmental agency, or another Federal agency (e.g., the Department of Defens cases of hazardous waste sites on military b can serve as the lead agency. The lead ag RPM is responsible for overseeing all techr enforcement, and financial aspects of a rem response.

The support agency plays a review concurrence role throughout the rem process. When EPA or another Federal ag acts as the lead agency, the state in whicl site is located usually serves as the sup agency. When the State is the lead agency, usually serves as the support agency.

When EPA and a State are involve remedial activities, the lead and support ager are identified in a Superfund Memorandur Agreement (SMOA), a Cooperative Agreem or a State Superfund Contract (SSC). **Superfund Memorandum of Agreement** general agreement that specifies the nature extent of interaction between EPA and th for one or more sites. A **Coop Agreement** is a site-specific agreement establishes Federal and state responsibilitie a specific CERCLA response action.[4] A S **Superfund Contract** is an agreement documents any required cost shares assurances necessary from a State but does involve the disbursement of Federal monies

A Federal agency other than EPA could assume the roles and responsibilities of the agency. These responsibilities inc coordinating and communicating with EPA the State in their shared role as support agenc The division of authority and responsib between the Federal agency as lead and support agencies, particularly in preparing Proposed Plan and the ROD, should be speci in an **Interagency Agreement** (IAG). agreement should be reached by considering process and activities outlined in this guida the CERCLA requirements, and the N Federal agencies conducting response actions expected to comply with this and other guidance, as specified in CERCLA section 1

Highlight 1: The Remedial Process



[1]This period will be extended an aditional 30 days upon timely request (see 55 FR 8770).

1.2.3 Potentially Responsible Parties

Under CERCLA section 104, an individual or company identified as potentially liable for a release of hazardous substances into the environment, or a **Potentially Responsible Party** (PRP), may also conduct CERCLA response actions, if that party is qualified and otherwise capable. For a PRP-prepared response action, either EPA or the state is the lead agency for overseeing the PRP's work and for developing the Proposed Plan and the ROD. PRPs may participate in the remedy selection process by recommending their own preferred alternative to the lead agency in a memorandum accompanying the Remedial Investigation/ Feasibilitly Study (RI/FS) Report and by submitting comments on the Proposed Plan, as well as on any other information contained in the Administrative Record, during the formal public comment period that is held before the final selection of a remedy for a site.

1.2.4 Remedial Investigation/Feasibility Study

Once a site is listed on the NPL and a lead agency has been identified, the lead agency performs a **Remedial Investigation and Feasibility Study**. During an RI/FS, the lead agency gathers information sufficient to support an informed risk management decision regarding which remedy appears to be most appropriate for a given site or an operable unit within a site. **Operable Units** (OUs) are discrete parts of an entire response action. An OU can be defined as a certain geographic portion of a site or an environmental medium at the site (e.g., alternative water supply, source control measures, mitigation of contamination in off-site areas, or ground-water remediation). Operable units may also be comprehensive but temporary remedies (e.g., temporary caps across a site) that can provide interim protection of human health and the environment before final remediation.

Usually, the RI and FS are conducted concurrently, in an interactive, iterative manner. The data collected during the RI are used to develop remedial alternatives in the FS, an alternatives identified in the FS determine necessity of treatability studies or the collec of additional data in the RI. In general, th consists of:

- Collecting data to characterize site condit
- Determining the nature and extent contamination at the site or operable un
- Assessing risks to human health and environment
- Conducting treatability tests to evaluate potential performance and cost of treatment technologies being considered the site.

In characterizing the site, the lead age identifies the source of contamination, poten routes of migration, and current and poten human and environmental receptors. baseline risk assessment conducted during the identifies the contaminants of potential conc and uses exposure and toxicity information determine the risks posed by the conditions the site to human health and the environme Treatability studies are bench, pilot, or full-sc tests of a particular technology on samples actual site wastes. Such studies are conducted identify which technologies are suitable addressing the waste to be treated.

The FS involves the identification a detailed evaluation of potential remed alternatives. This process begins with t formulation of viable alternatives, whi involves defining remedial action objective general response actions, volumes or area media to be addressed, and potentially applicat technologies. The alternatives should screened down, as appropriate, to a reasonat number. The remaining alternatives shou undergo a detailed analysis using the ni evaluation criteria. (For a discussion of th analysis, see Chapter 6.) The detailed a s profiles individual alternatives against t criteria and compares them with each other

gauge their relative performance against each factor. Each alternative, with the exception of the required no action alternative, is designed and continually refined to ensure that it will be protective of human health and the environment and that it will comply with its respective **Applicable or Relevant and Appropriate Requirements** (ARARs).[6]

1.2.5 Preferred Alternative

The lead agency identifies a **Preferred Alternative** before holding a formal public comment period on the proposed cleanup for a site. The detailed analysis provides the lead and support agencies with sufficient information to identify a preferred alternative. The preferred alternative is identified as the protective, ARAR-compliant remediation approach that is judged to provide the best balance of tradeoffs with respect to the five primary balancing criteria and is cost-effective. This evaluation should also consider state (i.e., support agency) and community acceptance of each alternative, when that information is available. The preferred alternative and, ultimately, the selected remedy should be chosen considering the Superfund program's "expectations." These are presented in **Highlight 2**.

1.2.6 Proposed Plan

The preferred alternative for a site is presented to the public in a **Proposed Plan**. The Proposed Plan briefly summarizes all of the alternatives studied in the detailed analysis phase of the RI/FS, highlighting the key factors that led to identifying the preferred alternative. The Proposed Plan, as well as the RI/FS and the other information, is made available for public comment in the Administrative Record.

1.2.7 Record of Decision

Following receipt of public comments and any final comments from the support agency, a remedy is selected and documented in a **ROD**. The ROD, a stand-alone document, which documents the remedial action plan for a site or operable unit, serves three basic functions:

- It certifies that the remedy selection process was carried out in accordance with CERCLA and, to the extent practicable, with the NCP
- It describes the technical parameters of the remedy, specifying the treatment, engineering, and institutional components, as well as remediation goals
- It provides the public with a consolidated source of information about the site and the chosen remedy, including the rationale behind the selection.

1.2.8 Remedial Design

The ROD provides the framework for the transition into **Remedial Design** (RD), the next phase of the remedial process. RD is an engineering phase during which technical drawings and specifications are developed for the subsequent Remedial Action. These specifications are based upon the detailed description of the remedy and the cleanup criteria provided in the ROD.

1.2.9 Remedial Action

After completion of the RD, the **Remedial Action** (RA) begins. During RD, the actual construction of the remedy or implementation phase of site cleanup occurs. When all phases of remedial activity at a site have been completed and no further remedial action is warranted, the site can be deleted from the NPL. Completed cleanup results should be compared with the terms in the ROD to determine whether remediation goals have been fulfilled so that the site can be deleted from the NPL.

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Highlight 2: Goal and Expectations for Superfund Remedial Actions

The following goal and expectations guide the decision maker in determining the method of protection (or combination of methods) most appropriate for a particular site or operable unit.

- The national goal of the remedy selection process is to select remedies that protect human health and the environment, that maintain protection over time, and that minimize untreated waste.

- EPA expects to use treatment to address the principal threats posed by a site, wherever practicable. Principal threats for which treatment is most likely to be appropriate include liquids, areas contaminated with high concentrations of toxic compounds, and highly mobile materials (NCP, 55 FR 8702).

- EPA expects to use engineering controls, such as containment, for waste that poses a relatively low long-term threat or where treatment is impracticable. Specific situations that may limit the use of treatment include sites with:

  - Wastes in which the contaminants are near health-based levels or that are substantially immobile or can otherwise be reliably contained over long periods

  - Wastes that are technically difficult to treat, such as mixed wastes of widely varying composition or wastes dispersed over extraordinarily large sites, such as municipal landfills or mining sites, where the scope of th problem treatment is impracticable

  - Wastes with characteristics that a treatment-based remedy would increase overall risk to human health and environment because of risks posed to workers, the community, or the environment during implement

- EPA expects to use a combination of methods, as appropriate, to achieve protection of human health and the environment. In appropriate site situations, treatment of the principal threats posed by a site, with priority place on treating waste that is liquid, highly toxic or highly mobile, will be combined with engineering controls (such containment) and institutional controls, as appropriate, for treatment residuals and untreated waste.

- EPA expects to use institutional controls such as water use and deed restrictions to supplement engineering contr as appropriate for short- and long-term management or to prevent or limit exposure to hazardous substances, pollutants, or contaminants. Institutional controls may be used during the conduct of the RI/FS and implementati of the remedial action and, where necessary, as a component of the completed remedy. The use of institutional controls shall not substitute for active response measures (e.g., treatment and/or containment of source material, restoration of ground waters to their beneficial uses) as the sole remedy unless such active measures are determin not to be practicable, based on the balancing of trade-offs among alternatives that is conducted during the selectic of remedy.

- EPA expects to consider using innovative technology when such technology offers the potential for comparable o superior treatment performance or implementability, fewer or lesser adverse impacts than other available approaches, or lower costs for similar levels of performance than more demonstrated technologies.

- EPA expects to return usable ground waters to their beneficial uses wherever practicable, within a time frame tha is reasonable given the particular circumstances of the site. When restoration of ground water to beneficial uses not practicable, EPA expects to prevent further migration of the plume, prevent exposure to the contaminated ground water, and evaluate further risk reduction.

1.3 OUTLINE OF THIS GUIDANCE

Although this guidance addresses only the preparation of Superfund decision documents, other guidance documents that address other stages of the remedial process are also available. Because preparation of the Proposed Plan and ROD relies to a great extent on the information collected and analyzed during the RI/FS process, the *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (Office of Solid Waste and Emergency Response [OSWER] Directive 9355.3-01, October 1988) is of particular importance. The ROD Guidance and RI/FS Guidance are interrelated documents that should be used when conducting remedial actions pursuant to CERCLA sections 104, 106, 120, and 122. Many portions of Proposed Plans and RODs will summarize information generated during the RI/FS. Appendix E of this guidance lists additional sources of information on the remedy selection process and other stages of the remedial process.

Chapters 2 through 9 address the following different aspects of the Superfund remedy selection process that require specific documentation:

- Chapter 2 presents the purpose of and the statutory requirements for the Proposed Plan and provides guidelines for issuing the Plan.
- Chapter 3 summarizes the roles and responsibilities of lead and support agencies in developing the Proposed Plan.
- Chapter 4 summarizes requirements for the newspaper notification that announces the availability of the Proposed Plan and discusses the public comment period.
- Chapter 5 describes the general framework for categorizing minor and significant changes made to the preferred alternative before issuance of the ROD and discusses documentation and public information activities that may be necessary.
- Chapter 6 presents the standard format for the ROD and discusses key elements to be included in each section.
- Chapter 7 summarizes the roles and responsibilities of lead and support agencies in developing the ROD.
- Chapter 8 discusses the standards and procedures to follow when post-ROD changes occur.
- Chapter 9 presents the special ROD formats for three types of remedial action decisions: no action, interim action, and contingency remedy decisions.
- Appendix A presents a basic description of a hypothetical site, on which several examples in the text and Appendix B are based.
- Appendix B is a sample Proposed Plan based on the hypothetical site outlined in Appendix A.
- Appendix C contains worksheets that can be used in evaluating and comparing remedial alternatives.
- Appendix D presents helpful hints for submitting decision document to Headquarters.
- Appendix E lists additional sources of information on the remedy selection process and other stages of the remedial process.

000090

1. This guidance replaces the February 27, 1985, memorandum: "Preparation of Decision Documents Approving Fund-Financed and Potentially Responsible Party Remedial Actions under CERCLA" and the *Guida on Preparing Superfund Decision Documents*, Interim Final, June 1989.

2. References made to CERCLA throughout this document should be interpreted as meaning CERCLA, as amen by SARA.

3. "National Oil and Hazardous Substances Pollution Contingency Plan," Final Rule, (55 FR 8666), March 8, 19

4. With a CA, EPA establishes an account to enable the State to use Trust Fund monies to finance response actio

5. Because a State may be either the lead agency or the support agency for most remedial activities, this guida often makes general reference to "lead" and "support" agency responsibilities, rather than EPA or st responsibilities. Federal agencies (other than EPA) have lead responsibility at sites under their jurisdicti however, EPA has final authority regarding remedy selection at such sites.

6. ARARs include any Federal or state standards, requirements, criteria, or limitations that are determined to legally applicable or relevant and appropriate to a CERCLA site or action. These requirements may inclu regulations promulgated under the Resource Conservation and Recovery Act (RCRA), the Toxic Substances Cont Act (TSCA), the Safe Drinking Water Act (SDWA), the Clean Water Act (CWA), and other Federal enviro n statutes or state laws. Applicable requirements are those cleanup standards, standards of control, and otl substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state l that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or otl circumstance found at a CERCLA site. Relevant and appropriate requirements are requirements that, while r "applicable" to circumstances at a particular CERCLA site, address problems or situations sufficiently similar those encountered at the site that their use is well suited to the particular site. Additional guidance on ARARs provided in the *CERCLA Compliance with Other Laws Manual: Parts I and II* (OSWER Directive 9234.1-(August 1988, and 9234.1-02, July 1989).

2.0 THE PROPOSED PLAN

000022

This chapter presents the purpose of the Proposed Plan and the statutory requirements for issuing the Plan pursuant to CERCLA sections 104, 106, 120, and 122. In addition, this chapter provides a suggested outline and format for writing the Proposed Plan.[1]

2.1 PURPOSE OF THE PROPOSED PLAN

The purpose of the Proposed Plan is to facilitate public participation in the remedy selection process by:

- Identifying the preferred alternative for a remedial action at a site or operable unit and explaining the reasons for the preference
- Describing other remedial options that were considered in detail in the RI/FS Report
- Soliciting public review and comment on **all** of the alternatives described
- Providing information on how the public can be involved in the remedy selection process.

The Proposed Plan is a public participation document and is expected to be widely read. The Proposed Plan, therefore, should be written in a clear and concise manner using non-technical language. In addition, the Proposed Plan should direct the public to the RI/FS Report as the primary source of detailed information on the remedial alternatives analyzed, as well as other site-specific information.

The Proposed Plan should present the lead agency's preliminary recommendation concerning how best to undertake a cleanup action at the site. The Proposed Plan should also make clear that the lead agency has "identified" a preferred alternative based on available information, but has not "selected" a remedy to be implemented. The Proposed Plan supports only preliminary decisions for a site and should include observations and tentative recommendations. **The Proposed Plan should not make definitive findings or declarative statements that would be difficult to revise later.**

In emphasizing that the preferred alternative is only an initial recommendation, the Proposed Plan should clearly state that changes to the preferred alternative, or a change from the preferred alternative to another alternative, may be made if public comments or additional data indicate that such a change would result in a more appropriate solution. The final decision regarding the selected remedy should be documented in the ROD after the lead agency considered all comments from both the support agency and the public. An important function of the Proposed Plan is to solicit public comment on **all** of the alternatives considered in the detailed analysis phase of the RI/FS because the lead and support agencies may select a remedy other than the preferred alternative.

The three separate statutory requirements in CERCLA that provide the basic framework in the Proposed Plan and the process for developing this document are CERCLA sections 113(k)(2)(B), 117(a), and 121(f)(1)(G).

<u>Section 113(k)(2)(B)</u> establishes the minimum procedures for public involvement in selecting a response action. The specific procedures for the Proposed Plan are to provide a:

- Notice to potentially affected persons and the public, which shall be accompanied by a brief analysis of the [proposed][2] plan and alternative plans that were considered
- Reasonable opportunity to comment and provide information regarding the [proposed] plan.

Section 117(a) establishes the baseline public participation requirements for remedial activities. The subsections relating to the Proposed Plan require that the lead agency:

- (1) Publish a notice and brief analysis of the proposed plan and make the plan available to the public

- (2) Provide a reasonable opportunity for submission of written and oral comments and an opportunity for a public meeting at or near the facility at issue regarding the proposed plan and regarding any proposed findings under section 121(d)(4) (relating to cleanup standards) [e.g., waivers]. The [lead agency] shall keep a transcript of the meeting and make such transcript available to the public

- [Include in] the notice and analysis published under paragraph (1) ... sufficient information ... as may be necessary to provide a reasonable explanation of the proposed plan and alternative proposals considered [in the RI/FS Report].

Section 121(f)(1)(G) specifies the minimum involvement EPA should afford the state in the remedial decision process. The requirements specific to the Proposed Plan are to provide:

- [a] Notice to the State and an opportunity to comment on the proposed plan for remedial action as well as on alternative plans under consideration. The [EPA's] proposed decision regarding the selection of remedial action shall be accompanied by a response to the comments submitted by the State including an explanation regarding any decision on compliance with promulgated State standards. A copy of such response shall also be provided to the State.

2.2 WRITING THE PROPOSED PLAN

The Proposed Plan summarizes essential information from the RI/FS Report. At a minimum, the Plan should:

- Summarize the environmental condition the site as determined during the RI

- Describe the remedial alternatives evalu in sufficient detail to provide a reason explanation of each alternative

- Identify the lead agency's prefer alternative

- Provide a general summary of the supp agency comments, if available (e. concurrence, nonconcurrence, or comments at present time), and the l agency's response to the comments

- Provide a brief analysis that supports preferred alternative, discussed in terms the nine evaluation criteria

- Identify and provide a summary explanat of any proposed waivers to the ARARs CERCLA section 121(d)(4).

Highlight 3 provides a recommended outl of the Proposed Plan. This outline conta elements that are both specifically **required** CERCLA and others that are **recommended** inclusion. Variations may be made appropriate.

Section 2.3 of this guidance provides mc specific guidance on the key elements of t Plan, and Section 2.4 discusses format. sample Proposed Plan for a hypothetic Superfund site (described in Appendix A) presented in Appendix B.

Highlight 3: Outline for the Proposed Plan

Introduction

- **Provide site name and location.**
- **Identify lead and support agencies.**
- **Introduce document's purpose, which is to:**
  - **Fulfill requirements of CERCLA section 117(a)**
  - **Describe alternatives analyzed**
  - **Identify preferred alternative and explain rationale for preference**
  - **Serve as companion to the RI/FS Report and administrative record file**
  - **Solicit public involvement in selection of a remedy.**

- **Stress importance of public input on all of the alternatives.**

Site Background

- Provide brief overview of site.
- Describe site history.

Scope and Role of Operable Unit or Response Action

- Describe scope of problem that the action will address.
- Describe role of action within site strategy.
- Identify how action addresses principal threat(s) and/or low level threats.

Summary of Site Risks

- Provide overview of baseline risk assessment, by describing the:
  - Contaminated media
  - Contaminant(s) of potential concern
  - Baseline exposure scenarios (e.g., routes of exposure, current and future land-use scenarios)
  - Current and potential site risks (including both carcinogenic and noncarcinogenic threats).

- Discuss how current risks compare with remediation goals.

- Discuss environmental risk(s), as appropriate.

Summary of Alternatives

- Provide narrative description of alternatives evaluated in detailed analysis of FS, including engineering components, treatment components, institutional controls, estimated present-worth cost, estimated construction and operation and maintenance costs, quantities of waste, implementation time, and the major ARARs associated with the alternative(s).

(Continued on next page)

000024

000025

Highlight 3 (continued)

Evaluation of Alternatives and The Preferred Alternative

- Identify the preferred alternative.
- Introduce the nine evaluation criteria and discuss how they are utilized to analyze cleanup options.
- Provide the rationale for the preferred alternative by profiling it against the nine criteria and highlighting how it compares with the other alternatives' major advantages and disadvantages. State/support agency and community acceptance should be addressed to the extent adequate information is available at the time.
- Discuss the lead agency's belief that the preferred alternative would satisfy the statutory findings, including the preference for treatment as a principal element.
- Include the support agency's recommendation that the alternative meets the statutory findings when the support agency concurs with the preferred alternative.

Community Participation*

- Provide notice of public comment period, encouraging written comments.
- Note time and place for a public meeting(s) (if they have been scheduled) or offer opportunity for meeting.
- Identify the location of the Administrative Record and information repositories.

* Community includes the general public and PRPs.

2.3 SECTION-BY-SECTION DESCRIPTION OF THE PROPOSED PLAN

2.3.1 Introduction

This introductory section should include the site name and location, and identify the lead and support agencies for the remedial action. The introduction should state that the Proposed Plan is a document that the lead agency is required to issue to fulfill CERCLA section 117(a).

The public should be informed of the function of the Proposed Plan in the remedy selection process, specifically, that its purposes are to:

- Identify the preferred alternative for remedial action at a site or operable unit and explain the reasons for the preference
- Describe the other remedial options considered in detail in the RI/FS Report
- Solicit public review of and comment on **all** of the alternatives described
- Provide information on how the public can be involved in the remedy selection process.

A clear statement should be made that the Proposed Plan highlights key information from the RI/FS Report but is not a substitute for that document. The Plan should refer the reader to the RI/FS Report and Administrative Record as more complete sources of information regarding the remedial action.[3] **The first section of the Proposed Plan should stress that public input on all alternatives, and on the information that supports the alternatives, is an important contribution to the remedy selection process.** The public should be encouraged to submit comments and should be informed that their comments can influence the lead agency's preference. The point should be made that the final remedial action plan, as presented in the ROD, could differ from the preferred alternative, depending upon new information or arguments the lead agency may consider as a result of public comments.

2.3.2 Site Background

The site background should include a site map and a brief description of the site, including the history of waste generation or disposal that has taken place there, the major contaminant(s) of concern, the contaminated media, and the extent of contamination.

2.3.3 Scope and Role of Operable Unit or Response Action

This section of the Proposed Plan should summarize the lead agency's overall strategy for remediating the site and describe how the action being considered in the Proposed Plan fits into that overall strategy.

If the response is being carried out in operable units, the purpose of each operable unit and their sequence should be described. For example, the following language could be included in this section: "This is the second of three planned operable units for the site. The first operable unit provided the community with an alternate water supply to prevent ingestion of contaminated ground water. This second operable unit addresses remediation of the source materials (e.g., lagoon contents, contaminated soil). The third and final operable unit will address the contaminated ground water."

As the preceding example illustrates, the Proposed Plan's description of the overall site strategy and the function of the proposed response action should indicate how and through what action or series of actions those portions of the site requiring remediation will be addressed, including the **principal threats** (if any).

2.3.4 Summary of Site Risks

This section of the Proposed Plan should summarize the extent of contamination at the site and the risks posed to human health and the

000026

environment using information developed during the RI. The summary of site risks should include key findings made in the baseline risk assessment conducted as part of the RI. This discussion should:

- Identify contaminated media
- Identify contaminant(s) of concern
- Describe exposure pathways (e.g., routes of exposure - ground water, surface water, air, and soil)
- Describe the potentially exposed population(s).

The description of site risks should not rely solely on standard numeric risk representations (such as cancer risks of 10^{-3} or a hazard quotient value of 22). These risk numbers should be accompanied by a discussion that explains, for example, that a cancer risk level of 10^{-3} means that at a reasonable maximum exposure an individual has a 1 in 1,000 chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at the site. Similarly, for noncarcinogenic effects, the discussion of the hazard quotient and hazard index should state that a hazard quotient (the ratio of the existing level of exposure to an acceptable level) greater than 1.0 indicates that the exposure level exceeds the protective level for the particular contaminant of concern.

In addition, for proposed remedies other than "no action," this section of the Proposed Plan should conclude with a statement similar to Highlight 4.

Highlight 4: Required Risk Language for Proposed Remedies

Actual or threatened releases of hazardous substances from this site, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare, or the environment.

2.3.5 Summary of Alternatives

The Summary of Alternatives section should briefly narrate the alternatives studied in the detailed analysis phase of the RI/FS Report. This description should specify the treatment technology(ies), engineering controls, institutional controls, quantities of waste handled, implementation requirements, estimat construction and operation and maintenan costs, and estimated implementation time fran associated with each remedy.

These descriptions also should incorpora the major ARARs associated with each optio For example, source control remedies whi involve placement or site closure should RCRA land disposal restrictions (LDRs) a RCRA Subtitle C or D closure standarc respectively. The sample Proposed Plan Appendix B of this guidance provides exampl of the level of detail for these discussions.

2.3.6 The Evaluation of Alternatives

This section should begin by identifying t preferred alternative. Next, the nine criter used to evaluate the alternatives in the detail analysis in the FS should be presented.

The nine criteria fall into three group threshold criteria, primary balancing criteri and modifying criteria. The threshold criter must be met for an alternative to be eligible f selection. The primary balancing criteria a used to weigh major trade-offs amor alternatives. Generally, the modifying criter are taken into account after public comment received on the Proposed Plan. **Highlight** presents information on the organization criteria and the major points that should addressed under each criterion. Additional

Highlight 5: The Nine Remedial Evaluation Criteria

THRESHOLD CRITERIA

1 Overall Protection of Human health and the Environment

- How Alternative Provides Human Health and Environmental Protection

2 Compliance with ARARs

- Compliance with Chemical Specific ARARs
- Compliance with Location-Specific ARARs
- Compliance with Action-Specific ARARs
- Compliance with Other Criteria, Advisories, and Guidances (TBCs)

PRIMARY BALANCING CRITERIA

3 Long-Term Effectiveness and Permanence

- Magnitude of Residual Risk
- Adequacy and Reliability of Controls

4 Reduction of Toxicity, Mobility, and Volume Through Treatment

- Treatment Process Used and Materials Treated
- Amount of Hazardous Materials Destroyed or Treated
- Degree of Expected Reductions in Toxicity, Mobility, and Volume
- Degree to Which Treatment is Irreversible
- Type and Quantity of Residuals Remaining After Treatment

5 Short-Term Effectiveness

- Protection of Community During Remedial Actions
- Protection of Workers During Remedial Actions
- Environmental Impacts
- Time Until Remedial Action Objectives are Achieved

6 Implementability

- Ability to Construct and Operate the Technology
- Reliability of the Technology
- Ease of Undertaking Additional Remedial Actions, if Necessary
- Ability to Monitor Effectiveness of Remedy
- Ability to Obtain Approvals from Other Agencies
- Coordination with Other Agencies
- Availability of Off-Site Treatment, Storage, and Disposal Services and Capability
- Availability of Necessary Equipment and Specialists
- Availability of Prospective Technologies

7 Cost

- Estimated Capital Costs
- Estimated Operation and Maintenance Costs
- Estimated Present Worth Cost

MODIFYING CRITERIA[1]

8 State Acceptance

- Features of the Alternative the State Supports
- Features of the Alternative About Which the State has Reservations
- Elements of the Alternative the State Strongly Opposes

9 Community Acceptance

- Features of the Alternative the
- Community Supports
-
- Features of the Alternative About Which the Community has Reservations

Elements of the Alternative the Community Strongly Opposes

[1] These criteria are assessed following comment on the RI/FS Report and th Proposed Plan.

000028

information on the nine criteria and detailed analysis of alternatives are provided in the NCP and the *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (OSWER Directive 9355.3-01, October 1988).

The Proposed Plan uses the nine criteria to profile the performance of the preferred alternative, explaining the rationale for the preference by briefly comparing the preferred alternative with the other alternatives under each criterion. For example, under the long-term effectiveness and permanence criterion, the quantity of residuals the preferred alternative leaves on site and the reliability of the long-term management controls used should be stated and compared with the other alternatives. **Highlights 5** and **6** present additional information on the major points to be addressed under each criterion.

The discussion in this section of the Proposed Plan should develop the initial rationale for the preferred alternative; however, it need not provide a comprehensive analysis of each alternative in relation to each of the nine criteria, **nor should it make conclusive, binding statements about an alternative.** For a more detailed explanation, the reader of the Proposed Plan should be directed to the comparative analysis contained in the RI/FS. Appendix C includes some sample worksheets that could be used during the preliminary stages in preparing this section of the Proposed Plan. The conclusion of this section of the Proposed Plan should include a summary by the lead Agency. The summary should state that **based on information currently available, the lead agency believes the preferred alternative provides the best balance of trade-offs among the other alternatives with respect to the evaluation criteria.** This section should include a statement summarizing the support agency's concurrence or nonconcurrence with the preferred alternative and should note that the lead agency expects the preferred alternative to satisfy the statutory requirements in CERCLA section 121(b) to:

- Be protective of human health and environment
- Comply with ARARs (or justify a waiver
- Be cost-effective
- Utilize permanent solutions and alternati treatment technologies or resource recove technologies to the maximum exte practicable
- Satisfy the statutory preference for treatme as a principal element, or justify not meeti the preference.

2.3.7 Community Participation

The public should be informed of t following:

- Dates of the public comment period (e.g March 1 through 30)
- Date, time(s), and location(s) of the publ meeting(s) held pursuant to CERCLA sectic 117(a) (and an offer to hold a meeting upo request if one has not been scheduled)
- Location of information repositories and th Administrative Record and the hours c availability
- Names, phone numbers, and addresses of th lead and support agency personnel who wi receive comments or who can suppl additional information.

000030

Highlight 6: Hints for Preparing the Nine Criteria Analysis

Overall Protection of Human Health and the Environment

In every FS, a "no action" alternative is developed as a baseline for comparative analysis purposes. In cases where the no action alternative is found not to meet this criterion, it can be ruled out for further consideration and, therefore, need not be discussed further in the criteria analysis.

Compliance with ARARs

For an alternative to pass the screening process in the RI/FS and thus become eligible for selection, it must comply with its ARARs or a waiver should be identified and the justification provided for invoking it. An alternative that cannot comply with ARARs, or for which a waiver cannot be justified, should be eliminated from consideration or further discussion as a potential alternative in the Proposed Plan or ROD.

Long-Term Effectiveness and Permanence

In addressing the long-term effectiveness and permanence of an alternative, the term "long-term effectiveness" should be viewed along a continuum (i.e., an alternative can offer a greater or lesser degree of long-term effectiveness). Alternatives that are more effective in the long-term are more permanent; however, the term "permanent" should not be used in describing the alternatives. Instead, an alternative should be described only in terms of "long-term effectiveness."

Cost

The costs of remedies always should be qualified as **estimates**.

State/Support Agency Acceptance

Where there are major support agency comments, they should be summarized under the state (i.e., support agency) acceptance criterion. The lead agency's response to those comments also should be summarized here.

Community Acceptance

Because information available on the community acceptance criterion may be limited before the public comment period for the Proposed Plan and the RI/FS Report, the Proposed Plan should indicate that this factor will be evaluated in the ROD or, if appropriate, the Proposed Plan should provide a preliminary summary based on available information. **Proposed Plans should not speculate on community acceptance of the alternatives.**

2.4 FORMATS FOR THE PROPOSED PLAN

There are two basic formats available to the lead agency for preparing the Proposed Plan. The first option is to issue the Proposed Plan in a fact sheet format, similar to the community relations fact sheets that traditionally have been issued by the Superfund program.

The second option for issuing the Proposed Plan is to prepare an expanded, more detailed document that is similar to a draft ROD, yet less lengthy and conclusive than a ROD. This latter option is more of a "stand-alone" document because it relies less on references to the RI/FS and other documents in the Administrative Record than does the more brief format.

Although the fact sheet format is expected to suffice for most Proposed Plans, specific site circumstances (e.g., complexity, public controversy) may call for using the expanded format. Regardless of the format chosen, the Proposed Plan should be written so that the information can be readily understood by the general public. The major components of the Proposed Plan and effective ways in which they can be summarized is outlined in *A Guide to Developing Superfund Proposed Plans* (OSWER Directive 9335.3-02FS-2, May 1990). After the Proposed Plan is issued, a copy should be sent to EPA Headquarters as soon as possible. Appendix D of this Guidance, describes the process for preparing and submitting the Proposed Plan to Headquarters. Sections 2.4.1 and 2.4.2 summarize the advantages and disadvantages associated with the two alternative formats for the Proposed Plan.

2.4.1 Fact Sheet Format

EPA and the States currently distribute fact sheets as part of the community relations activities for a site. Preparing the Proposed Plan in a fact sheet format would fulfill the statutory requirements related to the Plan. Because the Proposed Plan is issued to fulfill a statutory requirement, the Plan may be organized differently or may discuss informa not traditionally contained in commu relations fact sheets. The advantages of the sheet format are:

- The fact sheet is an established tool use communicate information to the public.
- Fact sheets can be easily distributed to public.
- Fact sheets are already issued by EPA States; Superfund personnel are familiar v fact sheet production and distribution.
- Some Regions and States already use the sheet format to announce a prefer alternative.

This format may be inappropriate if the l agency determines that the circumstances remedy selection at a particular site warran lengthier, detailed document that thoroughly describes the site conditions remedial alternatives.

2.4.2 Expanded Format

The lead agency may determine that t development of a more detailed document is t most appropriate option for the site or operat unit. Often, this document may be similar tc draft ROD. An expanded format for t Proposed Plan is more likely to be used when in-depth discussion of the alternatives in t RI/FS Report is necessary (e.g., if the site technically complex, involves a series operable units, or is the subject of considerat public concern). Documents following expanded format should include the informati specified in **Highlight 3**, but in greater deta The advantages of the expanded format are:

- A document with an expanded format c provide an in-depth discussion of the le and support agencies' rationale for the initi preference for an alternative.

- The document may later provide a more direct basis for the remedy selected in the ROD.

Disadvantages include:

- A lengthy discussion of the rationale may give the impression that a remedy has already been selected.

- Such a document could unintentionally divert attention from the RI/FS Report.

- Such a document may discourage public participation because of its length and the degree of detail included regarding the technical complexities of the site.

1. Chapter 9 should be consulted when preparing Proposed Plans for no action, interim action, and contingency remedy decisions.

2. [ ] denotes paraphrase.

3. Subpart I of the revised National Contingency Plan and the *Interim Guidance on Administrative Records for Selection of CERCLA Response Actions* (OSWER Directive 9833.3A, March 1989) provides detailed information on developing, maintaining, and providing access to the Administrative Record for the selection of the CERCLA response action.

000032

3.0 THE PROCESS FOR DEVELOPING THE PROPOSED PLAN

000033

3.1 OVERVIEW

This chapter summarizes the roles and responsibilities of the lead and support agencies in developing the Proposed Plan. Agreement on the viable alternatives for a site or operable unit is critical to the remedy selection process. Therefore, personnel in the lead and support agencies should begin discussions on the alternatives analyzed in the FS as early as possible. As the RI/FS progresses, discussions between the lead and support agencies should begin to focus on identifying a preferred alternative. These early discussions should help prevent delays in the later stages of the remedy selection process.

If PRPs conduct the RI/FS, the lead agency should be informed of the alternatives developed and screened, before the detailed analysis. The remaining alternatives that are evaluated in detail represent the waste management options that constitute the basis for selecting a response action. Early discussions on alternatives development should help prevent delays in the later stages of the remedial process. The lead agency should ensure that the PRPs and all support agencies are well informed of site activities by regularly updating the Administrative Record File.[1]

The general steps in preparing the Proposed Plan for public comment are summarized in **Highlight 7**. The sequence in which these steps are taken may vary among Regions and States.

The lead agency should begin drafting the Proposed Plan upon completion of the RI/FS Report. If a PRP prepares the RI/FS, then the Proposed Plan should be drafted by the lead agency after the lead agency approves the RI/FS. The RI/FS Report should be sent to the support agency as soon as the Report is available, but no later than when the draft Proposed Plan is transmitted to the support agency for review and comment.

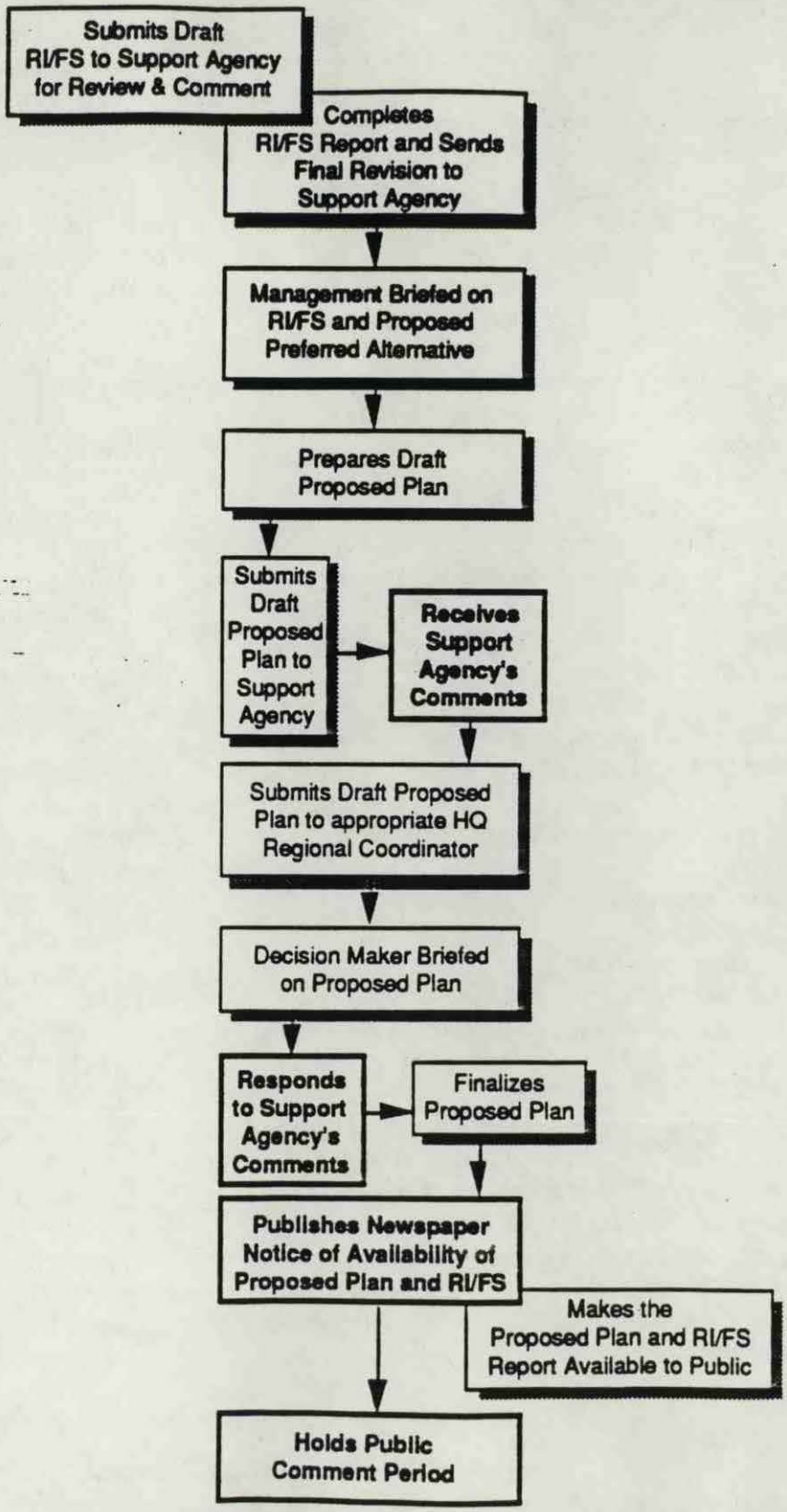
A preferred alternative is identified tentatively on the basis of the RI/FS Report and ongoing discussions between the lead and support agencies. To augment the regular flow of information to management, a formal briefing on the RI/FS and the preferred alternative should be made to management at this time. After this meeting, a draft Proposed Plan is written and submitted to the support agency and lead agency management for review and comment. Other intra-agency program offices should complete their review of the RI/FS Report during this period, if they have not already done so.

The lead agency should prepare the final Proposed Plan based on the comments from the support agency and the results of the internal program and management review process. This final version should include either a summary of the support agency's agreement with the Plan or its dissenting comments. If the state is the lead agency and EPA does not concur with the Proposed Plan, then EPA could assume lead responsibility for the Proposed Plan if a resolution cannot be reached (see Section 3.3 for more details). Finally, the notice announcing the availability of the RI/FS Report and the Proposed Plan should be published in a major newspaper, and both documents should be made available to the public for comment.

3.2 ROLES AND RESPONSIBILITIES OF THE LEAD AGENCY AND SUPPORT AGENCY

For the remedy selection process to be successful, lead and support agencies should interact throughout the entire RI/FS and Proposed Plan process. The goal of this continued interaction is to reach agreement on

Highlight 7: Preparation of the Proposed Plan by the Lead Agency



Note: Shaded boxes denote statutory requirements.

the Proposed Plan and the RI/FS Report before the start of the public comment period.

3.2.1 Designation of Roles and Responsibilities

EPA and the State play specific roles throughout the remedial process. These roles should be defined in the (SMOA), (CA), or (SSC).[2] The SMOA and/or CA should designate the lead and support agency for conducting the RI/FS, developing the Proposed Plan, and drafting the ROD. The SMOA, if applicable, should describe the general procedures for oversight and interaction between EPA and the State. In addition, the SMOA should contain site-specific agreements between EPA and the State, such as which agencies are designated to take the roles of the lead and support agencies at specific sites. In the absence of a SMOA, a CA negotiated between EPA and the State should provide this information for each specific site. The SSC, in contrast, should be used when the State has no lead responsibilities for a particular site or project and only when documentation of the cost-share is necessary.

3.2.2 Lead and Support Agency Responsibilities

The lead agency's responsibilities for developing the Proposed Plan are to:

- Draft the Proposed Plan
- Solicit comments on the Proposed Plan from the support agency(ies)[3]
- Respond in writing to comments from the support agency(ies) and include both the comments and responses in the Administrative Record File
- Summarize the comments received from the support agency(ies) and present the lead agency's response in the Proposed Plan
- Publish a newspaper notice announcing availability of the RI/FS Report and Proposed Plan
- Make the RI/FS Report and Proposed Plan available to the public in the Administrative Record.

The support agency's primary responsibilities are to review and comment in a timely fashion on (1) specific RI/FS deliverables, (2) the draft RI/FS Report(s), and (3) the Proposed Plan. **The statute requires that this review specifically address the preferred alternative, other remedial alternatives, ARARs, and any proposed waivers to ARARs.**

The role of other program offices within EPA and state agencies is to provide specific comments on the alternatives analyzed in the RI/FS Report. EPA and the State should establish the appropriate procedures and time frames for these intra-agency reviews. Review of the RI/FS Report by other program offices should be conducted at appropriate times during the RI/FS process to ensure that alternatives in the detailed analysis phase of the RI/FS Report comply with other program requirements (e.g., ARARs). For EPA, this may involve review by program offices such as the CWA Program, the RCRA Program, and the TSCA Program. If a draft Proposed Plan is available when the RI/FS Report is ready to be circulated, then the Plan should be circulated at the same time.

3.2.3 Management Review of the Proposed Plan

The lead and support agencies should determine the appropriate level of managerial review for the draft Proposed Plan and, as appropriate, include this in the SMOA, CA, or SSC. The Regional Administrator and State Director should be briefed on the RI/FS Report and the Proposed Plan by their respective staffs before these documents are released to the public. Most targeted and planned RODs in the CERCLA Information System (CERCLIS) will be delegated to the Regions for signature. In

000035

these cases, if certain criteria are met (per the Annual Remedy Delegation Report), the Region must consult with the appropriate Headquarters manager. However, the Assistant Administrator of OSWER should be briefed if the Proposed Plan and ROD for a site have not been delegated to the Regional Administrator. Issuance of the Proposed Plan provides the first opportunity for the public to comment on the remedial action identified as the preferred alternative by EPA and the State. Therefore, the Regional Administrator or State Director should be briefed on the contents of both the RI/FS Report and Proposed Plan, as well as on any unresolved or potentially problematic issues. This is especially true if a waiver to an ARAR is involved or if there are unresolved issues between the staffs of the lead and support agencies.

3.2.4 Support Agency Comment Period

The support agency's comment period presents an important opportunity for the lead and support agencies to reach agreement on the preferred alternative. **The lead agency should seek agreement from the support agency on the Proposed Plan before making the Plan available to the public.** The comment period begins when the support agency receives the Proposed Plan from the lead agency and should last at least 5, but no more than 10 working days. If a different time period for review is established in the SMOA, CA, or SSC, that time period should be followed. As previously mentioned, the draft RI/FS Report could be given to the support agency before the Proposed Plan is ready for review. The review period for the draft RI/FS Report should last at least 15 working days, unless a different time period is established in the SMOA, CA, or SSC, or by some informal arrangement between the lead and support agencies.

During the review period, the support agency should provide written comments on the preferred alternative and other components of the Proposed Plan. These comments should indicate one of the following:

- Agreement, with or without comments
- Disagreement, with or without commen
- No comment on the Plan at this time.

If the support agency does not respond tc lead agency's request for comments or prefe: withhold its comments until the public comr period, a copy of the written request comments and a note documenting that support agency did not provide comments sh(be placed in the Administrative Record Fil(the lead agency before the public comn period begins.

The lead agency should respond formall the support agency's comments that it rece: prior to making the Proposed Plan availabl(the public. The lead agency should address unresolved issues with the support age through a written explanation sent to the sup agency. The response should address concerns relating to the alternatives iden the Proposed Plan, the preferred alternat ARARs, and any proposed ARAR waiv particularly any that relate to state standards. addition to the formal response (i.e., letter) to the support agency, which should address concerns raised, comments from the supp agency should also be summarized in Proposed Plan under the state/support age: acceptance criterion in the Evaluation Alternatives section. These comments and lead agency's formal response to these comme **should be included, in their entirety**, in Administrative Record.

3.3 PROCEDURES FOR RESOLVI DISPUTES

If a dispute should arise between the l and support agencies during any phase of remedial process, the staffs of the lead support agencies should attempt to resolve th issues in a timely manner. In the event that st resolution is not possible, the issue(s) sh brought promptly to management attenti resolution.

The lead and support agencies should use the dispute resolution process specified in the SMOA or CA, when these are appropriate. If Federal agencies are involved, the dispute resolution process specified in the IAG should be followed. Alternatively, the lead and support agencies could consider using the dispute resolution process specified in Subpart F of the NCP.

Subpart F, "State Involvement in Hazardous Substance Response," of the NCP (40 CFR Part 300) outlines a dispute resolution process that EPA Regions and states should use to resolve disputes that arise during the RI/FS and remedy selection process. This approach encourages the lead and support agencies' RPMs to resolve any disputes promptly. If this cannot be accomplished, the issue could be referred to their supervisors for further EPA/state consultation.[4] This supervisory referral and resolution process should continue, if necessary, to the level of Director of the state agency and the Regional Administrator, respectively. If agreement still cannot be reached, the dispute should be referred to the Assistant Administrator of OSWER, who serves as final arbiter.

Regardless of the process used, the result should be an equitable resolution of outstanding issues. There may be instances, however, in which a final resolution cannot be achieved. If this should occur, two alternatives exist for continuing effective action. First, if EPA is the lead agency (pursuant to sections 104, 106, or 122), the Region should use its discretion as to whether to proceed with publication of the Proposed Plan. Second, if the State is the lead agency (pursuant to section 104), EPA could elect to become the lead agency for the Proposed Plan, public participation activities, and the ROD. (This applies only to Fund-financed, state-lead projects.) It should be noted, however, that mutual acceptance of the preferred alternative (and, ultimately, of the selected remedy) by both EPA and the State is crucial to effecting cleanup at the site.

3.4 ROLE OF OTHER FEDERAL AGENCIES

Executive Order 12580 delegates the authority for carrying out the requirements of CERCLA sections 117(a) and (c) to Federal agencies with Federal facilities under their jurisdiction. A Federal agency, therefore, has the responsibility to issue the Proposed Plan. The IAGs between a Federal agency, EPA, and, in many cases, the State should establish the responsibilities for each party in preparing the Proposed Plan for Federal facilities.

As the lead agency, a Federal agency's responsibilities for preparing the Proposed Plan include those lead agency responsibilities specified in Chapters 2 and 3 of this guidance. The support agency, EPA, and/or the State should have sufficient time before publication of the Proposed Plan to comment on the RI/FS Report and the Proposed Plan. The length of the review period should be specified in the IAG. The Federal agency should respond formally to comments made by EPA and the State. The formal response to the comments should be sent to the support agency(ies) and included in the Administrative Record File before the beginning of the public comment period.

Comments of the support agency (i.e., EPA and/or the State) and Federal agency responses to those comments should also be summarized in the Proposed Plan. Under the state/support agency acceptance criterion in the Evaluation of Alternatives section, the Federal agency should:

- Explain whether the support agency agrees or disagrees with the Proposed Plan (especially the preferred alternative)
- Indicate which alternative the support agency prefers when there is a disagreement
- Provide a summary of any outstanding support agency comments.

000037

3.5 ROLE OF POTENTIALLY RESPONSIBLE PARTIES

In accordance with the requirements of CERCLA sections 104 and 122, EPA can provide PRPs with the opportunity to conduct the required response actions (i.e., the RI/FS, except for the risk assessment, remedial design, and remedial action). In the event that the PRPs conduct the RI/FS (excluding the risk assessment), either EPA or the State will become the lead governmental agency for general oversight of the RI/FS. EPA or the State should prepare the Proposed Plan and the ROD, even if the PRP conducts the RI/FS.[5]

PRPs could participate in the selection process by commenting on Proposed Plan and on other publicly availa information contained in the Administrat Record during the formal public comm period. The lead agency, although not lega obligated to respond to comments submitted PRPs and members of the public before t formal public comment period, is encouraged do so.

1. If a State has taken responsibility for an NPL site and is conducting the cleanup under the State's own authority (i.e., a state-lead enforcement action), the state should keep EPA informed of the progress at the site.

2. The SMOA is a procedural agreement that outlines cooperative efforts between States and EPA Regions a defines the roles and responsibilities of each party in the conduct of a Superfund program in a state. For mo information, see *Interim Final Guidance on Preparing a Superfund Memorandum of Agreement (SMOA)* (OSWE Directive 9375.0-01, May, 1989). The CA is a contractual agreement between EPA and the State in which EF appropriates money to the State to conduct remedial planning activities and/or remedial action in compliance the NCP. The SSC documents any required cost sharing between EPA and the State but does not invol disbursement of Federal monies.

3. If the State has taken responsibility for an NPL site and is conducting the cleanup under the state's ov authorities (i.e., as a state-lead enforcement site), the State should keep EPA informed about progress at the sit

4. It is possible that one of the participants will choose to refer an unresolved issue to upper management, whi the other participant chooses to maintain jurisdiction over the issue.

5. At those sites for which the PRP conducts the RI/FS, the PRP should not indicate its preferred alternative in th RI/FS Report. If the PRP wants to communicate this information to the lead agency, it should do so through som other mechanism, such as a memorandum.

4.0 THE NEWSPAPER NOTIFICATION OF AVAILABILITY OF THE PROPOSED PLAN AND THE PUBLIC COMMENT PERIOD

000039

This chapter summarizes the requirements for the newspaper notification, which announces the availability of the Proposed Plan, and presents guidance on procedures for the public comment period.

4.1 STATUTORY REQUIREMENTS

CERCLA section 117 requires that upon completion of the Proposed Plan, the lead agency shall notify the public of the availability of the Plan, the RI/FS Report, and the Administrative Record. The statutory requirements are as follows:

- Section 117(a)(1) requires the lead agency to do the following:
  - Publish a notice and brief analysis of the Proposed Plan and make such Plan available to the public
  - Include sufficient information in the notice and analysis as may be necessary to provide a reasonable explanation of the Proposed Plan and alternative proposals considered.
- Section 117(d) further specifies that:
  - Publication shall include, at a minimum, publication in a major local newspaper of general circulation. In addition, each item developed, received, published, or made available under this section to the public shall be available for public inspection and copying at or near the facility or site where the remedial action is being considered.

4.2 WRITING THE NEWSPAPER NOTIFICATION

The lead agency's newspaper notification should include a brief abstract of the Proposed Plan, which describes the alternatives analyzed and identifies the preferred alternative. The notice should be published in a widely read section of the newspaper, rather than in the classified advertisements or legal notices. Key elements of the notification are summarized below. **Highlight 8** provides a sample newspaper notification based on the hypothetical site described in Appendix A.

The newspaper notification should consist of the following elements:

- **Site Name and Location**. The notice should include the proper site name and location.
- **The Date and Location of a Public Meeting** (if scheduled). If a meeting has not been requested or scheduled, the notice should inform the public of its right to request one.
- **Identification of Lead and Support Agencies**. The notice should identify which entities (i.e., EPA, state agency, or other Federal agency) are serving as lead and support agencies for the response action.
- **Alternatives Evaluated in the Detailed Analysis**. The notice should list the remedial alternatives evaluated in the detailed analysis phase of the FS.[1]
- **Identification of Preferred Alternative**. A brief statement of the major components of the preferred alternative should be included.[2]
- **Request for Public Comments**. **The notice should emphasize that the lead agency is soliciting public comment on all of the alternatives evaluated in the detailed analysis phase of the FS, as well as on the preferred alternative.** It should include a

Highlight 8: Sample Newspaper Notification of Availability of the Proposed Plan

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Invites
PUBLIC COMMENT ON THE PROPOSED CLEANUP OF THE EIO INDUSTRIAL SITE
at
129 FRANKLIN STREET, NAMELESS, TN

The U.S. Environmental Protection Agency (EPA) and the Tennessee Pollution Control Board (TPCB) will hold a Public Meeting to discuss the Remedial Investigation/Feasibility Study (RI/FS) Report and the Proposed Plan for the EIO site. The meeting will be held on September 10, 1991, at 7:30 p.m. in the Community Hall, 123 Market Road, Nameless, Tennessee.

EPA (the lead agency) and the TPCB (the support agency) evaluated the following options for addressing the contaminated soil, sediments, and ground water at the EIO site:

For soil and sediment cleanup:
- No action
- Excavation, incineration, and disposal off site
- In-situ soil vapor extraction and solidification
- Excavation, incineration, solidification, and capping on site
- Consolidation and capping.

For ground-water cleanup:
- No action
- Pump and treat by carbon adsorption and discharge to a publicly owned treatment works (POTW)
- Pump and treat by air stripping and discharge to XYZ River
- Treat by in-situ biorestoration.

Based on available information, the preferred option at this time is to excavate the estimated 13,000 cubic yards of contaminated soil and sediments at the site, incinerate the organics, solidify the soils to immobilize metal contaminant(s) of concern, and dispose of them on site and to pump and treat the ground water by carbon adsorption and discharge it to a POTW.

Although this is the preferred alternative at the present time, EPA and TPCB welcome the public's comments on all of the alternatives identified above. EPA and TPCB will choose the final remedy after the public comment period ends and may select any one of the options after taking those comments into account.

The Proposed Plan has been mailed to all known interested parties. Also, complete documentation of the analysis is presented in the RI/FS Report and in the Proposed Plan, which are available for review at the Nameless Public Library, 125 Elm Street, as are any other documents contained in the Administrative Record.

The public may comment in person at the public meeting and/or may submit written comments today and until October 1, 1991, to Joshua Doe at the EPA address below. For further information, contact:

Joshua Doe
Community Relations Coordinator
U.S. Environmental Protection Agency
200 Peachtree Street
Atlanta, GA 11111
(555) 555-4640

Toll Free (800) 333-3333 between 8:30 a.m. and 5:00 p.m., Monday through Friday, excluding Federal holidays.

clear statement that the preferred alternative is only a preliminary determination, and that any of the other options presented could be selected as the remedy based upon public comment, new information, or a reevaluation of existing information. The readers should be referred to the RI/FS Report and other contents of the Administrative Record File for further information on all of the remedial alternatives considered. The Proposed Plan also should request comments on any variances or waivers that must be obtained to comply with ARARs. For example, if a Treatability Variance is required to comply with the RCRA LDRs, the Proposed Plan should specifically solicit comments on the Variance for all alternatives for which it is required.

- **Public Participation**. The notice should inform the public of its role in the remedy selection process and provide the following information:

  - Location of the information repositories and the Administrative Record

  - Methods by which the public may submit comments

  - Dates of the public comment period.

4.3 PUBLIC COMMENT PERIOD

This section provides guidance on the procedures the lead agency should follow to satisfy the public participation requirements in section 117 of CERCLA. Section 117(a)(2) requires that the lead agency do the following:

> ... [provide] a reasonable opportunity for submission of written and oral comments and an opportunity for a public meeting at or near the facility at issue regarding the proposed plan and regarding any proposed findings [relating to cleanup standards and any proposed waiver]... [and] keep a transcript of the meeting and make such transcript available to the public.

The lead agency is charged with making the relevant documents, such as the Proposed Plan and the RI/FS Report, available to the public at the time the public comment period begins.[3] In addition, the lead agency should ensure that any information considered or relied upon in selecting the response action is included as part of the Administrative Record File and is available to the public during the public comment period.

CERCLA section 117(a)(2) also requires the lead agency to provide the public with a reasonable opportunity to submit written and oral comments on the Proposed Plan. The lead agency must allow the public a minimum of 30 days to comment on the information contained in the RI/FS Report (including any proposed waivers relating to ARARs). Longer time periods may be determined to be appropriate, depending on specific site circumstances. Upon timely request, section 300.415(m)(4)(iii) of the NCP also requires the lead agency to extend the comment period by a minimum of 30 additional days.

Although the lead agency could respond to oral or written comments received during the RI/FS process, before the public comment period, the lead agency has no legal obligation to do so. To ensure that all comments are addressed, the lead agency should ask individuals to resubmit comments that were initially made during the RI/FS process during the formal public comment period.

Further guidance on the public comment period and the lead agency's responsibilities can be found in *Community Relations in Superfund: A Handbook* (OSWER Directive 9230.0-3B, June 1988) and the *Final Guidance on Administrative Records for the Selection of CERCLA Response Actions* (OSWER Directive 9833.3A-1, December 3, 1990).

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1. Statutory requirements of CERCLA section 117(a).

2. Statutory requirements of CERCLA section 117(a).

3. In addition to being published in the newspaper, the notice of the Proposed Plan should be sent directly to PRPs via the community relations or enforcement mailing list for the site. (Although this is not a statutory requirement, this may allow those PRPs who may be outside the circulation area of the local newspaper to participate in a timely manner.)

5.0 PRE-RECORD OF DECISION CHANGES

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5.1 OVERVIEW

After the public comment period ends, a final remedial alternative is selected for adoption in the ROD. The selection of the remedy is based on the analysis presented in the Proposed Plan and RI/FS Report, giving consideration to the comments from the support agency and the public, as well as any other new and significant information received or generated. The lead agency may re-evaluate the preferred alternative in light of this information and may change a component of the preferred remedy or choose to implement a remedy other than the preferred alternative.

When the lead agency makes a change(s), the change must be documented. If a change is made (i.e., a different alternative from that preferred in the Proposed Plan or in a component of the remedy from Plan to final selection), according to CERCLA section 117(b), the lead agency should analyze these changes to determine if the modifications are "significant" or "minor."

This chapter presents a general framework for categorizing minor and significant changes made to the Proposed Plan after it is issued for public comment. It also specifies documentation and communication activities that may be necessary to inform the public of these changes. The chapter discusses only changes that are made before the ROD is signed; post-ROD changes are discussed in Chapter 8.

5.2 IDENTIFYING TYPES OF PRE-RECORD OF DECISION CHANGES

The lead agency has the discretion to make changes to the Proposed Plan based either on new information received from the public or support agency or on information generated by the lead agency itself during the remedial process. A site-specific determination of what constitutes a "significant" or a "minor" change is made after taking into consideration: (1) the information previously made available to the public; (2) the original description of the alternatives presented in the Proposed Plan (outlined in detail in the RI/FS Report); and (3) the impact that the changes may have on the alternative's scope, performance, and/or cost (see NCP preamble 55 FR 8772 for more discussion).

5.2.1 Minor Changes

Minor changes are those that have little or no impact on the overall scope, performance, or cost of the alternative originally presented in the Proposed Plan as the preferred alternative for the site or operable unit. Such changes typically will be clarifications, administrative changes, and minor technical or engineering changes that do not significantly alter the overall scope, performance, or cost of the alternative.

5.2.2 Significant Changes

In contrast to minor changes, **significant changes** have a significant or fundamental effect on the scope, performance, and/or cost of the preferred alternative. They generally involve either:

- Selecting an RI/FS alternative other than the preferred alternative identified in the Proposed Plan as the remedy
- Substantially modifying a component of the previously identified preferred alternative.

Highlight 9 explains the types of changes that constitute significant changes of a remedy's scope, performance, or cost. Because what constitutes a significant change will vary depending upon site circumstances and the manner in which the information was presented

Highlight 9: Changes That Significantly Affect Scope, Performance, and/or Cost

- **Scope:** Changes that substantially alter the volume of waste to be addressed or the physical area of the site, or address a new environmental pathway.
- **Performance:** Changes in treatment technologies or processes that significantly alter the long-term effectiveness of the remedy or that have significantly different short-term effects.
- **Cost:** Changes to any aspect of the selected alternative that substantially alter the capital or operation and maintenance cost estimates for the final alternative.

in the RI/FS Report and Proposed Plan, "significant change" is not specifically defined in this guidance. **Highlight 10** summarizes the process for analyzing and documenting pre-ROD changes.

5.3 DOCUMENTING PRE-RECORD OF DECISION CHANGES

CERCLA section 117(b) requires that the final remedial action plan (i.e., the ROD) be accompanied by:

> ... a discussion of any significant changes (and the reasons for such changes) in the proposed plan and a response to each of the significant comments, criticisms, and new data submitted [in the RI/FS Report and the Proposed Plan].

5.3.1 Documenting Minor Changes

Although the statute does not require documentation of **minor changes**, such changes to the Proposed Plan should be discussed in the "Description of Alternatives" section "ROD Decision Summary" (see **Highlight 1**: page 46) and should be documented in Administrative Record File. Minor chan should **not** be discussed in the signific changes section of the ROD Decision Summa

5.3.2 Documenting Significant Changes

The type of documentation required **significant changes** depends on whether or the change is a **logical outgrowth** of information available to the public for comm in the Proposed Plan and the RI/FS Report.

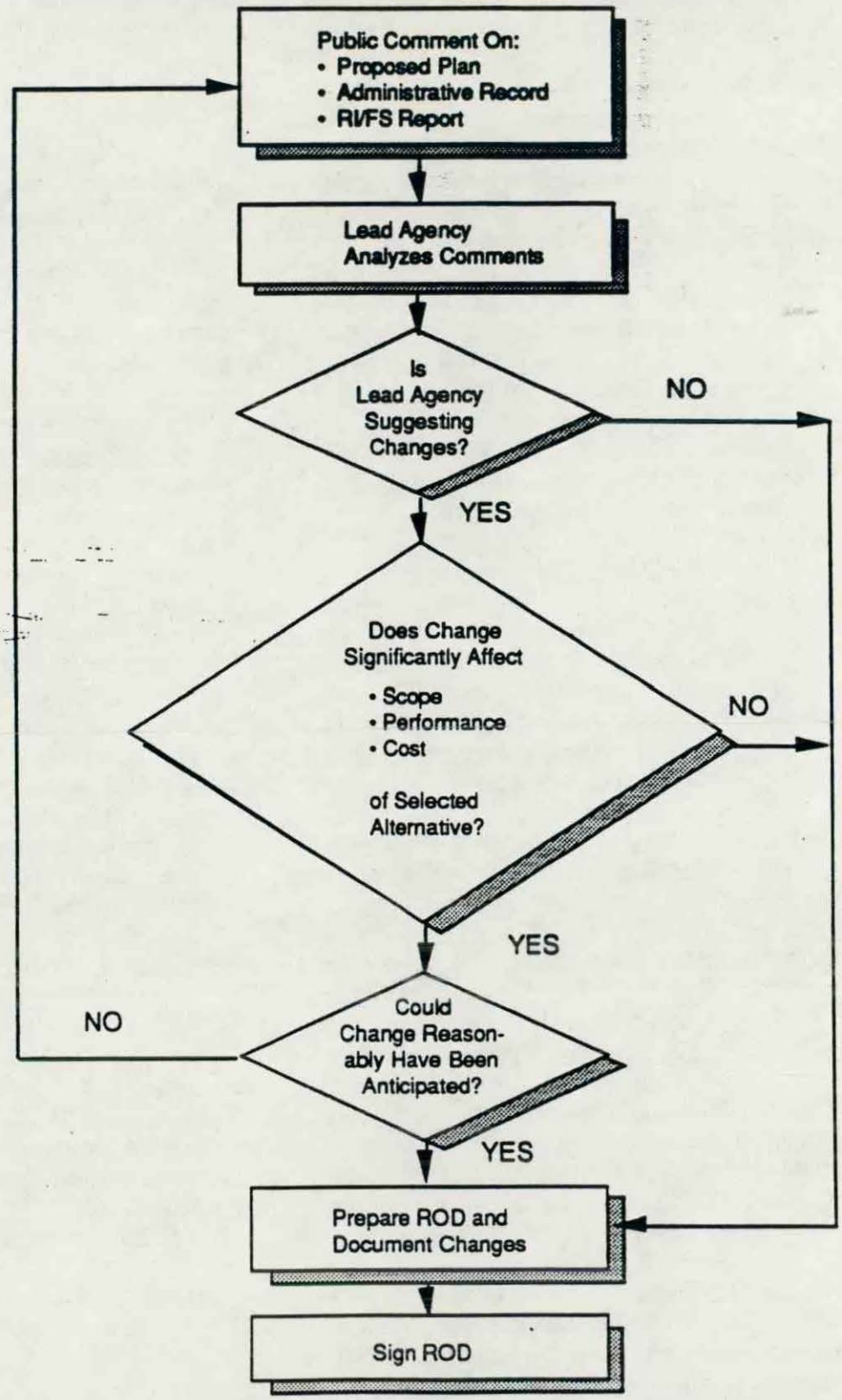
A logical outgrowth occurs where the pub could have reasonably anticipated the chan based on information available during the pub comment period and the comments submitt A significant change would be considered to a logical outgrowth where, based on the co ments received during the public comme period, the Agency selects, from among t alternatives discussed in the FS and/or Propos Plan, an alternative (or parts of alternatives) t differs from the preferred alternative Proposed Plan.

Significant Changes That Are Logical Ou growths of the Information Available to t Public

A significant change that is a logic outgrowth of information available to the publ in the Proposed Plan and RI/FS Report shou be documented at the end of the "Decisic Summary of the ROD" in the "Documentation Significant Changes" section. Additional publ notice or comment on this type of change unnecessary. Examples of types of significa changes that may be considered logic outgrowths include:

- **A Change to a Component of the Selecte Alternative**. In response to comments, t lead agency makes a significant change to component of the selected remedy (e.g., change in the preferred remedy's cos timing, level of performance, or complianc with ARARs) that could have been

Highlight 10: Pre-Record of Decision Changes



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anticipated by the public. The overall waste management approach represented by the alternative remains the same.

- **Selection of a Remedy Other Than the Preferred Alternative Specified in the RI/FS Report and Proposed Plan.** In response to comments, the lead agency determines, based on information received during the comment period, that the preferred alternative in the Proposed Plan no longer provides the most appropriate balance of trade-offs among the alternatives with respect to the nine evaluation criteria. Information available to the lead agency suggests that another alternative from the Proposed Plan and RI/FS Report provides the best balance of trade-offs, and the lead agency selects the other alternative.

- **Combining Components of Alternatives.** The Proposed Plan and RI/FS Report recommended several alternatives (or combinations of alternatives) for addressing different pathways at a site. The lead agency decides to combine some of the alternatives (or take parts of combinations to form yet another combination).

Significant Changes That Are Not Logical Outgrowths of the Information Available to the Public

In those limited situations in which the public could not reasonably have anticipated the significant change that is made, the change is not a logical outgrowth of the Proposed Plan and its supporting information. Therefore, a revised Proposed Plan that presents the new preferred alternative must be issued for public comment (NCP section 300.430(f)(3)(ii)(B)). The revised Proposed Plan must be prepared in accordance with the requirements of both CERCLA section 117 and the NCP. (These requirements are discussed in Chapters 2 and 3 of this guidance.) Appropriate supporting material that provides the necessary engineering, cost, and risk information for the new alternative(s), and that discusses how the new alternative(s) compares to the other alternatives with respect to evaluation criteria should be provided in revised Proposed Plan. (It may be appropr to provide this information as a supplemen the RI/FS Report.)

In addition, significant changes to the rev Proposed Plan must be documented at the en the "Decision Summary of the ROD" in "Documentation of Significant Changes" sect Examples of types of significant changes require a new Proposed Plan, additional pu comment, and documentation in the ROD presented below:

- **Selection of a New Alternative That Not Previously Considered.** The l agency determines that an alternative was **not** presented in the Proposed Plan detailed analysis phase of the RI/FS Re should be selected as the remedy. The alternative is not a logical outgrowth (e. combination) of considered alternati [The lead agency should issue a Proposed Plan that presents the preferred alternative and provi appropriate supporting information for pu comment. The significant change sho also be described in the ROD. T description should note the initially prefer alternative, the new alternative, and reason for the change.]

- **Significant Change to a Component of Selected Alternative.** Part of the rem must be altered (e.g., to comply wit newly discovered ARAR), resulting fundamental changes to the remedy. S changes require additional public commer making the change will radically alter overall remedy with regard to its sco performance, or cost in a manner that public could not reasonably have anticipat

Highlight 11 presents examples of mi and significant pre-ROD changes.

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Highlight 11: Examples of Pre-Record of Decision Changes

Minor Changes

- **It was determined that a remedy will require eight ground-water extraction wells, rather than six wells, as estimated originally in the Proposed Plan, to achieve cleanup objectives within the desired time period.**

- **The volume of material to be excavated and treated is actually 120,000 cubic yards, rather than the 110,000 cubic yards, as estimated originally in the Proposed Plan.**

- **Based on information received during the public comment period, the lead agency determines that the capital cost estimate in the Proposed Plan was about 10 percent too low; the actual capital cost of the remedy is $5,100,000. The lead agency also identifies factors that would extend the implementation time frame to 18 months. These changes do not significantly alter the scope, performance, or cost of the remedy.**

Significant Changes - Logical Outgrowth

- The RI/FS Report for a site specified one alternative to address contaminated soils and another to remediate the ground water. In identifying the preferred alternative for each of these media in the Proposed Plan, the lead agency did not make a conclusive determination regarding the most appropriate combination of the source control and ground-water alternatives for the site. The lead agency chooses to retain the preferred alternative for the ground water, but rejects the preferred soil remediation alternative and selects a different alternative from among those presented in the Proposed Plan.

- The lead agency receives new information during the public comment period that prompts a change in the remediation goal for the soils; as a result, the volume of contaminated soils that should be addressed is 30,000 cubic yards instead of 15,000 cubic yards, as originally estimated. The time to implement the remedy increases from 15 to 21 months, and costs increase by 15 percent.

Significant Changes - Not Logical Outgrowth

- In-situ vitrification, which was NOT presented in the Proposed Plan or the detailed analysis section of the FS, is selected as the remedy for the site, because new information was received indicating that in-situ vitrification could be used effectively at the site. This new remedy, however, is quite different in scope and performance from any other alternative considered in detail in either the Proposed Plan or RI/FS Report. Because the public has not had an adequate opportunity to comment on the technical, environmental, and human health aspects of the remedy or to evaluate and compare its performance in terms of the nine evaluation criteria, a revised Proposed Plan should be prepared and a new public comment period should be held before the remedy is adopted in the ROD.

NOTE: The examples presented here do not represent strict thresholds for changes in cost, volume, and/or time. THIS GUIDANCE DOES NOT ESTABLISH STANDARDS FOR SIGNIFICANT CHANGES.

6.0 WRITING THE RECORD OF DECISION

6.1 INTRODUCTION

This chapter presents a section-by-section discussion of the components of a CERCLA ROD. These components are the Declaration, the Decision Summary, and the Responsiveness Summary. This chapter applies specifically to decision documents prepared for **final response actions** that are planned either for a site or an operable unit within a site. Final response actions are those actions that comply with statutory determinations, and that address the statutory preference for treatment as a principal element.

Guidance on preparing a ROD that documents a no action or an interim (or limited) action is presented in Chapter 9. A no action decision is made when the lead agency determines that a response action is unnecessary to control, mitigate, or eliminate exposure. An interim action decision is made for those actions of limited scope that will be followed by final response actions for that operable unit. Chapter 9 outlines the modifications to the standard format (as outlined in this chapter) that should be made when documenting these two kinds of remedial decisions. In addition, the procedures in Chapter 9 should be consulted when a decision is contemplated that includes both a selected remedy and a contingency remedy that could be implemented if the primary remedy does not attain its performance specifications.

6.1.1 Purpose of the Record of Decision

The ROD documents the remedial action plan for a site or operable unit. It is prepared by the lead agency in consultation with the support agency(ies). The ROD has the following three purposes:

- First, the ROD serves a **legal** function in that it certifies that the remedy selection process was carried out in accordance with the requirements of CERCLA and, to the extent practicable, in accordance with the NCP[1]
- Second, the ROD is a **technical** document that outlines the engineering components and remediation goals of the selected remedy
- Third, the ROD is **informational**, providing the public with a consolidated source of information about the history, characteristics, and risks posed by the conditions at the site, as well as a summary of the cleanup alternatives considered, their evaluation, and the rationale behind the selected remedy.

The ROD is a "stand-alone" document; it must include all the necessary information and rationale to support the selected remedy. References to other documents, such as the RI/FS Report, should be minimal.

6.1.2 Statutory Requirements to Issue the Record of Decision

Sections 113 and 117 of CERCLA, as amended, require that the Agency issue a final remedial action plan. The Superfund program commonly refers to this plan as the ROD. Section 113(k)(2)(B)(v) of CERCLA, as amended, calls for "a statement of basis and purpose for the selected remedy at a site." In addition, section 117(b) requires that:

> Notice of the final remedial action plan [ROD] adopted shall be published and the plan shall be made available to the public before commencement of any remedial action. Such final plan shall be accompanied by a discussion of any significant changes (and the reasons for such changes) in the proposed plan and a response to each of the significant comments, criticisms, and new data submitted in written or oral presentations [Responsiveness Summary].

000048

6.1.3 Major Components of the Record of Decision

The ROD consists of three basic components: a Declaration, a Decision Summary, and a Responsiveness Summary (see **Highlight 12**):

- **The Declaration** functions as an abstract for the key information contained in the ROD and is the section of the ROD signed by the EPA Regional Administrator or Assistant Administrator.

- **The Decision Summary** provides an overview of the site characteristics, the alternatives evaluated, and the analysis of those options. The Decision Summary also identifies the selected remedy and explains how the remedy fulfills statutory requirements.

- The **Responsiveness Summary** addresses public comments received on the Proposed Plan, RI/FS Report, and other information in the administrative record.

The key elements of each of these three components are described in the following sections.

6.2 KEY ELEMENTS OF THE DECLARATION

The Declaration functions as an abstract for the information contained in the ROD. It briefly describes the selected remedy for the site and formally states that the selected remedy complies with CERCLA and is consistent, to the extent practicable, with the NCP. The Declaration is the section of the ROD signed by the EPA Regional Administrator or Assistant Administrator. The State Director or Federal facility representative should co-sign the ROD when the State or other Federal Agency is designated as the lead agency for preparing the ROD. **Highlight 13** is a sample of the Declaration.

Highlight 12: Outline for the Standard Record of Decision

Declaration

- Site Name and Location
- Statement of Basis and Purpose
- Assessment of the Site
- Description of the Selected Remedy
- Statutory Determinations
- Signature and Support Agency Acceptance of the Remedy

Decision Summary

- Site Name, Location, and Description
- Site History and Enforcement Activities
- Highlights of Community Participation
- Scope and Role of Operable Unit
- Site Characteristics
- Summary of Site Risks
- Description of Alternatives
- Summary of Comparative Analysis of Alternatives
- Selected Remedy
- Statutory Determinations
- Documentation of Significant Changes

Responsiveness Summary

- Community Preferences
- Integration of Comments

6.2.1 Site Name and Location

The proper site name (as listed on National Priorities List) and location (citin town or county and state in which the s located) should be included in the Declarat

6.2.2 Statement of Basis and Purpose

Section 113(k)(2)(B)(v) of CERCLA req that "a statement of basis and purpose o selected remedy" be prepared. To com this requirement, EPA must explain the fac

Highlight 13: Sample Declaration for the Record of Decision: Statutory Preference for Treatment as a Principal Element Is Met and Five-Year Site Review Is not Required

SITE NAME AND LOCATION

Super Kleen Company Site
Dustbowl, AZ

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Super Kleen Company site, in Dustbowl, Arizona, which was chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan. This decision is based on the Administrative Record for this site.

The State of Arizona concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

This operable unit is the final action of three operable units for the site. The first operable unit at this site involved remediation of a municipal well. The second operable unit involved remediation of the ground water. This final operable unit addresses the source of the soil and ground-water contamination. This action addresses the principal threat remaining at the site by treating the most highly contaminated soils and waste material. Treatment residuals and soils contaminated at low levels will be disposed of off site, so that the site will not require any long-term management.

The major components of the selected remedy include:

- Excavation and treatment, via on-site thermal destruction, of approximately 10,000 cubic yards of contaminated soils and waste materials from the former lagoon area
- Disposal of treatment residuals and approximately 2,000 cubic yards of contaminated soils at an off-site RCRA Subtitle C disposal facility.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Because this remedy will not result in hazardous substances remaining on-site above health-based levels, the five-year review will not apply to this action.

Signature (Regional Administrator/ Assistant Administrator	Signature (State Director)
Date	Date

000950

and legal basis for selecting a particular remedy. The ROD serves as this statement of basis and purpose, and the Declaration should make a statement to that effect. This section of the Declaration also should state that the information supporting the lead and support agencies' decisions on the selected remedy is contained in the administrative record. [Note: The Administrative Record Index need not be attached to the ROD but should be placed in the Administrative Record File.] This section should also specify whether the State concurs or does not concur with the selected remedy. **Highlight 14** provides standard language for the statement of basis and purpose.

Highlight 14: Standard Language for the Statement of Basis and Purpose
This decision document presents the selected remedial action for the (site name), in (location), which was chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this site. The State/Commonwealth of _____ (concurs/does not concur) with the selected remedy.

6.2.3 Assessment of the Site

The Declaration should state the existence of an imminent and substantial endangerment to public health, welfare, or the environment. The statement (or language similar to the statement) in **Highlight 15** should be added to all RODs (except where the cleanup decision is to take "no action") or this statement is not valid given the circumstances of the site:

Highlight 15: Standard Language for Assessment of the Site
Actual or threatened releases of hazardou substances from this site, if not addresse by implementing the response actio selected in this ROD, may present a imminent and substantial endangerment t public health, welfare, or th environment.

6.2.4 Description of the Selected Remed

The selected remedy should be identified described briefly. This description sh include the following elements:

- A brief explanation of how this respo action fits into the overall site clea strategy, if the action is an operabl (e.g., "this is the second of three o units")
- A statement as to how the selected respo action does or does not address the princi threat(s) posed by the site
- A description of the major components the selected remedy, in bullet for including the treatment technologies and engineering controls that will be used, well as any institutional controls, such deed or access restrictions.

6.2.5 Statutory Determinations

The ROD Declaration should conclude w the finding that the selected remedy satisfies statutory requirements of CERCLA section 1 For the Declaration, this can be accomplished making confirmatory statements that the select remedy attained the four statutory mandates (s below) and the statutory preference treatment.

The **four mandates** of CERCLA section 121 require that all remedial actions taken pursuant to sections 104 or 106 must:

- Be protective of human health and the environment
- Comply with ARARs (or justify a waiver)
- Be cost-effective
- Utilize permanent solutions and alternative treatment technologies or resource recovery technologies, to the maximum extent practicable.

In addition, the **statutory preference for treatment in CERCLA section 121 should be addressed in all RODs**, including those documenting selected remedies that do not meet the statutory preference for treatment. Section 121 requires that the lead agency provide an explanation whenever a remedy is chosen that does not employ treatment that permanently and significantly reduces the toxicity, mobility, or volume of hazardous substances as its principal element.

Finally, the applicability of the **five-year review** required by CERCLA section 121 should be addressed in this part of the Declaration. This review evaluates whether a remedy continues to provide adequate protection of human health and the environment, and it should be conducted at every site where the remedial action results in hazardous substances remaining on site above health-based levels.

Sample Boilerplate Language for Making Statutory Determinations

Sample boilerplate language that addresses the statutory determinations is provided in **Highlights 13** and **16**. The language in this section of the Declaration will vary, depending upon whether the statutory preference for treatment is satisfied and whether the five-year review is applicable. The sample Declaration in **Highlight 13** provides guidance for a remedy that meets the statutory preference for treatment as a principal element, with no required five-year review. The sample Declaration in **Highlight 16** provides guidance for a remedy that does **not** meet the statutory preference for treatment and for which a five-year review is required. For circumstances where the statutory preference for treatment is satisfied and a five-year review is required, the appropriate mix of sample language from **Highlights 13** and **16** should be used.

If the remedy does not meet the statutory preference for treatment, then the Statutory Determinations section of the Declaration should include a statement to this effect and summarize the rationale for choosing a remedy that does not contain treatment as a principal element. This rationale could be based on the specific factors used to determine that the treatment is impracticable, such as technical infeasibility, inadequate short-term protection of human health and the environment, or unavailability of necessary capacity, equipment, or specialists. In addition, a brief statement asserting that past or future operable units have met or will meet the statutory preference for treatment should be included, when appropriate.

6.2.6 Signature and Support Agency Acceptance of the Remedy

All ROD Declarations are signed and dated by Regional Administrator or the Assistant Administrator of OSWER. When the state is the lead agency for developing the ROD, the State Director should sign the ROD. When the state is the support agency, the state's signature on the ROD is optional (i.e., the SMOA, CA, or SSC may or may not provide for such signature). At a minimum, a letter from the state specifying concurrence or nonconcurrence should always be included in the Administrative Record File. In situations where a Federal agency other than EPA is the lead agency, that agency should co-sign the ROD with EPA.

000052

Highlight 16: Sample Declaration for the Record of Decision: Statutory Preference for Treatment as a Principal Element is Not Met and Five-Year Site Review is Required

SITE NAME AND LOCATION

Municipal Landfill Site
Nowhere, NY

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Municipal Landfill site, in Nowhere, New York developed in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan. This decision is based on the Administrative Record for this site.

The State of New York concurs on the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

This operable unit is the first of two that are planned for the site. The first operable unit addresses the source of the contamination by containing the on-site wastes and contaminated soils. The function of this operable unit is to seal off the Municipal Landfill site as a source of ground-water contamination and to reduce the risks associated with exposure to the contaminated materials. While this remedy addresses the principal threat at the site, the second operable unit will remediate the contaminated air plume.

The major components of the selected remedy include:

- Installing a security fence around the landfill site
- Capping the 65-acre landfill in accordance with RCRA Subtitle D requirements
- Installing surface-water controls to accommodate seasonal precipitation; and
- Conducting environmental monitoring to ensure the effectiveness of the remedial action.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment of the principal threat of the site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. The size of the landfill and the fact that there are no on-site hot spots that represent the major sources of contamination preclude selecting a remedy in which contaminant(s) of concern could be excavated and treated effectively.

Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Signature (Regional Administrator/ Assistant Administrator)	Signature (State Director)
Date	Date

Although the goal of the interactions between the lead and support agencies is to reach mutual agreement on the ROD, there may be limited instances in which this is not achieved. In such an event, the procedures for selecting and implementing the remedy depend on who has the lead responsibility for the ROD. If EPA has the lead, and the State does not concur with the selected remedy, then EPA has the discretionary authority to sign the ROD and continue through the remedial design stage. EPA cannot proceed beyond the remedial design stage, however, without the State's cost-share.

If the state is the lead and EPA does not concur with the selected remedy, EPA can assume the lead for the ROD and proceed through the design stage. In either case, all information pertaining to the disagreement should be included in the Administrative Record. It should be noted that EPA and/or the State retain authority to sign RODs where RI/FS activities are conducted by the PRPs or by a Federal agency.

6.3 KEY ELEMENTS OF THE DECISION SUMMARY

The Decision Summary, the second and main component of the ROD, should provide an overview of the site-specific factors and analysis that led to selection of the remedy for the operable unit or site. In general, this section of the ROD should describe the following:

- The history of site activities
- The nature and extent of site contamination
- The alternatives evaluated
- The analysis leading to the final remedy selection
- How the selected remedy satisfies the statutory requirements.

Although some of the information presented in the Decision Summary is similar to that presented in the Declaration, this section discusses the topics in greater detail and provides the rationale for those "declarations."

The Decision Summary, to a great extent, should summarize information that is already in the Administrative Record for a site, particularly the RI/FS Report. However, when information is unavailable or is not satisfactorily addressed in the Administrative Record, the discussion in the ROD Summary may need to be more thorough. The final section, which identifies the selected remedy and explains how the remedy satisfies the statutory requirements, is the one completely original section of the Decision Summary.

6.3.1 Site Name, Location, and Description

This section should briefly describe basic information about the site location and the actual or potential threat from the site. The site description should include the following information:

- Location and address at which the response action is occurring, including the name of the town or county, the state in which the site is located, and the site's distance from significant locations, such as an intersection or geographical boundary

Inclusion of maps and charts in this section is encouraged.

6.3.2 Site History and Enforcement Activities

This section should provide background information on the site's history and enforcement actions taken to date. Factors that should be addressed include the following:

- The history of activities at the site that have led to the current problems, such as manufacturing activities or disposal of hazardous substances (e.g., a key piece of information may be whether a site operated before or after the effective date of RCRA,

000054

such as November 19, 1980, or July 26, 1982)

- The history of Federal and state site investigations, removal, or remedial actions conducted to date under CERCLA, and under other environmental authorities, such as RCRA, CWA, CAA, or state authorities, as well as a history of any cited violations under Federal or state environmental regulations or statutes

- The history of CERCLA enforcement activities at the site, such as the results of PRP searches, whether a special notice has been issued to PRPs, or whether a lawsuit has been filed regarding cleanup of the site.

6.3.3 Highlights of Community Participation

CERCLA establishes a number of public participation activities that the lead agency must conduct during a remedial action. This section should briefly note how the public participation requirements in CERCLA section 113(k)(2)(B)(i-v) and 117 were met in the remedy selection process (e.g., issuance of fact sheets, opportunity for public comment, public meetings). These requirements are established to provide:

- Notice to potentially affected persons and the public, which shall be accompanied by a brief analysis of the plan and alternative plans that were considered [in the RI/FS Report and Proposed Plan]

- A reasonable opportunity to comment and provide information regarding the [proposed] plan [and RI/FS Report] (i.e., public comment period)

- An opportunity for a public meeting to be held in the affected area, in accordance with section 117(a)(2) (relating to public participation)

- A response to the significant co[illegible]e criticisms, and new data that were submi in either written or oral presentations

- A statement of the basis and purpose of selected action (e.g., the ROD).

Although this description should be brief, lead agency may also include a description any other major public participation activitie

Community response to the selected rem should not be included in this section; community's response to the selected rem should be addressed under the commur acceptance criterion in the comparative analy section of the ROD and specific comme responded to in the Responsiveness Summa **Highlight 17** is an example of the length a type of information that should be included this section. (This example is based on t hypothetical site described in Appendix.)

6.3.4 Scope and Role of Operable U[illegible] Response Action

This section should discuss how the operai unit or response action addressed by the RC fits into the overall site strategy. (For examp "This ROD addresses the second of thr planned activities at the site: the first address the alternate water supply; this one address contaminated ground water; and a third w address contaminated soils.") This secti should focus on how the response action fits in the overall site strategy for addressing threat(s) posed by the conditions at the site. should summarize the scope of the probler addressed by the selected action and identify t contaminated media (e.g., debris, container sediment, solid waste, drums, soil, sludge, a and should describe whether or not the acti will address any of the principal or low lev threats posed by conditions at the sit **Highlight 18** provides sample language f describing the scope and role of an operable ur or response action.

Highlight 17: Sample Language for Community Participation Activities

The RI/FS Report and Proposed Plan for the EIO Industrial Site were released to the public in August 1991. These two documents were made available to the public in both the Administrative Record and the information repository maintained at the EPA Docket Room in Region 4 and at the Nameless Public Library. The notice of the availability of these two documents was published in the Nameless Advocate on August 28, 1991. A public comment period was held from September 2, 1991 through October 1, 1991. A request for an extension to the public comment period was made. As a result, the public comment period closed on October 30, 1991. In addition, a public meeting was held on September 10, 1991. At this meeting, representatives from EPA and the Tennessee Pollution Control Board answered questions about problems at the site and the remedial alternatives under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision. This decision document presents the selected remedial action for the EIO Industrial Site, in Nameless, Tennessee, chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan. The decision for this site is based on the Administrative Record.

Highlight 18: Sample Language for Scope and Role of Operable Unit Section

As with many Superfund sites, the problems at the U.N. Owen Site are complex. As a result, EPA organized the work into three operable units (OUs). These are:

- OU One: Contamination in the soils.
- OU Two: Contamination in the municipal well.
- OU Three: Contamination of three ground-water aquifers.

EPA has already selected remedies for OU One in a ROD signed on October 22, 1991, and OU Two in a ROD signed on December 6, 1991 (the soils and the municipal well, respectively). Both of these actions are in the remedial design stage. Actual construction is planned to begin in March 1992 for OU One and July 1992 for OU Two.

The third OU, the subject of this ROD, addresses the contamination of three ground-water aquifers. Potential ingestion of water extracted from these aquifers poses the principal risk to human health because the EPA's acceptable risk range is exceeded and concentrations are greater than MCLs. The purpose of this response is to prevent current or future exposure to the contaminated ground water. This third operable unit will be the final response action for this site.

6.3.5 Summary of Site Characteristics

For all types of actions, this section should provide an overview of site contamination and the actual routes of exposure posed by the conditions at the site. This can be accomplished by describing the assessments made during the RI that characterized the site, its environment, and the extent of contamination.

The discussion in this section of the ROD should present a brief, comprehensive overview of the site. The use of maps illustrating the location of sources and distribution of contaminant(s) of concern, and tables listing the contaminant(s) of concern and concentrations in various media are recommended. A discussion of the site characteristics should include:

- A general overview of the site, summarizing geographical and topographical information such as natural resource use, adjacent land use, location of and distance to nearby populations, location in a floodplain, general surface-water and ground-water resources, and surface and subsurface features (e.g.,

000056

number and volume of tanks, lagoons, structures, and drums at the site).

- All known or suspected sources of contamination

- Types of contamination and affected media (including description of the quantity and types of hazardous substances present; their volume; whether they are carcinogens or noncarcinogens; the lateral and vertical extent of contamination; their mobility; and surface and subsurface pathways of migration)

- Routes of contaminant(s) of concern, migration, and all known current routes of human and environmental exposure

- Concentrations (e.g., average and maximum) of contaminants of concern in each medium

- Population and environmental areas that could be affected by the contaminant(s) of concern at the site

- Any site-specific factors (e.g., fractured bedrock) that may affect the remedial actions at the site

In addition to the above components of this section, for **ground-water actions,** this section should also include:

- A description of the aquifers of concern (currently and potentially affected), including ground-water flow directions/pattern (vertical and horzontal), any unusual ground-water flow patterns (e.g., fractural bedrock), and ground-water classification (e.g., class IIa, current drinking water supply).

- A description of the interconnection between ground water and surface water

- Presence of non-aqueous phase liquids (NAPLs).

6.3.6 Summary of Site Risks

The summary of the baseline risk assess in the ROD should indicate the risks to hu health and the environment that are or ma posed by the conditions at the site. information necessary to write this sum should be available in the risk assess chapter of the RI/FS Report. Approp summary paragraphs or tables in the R Report may be used directly to serve as the b for the ROD discussion of the baseline assessment. The RI/FS chapter describing risk assessment (or the risk assess document, if presented separately) shoul referenced.

The information presented in the summar site risks should support the decision to remedial action when there is an actual potential threat of release. Alternatively, w no action will be taken, the data and narra discussion should support that decision. Chapter 9 of this guidance for writing n RODs.) The description of the baseline assessment should also address the expo pathways and risks, so that the "Summar Comparative Analysis of Alternatives" late the ROD can clearly demonstrate how reductions resulting from the reme alternatives are related directly to the expos pathways and baseline risks (see Section 6. "Summary of the Comparative Analysis Alternatives").

Human Health Risks

Only a brief summary of the informat developed in the risk assessment should presented in the ROD. Information should presented so that the selected remedy will supported and individuals unfamiliar with site can understand the basis for undertak remedial action. A mixture of (1) text for (e.g., for describing the exposure pathways the risks) and (2) table format (e.g., presenting lists of contaminant(s) of conc risk numbers) may be used in the summary. **Highlight 19** for standard language to be usec

an introduction for this section. Further guidance on the summary and presentation of carcinogenic risk and for noncarcinogenic effects is currently being developed in the revisions to the *Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part A)* (Interim Final, EPA/540/1-89/002, December 1989).

Highlight 19: Sample Language for Human Health Risks Summary
The baseline risk assessment provides the basis for taking action and indicates the exposure pathways that need to be addressed by the remedial action. It serves as the baseline indicating what risks could exist if no action were taken at the site. This section of the ROD reports the results of the baseline risk assessment conducted for this site.

The discussion of risks in the ROD should be parallel to the major areas that are discussed in the sections of the risk assessment: identification of contaminant(s) of concern, exposure assessment, toxicity assessment, and risk characterization. The primary focus should be on those exposure pathways and contaminant(s) of concern found to pose actual or potential threats to human health.

Contaminant(s) of concern identification information should include brief descriptions of the following:

- Contaminant(s) of concern in **each medium** (e.g., benzene in soils; TCE in ground water) and exposure point concentrations for each medium. The upper confidence limit on the arithmetic mean, or a maximum concentration, and the areas that should be included for exposure point concentrations.
- Current land use (e.g., residential, industrial) at the site and basis (e.g., zoning maps, nearby development).
- Current or potential use of the ground water (e.g., potential drinking water, current irrigation use).
- Type of future land use expected at the site and basis (e.g., zoning maps, 20-year development plans).

Exposure assessment information should include brief discussions of the following:

- The potentially exposed population(s) in current and potential scenarios (e.g., worker currently working on site, adults and children living on site in the future)
- The special subpopulations, if any (e.g., children, subsistence fishermen, and families)
- Reasonable exposure pathways affecting each population group or subpopulation group (e.g., ingestion of contaminated ground water for adults and children, inhalation of volatiles for workers)
- The monitoring or modeling data and assumptions used to characterize exposure point concentrations
- The major assumptions about exposure frequency and duration that were included in the exposure assessment (e.g., frequency of exposure of 180 days/year, duration of 70 years, and contact rate for dermal exposure).

The exposure assessment in the RI/FS Report includes reasonable maximum estimates for both current and future exposure scenarios. When this information is available, descriptions of current and future exposures should be included in the ROD.

The ROD should indicate whether or not the exposure was quantified through the use of the

000058

standard exposure factors and scenarios as defined in *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors* (OSWER Directive 9285.6-03) or the use of site-specific factors. If the standard default exposure factors are not used, an explanation of why and what site-specific data were used should be included.

Toxicity assessment information should include the following:

- Chronic daily intake (CDI) factor for each chemical within each relevant exposure pathway for a given population at risk and assumptions under which the CDI was calculated (e.g., exposure point concentrations, land use-based media-specific intake rates, frequencies and durations) (e.g., $9x10^{-2}$ mg/kg/day exposure point concentration of TCE in ground water)

- Brief explanation of the toxicity information that was used to calculate the risk including, as appropriate, the slope factor (i.e., cancer potency factor), weight of evidence (i.e., the extent to which the available data indicate that an agent is a *human* carcinogen), reference dose, reference concentration, and the source of toxicity information where the risk values were taken, such as IRIS, HEAST.

- Brief list of the health effects of concern for the noncarcinogenic contaminants of concern

Highlight 20 provides the EPA weight-of-evidence classification system for carcinogenicity. The standard language in **Highlight 21** should be included in the ROD to explain the derivation and use of the slope factors and reference doses.

Risk characterization information should include the following for both current and future land-use scenarios:

- Quantified carcinogenic risks of each contaminant of concern in each relevant exposure medium for each exposure pathv (e.g., lifetime excess cancer risk of 3x1 due to benzene in ground water)

- Combined carcinogenic risks reflecting contaminant(s) of concern and pathw: reasonably expected to affect a giv population (e.g., the carcinogenic risk children playing at a residence who may exposed by ingesting soil or drinking lo ground water is 5×10^{-2})

- Potential for noncarcinogenic effects as ide tified by the hazard quotient for ea contaminant of concern in each exposu medium for each exposure pathway, appropriate, (e.g., direct contact of childr to contaminated soil is associated with hazard quotient of 15; indicating unacceptable concentration of naphthalene

- Potential for combined noncarcinoger effects, as expressed by hazard i which reflect the additive effects t

Highlight 20: EPA Weight-of-Evidence Classification System for Carcinogenicity

Group	Description
A	Human carcinogen
B1 or B2	Probable human carcinogen B1 indicates that limited data are available. B2 indicates sufficient evidence in animals and inadequate or no evidence in humans.
C	Possible human carcinogen
D	Not classifiable as to human carcinogenicity
E	Evidence of noncarcinogenicity for humans

reasonable combinations of contaminant(s) of concern and exposure pathway combinations for specific population groups

Highlight 21: Sample Language for Toxicity Assessment Summary

Slope factors (SFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic contaminant(s) of concern. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Slope factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to contaminant(s) of concern exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of contaminant(s) of concern from environmental media (e.g., the amount of a contaminant(s) of concern ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

- Brief explanation of the meaning of both the quantitative risk characterization and qualitative statements
- Discussion of significant sources of uncertainty inherent in the risk assessment
- Risk assessment conclusions based on data presented and any other facts that the decision maker should be made aware of that may affect risk to human health at sites (e.g., the presence of B2 carcinogens without quantitative toxicity numbers for risk characterization)
- Results of the baseline risk assessment (i.e., risk that would remain if no action were taken for the site or medium) based on the "reasonable maximum exposure scenario"
- Indication of whether or not the baseline risk is greater than the risk range for the site or for any medium and justification for taking action if the baseline risk is <u>not</u> greater than the risk range (e.g., current exposure to a sensitive population).

The language in **Highlight 22** should be included in the ROD to explain how cancer and noncancer risks are characterized in the baseline risk assessment.

As discussed previously, a combination of text, tables, and graphic presentations of risk information is encouraged for presenting the information in this section.

<u>Environmental Risks</u>

The ROD should address the risks to the environment that were considered in the RI/FS as well as human health risks. Procedures for addressing ecological risks are not standardized as they are for human health risk assessment.

000960

Highlight 22: Sample Language for Risk Characterization Summary

For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a life-time a result of exposure to the carcinogen. Excess life-time cancer risk is calculated from the following equation:

Risk = CDI x SF

where:

risk = a unit less probability (e.g., 2×10^{-5}) of an individual developing cancer;

CDI = chronic daily intake averaged over 70 years (mg/kg-day); and

SF = slope-factor, expressed as $(mg/kg\text{-}day)^{-1}$

These risks are probabilities that are generally expressed in scientific notation (e.g., 1×10^{-6} or $1E^{-6}$). An excess lifeti cancer risk of 1×10^{-6} indicates that, as a reasonable maximum estimate, an individual has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific expos conditions at a site.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e. life-time) with a reference dose derived for a similar exposure period. The ratio of exposure to toxicity is called a hazard quotient (HQ). By adding the HQs for all contaminant(s) of concern that affects the same target organ (e.g., liver) within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated.

The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

where:

CDI = Chronic Daily Intake

RfD = reference dose; and

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

The procedures and level of effort for the ecological assessment vary significantly depending on site-specific factors. **The level of effort and detail in the ecological assessment should be the guide for the amount of information that should be included in the ROD.**

The discussion of the ecological risks in the ROD should be parallel to the major sections of the assessment. The major sections of ecological assessments usually include: identification of contaminants of concern, exposure assessment, ecological effects assessment and risk characterization. However, depending upon the type of assessment conducted, the sections of the ecological assessment may vary. The following addresses the basics of an ecological assessment. The primary focus should be on those exposure pathways and contaminant(s) of concern found to pose actual or potential threats to the environment. RODs should include the following information to the extent they were discussed in the ecological assessment.

Identification of Contaminants of Concern

The identification may include brief descriptions of the following:

- The media of concern (e.g., soils, surface water, sediments)
- The contaminant(s) of concern chosen for each medium

Exposure Assessment

Exposure assessment information may include brief discussions of the following items:

- Characterization of the ecological setting (e.g., wetland, valley), on and near the site including aquatic and terrestrial habitats, habitat maps, and related field survey information). This includes identification of any ecologically sensitive areas.
- List of species that were the potential receptors that were evaluated in the ecological assessment and a statement about why they were chosen. This includes identification of Federal or state designated rare, endangered, and threatened species.
- Exposure pathways for receptor populations or selected species.
- Exposure point concentrations.
- The monitoring or modeling data and assumptions used to characterize exposure point concentrations.
- Summary of any field studies conducted to establish exposures (e.g., biomarkers, tissue analyses).

Ecological Effects Assessment

Information may include the following:

- Summary of the results of any field studies used to measure adverse ecological effects (e.g., macroinvertebrate studies, aquatic, soil and/or sediment toxicity tests)
- Brief explanation of toxicity endpoints chosen for the assessment (e.g., lethal concentration in which 50% of population dies (LC50), maximum acceptable toxicant concentration (MATC), reproductive impairment).

Ecological Risk Characterization Information

Information may include the following:

- Summary of the results of any field studies showing ecological risks
- Brief summary of the environmental risks associated with the relevant media, the basis of these risks, and how these risks were determined (e.g., comparison of predicted exposure and toxicity, field studies)

000062

- Discussion of significant sources of uncertainty inherent in the risk assessment

The *Risk Assessment Guidance for Superfund: Environmental Evaluation Manual* (Interim Final OSWER Directive 9285.7-01, March 1989) provides additional information about the environmental evaluation.

In addition, for all RODs, except those selecting "no action" and those where this conclusion is not valid given the circumstances at the site, the "Summary of Site Risks" section of the Decision Summary should conclude with statement (or language similar to the statement) contained in the "Assessment of the Site" section of the Declaration, as shown in **Highlight 23**.

Highlight 23: Sample Language For Summary of Site Risks
Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

Highlight 24 shows a sample summary of site risks.

6.3.7 Description of Alternatives

This section provides a concise description of how each alternative would address the contamination at the site or operable unit from the beginning of the remedy to its completion. This description should explain the treatment and/or engineering controls (e.g., containment) components of each alternative as they logically occur in the proposed remediation process. When describing a particular treatment or containment alternative, the general treatment family or containment objectives could be described. Specific process options within those categories can be described if there is confidence that the options will be used. For example, an alternative should be described as employing thermal destruction rather than rotary kiln incineration or infrared incineration. In the same way, a containment option that employs a RCRA Subtitle C cap should specify the objectives of the cap (e.g., reducing the permeability by covering the site with an impermeable layer), rather than the specific type of liner that could achieve that objective (e.g., synthetic liner, PVC).

The flow chart in **Highlight 25** illustrates the details outlined in Section 6.3.8 that should be included in these descriptions. Please note that it may be appropriate to describe the same components of a number of alternatives once. **Highlight 26** lists the details that should be described for each alternative. **In particular, it should incorporate the major ARARs associated with a remedial alternative in laying out exactly how the waste will be handled. Either a positive or a negative determination should be made for the alternatives involving management of a RCRA waste regarding the applicability or relevance and appropriateness of the RCRA LDRs. Highlight 27** contains a sample of a remedial alternative, based on the hypothetical site in Appendix A, that illustrates the level of detail appropriate for this section.

Highlight 28 lists the major potential ARARs for Superfund remedies that may need to be discussed in describing alternatives.

By providing a comprehensive description of the alternatives in this section, the comparative analysis of alternatives (which is the next section of the ROD) can focus on the differences or similarities among alternatives with respect to the nine evaluation criteria (see Section 6.3.8, "Summary of Comparative Analysis of Alternatives"). In addition, this initial description of the selected remedy should provide engineering details that will support the remedial design phase.

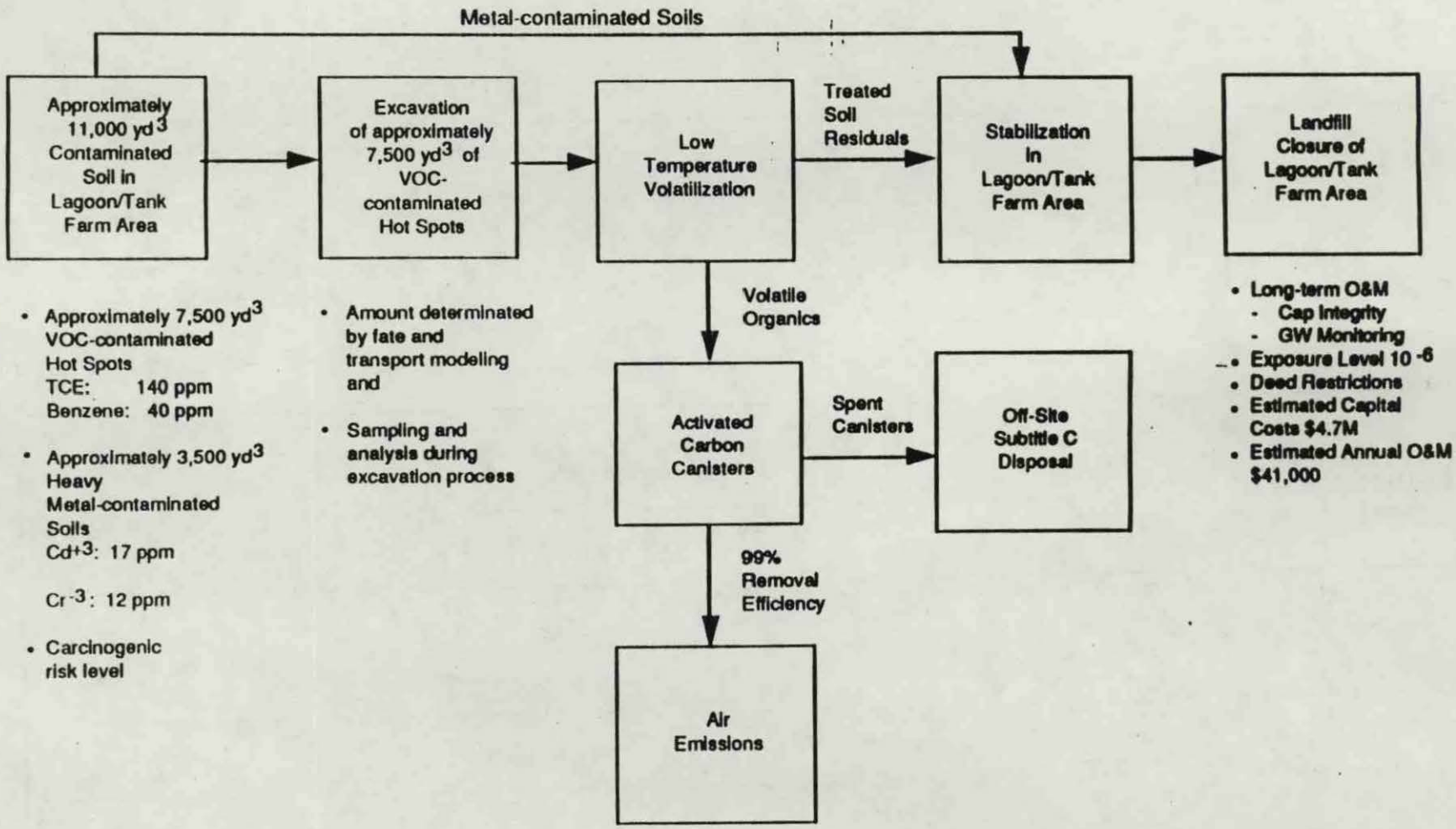
Total Exposure Point	Exposure Pathway	Contaminants of Concern	SF Source	Chronic Daily Intake (CDI) (mg/kg-day)	SF[2]	Cancer Risk (CDI x SF)	RfD (mg/kg-day)	Noncancer Hazard Index (CDI/RfD)
Nearby Residential Population	(1) Ground water ingestion (wells)	Benzene	IRIS	1.3793	0.029	4×10^{-2}	–	–
		PATHWAY TOTAL				4×10^{-2}		
	(2) Soil ingestion	Benzene	IRIS	0.2759	0.029	8×10^{-3}	–	–
		Chromium	Potential noncarcinogenic effects from ingestion of contaminated soils may also exist					
		PATHWAY TOTAL				8×10^{-3}		
		TOTAL RISK FOR AN INDIVIDUAL IN NEARBY RESIDENTIAL POPULATION				4.8×10^{-2}		
Distant Public Water Supply Users	(1) Ground water ingestion	[Table should continue for each total exposure point, pathway of exposure, and chemical of concern.]						

[1] Values are for illustration only.
[2] Slope factors are as of FY90, 4th Quarter.

SF = Slope Factor.
RfD = Reference Dose.
MEK = Methyl ethyl ketone.

000064

Highlight 25: Illustration of Components of Alternatives to be Described



Highlight 26: Description of Details for Each Alternative

- Treatment components. Describe the following, as appropriate:

  - Treatment technologies (e.g., thermal destruction) that will be used
  - Type and estimated volume of emissions/residuals expected
  - Type and estimated volume of waste treated
  - Primary treatment levels (e.g., BDAT, percentage or order of magnitude of reductions expected) and the basis (e.g., ARARs, risk-based levels) for selection of the treatment level
  - If appropriate, risks associated with emissions/residuals.

- Containment or storage components. Describe the following, as appropriate:

  - Type of storage (e.g., landfill, tank, surface impoundment, containers)
  - Type of closure that will be implemented (e.g., RCRA Subtitle C clean closure, landfill closure, Subtitle D solid waste closure)
  - Type and quantity of waste to be stored
  - Type and quantity of untreated waste and/or treatment residuals to be disposed of off-site or managed on-site in a containment system (e.g., cap, min. tech. unit)

  For ground-water actions:

  - Define areas to be contained aerially and vertically
  - Alternate performance standards.

- Ground-water component. Describe the following, as appropriate:

  - Ground-water classification (e.g., Class I, II, or III)
  - Remediation and residual levels (e.g., MCLs)
  - Estimated restoration timeframe and implementation reports
  - Area of attainment
  - Technologies/treatment trains that will be used
  - Volume of residuals to be treated
  - Approximate number of extraction wells and approximate pumping rate, where appropriate
  - Assumptions, limitations, and/or uncertainties (regarding effectiveness of the remedy)
  - Fully tracking all waste identified on the site to its final destination, including treatment residuals, if generated.

- The major ARARs, risk-based levels, and other "to be considereds" (TBCs)* being met/utilized for the specific components of the waste management process:

  - How the specific components of the alternative will or will not comply with the major ARARs
  - Why the standard is applicable or relevant and appropriate (e.g., placing a RCRA characteristic waste, thus RCRA closure is applicable)
  - A positive or negative determination for the LDRs; ARARs for residuals management; RCRA closure; Endangered Species Act; CWA; State ARARs.

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*TBCs are non-promulgated advisories, criteria, or guidance issued by Federal or state governments that are not legally enforceable standards. TBCs may also include proposed regulations. Before the lead agency proposes to utilize a TBC, it should obtain the support agency's agreement on the appropriateness of the TBC(s).

(Continued on next page.)

000066

Highlight 26: Description of Details for Each Alternative (continued)

- General components. Describe the following, as appropriate, for each of the three previous components:

  - Contaminated media addressed (and quantities and physical location at the site)
  - Whether treatability testing has been or will be conducted
  - Implementation requirements
  - Institutional controls
  - Assumptions, limitations, uncertainties
  - Estimated implementation timeframe
  - Estimated capital, operation and maintenance and present-worth costs
  - Information on physical effects on the environment caused by implementation of each alternative and efforts to be taken to minimize such effects
  - If applicable, provisions for ground-water monitoring once the system is shut off to ensure goals are maintained.

000067

Highlight 27: Sample Description of a Remedial Alternative

Alternative S4: Excavation of Contaminated Soils and Sediments, Incineration, Solidification, and On-site Disposal of Residuals

Major Components of the Remedial Alternative. The major features of this alternative include excavation of approximately 13,000 cubic yards of benzene- and chromium-contaminated soil and sediments from the lagoon area and the neighboring wetland; off-site incineration; solidification of the treatment residuals in the lagoon area; and RCRA Subtitle C landfill closure of the area.

Treatment Components: The amount of contaminated soil and sediments that will be excavated in the lagoon area was determined using fate and transport modeling to estimate the potential ground-water contamination. The ground water contamination could result from the migration of soil contaminant(s) of concern remaining in the lagoon area. The contaminated soils and sediments will be incinerated offsite. Because it is anticipated that incineration will not meet the LDR treatment standard of 3.7 mg/l (using a total waste analysis) for benzene, a Treatability Variance for soil and debris will be obtained. This Variance will establish alternate treatment levels.

For the ground-water component of the remedy, benzene-contaminated ground water will be pumped and treated using carbon adsorption. Residuals will be discharged to a POTW. Ground water will be pumped at a rate of approximately 5,000 gallons per day using approximately four extraction wells. Treatment of the ground water will take an estimated 18 - 24 months. Ground water will be treated to a level of 0.01 mg/l before discharge to the POTW and to a level of 0.005 mg/l by the POTW. These levels are based on Federal Water Quality Criteria and Maximum Contaminant Levels (MCLs) for benzene, respectively. Treatment will be monitored to ensure that remediation goals are achieved.

Containment Components: The residual ash and treated soils (approximately 5,000 cubic yards) would be solidified in the lagoon area in compliance with the LDR treatment standard for chromium of 0.5-6ppm. This 10-acre area would be capped and closed as a RCRA Subtitle C landfill in accordance with the requirements specified in 40 CFR 264.310 for landfill closure, which require a cap to have a permeability less than or equal to the permeability of the natural underlying soil. Closure of the area also would comply with the State's more stringent RCRA requirements.

The cap will be designed and constructed to promote drainage, minimize erosion of the cover, and provide long-term minimization of migration of liquids through the underlying contaminated soils. Consistent with the requirements of 40 CFR 264.117, long-term operation and maintenance (O&M) would be conducted to monitor the ground water around the landfill and to ensure the integrity of the cap.

General Components: The estimated time to implement this remedy and to meet the cleanup levels is 18 - 48 months for both remedy components. Institutional controls and ground-water monitoring shall be implemented. The estimated costs for the soil and sediment component of the remedy are: Capital costs: $6,230,000; O&M costs: $41,000; Present worth: $6,860,270. The estimated costs for the ground-water component of the remedy are: Capital costs: $3,240,000; O&M costs: $30,000; Present worth: $3,701,174. Some adverse effects on the habitats of several species will occur because of disturbance of the wetlands during excavation. Efforts will be made to minimize these effects.

Highlight 28: Examples of ARARs That Should be Included in Description of Alternatives Where Appropriate

- Safe Drinking Water Act (SDWA)
  - Maximum Contaminant Levels (MCLs)
  - MCL Goals (MCLGs)
- Resource Conservation and Recovery Act (RCRA) Subtitle C (Hazardous Waste Requirements)
  - Closure (i.e., landfill or clean closure)
  - Minimum Technology Requirements
  - Land Disposal Restrictions
- RCRA Subtitle D (Solid Waste Requirements)
- Clean Water Act
  - Federal Water Quality Criteria (FWQC)
- Toxic Substances Control Act (TSCA)
  - Polychlorinated biphenyls (PCB) standards
- Clean Air Act (CAA)
  - National Ambient Air Quality Standards (NAAQs)
- State ARARs.

6.3.8 Summary of the Comparative Analysis of Alternatives

This analysis should summarize the comparative analysis of alternatives presented in the detailed analysis section of the RI/FS Report. The RI/FS Guidance contains additional information on the subfactors included in each of the nine criteria. (These subfactors are also reflected in **Highlight 5** in this guidance and in the worksheets in Appendix C.) These factors should be addressed, when appropriate, in describing and evaluating alternatives. The comparative analysis provides the basis for explaining how the selected remedy satisfies the statutory requirements described in Section 6.3.10 (specifically, the cost-effectiveness and utilization of permanent solutions and treatment to the maximum extent practicable ["MEP"] findings). In addition, this section should provide the basis for determining which alternative provides the "best balance" of trade-offs with respect to the five primary balancing criteria.

Threshold Criteria

1) Overall protection of human health and the environment
2) Compliance with applicable or relevant and appropriate requirements.

Primary Balancing Criteria

3) Long-term effectiveness and permanence
4) Reduction of toxicity, mobility, or volume through treatment
5) Short-term effectiveness
6) Implementability
7) Cost.

Modifying Criteria

8) State/support agency acceptance
9) Community acceptance.

The major objective of this section of the ROD is to evaluate the relative performance of the alternatives with respect to the criteria so that the advantages and disadvantages associated with each cleanup option are clearly understood. The most effective way of organizing this analysis is to present a series of paragraphs headed by each criterion. Under each criterion, the alternative that performs best in that category is discussed first, with the other options discussed in sequence from most to least advantageous[2]. The comparative analysis section should include an explanation of each criterion. These explanations can be included under the appropriate criterion heading or together as an introductory paragraph. **Highlight 29** shows an example of a comparative analysis based on the hypothetical site in Appendix A.

In addressing the long-term effectiveness and permanence of an alternative, long-term effectiveness should be viewed along a continuum. Alternatives that are more effective in the long-term are more permanent; however, the term "permanence" should not be used to describe an alternative. Rather, an alternative should be described only in terms of "long-term effectiveness."

Only reductions achieved through treatment should be addressed under the "reduction of toxicity, mobility, or volume through treatment" criterion. Reductions of mobility accomplished through containment should be addressed under "overall protection of human health and the environment." The worksheets in Appendix C may be used to help prepare the comparative analysis summary.

6.3.9 The Selected Remedy

The remainder of the Decision Summary focuses on the selected remedy. This section of the ROD should identify and summarize the major treatment components of the selected remedy, as well as any engineering controls (e.g., containment) or institutional controls that will be part of the remedy. This section of the ROD should discuss the:

Highlight 29: Sample Comparative Analysis – Soil Wastes

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

All of the alternatives, except the no-action alternative, are protective of human health and the environment by eliminating, reducing, or controlling risk through treatment of soil contaminants, engineering controls, and/or institutional controls. Since the no-action alternative does not eliminate, reduce or control any of the exposure pathways, it is therefore not protective of human health or the environment and will not be considered further in th analysis as an option for the soil wastes.

Alternative S2, which involves offsite incineration and offsite disposal of soil, is protective of human health an environment because no well wastes remain onsite. Alternatives S3, S4, and S5 reduce the risk from contaminated through a combination of treatment and containment (S3 and S4) or through containment only (S5). The institution controls associated with alternatives S3, S4, and S5 minimize site usage through deed restrictions and, therefore, fu reduce exposure to contaminants remaining onsite.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriat requirements of other Federal and state environmental statutes or provides a basis for a invoking waiver.

All alternatives would attain their respective Federal and state ARARs. It is unlikely that the treatment in alternatives S2 and S4 would meet the LDR treatment standards; therefore, a Treatability Variance for soil and debr wastes would be obtained to comply with the LDRs.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criteri includes the consideration of residual risk and the adequacy and reliability of controls.

Alternative S2 affords the highest degree of long-term effectiveness because all contaminated soil would be excavated, treated, and disposed of offsite thereby eliminating operation and maintenance requirements. Alternative and S4 are effective in the long-term because both alternatives use treatment and solidification to reduce hazards pos by site contaminants. While risk from soil contaminated with benzene would be eliminated after implementation of t alternatives, the long-term risks of exposure to the remaining chromium contaminants would be reduced by stabilizin and capping the residuals. Proper maintenance of the cap, along with institutional controls, is necessary to ensure long-term effectiveness of these alternatives. Alternative S2 leaves all of the contaminated waste at the site and relie solely on a cap and institutional controls to prevent exposure. This alternative also has cap maintenance requiremen which are highly critical to the effectiveness of this remedy since all of the waste remains under the cap without pric treatment. Therefore, this alternative is not very effective in the long term.

Reduction of Toxicity, Mobility or Volume Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatm technologies a remedy may employ.

All of the soil/sediment alternatives except alternative S5 treat the wastes to reduce the toxicity, mobility or volu of the benzene. Alternatives S2 and S4 use incineration, and alternative S3 uses in-situ soil vapor extraction to treat soils. Both incineration and in-situ soil vapor extraction will reduce the toxicity, mobility, and volume of the contaminants. Treatment residuals containing chromium are solidified in each alternative thereby increasing waste volume somewhat, but reducing contaminant toxicity and mobility. Alternative S5 does not use treatment techn but instead uses a cap to contain the soil contamination, therefore the mobility is reduced.

Highlight 29: Sample Comparative Analysis – Soil Wastes

Short-Term Effectiveness

Short-term effectiveness refers to the period of time needed to complete the remedy and any adverse impacts on human health and the environment that may be posed during the construction and implementation of the remedy until cleanup levels are achieved.

Alternative S5, containment, would require the least amount of time to implement, compared with the other soil/sediment alternatives. Implementation of alternatives S2 and S4 would require less time than alternative S3, because incineration requires less time to implement than soil vapor extraction.

Alternatives S2, S4, and S5 include excavation and capping and, therefore, could pose short-term risks of exposure to volatiles and particulate emissions during excavation and cap construction. Alternative S3 also could cause the release of volatiles during soil vapor extraction. Because the capacity of offsite incinerators is limited, under alternatives S2 and S4, contaminated soils could be stockpiled for up to two years, increasing the risk of direct contact with the contaminants. In addition, there are some risks of exposure to air emissions from the incinerator as well as short-term risk associated with the offsite transportation of the excavated soil.

006072

- Selected remedy, the general technology type, or, if applicable, the specific process option

- Cleanup levels to be attained at the conclusion of the response action and the points of compliance for the media being addressed (e.g., MCLs will be met at the edge of the waste management area)

- Performance standards for all contaminants of concern

- Lead agency's basis for the cleanup levels (e.g., ARARs, risk calculation)

- Management of residuals and the type and quantity of residuals that will be generated if appropriate

- State requirements that are ARARs, if any.

If more than one area at the site is being addressed (e.g., treatment and landfilling of residuals), this section of the ROD should identify the cleanup levels **for each area**. A table may be included in this section of the ROD to summarize the cleanup levels goals for each area or medium. **Highlight 30** provides an example of a selected remedy, based on the hypothetical site in Appendix A.

The discussion of the selected remedy in this section of the ROD should expand upon the details of the remedy from the Description of Alternatives discussed in Section 6.3.7. One aspect of the selected remedy that should be described in detail is the estimated costs of the remedial action. The estimated capital costs of each major treatment and containment component of the selected remedy should be identified, along with an indication of the volume of material that each component will address and the estimated unit costs. Contingencies should also be listed. Estimated operation and maintenance costs should be stated in terms of estimated annual costs, and the total net present value should be presented. **Highlight 31** illustrates the type of cost estimates to be included for the remedy in **Highlight 30**. This section of the should mention that the remedy may somewhat as a result of the remedial de construction processes. The ROD include a clear statement that such ch general, reflect modifications resulting engineering design process. It sho address uncertainties as to the remedy a the goals, and, if appropriate, con measures.

In addition to the elements recomm the Description of Alternatives sect following elements of the selected should be addressed, as appropria **ground-water remedies**: expected pum flow rates; estimated number of extractic estimated time frames; cleanup levels; t processes; methods of control for cro impacts; gradient control system performance evaluations and schedule; to which extracted ground water will b before discharge.

6.3.10 Statutory Determinations

Once the selected remedy ha identified, the ROD Decision Summary conclude with a description of how the remedy meets the statutory requirem CERCLA section 121. The remedy sel the lead agency, in consultation with the agency, must:

- Be protective of human health environment

- Comply with ARARs (or justify an waiver)

- Be cost-effective

- Utilize permanent solutions and alt treatment technologies or resource r technologies to the maximum practicable

Highlight 30: Sample Selected Remedy Section

THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives using the nine criteria, and public comments, both EPA and the State have determined that a **combination of Alternatives S4 (excavation, incineration, solidification, and capping) and G2 (pump and treat by carbon adsorption and discharge to a POTW)** is the most appropriate remedy for the EIO Industrial Site in Nameless, TN.

Approximately 13,000 cubic yards of benzene- and chromium-contaminated soil and sediments will be excavated from the lagoon area and the neighboring wetland. The benzene in the soil will be incinerated. The treated soils will be solidified and then returned to the excavated lagoon area. The disposal area will be regraded, revegetated, and capped in accordance with Federal and state requirements for RCRA landfill closure. The estimated costs for this component of the remedy are: Capital costs: $6,230,000; O&M costs: $41,000; Present worth: $6,860,270.

Ground water will be pumped at a rate of approximately 5,000 gallons per day using approximately four extraction wells. Water will be treated using carbon adsorption. Treated water will be discharged to a POTW. Estimated costs for this component of the remedy are: Capital costs: $3,240,000; O&M costs: $30,000; Present worth: $3,701,174.

Cleanup Levels

The purpose of this response action is to control risks posed by direct contact with soils, sediments, and ground water and to minimize migration of contaminants to ground water. The results of the baseline risk assessment indicate that existing conditions at the site pose an excess lifetime cancer risk of 8×10^{-3} from direct contact with contaminated soils and sediments and 4×10^{-2} from ingestion of contaminated ground water. This risk relates to the benzene concentrations in soil, sediment, and ground water. This remedy will address all soils contaminated with benzene in excess of 0.00001 ppm and chromium in excess of 110 ppm. Benzene contamination remaining in soils at 0.00003 mg/kg corresponds to an excess lifetime cancer risk of 10^{-6} through each route of exposure. Since no Federal or state ARARs exist for soil, the action level for the benzene and chromium in soil was determined through a site-specific analysis. This analysis used fate and transport modeling to determine levels to which benzene and chromium in soils should be reduced in order to ensure no leaching of contaminant(s) of concern to ground water above 0.5 - 6 ppm. These soil cleanup levels will also be protective at the 10^{-6} excess cancer risk level for each chemical of concern.

This remedy will also address ground water contaminated with benzene in excess of 0.005 mg/l. Ground water will be treated to a level of 0.01 mg/l before discharge to the POTW and to a level of 0.005 mg/l by the POTW. This level, which corresponds to a lifetime cancer risk of 1×10^{-6}, is based on Federal Water Quality Criteria and MCLs for benzene. State water quality standards that are promulgated are not more stringent than this level. MCLs will be met at the discharge of the water from the POTW. Treatment will be monitored to ensure that cleanup levels are achieved.

Highlight 31: Example Cost Summary for the Selected Remedy
Estimated Costs of Selected Remedy

SOIL/SEDIMENT COMPONENT
Capital Costs:

Estimated Treatment Component	**Cubic Yards**	**Cost per CY**	**Cost**
Incineration	13,000	$330	$4,290,000
Containment Component			
Solidification	5,000	$ 60	300,000
Landfill closure of residuals	5,000	120	600,000
			$5,190,000
(Contingencies @ 20%)			1,038,000
			$6,228,000

Operation and Maintenance Cost:	**Annual Cost**
Landfill maintenance and ground-water monitoring around unit	$ 41,000
Net Present Value calculated using a 5% discount value over a 30-year period	$6,860,270

GROUND WATER COMPONENT
Capital Costs:

Estimated Treatment Component	**Gallons**	**Cost per Gal.**	**Cost**
Carbon Adsorption	100,000	$20	$2,000,000
Discharge to POTW	100,000	7	700,000
			$2,700,000
(Contingencies at 20%)			540,000
			$3,240,000

Operation and Maintenance Cost:	**Annual Cost**
Ground water monitoring	$ 30,000
Net Present Value calculated using a 5% discount value over a 30-year period	$ 3,701,174

TOTALS

Capital Costs	$ 9,468,000
Operation and Maintenance Cost	71,000
Present Value	10,561,444

- Satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element, **OR** explain why this preference is not satisfied.

A brief, site-specific description of how the selected remedy satisfies each of the statutory requirements should be provided in this section of the ROD.

Protection of Human Health and the Environment: This section of the ROD should describe how the selected remedy will provide adequate protection of human health and the environment through treatment, engineering controls, and/or institutional controls. Specifically, the remedy should be described in terms of how the existing or potential risks posed by the site or operable unit **through each pathway** will be eliminated, reduced, or controlled by the response action. This discussion should also indicate that exposure levels will be reduced to within the EPA-acceptable risk range within which EPA manages carcinogenic risk and that the Hazard Indices for non-carcinogens will be less than 1.0. Finally, this discussion should reflect that the implementation of the selected remedy will not pose unacceptable short-term risks or cross-media impacts. If the remedy addresses environmental risks, then there should be a brief discussion of how the remedy is protective of the environment.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).[3] This section of the ROD should:

- State whether the selected remedy will comply with all Federal ARARs and any more stringent state ARARs, or whether any ARAR waiver will be used. If a waiver is invoked, it should be identified and a justification provided.

- List and briefly describe the ARARs that will be attained by the selected remedy. This list should be organized according to chemical-specific, location-specific, and action-specific ARARs. Also, applicable requirements should be distinguished from the relevant and appropriate requirements for the RCRA LDRs and closure requirements, and other requirements, as necessary.

- List and briefly describe the TBCs (e.g., advisories, criteria, and guidances) being used and the reason for their use.[4]

Highlight 32 is an example of how TBCs can be summarized.[5]

Highlight 32: Sample Language for TBCs
In implementing the selected remedy, EPA and the State have agreed to consider a number of procedures that are ARARs but are TBCs. These include the guidance on designing RCRA caps (Draft RCRA Guidance Document, Landfill Design, Liner Systems and Final Cover, issued June 1982) and posting of a deed notice at the site after the remedial action has been completed. The guidance on designing RCRA caps includes specifications to be followed in constructing and maintaining a RCRA cap. Deed restrictions are institutional controls that will be enforced by the local government to ensure that the RCRA cap is not disturbed.

For some remedies, more lengthy discussion of a statute or regulation is necessary. For example, the selected remedy could be one that complies with the relevant and appropriate requirements of both clean closure and landfill closure under RCRA to fashion an "alternate" closure or a remedy for which LDRs are applicable and a Treatability Variance is being obtained.

Cost-Effectiveness: In this section, the lead agency should verify that the selected remedy affords overall effectiveness proportional to its costs, so that it represents a reasonable value for the money spent. This section should state

briefly how the selected remedy appears to be cost-effective, when the overall relationship between cost and effectiveness is compared to that for the other alternatives.

Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable (MEP): This section describes the rationale for the remedy selected, explaining how the remedy provides the best balance of trade-offs among the alternatives with respect to the evaluation criteria, particularly the five primary balancing criteria. The summary worksheets for conducting the comparative analysis, included in Appendix C of this guidance, could be used in discussing this determination.

The final remedy is selected from among alternatives that meet both the threshold criteria (protection of human health and the environment and compliance with ARARs or those alternatives utilizing ARARs waivers). The selection is based on a determination of which option best balances the trade-offs among the alternatives as they relate primarily to the following: long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. Those criteria that distinguish the alternatives will be the major trade-offs to be balanced in the selection decision. To the extent that alternatives are comparable with respect to a particular criterion (e.g., all options provide similar degrees of long-term effectiveness), that criterion is not a decisive factor in the selection process. The degree to which each alternative has state/support agency and community acceptance also is a factor considered in the decision, along with the primary trade-offs.

This section of the ROD should discuss **why** the selected remedy is believed to best meet the evaluation criteria, compared with the other alternatives, and why it is the most appropriate solution for the site. In identifying the alternative that provides the best balance of tradeoffs, the decision maker also is judging the alt to be the one that utilizes permanen and treatment technologies to the ma extent practicable for that site. The dis in this section should be organized as fo

- Provide a general statement that the s remedy utilizes permanent solutio treatment technologies to the ma extent practicable

- Highlight trade-offs among alter related to the five primary balancing c which should be discussed in this (Note: This order is important bec provides a hierarchy of importance):

  - Long-term effectiveness and perma
  - Reduction of toxicity, mobility, or through treatment
  - Short-term effectiveness
  - Implementability
  - Cost

- Discuss which of the five criteria decisive in the selection decision

- Describe how state and com acceptance were factored into the de making process.

The ROD should always mak affirmative finding that the selected r meets the statutory requirement to permanent solutions and treatment techn to the maximum extent practicable, **even a containment remedy**. In this situati extent of treatment found to be practicabl treatment at all. Therefore, where the s remedy does not employ any treatm resource recovery technologies, the expl of the rationale used in the decision include the reasons for finding treatmen impracticable.

Preference for Treatment as a Pri Element: In addition to the four st mandates discussed previously (i.e., ness, compliance with ARARs, cost

ness, and use of permanent solutions), the statutory preference for treatment as a principal element also should be addressed. In writing the ROD, the manner in which the preference is addressed will depend upon whether the selected remedy uses treatment to address any of the threats posed by the site (e.g., hot spots, contaminated ground water). If the selected remedy does not satisfy the statutory preference, the ROD should explain why it does not do so (e.g., large volumes of low-level contaminated waste).

Highlight 33 provides an example of a statutory determinations section (this example is based on the hypothetical site in Appendix A).

6.3.11 Documentation of Significant Changes

To fulfill the requirements of CERCLA section 117(b), the ROD should document and discuss the reasons for any significant changes made to the selected remedy from the time the Proposed Plan and RI/FS Report were released for public comment to the final selection of the remedy (see Chapter 5 for a complete discussion on pre-ROD significant changes).

The documentation of significant changes can be organized in the ROD in one of two ways, depending upon the nature of the changes. Where the significant change affects a feature of the preferred alternative (the selected remedy in the ROD), the documentation should appear at the end of the ROD. Where the significant change entails changing from the preferred alternative to another alternative discussed in the Proposed Plan, this should be documented before to the description of alternatives.

This section of the ROD should identify the preferred alternative from the Proposed Plan and should indicate whether any significant changes were made. If significant changes were made, the reasons for those changes should be explained. If a significant change was made that required issuance of a revised Proposed Plan and the announcement of a new public comment period, the activities performed in compliance with these requirements should be summarized as well.

Highlight 34 includes examples of the three different types of discussions that generally could be included in this section of the ROD. These examples were developed from information presented in the Appendix A. The first example is a case in which no significant changes are made. The second is a case in which a significant change is made that is a logical outgrowth of the information originally presented in the Proposed Plan and the RI/FS Report. In this second case, the only procedural requirement is to discuss the change in this section of the ROD. The final example is a case in which a significant change is made that is not a logical outgrowth of the information in the RI/FS and the Proposed Plan. This third example describes the additional public participation activities that should be conducted after the first Proposed Plan has been released for public comment.

6.4 THE RESPONSIVENESS SUMMARY

The Responsiveness Summary, the third component of the ROD, serves several purposes. First, it provides the lead agency decision makers with information about community preferences regarding both the remedial alternatives and general concerns about the site. Second, it demonstrates how public comments were integrated into the decision-making process. Third, it allows EPA to respond to comments "on the record." This means that a court reviewing the remedy will look to see whether EPA has provided a reasonable response to comments in the record and will not allow new presentation of evidence on those issues. **An adequate responsiveness summary is essential in defending RODs in judicial proceedings.**

Highlight 33: Sample Statutory Determinations Section

STATUTORY DETERMINATIONS

Under CERCLA section 121, EPA must select remedies that are protective of human health and th environment, comply with applicable or relevant and appropriate requirements (unless a statutory waive justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, to: or mobility of hazardous wastes as their principal element. The following sections discuss how the sele remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy protects human health and the environment through incineration of benzene- a chromium-contaminated soil and sediments, stabilization of the treated soil and sediment in the lagoon a and capping the lagoon area. This area will be capped and closed in accordance with RCRA landfill cl requirements to reduce the likelihood of migration of the contaminant(s) of concern.

Incineration of the contaminated soil and sediment will eliminate the threat of exposure to the most mobile contaminant(s) of concern via direct contact with or ingestion of contaminated soil and sediment. The current cancer risks associated with these exposure pathways is 8×10^{-3}. By excavating the contaminated soil and sediments and treating them in an incinerator, the cancer risks from exposure will reduced to less than 1×10^{-6}. This level falls within the EPA's acceptable risk range of 10^{-4} to 10^{-6}. E stabilizing the residuals and closing the lagoon area as a landfill, the risks of exposure via direct contact be further reduced. There are no short-term threats associated with the selected remedy that cannot readily controlled. In addition, no adverse cross-media impacts are expected from the remedy.

Pumping the ground water and treating it by carbon adsorption will eliminate the threat of exposure through ingestion of contaminated ground water. The current risk associated with this pathway is 4×10^{-2}. By treating the ground water and then discharging it to a POTW, the cancer risks from expos will be reduced to less than 1×10^{-6}, which is within the EPA-acceptable risk range. There are no shor term threats associated with the selected remedy that cannot be readily controlled. In addition, no adver cross-media impacts are expected from the remedy.

Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy of excavation, off-site incineration, solidification, and capping of contaminated and sediments and of pump and treat of ground water by carbon adsorption with discharge to a POTW comply with all applicable or relevant and appropriate requirements (ARARs). The ARARs are presente below.

Chemical-Specific ARARs:

- Safe Drinking Water Act MCLs (40 CFR Part 141)
- Clean Water Act FWQC (Clean Water Act section 304)

Continued on nex

Highlight 33: Sample Statutory Determinations Section (continued)

Location-specific ARARs:

- None.

Action-specific ARARs:

- Land Disposal Restriction (LDR) treatment standards for benzene (40 CFR 268). Because it is not expected that incineration will meet the LDR treatment standard for benzene, a Treatability Variance for soil and debris will be obtained.

- RCRA Subtitle C requirements for landfill closure (40 CFR 264.111 Subpart G), which specify a cap with a permeability less than or equal to the permeability of any bottom liner or natural subsoils present at the site.

- 40 CFR 264.117(a)(1) Subpart G Post-Closure and Monitoring requirements for 30 years.

- Rules 4-2, 4-3, and 5-3 of the Tennessee Regulations for Control and Abatement of Air Pollution, which affect actions that generate air emissions and odors.

- CWA Section 404 dredge and fill permit requirements for dredge and fill actions in navigable waters (including wetlands).

- CWA indirect discharge requirements (40 CFR 122) for nondomestic discharges to Publicly Owned Treatment Works (POTW).

- Endangered Species Act, which requires that Federal agencies to ensure that their actions do not jeopardize the continued existence of a threatened or endangered species.

Other Criteria, Advisories, or Guidance To Be Considered for This Remedial Action (TBCs):

- EPA and the State have agreed to incorporate a non-promulgated local deed restriction to prohibit excavation at the site after the remedial action is complete.

- E.O. 11990, Protection of Wetlands, which requires that Federal agencies conduct an evaluation to assess the impacts of an action on wetlands.

Cost-Effectivenes

EPA believes this remedy will eliminate the risks to human health at an estimated cost of $10,561,444, therefore the selected remedy provides an overall effectiveness proportionate to its costs, such that it represents a reasonable value for the money that will be spent.

Continued on next page

The selected remedy assures a much higher degree of certainty that the remedy will be effective i long-term because of the significant reduction of the toxicity and mobility of the wastes achieved thro incineration of the soil and sediments and solidification of the residuals before capping. The ground- component of the remedy ensures a higher degree of certainty of effectiveness than the other remedie because the technology employed is known to be effective for organic-contaminated wastewaters.

Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

EPA and the State of Tennessee have determined that the selected remedy represents the maximu extent to which permanent solutions and treatment technologies can be utilized in a cost-effective man the final source-control operable unit at the EIO site. Of those alternatives that are protective of hum health and the environment and comply with ARARs, EPA and the State have determined that this sel remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, re in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability while also considering the statutory preference for treatment as a principal element and considering sta community acceptance.

The selected remedy treats the principal threats posed by the soils and sediments, achieving signifi benzene reductions. This remedy provides the most effective treatment of any of the alternatives cons and will cost less than off-site disposal. The selection of treatment of the contaminated soil is consiste with program expectations that indicate that highly toxic and mobile wastes are a priority for treatment often necessary to ensure the long-term effectiveness of a remedy.

Preference for Treatment as a Principal Element

By treating the contaminated ground water and the contaminated soils by incineration and solidifyi residuals, the selected remedy addresses one of the principal threats posed by the site through the use c treatment technologies. By utilizing treatment as a significant portion of the remedy, the statutory pref for remedies that employ treatment as a principal element is satisfied.

Highlight 34: Three Examples of Documentation of Significant Changes

Example One: No Significant Changes

The Proposed Plan for the EIO site was released for public comment in August 1991. The Proposed Plan identified Alternative S4, excavation, incineration, solidification, and capping, as the preferred alternative for soil and sediment remediation. EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary.

Example Two: Significant Change Requiring Only Documentation in the ROD

The Proposed Plan was released for public comment in August 1991. It identified Alternative G2, pump and treat through carbon adsorption with discharge to a POTW, as the preferred alternative for ground-water remediation. Alternative G3 involved discharge to the XYZ River. During the public comment period, new information indicated that health and environmental levels could be met by the carbon adsorption treatment. In addition, it was discovered that the POTW in Nameless does not have the capacity to handle the additional wastewaters from the EIO site. Therefore, EPA and the State decided to select discharge to the XYZ River rather than discharge to the POTW.

Example Three: Significant Change Requiring a New Public Comment Period

A Proposed Plan for the EIO site was released for public comment in August 1991. The Plan identified Alternative S4, excavation, incineration, solidification, and capping, as the preferred alternative for soil and sediment remediation. During the public comment period, the results of remedial activities at another site with contamination problems similar to those at the EIO site indicated that an alternative treatment technology, in-situ vitrification, could be used successfully on contaminant(s) of concern similar to those at the EIO site. Further analysis of the vitrification alternative indicated that fewer short-term risks would be associated with it than with the incineration alternative. The information supporting this determination is available in the administrative record.

As a result of this new information, EPA decided to select in-situ vitrification as the new preferred alternative for cleaning up the EIO site. The Tennessee Pollution Control Board concurred with this decision. In compliance with statutory requirements for ensuring the public has the opportunity to comment on major remedy selection decisions, a new Proposed Plan was prepared presenting in-situ vitrification as the preferred alternative. The second Plan was made available to the public in October 1991. No significant comments were received during the second public comment period, and no significant changes have been made to the selected remedy.

To serve these purposes, the Responsiveness Summary should be a concise and complete summary of significant comments received from the public, including PRPs, during the public comment period required by CERCLA section 117. The summary should be accompanied by the lead agency's responses to these comments. Responses should be clear, accurate, and carefully written by the OSC or RPM, and/or by any other persons, as necessary, to ensure the best response.

When general policy matters are discussed in the Responsiveness Summary, it is recommended that they be brought to management's attention before the release of the ROD. If the lead agency determines that a point-by-point response to a set of comments is warranted, a separate comment/response document should be prepared. In this situation, a summary of these comments with the lead agency's response should be included in the Responsiveness Summary as well.

Guidance on preparing Responsiveness Summaries is available in *Community Relations in Superfund: A Handbook* (OSWER Directive 9230.0-3B, June 1988). This Handbook details the process of preparing the Summary and includes a sample Responsiveness Summary.

6.5 SUBMITTING RECORD DECISION TO EPA HEADQ

It is important that all signed RODs to Headquarters as soon as possible af are signed. Signed RODs are abstracte ROD Annual Report and the RODs D A completely assembled, clear, legible the ROD with a signed signature pag computer diskette containing the ROD sl forwarded by the RPM or other de individual to:

ROD Clearinghouse
Hazardous Site Control
Division (OS-220W)
U.S. EPA
401 M Street, S.W.
Washington, D.C. 20460

This process may be more efficient individual coordinates this effort in the F office (e.g., the administrative coordinator). Appendix E describes the of submitting RODs and othe documents to Headquarters.

1. Section 121(a) of CERCLA, as amended, provides that remedial actions should be carried out in acco with section 121 "and, to the extent practicable, the National Contingency Plan."

2. A symbolic ranking method without an accompanying narrative, such as a "+" for the "best" alternat a "-" for the lower-ranking alternative, is discouraged. Although this system could be used in a table, th symbols should not substitute for the narrative comparison.

3. Other available information that does not constitute an ARAR (e.g., advisories, criteria, and guidance be considered in the analysis if it helps to ensure protectiveness or is otherwise appropriate for use in a s alternative. These TBCs should be included in the description if the lead and support agencies agree tha inclusion is appropriate.

4. *CERCLA Compliance With Other Laws Manual* (OSWER Directive 9234.1-01, August 1988).

5. Key TBCs (i.e., those fundamental to the selected remedy) should be justified in the ROD. If the val TBCs is challenged, the justification for use of the TBC should also be provided in the Responsivene Summary (see Section 6.4).

7.0 THE PROCESS FOR DEVELOPING THE RECORD OF DECISION

This chapter describes the roles and responsibilities of the lead and support agencies in developing the ROD. Procedures to facilitate timely preparation, review, and final approval of the ROD are presented in this chapter, as well as dispute resolution procedures and the role of other Federal agencies in cleanup activities at Federal facilities.

7.1 OVERVIEW

As with the Proposed Plan, the lead agency has the responsibility for preparing the ROD and coordinating with the support agency(ies) and other lead agency program offices to attain concurrence on the selected remedy. Typically, the lead agency that prepares the RI/FS Report and the Proposed Plan will prepare the ROD, although this may vary from site to site. In many cases, EPA is the lead agency and prepares the ROD; however, the State can prepare the ROD either when the State is designated the lead agency in the SMOA, CA, or SSC or when there is a state-lead enforcement action at NPL sites. Federal agencies should prepare RODs for Federal facilities under their jurisdiction, consistent with the terms of their IAGs.

Although the roles of EPA, the State, and other Federal agencies may vary from site to site, EPA retains the final authority for selecting all response actions pursuant to CERCLA sections 104, 106, 120, and 122.

7.1.1 State Preparation of the ROD

The State should recommend a remedy for EPA concurrence and adoption for cases in which EPA and the State designate that state as the lead agency in the SMOA. Through the annual planning process, EPA and the State should designate those sites for which the State should prepare the ROD for EPA concurrence and adoption.

As indicated in the NCP, EPA intends to implement selectively the process of state preparation of RODs, giving the State the lead when both of the following conditions are met:

- The circumstances at a particular site warrant less EPA and more state involvement
- The State has demonstrated its ability to conduct remedial actions in an effective and responsible manner.

When the State is the lead agency for developing the RI/FS at a Fund-financed site, if agreed to by EPA, the State should prepare the Proposed Plan, publish the notice of availability, prepare the Responsiveness Summary, and develop the ROD. When the State has the responsibility for preparing the ROD, the State should recommend a remedy to EPA. EPA and the State then sign the ROD. In cases such as this, EPA retains final authority over remedy selection although the State prepared the ROD.

7.1.2 Remedy Selection for State-Lead Enforcement Actions

Not every remedial activity taken at NPL sites is conducted under the authority of CERCLA sections 104, 106 or 122. The State may take action at an NPL site under its own remedial authority. This kind of action is commonly referred to as a state-lead enforcement action.

The degree of EPA involvement in the remedy selection process at these sites is discretionary and should be established between EPA and the State in a SMOA, CA, or SSC. EPA may choose to concur or nonconcur with a remedy selected for such a site only when the SMOA, CA, or SSC specified such a role for EPA. Further guidance on state-lead enforcement actions is available in the *Interim Final Guidance on Funding CERCLA State*

Enforcement Actions at NPL Sites (OSWER Directive 9831.6A-6D, April 7, 1988).

7.1.3 Roles and Responsibilities of Other Federal Agencies

Executive Order 12580 delegates the authority for carrying out the requirements of CERCLA sections 117(a) and (c) to Federal agencies with Federal facilities under their jurisdiction. A Federal agency, therefore, can issue the Proposed Plan. The agreement among the Federal agency, EPA, and, in many cases, the State should establish the responsibilities of each party for preparation of the ROD.

For sites under its jurisdiction, a Federal agency has the lead responsibility for preparing the draft ROD in accordance with Chapter 6 and, when appropriate, Chapter 9 of this guidance, and for carrying out the lead agency responsibilities specified in this chapter. The Federal agency should prepare the draft ROD, taking into consideration new information and comments received during the public comment period, and should submit the draft ROD to EPA (and, where designated in the IAG, the State) for EPA's written approval. The Regional or Assistant Administrator's signature constitutes final EPA "adoption" of the ROD.

The Federal agency should publish a notice of availability pursuant to CERCLA section 117(d) and make the ROD available to the public before beginning the response action. In a limited number of cases, the Federal agency, EPA, or the State involved in a remedial action will not be able to reach agreement on the remedial approach for a site. If the parties are unable to reach agreement on the draft ROD even after a dispute resolution process has been followed, EPA should select the remedial action.

7.2 ROLES AND RESPONSIBILITIES OF LEAD AGENCY AND SUPPORT AGENCY

The responsibilities outlined below for the lead and support agency apply to EPA, the State, or another Federal agency, e specifically noted.

7.2.1 Lead Agency

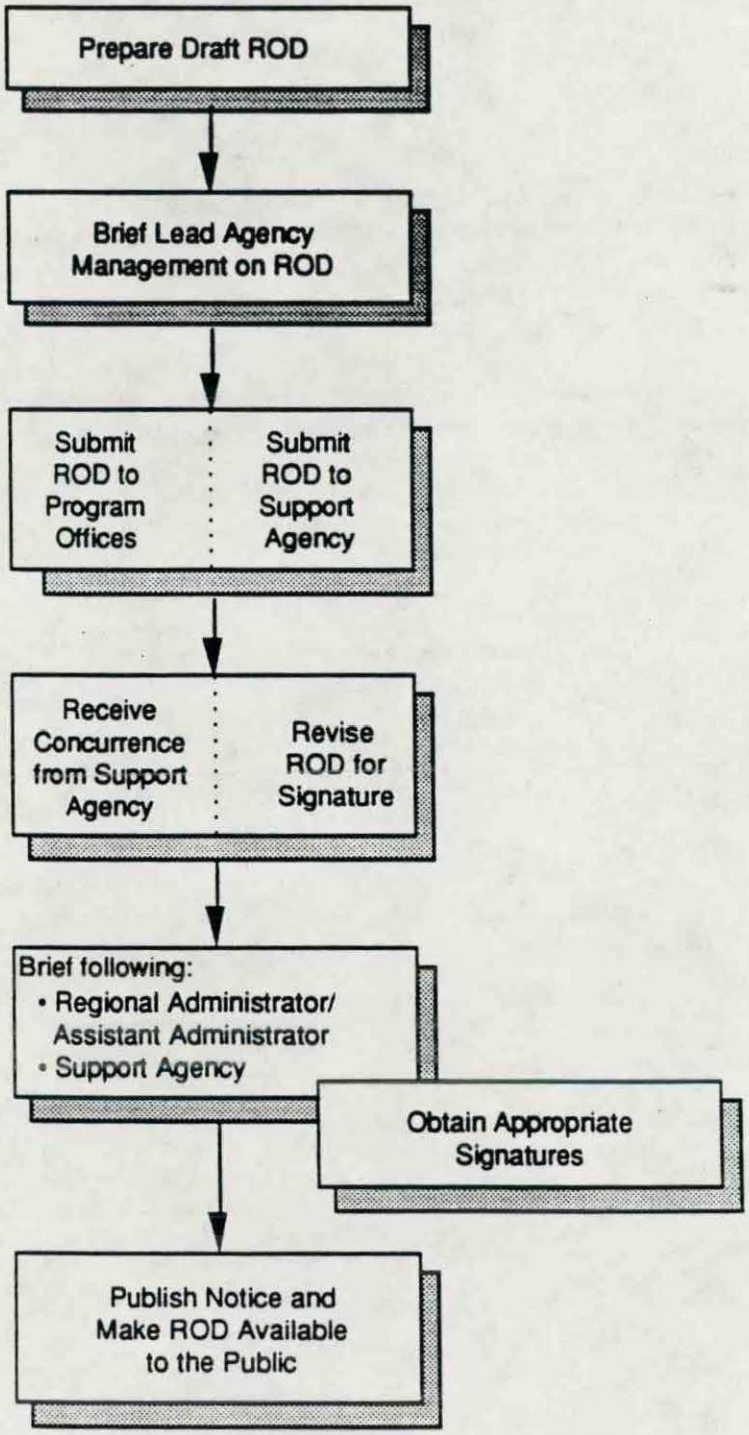
As shown in **Highlight 35,** t agency's responsibilities in the development process include the follow

- Preparing the draft ROD.
- Briefing lead agency upper manage the ROD.
- Submitting the draft ROD to oti agency program offices for their rev to the support agency to obt agency's formal concurrence selected remedy.
- Reviewing and addressing the agency's comments and modify selected remedy, as appropriate.
- Revising the draft ROD for sig
- Briefing the Regional Administrat if necessary for a consultatic appropriate Headquarters manager Assistant Administrator of OSWER as the designated personnel in the agency.
- Submitting the ROD to the I Administrator or the As Administrator of OSWER, if necess signature. (If a State or a Federal a the lead agency, that lead agency a should sign the ROD.)
- Publishing the newspaper notice ann availability of the ROD and mak ROD available to the public.

7.2.2 Support Agency

The support agency's responsibiliti ROD development process include:

Highlight 35: Lead Agency Responsibility in ROD Development Process



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Highlight 36: Sample Newspaper Notification of Availability of the Record of Decision

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY ANNOUNCES THE AVAILABILITY OF THE RECORD OF DECISION FOR THE EIO INDUSTRIAL SUPERFUND SITE IN NAMELESS, TENNESSEE

On March 31, 1991, the U.S. Environmental Protection Agency (EPA) signed the Record of Dec (ROD) that formally selects the cleanup plan for the soil contamination at the EIO Industrial site. The outlines EPA's decision for selecting the cleanup remedy for the site. The Tennessee Pollution Contro Board concurs with the findings in the ROD.

EPA has decided to excavate contaminated soils and sediments, treat the organic compounds by incineration, solidify the remaining wastes, and dispose of the treated soils on site. EPA will also pum contaminated ground water, treat it by carbon adsorption, and discharge it to a publicly owned treatmer works.

The Administrative Record for the site, which includes the ROD and all documents that formed th basis for EPA's selection of the cleanup remedy, is available for public review at the locations listed be

Nameless Public Library
125 Elm Street
Nameless, TN 00000
(101) 999-1099
Hours: Monday through Saturday
9 a.m. to 9 p.m.

U.S. EPA Docket Room, Region 4
Federal Building, 10th Floor
Atlanta, GA 11111
(555) 555-5555
Hours: Monday through Friday
8:30 a.m. to 5:00 p.m.

Questions about EPA's decision or other activities at the EIO Industrial Superfund site should be directed to:

Joshua Doe
Community Relations Coordinator
U.S. Environmental Protection Agency
200 Peachtree Street
Atlanta, GA 11111
(555) 555-4640
Toll-free: 1 (800) 333-3333
between 8:30 a.m. and 5:00 p.m., Monday through Friday, excluding Federal holidays

8.0 POST-RECORD OF DECISION CHANGES

8.1 EVALUATING POST-RECORD OF DECISION INFORMATION

After a ROD is signed, new information may be received or generated during the RD/RA that could affect how the Agency believes the remedy selected in the ROD should be implemented. Where information is submitted by a PRP, the public, or the support agency after a ROD is signed, the lead agency should consider this information when *all* of the following criteria are met (NCP section 300.825(c)):

- Comments contain significant information
- Information is not contained elsewhere in the Administrative Record File
- Information could not have been submitted during the public comment period
- Information substantially supports the need to alter the response action significantly.

The lead agency also may evaluate whether a change to the remedy is warranted on its initiative, even where the requirements of NCP section 300.825(c) are not met.

8.2 TYPES OF POST-RECORD OF DESICION CHANGES

The lead agency's categorization of a change, which ultimately will affect the documentation procedure required, is a site-specific determination and should consider the following factors:

- Whether or not the change significantly alters the scope of the remedy (e.g., the physical area of the response, remediation goals, type and volume of wastes)
- Whether or not the change would alter the performance (e.g., treatment levels to be attained) and thus raise concerns about the protectiveness or long-term effectiveness of the remedy that could not have been anticipated based on information in the ROD
- Whether or not the changes in costs are of such a nature that they could not have been anticipated, based on the estimates in the ROD and the recognized uncertainties associated with the hazardous waste engineering process selected.

Based on this evaluation, and depending on the extent or scope of modification being considered, the lead agency must determine that the post-ROD change fits into one of the following categories:

- Non-significant or minor
- Significant
- Fundamental.

Nonsignificant changes are minor changes that usually arise during design and construction, when modifications are made to the functional specifications of the remedy to optimize performance and minimize cost. Such changes may affect the type or cost of materials, equipment, facilities, services, and supplies used to implement the remedy. A **significant** change to a remedy is generally an incremental change to a component of a remedy that does not fundamentally alter the overall remedial approach. A **fundamental** change is a change that requires the reconsideration of the hazardous waste management approach selected in the ROD. That is, the scope, performance, or cost of the proposed change does not reflect that of the selected remedy.

Highlight 37 provides examples of post-ROD changes. (See also NCP preamble, 55 FR 8772.) Each type of post-ROD change is

Highlight 37: Post-Record of Decision Changes

Minor Changes

- Remedial design testing shows that the volume of soil requiring treatment is 75,000 cubic yards rather than 60,000 estimated in the ROD, but the cost of the remedy will only increase by 5 percent.

- During remedial design, it is discovered that it is not feasible to construct the on-site landfill (which is part selected remedy) in the location specified in the ROD. However, another location at the site is suitable for landfill, and this location is chosen.

Significant Changes

- Residuals from a treatment operation were not expected to be hazardous and it was planned to dispose of th site in a Subtitle D unit. However, testing after treatment determines that the residuals are hazardous waste off-site disposal at a Subtitle C facility is required.

- The lead agency determines that the attainment of a newly promulgated requirement is necessary, based on scientific evidence, because the existing ARAR is no longer protective. Although this new requirement wil a basic feature of the remedy (i.e., timing or cost), it will not fundamentally alter the remedy specified in t ROD (i.e., change the selected technology).

- Sampling during the remedial design phase indicates the need to increase the volume of waste material to be removed and incinerated by 50 percent in order to meet remediation goals, thereby increasing the cost of th action. This increase in the scope of the action represents a significant change.

- The lead agency decides to use carbon adsorption instead of air stripping to conduct ground-water treatment However, the basic pump and treat remedy remains unaltered and the cleanup level specified in the RO met by the new technology; therefore, the change is significant, but not fundamental.

- The lead agency determines that it is not feasible to construct an on-site landfill in accordance with the reme selected in the ROD. The treated wastes must be sent to an off-site landfill. Although the overall managem approach will remain the same, the costs and implementation time will increase significantly.

Fundamental Changes

- The in-situ soil washing remedy selected in the ROD proves to be infeasible to implement after testing durin remedial design. A decision is made to excavate and thermally treat the waste instead.

- The remedy selected in the ROD calls for off-site landfill disposal, but this option proves too costly because shortage of capacity. The lead agency decides to dispose of the waste in a newly constructed on-site landfill

- Remedial design testing determines that the selected remedy using natural attenuation of ground water will n protective. The lead agency decides to implement a pump and treat remedy instead.

- At the five-year review for the site, tests indicate that the remedy is not protective. A new remedy must be selected that will meet protectiveness requirements, resulting in major new costs for the site.

NOTE: The examples presented here do not represent strict thresholds for changes in cost, volume, and/or

associated with a different documentation procedure, as discussed below.

8.3 DOCUMENTING POST-RECORD OF DECISION CHANGES

The type of documentation required for a post-ROD change depends on the nature of the change. Changes that significantly or fundamentally affect the remedy selected in the ROD will require more explanation and/or opportunity for public comment than those that do not. As discussed below, significant changes require an Explanation of Significant Differences (ESD), and fundamental changes require a ROD amendment.

8.3.1 Documenting Non-Significant Post-Record of Decision Changes

If **non-significant** or minor changes are made, they should be recorded in the post-decision document file. If the lead agency chooses, non-significant changes can be documented for the public in an optional Remedial Design Fact Sheet.

8.3.2 Documenting Significant Post-Record of Decision Changes: the Explanation of Significant Differences (ESD)

When documenting **significant** changes made to a remedy, the lead agency must comply with the procedures specified in NCP section 300.435(c)(2)(i). An ESD should be prepared to provide the public with an explanation of the nature of the changes made to the remedy, to summarize the information that led to making that change, and to affirm that the revised remedy complies with the statutory requirements of CERCLA section 121. Generally, a new nine criteria analysis is not required; however, the ESD should include a statement that the ROD meets ARARs identified at the time the original ROD was signed (NCP section 300.430(f)(1)(ii)(B)(1) and (2)).

It also would be appropriate to prepare an ESD document when the lead agency decides to exercise a contingency remedy that was not sufficiently described in the ROD (see Chapter 9 of this guidance).

While the ESD is being prepared and made available to the public, the lead agency may proceed with the pre-design, design, construction, or operation activities associated with the remedy. The remedy can continue to be implemented in this case because the ESD represents only a notice of change, and the Agency is not reconsidering the overall remedy. The lead agency should consult with the support agency, as appropriate, before issuing an ESD (see NCP section 300.435(c)(2)). Although not specifically required by CERCLA section 121(f), it is also recommended for the lead agency to provide the support agency the opportunity to comment and to summarize the support agency's comments in the ESD. The agency also should publish a notice of availability and a brief description of the ESD in a local newspaper of general circulation (as required by CERCLA Section 117(c)), and make the ESD available to the public by placing it in the administrative record file and information repository. A formal public comment period is *not* required when issuing an ESD. In some cases, an additional public comment period or public meeting may be held voluntarily on a planned ESD (see NCP section 300.825(b)). This may be useful where there is considerable public or PRP interest in the matter. The Office of Emergency and Remedial Response (OERR) recommends issuing the ESD in a fact sheet format as outlined in **Highlight 38**. The appropriate Regional Manager may sign an ESD.

8.3.3 Documenting Fundamental Post-Record of Decision Changes: the ROD Amendment

When **fundamental** changes are made to the remedy selected in a ROD, the lead agency should conduct the public participation and documentation procedures specified in NCP section 300.435(c)(2)(ii). As a matter of policy, this would include issuing a proposed plan that highlights the proposed changes. The format

Highlight 38: Sample Format for ESD

Introduction: Begin with an introduction to the site and a statement of purpose for the ESD, including:

- Site name and location
- Identification of lead and support agencies
- Citation of CERCLA section 117(c) and NCP section 300.435(c)(2)(i)
- Summary of the circumstances that gave rise to the need for an ESD
- Statement that the ESD will become part of the Administrative Record File (NCP 300.825(a)(2))
- Address of location where the File is available and hours of availability of the File.

Summary of Site History, Contamination Problems, and Selected Remedy: Summarize the following aspe site or operable unit:

- The contamination problems and site history, including the date on which the ROD was signed
- The selected remedy, as originally described in the ROD.

Description of the Significant Differences and the Basis for those Differences: Summarize the significant c to the remedy and the basis for making those changes, including:

- Information that gave rise to significant differences from the selected remedy as it was originally specified, could include the following: (1) the results of treatability studies; or (2) other information developed or pro during the remedial design process that supports the change. Reference any information in the Administrati Record File that supports the need for the change.

- Description of the significant differences between the remedy as presented in the ROD and the action now pr As appropriate, this description should summarize the differences in scope, performance, or cost between the original and modified remedies, as necessary. For example:

Original Remedy	Modified Remedy
Excavation and incineration of 7,500 cubic yards of contaminated soil.	Excavation and incineration of 11,500 cubic yards of contaminated soil.
Air stripping and ground-water restoration.	Carbon adsorption for ground-water restoration.

Support Agency Comments: Include a summary of support agency comments on the ESD.

Affirmation of the Statutory Determinations: Affirm that the modified remedy continues to satisfy the requir of CERCLA section 121 by including a statement such as the following:

"Considering the new information that has been developed and the changes that have been made to the selected remedy, the [lead and support agencies] believe that the remedy remains protective of human health and the environment, complies with federal and state requirements that were identified [(1) in the ROD/(2) in this ESD] applicable or relevant and appropriate to this remedial action (at the time [(1) the original ROD/(2) this ESD] w signed), and is cost-effective. In addition, the revised remedy utilizes permanent solutions and alternative treatm resource recovery) technologies to the maximum extent practicable for this site."

Public Participation Activities: Document compliance with the appropriate public participation requirements:

- That notice has been issued that the contents of the Administrative Record File are available for public review comment

- The date of planned public information meetings, if applicable. (EPA is not required to hold public meetings ESDs but may choose to do so if warranted by public interest.)

should follow that of proposed plans (see Chapter 2). In general, the introductory sections of the ROD do not need to be readdressed in the ROD amendment.

The focus of the amendment should be as follows:

- Documenting the rationale for the amendment
- Evaluating the remedy originally selected and the new proposed remedy using the nine evaluation criteria
- Providing assurances that the proposed remedy satisfies the statutory requirements.

The format for a ROD amendment is presented in **Highlight 39**.

If the ROD to be amended addresses the entire response action for the site or a series of operable units (e.g., soil, surface water, and ground water), only that portion of the remedy being changed (e.g., ground water) requires an amendment. Under SARA section 121, for the portion of the ROD being amended, a new nine criteria analysis, including a new ARARs analysis, will be necessary. Portions of the analysis in the original ROD can be cross-referenced, where appropriate. Therefore, the amount of information included in a ROD amendment is a function of the type of change made to the remedy and the rationale for that change. RD/RA activities being conducted on other portions of the site or operable units not proposed for changes may continue during the amendment process.

When fundamental changes are proposed to the ROD, the lead agency should conduct the public participation and documentation procedures conducted for the original ROD (e.g., Proposed Plan, public comment period, Responsiveness Summary). The final decision to amend is not made until after consideration of public comment, as in the original ROD. (See NCP section 300.435(c)(2)(ii)(A)-(H).) When a fundamental change is proposed as a result of

Highlight 39: Sample Format for ROD Amendment

Introduction

- Site name and location
- Identify lead and support agencies
- Cite CERCLA section 117 and NCP 300.435(c)(2)(ii)
- Date of ROD signature
- Summarize circumstances that led to the need for a ROD amendment
- State that ROD amendment will become part of the Administrative Record File (NCP section 300.825(a)(2))
- Provide address where File is available for public review and hours of availability.

Reasons for Issuing the ROD Amendment

- Identify remedy selected in ROD
- Summarize rationale for changing remedy selected in the ROD.

Description of the New Alternatives

- Describe the original selected remedy and the new proposed remedies in the same manner requested in a standard ROD, highlighting the following:
- Treatment components
- Containment or storage components
- Ground-water components
- General components
- Major ARARs.

Evaluation of Alternatives

- Profile the original selected remedy and the new proposed remedies against the nine criteria.

Statutory Determinations

- Provide a statement that the modified remedy satisfies CERCLA section 121.

negotiations with a PRP, the Proposed Plan for the ROD amendment should be released for public comment before the consent decree. (If a change is made after a consent decree has been entered, involvement of the court may be required. Site managers should check with their Regional Counsel on how this may be accomplished.) ROD amendments must be signed by the Regional Administrator.

000093

9.0 DOCUMENTING NO ACTION, INTERIM ACTION AND CONTINGENCY REMEDY DECISIONS

This chapter discusses the essential components of RODs that are prepared to document three specific types of remedial action decisions: (1) **no action**; (2) **interim actions**; and (3) **contingency remedies**. In preparing one of these three types of RODs, RPMs should modify the format of the "standard ROD" for final response actions (see **Highlight 14** in Chapter 6) as indicated in this chapter. In the examples provided here, for each type of ROD, sections of the standard ROD that should be eliminated have been crossed out, and sections that should be modified according to the directions provided appear in bold. Sections of the ROD that are not crossed out or do not appear in bold should be prepared as in a standard ROD.

9.1 DOCUMENTING NO ACTION DECISIONS

EPA may determine that no action (i.e., no treatment, engineering controls, or institutional controls) is warranted under any of the following general sets of circumstances:

- When the site or a specific problem or area of the site (i.e., an operable unit) poses no current or potential threat to human health or the environment
- When CERCLA does not provide the authority to take remedial action
- When a previous response eliminated the need for further remedial response.

Examples of potential situations where no action decisions may be appropriate are provided in **Highlight 40**. Remedial alternatives that include solely institutional controls are not considered "no action." An alternative may include only monitoring and still be considered "no action." The remainder of this section outlines ROD formats to use for situations under which a no action ROD may be warranted.

Highlight 40: Situations Where No Action Decisions May Be Appropriate

- Where the baseline risk assessment concluded that conditions at the site pose no unacceptable risks to human health and the environment.
- Where a release involved only petroleum product that is exempt from remedial action under CERCLA section 101.
- Where a previous removal action eliminated existing and potential risks to human health and the environment so that no further action is necessary.

9.1.1 No Action Situation #1: Action Not Necessary for Protection

1. Declaration

- Site Name and Location
- Statement of Basis and Purpose
- ~~Assessment of the Site~~
- **Description of the Selected Remedy:** The lead agency should state that no action is necessary for the site or operable unit, although it may authorize monitoring to verify that no unacceptable exposures to

potential hazards posed by conditions at the site or operable unit occur in the future.

- ~~Statutory Determinations~~

- **Declaration Statement:** None of the section 121 statutory determinations are necessary in this section. Instead, the lead agency should state briefly that no remedial action is necessary to ensure protection of human health and the environment.

- Signature and Support Agency Acceptance of the Remedy

2. Decision Summary

- Site Name, Location, and Description

- Site History and Enforcement Activities

- Highlights of Community Participation

- Scope and Role of Operable Unit or Response Action

- Site Characteristics

- **Summary of Site Risks:** The information in this section provides the primary basis for the no action decision. The discussion should support the determination that no remedial action is necessary to ensure protection of human health and the environment. The lead agency should explain the basis for its conclusion that unacceptable exposures to hazardous substances will not occur. (In most cases, this will be based on the baseline risk assessment conducted during the RI.) In limited cases where alternatives were developed in the FS, the lead agency should reference the RI/FS Report.

- ~~Description of Alt. natives~~

- ~~Summary of Comparative Analysis of Alternatives~~

- ~~Selected Remedy~~

- Explanation of Significant Chang

3. Responsiveness Summary

9.1.2 No Action Situation #2: No (Authority to Take Action

1. Declaration

- Site Name and Location

- Statement of Basis and Purpose

- ~~Assessment of the Site~~

- **Description of the Selected Rem** lead agency should state that no necessary for the site or opera although it may authorize moni verify that no unacceptable exp potential hazards posed by conditi site or operable unit occur in

- ~~Statutory Determinations~~

- **Declaration Statement:** No sec statutory determinations are nece this section. This section shoul that EPA does not have authori CERCLA sections 104 or 106 t the problem(s) posed by the site or unit. If the problem has been re other authorities, this should be e

- Signature and Support Agency Ac of the Remedy

2. Decision Summary

- Site Name, Location, and Descrip

- Site History and Enforcement Act

- Highlights of Community Particip

- Scope and Role of Operable Unit or Response Action
- Site Characteristics
- Summary of Site Risks
- ~~Description of Alternatives~~
- ~~Summary of Comparative Analysis of Alternatives~~
- ~~Selected Remedy~~
- **Statutory Authority Finding:** The concluding statement of the absence of CERCLA authority to address the problem should be the same as in the Declaration.
- Explanation of Significant Changes

3. Responsiveness Summary.

9.1.3 No Action Situation #3: No Further Action Necessary

1. Declaration

- Site Name and Location
- Statement of Basis and Purpose
- ~~Assessment of the Site~~
- **Description of the Selected Remedy:** The lead agency should state that no action is necessary for the site or operable unit, although it may authorize monitoring to verify that no unacceptable exposures to risks posed by conditions at the site or operable unit occur in the future.
- ~~Statutory Determinations~~
- **Declaration Statement:** This Declaration should state that it has been determined that no further remedial action is necessary at the site or operable unit. The Declaration should explain that a previous response(s) at the site or operable unit eliminated the need to conduct additional remedial action. This section also should note whether a five-year review is required. Section 121(c) of CERCLA requires a five-year review of any earlier post-SARA remedy that eliminated the need to take further action (i.e., using engineering and/or institutional controls to prevent unacceptable exposures), yet resulted in hazardous substances, pollutants, or contaminants remaining at the site. As a matter of policy, EPA should generally perform a five-year review for pre-SARA remedies and removal actions that result in hazardous substances remaining on site, and any remedial action that requires five or more years to attain the cleanup levels specified in the ROD.
- Signature and Support Agency Acceptance of the Remedy

2. Decision Summary

- Site Name, Location, and Description
- Site History and Enforcement Activities
- Highlights of Community Participation
- Scope and Role of Operable Unit or Response Action
- Site Characteristics
- **Summary of Site Risks**: The information in this section provides the primary basis for the no action decision. The discussion should support the determination that no further remedial action is necessary to ensure protection of human health and the environment. The lead agency should explain the basis for its conclusion that unacceptable exposures to hazardous substances will not occur. (In most cases, this will be based on the baseline risk assessment conducted during the RI.) Any previous responses that were conducted at

006396

the site or operable unit that served to eliminate the need for additional remedial action should be summarized in this discussion. In limited cases where alternatives were developed in the FS, the lead agency should reference the RI/FS Report.

- ~~Description of Alternatives~~

- ~~Summary of Comparative Analysis of Alternatives~~

- ~~Selected Remedy~~

- ~~Statutory Determinations~~

- Explanation of Significant Changes

3. Responsiveness Summary.

9.2 DOCUMENTING INTERIM ACTION DECISIONS

During scoping, or at other points in the RI/FS, the lead agency may determine that an interim remedial action is appropriate.[1] An interim action is limited in scope and only addresses areas/media that will be followed by a final operable unit ROD. Reasons for taking an interim action could include the need to:

- Take quick action to protect human health and the environment from an imminent threat in the short term, **while a final remedial solution is being developed**; or

- Institute **temporary** measures to stabilize the site or operable unit and/or prevent further migration or degradation.

Interim actions either are implemented for separate operable units or may be a component of a final ROD. In either case, an interim action must be followed by a final ROD, which should: (1) provide long-term protection of human health and the environment; (2) fully address the principal threats posed by the site or operable unit; and (3) addres preference for treatment that redu toxicity, mobility, or volume of wastes

The basic format presented in thi will be the same for all interim However, the detailed information that provided within each section of the R vary, depending on whether the action a ground water or a contaminant source.

9.2.1 Interim Actions versus Early

Interim remedial actions should confused with "early remedial actions." in this case is simply a description of action is taken. Thus, an **early actio** that is taken before the risk assessmen site or operable unit has been complete actions may be **either interim or fi** managers may take an early action wher must be mitigated immediately, even "formal" RI or "formal" FS can be p Examples of early interim and early follow.

When an interim action is taken mitigate immediate threats, no forma Report will be available yet. preparation of an RI/FS Report is not for an interim action, there m documentation that supports the rational action, to fulfill the NCP's administrativ requirements. A summation of s collected during field investigations sh sufficient to document a problem in response. In addition, a short ana remedial alternatives considered, those and the basis for the evaluation (as is d focused FS) should be summarized to the selected action. **Highlight 41** examples of interim actions and early a

9.2.2 Interim Action Record of Format[2]

The Interim Action ROD should be to the limited scope and purpose o action.

Highlight 41: Examples of Possible Interim and Early Actions

Interim Actions

- Installing extraction wells to pump a groundwater aquifer to restrict migration of a contaminant plume with the intention of later installing additional wells (or taking other action) to address the contamination in a final action.

- Providing a temporary alternate source of drinking water with the intention of later, in a subsequent action, remediating the source of contamination and/or the aquifer.

- Constructing a temporary cap to control or reduce exposures until subsequent action is taken.

- Relocating contaminated material from one area of a site (e.g., residential yards) to another area of the site for temporary storage until a decision on how best to manage site wastes is made.

Early Actions

- Early interim action. Any of the interim actions discussed above, if taken before the completion of the risk assessment for the OU, would constitute an early action.

  If only drums are removed from an area with drum and soil contamination, the action could be viewed as an interim action because the area would undergo further study to determine the extent of the soil contamination. However, if drums are removed from an area where no residual contamination remains, the action would be an early final action.

- Early final action. Before the formal RI/FS is completed, drums are removed from the site along with surrounding contaminated soil that, without early attention, could result in contamination of currently uncontaminated areas. [This action, although taken early, is final because the removed drums and soil were taken off site for final disposal.]

The format for Interim Action RODs is outlined below.

1. Declaration

- Site Name and Location

- Statement of Basis and Purpose

- Assessment of the Site

- Description of Selected Remedy

- **Statutory Determinations:** The declaration statement should read as follows:

  This interim action is protective of human health and the environment in the short term and is intended to provide adequate protection until a final ROD is signed; complies with (or waives) Federal and state applicable or relevant and appropriate requirements for this limited-scope action, and is cost-effective. This action is interim and is not intended to utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for this [*site/operable unit*]. [*Note: Where treatment is utilized, replace the previous sentence with the following: "Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus is in furtherance of that statutory mandate."*] Because this action does not constitute the final remedy for the [*site/operable unit*], the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element [*Note: Include if treatment is being used: "although partially addressed in this remedy"*] will be addressed by the final response action. Subsequent actions are planned to address fully the threats posed by the conditions at this [*site/operable unit*]. Because this

remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim action ROD, review of this site and of this remedy will be ongoing as EPA continues to develop final remedial alternatives for the [*site/operable unit*].

- Signature and Support Agency Acceptance of the Remedy

2. Decision Summary

- Site Name, Location, and Description

- Site History and Enforcement Activities

- Highlights of Community Participation

- **Scope and Role of Operable Unit:** This section provides the rationale for taking the limited action. To the extent that information is available, the section should detail how the response action fits into the overall site strategy. This section should state that the interim action will be consistent with any planned future actions, to the extent possible.

- **Site Characteristics:** This section should focus on the description of those site or operable unit characteristics to be addressed by the interim remedy.

- **Summary of Site Risks:** This section should focus on risks addressed by the interim action and should provide the rationale for the limited scope of the action. The rationale can be supported by facts that indicate that temporary action is necessary to stabilize the site or portion of the site, prevent further environmental degradation, or achieve significant risk reduction quickly while a final remedial solution is being developed. Qualitative risk [illegible] may be presented if quantitat information is not yet available often will be the case. The more findings of the baseline risk as should be included in the subsequ action ROD for the operable unit ultimate cleanup objectives (i.e., ac exposure levels) for the site or unit.

- **Description of Alternatives**: This should describe the *limited* alternat were considered for the interim (generally three or fewer). Onl requirements that are applicable or and appropriate requirements (AR the limited-scope interim action sh incorporated into the descript alternatives.

- **Summary of Comparative Ana Alternatives:** The comparative should be presented in light of the scope of the action. Evaluatio [illegible] it relevant to the evaluation of interim need not be addressed in detail. their irrelevance to the decision sh noted briefly.

- Selected Remedy

- **Statutory Determinations:** The action should protect human health environment from the exposure pati threat it is addressing and the material being managed. The discussion should focus only o ARARs specific to the interim actio residuals management c implementation).[3] The discussio "utilization of permanent solutic treatment to the maximum practicable" should indicate that the action is not designed or expecte final, but that the selected represents the best balance of tr among alternatives with respec [illegible] p criteria, given the limited scope

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APPENDIX A

DESCRIPTION OF A HYPOTHETICAL SITE
(To be developed)

action. The discussion under the preference for treatment section should note that the preference will be addressed in the final decision document for the site or final operable unit.

- Explanation of Significant Changes

3. Responsiveness Summary.

9.3 DOCUMENTING CONTINGENCY REMEDIES

The lead agency, in consultation with the support agency, may decide to incorporate a contingency remedy in the ROD. Use of a contingency ROD may be appropriate when there is significant uncertainty about the ability of remedial options to achieve remediation levels (e.g., cleanup of an aquifer to non-zero MCLGs or MCLs).

For example, a contingency ROD may be appropriate when the performance of an innovative treatment technology (or a demonstrated technology being used on a waste for which performance data are not available) appears to be the most promising option, but additional testing will be needed during remedial design to verify the technology's performance capabilities; in this case, a more "proven approach" could be identified as a contingency remedy. *[Note: The use of contingency remedies should be carefully considered. Site managers should perform the necessary steps of treatability studies/field investigations to evaluate a technology's performance capabilities during the RI/FS. More detailed testing at the operational-scale level may be performed during design.]*

Where applicable, the ROD should specify under what circumstances the contingency remedy would be implemented, i.e., what are the criteria (e.g., failure to achieve desired performance levels) that EPA will use to decide to implement the contingency option as opposed to the selected remedy.

The format for Contingency Remedy RODs is outlined below.

1. Declaration

- Site Name and Location
- Statement of Basis and Purpose
- Assessment of the Site
- **Description of the Selected Remedy:** Both the selected remedy and the contingency remedy should be described in bullet form.
- **Statutory Determinations:** The Declaration should be modified to indicate that both the selected remedy and the contingency remedy will satisfy the statutory requirements.
- Signature and Support Agency Acceptance of the Remedy

2. Decision Summary

- Site Name, Location, and Description
- Site History and Enforcement Activities
- Highlights of Community Participation
- Scope and Role of Operable Unit or Response Action
- Site Characteristics
- Summary of Site Risks
- **Description of Alternatives:** This section should identify any uncertainties about the use of the technologies being considered, and the extent additional testing is needed. The selected remedy and the contingency remedy must be fully described.
- **Summary of Comparative Analysis:** The selected remedy and the contingency

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remedy should be evaluated *fully* against the nine criteria; the uncertainties should be noted, as well as the expectations for performance. Community (and support agency) acceptance of an innovative technology should be discussed in light of the CERCLA provisions in section 121(b)(2), which takes into account the degree of support for the action by the community.

- **Selected Remedy:** The selected and contingency remedies should be identified. Additional testing/investigations to occur as part of remedial design to further evaluate the selected remedy should be discussed. **The criteria that will be used to decide to implement the contingency remedy should be identified.**

- **Statutory Determinations:** The statutory determination discussion should document that both remedies fulfill CERCLA section 121 requirements.

- Explanation of Significant Changes

3. Responsiveness Summary.

1. A removal action also may be appropriate to address short-term risks at an NPL site. See Interim Guid Addressing Immediate Threats at NPL Sites, OSWER Directive 9200.2-03, January 30, 1990.

2. In some cases, RODs will be prepared that include both interim actions and a final action; such RODs clearly specify which components of the action are interim and which are final. For any final action comp the ROD should include the information and documentation required for the "standard ROD." For example a ROD includes a final source control measure and a temporary alternate water supply, the ROD must pro documentation required in the "standard format" for the final source control action, as well as addressing streamlined manner discussed above, the rationale and justification for the interim water supply action. example, it would be necessary to address the contaminated ground water in a final action ROD at a later

3. An interim remedy waiver may be appropriate where a requirement that is an ARAR cannot be met as the interim remedy but will be attained (unless use of one of the other five waivers is justified) by the fi remedy (CERCLA section 121(d)(4)(A) and NCP 300.430(f)(1)(ii)(C)(1)).

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APPENDIX B

SAMPLE PROPOSED PLAN
(To be developed)

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APPENDIX C

WORKSHEETS FOR THE SUMMARY COMPARATIVE ANALYSIS OF ALTERNATIVES

APPENDIX C

WORKSHEETS FOR THE SUMMARY COMPARATIVE ANALYSIS OF ALTERNATIVES

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- Worksheets for the Summary Comparative Analysis of Alternatives
- Summary of Evaluation Worksheet

This Appendix contains worksheets that could be used to assist in preparing the "Evaluation of Alternatives" section of the Proposed Plan and the "Comparative Analysis of Alternatives" section of the ROD. In preparing the Proposed Plan, the worksheets could be used to outline how all alternatives compare with the preferred alternative. In preparing the ROD, the worksheets can assist in identifying the most significant advantages and disadvantages among alternatives. This will facilitate a logical presentation of the comparative analysis, in which alternatives are discussed under each individual criterion. The individual notes and summary exhibit at the end of this Appendix may also prove a useful tool for briefing the Regional Administrator or the State Director on the findings in support of the Proposed Plan or the ROD.

These worksheets are optional tools. If used, the worksheets should not be included in the Administrative Record File.

Worksheets are included for each of the nine evaluation criteria:

Threshold criteria

- Overall protection of human health and the environment
- Compliance with ARARs

Balancing criteria

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost

Modifying criteria

- State/support agency acceptance
- Community acceptance.

In general, each worksheet includes the relevant questions that should be addressed under each criterion, space for listing each alternative, and additional space for notes.

The last exhibit in this Appendix presents a format for summarizing the results of the comparative analysis for the ROD.

WORKSHEETS FOR THE SUMMARY COMPARATIVE ANALYSIS OF ALTERNATIVES

THRESHOLD CRITERION: Overall Protection of Human Health and the Environment

QUESTIONS TO ADDRESS:

- How would the remedy eliminate, reduce, or control risks posed through each pathway through trea engineering controls, or institutional controls?
- Would there be any unacceptable short-term or cross-media impacts associated with the remedy?
- For carcinogens, would exposure levels be brought within the risk range?

ALTERNATIVE	NOTES	PROVI ADEQ PROTE CAN

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THRESHOLD CRITERION: Overall Protection of Human Health and the Environment (continued)

ALTERNATIVE	NOTES	PROVIDES ADEQUATE PROTECTION? (Y/N)

000108

THRESHOLD CRITERION: Compliance with ARARs

QUESTIONS TO ADDRESS:

- Would the alternative comply with chemical-specific, location-specific, or action-specific ARARs?
- If necessary, could a waiver be justified?
- Would the alternative comply with other guidance, criteria, or advisories that lead and support agen have agreed are "to be considered" for the action?

ALTERNATIVE	NOTES	ATTAIN ARARs (Y/N)

THRESHOLD CRITERION: Compliance with ARARs (continued)

ALTERNATIVE	NOTES	ATTAINS ARARs? (Y/N)

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006110

PRIMARY BALANCING CRITERION: Long-term Effectiveness and Permanence

Analysis Factor	Specific Factor Considerations
Magnitude of residual risks	• What would be the magnitude of the remaining risks? • What remaining sources of risk can be identified? How much would be due to treatment residuals, and how much would be due to untreated residual contamination? • Would a five-year review be required?
Adequacy and reliability of controls	• What is the likelihood that the technologies would meet required process efficiencies or performance specifications? • What type and degree of long-term management would be required? • What would be the requirements for long-term monitoring? • What operation and maintenance (O&M) functions would need to be performed? • What difficulties and uncertainties may associated with long-term O&M? • What is the potential need for replacement of technical components? • What would be the magnitude of the threats or risks should the remedial action need replacement? • What would be the degree of confidence that controls can adequately handle potential problems? • What would be the uncertainties associated with land disposal of residuals and untreated wastes?

ALTERNATIVE	NOTES	RELATIVE RANKING

PRIMARY BALANCING CRITERION: Long-term Effectiveness and Permanence (continued)

ALTERNATIVE	NOTES	RELATIVE RANKING

006111

PRIMARY BALANCING CRITERION: Reduction of Toxicity, Mobility, or Volume Through Treatment

Analysis Factor	Specific Factor Considerations
Treatment process and remedy	• Would the treatment process address the principal threats? • Would there be any special requirements for the treatment process?
Amount of hazardous material destroyed or treated	• What portion (mass, volume) of contaminated material would be destroyed? • What portion (mass, volume) of contaminated material would be treated?
Reduction in toxicity, mobility, or volume	• To what extent would the total mass of toxic contaminant(s) of potential concern or volume be reduced? • To what extent would the mobility of toxic contaminant(s) of potential concern be reduced? • To what extent would the volume of toxic contaminant(s) of potential concern be reduced?
Irreversibility of the treatment	• To what extent would the effects of treatment be irreversible?
Type and quantity of treatment residual	• What residuals would remain? • What would be their quantities and characteristics? • What risks would treatment residuals pose?
Statutory preference for treatment as a principal element	• Would principal threats be within the scope of the action? • Would treatment be used to reduce inherent hazards posed by principal threats at the site?

ALTERNATIVE	NOTES	RELATIVE RANKING

PRIMARY BALANCING CRITERION: Reduction of Toxicity, Mobility, or Volume Through Treatment

ALTERNATIVE	NOTES	RELATIVE RANKING

006113

PRIMARY BALANCING CRITERION: Short-term Effectiveness

Analysis Factor	Specific Factor Considerations
Protection of community during remedial actions	• What are the risks to the community that would need to addressed? • How would the risks to the community be address mitigated? • What risks would remain to the community that could readily controlled?
Protection of workers during remedial actions	• What are the risks to the workers that would need to be addressed? • What risks would remain to the workers that could not be controlled? • How would the risks to the workers be addressed and mit
Environmental impacts	• What environmental impacts are expected with the const and implementation of the alternative? • What are the available mitigation measures to be used an is their reliability to minimize potential impacts? • What would be the impacts that could not be avoided sho alternative be implemented?
Time until remedial response action objectives would be achieved	• How long until protection against the threats being addressed would be achieved? • How long until any remaining site threats would be addr • How long until remedial response objectives would be ach

ALTERNATIVE	NOTES	RELATIVE RANKING

PRIMARY BALANCING CRITERION: Short-term Effectiveness (continued)

ALTERNATIVE	NOTES	RELATIVE RANKING

000115

PRIMARY BALANCING CRITERION: Implementability - Technical Feasibility

Analysis Factor	Specific Factor Considerations
Technical Feasibility	
Ability to construct and operate technology	• What difficulties may be associated with construction? • What uncertainties would be related to construction?
Reliability of technology	• What is the likelihood that technical problems would l schedule delays?
Ease of undertaking additional remedial action, if necessary	• What likely future remedial actions would need to be anticipated? • How difficult would it be to implement the additional re actions, if required?
Monitoring considerations	• Do migration or exposure pathways exist that could monitored adequately? • What risks of exposure exist should monitoring be insuffic detect failure?

ALTERNATIVE	NOTES	RELATIVE RANKING

PRIMARY BALANCING CRITERION: Implementability - Availability of Service and Materials

Analysis Factor	Specific Factor Considerations
Availability of Services and Materials	
Availability of treatment, storage capacity, and disposal services	• Are adequate treatment, storage capacity, and disposal services available? • How much additional capacity would be necessary? • Would the lack of capacity prevent implementation? • What additional provisions would be required to ensure the needed additional capacity?
Availability of necessary equipment and specialists	• Are the necessary equipment and specialists available? • What additional equipment and specialists would be required? • Would the lack of equipment and specialists prevent implementation? • What additional provisions would be required to ensure the needed equipment and specialists?
Availability of prospective technologies	• Are technologies under consideration generally available and sufficiently demonstrated for the specific application? • Would technologies require further development before they could be applied full-scale to the type of waste at the site? • When should the technology be available for full-scale use? • Would more than one vendor be available to provide a competitive bid?

ALTERNATIVE	NOTES	RELATIVE RANKING

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PRIMARY BALANCING CRITERION: Implementability - Administrative Feasibility

Analysis Factor	Specific Factor Considerations
Administrative Feasibility	
Coordination with other agencies	• What steps would be required to coordinate with other agen • What steps would be required to set up long-term or f coordination among agencies? • Could permits for offsite activities be obtained if required?

ALTERNATIVE	NOTES	RELATIVE RANKING

PRIMARY BALANCING CRITERION: Cost

QUESTION TO ADDRESS:

- What are the estimated capital and O&M costs?

ALTERNATIVE	NOTES	RELATIVE RANKING

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MODIFYING CRITERION: State/Support Agency Acceptance

QUESTION TO ADDRESS:

- Does the State or Support Agency concur on the selected remedy?

ALTERNATIVE	NOTES	RELATIVE RANKING

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MODIFYING CRITERION: Community Acceptance

QUESTION TO ADDRESS:

- **Does the community accept the alternative?**

ALTERNATIVE	NOTES	RELATIVE RANKING

006123

EXHIBIT C-2
EXAMPLE OF A COMPLETED
COMPARATIVE ANALYSIS WORKSHEET

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EXHIBIT C-2
EXAMPLE OF A COMPLETED COMPARATIVE ANALYSIS WORKSHEET

CRITERION: Long-term Effectiveness and Permanence

Analysis Factor	Specific Factor Considerations
Magnitude of residual risks	• What would be the magnitude of the remaining risks? • What remaining sources of risk can be identified? How much w due to treatment residuals, and how much would be due to u residual contamination? • Would a five-year review be required?
Adequacy and reliability of controls	• What is the likelihood that the technologies would meet required efficiencies or performance specifications? • What type and degree of long-term management would be requi • What would be the requirements for long-term monitoring? • What operation and maintenance (O&M) functions would nee performed? • What difficulties and uncertainties may be associated with lo O&M? • What is the potential need for replacement of technical compone • What would be the magnitude of the threats or risks should the re action need replacement? • What would be the degree of confidence that controls can ade handle potential problems? • What would be the uncertainties associated with land disposal of re and untreated wastes?

ALTERNATIVE	NOTES
1. Incineration of TCE-contaminated soil, Ground-Water Pumping and Treatment, In-situ Fixation of Lead-contaminated soil, and Installation of a Cap	- Risks of direct contact eliminated. - Current and future risks from grou ingestion reduced to 10^{-6}. - If metals are present, ash will be di RCRA landfill. - O&M required for ground-water and cap. Failure of cap would h effect because soil would be fixed.
2. In-situ Soil Vapor Extraction of TCE-contaminated soil, In-situ Fixation of Lead-contaminated soil, Installation of a Cap, and Ground-Water Pumping and Treatment	- Current and future risk of direc eliminated. - Current and future risk from ing contaminated ground water reduced - May need additional controls if process does not meet perf specifications.

ALTERNATIVE	NOTES
	- O&M needed for cap and ground-water controls. Failure of cap would have little effect on ground water because of soil fixation, although direct contact may be a concern.
3. In-situ Soil Vapor Extraction of TCE-contaminated soil, Installation of a Cap over Lead-contaminated soil, and Ground-water Pumping and Treatment	- Risk of direct contact with soil is controlled. Inherent hazards of TCE-contaminated material reduced to health-based levels. - Current and future risk of exposure to ground water reduced to 10^{-6}. - May need additional controls if metals are present in the TCE contaminated area because vapor extraction would not remove metals. Such unidentified metals could leach into the ground water. - O&M required for ground-water treatment for 25-40 years. Long-term maintenance of cap required. Potential failure of cap would result in longer ground-water restoration time frame.
4. Cap of TCE and Lead-contaminated soils and Natural Attenuation of Ground Water	- Risks of direct contact eliminated as long as cap maintained. However, inherent hazard of waste remains. There is a potential for cap to fail. Cap will need maintenacne and replacement in future. - Current risk of exposure from ground-water ingestion eliminated by providing alternative water supply. Institutional controls used to control future use of ground water. - Potential failure of institutional controls may result in exposure to contaminated ground water during attenuation period.
5. No Action	- Existing risk remains. Future risk greater as plume migrates to residents. Evenutally, natural attenuation may decrease risk. - No controls over remaining contamination. No long-term management employed.

SUMMARY OF EVALUATION WORKSHEET

The exhibit below summarizes the relative ranking of the alternatives in terms of the primary balancing criteria. For purposes of clear, consistent presentation, the alternatives can be discussed in order of best to worst on the "Comparative Analysis" section of the ROD.

CRITERION	Alternatives
1A) Long-term Effectiveness 1B) Permanence	1) Most … Least
2) Reduction of Toxicity, Mobility, and Volume Through Treatment	2) Most … Least
3) Implementability	3) Most … Least
4) Short-term Effectiveness	4) Most … Least
5) Cost	5) Most … Least

006130

APPENDIX D

HELPFUL HINTS: HOW TO PREPARE AND SUBMIT DECISION DOCUMENTS TO HEADQUARTERS

APPENDIX D

HELPFUL HINTS: HOW TO PREPARE AND SUBMIT DECISION DOCUMENTS TO HEADQUARTERS

000131

After a decision document - Proposed Plan, ROD, ESD, or ROD Amendment - is issued, a copy should be sent as soon as possible to the following office in Headquarters:

ROD Clearinghouse
Hazardous Site Control Division
(OS-220W)
U.S. EPA
401 M Street, SW
Washington, DC 20460

The following procedures should be followed in preparing and submitting decision documents to Headquarters.

1. FORMAT

- One clear, LEGIBLE copy of the document (Proposed Plan, ROD, ESD, or ROD Amendment) should be provided to Headquarters. In addition, a WordPerfect version 5.0 copy of the ROD and/or ROD Amendment should be provided on a diskette.

- All documents should follow the format described in this guidance.

- All RODs and ROD Amendments should be single spaced.

- All documents should come to Headquarters completely assembled and legible. Do not send sections separately.

- For RODs and ROD Amendments, THE SIGNED AND DATED SIGNATURE PAGE SHOULD ALWAYS BE INCLUDED.

2. ATTACHMENTS, CHARTS, TABLES, MAPS, AND EXHIBITS

- All columns and text should be displayed completely.

- Computer printouts should be LEGIBLE, especially cost sheets. Dot-matrix printouts do not copy well.

- Try to avoid including reduced documents (e.g., tables and texts), because these documents tend to be illegible.

3. COST TABLES

- All columns and figures in the cost tables should be LEGIBLE, especially those that apply to the selected alternative.

- Costs should be broken down into capital, operation and maintenance, and present-worth costs.

4. ENFORCEMENT-CONFIDENTIAL INSERTS

- Enforcement-confidential pages should be labeled as such clearly and CONSPICUOUSLY.

000132

APPENDIX E

SOURCES OF INFORMATION

APPENDIX E

SOURCES OF INFORMATION

The following is a list of additional guidance documents that may be useful in preparing Superfund decision documents or are pertinent to the remedial decision-making process.

1. Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (P.L. 96-510), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) (P.L. 99-499).

2. National Oil and Hazardous Substances Pollution Contingency Plan, Final Rule, 40 CFR Part 300 (54 FR 8666), March 8, 1990.

3. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (Interim Final), U.S. EPA, OSWER Directive 9355.3-01, October 1988.

4. CERCLA Compliance with Other Laws Manuals, Part I, Interim Final, U.S. EPA, OSWER Directive 9234.1-01, August 1988, and Pat II, OSWER Directive 9234.1-02, July 1989.

5. Community Relations in Superfund: A Handbook, U.S. EPA, OSWER Directive 9230.0-3B, June 1988.

6. Superfund Remedial Design and Remedial Action Guidance, U.S. EPA, OSWER Directive 9355.0-4A, June 1986.

7. Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (Interim Final), U.S. EPA, OSWER Directive 9283.1-2, December 1988.

8. Guidance on Administrative Records for Selection of CERCLA Response Actions (Interim), U.S. EPA, OSWER Directive 9833.3, March 1989.

9. Risk Assessment Guidance for Superfund: Volume I -- Human Health Evaluation Manual ((Part A) Interim Final, EPA/540/1-89/002, December 1989).

10. Risk Assessment Guidance for Superfund: Volume II -- Environmental Evaluation Manual (Interim Final, EPA/540/1-89/001, March 1989).

11. Cooperative Agreements and Superfund State Contracts for Superfund Response Actions, Final Rule (55 FR 22994), June 5, 1990.

000133

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

000134

MEMORANDUM

SUBJECT: Maximum Contaminant Level (MCL) reference in the Arkwood Record of Decision (ROD), signed September 28, 1990.

FROM: Cynthia J. Kaleri
RPM, AR/LA Enforcement

TO: RD/RA Correspondence File, ARD084930148

This memorandum is to clarify the Arkwood ROD reference to an MCL for Pentachlorophenol (PCP) of 1 mg/l. I inquired about the validity of this reference in a meeting with ADPC&E, Ms. Jean Mescher (McKesson) and ERM (McKesson's consultant), and Weston (ARCS for EPA) held in EPA offices on 03/20/93. At the time of ROD signature, only a proposed MCL existed for PCP. The proposed MCL was 0.0001 mg/l (Current and Proposed National Primary and Secondary Drinking Water Regulations and Health Advisories for Other Contaminants, USEPA Region 6 - Water Supply Branch, November 16, 1990). In addition, since the ROD states that the soil target action level of 300 mg/kg PCP corresponds to 1mg/l PCP leachate from site soils, I asked what leachate test had been conducted (unspecified in ROD) and what correlation had been used.

McKesson/ERM responded that the Feasibility Study (FS) Report had referred to a **Long-Term Health Advisory** for PCP, and that the 1 mg/l should correspond to this criteria rather than an MCL. The TCLP had been the only leachate test conducted, and a straight line correlation had been assumed. McKesson would check the FS Report and call me back with appropriate references.

McKesson called back the following day with information extracted from the FS Report for the Arkwood Site: page 3-3 states that the TCLP was used in determining leachate from site soils; page 3-3 also provides a reference for the 1 mg/l as the **Long-Term Health Advisory for PCP** (Drinking Water Standards and Health Advisories, U.S. EPA, December 1985).

Given the fact that the current MCL for PCP is set at 0.001 mg/l, the concern which needs to be addressed for the RD project is whether or not the soil cleanup level is still protective of human health and the environment. However, a more fundamental concern might also be that the TCLP may not have been the appropriate test for determining leachability from site soils for the purpose of developing soil target action levels. An appropriate test today would require current site specific information.

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The more recent data results of the Ground Water Tracer Study do not indicate a potential problem with regard to the Arkwood site soils impacting the ground water and surrounding surface water bodies. Therefore, no data exists which would support a reevaluation of the target action levels specified in the ROD. However, the Arkwood ROD does call for 5 year reviews, in addition to groundwater monitoring during the first 2 years following the RA. The ROD also sets a contingency action for the groundwater: if Arkansas Water Quality Standards are not met within the two year monitoring period, treatment will be required to ensure that these levels are met. The state standards are based upon actual water usage of New Cricket Spring and were identified as an ARAR in the ROD--groundwater connection to New Cricket Spring was established in the ROD.

Therefore, the soil target action levels specified in the Arkwood ROD should still be protective of human health and the environment given all the information available to date. However, ground water monitoring for at least the first 2 years following the RA, and 5 year reviews for the site as a whole should provide an adequate check for identification of any potential problems not foreseeable at this time.

McKesson Corp.
One Post Street, San Francisco CA 94104-5296 Tel 415 983 8300

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McKesson

000136

Certified Mail

July 28, 1993

Ms. Cynthia J. Kaleri
EPA Project Coordinator
Arkwood Superfund Site
Superfund AR/LA Enforcement Section (6H-EA)
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202

Subject: Proposed Schedule Modifications
Arkwood, Inc. Site
Omaha, Arkansas

Dear Ms. Kaleri:

INTRODUCTION

As presented in our meeting held on July 8, McKesson is proposing to expedite the excavation and sieving portion of the Arkwood Project. The remedial activities associated with excavation and sieving would be initiated in early 1994 instead of the summer of 1995 as presented in the schedule attached to the Consent Decree. A proposed revised schedule and a Consent Decree schedule are attached.

The remaining Remedial Action activities, including incineration of the affected material, would follow a schedule similar (the differences are described below) to the schedule attached to our Consent Decree. The final end date for remedial action would be unchanged.

EXCAVATION AND SIEVING

In order to accommodate the initiation of the excavation and sieving in early 1994, we are proposing a decrease in the number of Remedial Design (RD) documents to be prepared and a separation of the excavation/sieving design and incineration design packages. The Consent Decree identified submission of a Preliminary (30%) RD, Intermediate (60%) RD, Pre-final (90%) RD, Final (100%) RD and a Remedial Action Plan (RAP).

Since the Preliminary Engineering Report (PER) submitted in May 1993 is comparable to a Preliminary (30%) RD, we are proposing to eliminate submittal of a Preliminary RD and, for the excavation and sieving activities, submit a substantially complete design package (approximately 80% RD) followed by simultaneous submittal of the Final RD documents and Remedial Action Plan.

We are anticipating completion of the excavating and sieving portion of the remedial action by the fall of 1994. However, we are proposing to retain the following summer for additional field activities in case unanticipated conditions are encountered.

INCINERATION

We are proposing to continue preparation of the RD for the incineration activities with submittal of an Intermediate (60%) RD in the fall of 1995 . Assuming that the excavation and sieving activities are substantially completed by this time, the volume and characteristics of the material to be incinerated will be known. This will aid in identification of the appropriate incineration equipment and design of the remaining remedial activities.

000137

SCHEDULE
The attached proposed schedule assumes that approval of the PER is received by July 30, 1993.

ADVANTAGES

- o Initiate Remedial Action activities one year ahead of schedule
- o Identify volume and characteristics of material requiring incineration
- o Isolate affected material, therefore, minimizing risk associated with the site

We look forward to our meeting scheduled for August 5 in Little Rock. Since the proposed expedited schedule requires dedication of substantial resources for submittal of major documents and preparation for upcoming field activities, we would appreciate a response from the EPA regarding this matter as soon as possible. If there is any additional information you need from us or if it would be helpful to conduct additional presentations on our proposed schedule modifications, please let me know.

Please do not hesitate to contact me if you would like to discuss this matter further.

Sincerely,

Jean A. Mescher
Project Coordinator
Manager, Environmental and Engineering Services

Enclosure

Copy:
- Chief, Environmental Enforcement Section, Dept. of Justice*
- EPA Assistant Regional Counsel (6C-WA)*
- Chief, Superfund Enforcement Branch (6H-E)*
- Arkansas Superfund Site Coordinator, Arkansas Dept. of Pollution Control and Ecology*
- Bob Barker, McKesson Service Merchandising Co.
- Dinah Szander, McKesson Corporation
- Ron Grimes, ERM-Southwest, Inc.
- Robert DeMay, Leonard, Street & Deinard
- David Williams, Cadwalader

*** CERTIFIED MAIL**

ARKWOOD SCHEDULE
July 23, 1993

000138

PRELIMINARY ENGINEERING REPORT (PER)

EPA Review/Approval . . . . . July 30, 1993 (*Assumed*)

EXCAVATION AND SIEVING

Intermediate (80%) RD
- Submit 80% to EPA . . . . . 75 days after PER approval
- EPA Review . . . . . 30 days

Final (100%) RD
- Submit 100% to EPA . . . . . 30 days after EPA comments on 80% RD
- EPA Review . . . . . 30 days
- Revise 100% RD . . . . . 15 days after EPA comments on 100% RD
- EPA Review/Approval . . . . . 15 days

Remedial Action Plan . . . . . .
- Submit RAP to EPA . . . . . 30 days after EPA comments on 80% RD
- EPA Review . . . . . 30 days
- Revise RAP . . . . . 15 days after EPA comments on RAP
- EPA Review/Approval . . . . . 15 days

Remedial Action
- Implement RAP . . . . . 570 days after RAP approval

INCINERATION

Intermediate (60%) RD
- Submit 60% to EPA . . . . . 278 days after initiating excavation and sieving
- EPA Review . . . . . 30 days

Pre-final (90%) RD
- Submit 90% to EPA . . . . . 45 days after EPA comments on ~~100%~~ 60% RD
- EPA Review . . . . . 30 days

Final (100%) RD
- Submit 100% to EPA . . . . . 30 days after EPA comments on 90% RD
- EPA Review . . . . . 30 days
- Revise 100% RD . . . . . 30 days after EPA comments on 100% RD
- EPA Review/Approval . . . . . 30 days

Remedial Action Plan . . . . . .
- Submit RAP to EPA . . . . . 30 days after approval of 100% RD
- EPA Review . . . . . 30 days
- Revise RAP . . . . . 30 days after EPA comments on RAP
- EPA Review/Approval . . . . . 30 days

Remedial Action
- Implement RAP . . . . . 847 days after approval of RAP

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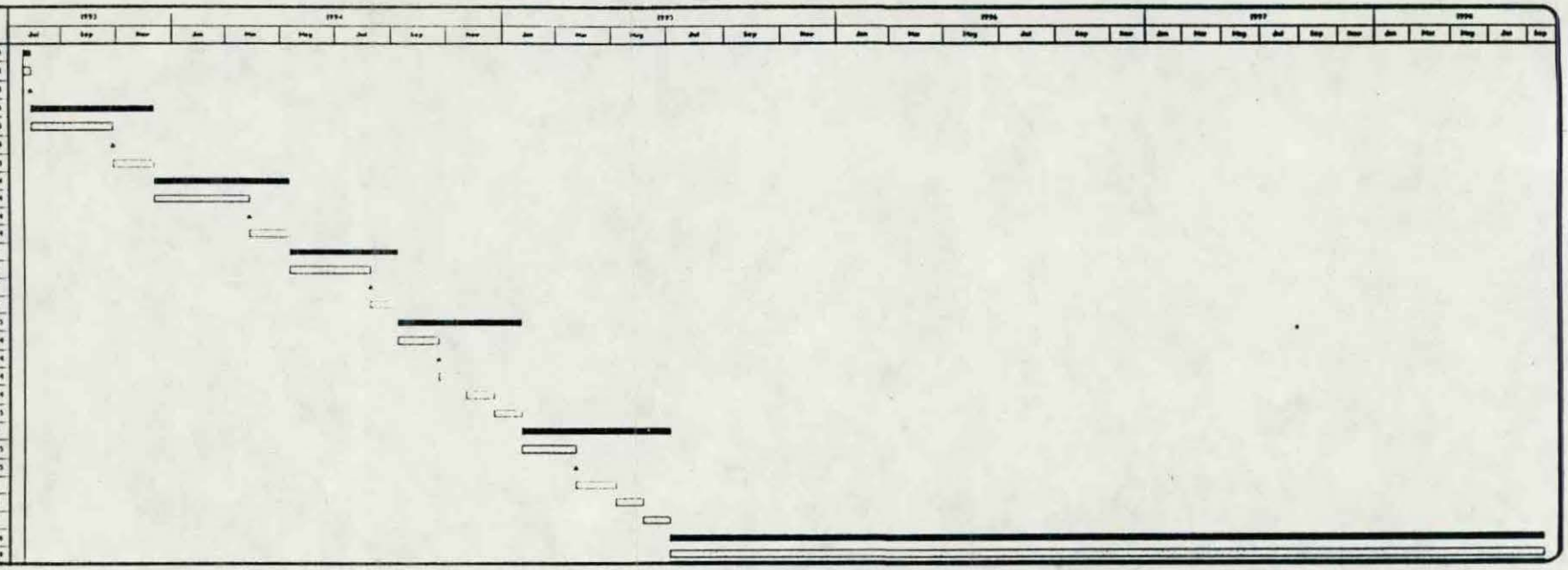
AVKIBOOD - CONSENT DECREE SCHEDULE
JULY 22, 1993

Task Name	Duration (Days)	End Date
Preliminary Legal Opt	0	7/30/93
EPA Review	0	7/30/93
EPA Approved	0	7/30/93
Preliminary (30%) RD	135	12/12/93
Prepare 30% RD	90	10/28/93
Submit 30% to EPA	0	10/28/93
EPA Review	45	12/12/93
Intermediate (60%) RD	150	5/6/94
Prepare 60% RD	105	3/27/94
Submit 60% to EPA	0	3/27/94
EPA Review	45	5/6/94
Prefinal (90%) RD	120	9/8/94
Prepare 90% RD	90	8/9/94
Submit 90% to EPA	0	8/9/94
EPA Review	30	9/8/94
Final (100%) RD	135	1/20/95
Prepare 100% RD	45	10/23/94
Submit 100% to EPA	0	10/23/94
EPA Review	30	11/22/94
Revise 100% RD	30	12/22/94
EPA Review/Approved	30	1/20/95
Remedial Action Plan	165	7/5/95
Prepare RAP	60	3/22/95
Submit RAP to EPA	0	3/22/95
EPA Review	45	5/6/95
Revise RAP	30	6/5/95
EPA Review/Approved	30	7/5/95
Remedial Action	960	5/24/98
Implement RAP	960	5/24/98



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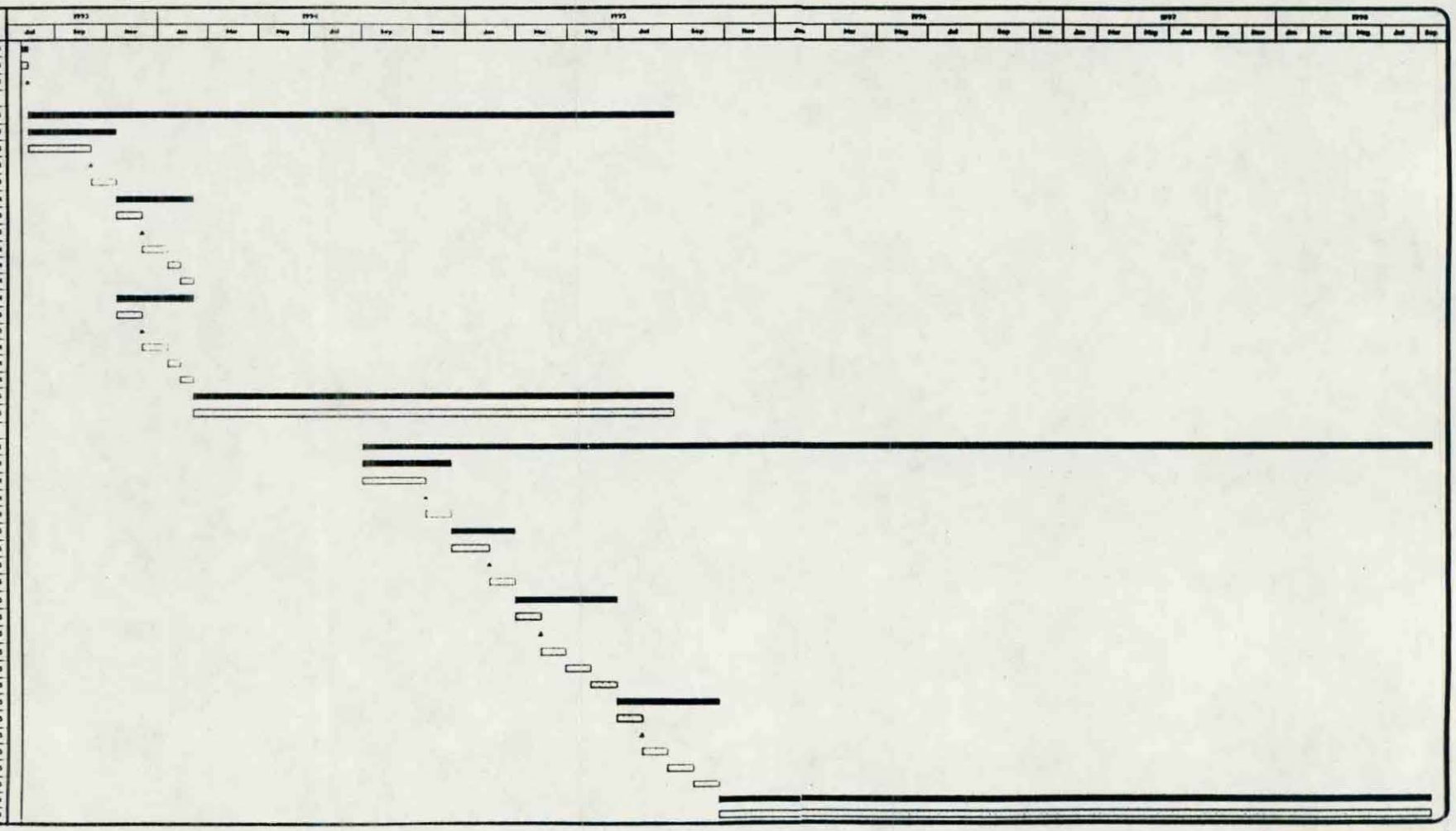
ARKWOOD - PROPOSED SCHEDULE MODIFICATIONS
JULY 22, 1993

Task Name	Duration (Days)	End Date
Preliminary Engin Rpt	0	7/26/93
EPA Review	0	7/26/93
EPA Approved	0	7/26/93
SCRUTINY AND REPORT	765	9/3/95
Intermediate (60%) DD (Lancor)	105	8/12/93
Prepare 60% DD	75	06/02/93
Submit 60% to EPA	0	06/03/93
EPA Review	30	8/12/93
Final (100%) DD (Lancor)	90	2/10/94
Prepare 100% DD	30	02/02/93
Submit 100% to EPA	0	02/02/93
EPA Review	30	3/8/94
Review 100% DD	15	3/26/94
EPA Review/Approval	15	2/10/94
Remedial Action Plan (Lancor)	99	2/10/94
Prepare RAP	30	02/02/93
Submit RAP to EPA	0	02/02/93
EPA Review	30	3/8/94
Review RAP	15	3/26/94
EPA Review/Approval	15	2/10/94
Remedial Action (Lancor)	570	9/3/95
Implement RAP	570	9/3/95
CONSTRUCTION	1,267	9/24/98
Intermediate (60%) DD (Lancor)	105	02/03/94
Prepare 60% DD	75	8/15/94
Submit 60% to EPA	0	8/15/94
EPA Review	30	02/03/94
Prefinal (90%) DD (Lancor)	75	2/28/95
Prepare 90% DD	45	5/29/95
Submit 90% to EPA	0	5/29/95
EPA Review	30	2/28/95
Final (100%) DD (Lancor)	120	6/28/95
Prepare 100% DD	30	3/30/95
Submit 100% to EPA	0	3/30/95
EPA Review	30	4/29/95
Review 100% DD	30	5/29/95
EPA Review/Approval	30	6/28/95
Remedial Action Plan	120	10/26/95
Prepare RAP	30	7/28/95
Submit RAP to EPA	0	7/28/95
EPA Review	30	8/27/95
Review RAP	30	9/26/95
EPA Review/Approval	30	10/26/95
Remedial Action	847	9/24/98
Implement RAP	847	9/24/98



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

000141

November 16, 1993

Ms. Jean A. Mescher
Project Coordinator
Manager, Environmental and Engineering Services
McKesson Corporation
One Post Street
San Francisco, California 94104-5296

Dear Ms Mescher:

The Environmental Protection Agency (EPA) agreed to McKesson's proposed phased approach for the Remedial Design/Remedial Action (RD/RA) project described in your correspondence dated July 28, 1993 via verbal approval given at our meeting in Little Rock on August 5. This letter is meant to clarify that approval in view of the recent design submittal dated October 29, 1993. The following considerations require documentation in order to maintain compliance with the Consent Decree and existing RD Work Plan for the Arkwood Site.

First, EPA acknowledges that the content of the approved Preliminary Engineering Report (PER) was comparable to a Preliminary (30%) RD Submittal. With this in mind, EPA agreed to waive a separate 30% RD Submittal on the basis that the technical requirements of the 30% RD Submittal had already been met via the PER.

Secondly, EPA acknowledges that certain provisions need to be delineated, given mutual understanding and agreement by McKesson:

1. **Definitions**

♦ Phase I will be considered an "Interim Action" for the Arkwood Site consisting of the pretreatment and storage stage of the remedy specified in the Record of Decision and Consent Decree. Phase I will also include those backfill activities which must be completed to minimize adverse environmental impacts prior to implementation of Phase II (i.e., backfill of material meeting clean up objectives, as discussed in our August 5th meeting in Little Rock).

♦ Phase II will be considered the "Final Action" for the Arkwood Site consisting of the incineration and site closure stage of the remedy specified in the Record of Decision and Consent Decree. Phase II will include all those required activities not completed in Phase I.

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2. **Deliverables**

Phase I. Interim Action (Pretreatment & Storage).

♦ For the Phase I RD, one "**60/90 %**" and one "**100 %**" design submittal will be completed. As discussed in our August 5th meeting, EPA and the Arkansas Department of Pollution Control and Ecology (ADPC&E) will honor those shortened agency review times outlined in your July 28th correspondence. However, EPA requests that review copies be submitted to all parties concurrently (inclusive of EPA's oversight contractor). Also, a "**Preliminary Remedial Action Plan (P-RAP)**" is required for approval prior to implementation of the Phase I RA. All of the submittals required for Phase I will be subtitled "Phase I, Interim Action (Pretreatment & Storage), in order to distinguish these documents from the Phase II RD/RA project activities.

Phase II. Final Action (Incineration & Site Closure).

♦ All submittals initially planned for in the Consent Decree (which did not envision a phased approach) are still required, with the exception of the 30% design submittal, being waived as indicated above. The 60% through the 100% design submittals, and **Final RAP** submittal will be subtitled "Phase II, Final Action Incineration & Site Closure" in order to distinguish these documents from the Phase I RD/RA project activities. Review times (durations) will remain as specified in the Consent Decree and RD Work Plan for these submittals. In addition, other activities outlined in the Consent Decree, which are scheduled in accordance with completion of the RAP and RA, will be so scheduled based upon the Final RA activities (Phase II).

Finally, EPA acknowledges that a phased approach for the RD/RA project should result in several benefits for all parties of concern:

1) The Interim Action represents a means of decreasing the long term risk posed by the Arkwood Site over the short term, while the design of the Final Action proceeds.

2) The Final Action may proceed more efficiently than typical of incinerator projects, since implementation of the Interim Action will allow several unknowns to be defined prior to completing the incinerator design.

3) Scheduling of remedial activities during the summer months may alleviate technical concerns with regard to moisture content of the soils. In addition, the fact that the remedial activities are planned for the summer months may reduce the anxiety of the local community, given the location of the school in relation to the site.

With these benefits in mind, EPA remains willing to work with McKesson to meet the proposed schedule for the Interim Action. However, as discussed in our conference call on November 12, 1993, the recent 60%/90% Interim Action RD submittal, dated October 29, 1993, needs additional detail and specifications prior to EPA providing constructive comments for incorporation into the 100% Interim Action RD submittal. Although the level of detail described in Section 2.4 of the Arkwood RD Work Plan may not be necessary since the Interim Action project will not be "bid out", a work plan amendment will be necessary to omit certain details for the Phase I RD project submittals (i.e., Construction Specification Institute [SCI] format).

Therefore, I have directed Weston to not prepare a detailed comment letter on the October 29th submittal at this time, since additional critical information will be forthcoming prior to the 100% submittal. Rather, as we discussed in our conference call, Weston has prepared a list of the type of details which are necessary for the Interim Action 60%/90% design submittal. Weston's correspondence is enclosed for your review. As specifications and drawings are completed and submitted, we will review material and prepare our comments appropriately. Please indicate at what point the 60%/90% submittal is complete to facilitate issuance of our final comments.

I hope this clarification helps in your preparation of a Work Plan Amendment and your continued efforts on the Interim Action design. If I can be of further assistance, do not hesitate to call me at (214)655-6772. Thank you for your continued effort to address EPA and ADPC&E's concerns.

Sincerely,

Cynthia J. Kaleri

Cynthia J. Kaleri
Remedial Project Manager (6H-EA)
Project Coordinator - Arkwood Site

Enclosure

cc: Bob Barker (McKesson Service Merchandising Co.)
Dinah Szander (McKesson Corporation)
Allan Gates (Mitchell, Williams, Selig & Tucker)
Molly Hall (Department of Justice)
Jon Weisberg (EPA Assistant Regional Counsel)
Sam Becker (EPA Chief, Superfund Enforcement Branch)
Michael Arjmandi (ADPC&E)
Michael E. Cavalier (WESTON)

WESTON
MANAGERS DESIGNERS CONSULTANTS
5599 SAN FELIPE
SUITE 700
HOUSTON, TEXAS 77056
PHONE: (713) 621-1820
FAX: (713) 621-6959

000144

15 November 1993

Ms. Cynthia J. Kaleri (6H-ET)
Remedial Project Manager
U.S.E.P.A., Region 6
1445 Ross Avenue
Dallas, TX 75202-2733

RE: Arkwood RD Oversight
Contract No.: 68-W9-0015
Work Assignment No.: 25-6PA3
Document Control No.: 4603-25-0028

Dear Mr. Kaleri:

Roy F. Weston, Inc. (WESTON®) is in receipt of the McKesson 60% Design Submittal for Phase I Remediation at the Arkwood Superfund Site, Omaha, AR. This submittal does not include Plans and Specifications as outlined in the Remedial Design Work Plan or Consent Decree.

Pursuant to the Conference Call on November 12, 1993, WESTON is withholding review of this submittal pending receipt of additional information. As discussed during the conference call, WESTON has attached a tentative design specification/drawing list for your review and use.

If you have any questions or comments regarding this information, please feel free to give us a call.

Very truly yours,

ROY F. WESTON, INC.

Michael E. Cavalier, P.E.
Site Manager

MEC/eoi

arkwood:DES_ltr.m15(eoi)

(5)

The list of suggested design specifications/drawings for the Arkwood RD submittal is as follows:

SPECIFICATIONS

1) Imported fill (Phase I ?)
2) Excavation & backfill
3) Site security (perimeter fencing, guards, gate, access, etc.)
4) Decontamination facilities (water treatment, handling, disposal, testing)
5) Site drainage (berms, swales, collection, stormwater control)
6) Road construction (materials, disposal, contamination control)
7) Temporary facilities (trailer, utilities, desk, etc.)
8) Material handling and storage facilities
9) Concrete specifications (strength, finish, rebar grade, testing, etc.)
10) Demolition (size reduction, triple rinse, ultimate use, etc.)
11) Sampling protocol (#, size of grid/cells, procedures, turnaround of analyses)

DRAWINGS

1) Existing site plan (site prior to RA showing affected areas)
2) Mobilization plan (location of decontamination facilities, trailers, parking, security, temporary utilitiy connections)
3) Traffic plan (temporary roads during excavation/backfill activities, clean vehicle access areas/roads)
4) Stormwater control plan (berm/swale locations with x-sections, invert elevations, grading, temporary holding tank for potential contaminated stormwater, etc.)
5) Decontamination facilities (plans, sections, details)
6) Site sampling/excavation plan (horizontal controls, coordinates of excavation/sampling grid, etc.)
7) Process flow diagram (material flow, equipment size/material/description, material balance information)
8) Facilities layout (building plan with dimensions, foundation design, structural details, building features-doors, ventilation, etc.)
9) Mechanical layout (could be vendor drawings)
10) Electrical one-line (one-line with major motors shown, load analysis, transformer size, MCC, etc.)
11) Electrical power plan (incoming power, conduit routing, conduit & wire size, indoor & outdoor lighting, etc.)

NOTE: This list does not represent the complete requirements for the RD design submittal but rather a suggested starting point of reference. The design engineer is responsible for the content of the formal design submittal documents.

EPA

An EPA Update on Activities
at the Arkwood, Inc., Superfund Site
May 6, 1994

ARKWOOD SITE UPDATE

THIS FACT SHEET WILL TELL YOU ABOUT . . .

- The history of the Arkwood site
- Plans to conduct remedial activities in two phases
- Activities planned for 1994
- How to find out more about the site

SITE BACKGROUND

The Arkwood Superfund site covers a 20-acre area in Boone County, southwest of Omaha, Arkansas. From 1961 until mid-1984, the site was the location of a creosote wood-treating facility. In 1985, after pentachlorophenol (PCP) was found in two springs and three domestic wells near the site, the U.S. Environmental Protection Agency (EPA)proposed that the site be added to the National Priorities List (NPL) qualifying it for investigation and remediation funding under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. The site was added to the NPL in 1989. Mass Merchandisers, Inc., (currently known as McKesson Service Merchandising Company [McKesson]), operator of the wood-treating facility from 1973 to 1984, conducted a remedial investigation and feasibility study (RI/FS) at the site under the terms of an Administrative Order on Consent. Results of the RI showed that site soils were contaminated with PCP, polynuclear aromatic hydrocarbons, and dioxins. The FS evaluated a number of possible plans for treating site contamination.

After reviewing the FS, EPA identified the plan that it considered to be best for the site. In order to reduce risks to human health and the environment, EPA proposed the following plan: (1) incinceration of sludges and contaminated soils and (2) monitoring of groundwater followed by treatment, if necessary. Following EPA's announcement of the proposed plan, more than 100 Omaha residents signed a petition against the use of incineration at the site. In response to community concerns, EPA added a pretreatment step to the proposed plan in order to reduce the amount of material that would be incinerated. In October 1990, the EPA Regional Administrator signed a Record of Decision (ROD) for the Arkwood site that outlined the rationale for selecting the remedy for the site.

On April 8, 1991, McKesson signed a Consent Decree describing the specific remedial activities that would be conducted to comply with the remedy outlined in the ROD. The Consent Decree was entered by the court in September 1992 following a public comment period. Studies to aid in developing the remedial design began in the fall of 1992. The studies showed that dry sieving the soils, rather than sieving and washing the soils as stated in the ROD, would be a more effective pretreatment process for addressing the type of contaminants found at the Arkwood site.

PHASED REMEDIAL APPROACH: INTERIM ACTION AND FINAL REMEDIAL ACTION STRATEGY

After predesign studies showed that dry sieving would reduce the amount of material to be incinerated, EPA and McKesson agreed to conduct remedial activities for the Arkwood site in two phases. Phase I, considered an Interim Action, consists of pretreating contaminated soils through dry-sieving. Pretreated soils that meet cleanup goals will be backfilled and graded on site to reduce the possibility of adverse environmental impacts that could occur before the second phase of activities begins. Pretreated soils that do not meet cleanup goals will be stored on site in enclosed structures.

Phase II, considered the Final Action, will consist of incinerating contaminated material and closing the site. Stored soils that did not meet cleanup goals following pretreatment, along with other contaminated materials, will be incinerated on site. All remaining remedial activities specified in the ROD will be conducted during this phase before the site is closed.

Conducting remedial activities in two phases will meet two important objectives: (1) the Interim Action will decrease the risk posed by the Arkwood site while the Final Action is being designed and (2) incineration during the Final Action may proceed more effectively using information obtained during the Interim Action than it would have if the Interim Action was not conducted.

Remedial activities have been scheduled during the summer to alleviate possible technical difficulties presented by soils with a high moisture content that are more likely to be present during the other seasons.

The Interim Action is scheduled to take place during the summer of 1994. The Final Action can begin as early as the summer of 1995 if the designs for the Final Action are completed by that time.

ACTIVITIES SCHEDULED FOR 1994

Several Interim Action activities have already begun at the Arkwood site. Completed activities or activities that are near completion include the following:

- Fencing and surveying the site
- Maintaining and clearing the site, including removing weeds, determining staging area locations, and setting up staging areas
- Setting up temporary site offices and a parking area

Before soil pretreatment begins, buildings will be installed on site to house equipment and to store pretreated materials. Contaminated waste drums currently on site will either be pretreated or stored for future treatment. Empty drums will be decontaminated and then disposed of off site in an appropriate municipal landfill. Some of the abandoned building foundations that currently exist on site will be demolished to prepare the site for remedial activities. Demolition waste will either be treated during the second phase of remedial activities, used onsite, or disposed of offsite.

The following specific Interim Action activities planned for pretreating soils are scheduled for 1994. They will be conducted after EPA completes its final review of the design documents. These activities include:

- Installing pretreatment buildings, storage buildings, and pretreatment process equipment
- Drying contaminated soils in place
- Excavating dried soils and testing excavated areas to confirm that the areas are clean

ACTIVITIES SCHEDULED (Continued)

- Sieving excavated soils to separate fine-grained and coarse-grained soils
- Storing fine-grained soils and coarse-grained soils that do not meet cleanup goals
- Backfilling excavated areas with soils that meet cleanup goals, and grading the site

Contaminated soils will be tilled in place to prepare them for pretreatment. Soils will be excavated after they are adequately dried.

Dried, excavated soils will be moved to treatment area and will be fed into the sieves separate fine-grained soils from coarse grained soils. Due to the nature of site contaminants, most of the coarse soils may meet the cleanup goals at this point. The coarse soils will be sampled, and any soils that do not meet cleanup goals will be stored for final treatment during the next phase of remedial activities. Soils that do meet cleanup goals will be used for backfill onsite. Finally, the site will be covered with clean topsoil and then graded.

Designs for the Final Remedy will be prepared during the fall of 1994.

* *

DO YOU HAVE ANY QUESTIONS?

If you have any questions about the Arkwood site, or need additional information, please contact the following EPA representatives:

Cynthia Kaleri
Remedial Project Manager
U.S. EPA Region 6
1445 Ross Avenue (6H-EA)
Dallas, TX 75202-2733
(214) 655-6772

Donn Walters
Community Relations Coordinator
U.S. EPA Region 6
1445 Ross Avenue (6H-MC)
Dallas, TX 75202-2733
(214) 655-6483

or dial EPA's toll free number:
1-800-533-3508

You may also visit EPA's local Arkwood Information Office located at the:

Omaha Public School
Omaha, Arkansas 72662

Hours are Mondays from 6:00 p.m. to 8:00 p.m.

or call Pam Gass, Office Manager and EPA Contractor, at (501)426-3345

to make an appointment to meet at a more convenient time.

For media inquiries please call EPA's Regional Press Officer, Dave Bary, at (214) 655-2200

INFORMATION REPOSITORIES

Copies of documents related to the Arkwood site are available for review at the Arkwood Information Office and at the following information repositories:

Boone County Library
221 West Stephenson Ave.
Harrison, AR 72601
(501)741-5913

Boone County Courthouse
County Clerk's Office
101 North Main St.
Harrison, AR 72601
(501)741-8428

Arkansas Department of
Pollution Control & Ecology*
9001 National Parkway
Little Rock, AR 72219-8913
(501)562-7444

Copies of documents related to the Arkwood site are also available at the EPA Region 6 Office in Dallas, Texas, at the address listed along with the site information contacts.

* *The Administrative Record for the site, a record of all the information that EPA considered or relied on when selecting the final remedy for the site, is available at the Arkwood Information Office and at this repository..*

FROM: EPA

U.S. Environmental Protection Agency
1445 Ross Avenue (6H-MC)
Dallas, TX 75202-2733

Address Correction Requested

TO:

INSIDE: PLANS FOR CONDUCTING REMEDIAL ACTIVITIES AT THE ARKWOOD, INC., SITE

Printed on Recycled Paper

ARKWOOD, INC. SUPERFUND SITE
OMAHA, ARKANSAS

EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)

INTRODUCTION

The Arkwood, Inc. Superfund Site ("Arkwood Site" or the "Site") is located west of U.S. Highway 65, one-half mile southwest of Omaha, Boone County, Arkansas. The Record of Decision ("ROD") for the Site was finalized on September 28, 1990. The Consent Decree ("CD") for implementation of the remedy specified in the ROD was entered by the Court on September 25, 1992 to allow Mass Merchandisers, Inc. ("MMI"), formerly known as McKesson Services and currently known as Millbrook Distribution Services ("Millbrook"), to implement the remedy.

The Environmental Protection Agency ("EPA") is the lead agency conducting oversight of the remedy implementation. The Arkansas Department of Pollution Control and Ecology ("ADPC&E") is the support agency for oversight activities.

This ESD is prepared in fulfillment of EPA's public participation responsibilities under Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"), as amended, 42 U.S.C. § 9617(c), which provides that after adoption of a final remedial action plan, if any remedial action is taken, settlement or consent decree under Section 106 or Section 122 is entered into, and if such action, settlement, or decree differs in any significant respects from the final plan, the President or the State shall publish an explanation of significant differences and the reasons such changes were made, 42 U.S.C. § 9617(c). Moreover, pursuant to the National Contingency Plan ("NCP"), 40 C.F.R. Part 300, EPA is required to publish an ESD when, after adoption of the ROD, the remedial action or enforcement action taken, or the settlement or consent decree entered into, differs significantly from the remedy selected in the ROD with respect to scope, performance, or cost. 40 C.F.R. § 300.435(c)(2)(i).

The 1990 ROD specified onsite incineration as the final treatment step for sludges and affected soils. Due to a significant reduction in the volume of affected soils actually being recovered during the first phase of the remedial action, off-site incineration at a commercial facility would save time and resources in completing the last phase of the remedial action.

This ESD will become part of the Administrative Record ("AR") File for the Arkwood Site, pursuant to the requirements of 40 C.F.R. § 300.825(a)(2). The AR File for the Arkwood Site is a record of all the information that EPA relied upon to select the remedy for the Site. The AR File is available for public review at the following locations:

1) EPA Region 6 Library
1400 Ross Avenue
Dallas, Texas 75202
Visitor Hours: 8:00am - 4:30pm, M-F
Phone: (214) 665-6424

2) ADPC&E
9001 National Parkway
Little Rock, Arkansas 72219-8913
Visitor Hours: 8:00am - 4:30pm, M-F
Phone (501) 562-7444

000151

3) Local Informational Repositories

Boone County Library
221 W Stephenson Ave
Harrison, Arkansas 72601
Hours: 9:00am - 5:00pm, M, W, F, S;
9:00am - 7:00pm, Th
Phone: (501) 741-5913

Boone County Court House
County Clerk's Office
101 North Main
Harrison, Arkansas 72601
Visitor Hours: 8:00am - 4:00pm, M-F
Phone: (501) 741-8428

SITE HISTORY, CONTAMINATION PROBLEMS, AND SELECTED REMEDY

The 15 acre Arkwood Site is located in an excavated area about 1,000 feet west of U.S. Highway 65, north of Cricket Road. The Site consisted of a millwork shop, a wood-treating plant that used creosote and pentachlorophenol ("PCP") in its process, and a yard for storing treated wood products prior to sale.

The plant 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 the early 1960's. In 1973, the site owner leased the wood-treating facility to MMI. The facility continued to operate until June 1984, at which time MMI sold or removed its inventory and process materials. In January 1985, MMI's lease expired and was not renewed. The owner dismantled the plant in 1986.

During its 20-plus years of operation, the plant generated an estimated 6,000 to 7,000 pounds of waste per year. Wastes from plant operations were reportedly dumped into a sinkhole at the treatment plant from the beginning of operations until 1970. The sinkhole was later sealed. In addition, waste oils were placed in a ditch adjacent to the railroad until approximately 1974, when MMI began using a chemical recovery system. Other wastes included liquids used to wash the treatment plant floor and equipment. These waste liquids were accumulated in a tank and then spread over the wood storage yard to control dust.

ADPC&E initially received a complaint about the Site in 1981. Preliminary investigations revealed detectable levels of PCP in area groundwater. 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) to determine the nature and extent of contamination and to investigate possible remedies for the Site. A ROD was finalized using information from the RI/FS 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. The low level threat from the Site was identified as direct contact with soils contaminated below health based levels and direct

contact with New Cricket Spring. New Cricket Spring contained PCP above Arkansas Water Quality Standards.

The 1990 ROD specified that all sludges and affected soils would be excavated, pre-treated onsite, and then incinerated onsite. Affected soils were defined as those soils containing contaminants greater than the clean up goals. Clean up goals included the following: 300 mg/kg PCP, 6 mg/kg benzo-(a)-pyrene equivalents (BAPE), and 20 ug/kg tetrachlorodibenzo-p-dioxin equivalents (TCDDE).

The pre-treatment step was anticipated to produce a "coarse" soils fraction separate from soil "fines". The 1990 ROD provided that the coarse material be tested and if clean up goals were met, the material could be backfilled onsite. The 1990 ROD stipulated that those coarse materials not meeting the clean up goals would be incinerated along with the fines. Based upon information generated in the RI/FS, the 1990 ROD estimated that affected soils totaled about 20,000 cubic yards to an approximate depth of one to two feet on the main area of the Site, and four to five feet in the railroad ditch area. The 1990 ROD estimated that sludges in the railroad ditch area and material in the sinkhole totaled 425 cubic yards.

On April 8, 1991, EPA and MMI signed an agreement, whereby MMI would design and implement the remedy selected in the 1990 ROD. This agreement, the CD, contained a detailed Scope of Work ("SOW") for all remedial activities. The CD was entered by the Court, following a public comment period, on September 25, 1992.

In order to optimize the design as well as the implementation of the soils remedy, the Remedial Design (RD) and Remedial Action (RA) activities outlined in the CD are being completed in two phases. The CD SOW outlined the initial consideration of a phased approach, to be determined during the preliminary design (SOW, Section II(A)(21), p. 17). EPA correspondence with McKesson Services dated November 16, 1993 approved a specific phased approach and detailed the split of remedial activities for each of 2 phases. EPA issued a fact sheet to describe the approved phased approach on May 6, 1994. EPA's November letter and May fact sheet will also be made part of the AR File for the Arkwood Site.

The phased approach allowed remedial activities to be started one year ahead of the original RD/RA schedule provided in the CD. The Phase I RD is complete and included excavation, pre-treatment, and temporary storage onsite. The Phase I RA was initiated in the spring of 1994 and will be completed in the summer of 1995. The Phase II RD is currently underway and will include off-site incineration and site closure activities. The Phase II RA will not commence until the RD is complete and all plans are approved by EPA.

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SIGNIFICANT DIFFERENCE FROM SELECTED REMEDY

The 1990 ROD for the Arkwood Site encompassed both a soils remedy and a groundwater remedy. This ESD only changes one component of the soils remedy. In consideration of the volume reduction anticipated from the pre-treatment step, the 1990 ROD estimated that only 7,000 cubic yards of material would need to be incinerated onsite over approximately a 140 days period (assuming a 50 cubic yards/day incinerator capacity). As the Phase I RA approaches completion, Millbrook estimates that only 3,000 to 3,500 cubic yards of material will need to be incinerated. This decreased volume estimate is due in part to the pre-treatment step and in part to the additional pre-design sampling conducted during the RD to refine the horizontal and vertical extent of affected soil areas.

Therefore, rather than complete the Phase II RD for an onsite incinerator, off-site incineration has been selected for completing the RA. This change in the remedy is due to the substantial decrease in volume of material to be incinerated. The remedy will be improved since the soils remedy will be completed at least 1 and 1/2 years ahead of schedule without fundamentally altering the RA outlined in the ROD. In addition, the groundwater remedy will be initiated earlier than currently scheduled in the CD.

Although cost estimates for this change are not substantially different from original remedy cost estimates, time for implementation and actual utilization of resources is much more effective than for the original remedy. For example:

1) design of an onsite incinerator is considerably more complex than the design for off-site shipment of a small volume of material to be handled at a commercial facility;

2) testing and shakedown of equipment and agency review via the official trial burn can be time consuming for any volume of material, and therefore is not as cost effective for a small scale project as for a larger volume project; and

3) the establishment of operating parameters via agency review of trial burn results is time consuming and complex given the evolving risk assessment procedures and policy initiatives which must be considered for Superfund incinerator projects--commercial facilities must meet operating specifications which are already outlined in the facility's permit.

Applicable or Relevant and Appropriate Requirements (ARARs) are still met for onsite activities. All current applicable federal and state regulations will be met for the transport and destruction of affected material at a commercial facility. The commercial facility which is selected to receive material will be selected in accordance with EPA's Off-Site Policy. 40 C.F.R. § 300.440 (1990).

000154

TABLE 1
COMPARISON OF ORIGINAL REMEDY VS MODIFIED REMEDY

ORIGINAL REMEDY ONSITE INCINERATION	MODIFIED REMEDY OFF-SITE INCINERATION
Construct onsite incinerator to handle a minimum of 7,000 cubic yards of material.	Transport of sludges and soils totaling 3,500 cubic yards to commercial facility for incineration.
Timeframe for onsite incineration, not including design, was estimated at 140 days. This RA timeframe does not include typical testing, trial burn activities, regulatory review of results and operating parameters set, etc. A current timeline for remedy implementation would be trial burn completed in 1996; incineration complete and equipment removal in the fall of 1997.	Phase I, partially completed the fall of 1994, is scheduled for completion the summer of 1995. Phase II will be initiated upon completion of Phase I and EPA approval of Phase II design documents. Implementation of Phase II is estimated at 3 months. Therefore, the Soils RA will be ahead of schedule by possibly 2 years.
Estimated costs for the entire remedy was $10.3 million.	New estimated cost for the entire remedy, utilizing off-site incineration is $9.8 million; this includes current actual expenditures.

000155

SUPPORT AGENCY COMMENTS

ADPC&E concurs with this significant change to a component of the original remedy, as evidenced by the attached letter dated May 1, 1995.

AFFIRMATION OF THE STATUTORY DETERMINATIONS

Considering the new information that has been developed and the one change that has been made to the selected remedy, EPA and ADPC&E believe that the remedy remains protective of human health and the environment, complies with federal and state requirements that were identified in the ROD as applicable or relevant and appropriate to this remedial action at the time the 1990 ROD was signed, and is cost effective. In addition, all current applicable regulations will be met by the commercial facility at the time of disposal for off-site incineration of affected material. The revised remedy still utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for the Site.

PUBLIC PARTICIPATION ACTIVITIES

Public notice for this ESD will be issued in the newspaper record, the Harrison Times, upon signature by the Regional Administrator. The Administrative Record File is available for public review at the informational repositories identified earlier in this ESD. EPA will hold a community Open House to discuss this ESD and any community concerns from 6:00 to 8:00 p.m. on July 13, 1995 at the Omaha Public School.

W.B. Hathaway

for *Jane N. Saginaw*
Regional Administrator

6/14/95
Date

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)562-6533 FAX: 562-2541

000156

May 1, 1995

Allyn M. Davis, Ph.D., Director
Hazardous Waste Management Division
U.S. EPA Region VI
1445 Ross Avenue, Suite 1200
Dallas, TX 75202

RE: Explanation of Significant Differences, Arkwood, Inc. Site, Omaha, Arkansas

Dear Dr. Davis:

A draft copy of Explanation of Significant Differences (ESD) for the Arkwood Superfund site was received on April 21, 1995. This letter serves as our acceptance of the Draft ESD.

Should you have any questions or require additional information, please contact Mike Bates at (501) 570-2891.

Sincerely,

Randall Mathis
Director

cc: William Luthans, EPA Region 6
Cynthia Kaleri, EPA Region 6
Marilyn Owen, EPA Region 6
Mike Bates, ADPC&E
Jean Koeninger, ADPC&E
Masoud Arjmandi, ADPC&E

SEPARATOR

05-00003

HAZ WASTE

REPORTS

06/22/2006

N/A

U.S. Environmental Protection Agency
Office of Waste Programs Enforcement
Contract No. 68-W9-0006

FIN #: 05-00003
PERMIT NO.
MEDIA: HAZARDOUS, SUPERFUND, BROWNFIELDS
ENFORCEMENT, COMPLIANCE, PERMITTING
DATE:

FINAL REVISED COMMUNITY RELATIONS PLAN

ARKWOOD, INC., SUPERFUND SITE
OMAHA, ARKANSAS

TES 9

Technical Enforcement Support at Hazardous Waste Sites Zone III Regions 5,6, and 7

Received By:
JUN 22 2006
ADEQ Records
Management Section

prc

PRC Environmental Management, Inc.

PRC Environmental Management, Inc.
1921 Rohlwing Road
Suite D
Rolling Meadows, IL 60008
708-255-4166
Fax 708-255-8528

PRC

FINAL REVISED COMMUNITY RELATIONS PLAN

ARKWOOD, INC., SUPERFUND SITE
OMAHA, ARKANSAS

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Waste Programs Enforcement
Washington, DC 20460

Work Assignment No.	:	C06009
EPA Region	:	6
Site No.	:	6BA3
Date Prepared	:	June 8, 1992
Contract No.	:	68-W9-0006
PRC No.	:	009-C06009
Prepared by	:	PRC Environmental Management, Inc.
Contractor Project Manager	:	Roberta M. Lloyd
Telephone No.	:	708/255-4166
EPA Work Assignment Manager	:	Verne McFarland
Telephone No.	:	214/655-2240

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TABLE OF CONTENTS

Section		Page
1.0	PLAN OVERVIEW	1
2.0	SITE BACKGROUND	2
3.0	COMMUNITY BACKGROUND	6
3.1	COMMUNITY PROFILE	6
3.2	HISTORY OF COMMUNITY INVOLVEMENT	6
3.3	COMMUNITY CONCERNS	8
4.0	COMMUNITY RELATIONS OBJECTIVES	10
5.0	SUGGESTED COMMUNITY RELATIONS ACTIVITIES	12

Appendix

A SCHEDULE OF SUGGESTED COMMUNITY RELATIONS ACTIVITIES

B EPA CONTACTS, ELECTED OFFICIALS, AND MEDIA CONTACTS

C INFORMATION REPOSITORIES, POSSIBLE MEETING LOCATIONS, AND SATELLITE OFFICE LOCATION

Figure		Page
1	SITE LOCATION	3
2	SITE LAYOUT	4

1.0 PLAN OVERVIEW

Community Relations Plans (CRPs) are developed to encourage and enhance communication among the U.S. Environmental Protection Agency (EPA), local officials, and citizens residing in communities near hazardous waste Superfund sites. CRPs usually provide background information on a specific Superfund site and nearby communities to help EPA develop a site-specific program for implementing community relations activities during various phases of the site investigation and remediation work.

This revised CRP for the Arkwood, Inc., Superfund (Arkwood) site is based on information gathered during community interviews, site visits, public meetings, and community open houses and workshops. This document has been prepared to help EPA develop a community relations program tailored to the needs of the Omaha, Arkansas, community during remedial design and remedial action (RD/RA) activities at the Arkwood site. This revised CRP supplements the original CRP prepared for the site in February 1987. The original CRP established a framework for conducting community relations activities during the remedial investigation and feasibility study (RI/FS) at the site.

This revised CRP includes the following information:

- **Section 2.0, Site Background** -- describes the Arkwood site, its operational history, and earlier Superfund response activities

- **Section 3.0, Community Background** -- briefly describes the Omaha community, presents a history of community involvement with the site, and explains major community concerns related to the site

- **Section 4.0, Community Relations Objectives** -- discusses community relations goals for the RD/RA phase of site activities

- **Section 5.0, Suggested Community Relations Activities** -- discusses suggested community relations activities to be conducted during the RD/RA phase of site activities

- **Appendices:**

  - **Appendix A:** Suggested Community Relations Activities

- **Appendix B:** EPA Contacts, Elected Officials, and Media Contacts
- **Appendix C:** Information Repositories, Possible Meeting Locations, and Satellite Office Location

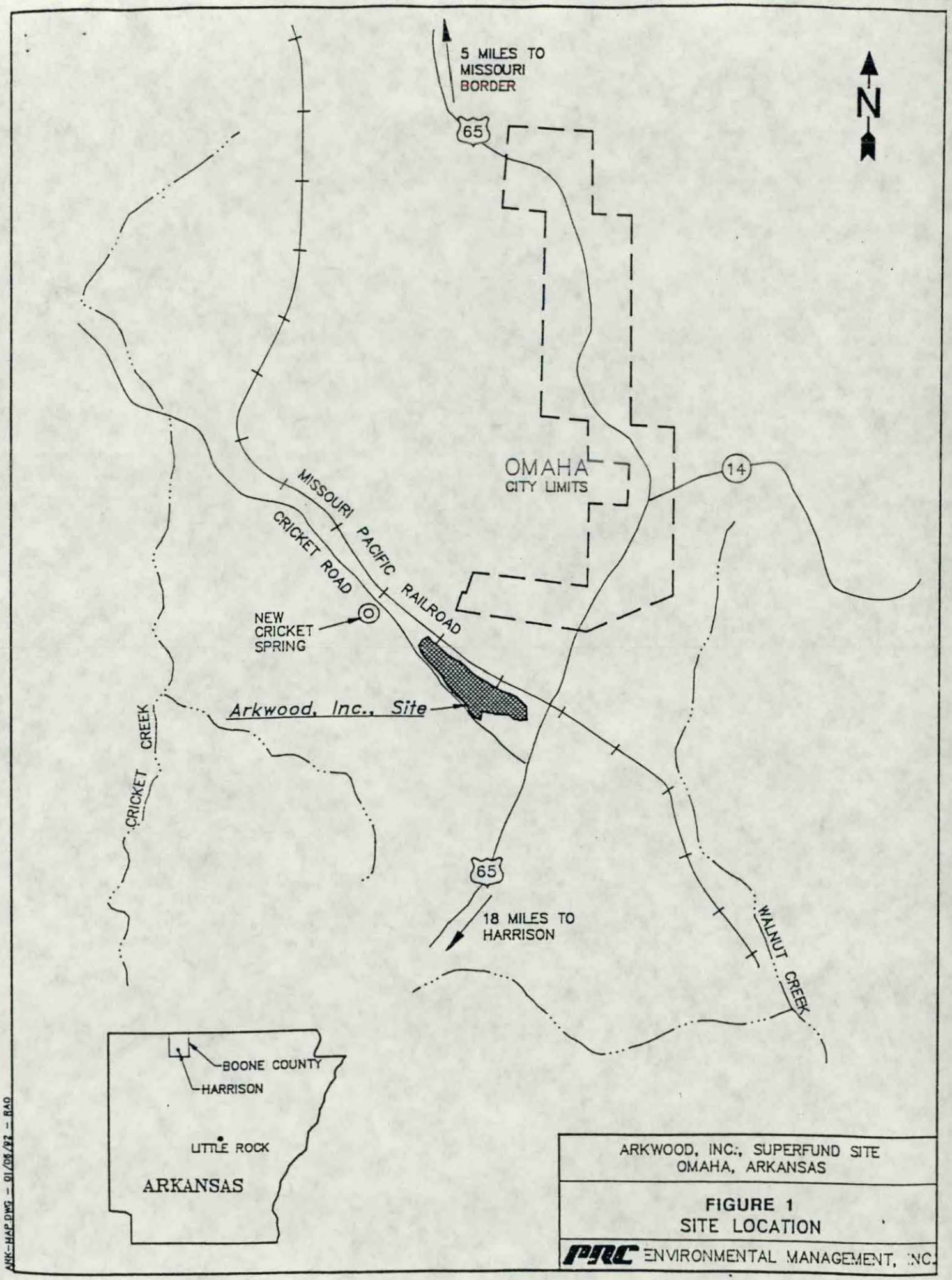
2.0 SITE BACKGROUND

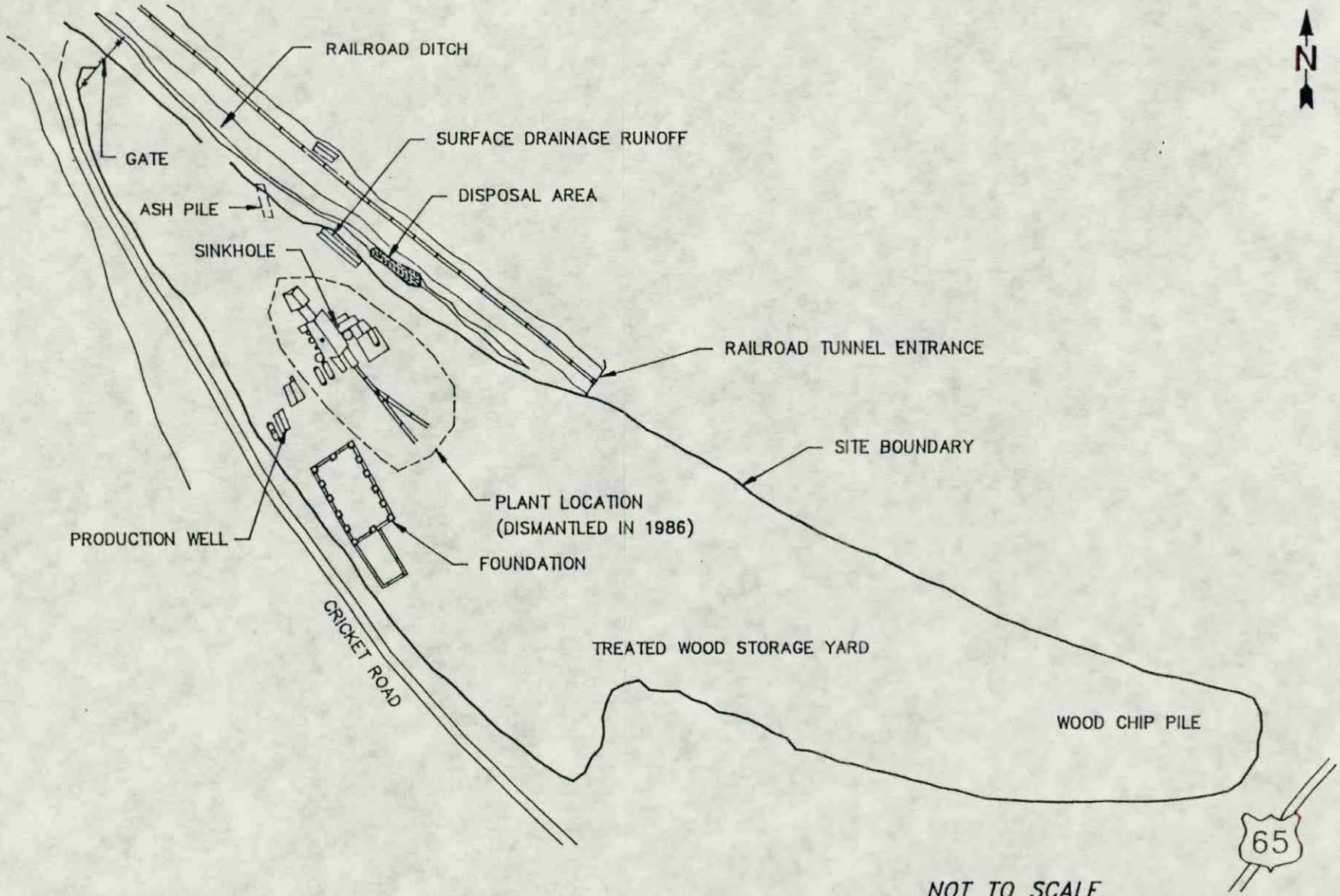
The 20-acre Arkwood site is located 0.5 mile southwest of Omaha, in Boone County, Arkansas, on an excavated area about 1,000 feet west of U.S. Highway 65. The northeastern limit of the property runs adjacent to a branch line of the Missouri Pacific Railroad; the southern and western limits are bound by Cricket Road (see Figure 1).

The Arkwood site was developed in the early 1900s, when a railroad company excavated about 40 to 50 feet below natural grade to obtain fill dirt for a railroad embankment (see Figure 2). In 1962, Arkwood, Inc., opened and operated a single-cylinder pentachlorophenol (PCP) and creosote wood-treatment facility. In 1973, Arkwood, Inc., leased the facility to Mass Merchandisers, Inc. (MMI). MMI operated the facility until June 1984, when it sold or removed its remaining inventory and materials. MMI's lease expired in January 1985, and in 1986, the plant was dismantled.

During its operation, the facility generated an estimated 6,000 to 7,000 pounds of waste per year. Wastes from plant operations were reportedly dumped into a sinkhole or cave at the facility until 1970. The sinkhole has since been sealed. Waste oils were placed in a ditch adjacent to the railroad until approximately 1974, when MMI began using a chemical recovery system. Other wastes, including the liquids used to wash the treatment equipment, were accumulated in a tank and sprayed over the wood storage yard to control dust.

In 1981, a railroad worker complained to the Arkansas Department of Pollution Control and Ecology (ADPC&E) that ground water was contaminated in the railroad tunnel running under and alongside the site. In May 1981, ADPC&E conducted a preliminary study of local water wells, natural springs, and nearby Walnut Creek. The results of the study indicated detectable levels of PCP present in ground water near the site. From May 1982 until December 1984, MMI conducted monthly surface and ground-water sampling of springs near the site. In May 1985, MMI and EPA entered into an Administrative Order on Consent (AOC). In the AOC, MMI agreed to conduct an RI/FS to determine the nature and extent of contamination at


5 MILES TO
MISSOURI
BORDER
65
N
OMAHA
CITY LIMITS
14
MISSOURI PACIFIC RAILROAD
CRICKET ROAD
NEW
CRICKET
SPRING
Arkwood, Inc., Site
CRICKET CREEK
65
18 MILES TO
HARRISON
WALNUT CREEK
BOONE COUNTY
HARRISON
LITTLE ROCK
ARKANSAS
ARKWOOD, INC., SUPERFUND SITE
OMAHA, ARKANSAS
FIGURE 1
SITE LOCATION
PRC ENVIRONMENTAL MANAGEMENT, INC.
ARK-MAP.DWG - 01/06/92 - RAO



NOT TO SCALE

ARKWOOD, INC., SUPERFUND SITE
OMAHA, ARKANSAS

FIGURE 2
SITE LAYOUT

ENVIRONMENTAL MANAGEMENT INC

the site. Shortly afterward, MMI submitted an RI/FS work plan to comply with the AOC. In 1985, EPA also proposed that the Arkwood site be included on the National Priorities List (NPL). The NPL is a list of uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response and funding under the Superfund program. The site was formally added to the NPL on March 31, 1989.

MMI began the RI in January 1988. Samples of soil, sediment, air, surface water, and ground water identified two threats: contaminated soil and contaminated shallow ground water. Of these, contaminated soil was determined to be the principal threat for two reasons: first, the site soil was likely to directly expose people to the contaminants, and second, soil has the potential to contaminate ground water. Results of the RI indicated that New Cricket Spring was the only surface water with consistent levels of contamination. PCP was the only chemical detected in surface water samples from New Cricket Spring. The highest concentration of PCP was found near the railroad ditch at levels ranging from 0.3 to 3.9 parts per million (ppm). During the RI, no other springs or residential wells sampled showed any evidence of wood-treating contaminants within a 1.5-mile radius of the site. However, soil sampling results revealed that wood-treating chemicals such as chlorinated dibenzodioxins and dibenzofurans, PCP, and polynuclear aromatic hydrocarbons (PAHs) were present in site soil.

In July 1990, EPA proposed a plan for addressing contamination at the site. The plan described several remedial alternatives considered in the FS and identified the alternative preferred by EPA. The preferred alternative included fencing the site, decontaminating and removing existing structures, monitoring ground water, and incinerating all the sludge and contaminated soil on site. In addition, to determine the path and extent of ground-water contamination migrating from the site, a dye tracing study was to be completed. Shortly thereafter, a 30-day public comment period was held to give the community an opportunity to comment on EPA's Proposed Plan.

During the public comment period, local residents and officials expressed concern about on-site incineration. In response to this concern, EPA modified the Proposed Plan to include treating contaminated soils with a sieve-and-wash process before incineration. This process would reduce both the amount of soil to be incinerated and the time required for incineration. In October 1990, EPA signed a Record of Decision (ROD) selecting the modified alternative as the remedy for the site. After signing the ROD, EPA entered into negotiations with MMI to discuss remedial activities MMI would conduct at the site. Negotiations ended on April 8, 1991, when

MMI signed an RD/RA Consent Decree. The Consent Decree describes the specific remedial activities that MMI will conduct at the site.

3.0 COMMUNITY BACKGROUND

This section describes the composition and makeup of the Omaha community, presents a history of community involvement with the site, and highlights the major concerns Omaha residents and local officials have expressed regarding the Arkwood site.

3.1 COMMUNITY PROFILE

The town of Omaha is located about 5 miles from the Missouri border, near Branson, Missouri, a major tourist attraction. During tourist season, a lot of traffic reportedly passes through Omaha, mainly due to the various gift shops located on the outskirts of the town. Omaha had a 1991 population of 191, according to the Harrison, Arkansas, Chamber of Commerce office. Because of its small size, the town of Omaha is often referred to as a village.

Omaha is somewhat isolated, and residents of nearby towns do not appear to be particularly concerned with, or aware of, activities in Omaha. Neighboring communities have not participated in public meetings concerning the site, and no formal or informal comments about the Arkwood site have been received from people residing outside of the town of Omaha.

Most residents must commute outside of Omaha to work. The four major employers in nearby Harrison, Arkansas, where many Omaha residents are employeed, are McKesson Service Merchandising (formerly MMI), Pace Industries, Levi Strauss & Company, and Emerson Electric.

3.2 HISTORY OF COMMUNITY INVOLVEMENT

Before 1981, public attention regarding the Arkwood site was minimal. In 1981, several Omaha residents complained that their private wells were contaminated. In response to the complaints, MMI tested the wells, replaced contaminated wells with new ones, and eventually purchased the property of one affected resident.

In 1986, EPA conducted a community assessment as part of the original CRP. EPA interviewed local officials, property owners, and residents in the Omaha area. The results of the

community interviews indicated that some residents living near the site were aware of the potential problems posed by site contamination, but they were not convinced that an immediate threat to their health and welfare existed. Several of the individuals interviewed said that if the problem were serious, action would have already been taken at the site.

Some residents living near the site were concerned about potential problems from site contamination, but others were more concerned that they would not be able to develop the site for industrial purposes. Developers of a large chicken feed operation had planned to build a facility on the Arkwood site property; however, when the site was placed on the NPL, the developers decided to build the facility in another town. Several officials interviewed expressed concern that economic development in Omaha would be hindered because the Arkwood site was designated as a Superfund site.

In February 1990, EPA held an RI open house to discuss results of the RI. On July 16, 1990, EPA held another open house at the Omaha Public School to discuss the site with interested citizens. And on July 25, about 50 residents and local officials attended a formal public meeting on the Proposed Plan at the Omaha Public School. During the public meeting, EPA discussed the Proposed Plan and received questions and comments from Omaha residents about the Proposed Plan and other alternatives considered to address contamination at the site. EPA also conducted a 30-day public comment period on the Proposed Plan. EPA responded to questions and comments received at the public meeting and during the public comment period in a document called the Responsiveness Summary. The Responsiveness Summary became part of the ROD for the site, and both documents were made available for public review at the site information repositories (see Appendix B).

After the ROD was signed in 1990, 189 Omaha residents signed a petition against EPA's selected remedy. As a result, personnel from PRC Environmental Management, Inc. (PRC), EPA's contractor, visited the town of Omaha in October and November 1990 to interview members of the community who had signed the petition. PRC interviewed 102 of the 189 individuals. Those interviewed included Omaha citizens, school board members, school teachers, the water superintendent, city aldermen, and the mayor. The purpose of the interviews was to discover and address community questions and concerns about the remedy selected to address contamination at the site.

The 1990 interview results showed that although members of the Omaha community had signed a petition against the selected remedy, the majority of those who signed the petition did so primarily for two reasons: (1) they didn't understand the remedy or (2) they were misinformed about the planned remedial alternative.

In response to questions and comments received during the 1990 interviews, EPA held a community workshop on February 7, 1991, to explain the incineration process. The workshop was held at the Omaha Public School and included discussions and several videotape presentations of incineration at other Superfund sites. About 20 people attended the workshop.

3.3 COMMUNITY CONCERNS

Several residents voiced their concerns about the Arkwood site during the 1986 community interviews. These concerns were discussed in the February 1987 CRP and are briefly summarized below.

Economic Development -- Many residents and local officials expressed concern that the Arkwood site would have a negative effect on economic growth and development in Omaha. Some felt that economic development in Omaha would be hindered by the fact that the Arkwood site had been listed on the NPL and designated as a Superfund site.

Access to the Site -- Many residents were concerned about the relatively easy access to the site. Specifically, some residents interviewed expressed concern about possible health hazards stemming from open access to the creosote and PCP at the site.

Cost -- Some residents believed it would be too expensive to conduct an RI/FS and clean up the site. This concern apparently stemmed from a belief that MMI might face financial difficulty if its cost of cleanup were too high, and that the community would, therefore, be adversely affected.

Several other concerns were discussed in the 1987 CRP. Residents were concerned that contamination from the site might drain from Cricket Creek and affect Table Rock Lake, a major recreation area near the site area. Residents who depended on private wells or springs expressed their own concerns. These residents felt that no organized system had been established to disseminate information on well sampling. Some residents had received well sampling results, but others had not. Concern was also expressed regarding the limestone foundation underlying Boone

County. The concern was that contamination could travel a long way in the underground caverns characteristic of this type of foundation.

In the summer of 1990, community interest in the site increased after EPA announced the Proposed Plan, which included incineration. The concerns identified during the 1990 public comment period and the subsequent community interviews are considered most representative of current attitudes and community perceptions regarding the site. These concerns are summarized below.

Safety of Incineration -- The 1990 interviews revealed that many residents were concerned about the safety of the incineration process and did not fully understand how incinerators work. Some residents were concerned that contaminants would be emitted from the incinerator. Others were concerned about the length of time required for incineration, the possibility of the incinerator malfunctioning, and the effectiveness of incinerators in general. Several residents requested that EPA hold a public meeting to explain the incineration process. The main causes for concern about the incinerator included the following: (1) the proposed incinerator's location in a valley, (2) its close proximity to the local school, and (3) its possible effect on nearby teachers and students. The Omaha School Superintendent expressed concern that teachers may threaten to leave the school, parents may keep their children home from school, and the school may subsequently be shut down if an incinerator was installed at the site.

Lack of Health Hazard -- Many residents doubt that the site poses a real health hazard. Several residents stated that they knew people who had worked at the Arkwood, Inc., plant for many years but had suffered no health problems. Some residents believed it was not necessary to clean up the site because wastes are no longer being generated there. Other members of the community believed that the site may pose a health hazard, but that if a hazard exists, it is not severe enough to warrant using an incinerator at the site. One resident said that members of the Omaha community would rather leave the contamination in place than burn it and expose area residents to the air emissions. Many of those interviewed believed that if the site really posed a health and environmental hazard, it would have been cleaned up years ago.

Inconsistent Information and EPA Credibility -- One resident said she was confused by the inconsistent information she received from EPA, the potentially responsible parties (PRPs), and Omaha residents. Some residents believe EPA has not been clear and straightforward at public meetings. Specifically, residents believe EPA has not given clear and concise answers to questions

information to them about other communities in which Superfund sites have undergone RA activities.

Because some residents were confused by inconsistent information received from PRPs, other Omaha residents, and EPA, an effort should be made to present information to the community as clearly as possible. When appropriate, EPA should communicate information to the community through workshops similar to the one EPA held in February 1991 to explain incineration.

2. Be Sensitive to Residents Living in Close Proximity to the Site

EPA should make an effort to be sensitive to the concerns of Omaha school students and staff and residents living near the site, especially those who have expressed concern about air emissions during the incineration process. Before starting remedial activities at the site, EPA should inform residents of planned construction activities and anticipated schedules. Specific information about the incinerator, such as anticipated hours of operation, should also be distributed to area residents. EPA may want to establish a central location for disseminating information and receiving feedback.

3. Build and Maintain a Relationship of Trust with the Omaha Community

EPA should establish and maintain a good relationship with the Omaha community. This is particularly important because most of the local residents are not fully aware of how incinerators work and many residents are skeptical about the high cost of incineration. If unaddressed, it is likely that the community's concerns will escalate when remedial activity begins. If EPA can establish a relationship with the community before construction activities begin, local residents should be more cooperative and less concerned when the incinerator is constructed.

In addition to providing timely and accurate information, a good way to establish this relationship is to work with the community on a small-scale, giving individual attention to areas of concern where necessary. Frequent, direct contact with local citizens would also help prevent miscommunication.

5.0 SUGGESTED COMMUNITY RELATIONS ACTIVITIES

The following community relations activities may be implemented to meet the objectives established for this revised CRP. These activities are suggested in response to community concerns and should ensure that effective communication is maintained between EPA and the Omaha community. Because community concerns could change as the RD/RA site activities progress, the activities listed below may be modified or activities may be added. Appendix A shows the anticipated schedule for each activity.

Information Repositories -- Local information repositories for the Arkwood site have been established at the Omaha School Library, Boone County Courthouse, Harrison Library, and ADPC&E offices in Little Rock (see Appendix C for repository locations). Each repository contains site-related information such as fact sheets, updates, technical reports, and information about the Superfund program. All repository documents are made available for public review and copying. In July 1990, an audit of the four repositories was conducted to determine their contents and to replenish lost or worn documents. In December 1991, a second audit was conducted for all repositories except the ADPC&E location.

Additional repository audits will be conducted as necessary to determine repository contents and to replace any needed materials. Also, as information becomes available during RD/RA activities, the repositories will be updated.

EPA Satellite Office and Part-Time Specialist -- EPA will establish a satellite office in the Omaha area. The office will be staffed with a part-time specialist from the Omaha area, who will serve as a liaison between area residents and EPA. The office will serve as a place for local residents to receive site-related information, ask questions, and voice their concerns. All community questions and concerns will be recorded on specially-designed citizen inquiry forms. These forms will be routinely submitted to EPA on a monthly basis, and the questions will be answered and concerns addressed. Establishing this office should ensure that community concerns are known by EPA and are responded to. Urgent requests will receive immediate responses. In addition, the office should greatly diminish the amount of misinformation received by the community, because accurate information on the selected remedy and the overall Superfund process will be available. Finally, the satellite office should help build a better rapport between EPA and the Omaha community.

Community Workshops and Open Houses -- Workshops and open houses are effective ways to provide information to small groups while encouraging feedback and questions in an informal setting. EPA held an open house in February 1990 to discuss the RI results. A second open house was held in July 1990 at the Omaha Public School to informally answer community questions about the Proposed Plan and the other remedial alternatives discussed in the FS report. In February 1991, after incineration was declared part of the selected remedy, and in response to several residents' requests, EPA representatives sponsored an information workshop at the Omaha Public School to explain the incineration process.

In the future, additional community workshops and open houses should be held as needed. For example, during the RD/RA phase of site activities, a community workshop could be held to explain progress made at the site. A community open house should be held to introduce the community to and explain the purpose of the new satellite office and to explain the significance of the RD/RA Consent Decree.

Public Meetings -- EPA held a formal public meeting at the Omaha Public School in July 1990 to receive public comments on the Proposed Plan. When the remedial design is complete or at the start of construction activities, EPA may hold another formal public meeting to present information to the site community and answer questions from the audience. Public comments on the draft remedial design documents may also be solicited at this meeting.

Fact Sheets and Updates -- A number of fact sheets and informational updates have been produced and distributed to the Omaha community to provide information on planned and ongoing site activities. Additional fact sheets and updates should be prepared and distributed when the satellite office opens and during design and construction activities. At a minimum, one fact sheet should be prepared when the design is 60 percent complete, and another should be prepared when construction activities begin.

Public Notices -- In 1990, public announcements of the Proposed Plan, the public comment period, public meetings, and the signing of the ROD were published in the Harrison Daily Times, a local newspaper. A public notice should be placed in the local newspaper to announce the opening of the satellite office and the accompanying open house. Additional public notices should be published as necessary.

Press Releases -- Prepared statements may be released to the local media to announce any significant findings during RD/RA activities, as well as to announce major milestones such as the completion of remedial design or the start of construction activities (see Appendix B for a list of media contacts).

Meetings with Local Officials -- Local officials should be kept informed of planned and ongoing progress during the RD/RA phase of site activities. Briefings and interviews will be held with local officials, school officials and faculty, and local media personnel before the satellite office is opened. EPA will also want to brief local officials before starting the remedial action to familiarize them with scheduled activities at the site (see Appendix B for a list of officials).

Update Mailing List -- To ensure that Omaha residents are receiving information as it becomes available, the site mailing list should be updated regularly. Prior to publication of this reivsed CRP, the mailing list was updated to reflect any changes in elected officials and names or addresses of individuals on file for the Arkwood site. For each community open house, workshop, and public meeting, a sign-in sheet will request each participant's name and address. From this information, the mailing list will subsequently be updated. In addition, updated lists will include those people who send in a request to be added to the mailing list. The names of people whose mailings are returned to EPA as undeliverable by the U.S. Postal Service will be removed from the list.

APPENDIX A

SCHEDULE OF SUGGESTED COMMUNITY RELATIONS ACTIVITIES

SCHEDULE OF SUGGESTED COMMUNITY RELATIONS ACTIVITIES

	Site Activities						
Community Relations Activities	Pre-Remedial Design	Remedial Design Work Plan Approved	Remedial Design 60% Complete	Remedial Design 100% Complete	Remedial Action Starts	Remedial Action 50% Complete	Remedial Action 100% Complete
Update Information Repositories	■	■	■	■	■	■	■
EPA Satellite Office Operations*	■	■	■	■	■	■	■
Community Workshops/ Open Houses	■		■		■	■	
Public Meetings				■			■
Fact Sheets and Updates	■		■	■		■	■
Public Notices	■			■			■
Press Releases	■		■	■	■		■
Meetings with Local Officials	■		■	■	■	■	
Update Mailing List	■	■	■	■	■	■	■

Notes:

■ = Occurence of suggested community relations activities.

* = The need for satellite office operations should be evaluated regularly; office operations would be conducted on an "as-needed basis."

APPENDIX B

EPA CONTACTS, ELECTED OFFICIALS, AND MEDIA CONTACTS

EPA CONTACTS AND ELECTED OFFICIALS

A. **EPA Project Representatives**

Verne McFarland
Community Relations Coordinator
EPA Region 6
1445 Ross Avenue (6H-MC)
Dallas, TX 75202-2240
(214) 655-2240
1-800-533-3508

Rick Ehrhart
Remedial Project Manager
EPA Region 6 (6H-EA)
1445 Ross Avenue
Dallas, TX 75202-2240
(214) 655-6582
1-800-533-3508

B. **Federally Elected Officials**

Arkansas

Senator Dale Bumpers
229 Dirksen Senate Office Building
Washington, D.C. 20510
(202) 224-4843

2527 Federal Building
Little Rock, AR 72201
(501) 324-6286

Senator David Pryor
267 Russell Senate Office Building
Washington, D.C. 20510
(202) 224-2553

3030 Federal Building
Little Rock, AR 72201
(501) 324-6336

Representative John Paul Hammerschmidt
2110 Rayburn House Office Building
Washington, D.C. 20515
(202) 225-4301

P.O. Box 1624
Ft. Smith, AR 72902
(501) 782-7787

Missouri

Senator John C. Danforth
249 Russell Senate Office Building
Washington, D.C. 20510
(202) 224-6154

1736 E. Sunshine
Spingfield, MO 65804
(417) 881-7068

Senator Christopher S. Bond (202) 224-5721
293 Russell Senate Office Building
Washington, D.C. 20510

1736 E. Sunshine (417) 881-7068
Springfield, MO 65804

Representative Melton D. Hancock (202) 225-6536
318 Cannon Office Building
Washington, D.C. 20515

2840A E. Chestnut Expressway (417) 862-4317
Springfield, MO 65802

C. State Elected Officials

Arkansas

Governor Bill Clinton (501) 682-2345
State Capitol
Little Rock, AR 72201

Senator Steve Luelf (501) 682-3000
Arkansas Senate
State Capitol
Little Rock, AR 52201

Representative Billy Joe Purdom (501) 375-7771
Arkansas House of Representatives
State Capitol
Little Rock, AR 72201

Representative Bob J. Watts (501) 375-7771
Arkansas House of Representatives
State Capitol
Little Rock, AR 72201

Missouri

Governor John Ashcroft (314) 751-3222
State Capitol
P.O. Box 720
State Capitol
Jefferson City, MO 65102

Senator Emory Melton (314) 751-2937
P.O. Box 42A
State Capitol
Jefferson City, MO 65101

Representative Doyle Childers (314) 751-2058
P.O. Box 102B
State Capitol
Jefferson, MO 65101

D. **Local Officials**

City of Omaha, Arkansas

Mayor Jake Arnold (501) 426-3388
P.O. Box 25
Omaha, AR 72662

City of Harrison, Arkansas

Mayor Willliam Gregg (501) 741-2525
P.O. Box 1715
Harrison, AR 72601

City of Branson, Missouri

Mayor Wade Meadows (417) 334-3345
P.O. Box 1309
Branson, MO 65616

Omaha Public School (510) 426-3366

Dr. David Land
P.O. Box 249
Omaha Public School
Omaha, Arkansas 72662

APPENDIX C

INFORMATION REPOSITORIES, POSSIBLE MEETING LOCATIONS, AND SATELLITE OFFICE LOCATION

APPENDIX C

Information Repositories

Boone County Courthouse
County Clerk's Office
101 North Main Street
Harrison, Arkansas 72601
Contact: David Witty
Phone: (501) 741-8428
Hours: 8:30 a.m. - 4:00 p.m.
Mon. through Fri.

Boone County Library
221 West Stephenson Avenue
Harrison, Arkansas 72601
Contact: Marilyn Smith
Phone: (501) 741-5913
Hours: 9:00 a.m. - 5:00 p.m.
Mon., Wed., Fri., and Sat.

Omaha Public School Library*
Omaha, Arkansas 72662
Contact: Donna Deez
Phone: (501) 426-3366
Hours: 7:30 a.m. - 3:30 p.m.
Mon. through Fri.

Arkansas Dept. of Pollution Control and
and Ecology (ADPC&E)*
8001 National Drive
Little Rock, Arkansas 72219-8913
Contact: [redacted]
Phone: (501) 562-7444
Hours: 8:00 a.m. - 4:30 p.m.
Mon. through Fri.

* The Administrative Record for the Arkwood site is located at the Omaha Public School Library and the ADPC&E office.

Possible Meeting Locations

Omaha Public School
Omaha, Arkansas
(501) 426-3366

Holiday Inn
Harrison, Arkansas
(501) 741-2391

Satellite Office Location

Omaha Public School
Omaha, Arkansas 72662
Contact: Dr. David Land
(501) 426-3366

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

July 2, 1992

Public Information Officer
Arkansas Department of Pollution Control and
Ecology (ADPC&E)
8001 National Drive
Little Rock, Arkansas 72219-8913

Gentlemen:

Enclosed are the Community Relations Plans for the Arkwood, Inc. and Popile, Inc. Superfund Sites.

Please add these Community Relations Plans to the information files that you maintain for these site.

Thank you.

Sincerely,

Donn Walters
for V. McFarland

Verne McFarland
Community Relations

Enclosure

Printed on Recycled Paper

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

July 2, 1992

Public Information Officer
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Sincerely,

Donn Walters for V. McFarland

Verne McFarland
Community Relations

Enclosure

Printed on Recycled Paper

Review number: ☐ 1 (first) ☐ 2 (second) ☒ 3 (third) ☐ Other (specify)
Triggering action: ☐ Actual RA Onsite Construction at OU No.__ ☐ Actual RA at OU No.__ ☒ Previous Five-Year Review Report ☐ Construction Completion ☐ Other (specify) _____
Triggering action date: February 7, 2003
Due date (five years after triggering action date): February 7, 2008

Issues and Recommendations

Issues

There are no issues that affect protectiveness.

Protectiveness Statement

The remedy at the Koppers Superfund Site is protective of human health and the environment because all exposure pathways that could result in unacceptable risk are being controlled. Residents within the former plume have been provided with an alternate water supply. A deed restriction on the property prevents unacceptable exposure to on-site soil contamination and restricts the property for industrial use only. Current data indicate that the groundwater remediation is progressing and that the remedy is functioning as required to achieve groundwater remediation standards.

U.S. ENVIRONMENTAL PROTECTION AGENCY

Superfund Information Systems

Superfund Site Progress Profile
ARKWOOD, INC. (EPA ID: ARD084930148)

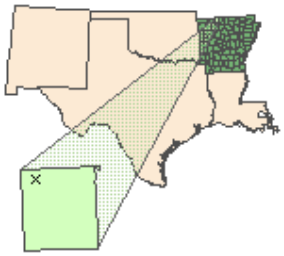
This profile provides you with information on EPA's cleanup progress at this Superfund site. This information includes: Site Location, Cleanup Progress Summary, Cleanup Impact Summary, Contamination, and Cleanup Progress. Please use the links and the "More Details…" box to find more details on this site.

The data and content on this page were last updated on Wednesday, August 21, 2013.

More Details...

More In-Depth Site Details (EPA Regional Content)
Site Contacts (EPA Cleanup Managers, etc.)
Additional Site Documents
Other Names for this Site (Aliases)
View GPRA Measures at this Site (see glossary)

Site Location



Get an interactive map

EPA Region 6 >
Serving Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 66 tribes

Site Address: S. OF CITY @ CRICKETT RR JUNC.
OMAHA, Arkansas
72662

County: BOONE

Cleanup Progress Summary

Construction Complete

Physical cleanup activities have been completed.

view detailed list of cleanup activities at this site >>

The National Priorities List (NPL) is the list of the most hazardous sites across the U.S. and its territories.

This site is on the NPL and is known as a Final NPL site (see glossary).

Potentially Responsible Parties (PRPs)

Cleanup Impact Summary

At each site, EPA assesses the risk to humans and the environment and determines the best approach to address the risk. During initial site studies and cleanup, EPA determines if current human exposures to contaminants are under control and takes actions to control any possible human exposures until cleanup has been completed. Once complete, cleanup provides long-term human health and environmental protection at the site.

OK **Current human exposures at this site are under control**

see glossary definition for "Human Exposure Environmental Indicator Measure." >>

At each site with known ground water

KOPPERS SUPERFUND SITE UPDATE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY • REGION 9 • SEPTEMBER 2001

INTRODUCTION

Now that the Koppers wood treating facility has closed, the United States Environmental Protection Agency (EPA) is pleased to announce that it can complete the soil cleanup at the Koppers Superfund Site in Oroville, CA. This fact sheet includes information about completing the soil removal, modification of the Consent Decree, and the status of the groundwater cleanup. A glossary of terms that appear in **bold** can be found at the end of this document.

SOIL REMOVAL WORK TO BE COMPLETED

In 1996, EPA revised the1989 **Record of Decision** (ROD) for the soil cleanup method at the site with ROD Amendment #1. EPA concluded that the original soil cleanup technologies selected could not achieve the cleanup goals. ROD Amendment #1 changed the soil remedy to allow removal and disposal of contaminated soil in an **on-property** landfill. In 1997 and 1998, the accessible contaminated soil was removed and placed in a landfill built on site. ROD Amendment #1 also called for the removal of the remaining contaminated soil (approximately 20,000 cubic yards) under the wood treating plant when the plant closed its operations. On March 15, 2001, Koppers ceased operations and began working with the California Department of Toxic Substances Control to perform a **Resource Conservation Recovery Act** (RCRA) closure for the facility. The closure procedures are expected to be completed by the end of June 2002. Upon completion of the RCRA closure, Beazer East, Inc., who has **Superfund** site cleanup responsibility, will remove the contaminated soil under the facility and place it in the previously built landfill(See figure#1). It is anticipated that the soil remediation will be completed by end of October 2002.

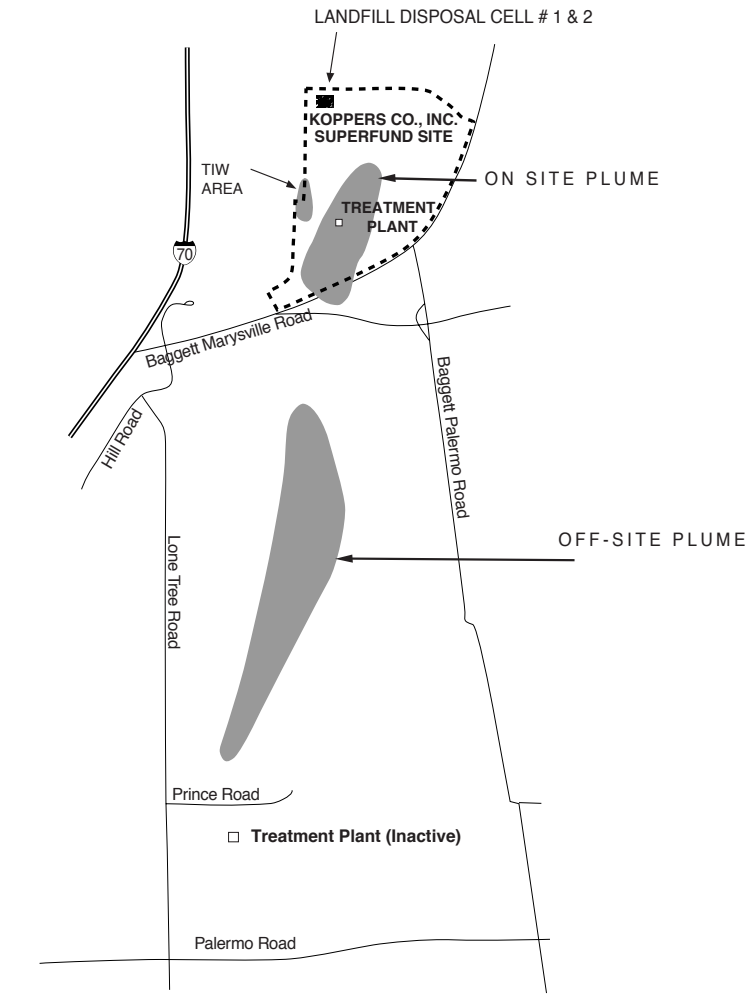
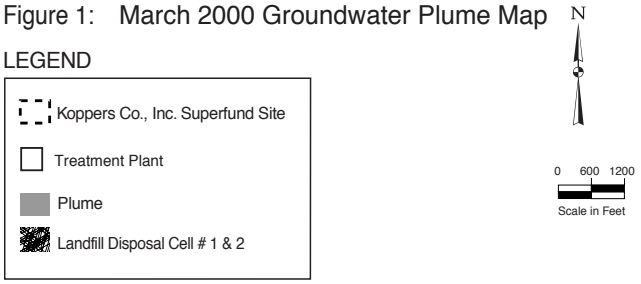


Figure 1: March 2000 Groundwater Plume Map



CONSENT DECREE MODIFICATION TO REFLECT ROD AMENDMENTS

The terms of the original Consent Decree (CD), signed on February 6, 1992, do not reflect the changes in the work resulting from ROD Amendment#1 signed in 1996 and ROD Amendment#2 signed in 1999. **A** Consent Decree is a legal document, approved by a judge, that formalizes an agreement reached between EPA and potentially responsible parties through which PRP's will conduct all or part of a cleanup action at a Superfund site.

ROD Amendment #1 provided for consolidation of site contaminated soil in an on-property landfill. ROD Amendment #2 called for the issuing of a **Technical Impracticability Waiver**(**TIW**) for the groundwater cleanup at the former creosote pond and cellon blown areas due to the presence **of dense non-aqueous phase liquid**. It allows the pump and treat remedy to be augmented by enhanced **in-situ bioremediation** and makes provision for monitored natural attenuation, if necessary.

Once negotiations are settled with Beazer East, Inc. and the modified CD is lodged with the District Court, a notice - including a thirty day comment period - will be published in Federal Register (FR). Following the FR publication of the notice, EPA will place an announcement in the city's local paper. The EPA will review and respond to all significant comments. The District Court will review the responses and make the decision to approve or disapprove the legal agreement. The EPA expects the amended CD process to be complete by December 2001.

CONTAMINATION REDUCED, WELLS BACK IN SERVICE

The ground water monitoring report shows that the contaminated groundwater concentrations continue to be reduced. As a result, the EPA has returned another residential well to domestic use. Residents are removed from the water subsidy program when their well, tested for a full year, meets the EPA cleanup standard contained in the ROD. Of the original 38 residential homes who received alternative water source, only seven remain on the water subsidy. EPA continues to monitor the groundwater on a quarterly bases.

SITE BACKGROUND

Since 1948, the 200-acre Koppers Company, Inc. (Oroville Plant) site was used to conduct wood treating operations designed to prevent wood deterioration by insects or fungi. Koppers purchased the plant from the National Wood Treating Company in 1955. The facility closed on March 15, 2001. Chemical and wastewater handling procedures and wood treatment and storage operations have contaminated the soil and groundwater on and off site. Fires at the Koppers facility occurred in 1963 and 1987, causing increased contamination at the site. Groundwater, on- and **off-property** has been contaminated primarily with **pentachlorophenol** (**PCP**). Soil on-property has been contaminated with PCP and other hazardous substances used in Koppers' wood treating activities. The contaminated groundwater is located beneath this site and off-property south of the Koppers site. In 1973, PCP was discovered in nearby residential wells that are used as a source of drinking water. In 1988, the Koppers Company, Inc. was bought by the parent company of Beazer East, Inc. (Beazer). Beazer later sold the wood treating plants to Koppers Industries, Inc. (KII) which is the current owner and operator. However, Beazer is the recognized potentially responsible party for Superfund remediation. Beazer has installed both a 600 gallons per minute (gpm) Pump and Treat System for off-property and a 400 gpm P&T for the on-property groundwater contamination and treatment. The off-property P&T was discontinued due to significant progress cleaning up the groundwater. Since1998, in-situ bioremediation additives have been added to both the off and onsite groundwater **plume** areas to speed up the cleanup.

GLOSSARY

Bioremediation - is the use of microorganisms (such as bacteria) to transform substances into nontoxic compounds

Creosote - is a semi-volatile organic compound composed of numerous polynuclear aromatic hydrocarbons (PAHs) used as a wood preservative - some PAHs can cause cancer cPAHs

Dense Non-Aqueous Phase Liquids (DNAPLs) - are liquids that are both not mixable and denser than water such as creosote

In-situ - is a Latin term meaning *in place*; in situ treatment of soil is performed without the need for excavation

Monitoring well - is used to allow sampling for constituent analysis

Off-Property - is an area off the property south of the wood treatment facility owned by Koppers with impacted groundwater (south of Baggett-Marysville Road)

On-Property - is an area on the wood treatment facility property owned by Koppers (north and west of Baggett-Marysville Road)

Pentachlorophenal (PCP) - is an polar organic compound used as a wood preservative which has been shown to increase the risk of cancer in laboratory animals and thus, could possibly be associated with cancer in humans

Plume - is the extent and depth of contaminated groundwater underground

Resource Conservation and Recovery Act - is a program that manages operators that generate and transporters of hazardous wastes

Record of Decision - is a legal document issued by the EPA that provides the remedy actions for cleaning up a superfund site

Superfund - is a program operated under the legislative authority of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Superfund Amendment Reauthorization Act (SARA) that funds and carries out the EPA solid waste emergency and long-term removal remedial activities

Technical Impracticability Waiver : is a waiver of the requirement to clean up the groundwater to drinking water standards for certain highly contaminated areas of groundwater near non-aqueous phase liquid. EPA believes it is technically infeasible (unable) to clean groundwater in these areas to drinking water standards

KOPPERS SUPERFUND SITE UPDATE

INFORMATION REPOSITORIES

EPA maintains information repositories that contain project documents, fact sheets and other reference materials.

Butte County Public Library
1820 Mitchell Avenue
Oroville, CA 95966
(530) 538-7641

Meriam Library
California State University at Chico
Chico, CA 95929-0295
(530) 898-5720

Superfund Records Center
95 Hawthorne Street
San Francisco, CA 94105
(415) 536-2000

FOR FURTHER INFORMATION

Anyone with questions or comments can call Jackie Lane, EPA community involvement coordinator, toll-free at (800) 231-3075 or directly at (415) 744-2267. If you did not receive this fact sheet through the mail, but would like future publications, you can leave you name and address on the toll-free line as well. You can also contact Charles Berrey, EPA's Remedial Project Manager for the site, by calling him directly at (415) 744-2223 or leave a message at (800) 231-3075.

U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street (SFD-3)
San Francisco, CA 94105
Attn: Jackie Lane

Official Business
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KOPPERS CO, INC.
SUPERFUND SITE UPDATE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY • REGION 9 • AUGUST 2002

EPA STARTS REVIEW OF CLEANUP AT THE KOPPERS SUPERFUND SITE

The United States Environmental Protection Agency (EPA) is conducting a review of the cleanup at the Koppers Superfund site in Oroville, CA. This review is conducted every five years to ensure that the cleanup remedy remains protective of human health and the environment. From now through December 2002, the EPA will conduct a review of the soil remedy and the groundwater system cleanup actions at the Koppers Superfund site. The EPA invites the community to learn more about this review process and how you can get involved. This fact sheet explains the five-year review process and gives an update on the soil and groundwater cleanup.

FIVE-YEAR REVIEW

According to Superfund law, if a cleanup results in contaminants at a Superfund site above levels that allow for unlimited use and unrestricted exposure, the cleanup will be reviewed every five years. During the review, the EPA studies information about the site and does a site inspection. The methods, findings, and conclusions of the review are documented in the five-year review report. The report can include the following: a site background and history, an explanation of the cleanup measures in place, an explanation of documents and laws reviewed and why, an explanation of the site inspection conducted and sampling results, if taken, an explanation of how the community will be notified about the review, past actions conducted from previous reviews, site recommendations and a statement of protectiveness. The statement of protectiveness explains whether the cleanup continues to be effective and can recommend improvements to ensure that the cleanup continues to be effective.

HOW CAN THE COMMUNITY BECOME INVOLVED?

The community can be involved by calling us on our toll-free line at (800) 231-3075 to let us know if you are interested in participating in the review process. One way to become involved is to call us and tell us how you feel about the cleanup conducted so far. Upon completion, the five-review report will be available for public review at the site's information repositories (see back page for locations), and EPA will publish a notice in the local paper.

To get more site information look up the Web page: http://yosemite.epa.gov/r9/sfund/overview.nsf, under Koppers Industries Inc. (Oroville Plant).

UPDATE ON SOIL REMOVAL WORK

In 1997 and 1998, any accessible contaminated soil was removed and placed in an on-site landfill. Contaminated soil under the plant's wood treating process area was to remain until the plant ceased operations. In March 2001, Koppers Industries, Inc. ceased active wood treating and has worked to close the plant in accordance with federal and state laws. Beazer East, Inc. (Beazer), a former owner, retains the responsibility for completing the removal of contaminated soils. Beazer is scheduled to complete the soil removal by the end of this year.

GROUNDWATER STATUS

The groundwater monitoring reports show that the area of off-property contaminated groundwater at the site is shrinking (see next page). As a result, the EPA has returned 27 of the original 34 residential wells to domestic use. Residents are removed from the water subsidy program when their well, tested for a full year, is free of contamination and the water meets federal and state drinking water standards. Quarterly groundwater monitoring is conducted and the EPA continues to review the site's groundwater monitoring reports.

SITE BACKGROUND

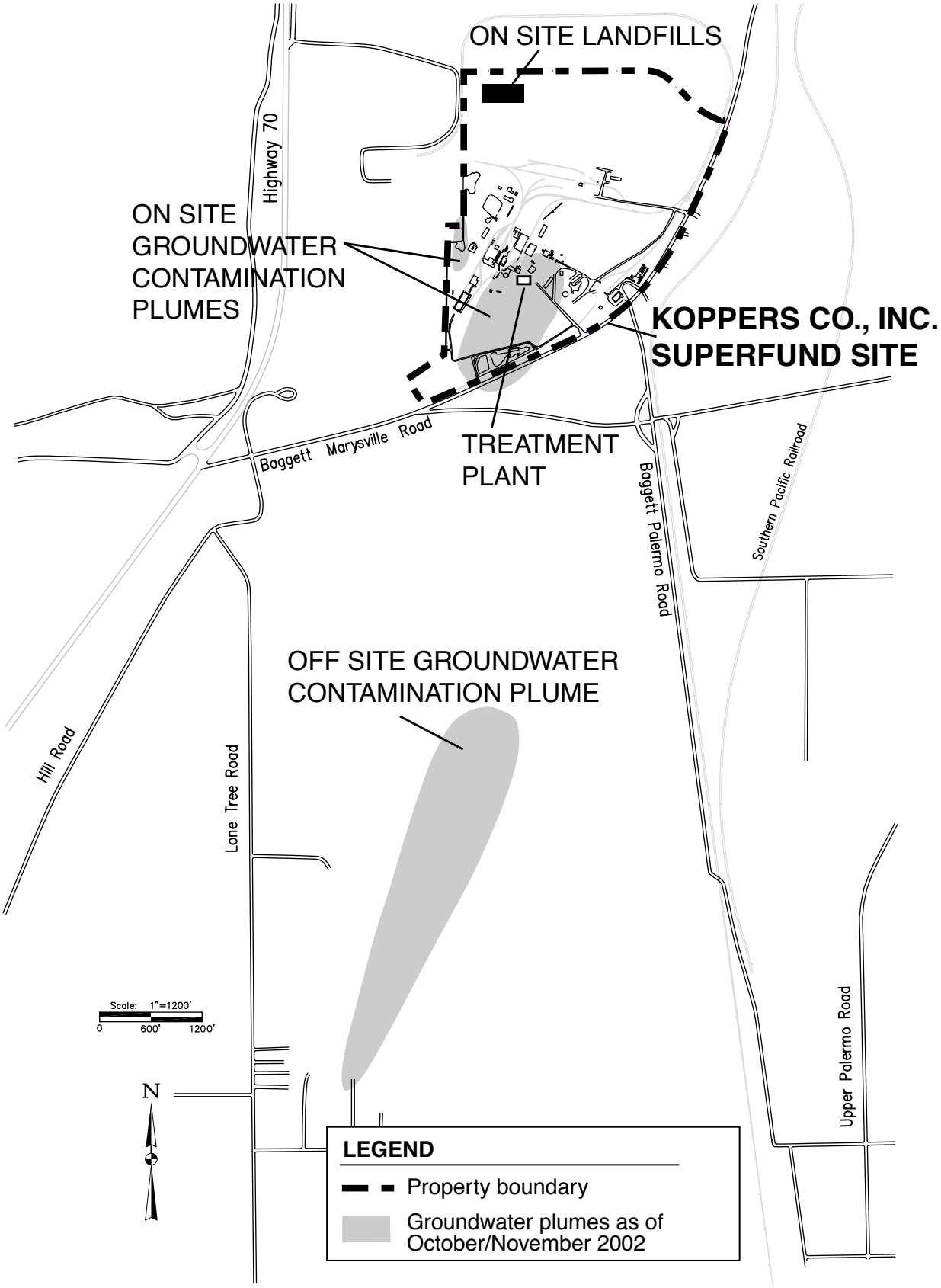
Since 1948, the 200-acre Koppers Company, Inc. site was used to treat wood to prevent deterioration by insects or fungi. The facility closed on March 15, 2001. Chemical and wastewater handling procedures and wood treatment and storage operations have contaminated the soils and the groundwater. Fires at the Koppers facility occurred in 1963 and 1987, causing increased contamination at the site. Groundwater has been contaminated with pentachlorophenol (PCP). PCP is a wood preservative shown to increase the risk of cancer in laboratory animals and could possibly be associated with cancer in humans. Soils on the site have been contaminated with PCP and other hazardous substances used in Koppers' wood treating activities.

The contaminated groundwater is beneath the site and off-property south of the Koppers site. In 1973, PCP was discovered in nearby residential drinking water wells. In 1988, the Koppers Company, Inc. was bought by the parent company of Beazer East, Inc. Beazer later sold the wood treating plants to Koppers Industries, Inc. which is the current owner. However, Beazer is the recognized potentially responsible party for the cleanup. Beazer has installed two treatment systems to pump out and treat contaminated groundwater on the property and off-property. The off-property treatment system was turned off due to significant progress in the cleaning up of the groundwater. Since 1998, certain nutrients have been added to the site's monitoring wells to increase the growth of microorganisms that break down the chemical PCP to a non-hazardous substance.

FOR MORE INFORMATION

If you have questions or comments, please call Jackie Lane, EPA community involvement coordinator, toll-free at (800) 231-3075 or directly at (415) 972-3236.
If you did not receive this fact sheet through the mail but would like future publications, you can leave your name and address on the toll-free line as well.

You can also contact Charles Berrey, Remedial Project Manager, by calling him directly at (415) 972-3146 or leave a message at (800) 231-3075.



Koppers Co., Inc. Superfund Site map (A more detailed map can be viewed on EPA's Web site, referenced on page 1.)

KOPPERS CO., INC
SUPERFUND SITE UPDATE

INFORMATION REPOSITORIES

EPA maintains two information repositories in the Oroville area and the Superfund Records Center in San Francisco which contain project documents, fact sheets and other reference materials:

Butte County Public Library
1820 Mitchell Avenue
Oroville, CA 95966
(530) 538-7641

Meriam Library
California State University at Chico
Chico, CA 95929-0295
(530) 898-5720

Superfund Records Center
95 Hawthorne Street
San Francisco, CA 94105
(415) 536-2000

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U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street (SFD-3)
San Francisco, CA 94105
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Koppers Co., Inc. Superfund Site Update

United States Environmental Protection Agency • Region 9 • August 2003

EPA REQUESTS YOUR COMMENTS ON CONSENT DECREE AMENDMENT

INTRODUCTION

The United States Environmental Protection Agency (EPA) invites the public to review and comment on a Consent Decree (CD) amendment concerning the cleanup of the Koppers **Superfund** site in Oroville, CA. The CD availability notice has been published in the Federal Register on **August 7, 2003.** In addition, the EPA has placed a notice in the City's local newspaper announcing the opening of the 30-day public comment period that ends on **September 7, 2003.** This fact sheet also gives an update on the soil and groundwater cleanup. Terms that appear in **bold** are defined in the Glossary on page 4.

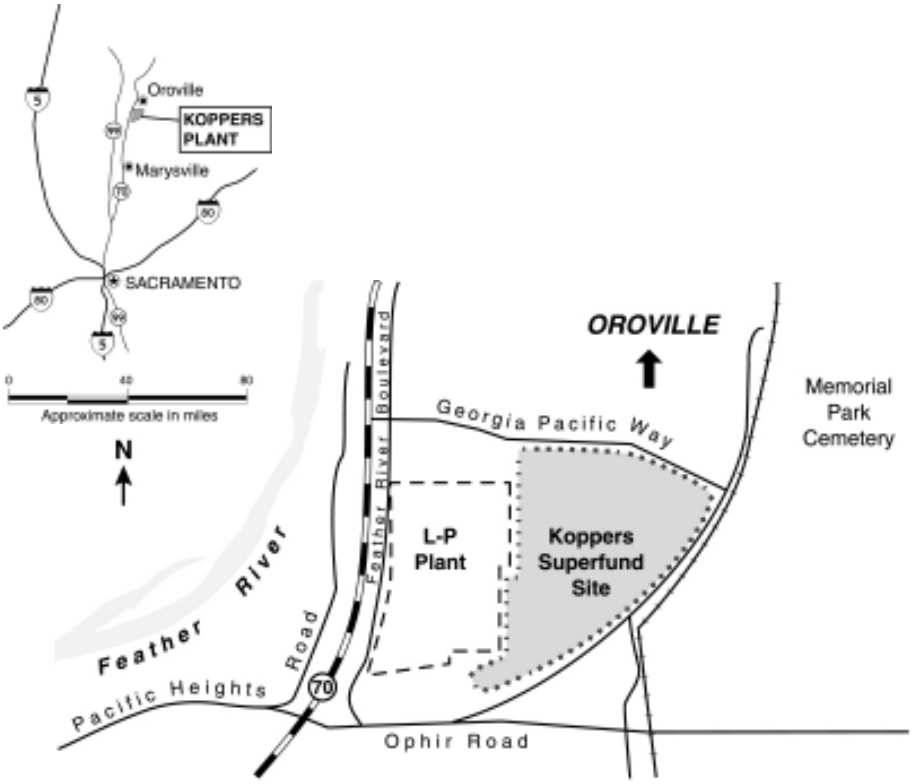

Figure 1: Location of Koppers Co., Inc. Superfund Site

CONSENT DECREE AMENDMENT

The 1989 **Record of Decision** (ROD) called for the restoration of groundwater to a safe public drinking water level and provided an alternative water supply to those residents potentially affected by the contamination until groundwater is restored. The terms of the original CD signed on February 7, 1992, do not reflect the changes in the cleanup work that will be performed as a result of the signing of ROD Amendment #1 on August 29, 1996 and the signing of ROD Amendment #2 on September 23, 1999. The amendment brings these decisions into one document. A CD is a legal document, approved by a judge, that formalizes an agreement reached between EPA and the potential responsible parties (PRPs) through which the PRPs will conduct all or part of a cleanup action at a Superfund site and reimburse EPA's past costs for work

Cont'd. on page 2

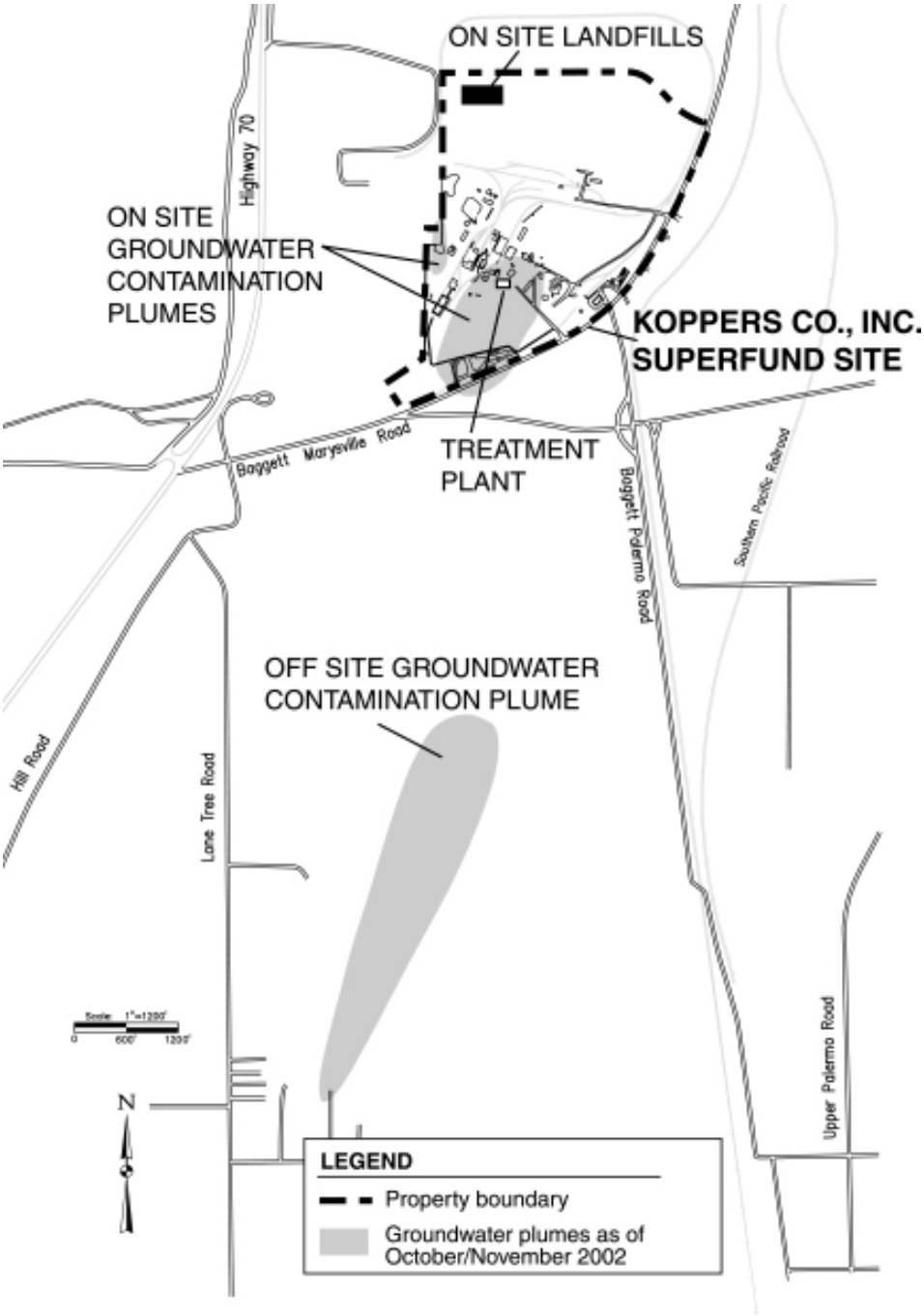

Figure 2: *Koppers Superfund Site, 2002, showing groundwater plumes*

performed at the site. The CD is subject to a public comment period before a judge approves the agreement. If it is approved, the court will enforce the order.

The work to be performed by the PRP is outlined in the Statement of Work (SOW) which is appended to the CD amendment. The following is a summary of the SOW:

ROD Amendment #1 provides for the consolidation of the site contaminated soil in an **on-property** landfill, including soils beneath the capped portions of the process area (see Figure 3). This work was completed September 2002 and a preliminary close-out report is being prepared.

ROD Amendment #2 provides for a Technical Impracticability Waiver (TIW) of the groundwater cleanup at the former **creosote** pond and cellon blow down areas due to the presence of dense non-aqueous phase liquids (DNAPLs). DNAPLs are liquids that are both not mixable and denser than water such as creosote. A TIW waives the requirement to clean up the groundwater to drinking water standards for certain highly contaminated areas of groundwater near non-aqueous phase liquid. EPA believes it is technically infeasible to clean groundwater in these areas to drinking water standards at this time. The ROD amendment also allows the pump and treat remediation to be augmented by enhanced **in-situ bioremediation** and makes provision for **monitored natural attenuation**, if necessary.

HOW TO COMMENT AND WHAT HAPPENS NEXT?

The public is encouraged to comment on this document and especially the Statement of Work which gives details about the work that will be performed. You can find a copy of this document at the site information repositories listed at the end of this fact sheet or call Jackie Lane at Toll-free (800) 231-3075 or her direct line at (415) 972-3236.

You may send your written comments on the Consent Decree amendment postmarked no later than **September 7, 2003** to the following address:

Bill Weinischke
U.S. Department of Justice
P.O. Box 7611
Washington, D.C.
20044-7611

After the Consent Decree comment period ends, the Department of Justice (DOJ) will review and develop responses to all significant comments and submit both to the District Court. Once the court makes a decision, the DOJ will publish a notice in

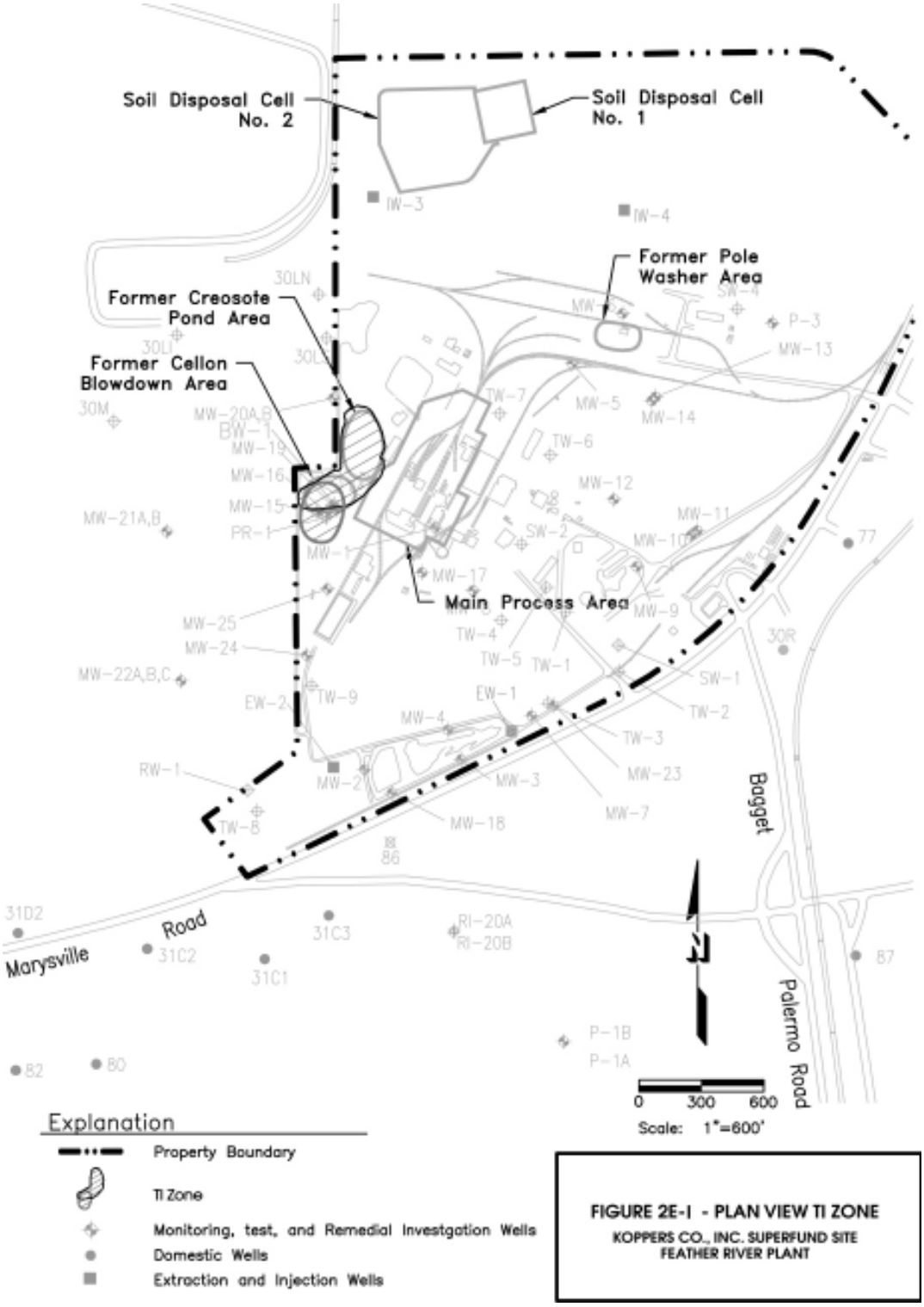

Figure 3: *Koppers site, showing on-property plume where the process area is and the TI and soil areas*

the Federal Register announcing the decision including any comments and the responsiveness summary. EPA will follow up this publication with a short announcement in the City's local paper.

UPDATE ON SOIL REMOVAL WORK

On March 15, 2001, Koppers Industries, Inc. (KII) ceased operations and began working with the California Department of Toxic Substances Control to conduct a Resource Conservation Recovery Act (RCRA) closure for the facility. RCRA is a law and a program that manages the operators that generate and transport hazardous wastes. With the completion of the KII RCRA closure in July 2002, the remaining soil remediation effort under Superfund was completed September 2002. A preliminary closeout report is being prepared for the soils remedy.

GROUNDWATER STATUS

The groundwater monitoring reports show continued improvement in the shrinking of the **off-property** contaminated groundwater at the site (see Figure 2). Due to the receding off-property contaminated groundwater plume, the EPA has returned thirty-one of the original thirty-eight residential wells to domestic use. Residents are removed from the water subsidy program when their well, tested for a full year, is free of contamination and within the Federal and State drinking water standards. Quarterly groundwater monitoring is conducted and the EPA continues to review the site's semiannual groundwater monitoring reports.

GLOSSARY

Bioremediation - is the use of microorganisms (such as bacteria) to transform substances into nontoxic compounds

Creosote - is a semi-volatile organic compound composed of numerous polynuclear aromatic hydrocarbons (PAHs) used as a wood preservative - some PAHs can cause cancer cPAHs

In-situ - is a Latin term meaning *in place*; in situ treatment of soil is performed without the need for excavation

Off-Property - is an area off the property south of the wood treatment facility with impacted groundwater (south of Baggett-Marysville Road)

On-Property - is an area on the wood treatment facility property (north and west of Baggett-Marysville Road)

Record of Decision (ROD) - A legal document issued by EPA that provides the remedy actions for cleaning up a Superfund site

Superfund - is a program operated under the legislative authority of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Superfund Amendment Reauthorization Act (SARA) that funds and carries out the EPA solid waste emergency and long-term removal remedial activities

INFORMATION REPOSITORIES

EPA maintains two information repositories in the Oroville area that contain project documents, fact sheets and other reference materials.

Butte County Public Library
1820 Mitchell Avenue
Oroville, CA 95966
(530) 538-7641

Meriam Library
California State University at Chico
Chico, CA 95929-0295
(530) 898-5720

Superfund Records Center
95 Hawthorne Street
San Francisco, CA 94105
(415) 536-2000

FOR FURTHER INFORMATION

Anyone who has questions or comments can call Jackie Lane, EPA Community Involvement Coordinator, Toll-free at (800) 231-3075 or directly at (415) 972-3236. If you did not receive this fact sheet through the mail, but would like future publications, you can leave you name and address on the toll-free line as well. You can also contact Charles Berrey, EPA Remedial Project Manager for the site, by calling him directly at (415) 972-3146 or leave a message at (800) 231-3075.

SITE BACKGROUND

Since the 1940's, the 205-acre Koppers Company, Inc. (Oroville Plant) site was used to conduct wood treating operations designed to prevent wood deterioration by insects or fungi. Koppers purchased the plant from the National Wood Treating Company in 1955. The facility closed on March 15, 2001.

Chemical and wastewater handling procedures and wood treatment and storage operations have contaminated the soil and groundwater on- and off-property. Fires at the Koppers facility occurred in 1963 and 1987, causing increased contamination at the site. Groundwater, on- and off-property, has been contaminated primarily with pentachlorophenol (PCP). PCP is a polar organic compound used as a wood preservative which has been shown to increase the risk of cancer in laboratory animals and, thus, could possibly be associated with cancer in humans. Soils on-property have been contaminated with PCP and other hazardous substances used in Koppers' wood treating activities. The contaminated groundwater is beneath this site and off-property south of the Koppers site. In 1973, PCP was discovered in nearby residential wells that are used as a source of drinking water.

In 1988, the Koppers Company, Inc. was bought by the parent company of Beazer East, Inc. (Beazer). Beazer later sold the wood treating plant to Koppers Industries, Inc. (KII). KII sold the Oroville facility back to Beazer, Inc. in November 2002. Beazer continues to be recognized as the potentially responsible party for Superfund remediation. Beazer has installed both a 600 gallons per minute (gpm) Pump and Treat System (P&T) for off-property and a 400 gpm P&T for the on-property groundwater contamination and treatment. The off-property P&T was discontinued due to significant progress cleaning up the groundwater. Since 1998, in-situ bioremediation additives have been added to both the on- and off-property groundwater plume areas to speed up the cleanup.

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Koppers Superfund Site

U.S. Environmental Protection Agency $ Region 9 $ San Francisco, CA $ January 2008

Five-Year Review Fact Sheet

This fact sheet provides an update of activities at the Koppers Industries, Inc. Superfund Site and also provides notice of the upcoming five-year review. It is being distributed to EPA's mailing list for the Koppers Site and other interested parties. If you are not on the mailing list and would like to be added, please contact one of the EPA staff listed at the end of this fact sheet.

Five-Year Review

The United States Environmental Protection Agency (EPA) is beginning the third five-year review for the Koppers Superfund Site in Oroville, CA and expects to complete the review in 2008. A five-year review is required by the Superfund law whenever the remedy for a site either leaves waste on site above levels that are safe for unrestricted use or will take longer than five years to reach cleanup goals. The purpose of the five-year review is to determine if the remedy is protective of human health and the environment.

For the Koppers site, the review is required because a) the soil cleanup goals were set at levels that allow for only commercial/industrial use (not residential use) and b) the groundwater remedy includes an area on the former Koppers property where EPA determined that it would be technically impracticable to achieve cleanup levels that allow for unrestricted use of the water. A copy of the Five-Year Review Report will be made available for the public to review both online and at the information repositories (see list on page 2).

Past Five-Year Reviews

Two five-year reviews have been completed for the Koppers site. The first review was completed in December 1997. The review evaluated contamination levels and actions taken on the site up to that point in time. The groundwater treatment and soil consolidation remedies were found to be protective of human health and the environment. The second five-year review evaluated the remedies and any changes at the site that had taken place between December 1997 and February 2003. The review concluded that cleanup remedies remained protective of human health and the environment. The review noted that the deed restriction to prohibit residential use of the Koppers property was not yet in place; that action was completed in November 2003.

Remedy Selection for Koppers

A Record of Decision (ROD) for Koppers was signed in 1989 and has been amended twice, first in 1996 and again in 1999. The Koppers site is currently in the Operation and Maintenance (O&M) phase of the Remedial Action as described in the ROD and ROD amendments. Once the groundwater cleanup goals are met, the site will be de-listed.

Site History

From 1948 until March 2001, the 205-acre Koppers Co., Inc. (Oroville Plant) site was used to conduct wood-treating operations to prevent wood deterioration by insects or fungi. Chemical and waste-water handling procedures, wood treatment and storage operations contaminated the soil and groundwater on and

off site. In 1973, pentachlorophenol (PCP) was discovered in nearby residential wells that were used as a source of drinking water. Fires at the Koppers facility occurred in 1963 and 1987 causing increased contamination at the site. Groundwater, surface water and soils on and off site were contaminated with pentachlorophenol (PCP) and other hazardous substances used in Koppers' wood-treating activities.

In November 2006, the former Koppers plant property (exclusive of those parcels where the site's two landfill cells containing contaminated soils, the groundwater treatment operation and the pond areas are located) was sold to a land developer for development as an industrial park.

Chemicals of Concern

Groundwater

- Pentachlorophenol (PCP)
- Dioxins and Furans
- Boron
- Polycyclic aromatic hydrocarbons (PAHs)
- Heavy metals including copper, chromium and arsenic

Site Soils

- Dioxins and Furans
- Pentachlorophenol (PCP)
- Polycyclic aromatic hydrocarbons (PAHs)
- Heavy metals including copper, chromium and arsenic

Cleanup Actions

The site was addressed in two stages: immediate actions and a long-term remedial phase focusing on cleanup of the entire site.

Immediate Actions

- 1986 – An alternative water supply was provided to residents south of the site in areas of potential groundwater contamination
- 1987 – EPA's Emergency Response personnel performed an emergency cleanup in response to a dioxin release that resulted from an on-site fire
- 1994 – EPA directed Beazer East, Inc. (BEI) to build an on-site landfill for disposal of surface soils containing high levels of dioxin and other contaminants

For More Information

Please visit the website: www.epa.gov/region09/Koppers

Information Repositories

Butte County Public Library
1820 Mitchell Ave.
Oroville, CA 95965
(530) 538-7642

Meriam Library
California State University at Chico
Chico, CA 95929-0295
(530) 898-5862

EPA Superfund Records Center
95 Hawthorne St.
San Francisco, CA 94105
(415) 536-2000

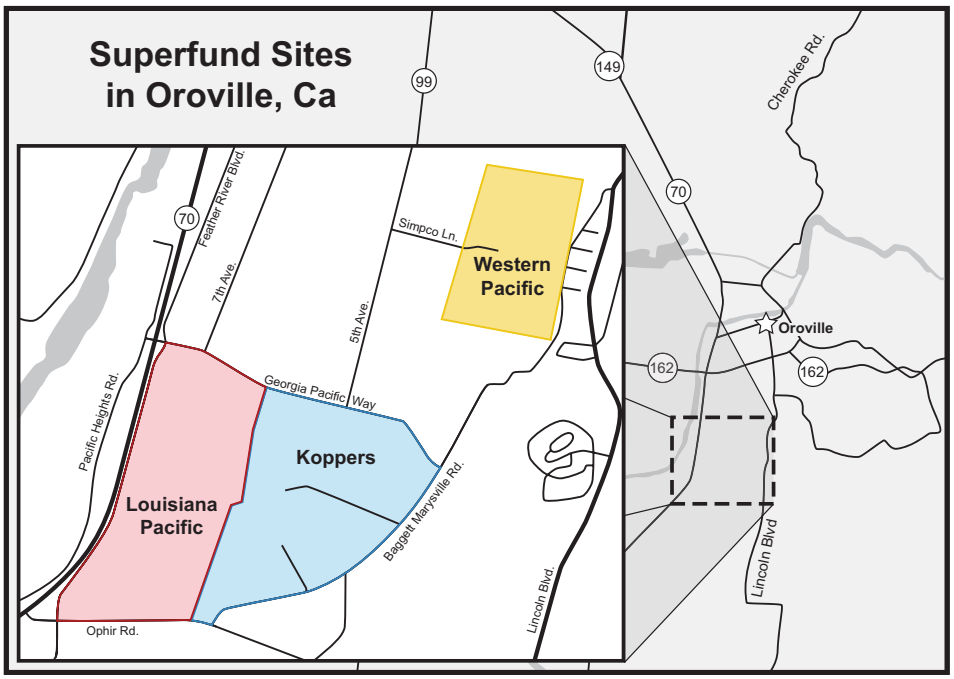
EPA Superfund Sites in Oroville, CA

Koppers Industries, Inc., Louisiana Pacific Corp. and Western Pacific Railroad Co.

This flyer provides an overview of the three Superfund sites in the community of Oroville, CA. It is being distributed to advise the public of current status, cleanup progress and future activities at these sites. If you are not on the mailing list and would like to be added, or if you would like addtitional information about these sites, please see the Additional Information section at the end of this flyer.

In the City of Oroville, CA, there is one current Superfund Site (Koppers Industries, Inc.) with cleanup ongoing and two former Superfund Sites (Louisiana Pacific Corp. and Western Pacific Railroad Co.). In this flyer, the US Environmental Protection Agency (EPA) will give a brief overview of each site and its current status in the Superfund process.

The three sites are located south of downtown Oroville (see figure). Approximately 10,650 people live within a three-mile radius of these sites. These residents depend on groundwater as their source of drinking water, and four California Water Service Company wells are located within three miles of these sites. Water from the wells is blended with water from the Feather River to serve the company's 10,000+ customers. The nearest down-gradient private water supply well is just south of these sites, and there are numerous private water supply wells within three miles of the sites. Contamination of groundwater from site-related chemicals had extended two miles to the south of the sites, but the extent of groundwater contamination has been significantly reduced since cleanup work began at the sites.



Western Pacific:

A former 90-acre railroad yard. Soil and groundwater cleanup was done by Union Pacific Rail Road, and a deed restriction limits future use of the site.

Louisiana-Pacific:

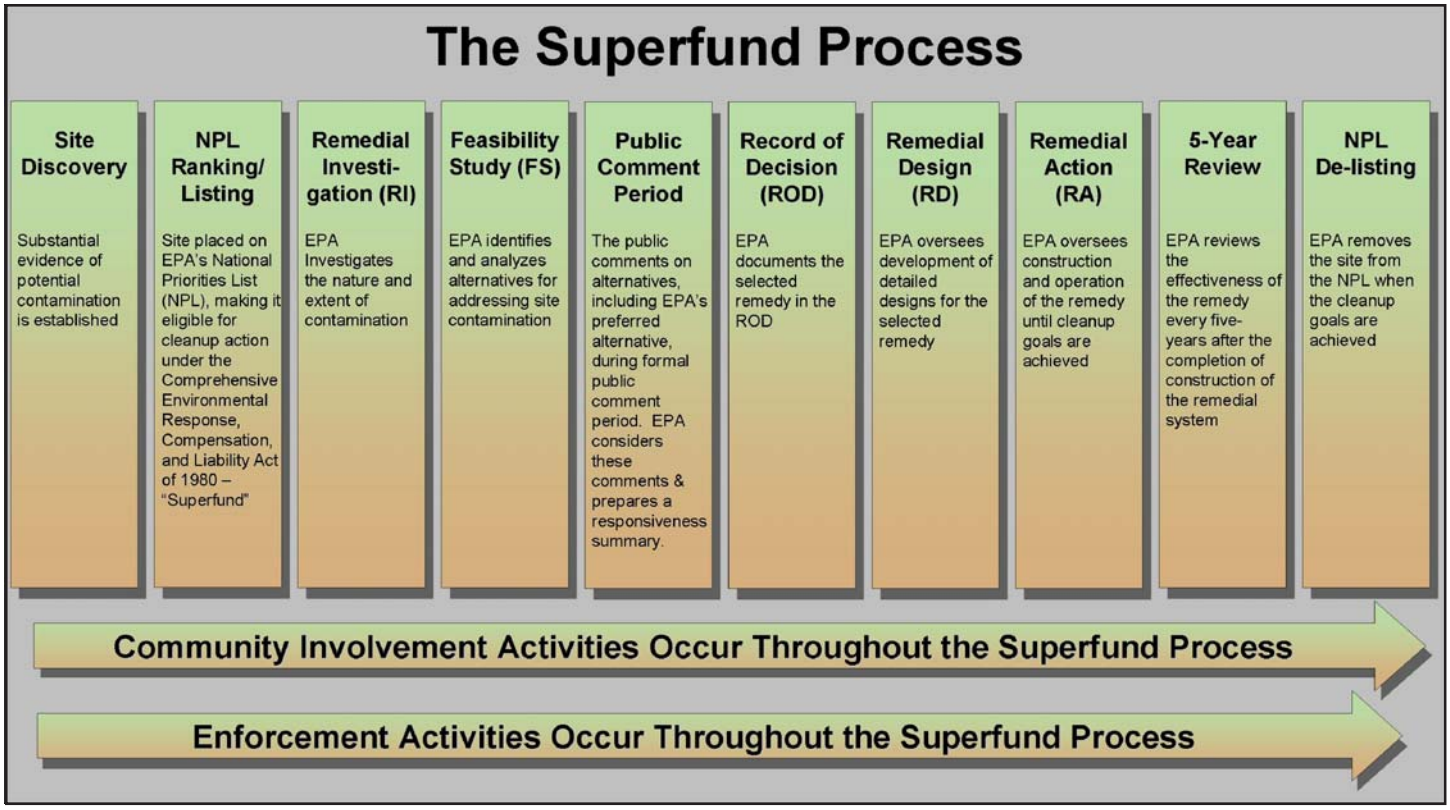
A former saw mill, log deck and hardboard manufacturing plant. No cleanup activities were required and L-P has dismantled its facilities.

Koppers:

A former wood treating plant. Soil cleanup has been completed and groundwater cleanup is ongoing.

What is Superfund?

Superfund is the name given to the federal environmental program established to address abandoned hazardous waste sites; it is administered by the EPA. It is also the name of the cleanup fund established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. This law was enacted in the wake of the discovery of toxic waste dumps such as Love Canal and Times Beach in the 1970s. It allows the EPA to investigate such sites and make responsible parties either perform cleanups or reimburse the government for EPA-lead cleanups.



Site Progress

Koppers Industries, Inc.

Listed: 1984
ROD: 1989
RD/RA: 1992
Five Year Review(s): 1997, 2003 & 2008 (Planned)
Delisted: N/A - Active

Louisiana Pacific Corp

Listed: 1986
ROD: 1995
(No Action Required)
Five Year Review(s): N/A
Delisted: 1996

Western Pacific Railroad

Listed: 1990
ROD: 1997
RD/RA: 1997
Five Year Review(s): 2003 & 2008 (Planned)
Delisted: 2001

Additional Information

Additional information is available for all three Superfund Sites. There are site-specific websites that are maintained by EPA. Remedial Project Managers (RPMs) and Community Involvement Coordinators (CICs) are available if you would like to contact them directly. For site-specific information please see below:

Koppers Industries, Inc.

RPM
Kim Hoang
hoang.kim@epa.gov
415-972-3147

CIC
Luis Garcia-Bakarich
garcia-bakarich.luis@epa.gov
415-972-3237

Web Site
www.epa.gov/region09/Koppers

Louisiana Pacific Corp

RPM
Kim Hoang
hoang.kim@epa.gov
415-972-3147

CIC
Luis Garcia-Bakarich
garcia-bakarich.luis@epa.gov
415-972-3237

Web Site
www.epa.gov/region09/Louisiana-Pacific

Western Pacific Railroad

RPM
Holly Hadlock
hadlock.holly@epa.gov
415-972-3171

CIC
Luis Garcia-Bakarich
garcia-bakarich.luis@epa.gov
415-972-3237

Web Site
www.epa.gov/region09/WesternPacific

Long-term Remedial Actions

Groundwater

- Contain contaminated groundwater and restore the aquifer outside of the TI zone (see below) using pump and treat technology augmented by nutrient addition to enhance natural biological degradation of the groundwater contamination (ongoing)
- Monitor a four-acre Technical Impracticability (TI) zone on the former Koppers property where EPA determined that achieving groundwater cleanup goals is not technically practical (ongoing)

Soils

- Consolidate remaining contaminated soil and debris into a second landfill cell (completed in 2002)
- Deed restriction to prohibit residential use of the former Koppers property (completed in 2003)

Institutional Controls

- Deed Restriction to limit the use of the parcel where the two landfill cells are located (completed in 2006)

Current Extent of Contamination

Soils

Surface soils cleanup was completed in 2002 by placing contaminated soils in the two on-site landfill cells. The landfill cells were constructed in compliance with the requirements for a hazardous waste landfill under the Resource Conservation and Recovery Act (RCRA, the hazardous waste law regulating landfill design). The two landfill cells are lined and capped such that contaminated soils held within do not intermingle with non-contaminated soils and water cannot influence the contaminants that are bound to the soils within. A land-use-covenant that restricts the site to industrial use was put in place in 2003.

Groundwater

Active treatment is addressing groundwater contamination within the site boundaries. At the start of the cleanup, PCPs had been detected in groundwater up to two miles south of the Koppers property. The off-property PCP plume has shrunk considerably, and the off-property groundwater treatment plant on Prince Road has been decommissioned.

EPA Contacts

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Koppers Co., Inc. Superfund Site
Five-Year Review Fact Sheet

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Region 9
75 Hawthorne Street (SFD-3)
San Francisco, CA 94105
Attn: Luis Garcia-Bakarich (Koppers 1/08)

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Koppers Co., Inc. (Oroville Plant)

Superfund Site
Original AR - Part 1 (includes updates 1-3)
Administrative Record Index

To request copies of administrative record documents, an electronic order form is available.

The documents contained in this administrative record file were used by the U.S. Environmental Protection Agency in identifying appropriate remedial activities for use at the Koppers Co., Inc. Superfund site in Oroville, California. These documents are available in the repositories at the Merian Library of Cal. State University at Chico, at Butte County Public Library in Oroville and in the Region 9 Superfund Records Center in San Francisco.
The Koppers administrative record includes an initial set of documents compiled in December 1988 and seven supplements, or additional sets of documents, added since that time. All of these documents have been microfilmed. A brief description of each of these groups of documents is provided below:

Group	AR Doc.#	Format	Description
Initial	1-376	microfilm	Arranged chronologically from 9/26/83 to 8/22/88, with undated documents at the end of the sequence.
Suppl.1	377-512	microfilm	Arranged chronologically from 4/7/86 to 8/29/89. The initial group and this supplement were the basis for the 1989 ROD as well as the actions taken in response to the 1987 fire at the site. Documents related to the post-fire removal action are indicated in the index by an(R) below each document number.
Suppl.2	513 & 514	microfilm	Consists of the 1989 Record of Decision (ROD) and the 1991 Explanation of Significant Differences (i.e., minor modifications to the ROD).
Suppl.3	515&516	microfilm	Includes the Consent Decree requiring Beazer East, Inc. to implement the 1989 ROD.
Suppl.4	517-737	microfilm	Post-ROD documents that support the March 1996 proposed plan
Suppl.5	738-750	microfilm	Post-ROD documents, including the Site-Wide Soils Remedy Report, that support the March 1996 proposed plan.
Suppl.6	751-764	microfilm	Documents received or prepared after the proposed plan was issued - including the ROD amendment.
Suppl.7	765-1054	microfilm	Post-ROD documents that support the 1998 proposed plan - amendment #2 to the ROD for soil and groundwater.
Suppl. 8	1055-1089	microfilm	Documents received or prepared after the proposed plan was issued, including ROD amendment #2.

In addition to the documents described above, a separate administrative record was prepared for the removal action undertaken in 1994 for dioxin-contaminated soil. This removal action AR, contained in two looseleaf binders, is considered to be part of the cumulative AR that was used by EPA in identifying response activities at the site. It is also available in this library.

For ease of use, the indexes for the initial compilation and the eight supplements have been combined to produce a cumulative index that is presented in two formats. The first format lists the documents in AR number order, which reflects the arrangement of the documents in the file. When you are scrolling through the microfilm, the index in AR number order will be most useful for you. The second format lists the documents in ascending chronological order. When you know the date of a particular document you want to look at, use the chronological index. Both indexes contain exactly the same information.

The list of U.S. Environmental Protection Agency guidance documents which were considered or relied upon in the selection of the remedy is document AR 1089 in this administrative record file. Copies of the guidance documents are contained in the Compendium of CERCLA Response Selection Guidance Documents located in the Region 9 Superfund Records Center.

The administrative record file will continue to be added to as documents become available. It will be complete after public comments on EPA's Proposed Plan, EPA's response to comments, and the Record of Decision (ROD) are included.

List of Abbreviations and Acronyms Used in Administrative Record Index

ABBREVIATION	MEANING
ARAR	Applicable or Relevant and Appropriate Restriction (or Requirement)
ATSDR	Agency for Toxic Substances and Disease Registry
CA	State of California
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Superfund)
CRWQCB	California Regional Water Quality Control Board
DHS	Department of Health Services
D&M	Dames & Moore
DTSC	California Department of Toxic Substances Control
EA	Endangerment Assessment
EPA	Environmental Protection Agency
FOIA	Freedom of Information Act
FS	Feasibility Study or Forest Service
FSP	Field Sampling Plan
HRS	Hazard Ranking System
IPE	Isopropyl Ether
LDS	Leak Detection System
MSDS	Material Safety Data Sheets
NPL	National Priorities List
OU	Operable Unit
PAH	Polynuclear Aromatic Hydrocarbon
PCP	Pentachlorophenol
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
RDRA	Remedial Design/Remedial Action
REM	Remedial Hazardous Site Engineering Management (type of contract)
REM/FIT	Remedial Hazardous Site Engineering Management/Hazardous Site Field Investigation Team (contract)
RI	Remedial Investigation

ROC	Record of Communication
ROD	Record of Decision
SAP	Sampling & Analysis Plan
SAS	Special Analytical Services
TAT	Technical Assistance Team
TCDD	Dioxin (Tetrachlorodibenzo-p-dioxin)
TDD	Technical Directive Document
TDS	Total Dissolved Solids
TEF	Toxicity Equivalency Factors
TL	Transmittal Letter
TOC	Total Organic Carbon (or Compound)
US	United States
w/	with
w/TL	with Transmittal Letter

Administrative Record Index

Doc Date	Author / Author Org.	Addressee / Addressee Org.	Title / Subject	Doc ID
-	California Analytical Laboratories, Inc	Environmental Protection Agency - Region 9	Review of analytical data for final surface water & sediment rpt & phase 1 soils rpt (handwritten notes) w/attchs	88056989
-	-	-	Removal sample results, raw data	88056990
-	CA Dept of Health Services	-	Fact sheet: Pentachlorophenol in unexposed populations	88057938
9/26/1983	William Marshall / CA Regional Water Quality Control Board - Central Valley Region	Stephen Smith / Koppers Industries, Inc	Ltr: Re status of cleanup activities	88057698
9/26/1983	William Marshall / CA Regional Water Quality Control Board - Central Valley Region	-	Ltr: Reservations & comments re site inspection, 9/2/83	88057699
7/1/1984	J Exner / International Technology Corp	-	Appendix I - A sampling strategy for clean up of dioxin in soil	88056847
7/8/1984	Vernon Houk / US Dept of Health & Human Services	Morris Kay / Environmental Protection Agency - Region 7	Ltr: Health issues related to cleanup of TCDD contamination	88057700
9/18/1984	Suzanne Chaewsky / Ecology & Environment, Inc	Robert Mandel / Environmental Protection Agency - Region 9	Ltr: Site inspection rpt of 9/05/84	88056848
9/26/1984	Susanne Smith / Koppers Industries, Inc	Paul La Courreye / Environmental Protection Agency - Region 9	Ltr: Superfund money at Koppers	88057701
10/3/1984	R Wilcoxon / CA Dept of Health Services	Harry Seraydarian / Environmental Protection Agency - Region 9	Memo: Rpt of visit to Koppers Co in Oroville on 9/5/84	88056849
4/4/1985	George Muehleck / Ecology & Environment, Inc	Paul La Courreye / Environmental Protection Agency - Region 9	Memo: Rpt of visit to Koppers Co, Oroville, 4/1-2/85	88057702
5/8/1985	Richard Wilcoxon / CA Dept of Health Services	Harry Seraydarian / Environmental Protection Agency - Region 9	Ltr: Re supervision of site cleanup	88057703
5/15/1985	Jessica Donovan / Dames & Moore	George Muehleck / Ecology & Environment, Inc	TL: w/o various documents relating to Koppers site	88057704
9/1/1985	Koppers Industries, Inc	-	Characterization/Treatability study rpt, Koppers Co Inc, Feather River Plant appendices	88056850
9/1/1985	Koppers Industries, Inc	-	Appendix 14, land treatment demonstration study results	88056851
1/31/1986	William Marshall / CA Regional Water Quality Control Board - Central Valley Region	Stephen Smith / Koppers Industries, Inc	TL: Cleanup & abatement order & list of addresses	88056852
2/19/1986	Stephen Smith / Koppers Industries, Inc	Ralph Haynes / City of Palermo	Ltr: Request for permission to drill wells on property	88057705
3/17/1986	Jane Hoppin / Ecology & Environment, Inc	-	CERCLA site sampling plan, Koppers/Louisiana-Pacific study area	88056853
3/18/1986	Stephen Smith / Koppers Industries, Inc	Forrest Johnson / City of Encinitas	Ltr: Expects the well drilling for the RI/FS to get underway in April	88057706
3/19/1986	Stephen Smith / Koppers Industries, Inc	Gene Ferguson / City of Palermo	Ltr: Request for permission to drill wells on property	88057707
3/20/1986	Stephen Smith / Koppers Industries, Inc	G Wright / City of Orange R Wright / City of Orange	Ltr: Expect the well drilling for the well drilling for the RI/FS to get under way in April	88057708
3/20/1986	Stephen Smith / Koppers Industries, Inc	Everett Krakov / City of Wood Lake	Ltr: Expects the well drilling to get under way in April	88057709
3/20/1986	Stephen Smith / Koppers Industries, Inc	L Rodgers / City of Oroville W Rodgers / City of Oroville	Ltr: Expects the well drilling for the RI/FS to get under way	88057710
3/20/1986	Stephen Smith / Koppers Industries, Inc	Art Bugni / Standard Realty & Development Co	Ltr: Re request for permission to run drilling water drain line across Union Pacific property	88057711
3/20/1986	Stephen Smith / Koppers Industries, Inc	J Rodgers / City of Oroville P Rodgers / City of Oroville	Ltr: Request for permission to run drilling water drain across Union Pacific	88057712
3/20/1986	Stephen Smith / Koppers Industries, Inc	W Bettencourt / City of Goodson J Bettencourt / City of Goodson	Ltr: Request for permission to run drilling water drain line across Union Pacific property	88057713
3/21/1986	Forrest Johnson / City of Encinitas	Stephen Smith / Koppers Industries, Inc	Ltr: Permission to drill wells	88057714
4/7/1986	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits quarterly gw monitoring per 1/86 RI/FS workplan w/attch	88057939
4/15/1986	Paul Brossia / Standard Realty & Development Co	Rudolf Schultz / City of Oroville	Ltr: Copy of license agreement for review	88057716

4/15/1986	Paul Brossia / Standard Realty & Development Co	Stephen Smith / Koppers Industries, Inc	Ltr: License agreement	88057715
4/17/1986	Stephen Smith / Koppers Industries, Inc	R Schultz / City of Oroville S Schultz / City of Oroville	Ltr: Monitoring wells need to be drilled	88057717
4/18/1986	Ray Thompson / Hefner, Stark & Marois (Attorneys)	John Murphy / City of Orange	TL: w/ltr to Geoffrey Jones from Stephen Smith on 4/10/86 w/attch map re Prater v Koppers	88057718
4/24/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: EPA's request for a compilation of background hydrology information on Koppers	88057719
4/25/1986	Environmental Protection Agency - Region 9	Koppers Industries, Inc	Administrative order on consent #86-04	88056854
5/1/1986	Koppers Industries, Inc	-	Workplan for RI/FS Study	88056855
5/1/1986	Environmental Protection Agency	-	Fact sheet: EPA & Koppers agree on site investigation plan	88056856
5/1/1986	John Kemmerer / Environmental Protection Agency - Region 9	Thomas Hays / Koppers Industries, Inc	TI: w/o pre-printed pages of consent order	88057720
5/2/1986	Steven Trudell / Dames & Moore	Stephen Smith / Koppers Industries, Inc	Ltr: Transmits 16 copies of RI/FS workplan, w/o encls	88057721
5/7/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: requests additional air quality monitoring	88057722
5/15/1986	Environmental Protection Agency - Region 9	-	Surface water & sediment sampling results w/attach map & memo analysing results	88056857
5/20/1986	Steven Trudell / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Revision #1, RI/FS workplan	88056858
5/22/1986	-	-	Questions & concerns raised at community meeting, reproduced from group memory	88057723
5/22/1986	Steven Trudell / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Initiation of field activities for RI/FS, schedule	88056798
5/29/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Asks Koppers to follow certain criteria in reporting analytical results from field activities at Koppers w/o attch	88057724
6/1/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Receipt of monthly status rpt	88057725
6/5/1986	Environmental Protection Agency - Region 9	-	Community work group mtg agenda	88057726
6/9/1986	Joe DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits final copies of audit plan and checklist forms, w/encls, memo to J DeMartini fr W Hansen 1/14/87 & photos	88056859
6/9/1986	Steven Trudell / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	TL: Revision #2 to RI/FS workplan	88057727
6/10/1986	Steven Trudell / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	TL: w/monthly status rpt for June, rpts initiation of RI/FS for Feather River plant	88057728
6/10/1986	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 5/86, w/TL to John Kemmerer fr Steven Trudell	88056799
6/12/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Comments on the content of Monthly Status Reports	88057685
6/17/1986	-	-	Community meeting notes on meeting held to accept written comments on RI/FS workplan for Koppers	88057729
6/19/1986	Ken Wells / Roy F Weston, Inc - Weston-SPER	William Lewis / Environmental Protection Agency - Region 9	Ltr: Koppers sampling w/attch data & photocopies of photos	88057730
6/20/1986	John Kemmerer / Environmental Protection Agency - Region 9	Thomas Hays / Koppers Industries, Inc	Ltr: Accounting of all response & oversight costs incurred by EPA	88057731
6/20/1986	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: RI/FS quarterly groundwater monitoring rpt for 4/86, w/attchs	88056800
6/20/1986	Steven Trudell / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Monthly Status Report Information RI/FS: Projected sampling schedule w/attachment	88057686
6/23/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Describes what kind of validation criteria is needed for ground water monitoring rpt w/attch QA/QC requirements	88057732
6/25/1986	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Administrative details re 2 projects EPA has let contracts for	88057733
6/26/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Request for additional ground water monitoring & analysis reporting	88057734
7/1/1986	J DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Characterization/treatability study rpt	88056860
7/3/1986	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Difficulty obtaining permission to locate wells on some off-site properties w/attchs	88056861
7/8/1986	Robin Spencer / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Sample plan for Koppers Feather River Plant	88056862
7/9/1986	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Firms contracted to conduct portions of RI/FS	88056863

7/9/1986	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 6/86, w/TL to John Kemmerer fr Steven Trudell	88056801
7/11/1986	Timothy Vendlinski / Environmental Protection Agency - Region 9	Community Work Group	Ltr: 2nd community work group meeting	88057735
7/18/1986	Jon Wactor / Environmental Protection Agency - Region 9	Thomas Hays / Koppers Industries, Inc	Ltr: Accounting of all response and oversight costs incurred by EPA	88057736
7/22/1986	Laura Tom / Environmental Protection Agency - Region 9	Dale Shileikis / Dames & Moore	Ltr: Summary of recent discussion on available EPA quality control (QC) check samples	88057737
7/22/1986	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Addition to mailing list	88057738
7/31/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: EPA recommendations for additional sampling to be done by Koppers	88057740
7/31/1986	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	TL: w/o wastewater treatability rpt	88057739
8/1/1986	Camp Dresser & McKee, Inc	-	Community relations workplan for Koppers Oroville site	88056864
8/1/1986	Camp Dresser & McKee, Inc	-	Community Relations Workplan for Koppers Oroville Site, Oroville, California	88056840
8/7/1986	Thomas Hays / Koppers Industries, Inc	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: RI/FS quarterly monitoring w/3 tables, ltr to D Kerschner fr S Trudell 6/30/86 & marginalia	88057741
8/8/1986	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 7/86, w/TL to John Kemmerer fr Steven Trudell	88056802
8/12/1986	Jon Wactor / Environmental Protection Agency - Region 9	Thomas Hays / Koppers Industries, Inc	Ltr: Comments re quarterly gw monitoring rpt for 4/86	88057742
8/12/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Response to 6/25/86 ltr re administrative detail on air quality & surface water/sediment sampling projects	88057743
8/13/1986	Woodward-Clyde Consultants	-	Feather River Plant soils sampling audit rpt w/Apps A-E, photos & TL to John Kemmerer fr S Huntsman & J DeMartini	88056874
8/14/1986	Tim Vendlinski / Environmental Protection Agency - Region 9	Community Work Group	Ltr: 3rd Community Work Group mtg agenda, 8/20/86	88057744
8/19/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Release of several thousand gallons of water to residential property incident on 8/14/86 w/faxed handwritten TL fr J Kemmerer fr S Smith, 8/20/86	88057745
8/20/1986	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	TL: Transmits drawing for water containment structure for RI/FS well drilling (handwritten fax)	88056875
8/20/1986	Community Work Group	-	Summary of questions & comments for Koppers Site Community Work Group mtg	88057746
8/25/1986	Environmental Protection Agency - Region 9	-	Response to comments re public review of RI/FS workplan w/TL to Community Members fr J Kemmerer 8/25/86	88057754
8/27/1986	Jon Wactor / Environmental Protection Agency - Region 9	Thomas Hays / Koppers Industries, Inc	Ltr: Response & oversight costs incurred by EPA up to 4/25/86	88057748
8/27/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: RI/FS workplan revisions for endangerment assessment	88057747
9/8/1986	Michelle Sealy / Citizens for Clean Water	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Clean-up goals of Koppers Hazardous Waste Site	88057749
9/9/1986	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 8/86	88056803
9/12/1986	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Revisions to Feather River RI/FS	88057750
9/18/1986	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Additional air quality & surface water investigations	88057753
9/18/1986	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Response to 8/12/86 letter re air quality & surface water investigations	88057751
9/18/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Response to 8/12/86 ltr re coordination of Endangerment Assessment w/Koppers RI/FS work & transmits ICF/Clement tentative EA schedule w/o encls	88057752
9/24/1986	Koppers Industries, Inc	Environmental Protection Agency - Region 9	RI/FS quarterly groundwater monitoring rpt, 7/86, w/TL to John Kemmerer fr Stephen Smith	88056804
9/25/1986	Sean Kennedy / Ecology & Environment, Inc	-	Data Validation rpt: SAS 2403Y, analysis: organics for PCP, PAH, & IPE, w/TL to A Strauss fr K Kitchingman 9/25/86	88056865
9/25/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Koppers violation of sect V of Consent Order for site & receipt of incomplete draft phase I surface water & sediment rpt	88057755
9/26/1986	Stephen Smith / Koppers Industries, Inc	Interested Persons / NONE	Ltr: Groundwater situation update #23, w/7/86 monitoring results	88056805
9/29/1986	Thomas Hays / Koppers Industries, Inc	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: Letters on superfund site past response costs	88057756

10/7/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Water containment structure for well drilling at Feather River Plant	88057757
10/9/1986	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 9/86, w/TL to John Kemmerer fr Steven Trudell	88056806
10/10/1986	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Guidelines for resolution of problem at well RI-4 w/attachment	88057687
10/15/1986	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Confirmation of 10/14/86 telephone call re comments on quarterly monitoring rpts	88057758
10/15/1986	Environmental Protection Agency - Region 9	-	Comments on draft remedial action objectives & potential remedial action alternatives rpt w/TL to D Kerschner fr J Kemmerer, 10/15/86	88057759
10/16/1986	Sean Kennedy / Ecology & Environment, Inc	-	Data Validation rpt: SAS 2403Y, analysis: Cl, Cr, B, As, TDS, TOC, & others w/TL to A Strauss fr K Kitchingman, 10/16/86	88056876
10/23/1986	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Koppers is in technical disagreement with EPA's decision to re-enter broken casing pieces	88057688
10/24/1986	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Drilling schedule for Feather River RI/FS	88057760
10/27/1986		Dames & Moore	RI/FS phase I draft soil rpt, Apps C-G	88056884
10/30/1986	John Kemmerer / Environmental Protection Agency - Region 9	Michelle Sealy / Citizens for Clean Water	Ltr: Standards & process to determine for cleanup requirements at superfund sites w/attch	88056877
11/4/1986	Robert Williams / Ecology & Environment, Inc	-	REM/FIT zone 2, drilling audit rpt of Feather River Plant w/Apps A-E & photos (Cont #68-01-6692, TDD #R-09-8402-37)	88056878
11/4/1986	Environmental Protection Agency - Region 9	-	Comments on draft surface/water sediment rpt w/TL to D Kerschner fr J Kemmerer, 11/4/86	88057761
11/7/1986	Dames & Moore	-	Monthly Status Report for October 1986 w/TL to John Kemmerer from Steven Trudell	88056841
11/12/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Transmits comments on draft alternatives screening rpt w/encl	88057762
11/12/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Sealing of drive casing near RI-4	88057763
11/13/1986	Citizens for Clean Water	-	Summary of 11/13/86 special community mtg w/list of participants	88057764
11/14/1986	Dames & Moore	Koppers Industries, Inc	RI/FS, remedial action objectives & potential remedial action alternatives rpt, w/TL to J Kemmerer fr S Trudell	88056879
11/14/1986	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Temporary impoundment for RI/FS pump tests, w/drawing & percolation test data	88056807
11/18/1986	Citizens for Clean Water	-	Summary of 11/18/86 Work Group mtg	88057765
11/19/1986	Bob Williams / Ecology & Environment, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Memo: Oversight of field work performed by Dames & Moore at Feather River site 11/14/86 & 11/17/86	88057766
11/19/1986	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Temporary impoundment for pump test water should not be used during the upcoming pump test at RI-10	88057767
11/20/1986	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Draft alternatives screening rpt for Feather River RI/FS re requirements of Task 11	88057768
11/20/1986	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: RI/FS project schedule	88057769
11/20/1986	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Recalculations of percolation tests fr temporary impoundment, w/ltr 11/20/86 to S Smith of Koppers Co fr K Whisenhunt of Cook Assoc & attchs	88056808
11/21/1986	Environmental Protection Agency - Region 9	-	Comments on draft phase I soil rpt w/TL to D Kerschner fr J Kemmerer, 11/21/86	88057770
11/24/1986	Dames & Moore	Koppers Industries, Inc	RI/FS, phase 1 draft well installation rpt, w/Apps A-E	88056880
11/24/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Comments on rpt of remedial action objectives & potential RA alternatives	88057771
11/26/1986	Dames & Moore	Koppers Industries, Inc	RI/FS, final phase 1 surface water & sediment rpt, w/Apps A-D	88056881
12/1/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: EPA informing Koppers of violation of sect 5 of consent order for site & receipt of phase 1 surface water & sediment rpt	88057772
12/2/1986	Robert Peterson / California Analytical Laboratories, Inc	Stephen Smith / Koppers Industries, Inc	Ltr: References amended data sheet sent 10/30/86 w/attchs & TL to N Prince fr S Smith 12/8/86	88056882
12/2/1986	Steven Trudell / Dames & Moore	David Kerschner / Koppers Industries, Inc	Ltr: Recommendations for additional phase I work remedial investigation w/TL to J Kemmerer fr D Kerschner, 12/2/86	88057773

12/2/1986	Steven Trudell / Dames & Moore	David Kerschner / Koppers Industries, Inc	Ltr: Recommendations for additional phase I work remedial investigation w/TL to J Kemmerer fr D Kerschner, 12/2/86	88057774
12/5/1986	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Air pathway of contaminant migration & potential remediation measures applied to emission sources	88057775
12/8/1986	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Response to 11/24/86 ltr re air emissions for existing plant operations do not fall under CERCLA jurisdiction	88057776
12/8/1986	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Additional phase I work	88057777
12/8/1986	Stephen Smith / Koppers Industries, Inc	John Bettencourt, Resident / City of Louisberg, MO Wilma Bettencourt, Resident / City of Louisberg, MO	Ltr: Permission to drill a test hole on property as part of gw investigation w/map	88057778
12/8/1986	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Response to 11/24/86 ltr re air emissions for existing plant operations do not fall under CERCLA jurisdiction	88057779
12/9/1986	Stephen Smith / Koppers Industries, Inc	Everett Krachov, Resident / City of Wood Lake	Ltr: Permission to drill well on property w/map	88057780
12/9/1986	Dames & Moore	-	Monthly Status Report for November 1986 w/TL to John Kemmerer from Steven Trudell	88056842
12/10/1986	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Actions taken re use of impoundment	88057781
12/11/1986	Dave Kerschner / Koppers Industries, Inc	Steven Trudell / Dames & Moore	Drilling delays during phase I well installation program w/TL to J Kemmerer fr D Kerschner, 1/6/87	88057794
12/12/1986		Dames & Moore	RI/FS final phase I soil rpt, w/Apps A-G & maps	88056883
12/12/1986	Steven Trudell / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Additional information for phase I surface water & sediment rpt RI/FS w/attchs	88056885
12/12/1986	Environmental Protection Agency - Region 9	-	Summary of responses to EPA 11/21/86 comments for phase I soil rpt RI/FS w/TL to J Kemmerer fr Steven Trudell, 12/12/86	88057782
12/12/1986	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: RI/FS quarterly gw monitoring rpt for 10/86	88057783
12/13/1986	Dames & Moore	-	RI/FS alternatives screening rpt	88056886
12/16/1986	Environmental Protection Agency - Region 9	-	Comments on draft phase I well installation rpt w/TL to D Kerschner fr J Kemmerer, 12/16/86	88057784
12/17/1986	Community Work Group	-	Draft mtg summary for 12/17/86 Community Work Group mtg w/attch 1	88057785
12/17/1986	Environmental Protection Agency - Region 9	-	Community work group mtg announcement	88057786
12/18/1986	John Kemmerer / Environmental Protection Agency - Region 9	Bobbie Peterson, Resident / City of Oroville	Ltr: Possible impacts fr problems that occured during installation of well as a part of RI/FS w/map & rough sketch of conditions of stuck casing	88057787
12/19/1986	Steven Trudell / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	TL: Laboratory QA documentation analysis of surface water, sediment & soil samples RI/FS	88057788
12/30/1986	Jeff Zelikson / Environmental Protection Agency - Region 9	James Batchelder / Koppers Industries, Inc	Ltr: Demand for payment of penalties for violations of Administrative Order on Consent	88057789
12/31/1986	Robert Peterson / California Analytical Laboratories, Inc	Stephen Smith / Koppers Industries, Inc	Ltr: Analytical data from soil samples tested for PCPs	88057790
1/1/1987	CA Dept of Health Services	-	Drinking water action levels recommended by Dept of Health Services	88057791
1/5/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Comments on RI/FS alternatives screening rpt	88057792
1/6/1987	William Hansen / Woodward-Clyde Consultants	Joseph DeMartini / Woodward-Clyde Consultants	Memo: Oversight field inspection of offsite drilling activities on 10/24/86 & 10/25/86 (Cont #68-01-6939)	88057793
1/7/1987	Dames & Moore	-	RI/FS phase I well installation rpt, w/Apps A-E, TL to J Kemmerer fr S Trudell, 1/6/87 & responses to comments in EPA ltr of 12/16/86	88056887
1/8/1987	Thomas Hays / Koppers Industries, Inc	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: Concern that confidential correspondence not be released to Citizens for Clean Water	88057795
1/9/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: RI/FS preventive actions at stuck casing	88057796
1/9/1987	Dames & Moore	-	Monthly Status Report for December 1986 w/TL to John Kemmerer from Steven Trudell	88056843
1/14/1987	Environmental Protection Agency - Region 9	-	Community Work Group mtg summary for Koppers Oroville & Louisiana-Pacific sites w/attch 1	88056888
1/14/1987	William Hansen / Woodward-Clyde Consultants	Joseph DeMartini / Woodward-Clyde Consultants	Memo: Observations of dual tube reverse air rotary drilling at exploration hole EH-1 w/photos	88056889

1/14/1987	Environmental Protection Agency - Region 9	-	Community work group mtg announcement re Koppers & Louisiana-Pacific superfund sites	88057797
1/15/1987	Fred Baker / Dames & Moore	Steven Trudell / Dames & Moore	Memo: Recommendations for continued RI field work at Feather River plant w/tables	88056890
1/19/1987	E. Gonzalez / Woodward-Clyde Consultants	W.R. Hansen / Woodward-Clyde Consultants	Memo: Observation of Louisiana Pacific Site, 1/7/87 to 1/16/87 w/photos (Cont #68-01-6939)	88056891
1/20/1987	Steven Trudell / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Response to additional EPA comments alternatives screening rpt RI/FS, Feather River plant w/tables	88056892
1/20/1987	Dames & Moore	Environmental Protection Agency - Region 9	RI/FS quarterly monitoring 10/86 sampling round, laboratory rpts & QA documentation	88056809
1/21/1987	Thomas Hays / Koppers Industries, Inc	Jeff Zelikson / Environmental Protection Agency - Region 9	Ltr: Feather River proposed penalty in draft phase 1 surface water & sediment rpt w/attchs	88056829
1/21/1987	Jon Wactor / Environmental Protection Agency - Region 9	Thomas Hays / Koppers Industries, Inc	Ltr: Confidentiality of info submitted pursuant to consent order #86-04	88057798
1/21/1987	Thomas Hays / Koppers Industries, Inc	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: EPA intention re emissions fr wood treating process w/ltr to D Kerschner fr J Kemmerer 1/5/87	88057799
1/26/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Results of RI/FS October Sampling Round w/attachments	88057689
1/27/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Proposed mtg on status of RI/FS, 2/11/87	88057800
1/30/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Quality assurance documentation, RI/FS w/attchs 1-4	88057801
2/9/1987	Dames & Moore	Environmental Protection Agency - Region 9	Monthly Status Report for January 1987 w/TL to John Kemmerer from Steven Trudell	88056810
2/17/1987	-	-	Water sampling (Handwritten data)	88056951
2/17/1987	Environmental Protection Agency - Region 9	-	Community work group mtg announcement w/o encl	88057802
2/18/1987	Jean Czuczwa / Battelle Memorial Institute	Koppers Industries, Inc	Final rpt on determination of polychlorinated dibenzo-P-dioxins & polychlorinated dibenzofurans in water samples w/TL to S Smith fr J Czuczwa 2/18/87	88056893
2/19/1987	Thomas Hays / Koppers Industries, Inc	Environmental Protection Agency - Superfund Accounting	Ltr: Transmits check representing payment for past salary & travel costs w/encl	88057804
2/19/1987	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits material Safety Data sheets (MSDS) for melamine & dicyandiamide to formulate NCX fire retardant w/encl	88057805
2/19/1987	John Kemmerer / Environmental Protection Agency - Region 9	Norman Prater / City of Oroville	Ltr: Transmits list of chemicals under review by EPA in preparing the endangerment assessment for site w/encl	88057806
2/24/1987	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Transmits recommended changes in well completion procedures (Cont #68-01-6939)	88057811
2/26/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: EPA position on phase 2 work	88057807
2/26/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: EPA position on phase 2 work	88057808
3/3/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Confirmation of plans for mtg on RI/FS status, 3/16/87	88057809
3/6/1987	Keystone Environmental Resources, Inc	-	Alternatives screening rpt, Addendum 1, sources of cost data w/TL to J Kemmerer fr D Kerschner 3/6/87	88056894
3/9/1987	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 2/87, w/TL to John Kemmerer fr Steven Trudell	88056811
3/10/1987	Jody Hudson / Environmental Protection Agency - Region 7	-	Quality assurance project plan for air monitoring at dioxin remediation sites w/Apps A & B, rev 0	88056895
3/10/1987	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Additional phase 2 work for discussion on 3/16/87 mtg	88057863
3/18/1987	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Construction of meteorological station at Feather River plant	88057810
3/23/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits field oversight notes for RI w/attch	88056896
3/23/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits field oversight notes for RI w/attchs	88056897
3/25/1987	-	-	Meeting summary for Louisiana-Pacific superfund site, community mtg	88056898
3/27/1987	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits 2 tables re April gw monitoring wells	88057812
3/31/1987	Fred Baker / Dames & Moore	Steven Trudell / Dames & Moore	Recommendations for continued RI field work at Feather River plant w/TL to J Kemmerer fr S Trudell 3/31/87	88056899

3/31/1987	Fred Baker / Dames & Moore	Steven Trudell / Dames & Moore	Recommendations for continued RI field work at Feather River plant w/TL to J Kemmerer fr S Trudell 3/31/87	88056900
3/31/1987	Joseph Niland / Dames & Moore	William Hansen / Woodward-Clyde Consultants	Ltr: Transmits draft copy of completion data for RI wells at Feather River plant w/encl	88057813
4/8/1987	William Hansen / Woodward-Clyde Consultants	Joseph DeMartini / Woodward-Clyde Consultants	Memo: Oversight of dual tube reverse air rotary drilling at Feather River plant, progress rpt #7 w/photos (REM 2 Cont #68-01-6939)	88056901
4/8/1987	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: ROC of Endangerment assessment (EA) conducted by EPA contractor as part of Feather River RI/FS	88057814
4/9/1987	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 3/87, w/TL to John Kemmerer fr Steven Trudell	88056812
4/10/1987	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Transmits preliminary sampling results from EPA sampling performed on 4/7/87 pursuant to order 87-03 w/attch	88056902
4/10/1987	Jeff Zelikson / Environmental Protection Agency - Region 9	Koppers Industries, Inc	Administrative order for removal action, docket #87-03 (incomplete)	88056903
4/10/1987	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Transmits results from EPA sampling performed on 4/7/87 pursuant to order 87-03 w/o encl	88057815
4/10/1987	Jeff Zelikson / Environmental Protection Agency - Region 9	Glen Tenley / Koppers Industries, Inc	Ltr: Transmits unilateral order w/o encl & certified mail receipt #P 017 638 023	88057816
4/13/1987	Thomas Hays / Koppers Industries, Inc	Jon Wactor / Environmental Protection Agency - Region 9 John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Delay in implementation of 4/86 RI/FS order on consent re RI/FS	88057817
4/16/1987	California Analytical Laboratories, Inc	Koppers Industries, Inc	Water samples fr 4/6/87 fire	88056904
4/21/1987	Thomas Hays / Koppers Industries, Inc	James Grove / Environmental Protection Agency - Region 9	Ltr: Oroville plant lagoon w/attch	88057818
4/21/1987	Dames & Moore	Environmental Protection Agency - Region 9	Water level contour maps for 12/86-3/87, w/TL to John Kemmerer fr Fred Baker	88056813
4/22/1987	Thomas Hays / Koppers Industries, Inc	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: Transmits Feather River site assessment plan pursuant to order #87-03 w/encl	88056905
4/23/1987	Environmental Protection Agency - Region 9	-	Incident rpt re fire on 4/6/87 w/attch (supplement to rpt fr Koppers)	88056906
4/23/1987	William Hansen / Woodward-Clyde Consultants	Joseph DeMartini / Woodward-Clyde Consultants	Ltr: Transmits oversight of activities, progress rpt #7, 4/8/87 w/encl	88056907
4/24/1987	O H Materials Corp	Koppers Industries, Inc	Workplan for facility decontamination wood treatment plant, w/Apps A-D	88056908
4/29/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Transmits comments to site assessment plan 4/22/87 w/attch	88057819
4/30/1987	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: 2d quarter 87 gw sampling w/attch	88057820
5/4/1987	Dames & Moore	Koppers Industries, Inc	RI/FS, phase 2 surface water & sediment rpt, w/Apps A-D	88056909
5/7/1987	John Kemmerer / Environmental Protection Agency - Region 9	Don Speegle, Resident / City of Oroville	Ltr: Transmits results of analyses for pentachlorophenol & penta breakdown products w/attch	88056910
5/7/1987	Jon Wactor / Environmental Protection Agency - Region 9	Thomas Hayes / Koppers Industries, Inc	Ltr: Modification of order #87-03	88057821
5/8/1987	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 4/87, w/TL to John Kemmerer fr Steven Trudell	88056814
5/8/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Results of RI/FS January Sampling Round w/attached tables	88057695
5/11/1987	Steven Simanonok / Environmental Protection Agency - Region 9	-	Wipe samples from Koppers fire of 4/6/87 (w/handwritten notes)	88057822
5/11/1987	Thomas Hays / Koppers Industries, Inc	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: Compliance with order #87-03	88057823
5/13/1987	Thomas Hays / Koppers Industries, Inc	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: Transmits sampling results as required by assessment plan w/attch	88056911
5/15/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits additions to 2nd quarter 87 monitoring 4/30/87 w/attch	88056912
5/15/1987	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Progress of RI/FS	88057824
5/18/1987	Environmental Protection Agency - Region 9	-	Community work group meeting announcement w/mtg summary of 2/17/87 & attch A	88056950
5/18/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Comments on facility decontamination plan	88057825
5/18/1987	Community Work Group	-	Community work group mtg summary, Koppers & Louisiana-Pacific superfund sites w/attch A	88057826
5/20/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Correction to January sampling round: value for onsite well MW-16	88057690

5/22/1987	Jeff Zelikson / Environmental Protection Agency - Region 9	Glen Tenley / Koppers Industries, Inc	Ltr: Modification of order 87-03 re industrial processes & plant operations, w/attch	88057828
5/22/1987	Keystone Environmental Resources, Inc	Waleco Corp	Laboratory Treatability Report: Attachment 4	88056759
5/26/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Comments on draft phase 2 surface water & sediment rpt	88057829
5/26/1987	James Batchelder / Koppers Industries, Inc	Jim Grove / Environmental Protection Agency - Region 9	Ltr: Request for additional info re calculated values for assessment plot samples w/marginalia	88057830
5/28/1987	Stephen Smith / Koppers Industries, Inc	Daniel Shane / Environmental Protection Agency - Region 9	Memo: Transmits preliminary results of soil assessment tests w/encl	88056913
5/28/1987	David Kerschner / Keystone Environmental Resources, Inc	Jim Grove / Environmental Protection Agency - Region 9	Ltr: Revised workplan for facility decontamination at Feather River plant	88057831
5/29/1987	Emilio Gonzalez / Woodward-Clyde Consultants	Joseph DeMartini / Woodward-Clyde Consultants	Memo: Oversight of air rotary drilling & well installation progress rpt #11, week ending 5/29/87 w/photos (Cont #68-01-6939)	88057832
5/29/1987	Stephen Smith / Koppers Industries, Inc	James Grove / Environmental Protection Agency - Region 9	ROC: Disposal of well development water as part of RI/FS w/attch	88057833
6/2/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits draft copy of performance audit of gw monitoring prog, 2nd quarter 87 w/encl	88056914
6/2/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits performance audit of gw monitoring program 2nd quarter 87, 5/28/87 w/attch	88056915
6/3/1987	Judith Ayres / Environmental Protection Agency - Region 9	Jane Dolan / Butte County - Board of Supervisors	Ltr: Response to incident at site	88057835
6/5/1987	Emilio Gonzalez / Woodward-Clyde Consultants	Joseph DeMartini / Woodward-Clyde Consultants	Memo: Oversight of air rotary drilling & well installation, progress rpt #12, week ending 6/5/87 w/photos (Cont #68-01-6939)	88056916
6/8/1987	John Kemmerer / Environmental Protection Agency - Region 9	James Batchelder / Koppers Industries, Inc	Ltr: Transmits 4 documents on Toxicity Equivalency Factors (TEF) values w/encls	88056917
6/9/1987	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 5/87, w/TL to John Kemmerer fr Fred Baker	88056815
6/10/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits oversight progress rpts #8 3/27/87, #9 4/3/87, #10 4/10/87 & #11 4/29/87 w/attch (Cont #68-01-6939)	88056918
6/12/1987	Dames & Moore	Koppers Industries, Inc	RI/FS phase 2, surface water & sediment rpt, w/Apps A-D, maps & TLs to J Kemmerer fr F Baker 5/15/87	88056919
6/12/1987	Paul Marshall / CA Dept of Health Services - Toxic Substances Control Div	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Topics re preliminary discussion for preparing blanket ARAR policy & transmits ARARs for site w/ encls	88056920
6/12/1987	Emilio Gonzalez / Woodward-Clyde Consultants	Joseph DeMartini / Woodward-Clyde Consultants	Memo: Oversight of air rotary drilling & well installation progress rpt #13, week ending 6/12/87 (Cont #68-01-6939)	88056921
6/15/1987	Stephen Smith / Koppers Industries, Inc	Jerry Clifford / Environmental Protection Agency - Region 9	Ltr: Fire assessment results w/attchs	88056922
6/17/1987	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits final results fr waste water system samples w/o attchs 2 & 3	88057836
6/17/1987	CA Dept of Health Services - Toxic Substances Control Div	-	Applied action levels	88057837
6/18/1987	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Decontamination work at site	88057838
6/19/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: EPA oversight activities, gw investigation re RI/FS	88057839
6/24/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: RI/FS sampling round w/attchs	88056923
6/24/1987	Jeff Zelikson / Environmental Protection Agency - Region 9	Glen Tenley / Koppers Industries, Inc	Ltr: Permission granted to operate/process South of site assessment plot 12 re Order 87-03	88057840
6/24/1987	Jeff Zelikson / Environmental Protection Agency - Region 9	Glen Tenley / Koppers Industries, Inc	Ltr: Order 87-03 re industrial processes & plant operations at site	88057841
6/24/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Results of RI/FS April Sampling Round w/attachments	88057691
6/26/1987	Emilio Gonzalez / Woodward-Clyde Consultants	Joseph DeMartini / Woodward-Clyde Consultants	Memo: Oversight of drilling & well installation progress rpt #15, week ending 6/26/87 w/photos (Cont # 68-01-6939)	88056924
6/30/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits oversight rpts for activities, progress rpts #11 5/29/87, #12 6/5/87, #13 6/12/87 w/attch (Cont # 68-01-6939)	88056925
7/1/1987	Community Work Group	-	Community Work Group draft mtg summary Koppers & Louisiana-Pacific superfund sites w/attch A	88056926
7/1/1987	Environmental Protection Agency - Region 9	-	Community Work Group mtg announcement w/o encls	88057842
7/6/1987	Paul Marshall / CA Dept of Health Services - Toxic Substances Control Div	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Review & comments for phase 2 surface water & sediment rpt of 6/12/87 w/o encls	88057843
7/6/1987	John Kemmerer / Environmental Protection Agency - Region 9	Bob Jupin / Keystone Environmental Resources, Inc	Ltr: Transmits preliminary data fr meteorological monitoring fr 5/28/87 to 6/24/87, w/attch	88057844

7/9/1987	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 6/87, w/TL to John Kemmerer fr Fred Baker	88056816
7/10/1987	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: EPA required revisions to decontamination plan	88057845
7/10/1987	Jeff Zelikson / Environmental Protection Agency - Region 9	Glen Tenley / Koppers Industries, Inc	Ltr: Approval of creosote wood treatment process operation re order 87-03	88057846
7/13/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits field rpts for oversight of activities, progress rpt #15, 6/26/87 w/attch (Cont #68-01-6939)	88056927
7/14/1987	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Soil sample results fr temporary pond w/attchs	88057847
7/15/1987	Jeff Zelikson / Environmental Protection Agency - Region 9	Glen Tenley / Koppers Industries, Inc	Ltr: Order 87-03 re industrial processes & plant operations at site	88057850
7/15/1987	Jeff Zelikson / Environmental Protection Agency - Region 9	Glen Tenley / Koppers Industries, Inc	Ltr: Approval for certain operations re order 87-03	88057848
7/15/1987	Thomas Hays / Koppers Industries, Inc	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: Intentions to restart Cellon cylinder re order #87-03	88057849
7/17/1987	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Dioxin risk assessments & furans levels related to 4/6/87 fire	88057851
7/20/1987	Paul Marshall / CA Dept of Health Services - Toxic Substances Control Div	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Review & comments of phase 2 draft surface water & sediment rpt	88057852
7/21/1987	P Chattopadhyay / Ecology & Environment, Inc	Environmental Protection Agency - Region 9	QC/QA data review summary w/App A (TDD #F9-8704-06)	88056928
7/22/1987	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: 3rd quarter gw sampling w/marginalia	88057853
7/23/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Transmits evaluation of preliminary aquifer test results w/attch (REM 2 Cont #68-01-6939)	88056930
7/28/1987	Mark McClanahan / US Dept of Health & Human Services - Agency for Toxic Substances & Disease Registry	Donald Hawkins / Environmental Protection Agency - Region 9	Ltr: Evaluation of proposed cleanup plan for wood treatment facility	88057854
7/28/1987	Mark McClanahan / US Dept of Health & Human Services - Agency for Toxic Substances & Disease Registry	Donald Hawkins / Environmental Protection Agency - Region 9	Ltr: Evaluation of proposed cleanup plan for wood treatment facility	88057855
7/31/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits oversight activities, progress rpt #16, 7/3/87, w/attch	88056931
7/31/1987	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	TL: Analytical data packs for air sampling w/o encl	88057856
8/1/1987	Environmental Protection Agency - Region 9	-	Koppers & Louisiana-Pacific progress rpt, 8/87	88056932
8/1/1987	Environmental Protection Agency - Region 9	-	Progress rpt Koppers & Louisiana-Pacific superfund sites	88057857
8/5/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: RI/FS surface water/sediment sampling pursuant to consent order	88057858
8/5/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: RI/FS surface water/sediment sampling pursuant to consent order	88057859
8/6/1987	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 7/87, w/TL to John Kemmerer fr Fred Baker 8/7/87	88056817
8/7/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits monthly status rpt on RI/FS for 7/87 w/attch	88056933
8/7/1987	Jill Blundon / Koppers Industries, Inc	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: Report required by amended paragraph 7 re order 87-03	88057860
8/10/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits oversight activities, progress rpt #17, 7/10/87 w/attch	88056934
8/10/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Follow-up on RI/FS mtg on 8/6/87	88057861
8/12/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits oversight activities, progress rpt #18, 7/17/87 w/attchs & photos	88056935
8/13/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits oversight activities, progress rpt #20, 7/31/87 w/attchs & photos	88056936
8/14/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: RI/FS work revisions on soils & surface water/sediments	88057862
8/14/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: RI/FS work revisions on soils & surface water/sediments	88057864
8/17/1987	Jeff Zelikson / Environmental Protection Agency - Region 9	Glen Tenley / Koppers Industries, Inc	Ltr: Resume operation of penta-in-oil process re order 87-03	88057865
8/17/1987	Jeff Zelikson / Environmental Protection Agency - Region 9	Glen Tenley / Koppers Industries, Inc	Ltr: Resume operation of penta-in-oil process re order 87-03	88057866
8/19/1987	I C F/Clement	Environmental Protection Agency - Region 9	Draft preliminary endangerment assessment of Feather River Plant	88056937
8/20/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Transmits draft preliminary endangerment assessment w/o attch	88057884
8/26/1987	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Pentachlorophenol silo samples	88057867

8/31/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits oversight activities, progress rpt #21, 8/27/87 w/attchs	88056938
8/31/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Disposal of water fr Louisiana-Pacific gw monitoring wells	88057868
9/2/1987	Community Work Group	-	Community Work Group mtg summary, Koppers & Louisiana-Pacific superfund sites w/map	88056939
9/8/1987	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits rpt on follow-up performance audit of gw monitoring program, 3rd quarter, 9/1/87 w/attch	88056948
9/9/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits monthly status rpt for 8/87 w/encl	88056940
9/9/1987	John Kemmerer / Environmental Protection Agency - Region 9	Michelle Sealy / Citizens for Clean Water	Ltr: Transmits documents of concerns raised in 9/2/87 community work group mtg w/o encl	88057869
9/9/1987	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 8/87, w/TL to John Kemmerer fr Fred Baker	88056818
9/10/1987	Mark Bashor / US Dept of Health & Human Services - Agency for Toxic Substances & Disease Registry	Michele Sealy / Citizens for Clean Water	Ltr: Request for ATSDR health assessment	88057870
9/14/1987	Alex Cunningham / CA Dept of Health Services	Jeff Zelikson / Environmental Protection Agency - Region 9	Ltr: Transmits ARARs for hazardous waste cleanup w/encl	88056941
9/16/1987	John Kemmerer / Environmental Protection Agency - Region 9	Bob Jupin / Keystone Environmental Resources, Inc	Ltr: Transmits data fr meteorological monitoring 5/87 to 8/87 w/attch	88056942
9/18/1987	Jill Blundon / Koppers Industries, Inc	Jeff Zelikson / Environmental Protection Agency - Region 9	Ltr: Actions taken to expedite cleanup & restart of operations pursuant to order #87-03	88057871
9/18/1987	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: RIFS gw monitoring program w/attch	88057872
9/22/1987	Jon Wactor / Environmental Protection Agency - Region 9	Jill Blundon / Koppers Industries, Inc	Ltr: Request for payment of past response & oversight costs	88057873
9/22/1987	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits Dames & Moore review of hydrogeologic portion of Feather River RI w/attch	88057874
9/23/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Additional pumping tests proposal	88057875
9/24/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: RI/FS 8/87 sampling round w/attchs	88056943
9/24/1987	Dames & Moore	Environmental Protection Agency - Region 9	RI/FS 8/87 sampling round, w/TL to John Kemmerer fr Fred Baker	88056819
10/7/1987	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: RI/FS gw monitoring	88057876
10/8/1987	Jeff Zelikson / Environmental Protection Agency - Region 9	Helen Perivier / Greenpeace	Ltr: Resumption of pentachlorophenol (PCP) wood treating operations w/attch	88057877
10/9/1987	Dames & Moore	Koppers Industries, Inc	RI/FS draft phase 1B soil rpt, w/App A, maps & TL to J Kemmerer fr F Baker 10/9/87	88056944
10/9/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits monthly status rpt for 9/87 w/attch	88056945
10/9/1987	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 9/87, w/TL to J Kemmerer fr F Baker	88056820
10/13/1987	James Allen / CA Dept of Health Services - Toxic Substances Control Div	Keith Takata / Environmental Protection Agency - Region 9	Ltr: Initial identification of ARARs for site w/attchs	88056946
10/13/1987	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Additional field work pursuant to sect V.E. of consent order	88057878
10/14/1987	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits laboratory results for samples fr RI-15 w/attch	88057879
10/21/1987	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Permission to use surface impoundment at Feather River plant for disposal of drilling water fr Louisiana-Pacific site	88057880
10/23/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: RI/FS additional work in soil, surface water & sediment sampling w/attchs	88057881
10/28/1987	John Kemmerer / Environmental Protection Agency - Region 9	James Hansen, Resident / City of Oroville	Ltr: Issues re investigation of Koppers & Louisiana-Pacific sites	88056949
10/29/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Comments on draft phase 1B soil rpt pursuant to consent order w/attch	88056947
10/29/1987	Paul Marshall / CA Dept of Health Services - Toxic Substances Control Div	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Review comments on draft phase 1B soil rpt	88057882
11/3/1987	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Review comments on draft phase 1B soil rpt	88057883
11/4/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits analytical results for boiler ash sample collected in 8/87 required in draft phase 1B soil rpt w/encls	88056952
11/5/1987	Jeff Zelikson / Environmental Protection Agency - Region 9	Glen Tenley / Koppers Industries, Inc	Ltr: Removal of pentachlorophenol fr storage silo re order 87-03	88057803

11/5/1987	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Review comments of draft preliminary endangerment assessment	88057885
11/5/1987	Environmental Protection Agency - Region 9	-	Ltr: Progress rpt & next community mtg announcement	88057903
11/9/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits RI/FS monthly status rpt for 10/87 w/encls	88056953
11/9/1987	Stephen Smith / Koppers Industries, Inc	Paul Brossi / Union Pacific Railroad Co	Ltr: Investigation of gw contamination w/map	88057886
11/9/1987	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 10/87, w/TL to John Kemmerer fr Fred Baker	88056821
11/19/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Request for comments on draft preliminary endangerment assessment & need for more progress on FS, w/o attchs	88056822
11/20/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Response to comments re draft phase 1B soil rpt w/attch	88057887
11/30/1987	John Kemmerer / Environmental Protection Agency - Region 9	Kay Lynn Newhart, Resident / City of Oroville	Ltr: Sampling of pentachlorophenol storage silo w/attchs	88056954
11/30/1987	John Kemmerer / Environmental Protection Agency - Region 9	Kay Lynn Newhart, Resident / City of Oroville	Ltr: Sampling of penta silo w/attch	88057888
11/30/1987	John Kemmerer / Environmental Protection Agency - Region 9	Michelle Sealy / Citizens for Clean Water	Ltr: Volatile organic compounds in soil study	88057889
12/9/1987	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits RI/FS monthly status rpt for 11/87 w/encls	88056955
12/9/1987	Jill Blundon / Koppers Industries, Inc	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: Transmits agreement exempting Koppers fr liability costs & expenses for EPA activities ar Feather River plant w/encl	88057890
12/9/1987	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 11/87, w/TL to John Kemmerer fr Fred Baker	88056823
12/10/1987	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Schedule for RI/FS rpt	88057891
12/11/1987	John Kemmerer / Environmental Protection Agency - Region 9	-	Memo: Transmits Koppers 12/2/87 ltr re Dames & Moore recommendations for additional phase 1 work at site w/o attch	88057892
12/16/1987	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Louisiana-Pacific RI/FS, EPA use of Koppers wastewater treatment facilities, w/o attchs	88057893
12/17/1987	David Clark, IV / Ecology & Environment, Inc	William Lewis / Environmental Protection Agency - Region 9	TAT rpt - Koppers Feather River plant site assessment & monitoring	88056834
1/1/1988	I C F Technology, Inc	-	Toxicity assessment for contaminants present at site w/references	88056956
1/4/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits RI/FS monthly status rpt for 12/87 w/encls	88056957
1/4/1988	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 12/87, w/TL to John Kemmerer fr Fred Baker	88056824
1/5/1988	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmittal of letter fr Dames & Moore which presents achievable deadlines for project	88057894
1/7/1988	Environmental Protection Agency - Region 9	-	Progress rpt, Koppers & Louisiana-Pacific superfund sites w/Community Work Group draft mtg summary, 11/5/87	88056958
1/11/1988	Dames & Moore	Koppers Industries, Inc	RI/FS draft phase 2 well installation rpt, w/maps	88056959
1/11/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits RI/FS 10/87 sampling round w/attch	88056960
1/11/1988	Dames & Moore	Environmental Protection Agency - Region 9	RI/FS 10/87 sampling round, w/TL to John Kemmerer fr Fred Baker	88056825
1/14/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Completion of aquifer pump tests	88057895
1/21/1988	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Soil plot samples fr fire to be retested for dioxins & furans	88057896
1/22/1988	Joseph DeMartini / Woodward-Clyde Consultants	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits oversight rpt for well construction, piezometer P1, 1/18/88 w/encl	88056961
1/26/1988	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Soil plot retesting	88057897
2/1/1988	Environmental Protection Agency - Region 9	-	Progress rpt w/Community Work Group mtg summary 1/7/88	88056962
2/1/1988	Environmental Protection Agency - Region 9	-	Progress rpt	88057898
2/4/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: RI/FS schedule w/attchs	88056963
2/5/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Phase 3 surface water & sediment sampling round w/attchs	88056964
2/5/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits RI/FS monthly status rpt for 1/88 w/encl	88056965

2/5/1988	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 1/88, w/TL to John Kemmerer fr Fred Baker	88056826
2/12/1988	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Comments on penta silo closure plan w/attchs	88056966
2/17/1988	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Inventory of wastes in containers at Feather River plant	88057899
2/18/1988	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Schedule agreement for phase 2 work	88057900
2/19/1988	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Conditional approval of penta silo closure plan	88057901
2/22/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: RI/FS schedule	88057902
2/29/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: RI/FS air investigation	88057904
2/29/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Performance of Air-Emissions Investigation	88057696
3/7/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Phase 1 gw summary rpt (Folder Pts 1-3)	88056967
3/8/1988	Paul Marshall / CA Dept of Health Services - Toxic Substances Control Div	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Review comments of draft phase 2 well installation rpt	88057905
3/8/1988	Richard Graham / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: EPA claim for response & oversight costs for site	88057906
3/9/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits monthly status rpt for 2/88 w/encl	88056968
3/9/1988	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 2/88, w/TL to John Kemmerer fr Fred Baker	88056827
3/18/1988	John Kemmerer / Environmental Protection Agency - Region 9	Sue Powers, Resident / City of Oroville	Ltr: Transmits product use guidelines for wood treating chemicals w/attchs	88056969
3/18/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Discharge of water produced during L-P RI/FS & transmits RI/FS workplan for site w/o encl	88057907
3/21/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits laboratory analysis rpt for soil samples w/encls	88056970
3/25/1988	Jill Blundon / Koppers Industries, Inc	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: RI/FS air investigation	88057909
3/25/1988	Stephen Smith / Koppers Industries, Inc	Richard Vaille / Environmental Protection Agency - Region 9	Ltr: Contaminated soil disposal	88057908
3/31/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Transmits comments to draft RI/FS phase 1 gw summary rpt 3/7/88	88056971
3/31/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Transmits comments to draft RI/FS phase 1 gw summary rpt 3/7/88	88056972
3/31/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Toxicity assessment for contaminants present at Koppers Co plant, w/rpt	88056828
4/1/1988	Environmental Protection Agency - Region 9	-	Progress rpt w/Community Work Group mtg summary 3/9/88	88056973
4/1/1988	Paul Marshall / CA Dept of Health Services - Toxic Substances Control Div	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Review comments of phase 1 gw summary rpt 3/7/88	88057910
4/1/1988	CA Dept of Health Services	-	Fact Sheet: Health advisory on egg & chicken consumption	88057911
4/1/1988	CA Dept of Health Services	-	Fact Sheet: California health dept continues investigation of Oroville area egg contamination	88057912
4/4/1988	Jeff Zelikson / Environmental Protection Agency - Region 9	Richard Graham / Koppers Industries, Inc	Ltr: Documentation of EPA response & oversight costs for site & demand for payment	88057913
4/5/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits quarterly RI/FS 1/88 sampling round	88056974
4/5/1988	Marianne Rogers / Lyon County, NV - Board of County Commissioners	Environmental Protection Agency - Region 9	Ltr: FOIA Request	88056795
4/7/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits monthly status rpt for 3/88 w/encls	88056975
4/7/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Ground water modeling studies & computer hardware difficulties	88057914
4/7/1988	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 3/88, w/TL to John Kemmerer fr Fred Baker	88056830
4/11/1988	Robert Peterson / Enseco-California Analytical Laboratory	Stephen Smith / Koppers Industries, Inc	Ltr: Transmits report for three soil samples for fire proj w/encls	88056976
4/11/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Environmental Protection Agency - Region 9	Ltr: Confirms mtg plans re RI/FS draft phase 1 gw summary rpt revisions at 4/18/88 w/agenda, mtg notes & list of attendees	88057915
4/11/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Completion of plugging the R7-4 drillhole	88057916

4/13/1988	Cate Jenkins / Environmental Protection Agency - Washington, D C	Jeff Zelikson / Environmental Protection Agency - Region 9	Memo: Citizen current & past exposures at wood treating facility	88057917
4/13/1988	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits soil plot 15 results w/attch	88057918
4/14/1988	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Koppers claims force majeure due to computer hardware problems	88057919
4/15/1988	Jerry Clifford / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Disposal of contaminated soil	88057920
4/16/1988	Michelle Sealy / Citizens for Clean Water	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: RI/FS phase 1 gw summary rpt, 3/7/88	88057921
4/22/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits response to comments re RI/FS phase 1 gw summary project rpt w/maps	88056977
4/26/1988	CA Dept of Health Services	-	Oroville community mtg agenda re dioxin in eggs	88057922
4/26/1988	Betsy Curnow / Environmental Protection Agency - Region 9	Richard Wagner / Environmental Protection Agency - Office of Inspector General	Memo: Referral of citizen complaint w/attch	88057923
4/26/1988	Environmental Protection Agency - Region 9	-	Community mtg re historical domestic well water quality data w/attch	88057924
4/26/1988	Hannah Pavlik / Dames & Moore	Naomi Goodman / I C F Technology, Inc	Ltr: Transmits 1 floppy diskette containing data from gw quality database w/o encl	88057925
4/27/1988	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits monthly rpt ltr for 12/83 & waste discharge requirements annual rpt for 1983 to clarify data erroneously reported, w/encls	88056978
4/28/1988	Jeff Zelikson / Environmental Protection Agency - Region 9	Sylvia Lowrance / Environmental Protection Agency - Washington, D C	Ltr: Review comments of Cate Jenkins memo re draft gw summary rpt, 3/7/88 w/concurrences	88056929
5/3/1988	Michelle Sealy / Citizens for Clean Water	Jeff Zelikson / Environmental Protection Agency - Region 9	Ltr: Comments re historical domestic well water quality data w/ltr to Congressman Dingell	88057927
5/3/1988	David Kerschner / Koppers Industries, Inc	James Allen / CA Dept of Health Services - Toxic Substances Control Div	Ltr: Closure plan for treatment pond, biological filter bed & spray irrigation field for Koppers per admin order	88057928
5/3/1988	Jeff Zelikson / Environmental Protection Agency - Region 9	Marianne Rogers / Lyon County, NV - Board of County Commissioners	Ltr: Response to FOIA RIN-9-0454-88, re Environmental Resource Management, Koppers, Selma Treating Company, information on Koppers	88056796
5/6/1988	Dames & Moore	Koppers Industries, Inc	RI/FS phase 3 surface water & sediment rpt	88056979
5/9/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits monthly RI/FS status rpt for 4/88 w/soil chemical & physical analyses rpt	88056980
5/9/1988	David Kerschner / Koppers Industries, Inc	Jeff Zelikson / Environmental Protection Agency - Region 9	Ltr: Cate Jenkins memo, 4/13/88 & data entry error in historical database	88057929
5/10/1988	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 4/88, w/TL to John Kemmerer fr Fred Baker 5/9/88	88056831
5/11/1988	Jerry Clifford / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: Disposal of excavated soil fr site	88057930
5/12/1988	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits chain of custody forms & lab check form for samples in question w/encls	88056981
5/17/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Data processing error in historical database	88057931
5/17/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Dames & Moore computer hardware difficulties & RI/FS schedule w/attch	88057932
5/19/1988	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Dames & Moore computer systems problem & force majeure	88057933
5/25/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Review comments on RI/FS revised gw summary rpt, draft phase 3 surface water & sediment rpt w/attch	88056982
6/3/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits monthly status rpt for 5/88 w/encls	88056983
6/3/1988	Dean Calland / Babst, Calland, Clements & Zomnir (Attorneys)	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: Payment of EPA past response & oversight costs at site Docket #86-04 w/o attch	88057934
6/13/1988	Cate Jenkins / Environmental Protection Agency - Office of Solid Waste & Emergency Response	John Dingell / US Congress Frank Lautenburg / US Senate - Committee on Environment & Public Works Max Baucus / US Senate - Committee on Environment & Public Works	Ltr: Congressional investigation & oversight of EPA	88056984
6/21/1988	John Kemmerer / Environmental Protection Agency - Region 9	James Batchelder / Koppers Industries, Inc	Ltr: Koppers agrees to modify agreement of 3/9/88 with EPA re discharge of drilling water w/attached Agreement	88057692
6/27/1988	Dames & Moore	-	RI/FS rpt, Koppers Feather River plant, Appendices A-F	88056760

7/1/1988	Keystone Environmental Resources, Inc	Newport Assoc Development Co	Treatability Rpt-Lab Demo Evaluating Biodegradation of Coal Tar Related Chemicals of Interest in Soil/Groundwater in Former Manufactured Gas Holders	88056761
7/6/1988	Stephen Smith / Koppers Industries, Inc	Interested Persons / NONE	Ltr: Transmits quarterly gw monitoring results for 7/87, 10/87 & 1/88 w/attchs	88056985
7/7/1988	Stephen Smith / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Include 5 extra wells fr south of Palermo Rd in 7/88 quarterly sampling w/map	88057935
7/8/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits monthly status rpt for 6/88 w/encl	88056986
7/11/1988	Dames & Moore	Environmental Protection Agency - Region 9	Remedial Investigation Report	88056762
7/13/1988	Fred Baker / Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Transmits response to comments re RI/FS phase 1 gw summary rpt w/encls (Parts 1 & 2)	88056987
8/2/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Review comments on draft RI rpt, schedule w/attch	88056988
8/8/1988	Jeff Zelikson / Environmental Protection Agency - Region 9	James Batchelder / Koppers Industries, Inc	Ltr: Demand for payment of penalties for violation of order	88057936
8/10/1988	Dames & Moore	-	Monthly Status Report for July 1988 w/TL to John Kemmerer, 8/10/88	88056763
8/11/1988	Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	RI/FS April Sampling Round w/TL to John Kemmerer, 8/11/88	88056764
8/22/1988	Jeff Zelikson / Environmental Protection Agency - Region 9	James Batchelder / Koppers Industries, Inc	Ltr: EPA request for information utilized in preparation of phase 1 gw summary rpt	88057937
8/30/1988	Dames & Moore	-	Response to comments re RI/FS rpt	88056765
9/1/1988	Keystone Environmental Resources, Inc	Koppers Industries, Inc	Toxicologic Profiles	88056793
9/10/1988	Koppers Industries, Inc	-	Monthly Status Report for August 1988 w/TL to J Kemmerer fr F Baker, 9/10/88	88056766
9/15/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: EPA Review of Comments on RI/FS Completed, Endangerment Assessment due 9/30/88	88057640
9/19/1988	David Kerschner / Koppers Industries, Inc	Jeff Zelikson / Environmental Protection Agency - Region 9	Ltr: Response to two ltrs dated 8/8/88 & 8/22/88 re RI/FS	88057641
9/20/1988	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	TL: Toxicologic Profiles	88057642
9/23/1988	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: EPA not following process defined in order request to review & comment on workplan for air monitoring program	88057643
9/26/1988	Jerry Clifford / Environmental Protection Agency - Region 9	David Kerschner / Keystone Environmental Resources, Inc	Ltr: Request for Information re Compilation of Data from Koppers Superfund Site	88057644
9/26/1988	John Kemmerer / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: EPA use of Koppers surface impoundment, w/memo to W Hansen fr E Gonzalez, 7/27/88, & attch	88057645
9/27/1988	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Response to EPA Comments on RI Report, Endangerment Assessment & Resultant Feasibility Study Schedules	88057646
9/30/1988	Fred Baker / Dames & Moore	Dan Lincicome / TechLaw, Inc	TL: Documents Related to RI/FS Appendix C	88056767
10/5/1988	David Kerschner / Koppers Industries, Inc	Jerry Clifford / Environmental Protection Agency - Region 9	Ltr: "Davis Database"	88057647
10/6/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Keystone Environmental Resources, Inc	Ltr: EPA's Position on Issues Raised in Ltrs of 9/27/88 & 9/23/88	88057648
10/10/1988	Dames & Moore	-	Monthly Status Report for September 1988 w/TL to J Kemmerer fr F Baker 10/10/88	88056768
10/12/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	TL: Transmittal of Workplan & Analysis Plan for Emission Testing	88057650
10/14/1988	Stephen Smith / Koppers Industries, Inc	Jerry Clifford / Environmental Protection Agency - Region 9	Ltr: Plan to Dispose of Some Fire Related Wastes to a CERCLA Approved Hazardous Waste Facility	88057651
10/19/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Modeling Results Will Not Be In RI/FS, Koppers Involvement In Endangerment Assessment, Issues At 10/11/88 Meeting	88057652
10/20/1988	Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	RI/FS July Semi-Annual Sampling Round w/TL's to John Kemmerer 10/20 & 10/21/88	88056769
10/25/1988	Mary O'Donnell / Environmental Protection Agency - Region 9	Pam Herman / City of Chico	TL: Administrative Record	88057654
10/31/1988	Stephen Smith / Koppers Industries, Inc	Interested Persons / NONE	Ground Water Situation Update #27	88056770
11/1/1988	Ebasco Services, Inc	-	Final Endangerment Assessment	88056771
11/4/1988	Dames & Moore	-	Monthly Status Report for October 1988 w/TL to John Kemmerer, 11/04/88	88056772
11/4/1988	David Clark, IV / Ecology & Environment, Inc	William Lewis / Environmental Protection Agency - Region 9	TAT rpt - Koppers Feather River plant pentachlorophenol silo removal, Oroville	88056832

11/4/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Keystone Environmental Resources, Inc	TL: Endangerment Assessment	88057655
11/8/1988	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	TL: Comments Concerning EBASCO's Workplan/Sampling & Analysis Plan for Emissions Testing at Koppers Feather River Plant	88057656
11/18/1988	Chester Babst / Babst, Calland, Clements & Zomnir (Attorneys)	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: Partial Response to Issues Raised at Meeting at EPA-9 in October 1988	88057657
11/30/1988	John Kemmerer / Environmental Protection Agency - Region 9	Don Speegle, Resident / City of Oroville	Ltr: Transmits HRS Scoring Package, w/attached HRS Package	88057658
12/1/1988	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpt for 11/88, w/TL to John Kemmerer fr Allen Kearns	88056833
12/2/1988	John Kemmerer / Environmental Protection Agency - Region 9	Laurie Kimball / NONE	TL: Documents on Health Effects of Pentachlorophenol	88057659
12/13/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	TL: EPA's Emission Estimation Plan	88057660
12/19/1988	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Koppers Industries, Inc	Ltr: Quality assurance review of tabulated data in appendix C of phase 1 ground water summary rpt	88057661
12/20/1988	Chester Babst / Babst, Calland, Clements & Zomnir (Attorneys)	Jon Wactor / Environmental Protection Agency - Region 9	Ltr: Request that EPA reconsider position on draft FS schedule	88057694
1/1/1989	Ruth Sheldon, Resident / City of Oroville	Environmental Protection Agency - Region 9	Ltr: Questions re Superfund sites	88057662
1/9/1989	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Response to 9/26/88 ltr, agrees that EPA has satisfied item 3 of 3/9/88 agreement	88057663
1/19/1989	John Kemmerer / Environmental Protection Agency - Region 9	Donn Diebert / CA Dept of Health Services - Toxic Substances Control Div	Ltr: Request for Written Comments on Draft FS Rpt	88057664
1/27/1989	Dames & Moore	John Kemmerer / Environmental Protection Agency - Region 9	RI/FS Quarterly Sampling Round w/TL to John Kemmerer, 1/27/89	88056774
1/27/1989	Daniel McGovern / Environmental Protection Agency - Region 9	Victor Kimm / Environmental Protection Agency - Region 9	Memo: Dioxin-contaminated animal products in Oroville w/attchs	88057665
1/31/1989	Dames & Moore	Environmental Protection Agency - Region 9	Monthly Status Report on RI/FS for December 1988 w/TL to J Kemmerer fr A Kearns	88056794
2/9/1989	John Kemmerer / Environmental Protection Agency - Region 9	Ruth Sheldon, Resident / City of Oroville	Ltr: Response to request for info on Superfund sites around country & inquiry re how sites are identified & evaluated for NPL, w/charts & list of deleted sites	88057666
2/17/1989	Dames & Moore	-	Draft-Ground Water Modeling Report-Section 6 & Appendix E w/TL to J Kemmerer fr A Kearns, 2/17/89	88056776
2/17/1989	David Kerschner / Keystone Environmental Resources, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Suggested Changes to Groundwater Monitoring Program w/Attached Tables	88057667
2/21/1989	David Kerschner / Keystone Environmental Resources, Inc	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Ltr: Options Regarding Water Discharge at Feather River Plant, Intent to Conduct Pilot-Scale Treatability Study	88056777
2/24/1989	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Keystone Environmental Resources, Inc	Ltr: Comments on Draft FS	88057668
2/27/1989	Jeff Zelikson / Environmental Protection Agency - Region 9	David Kerschner / Keystone Environmental Resources, Inc	Ltr: Reconsideration & review of issues raised in ltr fr C Babst to Jon Wactor re air monitoring at Oroville	88057669
2/28/1989	Jerry Clifford / Environmental Protection Agency - Region 9	William Morris / Koppers Industries, Inc	Ltr: 104(e) request for information	88056778
2/28/1989	Dames & Moore	Environmental Protection Agency - Region 9	Monthly Status Report for February 1989 w/TL to J Kemmerer fr A Kearns, 02/28/89 & Sampling Reports for Jan 26-Feb 20, 1989	88056779
2/28/1989	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Keystone Environmental Resources, Inc	Ltr: Receipt & Approval of Draft Groundwater Modeling Report (Section 6 of Phase I Ground Water Summary)	88057670
3/1/1989	Koppers Industries, Inc	-	Newsletter: "Update newsletter"	88056835
3/8/1989	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Keystone Environmental Resources, Inc	TL: Documentation on New DHS Applied Action Level for PCP in Drinking Water	88057671
3/8/1989	David Kerschner / Koppers Industries, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Comments on Feather River Draft FS Report	88057672
3/10/1989	Stephen Smith / Koppers Industries, Inc	Interested parties / NONE	Ltr: RI Approved by EPA, Draft FS Submitted to EPA & Transmittal of Ground Water Monitoring Results for 10/88 w/Attachments	88056780
4/7/1989	Ronald O'Toole / Keystone Environmental Resources, Inc	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Ltr: Technical overview of proposed pilot-scale groundwater treatment system w/attchs	88056836
4/17/1989	John Kemmerer / Environmental Protection Agency - Region 9	Ed Cargile / CA Dept of Health Services	Information on Keystone Environmental Experience w/Bioremediation	88057673
4/24/1989	Dames & Moore	Environmental Protection Agency - Region 9	RI/FS January Semi-Annual Sampling Round w/TL to J Kemmerer fr A Kearns, 4/24/89	88056781

4/28/1989	CA Regional Water Quality Control Board - Central Valley Region	-	CRWQCB Central Valley Region Order #89-073 Water Discharge Requirements for Koppers & Beazer w/TL to Steve Smith, 5/15/89 & Information Sheet	88056785
5/1/1989	Environmental Protection Agency - Region 9	-	Fact Sheet: Proposed cleanup plans for Koppers site	88056837
5/2/1989	TechLaw, Inc	Environmental Protection Agency - Region 9	Quality Assurance Audit Report for RI/FS Phase I Ground Water Summary Report for Koppers Feather River w/TL to John Kemmerer, 5/2/89	88056782
5/10/1989	Stephen Smith / Koppers Industries, Inc	-	Business & Contingency Plan, Feather River Plant, Koppers Industries, Inc. (Revision 2)	88056783
5/12/1989	James Byard / NONE	Oroville Industrial Development Corp	Koppers Wood Treatment Plant-Evaluation of Hazards to the Oroville Community w/TL to J Kemmerer fr D Kerschner, 6/20/89	88056784
5/15/1989	Dames & Moore	-	Revised Draft Feasibility Study Report, Koppers Feather River Plant Job #14247-014-44	88056786
5/15/1989	John Kemmerer / Environmental Protection Agency - Region 9	Ed Cargile / CA Dept of Health Services	Ltr: Transmits revised FS rpt to Don Diebert	88057674
6/1/1989	James Hansen, Resident / City of Oroville	-	Comments & questions on Superfund sites in greater Oroville (CA) area	88057675
6/8/1989	Jeffrey Mott / Butte County Air Pollution Control District	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Comments on Proposed Cleanup Strategy for Koppers Superfund Site w/Attached Copy of District Rules 401, 402 & 403	88057676
6/13/1989	Environmental Protection Agency - Region 9	-	Public Hearing re Proposed Plan to Clean Up Contamination On & In Vicinity of Koppers Superfund Site	88056787
6/13/1989	Sherri Wheaton / NONE	-	Student Term Paper on Pentachlorophenol	88056788
6/16/1989	Louisiana-Pacific Corp	John Kemmerer / Environmental Protection Agency - Region 9	Comments of Louisiana Pacific Corp on EPA's Proposed Clean Up Plans for Koppers Company Superfund Site	88056789
6/16/1989	Anthony Landis / CA Dept of Health Services	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Comments on EPA's Proposed Clean-up Plan for the Koppers-Oroville Site w/Attached Memorandum & Maps	88057678
6/16/1989	David Kerschner / Beazer Materials & Services, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Request Copy of Administrative Record Index	88057679
6/18/1989	Betty Vassar, Resident / City of Oroville	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Request to Test Private Wells	88057680
6/19/1989	Keystone Environmental Resources, Inc	Beazer Materials & Services, Inc	Evaluation of the Endangerment Assessment	88056790
6/20/1989	David Kerschner / Beazer Materials & Services, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Comments on RI/FS & Proposed Remedial Action Plan w/Attachments	88057681
6/20/1989	James Pedri / CA Regional Water Quality Control Board - Central Valley Region	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Comments on EPA's Proposed Cleanup Plan w/Attached Memorandum	88057682
6/20/1989	John Kemmerer / Environmental Protection Agency - Region 9	David Kerschner / Beazer Materials & Services, Inc	TL: Administrative Record Index	88057683
6/27/1989	Dames & Moore	Environmental Protection Agency - Region 9	Monthly Status Report for April 1989 w/Table-Estimated RI/FS Completion by Task as of 4/30/89 w/TL to J Kemmerer fr A Kearns, 6/27/89	88056792
7/1/1989	Keystone Environmental Resources, Inc	Beazer Materials & Services, Inc	Statement of Work, Remedial Technology Evaluations, Feather River Treated Wood Site w/TL to John Kemmerer from David Kerschner 07/18/89	88056838
7/28/1989	David Kerschner / Beazer Materials & Services, Inc	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Revised Appendix C-1 to Feather River Groundwater Summary Report ("Davis Database") w/Attached Appendix	88057684
8/29/1989	John Kemmerer / Environmental Protection Agency - Region 9	-	List of Guidance Documents	88056839
9/1/1989	Environmental Protection Agency - Region 9	-	Operable unit record of decision & response summary	88056844
9/27/1989	Dames & Moore	Environmental Protection Agency - Region 9	Monthly status rpts w/TLs to J Kemmerer fr A Kearns, 5/89 & 7/89-8/89	88056791
1/29/1991	Daniel McGovern / Environmental Protection Agency - Region 9	-	Explanation of significant differences (signed)	88056845
6/26/1991	Richard Stewart / US Dept of Justice - Environment & Natural Resources Div	-	Notice re lodging of consent decree pursuant to CERCLA (Federal Register, v56, #123, p 29263)	88057697
2/6/1992	US Dept of Justice - Environment & Natural Resources Div	-	Consent decree for RD/RA & recovery of past response costs, USA v Beazer East Inc, civil action docket #S-91-767 LKK, w/apps B-C & w/o app A	88056846

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Pacific Southwest, Region 9: Superfund
Serving Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations

Koppers Co., Inc. (Oroville Plant)

Superfund Site
Original AR - Part 2 (includes updates 4-8)
Administrative Record Index

To request copies of administrative record documents, an electronic order form is available.

The documents contained in this administrative record file were used by the U.S. Environmental Protection Agency in identifying appropriate remedial activities for use at the Koppers Co., Inc. Superfund site in Oroville, California. These documents are available in the repositories at the Merian Library of Cal. State University at Chico, at Butte County Public Library in Oroville and in the Region 9 Superfund Records Center in San Francisco.
The Koppers administrative record includes an initial set of documents compiled in December 1988 and seven supplements, or additional sets of documents, added since that time. All of these documents have been microfilmed. A brief description of each of these groups of documents is provided below:

Group	AR Doc.#	Format	Description
Initial	1-376	microfilm	Arranged chronologically from 9/26/83 to 8/22/88, with undated documents at the end of the sequence.
Suppl.1	377-512	microfilm	Arranged chronologically from 4/7/86 to 8/29/89. The initial group and this supplement were the basis for the 1989 ROD as well as the actions taken in response to the 1987 fire at the site. Documents related to the post-fire removal action are indicated in the index by an(R) below each document number.
Suppl.2	513 & 514	microfilm	Consists of the 1989 Record of Decision (ROD) and the 1991 Explanation of Significant Differences (i.e., minor modifications to the ROD).
Suppl.3	515&516	microfilm	Includes the Consent Decree requiring Beazer East, Inc. to implement the 1989 ROD.
Suppl.4	517-737	microfilm	Post-ROD documents that support the March 1996 proposed plan
Suppl.5	738-750	microfilm	Post-ROD documents, including the Site-Wide Soils Remedy Report, that support the March 1996 proposed plan.
Suppl.6	751-764	microfilm	Documents received or prepared after the proposed plan was issued - including the ROD amendment.
Suppl.7	765-1054	microfilm	Post-ROD documents that support the 1998 proposed plan - amendment #2 to the ROD for soil and groundwater.
Suppl. 8	1055-1089	microfilm	Documents received or prepared after the proposed plan was issued, including ROD amendment #2.

In addition to the documents described above, a separate administrative record was prepared for the removal action undertaken in 1994 for dioxin-contaminated soil. This removal action AR, contained in two looseleaf binders, is considered to be part of the cumulative AR that was used by EPA in identifying response activities at the site. It is also available in this library.

For ease of use, the indexes for the initial compilation and the eight supplements have been combined to produce a cumulative index that is presented in two formats. The first format lists the documents in AR number order, which reflects the arrangement of the documents in the file. When you are scrolling through the microfilm, the index in AR number order will be most useful for you. The second format lists the documents in ascending chronological order. When you know the date of a particular document you want to look at, use the chronological index. Both indexes contain exactly the same information.

The list of U.S. Environmental Protection Agency guidance documents which were considered or relied upon in the selection of the remedy is document AR 1089 in this administrative record file. Copies of the guidance documents are contained in the Compendium of CERCLA Response Selection Guidance Documents located in the Region 9 Superfund Records Center.

The administrative record file will continue to be added to as documents become available. It will be complete after public comments on EPA's Proposed Plan, EPA's response to comments, and the Record of Decision (ROD) are included.

List of Abbreviations and Acronyms Used in Administrative Record Index

ABBREVIATION	MEANING
ARAR	Applicable or Relevant and Appropriate Restriction (or Requirement)
ATSDR	Agency for Toxic Substances and Disease Registry
CA	State of California
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Superfund)
CRWQCB	California Regional Water Quality Control Board
DHS	Department of Health Services
D&M	Dames & Moore
DTSC	California Department of Toxic Substances Control
EA	Endangerment Assessment
EPA	Environmental Protection Agency
FOIA	Freedom of Information Act
FS	Feasibility Study or Forest Service
FSP	Field Sampling Plan
HRS	Hazard Ranking System
IPE	Isopropyl Ether
LDS	Leak Detection System
MSDS	Material Safety Data Sheets
NPL	National Priorities List
OU	Operable Unit
PAH	Polynuclear Aromatic Hydrocarbon
PCP	Pentachlorophenol
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
RDRA	Remedial Design/Remedial Action
REM	Remedial Hazardous Site Engineering Management (type of contract)
REM/FIT	Remedial Hazardous Site Engineering Management/Hazardous Site Field Investigation Team (contract)
RI	Remedial Investigation

ROC	Record of Communication
ROD	Record of Decision
SAP	Sampling & Analysis Plan
SAS	Special Analytical Services
TAT	Technical Assistance Team
TCDD	Dioxin (Tetrachlorodibenzo-p-dioxin)
TDD	Technical Directive Document
TDS	Total Dissolved Solids
TEF	Toxicity Equivalency Factors
TL	Transmittal Letter
TOC	Total Organic Carbon (or Compound)
US	United States
w/	with
w/TL	with Transmittal Letter

Administrative Record Index

Doc Date	Author / Author Org.	Addressee / Addressee Org.	Title / Subject	Doc ID
3/1/1990	Dames & Moore	Environmental Protection Agency - Region 9	4th quarter 89 gw monitoring rpt, annual summary rpt for site w/TL to F Schauffler fr V Wright & A Mindling 4/4/90	88057065
10/1/1990	Dames & Moore	Environmental Protection Agency - Region 9	Groundwater monitoring rpts, 1st quarter-3rd quarter 90, w/TLs	88057041
3/6/1991	David Kerschner / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Plans to contruct drip pad	88058188
3/14/1991	Dennis Wilson / CA Regional Water Quality Control Board - Central Valley Region	David Kerschner / Beazer East, Inc Stephen Smith / Koppers Industries, Inc	Ltr: Detailed plans & rpt requested before construction of drip pads begins	88058189
3/27/1991	Donn Diebert / CA Dept of Health Services - Toxic Substances Control Div	David Kerschner / Beazer East, Inc	Ltr: Disposition of excavated soils fr drip pad construction	88058190
4/1/1991	Dames & Moore	Environmental Protection Agency - Region 9	Groundwater monitoring rpt, 4th quarter 90, w/TL to F Schauffler fr A Mindling 4/24/91	88057179
4/2/1991	Marvin Miller / Koppers Industries, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Transmits 2 drip track drawings & comments on same, w/2 drawings	88057172
5/2/1991	David Kerschner / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Soil quality review, excavation & construction of drip pad	88058191
6/18/1991	David Kerschner / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Soil excavation & construction of drip pad	88058192
7/9/1991	Ed Cargile / CA Dept of Health Services - Toxic Substances Control Div	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Proper storage of hazardous soils at site, w/encl	88058193
8/2/1991	William Morris / Koppers Industries, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: New drip pad to be installed by 5/6/92	88058194
8/9/1991	Susan Colman / Munger, Tolles & Olson (Attorneys)	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Confirmation of 7/24/91 meeting results re soil operable units & clarification of carbon regeneration issue, w/figures 8 & 9	88057170
8/16/1991	Frederick Schauffler / Environmental Protection Agency - Region 9 Thomas Kelly / Environmental Protection Agency - Region 9	David Kerschner / Beazer East, Inc	Ltr: Drip pad construction must comply w/EPA wood-preserving rule	88058195
10/25/1991	William Morris / Koppers Industries, Inc	Environmental Protection Agency - Region 9	Ltr: Final approval needed for construction of wood-preserving drip pad	88058196
11/21/1991	Jane Patarcity / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Jane Patarcity assumes responsibilities as Beazer program manager for Feather River Plant	88058022
12/1/1991	Dames & Moore	Environmental Protection Agency - Region 9	Groundwater monitoring rpts, 1st quarter-3rd quarter 91, w/TL to F Schauffler fr J Niland	88057042
1/1/1992	Dames & Moore	Environmental Protection Agency - Region 9	Groundwater monitoring rpt, 4th quarter 91, w/sampling correction & TL to F Schauffler fr A Mindling 2/12/92	88057180
1/1/1992	Dames & Moore	-	Bidding & contract document, off property gw remediation system (preliminary) v1	88057063
1/1/1992	Dames & Moore	-	Construction specifications, off-property gw remediation system, initial phase v2 (preliminary)	88057064
1/9/1992	James Campbell / Beazer Materials & Services, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Transmits ltr to J Campbell fr W Zirjacks 1/8/92 & requests approval of soil storage bldg design, w/3 drawings	88057173
1/9/1992	Jane Patarcity / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Transmits draft RA workplan, 2 water plans & comments on delayed consent decree, w/o encls	88058023
1/31/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	Jane Patarcity / Beazer East, Inc	Ltr: EPA approves soil storage bldg & drip pad	88058197
2/3/1992	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Construction of soil storage bldg begins 2/10/92	88058198
2/3/1992	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Soil storage bldg construction schedule	88058199

2/12/1992	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Issues re 100-yr flood plain in ROD, w/attchs	88057123
2/20/1992	Winston Zirjacks / Dames & Moore Joseph Turner / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: On 2/25/92 Dames & Moore will begin field activities as per data collection plan	88058024
2/21/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	Jane Patarcity / Beazer East, Inc	Ltr: EPA approves location of soil storage bldg in relation to 100-yr flood plain	88058200
3/10/1992	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Procedure for soil placement on soil storage bldg pad	88058201
3/12/1992	Stuart Senator / Munger, Tolles & Olson (Attorneys)	Frederick Schauffler / Environmental Protection Agency - Region 9 Gregory Ritter / Environmental Protection Agency - Region 9	Ltr: Confirms that Beazer recorded certified copy of consent decree in County Recorder's office, w/1st page of consent decree	88058025
3/16/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	Winston Zirjacks / Dames & Moore	ROC: EPA raises specific questions re soil storage bldg & drip pad construction	88058202
3/25/1992	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Design changes for soil storage building foundation, w/2 attchs	88058210
3/27/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	ROC: Soil storage bldg & drip pad construction	88058203
4/1/1992	Marvin Miller / Koppers Industries, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Transmits final drawings for drip track & comments on same, w/2 drawings	88057171
4/2/1992	Stephen Smith / Koppers Industries, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Notice of S-3 cap off-site disposal	88058164
4/8/1992	Jane Patarcity / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Notifies that James Werling will temporarily assume responsibilities as Beazer project coordinator	88058026
4/10/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: S-3 cap off-site disposal of concrete, w/o encl	88058165
4/10/1992	Stephen Smith / Koppers Industries, Inc	Richard Vaille / Environmental Protection Agency - Region 9	Ltr: Construction schedule provided & extension requested for completing wood-preserving drip pads	88058204
4/13/1992	James Pedri / CA Regional Water Quality Control Board - Central Valley Region	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: CA Regional Water Quality Control Board comments on draft RA workplan for Feather River Plant	88057124
4/15/1992	Stephen Smith / Koppers Industries, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Plans for conversion to copper naphthanate preservative treatment, w/3 drawings	88058185
4/16/1992	Jane Patarcity / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Summary of additional drip pad construction & request for EPA approval	88058205
4/21/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	Stephen Smith / Koppers Industries, Inc	Ltr: EPA approves copper naphthanate conversion & new drip pad construction for cylinder #6	88058206
5/8/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	EPA comments on draft RA workplan for Feather River Plant, w/TL fr F Schauffler to J Werling 5/8/92	88057125
5/15/1992	Stephen Smith / Koppers Industries, Inc	Richard Vaille / Environmental Protection Agency - Region 9	Ltr: Koppers rescinds its extension request for wood-preserving drip pad	88058207
5/15/1992	Marvin Miller / Koppers Industries, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	ROC: Construction of #6 drip pad begins 5/18/92 & EPA approves temporary storage of concrete/asphalt debris in soil storage bldg	88058208
5/18/1992	Donn Diebert / CA Dept of Health Services - Toxic Substances Control Div	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Comments on draft RD/RA workplan, w/encl	88057126
6/1/1992	James Campbell / Engineering Management, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Scope of work for lab treatability study, w/ltr to J Campbell fr G Gromicko 5/15/92	88057174
6/3/1992	James Werling / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Comments on draft NPDES permit, w/attch	88057127
6/10/1992	Marvin Miller / Koppers Industries, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Soil management at #6 storm water pit	88058187
6/15/1992	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Transmits workflow logic diagrams & related information, w/o encls	88058027
6/24/1992	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Transmits copies of project schedule (figures 24-26) for final RA workplan & related info, w/fax cover sheet only	88058028
7/2/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	Ltr: Final RA workplan is approved, subject to attached modifications, w/encl	88058029
7/9/1992	James Campbell / Engineering Management, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Transmits request for proposal of soil washing demo test & comments on exclusion of bid forms & D size drawings	88057175
7/16/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	Ltr: Issues re draft NPDES permit	88058030

7/17/1992	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Draft 70% design submittal, including 70% design rpt, 70% construction plans & 70% construction specifications, w/o encl	88058031
7/22/1992	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Groundwater arsenic & chromium background evaluation for Feather River Plant, w/2 attchs	88058015
7/24/1992	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Approval needed for quality assurance project plan (QAPP), field sampling plan (FSP) & sampling & analysis plan (SAP)	88058032
8/1/1992	Dames & Moore	Environmental Protection Agency - Region 9	Final remedial action workplan, w/EPA comments 7/2/92 & TL to F Schauffler fr W Zirjacks 8/7/92	88057163
8/23/1992	Dames & Moore	Beazer East, Inc	Semi-annual progress rpt #1 on effectiveness of treatment technologies, w/TL to F Schauffler fr W Zirjacks 8/24/92	88057164
9/7/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	Comments on draft 70% design submittals for off-property groundwater, w/TL fr F Schauffler to J Werling	88057128
9/22/1992	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Response to EPA comments on draft 70% design submittals, w/TL fr W Zirjacks to F Schauffler	88057129
10/1/1992	James Campbell / Engineering Management, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: S-3 area cap design submittal, w/o encl	88058166
10/1/1992	Beazer Materials & Services, Inc	-	Oversize maps/drawings: Off property gw remediation system 100% design (preliminary), 1 in = 2000 ft, 26 plates	88057039
10/6/1992	James Werling / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Notification that James Werling assumes responsibilities as Beazer project coordinator	88058033
10/15/1992	Kurt Fehling / McLaren/Hart Environmental Engineering Corp - ChemRisk Div	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Announces that interim LDS approach rpt: leachability & degradation will arrive under separate cover	88058034
10/17/1992	James Campbell / Engineering Management, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Off-property groundwater design submissions	88058035
10/29/1992	Dames & Moore	Environmental Protection Agency - Region 9	100% design draft rpt, initial phase off-property gw remediation system w/TL to F Schauffler fr W Zirjacks	88057066
10/29/1992	Gregg Cummings / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: 4 off-property groundwater remediation documents (3 copies each) submitted for 100% EPA review, w/o attchs	88058036
10/30/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	Ltr: Transmits EPA comments on draft operation & maintenance manual for off-property gw system & operations basis for system, w/encl	88057221
10/30/1992	James Werling / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Transmits ltr re county permit requirements & discusses changes in design rpt, w/attch	88058037
11/16/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	EPA comments on draft RA quality assurance project plan (QAPP), w/TL fr F Schauffler to J Werling	88057130
11/16/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	EPA comments on draft 30% design rpt for on-property groundwater remediation system, w/TL fr F Schauffler to J Werling	88057131
11/19/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	EPA comments on health & safety program (HSP) for remedial activities, w/TL fr F Schauffler to J Werling	88058038
11/19/1992	James Werling / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Drilling activities for off-property groundwater remediation	88058039
11/25/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	Ed Cargile / CA Environmental Protection Agency - Dept of Toxic Substances Control Larry Smith / U R S Consultants, Inc Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Memo: Soil washing treatability study workplan, w/o encl	88058183
11/25/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	EPA comments on draft 100% design submittals for off-property groundwater remediation, w/TL fr F Schauffler to J Werling	88058040
12/1/1992	Dames & Moore	Environmental Protection Agency - Region 9	Sampling & analysis plan (SAP) remedial actions, w/EPA comments 7/92 & TL to F Schauffler fr W Zirjacks 12/18/92	88057161
12/2/1992	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Response to EPA comments on draft 30% design rpt for on-property groundwater remediation system, w/TL fr W Zirjacks to F Schauffler	88057132
12/4/1992	James Pedri / CA Regional Water Quality Control Board - Central Valley Region	James Werling / Beazer East, Inc	Amended order #92-220 re waste discharge requirements for groundwater extraction & treatment system, w/TL of 1/11/93, factsheet, & attchs A-C	88057133

12/7/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	B Kircher / Butte County - Dept of Development Services	Ltr: Disposition of treated groundwater as per ROD	88058041
12/10/1992	Dames & Moore	Environmental Protection Agency - Region 9	100% design final rpt, initial phase off-property gw remediation system w/TL to F Schauffler fr W Zirjacks	88057059
12/10/1992	Gregg Cummings / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: 5 off-property groundwater remediation documents (3 copies each) are submitted for final EPA review, w/o attchs	88058042
12/23/1992	James Werling / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Progress dates for off-property groundwater remediation activities	88058043
12/28/1992	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	Ltr: EPA approves 100% final design submittals for off-property groundwater remediation subject to specified comments	88058044
1/19/1993	Michael Tischuk / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Disposal of water generated while drilling off-property groundwater remediation system, w/2 attchs	88058217
1/20/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	Ltr: Disposal of water generated during well drilling	88058216
2/1/1993	Dames & Moore	Environmental Protection Agency - Region 9	Draft field sampling plan, initial phase on-property gw remedial action	88057058
2/1/1993	Dames & Moore	Environmental Protection Agency - Region 9	Groundwater monitoring rpts, 1st quarter-3rd quarter 92, w/TLs	88057040
2/1/1993	Dames & Moore	-	70% design rpt, initial phase, on-property gw remediation system, draft	88057067
2/1/1993	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Draft 70% design package for on-property groundwater remediation, w/o attchs	88058045
2/5/1993	James Pedri / CA Regional Water Quality Control Board - Central Valley Region	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Substantive requirements for reinjection of treated wastewater fr off- & on-property groundwater treatment systems	88058046
2/10/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	Ltr: Substantive requirements for reinjection of treated groundwater & related dispute issues, w/o encl	88058047
2/10/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	Ltr: EPA position on disposal of development water fr new off-property wells	88058215
2/12/1993	James Werling / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Michael Tischuk replaces James Werling as Beazer project coordinator	88058048
2/12/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	James Werling / Beazer East, Inc	Ltr: EPA comments on draft RA data management plan	88058049
2/22/1993	Dames & Moore	Beazer East, Inc	Semi-annual progress rpt #2 on effectiveness of treatment technologies, w/TL to F Schauffler fr W Zirjacks	88057167
2/24/1993	Michael Tischuk / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Fax TL: 1st authorizations for Dames & Moore's services re soil washing & in-situ bio-design tasks, w/attchs	88058050
3/3/1993	Dames & Moore	Environmental Protection Agency - Region 9	Draft operation & maintenance (O&M) manual, off-property gw remediation system v1 w/TL to F Schauffler fr W Zirjacks	88057055
3/3/1993	Dames & Moore	-	Equipment manufacturer's manuals for draft operation & maintenance (O&M) manual, off-property gw remediation system	88057056
3/8/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on RA quality assurance project plan (QAPP), w/TL fr F Schauffler to M Tischuk	88058051
4/8/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves revised, final RA quality assurance project plan (QAPP)	88058052
4/16/1993	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Revised, final RA quality assurance project plan (QAPP) incorporates Beazer's response to EPA comments, w/o attchs	88058053
4/22/1993	Andrew Kopania / Dames & Moore Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Comments on enclosed, revised design drawings for off-property groundwater remediation system, w/o encls	88058054
4/28/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Transmits title page of revised, final RA quality assurance project plan (QAPP) & requests Beazer signature 1st, w/o encl	88058055
4/29/1993	Michael Tischuk / Beazer East, Inc	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Monthly discharge monitoring rpts for Feather River Plant, 3/93 - 8/95, w/TLs fr M Tischuk to P Woodward	88057110
5/1/1993	Dames & Moore	Environmental Protection Agency - Region 9	Groundwater monitoring rpt, 4th quarter 92, w/TL to F Schauffler fr A Mindling 5/13/93	88057178
5/11/1993	Bruce Hickman / Dames & Moore	Michael Tischuk / Beazer East, Inc	Memo: Feather River S-2 soil washing results for dioxins & furans	88057150
5/24/1993	Jeff Zelikson / Environmental Protection Agency - Region 9	William Morris / Koppers Industries, Inc	Ltr: Sec 3007(a) request for information re drip pads, w/o mail receipt P 424 454 437	88058209

6/14/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Comments on draft 70% design rpt for on-property groundwater remediation system, w/TL fr F Schauffler to M Tischuk	88057134
6/15/1993	Michael Tischuk / Beazer East, Inc	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Effluent & receiving water quality assessment, w/TL fr M Tischuk to P Woodward	88057111
6/23/1993	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Jim Miller / Louisiana-Pacific Corp	Ltr: Requirements re continued use of electric fire well	88058174
6/28/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves revised RA data management plan	88058056
6/28/1993	Donn Diebert / CA Dept of Health Services - Toxic Substances Control Div	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Comments on S-3 cap design proposal, w/o attchs	88058167
7/2/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Reinjection of off-property groundwater treatment system effluent, w/attch	88058057
7/9/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA preliminary comments on draft S-2 soil washing pilot test operations plan, rev 0, w/TL fr F Schauffler to M Tischuk	88058152
7/16/1993	Michael Tischuk / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Schedule for reinjection of off-property groundwater remediation system effluent	88058058
7/19/1993	Andrew Kopania / Dames & Moore Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Shallow groundwater in dredge tailings areas	88058059
7/22/1993	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Comments on Dames & Moore ltr of 7/19/93 discussing shallow groundwater in dredge tailings areas	88058060
7/22/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on leachability & degradation study approach, w/TL fr F Schauffler to M Tischuk	88058061
7/23/1993	Michael Tischuk / Beazer East, Inc	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Ltr: PAHs detected in NPDES monitoring of off-property groundwater	88058062
7/29/1993	Dames & Moore	Environmental Protection Agency - Region 9	100% design rpt, initial phase, on-property groundwater remediation system	88057062
7/29/1993	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Draft, initial phase on-property groundwater remediation system design package, w/o attchs	88058063
7/30/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	TL: EPA comments on draft 30% design rpt for S-3 cap, w/encl	88058168
8/1/1993	Dames & Moore	Environmental Protection Agency - Region 9	Final field sampling plan S-1 initial phase remedy w/TL to F Schauffler fr W Zirjacks 8/2/93	88057057
8/1/1993	Dames & Moore	Environmental Protection Agency - Region 9	Final design memorandum, S-1 initial phase remedy for site w/TL to F Schauffler fr W Zirjacks 8/2/93	88057060
8/1/1993	Dames & Moore	Environmental Protection Agency - Region 9	Final field sampling plan, soil OU S-2, pilot soil washing test w/TL to F Schauffler fr W Zirjacks 8/2/93	88057061
8/1/1993	Dames & Moore	Environmental Protection Agency - Region 9	Draft field sampling plan (FSP) - leachability & degradation study supplemental data needs, w/TL to F Schauffler fr W Zirjacks 8/5/93	88057162
8/1/1993	Dames & Moore	Environmental Protection Agency - Region 9	Extraction well field rpt - initial phase off-property groundwater RA, v1, w/TL fr W Zirjacks to F Schauffler 8/20/93	88057119
8/1/1993	Dames & Moore	Environmental Protection Agency - Region 9	Extraction well field rpt - initial phase off-property groundwater RA, v2 - Appendices	88057120
8/6/1993	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: As-built drawings for construction of initial phase off-property groundwater remediation system, w/o attch	88058064
8/16/1993	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Revised schedule for S-2 soil washing activities, w/encl	88058153
8/16/1993	Winston Zirjacks / Dames & Moore Jeff Bensch / Dames & Moore	James Wagoner / Butte County Air Pollution Control District	Ltr: Request for air discharge limitations for on-property groundwater remediation system, w/attch	88058065
8/23/1993	Dames & Moore	Beazer Materials & Services, Inc	Semi-annual progress rpt #3 on effectiveness of treatment technologies, w/TL to F Schauffler fr W Zirjacks	88057168
8/25/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Information needed for RA rpts, w/o encl	88058066
8/27/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer Materials & Services, Inc	Ltr: Transmits EPA rev comments on draft 100% design rpt-inital phase on-property gw system, 7/29/93 w/attch w/o tables & figs (RA start, RD complete)	88056871
9/1/1993	Dames & Moore	Beazer Materials & Services, Inc	Leachability & degradation study (LDS), preliminary modeling rpt, v1	88057044

9/1/1993	Dames & Moore	Beazer Materials & Services, Inc	Leachability & degradation study (LDS), preliminary modeling rpt, v2 (appendices)	88057045
9/1/1993	Dames & Moore	Beazer Materials & Services, Inc	Leachability & degradation study (LDS), preliminary modeling rpt, v3 (con't appendices)	88057046
9/7/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on S-2 soil washing pilot test operations plan, rev 1, w/TL fr F Schauffler to M Tischuk	88057151
9/16/1993	William Norton / Westinghouse Remediation Services Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Fax TL: Dust control plan for S-2 soil washing pilot demo	88058154
9/21/1993	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Data transmittal for RA rpts for off-property groundwater & S-3 cap, w/o encl	88058067
9/21/1993	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Response to EPA comments on draft 30% design rpt for S-3 cap, w/encl	88058169
9/22/1993	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Transmits response to EPA comments on soil washing pilot test operations plan, rev 1, w/attchs	88057152
9/22/1993	James Miller / Louisiana-Pacific Corp	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Ltr: Description of fire system, process water pumping & water requirements, w/o encl	88058019
9/27/1993	Beazer East, Inc	Environmental Protection Agency - Region 9	Response to EPA comments on draft 100% design rpt, initial phase on-property groundwater remediation system, w/TL fr W Zirjacks to F Schauffler	88057118
9/27/1993	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Response to EPA comments on S-2 soil washing site civil design, w/5 drawings	88057153
10/1/1993	Dames & Moore	Environmental Protection Agency - Region 9	Final field sampling plan (FSP) for S-2 pilot soil washing test, w/TL fr W Zirjacks to F Schauffler & handwritten sheet of 14 questions	88057154
10/7/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	TL: EPA comments on Beazer response to EPA comments on S-2 soil washing pilot test operations plan, rev 1	88058155
10/8/1993	Andrew Kopania / Simon Hydro-Search, Inc	Michael Tischuk / Beazer East, Inc	Ltr: Electric fire well & 2 other water supply wells not to be adversely affected by new groundwater pumping requirements	88058175
10/15/1993	Winston Zirjacks / Dames & Moore Jeff Bensch / Dames & Moore Fred Cooper / Dames & Moore	James Wagoner / Butte County Air Pollution Control District	Ltr: Response to Butte Co questions re allowable air emission rates for on-property groundwater remediation system, w/attchs	88057135
10/25/1993	Bruce Hickman / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Fax TL: Beazer response to 2nd set of EPA comments on draft S-2 soil washing test operations plan, w/attchs	88057155
10/29/1993	Bruce Hickman / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Fax TL: D&M response to EPA questions re field analytical methods for S-2 soil washing pilot test	88058156
11/1/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	TL: EPA comments on Westinghouse operations plan & Dames & Moore final field sampling plan (FSP) for S-2 soil washing pilot test	88058157
11/2/1993	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Evaluation of ohmicron immunoassay PCP test re S-2 pilot soil washing test	88058158
11/8/1993	James Pedri / CA Regional Water Quality Control Board - Central Valley Region	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Substantive requirements for reinjection of treated wastewater fr off- & on-property groundwater, w/Table 1	88058068
11/9/1993	Bruce Hickman / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Fax TL: Response to EPA comments on Westinghouse operations plan & Dames & Moore final field sampling plan for S-2 soil washing pilot test	88058159
11/10/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Revised Westinghouse operations plan & Dames & Moore final field sampling plan for S-2 soil washing pilot test	88058160
11/16/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Reinjection of effluent fr off-property groundwater treatment plant, w/Table 1	88058069
11/30/1993	Simon Hydro-Search, Inc	Beazer East, Inc	Draft groundwater arsenic & chromium background study, w/TL to F Schauffler fr A Kopania 12/1/93	88057165
12/2/1993	Andrew Kopania / Simon Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Well installation program for on-property groundwater	88058070
12/8/1993	Andrew Kopania / Simon Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Response to EPA comments on draft field sampling plan (FSP) for shallow groundwater fate & transport study, w/attchs	88057136
12/9/1993	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Air emmissions approval for on-property groundwater, w/encl	88058071
12/16/1993	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	TL: EPA comments on draft post-treatment evaluation plan - waste streams from S-2 soil	88058161

			washing operations, w/encl	
1/4/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Jim Miller / Louisiana-Pacific Corp	ROC: Phone conversation w/Jim Miller re use of electric fire well & other water supply wells	88058176
1/7/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA reviews S-4 soil arsenic & chromium background study of field sampling plan (FSP), w/comments	88058151
1/10/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on draft operation & maintenance manual for off-property groundwater, v1, w/TL fr F Schauffler to M Tischuk	88058072
1/15/1994	Westinghouse Remediation Services Inc	Beazer East, Inc	Rpt on pilot scale demonstration test of S-2 soil washing	88057157
1/18/1994	Michael Tischuk / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: S-2 soil washing pilot study rpt, w/attchs	88057156
1/18/1994	Michael Tischuk / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Response to EPA comments on draft post-treatment evaluation plan for S-2 soil washing pilot study	88058162
1/18/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Disposal of washwater fr S-2 soil washing pilot test	88058163
1/19/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	TL: EPA comments on draft final design rpt & operations & maintenance (O&M) plan for S-3 cap, w/encl	88058170
1/24/1994	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Draft operation & maintenance manual for on-property groundwater, v1, w/o attch	88058073
1/25/1994	William Short / Dames & Moore Winston Zirjacks / Dames & Moore	Michael Tischuk / Beazer East, Inc	Ltr: Extraction well EW-2 rehabilitation for initial phase on-property groundwater, w/fax TL fr W Short to F Schauffler	88058074
1/28/1994	Andrew Kopania / Simon Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Sonic core drilling for on-property groundwater remediation system	88058075
2/1/1994	Environmental Solutions, Inc	Beazer East, Inc	Workplan for additional soils investigation, w/TL fr D Shukla to F Schauffler 2/11/94	88057109
2/10/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on draft operation & maintenance manual for on-property groundwater, v1, w/TL fr F Schauffler to M Tischuk	88057137
2/11/1994	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Final operation & maintenance manual for off-property groundwater remediation system, w/o attch	88058076
2/16/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on field sampling plan (FSP) for off-property groundwater RA, w/TL fr F Schauffler to M Tischuk	88057138
2/17/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on draft field sampling plan (FSP) for initial phase of on-property groundwater system, w/TL fr F Schauffler to M Tischuk	88057139
2/22/1994	Dames & Moore	Beazer East, Inc	Semi-annual progress rpt #4 on effectiveness of treatment technologies	88057169
2/28/1994	Michael Tischuk / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Start-up influent & effluent sample results fr on-property groundwater remediation system	88058077
3/1/1994	Dames & Moore	Environmental Protection Agency - Region 9	Field sampling plan, initial phase on-property gw remedial action, revision 0 w/TL to F Schauffler fr W Zirjacks 3/4/94	88057053
3/2/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves revised S-4 soil arsenic & chromium background study of field sampling plan (FSP) based on enclosed modifications	88058150
3/7/1994	Lisa Hanusiak / I C F Kaiser Engineers, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Memo: Comments on workplan for proposed additional soils investigation	88058078
3/9/1994	Jeff Bensch / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Start-up influent & effluent sample results fr on-property groundwater remediation system	88058079
3/11/1994	Dames & Moore	Environmental Protection Agency - Region 9	Final design rpt for OU S-3 cap & operations & maintenance (O&M) plan w/TL to F Schauffler fr W Zirjacks	88057047
3/14/1994	Winston Zirjacks / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Response to EPA comments on draft operation & maintenance manual for on-property groundwater, v1, w/TL fr W Zirjacks to F Schauffler	88057140
3/17/1994	Jeffrey Bold / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Modified standard operating procedure for soil sampling in S-4 soil arsenic & chromium background study of field sampling plan (FSP)	88058149
3/17/1994	Dames & Moore	Environmental Protection Agency - Region 9	Response to EPA comments on draft field sampling plan (FSP) for soil arsenic & chromium background study, w/TL to F Schauffler fr J Bold	88058182
3/18/1994	Dames & Moore	Environmental Protection Agency - Region 9	Groundwater monitoring rpt, 4th quarter 93, w/TL to F Schauffler fr W Zirjacks	88057181
3/18/1994	Dames & Moore	Environmental Protection Agency - Region 9	Remedial action, gw monitoring rpts, 2nd quarter-3rd quarter 93, w/TLs to F Schauffler fr W Zirjacks	88057043

3/29/1994	Robert Fisher / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Start-up influent & effluent sample results fr on-property groundwater remediation system	88058080
3/30/1994	S B P Technologies Inc	Beazer Materials & Services, Inc	Final rpt, S-1 soils bioremediation demonstration, pre-construction laboratory testing results	88057049
3/30/1994	Andrew Kopania / Simon Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Draft monitoring well evaluation rpt, w/o attch	88058081
3/31/1994	Simon Hydro-Search, Inc	Beazer Materials & Services, Inc	Draft monitoring well evaluation rpt	88057054
3/31/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on workplan for additional soils investigation, w/TL fr F Schauffler to M Tischuk	88058083
3/31/1994	Jeffrey Bold / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: 5 sampling locations changed in S-4 soil arsenic & chromium background study of field sampling plan (FSP), w/revised table 1	88058148
3/31/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	James Miller / Louisiana-Pacific Corp	Ltr: Transmits excerpts of formaldehyde data fr Beazer monitoring rpts, w/o encl	88058082
4/1/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on operation & maintenance manual for on-property groundwater, v1 & v2, w/TL fr F Schauffler to M Tischuk	88058084
4/20/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on field sampling plan (FSP) for initial phase on-property groundwater, w/TL fr F Schauffler to M Tischuk	88058085
4/22/1994	Jeffrey Bold / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Pentachlorophenol (PCP) found in perched water near former pole washing area, w/table 1	88058177
4/25/1994	James Severns / Environmental Solutions, Inc Jonathan Scheiner / Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Response to EPA comments on workplan for additional soils investigation at Feather River Plant	88057106
5/3/1994	Daniel Rodoni / I C F Kaiser Engineers, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Memo: Response to comments on workplan for additional soils investigation	88058086
5/4/1994	Jeff Bensch / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Response to EPA comments on operation & maintenance manual for on-property groundwater remediation, v1 & v2, w/TL fr J Bensch to F Schauffler	88057141
5/5/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves workplan for additional soils investigation	88058087
5/11/1994	Jonathan Scheiner / Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Memo: Notification of upcoming field work for additional soils investigation	88058088
5/18/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Ltr: Transmits draft conceptual design memo for dioxin-contaminated soils, comments on same & transmits 4 maps re monitoring well rpt, w/o encls	88058089
5/27/1994	Jeffrey Bold / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Evaluation of chip seal integrity for S-3 cap, w/map	88058171
6/2/1994	James Mueller / S B P Technologies Inc	Michael Tischuk / Beazer East, Inc	Draft final rpt on in situ bioventing study of former creosote pond area, w/TL fr J Mueller to M Tischuk	88057142
6/7/1994	William Veile / CA Environmental Protection Agency - Dept of Toxic Substances Control	Edward Cargile / CA Environmental Protection Agency - Dept of Toxic Substances Control	Memo: Comments on draft conceptual design memo for on-site soil disposal cell, w/TL to F Schauffler fr E Cargile 9/16/94	88058094
6/7/1994	Jeff Bensch / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Response to EPA comments on field sampling plan (FSP) for initial phase of on-property groundwater, w/TL fr J Bensch to F Schauffler	88058090
6/17/1994	Hydro-Search, Inc	Beazer Materials & Services, Inc	Draft off-property gw remedy rpt	88057048
6/30/1994	Dames & Moore	Environmental Protection Agency - Region 9	Technical memo: Shallow gw investigation remedial action w/TL to F Schauffler fr J Bensch	88057051
7/28/1994	Dames & Moore	Environmental Protection Agency - Region 9	Draft design memorandum, S-4 initial phase remedy for site w/TL to F Schauffler fr J Bensch	88057050
7/28/1994	Beazer East, Inc	Environmental Protection Agency - Region 9	Response to EPA comments on draft design memo S-4, initial phase remedy, w/TL to F Schauffler fr J Bold 12/14/95	88057182
8/1/1994	Environmental Solutions, Inc	Beazer East, Inc	Rpt of additional soils investigation at Feather River Plant, w/TL to F Schauffler fr J Severns 8/3/94	88057108
8/4/1994	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Product recovery well & new monitoring wells to be installed for on-property groundwater remediation	88058091
8/25/1994	Joe Martin / Chico News & Review	-	Newsclip: On-site landfill proposed for Koppers cleanup	88058020
8/29/1994	Jeff Bensch / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Semi-annual progress rpt #5 on effectiveness of treatment technologies, w/TL fr J Bensch to F Schauffler	88058092

9/9/1994	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Installation of product recovery well & related on-property monitoring wells in former creosote pond area	88058093
9/9/1994	Gregory Ritter / Environmental Protection Agency - Region 9	Ronald Hausmann / Munger, Tolles & Olson (Attorneys)	Ltr: RA workplan for additional work is discussed, w/TL & requested signature fr R Hausmann to G Ritter 9/21/94	88058096
9/15/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Comments & requirements re monitoring wells - initial phase on-property groundwater system	88058017
9/15/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Comments on bid document - construction of onsite soil disposal cell	88058016
9/15/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Comments & requirements re free product recovery well - initial phase on-property groundwater system	88058018
9/16/1994	Michael Tischuk / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Requests written confirmation that disposal of dioxin-contaminated soils in landfill is agreed to be final & permanent remedy	88058227
9/19/1994	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Penta Risc results fr monitoring well test hole	88058095
9/19/1994	James Tjosvold / CA Environmental Protection Agency - Dept of Toxic Substances Control	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Review of engineering & design rpt, on-site soil disposal cell, w/2 memos to E Cargile fr W Veile	88058225
9/22/1994	Jeff Bensch / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Product recovery well & storage tank on-property groundwater remediation, w/manufacturer info sheets	88058097
10/3/1994	William Ladie / International Technology Corp	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Transmits IT health & safety plan & storm water runoff control plan, w/o encls	88058098
10/5/1994	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Proposed groundwater monitoring & sampling schedule, w/tables 1 & 2	88057158
10/14/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on draft health & safety plan for remedial activities, w/TL fr F Schauffler to M Tischuk	88058099
10/18/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on soil removal plan (section G) & addendum, w/TL fr F Schauffler to M Tischuk	88057143
10/26/1994	K Hendrix / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Fax TL: Diagram for on-property water treatment system	88058100
10/27/1994	Tej Singh / Innovative Technical Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Fax TL: Equipment decontamination pad for on-site disposal cell, w/2 diagrams	88058101
10/28/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on addendum to IT health & safety plan, w/TL fr F Schauffler to M Tischuk	88058102
10/31/1994	Kirk Girard / Louisiana-Pacific Corp	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Question raised re need for alternative water supply & groundwater pumped fr fire wells	88058178
11/2/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on section G - soil removal plan, revision 1.0, w/TL fr F Schauffler to M Tischuk	88058103
11/15/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Transmits AR index for soil removal action & gives info on same, w/o encl	88058104
11/17/1994	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Proposed modification for off-property groundwater remedy	88058105
11/21/1994	William Collier / Environmental Solutions, Inc Michael Leonard / Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Fax TL: EPA concurrence w/construction modifications for vadose zone monitoring trench installation, w/fax cover sheet	88058106
12/2/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on revised addendum to IT health & safety plan, w/TL fr F Schauffler to M Tischuk	88058107
12/15/1994	Daniel Nadzam / I T Corp James Roughton / International Technology Corp	Environmental Protection Agency - Region 9	Addendum to IT health & safety plan for remedial activities	88057144
12/15/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on section G - soil removal plan, revision 2.0, w/TL fr F Schauffler to M Tischuk	88058108
12/16/1994	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Comment on revised addendum to IT health & safety plan	88058109
12/20/1994	James Severns / Environmental Solutions, Inc Michael Leonard / Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Design modification request for approval of substitution in disposal cell cover	88058229
1/5/1995	International Technology Corp	Environmental Protection Agency - Region 9	Track removal & replacement plan for construction of on-site soil disposal cell, revision 2, w/fax TL fr T Singh to F Schauffler 1/11/95	88057145
1/25/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA comments on off-property groundwater remediation	88058110

1/25/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Kirk Girard / Louisiana-Pacific Corp	Ltr: Water supply issues, including use of electric fire well	88058111
1/26/1995	William Ladie / International Technology Corp	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: IT health & safety plan addendum response includes construction of on-site disposal cell	88058112
2/10/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves design modification request for disposal cell cover	88058228
2/22/1995	Beazer East, Inc	Environmental Protection Agency - Region 9	Semi-annual progress rpt #6 on effectiveness of treatment technologies, w/TL fr J Bensch to F Schauffler	88058113
2/27/1995	Dames & Moore	Environmental Protection Agency - Region 9	Section G - soil removal plan, revision 4.0, w/TL fr G Dearth to F Schauffler	88057117
2/28/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves section G - soil removal plan, revision 4.0	88058114
3/3/1995	Andrew Kopania / Hydro-Search, Inc	Beazer East, Inc	Annual 1994 RA groundwater monitoring rpt for Feather River Plant	88057114
3/4/1995	Kirk Girard / Louisiana-Pacific Corp	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Increased water supply needs & possible need for alternative water supply fr Beazer	88058179
3/13/1995	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Workplan to implement expanded phase extraction rate reduction for off-property groundwater remediation system	88058115
3/23/1995	Tej Singh / Innovative Technical Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Summary of water handling procedures for decontamination water & for rain water	88058116
3/30/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA comments on workplan for proposed extraction flow rate reduction at off-property groundwater remediation system	88058117
4/6/1995	Michael Leonard / Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Request for design modification approval for onsite soil disposal cell, w/drawing, w/o table	88058119
4/6/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region Ed Cargile / CA Environmental Protection Agency - Dept of Toxic Substances Control Larry Smith / U R S Consultants, Inc	Memo: Soil removal & soil FS update w/o encl	88058233
4/6/1995	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Response to EPA comments on workplan to implement expanded phase extraction reduction for off-property groundwater	88058118
4/17/1995	Hydro-Search, Inc	Environmental Protection Agency - Region 9	Response to EPA comments on preliminary modeling rpt, leachability & degradation study, w/TL to F Schauffler fr A Kopania 5/22/95	88057183
4/17/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments (9/93) on preliminary modeling rpt - leachability & degradation study, w/TL fr F Schauffler to M Tischuk	88058120
5/5/1995	Ed Cargile / CA Environmental Protection Agency - Dept of Toxic Substances Control	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: DTSC approves onsite soil disposal cell design modification	88058121
5/9/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Design modification request re clay liner of disposal cell cap	88058122
5/12/1995	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Draft postclosure maintenance & monitoring plan for soil disposal cell, w/o encl	88058123
5/15/1995	Ronald Oak / International Technology Corp	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Air sampling summary, 4/26/95 - 5/12/95	88058124
5/19/1995	Ronald Oak / International Technology Corp	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Additional air sampling info to be added to ltr of 5/15/95	88058125
5/23/1995	Jeffrey Bold / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Change in screening levels with Penta Risc test kits	88058126
6/7/1995	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Additional info re free product recovery well & monitoring wells at Feather River Plant, w/attchs A-C	88057112
6/7/1995	Andrew Kopania / Hydro-Search, Inc	Beazer East, Inc	Expanded-phase extraction rate reduction rpt of field activities & capture zone analysis, off-property groundwater remediation system, w/attchs A-F	88057113
6/8/1995	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Rpt on extraction rate reduction & capture zone analysis & ltr on free product recovery well & monitoring wells (2 copies each), w/o encls	88058127
6/9/1995	Tej Singh / Innovative Technical Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Fax ROC: Increase in final cell elevation	88058128
6/12/1995	Jeffrey Bold / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Draft site-wide soils remedy rpt, section 2.0 (2 copies), w/o attchs	88058129

6/16/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	TL: EPA comments on sampling & analysis plan (SAP)	88058130
6/28/1995	Andrew Kopania / Hydro-Search, Inc	Beazer East, Inc	Pilot bioremediation system design memorandum in former creosote pond area, Feather River Plant	88057116
6/28/1995	Andrew Kopania / Hydro-Search, Inc	Beazer East, Inc	RA groundwater monitoring rpt for Feather River Plant, 1st quarter, 1995, w/TL fr A Kopania to F Schauffler	88057115
7/3/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region Ed Cargile / CA Environmental Protection Agency - Dept of Toxic Substances Control	Memo: Soil FS update & related issues w/o encl	88058234
7/7/1995	Tej Singh / Innovative Technical Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Air monitoring data for soil removal activities in exclusion zone, w/attchs	88057146
7/7/1995	Chuck Bartholomew / International Technology Corp	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Permission requested to load & transport rejected structural fill	88058131
7/10/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	-	Memo: Future land use decisions	88058132
7/11/1995	Jeffrey Bold / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Revised text & tables of sampling & analysis plan (SAP), revision 1.0, w/encls	88057159
7/12/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	TL: EPA comments on operation & maintenance manual modifications re free product recovery well, w/encl	88058134
7/14/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	-	Summary of TO-9 air sampling results re S-1 removal action	88058135
7/14/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	TL: EPA comments on pilot bioremediation system design memo for former creosote pond area, w/encl	88058133
7/20/1995	Ian Hutchison / Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Request for potential design modification approval for onsite soil disposal cell, w/encl & fax TL fr I Hutchison to F Schauffler	88057147
7/21/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Potential cell cover design modification for soil disposal cell	88058136
8/9/1995	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Replacement pages for free product recovery well in operations & maintenance manual, w/o attchs	88058137
8/22/1995	Jeff Bensch / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Semi-annual progress rpt #7 on effectiveness of treatment technologies, w/encl	88058138
8/23/1995	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Draft leachability & degradation study & draft on-property groundwater remedy rpt, w/o attchs	88058139
8/24/1995	Hydro-Search, Inc	Environmental Protection Agency - Region 9	Response to EPA comments on draft leachability & degradation study, w/TL to F Schauffler fr A Kopania 12/15/95	88057176
8/24/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Transmits operations & maintenance (O&M) audit rpt for 1994 off-property groundwater treatment system & comments on rpt, w/encl	88058140
8/25/1995	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Workplan for shallow groundwater extraction treatability testing in former pole washer area, w/attchs	88057160
8/31/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on workplan for shallow groundwater extraction treatability testing, w/TL fr F Schauffler to M Tischuk	88058141
9/27/1995	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Plan for soil stockpiling & dewatering in former pole washing area	88058180
9/29/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA comments re soil stockpiling & dewatering	88058142
10/9/1995	Jeffrey Bensch / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Response to EPA's operations & maintenance (O&M) audit rpt for off-property treatment system, w/o encls	88058143
10/16/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region Ed Cargile / CA Environmental Protection Agency - Dept of Toxic Substances Control	Memo: Transmits EPA draft approval ltr on final design rpt/operation & maintenance plan for S-3 cap & comments on same, w/o attch	88058172
10/16/1995	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Response to EPA comments on soil stockpiling & dewatering, w/attch	88058181
10/17/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves work to begin on soil stockpiling & dewatering & requests work schedule	88058144
10/17/1995	Frederick Schauffler / Environmental Protection	Michael Tischuk / Beazer East, Inc	EPA comments on v1 - Operation & maintenance (O&M) manual for	88058145

	Agency - Region 9		off-property groundwater remediation system, w/TL fr F Schauffler to M Tischuk	
11/14/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on draft design memo S-4 for initial phase remedy, w/TL fr F Schauffler to M Tischuk	88058146
11/15/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on draft leachability & degradation study, w/TL fr F Schauffler to M Tischuk	88058147
11/15/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves final design rpt & operation & maintenance plan for S-3 cap - subject to enclosed comments	88058173
11/15/1995	Andrew Kopania / Hydro-Search, Inc	Beazer East, Inc	Revised off-property groundwater remedy rpt for Feather River plant, w/TL to F Schauffler fr A Kopania	88057228
11/16/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	TL: EPA comments on draft site-wide soils remedy rpt, w/encl	88057148
11/21/1995	Andrew Kopania / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Replacement pages in response to EPA comments on v1 - Operation & maintenance (O&M) manual, w/attchs	88057149
11/26/1995	S B P Technologies Inc	Beazer East, Inc	Quarterly rpt - baseline data summary, w/TL fr J Mueller to M Tischuk	88057107
12/1/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	-	Fact sheet: EPA looking at new cleanup options for contaminated soils	88058021
12/8/1995	Nick Ellena / Chico Enterprise-Record	-	Newsclip: Koppers initial study for annexation does not cover potential impacts	88058213
12/11/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Ed Cargile / CA Environmental Protection Agency - Dept of Toxic Substances Control Larry Smith / U R S Consultants, Inc Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Fax TL: Request for input re draft comments on "Revised off-property groundwater remedy rpt," w/o attch	88058218
12/12/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	TL: EPA supplemental comments on draft site-wide soils remedy rpt, w/encl	88058014
12/13/1995	Chico Enterprise-Record	-	Newsclip: Workshops to explain faulty Koppers cleanup plan	88058212
12/14/1995	Oroville Mercury-Register	-	Newsclip: Koppers now needs new cleanup plan	88058211
12/15/1995	Nick Ellena / Chico Enterprise-Record	-	Newsclip: New effort planned to clean up toxic soil	88058186
12/18/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Vivian Meyer / City of Oroville	Ltr: Site cleanup status & future site use	88058214
12/18/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Dennis Diver / City of Oroville - Office of the Mayor	Ltr: Soil clean-up & possible residential use of Koppers property in future	88058220
12/19/1995	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Transmits EPA comments on revised off-property groundwater remedy rpt & discusses system shutdown, w/o comments, w/2 fax cover sheets	88058219
12/26/1995	K Hendrix / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Fax memo: Off-site treatment plant FR #2 will be shut down on 12/28/95	88058256
1/3/1996	Hydro-Search, Inc	Beazer East, Inc	Remedial action groundwater monitoring rpt, 3rd quarter 95, w/TL to F Schauffler fr A Kopania	88057166
1/16/1996	Beazer East, Inc	Environmental Protection Agency - Region 9	Response to EPA comments on draft site-wide soils remedy rpt w/TL to file fr F Schauffler	88057193
1/19/1996	Jeffrey Bensch / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Response to EPA comments on revised off-property groundwater remedy rpt, w/TL to F Schauffler fr J Bensch	88057229
2/12/1996	Jeff Bensch / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Monthly status rpts, 3/92 - 2/96, w/TLs fr J Bensch to F Schauffler	88057121
2/20/1996	Gerald Hiatt / Environmental Protection Agency - Region 9	Frederick Schauffler / Environmental Protection Agency - Region 9	Memo: Risk assessment assumptions	88058184
2/22/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Re-evaluation of human health risks in Appendix B of draft site-wide soils remedy rpt, w/appendix 1 & memo to F Schauffler fr G Hiatt, 2/20/96	88057177
2/22/1996	Beazer East, Inc	Environmental Protection Agency - Region 9	Semi-annual progress rpt #8 on effectiveness of treatment technologies, w/TL to F Schauffler fr J Bensch	88058222
2/29/1996	Billie Flaherty / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Disposal of creosote-containing soil fr former creosote pond & possible land disposal restrictions (LDRs)	88058221
2/29/1996	Andrew Kopania / Hydro-Search, Inc Jennifer Abrahams / Hydro-Search, Inc	Beazer East, Inc	Leachability & degradation study	88057184

2/29/1996	Dames & Moore	Beazer East, Inc	Design memorandum S-4 initial phase remedy for site, w/Appendices A-D & TL to F Schauffler fr J Bold	88057185
2/29/1996	Jennifer Abrahams / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Leachability & degradation study (2 copies), w/o encls	88058224
3/1/1996	Environmental Protection Agency - Region 9	-	Fact Sheet: EPA proposes on-site landfill for contaminated soils	88057186
3/6/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Ed Cargile / CA Environmental Protection Agency - Dept of Toxic Substances Control	Ltr: Request for State identification of ARARs, w/attached form	88058230
3/18/1996	Jennifer Abrahams / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	TL: Revised figure A2-4 to be inserted into leachability & degradation study of 2/29/96, w/o encls	88058223
3/18/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc Jeffrey Bold / Dames & Moore Andrew Kopania / EMKO Environmental, Inc	Memo: Comment on LDS rpt w/corrected legend for Figure A2-4	88058241
3/19/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA comments on design memorandum S-4 initial phase remedy	88058231
3/19/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	James Campbell / NONE Jeffrey Bold / Dames & Moore Michael Tischuk / Beazer East, Inc	Memo: Transmits revisions of specific pages in soils rpt	88057191
3/25/1996	Dames & Moore	Environmental Protection Agency - Region 9	Site-wide soils remedy rpt, w/TL to F Schauffler fr J Bold	88057187
3/29/1996	Chico Enterprise-Record	Andrew Bain / Environmental Protection Agency - Region 9	Newsclip: EPA announces public comment period on proposed plan for soils	88058235
4/10/1996	Hydro-Search, Inc	Beazer East, Inc	Annual 1995 RA groundwater monitoring rpt (Feather River plant), w/TL to F Schauffler fr J Abrahams	88057206
4/10/1996	Hydro-Search, Inc	Beazer East, Inc	Annual 1995 RA groundwater monitoring rpt (Feather River plant), appendix D - data validation rpts, w/TL to J Abrahams fr J Kearns 12/8/95	88057207
4/16/1996	Environmental Protection Agency - Region 9	-	Community meeting on proposed plan (transcript)	88057188
4/20/1996	Nick Ellena / Chico Enterprise-Record	-	Newsclip: Interest in Koppers cleanup dwindles	88058236
4/22/1996	Nick Ellena / Oroville Mercury-Register	-	Newsclip: Latest Koppers cleanup draws little interest	88058237
4/25/1996	Gerald Hiatt / Environmental Protection Agency - Region 9	Frederick Schauffler / Environmental Protection Agency - Region 9	Memo: Total chromium & hexavalent chromium data in RI w/encl	88058239
5/9/1996	James Tjosvold / CA Environmental Protection Agency - Dept of Toxic Substances Control	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: DTSC response to March 1996 proposed plan includes deed restrictions	88058238
5/17/1996	Billie Flaherty / Beazer East, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Argues that land disposal restrictions (LDRs) do not apply to creosote-containing soils at site	88058240
5/20/1996	Richard Hume / CA Environmental Protection Agency - Dept of Toxic Substances Control	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: ARARs for site	88057189
7/9/1996	S B P Technologies Inc	Beazer East, Inc	1st round & 2nd round data summaries, in situ groundwater pilot bioremediation system, w/TL to F Schauffler fr A Kopania 9/11/96	88057233
7/31/1996	Jeffrey Bold / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Request to begin preparation activities in former creosote pond area, w/map & health & safety plan of 8/6/96	88058263
8/1/1996	Jeffrey Bold / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Soil removal action closure request, w/encls	88057234
8/1/1996	Dames & Moore	Environmental Protection Agency - Region 9	Technical Memo: Recommended soil removal activities at former biologic treatment facility, w/TL to F Schauffler fr J Bold 8/14/96	88057235
8/6/1996	Jeffrey Bold / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Request to begin site preparation activities in former creosote pond area, revision 2.0, w/map & health & safety plan of 8/6/96	88058264
8/8/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves revision 2.0 of proposal for former creosote pond area dewatering, subject to 2 comments	88058265
8/20/1996	Jeffrey Bold / Dames & Moore	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Request to continue former creosote pond preparation activities, revision 3.0, w/health & safety plan of 8/19/96	88057236
8/21/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves soil removal action closure request	88058267
8/22/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves revision 3.0 for former creosote pond area dewatering, subject to specific comments	88058269

8/29/1996	Environmental Protection Agency - Region 9	-	Record of decision, amendment #1 for soils & groundwater OU	88057192
9/3/1996	Environmental Protection Agency - Region 9	-	Selected CERCLA guidance documents for Koppers administrative record	88058232
9/14/1996	Scott Brown / T R C Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Transmits Appendix B - health & safety requirements & Appendix C - addendum to health & safety program dust monitoring, w/attchs	88057237
9/17/1996	Jeffrey Bold / T R C Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Transmits lab analyses of former creosote pond water samples, w/encls	88057238
9/17/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves design drawings as submitted & requests itemized changes in scope of work & technical specifications (01 RD complete/RA start 07)	88058243
9/17/1996	Jeffrey Bold / T R C Environmental Solutions, Inc Scott Brown / T R C Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Requests EPA permission to complete deep excavation in former pole washer area & allow removed soils to drain, w/2 maps	88058270
9/18/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Transmits RD/RA workplan outline for implementing ROD amendment #1, w/encl	88058271
9/20/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves proposal to complete deep excavation in former pole washer area, subject to specific comments	88058272
9/24/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves revised health & safety plan & wants to know actual start date for work at former pole washer area	88058273
9/26/1996	Jeffrey Bold / T R C Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Request for EPA permission to transport contaminated soil to soil storage bldg	88058274
9/30/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves request to excavate & transport contaminated soil to soil storage bldg	88058275
10/1/1996	T R C Environmental Solutions, Inc	Beazer East, Inc	Draft soil removal addendum #1 - former biological treatment facility, w/TL to F Schauffler fr J Bold 10/7/96	88057239
10/1/1996	T R C Environmental Solutions, Inc	Beazer East, Inc	Draft soil removal addendum #2 - soil storage bldg & fire debris storage area, w/TL to F Schauffler fr J Bold 10/30/96	88057240
10/1/1996	T R C Environmental Solutions, Inc	Beazer East, Inc	Draft soil removal addendum #3 - former creosote pond area, w/TL to F Schauffler fr J Bold 10/17/96	88057241
10/1/1996	T R C Environmental Solutions, Inc	Beazer East, Inc	Draft RD/RA workplan for expanded phase soil remedy, w/TL to F Schauffler fr J Bold 10/21/96	88057246
10/2/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on Appendices B & C of "Scope of work & technical specifications for soil disposal cell #2," w/TL to M Tischuk fr F Schauffler	88058282
10/21/1996	Jeffrey Bold / T R C Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Response to EPA comments w/revised Appendices B & C, revised fig 3, Appendix A of draft soil removal addendum #1 & TL to F Schauffler fr J Bold	88057244
10/24/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA comments on revised task-specific health & safety plan for soil removal activities & closure of former treatment facility, w/encls	88058283
10/25/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on draft soil removal addendum #1 - former biological treatment facility, w/TL to M Tischuk fr F Schauffler	88058277
10/25/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA comments on task-specific health & safety plan for transportation of stockpiled soil from former pole washer area	88058286
10/25/1996	Jeffrey Bold / T R C Environmental Solutions, Inc Scott Brown / T R C Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Requests EPA approval to transport stockpiled soil from former pole washer area to onsite disposal cell #2, w/health & safety plan & figure 3	88058284
10/25/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Re scope of work/technical specifications for onsite soil disposal cell #2, EPA approves Appendix B & approves conditionally Appendix C	88058285
10/29/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on draft soil removal addendum #3 - former creosote pond area, w/TL to M Tischuk fr F Schauffler	88058279
11/1/1996	T R C Environmental Solutions, Inc	Beazer East, Inc	Draft soil removal addendum #5 - former drip track, log drying & process areas, w/TL to F Schauffler fr J Bold 11/13/96	88057242
11/1/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA comments on task-specific health & safety plan for former creosote pond area	88058287

11/4/1996	Scott Brown / T R C Environmental Solutions, Inc Jeffrey Bold / T R C Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Response to EPA comments on draft soil removal documents, w/figure 1	88058281
11/5/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on draft soil removal addendum #2 - soil storage bldg & fire debris storage area, w/TL to M Tischuk fr F Schauffler	88058278
11/14/1996	T R C Environmental Solutions, Inc	Beazer East, Inc	Appendix B standard operating procedures of draft soil removal addendum #5, w/TL to F Schauffler fr J Bold	88057243
11/15/1996	Andrew Kopania / EMKO Environmental, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Current status & future options for off-property groundwater treatment plant, w/tables 1 & 2	88057247
11/18/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on draft soil removal addendum #5 - shallow soils areas, w/TL to M Tischuk fr F Schauffler	88058280
11/20/1996	T R C Environmental Solutions, Inc	Beazer East, Inc	Revised Appendix A health & safety plan of draft soil removal addendum #5, w/TL to F Schauffler fr J Bold	88058276
12/6/1996	Jeffrey Bold / T R C Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Proposed decontamination & closure protocol for soil storage bldg & fire debris storage area	88058288
12/13/1996	Jeffrey Bold / T R C Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Weekly rpts #1-3, 5-7 (10/23-11 /12/96, 11/21-12/11/96) for soil removal activities, w/TLs	88057249
12/20/1996	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on draft RD/RA workplan for expanded phase soil remedy, w/TL to M Tischuk fr F Schauffler	88058289
1/7/1997	Jeffrey Bold / T R C Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Response to EPA comments on draft soil removal documents, w/tables, figures & TL to F Schauffler fr J Bold	88057245
1/9/1997	William Morris / Koppers Industries, Inc	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Monthly monitoring results, w/TLs to P Woodward fr W Morris, 1/92-12/96, 3/91-12/91, 1/90 & 5/90-12/90	88057363
1/10/1997	Jeffrey Bensch / Hydro-Search, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Monthly status rpts #49-65 (3/96-7/97), w/TLs fr J Abrahams to C Berrey	88057230
1/10/1997	Scott Brown / T R C Environmental Solutions, Inc Jeffrey Bold / T R C Environmental Solutions, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Response to EPA comments on draft RD/RA workplan for expanded phase soil remedy, w/TL to F Schauffler fr J Bold	88057248
1/20/1997	Andrew Kopania / EMKO Environmental, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Interim action proposed for deep excavation in former pole washer area	88058290
1/20/1997	Jennifer Abrahams / H S I GeoTrans, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Monthly (12/96) & quarterly (4th quarter 1996) monitoring disrupted by extensive flooding in Oroville	88058291
1/27/1997	Jennifer Abrahams / H S I GeoTrans, Inc	Frederick Schauffler / Environmental Protection Agency - Region 9	Ltr: Recommends that RA monitoring continue to include well RI-1 for annual sampling & to exclude well RI-17C, w/tables 1 & 2	88058292
2/27/1997	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Transmits EPA comments on draft RD/RA workplan, requests new table 1 re ARARs & extends date to 4/18/97 to submit revised workplan, w/encl	88058293
2/28/1997	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves revised off-property groundwater remedy rpt as modified & subject to attached comments, w/EPA final comments	88058294
2/28/1997	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	EPA comments on groundwater arsenic & chromium background study, w/TL to M Tischuk fr F Schauffler	88058295
3/1/1997	T R C Environmental Solutions, Inc	Beazer East, Inc	Closure rpt for former biological treatment facility, w/TL to C Berrey fr T Patterson 3/13/97	88057261
3/1/1997	T R C Environmental Solutions, Inc	Beazer East, Inc	RD/RA workplan for expanded phase soil remedy	88057262
3/1/1997	T R C Environmental Solutions, Inc	Beazer East, Inc	Lab rpts for former BFT (biological treatment facility) closure, data validation rpt only - quality assurance review of samples, v1, pt 1, w/TL	88057272
3/1/1997	T R C Environmental Solutions, Inc	Beazer East, Inc	Lab rpts for former biological treatment facility (BFT) closure, v1, pt 2, raw data only, w/TLs	88057273
3/1/1997	T R C Environmental Solutions, Inc	Beazer East, Inc	Lab rpts for former BFT (biological treatment facility) closure, v2, raw data only, w/TLs	88057274
3/1/1997	T R C Environmental Solutions, Inc	Beazer East, Inc	Lab rpts for former BFT (biological treatment facility) closure, v3, raw data only, w/TLs	88057275
3/3/1997	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Officially notifies of new EPA project coordinator, Charles Berrey	88058296
3/3/1997	Frederick Schauffler / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves response to EPA comments & requests submission of revised addenda #s 3 & 5	88058297
3/14/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Deep excavation nutrient addition in former pole washer area, w/encls (2)	88057284

4/2/1997	EMKO Environmental, Inc H S I GeoTrans, Inc	Beazer East, Inc	Revised off-property groundwater remedy rpt, w/appendices A & B, attch & TL to C Berrey fr J Abrahams	88057263
4/2/1997	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Transmits revised off-property groundwater remedy rpt & response to EPA comments on gw arsenic & chromium background study, w/o attchs	88058304
4/28/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Approves closure rpt for former biological treatment facility & makes 2 comments	88058305
4/28/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Response to comments on revised off-property groundwater remedy rpt	88058307
4/30/1997	H S I GeoTrans, Inc	Beazer East, Inc	Annual 1996 RA groundwater monitoring rpt, w/TL to C Berrey fr J Abrahams	88057271
5/1/1997	T R C Environmental Solutions, Inc	Beazer East, Inc	Revised soil removal addendum #3 - former creosote pond area, w/TL to C Berrey fr S Brown 5/15/97	88057265
5/1/1997	T R C Environmental Solutions, Inc	Beazer East, Inc	Revised soil removal addendum #5 for former drip track, log drying & process areas, w/TL to M Tischuk fr C Berrey 5/29/97	88057267
5/1/1997	T R C Environmental Solutions, Inc	Beazer East, Inc	Revised Appendix C - Addendum to health & safety program - dust monitoring, w/TL to C Berrey fr S Brown 5/6/97	88057268
5/7/1997	Scott Brown / T R C Environmental Solutions, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Requests EPA approval to proceed w/dewatering fire water pond & describes dewatering procedures, w/attchs	88057266
5/15/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Approves & comments on RD/RA workplan for expanded phase soil remedy, fire water pond dewatering & revised health & safety addendum	88058309
5/21/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Approves & comments on revised soil removal addendum #3	88058308
5/30/1997	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: 1997 annual assessment of process area cap, w/attchs 1-3 & EPA ltr of 6/20/97	88057264
6/1/1997	T R C Environmental Solutions, Inc	Beazer East, Inc	Soil removal addendum #6 - remaining shallow soils areas, w/TL to C Berrey fr S Brown 6/19/97	88057269
6/1/1997	CA Dept of Health Services - Environmental Health Investigations Branch	-	Biological monitoring & health interview study among residents of area w/pentachlorophenol-contaminated groundwater	88057270
6/1/1997	Environmental Protection Agency - Region 9	-	Fact Sheet: EPA revises soil cleanup plan for site	88058302
6/4/1997	William Mahaffey / Pelorus Environmental & Biotechnology Corp	-	Article: Bioremediation of pentachlorophenol, chapter 1 - survey of metabolic pathways & rate constants w/TL to C Berrey fr J Abrahams 2/9/99	88057467
6/23/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Approves & comments on revised soil removal addendum #6 - remaining shallow soils areas	88058310
7/11/1997	Scott Brown / T R C Environmental Solutions, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Transmits construction schedule re soil removal, soil placement & closure for onsite disposal cell #2, w/encl	88058268
7/11/1997	Scott Brown / T R C Environmental Solutions, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Transmits response to EPA comments re soil removal addenda #3 (revised), #5 (revised) & #6, w/encls	88058303
8/4/1997	C & K Engineering Corp	Environmental Protection Agency - Region 9	Fax ltr: Transmits health & safety plans #1 & 2 for soil removal at Feather River plant, w/encls	88057395
8/13/1997	Jeffrey Bold / Dames & Moore	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Proposed soil sampling for area 5 - former pole washer area, w/env	88058311
8/14/1997	Charles Berrey / Environmental Protection Agency - Region 9	Ed Cargile / CA Environmental Protection Agency - Dept of Toxic Substances Control Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Ltr: Requests comments for 5-yr ROD review	88058497
8/14/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Comments on annual 1996 RA groundwater monitoring rpt	88058498
8/14/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA concurrence of soil removal task re health & safety plans #1 & 2	88058500
8/14/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA concurrence of soil sampling plan for area 5, w/encls	88058501
8/14/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA concurrence w/deletion of soil removal in areas 7a, 7c & 8b, w/preliminary sampling results for named areas & Figures 1-3	88057396
8/18/1997	Scott Brown / T R C Environmental Solutions, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Transmits revised construction schedule that includes area 7e - former log drying area & area 5 - former pole washer area, w/encl	88058312
8/21/1997	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: On-property groundwater in situ bioremediation program, w/encls	88057276
9/3/1997	Scott Brown / T R C Environmental Solutions, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Sampling results for area 7c, w/table 1	88058313

9/3/1997	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Memo: Response to EPA request for groundwater sampling & use history	88058314
9/4/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA concurrence re additional soil sampling plan for area 5, w/encls	88057277
9/4/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA confirmation to backfill specific portions of area 7c	88058315
9/8/1997	Andrew Kopania / EMKO Environmental, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Evaluation of soil removal goals for former pole washer area deep excavation, w/figure 1	88058316
9/9/1997	Jeffrey Bold / Dames & Moore	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Remediation plan for area 5 - former pole washer area, w/encls	88057278
9/10/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Concurrence for remaining area 5 remediation & discussion of closure report	88058317
9/18/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA comments re on-property groundwater in situ bioremediation program, w/Figure 5	88058495
9/18/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Comments re on-property groundwater in situ bioremediation program, w/map	88058318
9/22/1997	Scott Brown / T R C Environmental Solutions, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Comments on cell #2 in final cover elevation for soil removal activities, w/2 oversize, folded drawings	88057393
9/26/1997	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Transmits Beazer response to EPA comments on annual 1996 RA groundwater monitoring rpt, w/encl	88058492
10/2/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA comments on backfill concurrence for areas 4, 6a, 6b, 7b, 7c, 7d, 8a, 8b, 8d & 9, w/encls	88057392
10/9/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Backfill concurrence areas 7a & 8c meet ROD criteria for backfilling	88058491
10/14/1997	Scott Brown / T R C Environmental Solutions, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Weekly rpts #8-20 (6/15/97-9/27/97) for soil removal activities, w/TLs	88057258
10/18/1997	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Response to comments re on-property groundwater in situ bioremediation program	88058319
10/28/1997	Scott Brown / T R C Environmental Solutions, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: 1997 activities re pipe rupture in former pole washer area	88058393
11/11/1997	Scott Brown / T R C Environmental Solutions, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Provides additional penta kit data for soil removal activities	88058394
11/14/1997	Scott Brown / T R C Environmental Solutions, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Feather River landfill comparison table	88058395
12/12/1997	Charles Berrey / Environmental Protection Agency - Region 9	Jennifer Abrahams / H S I GeoTrans, Inc	Ltr: Minutes for 12/11/97 RA meeting, including HSI comments of 12/12/97	88058399
12/17/1997	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: On-property in situ bioremediation system operation	88058400
12/22/1997	Keith Takata / Environmental Protection Agency - Region 9	-	Executive summary 5-yr ROD review, w/concurrences, ROD, ESD to ROD, ROD Amendment #1 & pentachlorophenol monitoring results	88057355
12/30/1997	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Discusses & transmits proposed FSP data for 8 domestic wells south of site, w/encl	88057356
1/26/1998	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA comments on FSP for alternative water supply program	88058398
1/29/1998	Scott Brown / T R C Environmental Solutions, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Weekly rpts for soil removal activities, #21-29, 10/4/97-12/13/97, w/TLs to C Berrey fr S Brown	88057351
2/23/1998	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Installation of shallow groundwater wells at disposal cell 2	88058404
2/23/1998	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Current status of on-property groundwater monitoring wells & recommended modifications for specific wells, w/attch	88058405
3/4/1998	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: On-property groundwater monitoring wells, w/table 2	88058407
3/6/1998	W Morris / Koppers Industries, Inc	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Ltr: Summaries of groundwater monitoring data for 1997	88057371
3/19/1998	W Morris / Koppers Industries, Inc	Philip Woodward / CA Regional Water Quality Control Board - Central Valley Region	Ltr: 1997 groundwater analysis results for monthly monitoring data collected	88057372
3/20/1998	Yoga Navayogarajah / U R S Greiner, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Action items resulting fr EPA/Beazer meeting on 3/11/98	88058409
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Palermo	Ltr: Beazer East has restored public drinking water to residential well #89, w/encls (redacted, FOIA ex 6)	88058424

4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Palermo	Ltr: Beazer East has restored public drinking water to residential well #97, w/encls (redacted, FOIA ex 6)	88058425
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Palermo	Ltr: Beazer East has restored public drinking water to residential well #115, w/encls (redacted, FOIA ex 6)	88058426
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Palermo	Ltr: Beazer East has restored public drinking water to residential well #133, w/encls (redacted, FOIA ex 6)	88058427
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to residential wells #RI-15 & RI-18A, w/encls (redacted, FOIA ex 6)	88058428
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to residential well #002, w/encls (redacted, FOIA ex 6)	88058432
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Yucaipa	Ltr: Beazer East has restored public drinking water to residential well #001, w/encls (redacted, FOIA ex 6)	88058429
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to residential well #003, w/encls (redacted, FOIA ex 6)	88058430
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Stockton	Ltr: Beazer East has restored public drinking water to residential well #003, w/encls (redacted, FOIA ex 6)	88058431
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to residential well #32, w/encls (redacted, FOIA ex 6)	88058433
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Palermo	Ltr: Beazer East has restored public drinking water to residential well #35, w/encls (redacted, FOIA ex 6)	88058434
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Palermo	Ltr: Beazer East has restored public drinking water to residential well #36, w/encls (redacted, FOIA ex 6)	88058435
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to well #37, w/encls (redacted, FOIA ex 6)	88058436
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Palermo	Ltr: Beazer East has restored public drinking water to residential well #42, w/encls (redacted, FOIA ex 6)	88058437
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to residential well #52, w/encls (redacted, FOIA ex 6)	88058438
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to residential well #53, w/encls (redacted, FOIA ex 6)	88058439
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to residential well #63, w/encls (redacted, FOIA ex 6)	88058440
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to residential well #64, w/encls (redacted, FOIA ex 6)	88058441
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to residential well #65, w/encls (redacted, FOIA ex 6)	88058442
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer's preparation to sample residential well #31C2, w/encls (redacted, FOIA ex 6)	88057418
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to residential wells #78 & #93, w/encls (redacted, FOIA ex 6)	88057419
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Palermo	Ltr: Beazer East has restored public drinking water to residential wells #40 & #88, w/encls (redacted, FOIA ex 6)	88057420
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer's preparation to sample residential well #54, w/encls (redacted, FOIA ex 6)	88058412
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer's preparation to sample residential well #81, w/encls (redacted, FOIA ex 6)	88058413
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer's preparation to sample residential well #31D3, w/encls (redacted, FOIA ex 6)	88058414
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer's preparation to sample residential well #59, w/encls (redacted, FOIA ex 6)	88058415
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer's preparation to sample residential well #60, w/encls (redacted, FOIA ex 6)	88058416
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Pacifica	Ltr: Beazer's preparation to sample residential well #61, w/encls (redacted, FOIA ex 6)	88058417
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer's preparation to sample residential well #62, w/encls (redacted, FOIA ex 6)	88058418
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Durham	Ltr: Beazer East has restored public drinking water to residential well #68, w/encls (redacted, FOIA ex 6)	88058419
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to residential well #69, w/encls (redacted, FOIA ex 6)	88058420
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to residential well #70, w/encls (redacted, FOIA ex 6)	88058421

4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Palermo	Ltr: Beazer East has restored public drinking water to residential well #74, w/encls (redacted, FOIA ex 6)	88058422
4/6/1998	Charles Berrey / Environmental Protection Agency - Region 9	Resident / City of Oroville	Ltr: Beazer East has restored public drinking water to residential well #84, w/encls (redacted, FOIA ex 6)	88058423
4/9/1998	Michael Tischuk / Beazer East, Inc	Resident / City of Oroville	Ltrs (33) w/water reimbursement payments to individuals who own private wells south of Koppers Co (redacted, FOIA ex 6)	88057451
4/14/1998	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Off-property groundwater in situ bioremediation program, w/1 figure & 2 attchs	88057374
4/27/1998	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Comments on off-property groundwater in situ bioremediation program	88058443
5/11/1998	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Notifies of off-property groundwater extraction wells modification to be done during May 1998	88058444
5/29/1998	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Transmits & discusses 1998 annual assessment of process area cap, w/attchs 1 & 2	88057375
6/8/1998	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA comments on data quality objectives for off-property groundwater remediation system	88058382
6/11/1998	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approval of revised off-property groundwater in situ bioremediation program, w/Beazer's revised bioremediation program of 6/10/98	88057380
6/25/1998	Yoga Navayogarajah / U R S Greiner, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Presents action items & discussion points fr 6/17/98 RA meeting	88058391
8/1/1998	Environmental Protection Agency - Region 9	-	Fact Sheet: EPA groundwater cleanup progress update	88058452
8/3/1998	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Comments on 1998 annual assessment of process area cap	88058456
8/18/1998	Michael Tischuk / Beazer East, Inc	James Tjosvold / CA Environmental Protection Agency - Dept of Toxic Substances Control	Ltr: DTSC involvement developing model institutional control language for site	88058454
8/24/1998	H S I GeoTrans, Inc	Environmental Protection Agency - Region 9	Semi-annual progress rpts #9-13 (8/96-8/98) on effectiveness of treatment technologies for remediation activities, w/TLs	88057259
9/2/1998	EMKO Environmental, Inc H S I GeoTrans, Inc	Beazer East, Inc	Annual 1997 RA groundwater monitoring rpt, Feather River plant, w/TL to C Berrey fr J Abrahams	88057383
9/8/1998	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Response to EPA comments on data quality objectives for off-property groundwater remediation system at Feather River plant	88057410
9/11/1998	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA comments on annual 1997 RA groundwater monitoring rpt	88058555
9/22/1998	Yoga Navajogarajah / U R S Greiner, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Provides action items & discussion points fr 9/16/98 RA mtg	88058557
9/23/1998	EMKO Environmental, Inc H S I GeoTrans, Inc	Beazer East, Inc	1st quarter 1998 RA groundwater monitoring rpt for Feather River plant, w/TL to C Berrey fr J Abrahams	88057409
9/28/1998	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Response to EPA comments on revised evaluation of technical impracticability of gw restoration in creosote pond & cellon blowdown areas	88058558
10/8/1998	Charles Berrey / Environmental Protection Agency - Region 9	Ed Cargile / CA Environmental Protection Agency - Dept of Toxic Substances Control	Ltr: ARAR for ROD amendment	88058564
10/13/1998	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA comments on 1st quarter 1998 RA groundwater monitoring rpt	88058563
10/27/1998	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Transmits round 10 data summary in situ groundwater bioremediation system, w/o attch	88058534
11/1/1998	T R C Environmental Solutions, Inc	Beazer East, Inc	Appendices A-N only of construction documentation & closure rpt for cell #2 & associated soil removal activities	88057454
11/1/1998	T R C Environmental Solutions, Inc	Beazer East, Inc	Appendices O & P only of construction documentation & closure rpt for cell #2 & associated soil removal activities	88057455
11/1/1998	T R C Environmental Solutions, Inc	Beazer East, Inc	Confirmatory testing raw data index for cell #2 closure rpt, v3 of 4	88057458
11/1/1998	T R C Environmental Solutions, Inc	Beazer East, Inc	Confirmatory testing raw data index for cell #2 closure rpt, v1 of 4	88057456
11/1/1998	T R C Environmental Solutions, Inc	Beazer East, Inc	Confirmatory testing raw data index for cell #2 closure rpt, v2 of 4	88057457
11/1/1998	T R C Environmental Solutions, Inc	Beazer East, Inc	Confirmatory testing raw data index for cell #2 closure rpt, v4 of 4	88057459

11/19/1998	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Round 10 data summary in situ groundwater pilot bioremediation system - former creosote pond area, w/research brief #26 re hydrocarbon mixtures	88058519
11/23/1998	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Notifies that off-property groundwater modifications were not performed & comments on same	88058566
12/1/1998	T R C Environmental Solutions, Inc	Beazer East, Inc	Construction documentation & closure rpt for cell #2 & associated soil removal activities, w/TL to C Berrey fr S Brown 12/3/98, w/o appendices	88057453
12/9/1998	H S I GeoTrans, Inc EMKO Environmental, Inc	Beazer East, Inc	Semi-annual 1998 RA groundwater monitoring rpt, w/TL & ltr of 12/23/98 w/EPA comments on rpt	88057452
12/10/1998	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Monthly progress rpts #66-82 for 8/97-12/98, w/TLs to C Berrey fr J Abrahams	88057350
12/22/1998	Yoga Navayogarajah / U R S Greiner, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Provides lists of action items & discussion points from 12/17/98 RA meeting	88058567
12/24/1998	Michael Tischuk / Beazer East, Inc	Ed Cargile / CA Environmental Protection Agency - Dept of Toxic Substances Control	Ltr: Closure of inactive RCRA units	88058574
12/28/1998	T R C Environmental Solutions, Inc	Environmental Protection Agency - Region 9	Revised tables 3.2, 3.6, 3.7 & appendix N for construction documentation & closure rpt for cell #2 & associated soil removal activities w/TL	88057460
12/30/1998	James Tjosvold / CA Environmental Protection Agency - Dept of Toxic Substances Control	Michael Tischuk / Beazer East, Inc	Ltr: Concurrence of closure for resource conservation & recovery act (RCRA) units at site	88058569
1/7/1999	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: RA groundwater monitoring reporting procedures	88058575
1/11/1999	H S I GeoTrans, Inc	Environmental Protection Agency - Region 9	Monthly progress rpt #83, 1/99 w/TL to C Berry fr J Abrahams	88058568
1/20/1999	Richard Hume / CA Environmental Protection Agency - Dept of Toxic Substances Control	Charles Berrey / Environmental Protection Agency - Region 9	Applicable or relevant & appropriate requirements (ARARs) for groundwater remediation w/encls	88057461
1/21/1999	Environmental Protection Agency - National Exposure Research Laboratory	Environmental Protection Agency - Region 9	Review of the statistical analysis for site w/TL to C Berrey fr K Brown 1/26/99	88057462
1/29/1999	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Comments on construction documentation & closure rpt for cell #2 & associated soil removal activities	88057463
2/1/1999	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Memo: Transmits chart of pentachlorophenol degradation pathways & comparison of water quality goals, w/encls	88058576
2/22/1999	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Semi-annual progress rpt on effectiveness of treatment technologies - rpt #14, w/TL to C Berrey fr J Abrahams	88058591
3/8/1999	H S I GeoTrans, Inc EMKO Environmental, Inc	Beazer East, Inc	Final evaluation of technical impracticability of gw restoration in former creosote pond & cellon blowdown areas, w/TL to C Berrey fr J Abrahams	88057465
3/17/1999	-	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Comments on proposed plan (redacted, FOIA ex 6)	88058592
3/22/1999	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	TL: PCP (pentachlorophenol) biodegradation & toxicity, w/encls	88057468
3/23/1999	Environmental Protection Agency - Region 9	-	Community meeting on 3/23/99 re groundwater amendment proposed plan (original version & version corrected by URS Corp)	88057469
3/25/1999	Anita Singh / Lockheed Martin Corp	Charles Berrey / Environmental Protection Agency - Region 9	Memo: Transmits list of issues to be discussed in conference call, w/encl	88058577
3/26/1999	-	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Comments on proposed plan (redacted, FOIA ex 6)	88058578
4/12/1999	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Summary of 3/25/99 teleconference re statistical evaluation of soil data	88058579
4/13/1999	EMKO Environmental, Inc H S I GeoTrans, Inc	Beazer East, Inc	Annual 1998 RA groundwater monitoring rpt, w/TL to C Berrey fr J Abrahams	88057466
4/20/1999	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Revised summary of 3/25/99 teleconference re statistical evaluation of soil data	88058580
4/20/1999	Yoga Navayogarajah / U R S Greiner Woodward Clyde, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Lists action items from 4/15/99 RA meeting	88058581
4/21/1999	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: On-property groundwater remediation system temporary shutdown on 4/15/99	88058582
4/23/1999	Charles Berrey / Environmental Protection Agency - Region 9	-	Ltr: Response to comments on proposed plan (redacted, FOIA ex 6)	88058583

4/23/1999	Charles Berrey / Environmental Protection Agency - Region 9	-	Ltr: Response to comments on proposed plan (redacted, FOIA ex 6)	88058584
4/23/1999	Charles Berrey / Environmental Protection Agency - Region 9	-	Ltr: Off-property groundwater restoration & testing residential well (redacted, FOIA ex 6)	88058585
4/23/1999	Charles Berrey / Environmental Protection Agency - Region 9	-	Ltr: Off-property groundwater restoration & testing residential well (redacted, FOIA ex 6)	88058586
4/23/1999	Charles Berrey / Environmental Protection Agency - Region 9	-	Ltr: Off-property groundwater restoration & testing residential well (redacted, FOIA ex 6)	88058587
5/6/1999	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Ltr: Proposed FSP for residential wells 31C2, 31D3 & 54, w/o attch (redacted, FOIA ex 6)	88058645
5/7/1999	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Requirements for annual assessment of process area cap	88058588
5/10/1999	Jennifer Abrahams / H S I GeoTrans, Inc	Charles Berrey / Environmental Protection Agency - Region 9	Monthly progress rpts #84-87, 2/99-5/99, w/TLs to C Berrey fr J Abrahams	88057474
5/10/1999	James Tjosvold / CA Environmental Protection Agency - Dept of Toxic Substances Control	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Concurs with proposed plan to modify groundwater remedy	88058589
5/10/1999	James Pedri / CA Regional Water Quality Control Board - Central Valley Region	John Kemmerer / Environmental Protection Agency - Region 9	Ltr: Concurs with proposed plan to modify groundwater remedy	88058590
5/20/1999	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Comments on annual 1998 RA groundwater monitoring rpt	88058593
5/20/1999	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Approves FSP for alternative water supply wells 31C2, 31D3 & 54, w/conditions to be met	88058594
6/30/1999	Dames & Moore	Beazer East, Inc	Ltr: 1999 annual assessment of process area cap, w/contingency plan & TL to C Berrey fr J Bold	88057389
8/26/1999	Charles Berrey / Environmental Protection Agency - Region 9	Edward Cargile / CA Environmental Protection Agency - Dept of Toxic Substances Control	Ltr: Review of ROD amendment #2 for site	88058604
9/16/1999	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: EPA approves & comments on 1999 annual assessment of process area cap	88058605
9/23/1999	Environmental Protection Agency - Region 9	-	Amendment #2 to ROD for soil & groundwater operable unit (01 ROD Amendment #2 02)	88057508
9/23/1999	Environmental Protection Agency - Region 9	-	Amendment #2 to ROD for soil & groundwater operable unit (concurrence copy)	88058606
9/24/1999	Charles Berrey / Environmental Protection Agency - Region 9	Michael Tischuk / Beazer East, Inc	Ltr: Comments on amendment #2 to ROD for soil & groundwater OU	88058607
10/6/1999	Environmental Protection Agency - Region 9	-	Compendium of CERCLA guidance documents selected for Koppers AR	88058608

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Site Overview link

Last updated January 4, 2011
Last updated on 08/22/2013

U.S. ENVIRONMENTAL PROTECTION AGENCY

Superfund Information Systems

Cleanup Activities at ARKWOOD, INC. (EPA ID: ARD084930148)

Back to the Profile for this Site

The data and content on this page were last updated on Thursday, August 15, 2013.

Additional Site Documents | Other Names for this Site (Aliases) | Contaminants of Concern | Cleanup Activities | Operable Units (OUs) | Site Contacts | GPRA Measures

There are many stages of cleanup including site study, remedy selection, remedy design, remedy construction, and post-construction. Activities undertaken early in the cleanup process focus on understanding problems at the site while those taken later in the cleanup process focus on physically addressing those problems identified. This tab provides a detailed list of cleanup activities at this site. Sometimes, these cleanup activities are called "actions".

Activities Underway

Activity	Leading Organization	Area of Site Addressed (OU)	Start Date
OPERATIONS AND MAINTENANCE (see glossary)	Responsible Party	SITEWIDE (00)	06/28/1996

see glossary for definitions of activities, leading organization, operable units (OUs) or start dates >>

Activities Completed

Activity	Leading Organization	Area of Site Addressed (OU)	Start Date	Completion Date
PREPARATION OF COST DOCUMENT PACKAGE (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	04/25/2013
PREPARATION OF COST DOCUMENT PACKAGE (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	04/26/2012
FIVE-YEAR REVIEW (see glossary)	EPA Fund-Financed	GROUNDWATER/SOIL (01)	12/10/2010	08/18/2011
View Documentation [1.24MB]				
PREPARATION OF COST DOCUMENT PACKAGE (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	05/17/2011
PREPARATION OF COST DOCUMENT PACKAGE (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	04/29/2010

PREPARATION OF COST DOCUMENT PACKAGE (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	03/27/2009
PREPARATION OF COST DOCUMENT PACKAGE (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	03/28/2008
PREPARATION OF COST DOCUMENT PACKAGE (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	05/16/2007
PREPARATION OF COST DOCUMENT PACKAGE (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	05/26/2006
FIVE-YEAR REVIEW (see glossary)	EPA Fund-Financed	GROUNDWATER/SOIL (01)	Not Available	03/31/2006
View Documentation [485KB]				
PREPARATION OF COST DOCUMENT PACKAGE (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	04/21/2005
PREPARATION OF COST DOCUMENT PACKAGE (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	05/07/2004
PREPARATION OF COST DOCUMENT PACKAGE (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	05/19/2003
FIVE-YEAR REVIEW (see glossary)	Responsible Party	GROUNDWATER/SOIL (01)	02/28/1994	03/13/2001
View Documentation [152KB]				
POTENTIALLY RESPONSIBLE PARTY COMMUNITY INVOLVEMENT (see glossary)	Responsible Party	GROUNDWATER/SOIL (01)	11/03/1986	11/03/1996
PRELIMINARY CLOSE-OUT REPORT PREPARED (see glossary)	EPA Fund-Financed	SITEWIDE (00)	Not Available	06/28/1996
POTENTIALLY RESPONSIBLE PARTY REMEDIAL ACTION (see glossary)	Responsible Party	SITEWIDE (00)	06/23/1995	06/28/1996
Technologies Used: Incineration; and Residuals Disposal.				
POTENTIALLY RESPONSIBLE PARTY REMEDIAL ACTION (see glossary)	Responsible Party	SITEWIDE (00)	06/29/1994	08/27/1995
Technologies Used: Disposal; Engineering Control, Not Specified; and Excavation.				
POTENTIALLY RESPONSIBLE PARTY REMEDIAL DESIGN (see glossary)	Responsible Party	SITEWIDE (00)	10/21/1991	06/23/1995
Explanation Of Significant Differences (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	06/14/1995
Technology Used: Incineration.				
POTENTIALLY RESPONSIBLE PARTY REMEDIAL DESIGN (see glossary)	Responsible Party	SITEWIDE (00)	10/21/1991	06/29/1994
CONSENT DECREE (see glossary)	Federal Enforcement	SITEWIDE (00)	05/30/1991	09/23/1992

Lodged By DOJ (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	12/17/1991
REMOVAL ASSESSMENT (see glossary)	Responsible Party	SITEWIDE (00)	12/06/1991	12/06/1991
REMEDIAL DESIGN/REMEDIAL ACTION NEGOTIATIONS (see glossary)	Federal Enforcement	SITEWIDE (00)	09/28/1990	05/30/1991
NATIONAL PRIORITIES LIST RESPONSIBLE PARTY SEARCH (see glossary)	Federal Enforcement	SITEWIDE (00)	08/23/1990	10/05/1990
Outcome: Potentially Responsible Party (PRP) search complete, viable PRPs identified				
RECORD OF DECISION (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	09/28/1990
Outcome: Final Remedy Selected at Site Technologies Used: Access Restriction; Alternate Drinking Water, Not Specified; Cap; Deed Notices; Disposal; Excavation; Incineration; Monitoring; Natural Attenuation; Revegetation; and Soil Washing.				
Special Notice Issued (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	09/28/1990
POTENTIALLY RESPONSIBLE PARTY REMEDIAL INVESTIGATION/FEASIBILITY STUDY (see glossary)	Responsible Party	SITEWIDE (00)	05/15/1986	09/28/1990
ADMINISTRATIVE RECORDS (see glossary)	Federal Enforcement	SITEWIDE (00)	07/12/1990	07/12/1990
Outcome: Admin Record Compiled for a Remedial Event				
REMOVAL ASSESSMENT (see glossary)	Responsible Party	SITEWIDE (00)	04/02/1990	05/16/1990
FINAL LISTING ON NATIONAL PRIORITIES LIST (see glossary)	EPA Fund-Financed	SITEWIDE (00)	Not Available	03/31/1989
REMOVAL ASSESSMENT (see glossary)	Responsible Party	SITEWIDE (00)	02/02/1989	02/02/1989
CONSENT DECREE (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	07/11/1988
Lodged By DOJ (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	07/11/1988
SECTION 104(E) REF LITIGATION (see glossary)	Federal Enforcement	SITEWIDE (00)	02/28/1987	07/11/1988
SECTION 106 LITIGATION (see glossary)	Federal Enforcement	SITEWIDE (00)	02/28/1987	07/11/1988
POTENTIALLY RESPONSIBLE PARTY REMOVAL (see glossary)	Responsible Party	SITEWIDE (00)	08/12/1987	08/13/1987
Outcome: Stabilized				
UNILATERAL ADMIN ORDER (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	08/04/1987
Special Notice Issued (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	06/18/1987

PRELIMINARY ASSESSMENT (see glossary)	State, Fund Financed	SITEWIDE (00)	03/01/1987	03/01/1987
Outcome: Low Priority				
SITE INSPECTION (see glossary)	State, Fund Financed	SITEWIDE (00)	03/01/1987	03/01/1987
Outcome: High Priority				
INFORMATION REPOSITORY ESTABLISHED (see glossary)	Responsible Party	GROUNDWATER/SOIL (01)	Not Available	11/05/1986
ISSUE REQUEST LETTERS (104E) (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	09/23/1986
ADMINISTRATIVE ORDER ON CONSENT (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	05/15/1986
REMEDIAL INVESTIGATION/FEASIBILITY STUDY NEGOTIATIONS (see glossary)	Federal Enforcement	SITEWIDE (00)	05/15/1986	05/15/1986
NATIONAL PRIORITIES LIST RESPONSIBLE PARTY SEARCH (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	11/15/1985
Outcome: No Potentially Responsible Parties identified				
Notice Letters Issued (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	11/05/1985
Notice Letters Issued (see glossary)	EPA Fund-Financed	SITEWIDE (00)	Not Available	11/05/1985
Special Notice Issued (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	11/05/1985
ISSUE REQUEST LETTERS (104E) (see glossary)	Federal Enforcement	SITEWIDE (00)	Not Available	10/31/1985
PROPOSAL TO NATIONAL PRIORITIES LIST (see glossary)	EPA Fund-Financed	SITEWIDE (00)	Not Available	09/18/1985
DISCOVERY (see glossary)	EPA Fund-Financed	SITEWIDE (00)	Not Available	04/09/1985

see glossary for definitions of activities, leading organization, operable units (OUs), start dates, and completion dates

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Return to Search Results | **Return to Search Superfund Site Information**

Preliminary Closeout Report for Koppers Company, Inc., Superfund Site, Oroville, California

Prepared by

U. S. Environmental Protection Agency

September 2003

Contents

Page

Acronyms and Abbreviations ..... **iii**

Preliminary Closeout Report **1**

1.0 Introduction 1
2.0 Summary of Site Conditions 1
2.1 Background 1
2.2 Remedial Construction Activities 12
3.0 Demonstration of Cleanup Activity Quality Assurance and Quality Control 19
4.0 Activities and Schedules for Site Completion 20
5.0 Summary of Remediation Costs 20
6.0 Five-Year Review 21
7.0 Works Cited 21
8.0 Signature 22

Tables

1 Site Activities and Investigation 5

2 Summary of Soil Removal and Remedial Actions from 1995 to 2002 17

3 Completion Schedule 21

Figures (in separate PDF files)

1 Site Location Map .....

2 Site Features .....

3 Cell Location and Areas of Remediation .....

4 On Property PCP Concentrations .....

5 On Property Boron Concentrations .....

6 Off Property PCP Concentrations .....

Acronyms and Abbreviations

µg/L	micrograms per liter
Beazer	Beazer East, Inc.
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	contaminant of concern
cy	cubic yards
DTSC	Department of Toxic Substances Control
ESD	Explanation of Significant Difference
FS	Feasibility Study
gpm	gallons per minute
IPE	isopropyl ether
KCI	Koppers Company Inc.
KII	Koppers Industries, Inc. (prior to 1988 referred to as Koppers Company Inc.)
L-P	Louisiana Pacific
MNA	monitored natural attenuation
msl	mean sea level
NPL	National Priorities List
O&M	operations and maintenance
P&T	pump and treat
PAH	polynuclear aromatic hydrocarbons
PCDD	polychlorinated dibenzo-p-dioxins
PCDF	polychlorinated dibenzofurans
PCP	pentachlorophenol
ppb	parts per billion
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RI	remedial investigation
ROD	Record of Decision