Appendix F
Regulatory Review

Applicable or Relevant and Appropriate Requirements Evaluation

PREPARED FOR: **Alexa Stamets/CH2M HILL**

PREPARED BY: **Andrew Redmond/CH2M HILL**

COPIES: **Caroline Ziegler/CH2M HILL**

DATE: **April 19, 2006**

This technical memorandum presents an evaluation of the Applicable or Relevant and Appropriate Requirements (ARARs) at the Stringfellow Superfund Site (also referred to as "site").

Purpose of ARARs Review

The purpose of an ARARs review is to determine whether laws, regulations, or guidance promulgated since approval of site decision documents alter the remedy's protectiveness of human health and the environment. The ARARs review attempts to answer the following question: Are exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) selected at the time of remedy decisions still valid?

ARARs are established in the site decision documents: Record of Decisions (RODs), ROD Amendments, or Explanation of Significant Differences (ESDs). Changes to ARARs, where necessary, can be memorialized in ROD Amendments or ESDs. Current versions of the California Code of Regulations (CCR) and Title 40 of the Code of Federal Regulations (CFR) were consulted (via the internet or in hardcopy) to review pertinent updates of laws, regulations, or guidance.

The preamble to the National Contingency Plan (NCP) states that remedy selection decisions are not to be reopened unless new or modified requirements call into question the protectiveness of the selected remedy (55 CFR 8757, March 8, 1990). This is interpreted to mean generally that ARARs are frozen at the time of remedy approval, unless updated by additional decision documents.

ARARs Background

Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that remedial actions implemented at CERCLA sites are carried out in compliance with any federal or more stringent state environmental standards, requirements, criteria, or limitations that are determined to be ARARs.

CERCLA response actions are exempted by law from the requirement to obtain federal, state, or local permits related to any activities conducted completely onsite. However, this

does not remove the requirement to meet the substantive provisions of permitting regulations that are ARARs.

Applicable. Applicable requirements are cleanup standards, criteria, or limitations promulgated under federal or state law that specifically address the situation at a CERCLA site. A requirement is applicable if the jurisdictional prerequisites of the environmental standard show a direct correspondence when objectively compared with the conditions at the site.

Relevant and appropriate. If a requirement is not legally applicable, the requirement is evaluated to determine whether it is relevant and appropriate. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable, address problems or situations sufficiently similar to the circumstances of the proposed response action and are well suited to the conditions of the site. The criteria for determining relevance and appropriateness are listed in 40 CFR 300.400(g) (2).

To be considered (TBC). TBC criteria are requirements that may not meet the definition of an ARAR, but still may be useful in determining whether to take action at a site or to what degree action is necessary. TBC criteria, as defined in 40 CFR 300.400(g) (3), are nonpromulgated advisories or guidance issued by federal or state government that are not legally binding but may provide useful information or recommended procedures for remedial action. Although TBC criteria do not have the status of ARARs, they are considered together with ARARs to establish the required level of cleanup for protection of human health and the environment.

Pursuant to U.S. Environmental Protection Agency (USEPA) guidance, ARARs generally are classified into three categories: chemical-specific, location-specific, and action-specific requirements. These categories of ARARs are identified below:

Action-specific ARARs are requirements that apply to specific actions that may be associated with site remediation. Action-specific ARARs often define acceptable handling, treatment, and disposal procedures for hazardous substances. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. Examples of action-specific ARARs include requirements applicable to landfill closure, wastewater discharge, hazardous waste disposal, and emissions of air pollutants.

Chemical-specific ARARs include those laws and regulations that regulate the release to the environment of materials possessing certain chemical or physical characteristics or containing specified chemical compounds. These requirements generally set health- or risk-based concentration limits or discharge limits for specific hazardous substances.

Location-specific ARARs are those requirements that relate to the geographical or physical location of the site, rather than the nature of the contaminants or the proposed site remedial actions. These requirements may limit the placement of remedial action, and may impose additional constraints on the cleanup action. For example, location-specific ARARs may refer to activities in the vicinity of wetlands, floodplains, endangered species habitat, and areas of historical or cultural significance.

Stringfellow Background

The site is located approximately 50 miles east of Los Angeles, in Pyrite Canyon, north of the community of Glen Avon, California. The site includes both a former Class I industrial waste disposal area and the area impacted by groundwater contamination. The site is a CERCLA Superfund Site, and was placed on the National Priority List (NPL) in 1983. The site is divided into Zones 1, 2, 3 and 4 (see Figure 2 in the main document):

- **Zone 1–Onsite/Upper Mid-Canyon Area.** This zone includes the original 17-acre disposal area in the northern uppermost part of Pyrite Canyon, extending approximately 600 feet south of the clay barrier dam.
- **Zone 2–Mid-Canyon Area.** This zone is the middle reach of Pyrite Canyon extending approximately 800 feet south of Zone 1. The mid-canyon extraction wells are located along the southern, downgradient boundary of Zone 2.
- **Zone 3–Lower Canyon Area.** This zone is the lower reach of Pyrite Canyon extending approximately 2,400 feet south of Zone 2 to Highway 60. The lower canyon extraction wells are located along the southern, downgradient boundary of Zone 3.
- **Zone 4–Glen Avon Community.** This zone includes the area of Glen Avon south of Highway 60 and downstream of Pyrite Canyon, and extends to the current leading edge of the groundwater plume at the Santa Ana River, approximately 4 miles southwest of the former disposal ponds (located in Zone 1).

Approximately 34 million gallons of liquid wastes containing spent acids and caustics, solvents, pesticide byproducts, metals, and various inorganic and organic compounds were discharged into surface impoundments in Zone 1 from 1956 to 1972. In addition, perchlorate has been detected at the site.

According to the Stringfellow 2002 Annual Report (Tetra Tech, 2004), soil contamination is limited to Zone 1. Soil contaminants at the site include the following compounds:

- volatile organic compounds (VOC)
- p-chlorobenzene sulfonic acid (p-CBSA)
- Dichlorodiphenyldichloroethane (DDD)
- Dichlorodiphenyltrichloroethane (DDT)
- Metals (including chromium, cadmium and lead)

In general, contaminant concentrations in groundwater are highest in Zone 1, and decrease with distance from Zone 1. According to the Stringfellow 2002 Annual Report, groundwater contaminants at the site include:

- Trichloroethene (TCE)
- VOCs
- Perchlorate
- p-CBSA
- Sulfate
- Metals (including chromium)

The remedies at the site include:

- **Liquid Waste Removal.** Historically, all liquid wastes at the surface of the site were removed to a federally approved hazardous waste disposal facility.
- **Clay Cap.** A clay cap was installed to retard infiltration of rainfall into Zone 1.
- **Upgradient Interception System** designed to intercept and divert uncontaminated shallow groundwater (from up to 25 extraction wells) and surface water (drainage trenches) to control in-flow to the original waste disposal area. Extracted and diverted water is discharged into a surface water channel system and eventually into Pyrite Creek (south of the site). Historical flows from the upgradient extraction wells range from under 50,000 gallons per month to more than 100,000 gallons per month, with high flow only during periods of high rainfall.
- **Clay Barrier Dam** installed to prevent migration of contamination from Zone 1.
- **Mid-Canyon Pretreatment Plant (PTP)** in Zone 2, designed to treat perchlorate, metals, and organic compounds in extracted groundwater. Treated water is discharged to the Santa Ana Regional Interceptor (SARI) sewer line under permit No. 4D-98-S101 issued by the Santa Ana Watershed Project Authority (SAWPA). Hazardous wastes are generated at the PTP, and are transported and disposed offsite at federally approved disposal facilities. The Department of Toxic Substances Control (DTSC) determined that filter cake (hazardous waste) from the PTP exceeding the Universal Treatment Standards (UTS) must be incinerated. As a result, a portion of the filter cake from the PTP is sent off-site for incineration.
- **Zone 1 Hydraulic Control and Dewatering System** that consists of groundwater extraction wells within Zone 1A; the effluent is delivered to the PTP.
- **Downgradient Hydraulic Control System** that consists of groundwater extraction wells located in Zone 1 immediately downgradient of the clay barrier dam; the effluent is delivered to the PTP.
- **Zone 2 Hydraulic Control System** that consists of groundwater extraction wells in Zone 2; the effluent is delivered to the PTP.
- **Lower Canyon Treatment Facility (LCTF)** in Zone 3, designed to treat VOCs, and perchlorate in groundwater extracted from the southern end of Zone 3 and the "north" and "south" extraction wells in Zone 4. The LCTF effluent is delivered to PTP effluent holding tanks for discharge to the SARI. Hazardous wastes are generated at the LCTF, and are transported and disposed off-site at federally approved disposal facilities.
- **Community Wellhead Treatment System (CWTS)** in Zone 4, designed to treat perchlorate and VOCs in groundwater extracted from two "tree-farm wells" located approximately 2 miles south of Highway 60. The CWTS effluent is either used for local irrigation or discharged to Pyrite Creek under Waste Discharge Requirements, Order No. R8-2003-0085, National Pollution Discharge Elimination System (NPDES) No. CAG918001 issued by the California Regional Water Quality Control Board (Water Board), Santa Ana Region.

- **Access Restrictions.** Access is restricted to Zone 1 and the PTP via fencing and security services. Access is restricted to the LCTF and the CWTS via fencing.

Stringfellow Superfund Site ARARs Review

The following documents were consulted in completing this ARARs review:

- First ROD, 1983
- Second ROD, 1984
- Third ROD, 1987
- Fourth ROD, 1990
- Five-Year Review, 1993
- ESD, 1998
- Five-Year Review, 2001

First ROD, July 22, 1983

The first ROD addressed remedies at Zone 1, the Original Disposal Area. No ARARs were identified in the first ROD. This ROD consisted of institutional and access controls, and documentation of removal actions.

Second ROD, July 18, 1984

The second ROD addressed remedies at Zone 2, the Mid-Canyon Area. No location-specific or chemical-specific ARARs were identified. Action-specific ARARs relevant to the second ROD are presented in Table 2. The Clean Water Act (CWA) and Clean Air Act (CAA) were identified as ARARs in this ROD.

Third ROD, June 25, 1987

The third ROD addressed remedies at Zone 3, the Lower Containment Area. No location-specific or chemical-specific ARARs were identified in the third ROD. The CWA, CAA and Resource Conservation and Recovery Act (RCRA) were identified as action-specific ARARs (presented in Table 2). Under the CWA, pretreatment requirements must be met for the extracted groundwater discharge to the Santa Ana Regional Interceptor (SARI) sewer line. RCRA is relevant to the sludge (solid waste or hazardous waste) generated by the PTP.

Fourth ROD, September 30, 1990

Fourth ROD, Zone 1 – Original Disposal Area

No location-specific or chemical-specific ARARs were identified. The CWA, CAA and RCRA were identified as action-specific ARARs (presented in Table 2). Under the CWA, pretreatment requirements must be met for discharge to the SARI sewer line. The RCRA Land Disposal Restriction requirements are applicable because the sludge generated at the pretreatment plant may be considered hazardous.

Fourth ROD, Zone 4 – Glen Avon Community

No location-specific ARARs were identified. The CWA and CAA were identified as action-specific ARARs (presented in Table 2). Under CWA, requirements in the NPDES Program are applicable. In addition, under the CAA, the South Coast Air Quality Management District (SCAQMD) Regulation XIII is applicable. Chemical-specific ARARs identified in the ROD include the Safe Water Drinking Act (SWDA). Under the SDWA, Maximum Contaminant Levels (MCLs) must be met at the tap. For the action of reinjection, the Underground Injection Control program requires that the SDWA and the State of California MCLs be met.

Guidelines included in the fourth ROD stated that ARARs need to be considered for the primary chemicals of concern for Zone 4:

- TCE
- Chloroform
- Sulfate
- Nitrate

The 5 micrograms per liter (µg/L) state and federal MCL for TCE has not changed since issuance of the fourth ROD. Similarly, the federal ambient water quality health-based standard of 6 µg/L chloroform is unchanged from the remediation goal used in the fourth ROD.

Five-Year Review Report for Zone 2, February 10, 1993

No changes to ARARs were identified in the Five-Year Review Report for Zone 2 issued on February 10, 1993.

ESD, July 9, 1998

The ESD issued on July 9, 1998 addressed remedies at Zone 2, the Mid-Canyon Area. This ESD presented a proposed change in the remedy chosen in the second ROD. The change consisted of constructing a pipeline from the PTP for discharge to the SARI instead of hauling discharge to the SARI by truck. No changes to ARARs were identified in the ESD issued July 9, 1998.

Five-Year Review Report, September 27, 2001

The Five-Year review issued on September 27, 2001, identified RCRA as an ARAR relevant to management and disposal of sludge (solid waste or hazardous waste) generated by the PTP. In addition, Secondary MCLs were added to the Zone 4 chemical-specific ARARs as TBC criteria. Secondary MCLs are non-enforceable guidelines recommended for cosmetic (skin or tooth color) or aesthetic (taste, odor, or color) effects of contaminants.

Summary of Numeric Limitations

A summary of numeric limitations evaluated as part of this regulatory review for the site is presented in Table 1.

TABLE 1
Summary of Numerical Limitations
Applicable or Relevant and Appropriate Requirements Evaluation, Stringfellow Superfund Site

Compound	Zone 4 Remediation Goals from Fourth ROD (µg/L)	Federal MCLs (µg/L)	Federal Secondary MCLs (µg/L)	California MCLs (µg/L)	California Secondary MCLs (µg/L)	SARI Discharge Limits (µg/L)	Pyrite Creek Discharge Limits (µg/L)
TCE	5	5	---	5	---	---	5
Chloroform	6	---	---	---	---	---	5
Sulfate	Not established[a]	---	250,000	---	---	---	---
Nitrate[b]	Not established[c]	10,000	---	---	45,000	---	---
Perchlorate	Not established	Interim Action Level 4 parts per billion (ppb)	---	---	---	---	4
Cadmium	Not established	5	---	5	---	64	---
Chromium (total)	Not established	100	---	50	---	2,000	---
Lead	Not established	15[d]	---	15[d]	5[d]	580	50
Manganese	Not established	---	50	---	50	---	---
Nickel	Not established	---	---	---	100	3,510	---
Pesticides	Not established	---	---	---	---	10	---
DDD	Not established	---	---	---	---	---	---
DDT	Not established	---	---	---	---	---	---
PCBs	Not established	0.5	---	0.5	---	10	---
p-CBSA	Not established	---	---	---	---	---	---

TABLE 1
Summary of Numerical Limitations
Applicable or Relevant and Appropriate Requirements Evaluation, Stringfellow Superfund Site

Compound	Zone 4 Remediation Goals from Fourth ROD (µg/L)	Federal MCLs (µg/L)	Federal Secondary MCLs (µg/L)	California MCLs (µg/L)	California Secondary MCLs (µg/L)	SARI Discharge Limits (µg/L)	Pyrite Creek Discharge Limits (µg/L)

Notes:

[a] The Remediation Goals were set based on MCLs. There is no Federal or State MCL for Sulfate. The Federal Secondary MCL for Sulfate is 250 mg/L (250,000 µg/L) based on aesthetic value of drinking water. This was not set as a Remediation Goal; finalization of the Sulfate Remediation Goal was deferred in the fourth ROD.

[b] Federal MCL for Nitrate (as N), California MCL for Nitrate (as NO_3).

[c] The Remediation Goals were set based on MCLs. The 10 mg/L (10,000 µg/L) Federal MCL for Nitrate (as N) was not set as a Remediation Goal since background Nitrate concentrations in many areas exceed this standard. Finalization of the Nitrate Remediation Goal was deferred in the fourth ROD.

[d] Regulatory Action Level – not an MCL.

MCLs: USEPA maximum contaminant levels in drinking water; http://www.epa.gov/safewater/mcl.html#mcls

Secondary MCLs: Nonenforceable guidelines that the USEPA recommends; http://www.epa.gov/safewater/mcl.html#mcls

California state MCLs and secondary MCLs: Title 22 CCR; http://www.dhs.ca.gov/ps/ddwem/chemicals/chemindex.htm

SARI limits: SAWPA Permit No. 4D-98-S101; daily maximum limits.

Pyrite Creek Limits: Water Board Order No. R8-2002-0007, NPDES No. CAG918001; average monthly limits.

ARARs Review Tables

Tables 2 through 4 list the ARARs cited in the above-referenced site decision documents, and address additional ARARs where applicable. Table 2 contains action–specific ARARs, Table 3 contains chemical–specific ARARs, and Table 4 contains location-specific ARARs. The tables provide the applicable zone, citations, requirements, decision document that established the ARAR, and whether any updates have occurred for the ARARs since the last five-year review. Note that current versions of the CCR and Title 40 of the CFR were consulted (via the internet or in hardcopy) to review pertinent updates.

TABLE 2
Action-Specific ARARs
Applicable or Relevant and Appropriate Requirements Evaluation, Stringfellow Superfund Site

Action / Zone	Citation	ROD	Five-Year Review	ARAR Determination	New Standard/ Requirement	Comments
Dewatering						
Zone 1	CWA, 40 CFR Part 403	Fourth ROD: National Pretreatment Standards for discharges to POTWs	National Pretreatment Standards for discharges to POTW	Applicable	None	Substantive requirements of the federal Clean Water Pretreatment Standards (40 CFR Part 403) are ARARs for discharges of treated groundwater to POTWs. Requirements are administered through discharge permits issued by the SAWPA.

TABLE 2
Action-Specific ARARs
Applicable or Relevant and Appropriate Requirements Evaluation, Stringfellow Superfund Site

Action / Zone	Citation	ROD	Five-Year Review	ARAR Determination	New Standard/ Requirement	Comments
Zones 2 and 3	CWA, 40 CFR Part 403	Second and Third RODs: Proposed pretreatment objectives were listed	National Pretreatment Standards for discharges to POTW	Applicable	None	Substantive requirements of the federal Clean Water Pretreatment Standards (40 CFR Part 403) are ARARs for discharges of treated groundwater to POTWs. Requirements are administered through discharge permits issued by the SAWPA.
Hazardous Waste						
Zone 1	RCRA; 40 CFR Part 268, and 42 USC Section 6924(m)	Fourth ROD: Land Disposal Restrictions	Land Disposal Restrictions	Applicable	None	Potentially applicable to the disposal of treatment sludge from the pretreatment plant.
Zone 1	RCRA; 40 CFR Part 261	Fourth ROD: Identification and listing of hazardous wastes	Identification and listing of hazardous wastes	Applicable	None	Applicable to classification of remediation wastes for onsite/offsite disposal
Zones 2 and 3	RCRA; 40 CFR Part 261	None	Identification and Listing of Hazardous Wastes	Applicable	None	Applicable to the classification of remediation wastes for onsite/offsite disposal.
Zones 2 and 3	RCRA; 40 CFR Part 268	None	Land Disposal Restrictions	Applicable	None	Potentially applicable to the treatment/disposal of remediation wastes that are hazardous.
Underground Injection						
Zone 4	SDWA; 40 CFR Part 144	Fourth ROD: Under-ground Injection Control	Underground Injection Control	TBC (if treated groundwater is reinjected)	None	Regulations governing underground injection are applicable if treated groundwater is reinjected. The SDWA requires an Underground Injection Control permit which, in California, is administered by the USEPA for wells not related to oil and gas activities. The Underground Injection Control regulations allow injection of groundwater that has been treated and is being reinjected into the same formation from which it was withdrawn, subject to USEPA approval as a CERCLA remedial action (40 CFR 144.12[c]).

TABLE 2
Action-Specific ARARs
Applicable or Relevant and Appropriate Requirements Evaluation, Stringfellow Superfund Site

Action / Zone	Citation	ROD	Five-Year Review	ARAR Determination	New Standard/ Requirement	Comments
Waste Management Units						
Zone 4	Porter-Cologne; 23 CCR Sections 2550.2 through 2550.5	Fourth ROD: Water Quality Protection Standard	Water Quality Protection Standard	Applicable or relevant and appropriate	None	The Water Board establishes a water quality protection standard for waste management units, specifying the constituents of concern and the concentration limits for each constituent. The concentration limits are set at background unless it is technically or economically infeasible to achieve background for that site.
Emissions of VOCs						
Zone 4	CAA; Section 110; 42 USC Section 7410	Fourth ROD: Emissions of VOCs from new sources	Emissions of VOCs from new sources	TBC	None	The SCAQMD regulates emissions of VOCs from new sources in Regulation XIII.
Air Stripping Operations						
Zone 4	CAA	Fourth ROD: Air Stripping Operations	Air Stripping Operations	No longer applicable	SCAQMD Regulation XI, Rule 1167 was rescinded in December 1988	The SCAQMD regulates emissions of toxic air contaminants from new and existing sources in Regulation XIV.

Notes:
CAA = Federal Clean Air Act
CCR = California Code of Regulations
CFR = Code of Federal Regulations
CWA = Clean Water Act
NESHAP = National Emissions Standard for Hazardous Air Pollutants
Porter-Cologne = California Porter Cologne Water Quality Control Act
POTW = Publicly Owned Treatment Works
SAWPA = Santa Ana Watershed Project Authority
SCAQMD = South Coast Air Quality Management District
SDWA = Safe Drinking Water Act
TSCA = Toxic Substances Control Act
USC = United States Code

TABLE 3
Chemical-Specific ARARs
Applicable or Relevant and Appropriate Requirements Evaluation, Stringfellow Superfund Site

Chemical / Zone	Citation	ROD	Five-Year Review	ARAR Determination	New Standard/ Requirement	Comments
Contaminants in public drinking water supply systems						
Zone 4	SDWA; 40 CFR 141 Subparts B, G & I	Fourth ROD: MCLs	Fourth ROD: MCLs	Relevant and appropriate	None	The concentration of contaminants in public drinking water supply systems must not exceed national primary drinking water MCLs. Because MCLs are applied at the tap, they are not applicable; however, they are considered to be relevant and appropriate for groundwater zones that are potential sources of drinking water supply.
Zone 4	SDWA; 40 CFR 141 Subpart F	Fourth ROD: Non-zero Maximum Contaminant Level Goals (MCLGs)	Fourth ROD: Nonzero MCLGs	Relevant and appropriate	None	Nonzero MCLGs are nonenforceable, maximum levels of contaminants in drinking water at which no known or anticipated adverse effect would occur. Nonzero MCLGs may be relevant and appropriate for groundwater determined to be a current or potential source of drinking water and where multiple contaminants or pathways of exposure exist.
Zone 4	SDWA; 40 CFR 143	Fourth ROD: Secondary Drinking Water Regulations	Fourth ROD: Secondary Drinking Water Regulations	TBC	None	Secondary Drinking Water Regulations control contaminants in drinking water that primarily affect the aesthetic qualities relating to the public acceptance of drinking water. The regulations are not federally enforceable but are intended as guidelines for the states.

Notes:
CAA = Federal Clean Air Act
CCR = California Code of Regulations
CFR = Code of Federal Regulations
CWA = Clean Water Act
NESHAP = National Emissions Standard for Hazardous Air Pollutants
Porter-Cologne = California Porter Cologne Water Quality Control Act
POTW = Publicly Owned Treatment Works
SCAQMD = South Coast Air Quality Management District
SDWA = Safe Drinking Water Act
TSCA = Toxic Substances Control Act
USC = United States Code

TABLE 4
Location-Specific ARARs
Applicable or Relevant and Appropriate Requirements Evaluation, Stringfellow Superfund Site

Location / Zone	Citation	ROD	Five-Year Review	ARAR Determination	New Standard/ Requirement	Comments
VOC Emissions within 500 feet of a school Zone 4	CAA	None	None	TBC regarding location of the CWTS for VOCs	SCAQMD Regulation XIV, Rule 1401.1; Adopted November 4, 2005	The SCAQMD Regulation XIV, Rule 1401.1 regulates emissions of toxic air contaminants from new sources within 500 feet of a school.

Notes:
CAA = Federal Clean Air Act
CWA = Clean Water Act
NPDES = National Pollutant Discharge Elimination System
SCAQMD = South Coast Air Quality Management District

Stringfellow Superfund Site ARARs Summary

The site ARARs (as established in the RODs, ESD, and previous five-year reviews) were evaluated. The basis for ARARs are the laws and regulations applicable to the site location, remedy actions, and contaminants of concern. The site is a CERCLA Superfund Site, and was placed on the NPL in 1983. CERCLA response actions are exempted by law from the requirement to obtain federal, state, or local permits related to any activities conducted completely on-site. However, this does not remove the requirement to meet the substantive provisions of permitting regulations that are ARARs. Regardless of the exemption from permitting, the site is operating under two permits. The PTP and LCTF discharge to the SARI sewer line under permit No. 4D-98-S101 issued by SAWPA, and the CWTS discharges to Pyrite Creek under Waste Discharge Requirements, Order No. R8-2003-0085, NPDES No. CAG918001 issued by the Water Board.

The following is a summary of the findings of this ARARs review.

Zone 1 (Original Disposal Area), Zone 2 (Mid-Canyon Area), Zone 3 (Lower Canyon Area). No changes to existing ARARs.

Zone 4 (Community Area). One change to existing ARARs specified for Zone 4 – the SCAQMD Regulation XI, Rule 1167 for air stripping operations was rescinded in December 1988. This was established as an action-specific ARAR in the fourth ROD, and is no longer applicable.

VOC Emissions within 500 feet of a school. The SCAQMD Regulation XIV, Rule 1401.1 (adopted November 4, 2005) regulates emissions of toxic air contaminants from new sources within 500 feet of a school. If there are direct VOC emission points from the CWTS, then substantive requirements of the SCAQMD Regulation XIV, Rule 1401.1 is a location-specific TBC regarding location of the CWTS.

Appendix G
Toxicology Review

Risk Assessment and Toxicology Analysis

PREPARED FOR: **Alexa Stamets, CH2M HILL**

PREPARED BY: **Gayle Lytle, CH2M HILL**

DATE: **July 22, 2006**

This technical memorandum presents a risk assessment and toxicology analysis to support the five-year review of the Stringfellow Superfund Site in Riverside County, California.

Changes in Exposure Pathways

A supplemental health risk assessment (HRA) for the site was prepared by the ChemRisk Division of McLaren/Hart Environmental Engineering Corporation with the concurrence of Region 9 of the U.S. Environmental Protection Agency (USEPA) in 1995. This supplemental HRA was reviewed as part of this five-year review. Because of mitigative measures that have taken place at the site, all significant pathways of exposure are currently incomplete. However, if private wells were to be used for purposes other than irrigation (for example, drinking, showering, or washing), use of groundwater for domestic purposes would be a potentially significant exposure route for contaminants in groundwater. The potential pathways of exposure to constituents in groundwater evaluated in the supplemental HRA include: (1) residential ingestion of groundwater from the tap, (2) use of groundwater for showering and bathing would result in dermal exposure to groundwater chemicals, and (3) inhalation exposure can occur to chemicals volatilized during showering/bathing.

Exposure to volatile organic compound (VOC) vapors from migration to indoor air has become a concern for Superfund Sites in recent years. In September 2002, USEPA's Office of Solid Waste and Emergency Response (OSWER) released an external review draft "*Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils*" (USEPA, 2002) that focuses specifically on this pathway.

The indoor air exposure pathway in Zone 4 was previously evaluated in the *Supplemental Health Risk Assessment for Zone 4* (ChemRisk 1995). That report concluded that exposure due to vapor transport from groundwater in Zone 4 is insignificant compared to exposure through indoor groundwater use. The groundwater vapor flux pathway to indoor air was therefore not included in the supplemental risk assessment since it would be such a small fraction of the total dose. In addition, the assumptions used in this evaluation were conservative. Thus, the approach used would likely overestimate actual expected indoor air concentrations by several orders of magnitude. Based on the evaluation presented in the *Supplemental Health Risk Assessment*, exposure to VOC vapors from migration from groundwater to indoor air is not expected to pose a significant risk to receptors in Zone 4.

While a similar evaluation has not been completed for Zones 1 through 3, TCE concentrations in Zone 3 are less than screening levels for potential vapor intrusion concerns. TCE concentrations in Zones 1 and 2 exceed screening levels for potential vapor intrusion concerns. This exposure pathway is currently incomplete because there are no

permanent structures in these two zones. However, an evaluation of the indoor air exposure pathway should be conducted in these zones before buildings or other permanent structures are constructed to determine if this exposure pathway poses a significant risk to future receptors.

Changes in Toxicity Values

Since the Supplemental HRA was submitted in 1995, there have been a number of changes to the toxicity values for certain constituents of concern at the Stringfellow site. Table 1 provides a direct comparison between the 1995 toxicity values and current USEPA Region 9 values. The chemicals listed are compiled from Table 3 of the supplemental HRA. However, these changes do not affect the protectiveness of the remedy.

For carcinogenic effects, revisions to the toxicity values for 1,4-dichlorobenzene indicate a reduced excess cancer risk associated with potential oral exposure to this compound based on Cal-EPA values and a higher excess cancer risk associated with potential inhalation exposure. For noncarcinogenic effects, revisions to toxicity values for chlorobenzene and chloroform indicate a reduced hazard index from exposure to these chemicals than previously considered.

The greatest uncertainty with toxicological changes for site contaminants is associated with TCE. In 2001, USEPA's Office of Research and Development (ORD) released "Trichloroethylene Health Risk Assessment: Synthesis and Characterization" (TCE Health Risk Assessment) for external peer review. The draft TCE Health Risk Assessment takes into account recent scientific studies of the health risks posed by TCE following the current cancer guidelines and incorporating current data and understanding physiological/biochemical processes. With this determination, a range of cancer slope factors were developed, some of which would result in more stringent cleanup levels than the current maximum contaminant level (MCL). This toxicity evaluation is under review by several external scientific panels. The toxicity of TCE should be reevaluated during the next five-year review (to be completed in 2011).

Changes in Analytical Techniques

Over the last several years new analytical techniques have been developed that have enabled the detection of lower concentrations of COCs, including perchlorate. As a result, perchlorate has recently been detected in many groundwater wells in California where it was previously not recognized. Recent groundwater investigations have also revealed that 1,4-dioxane, n-nitrosodimethylamine (NDMA), and methyl tertiary butyl ether (MTBE) are present in groundwater at the site.

References

ChemRisk. 1995. *Supplemental Health Risk Assessment for Zone 4, Stringfellow NPL Site in Riverside County, California*. December.

USEPA. 2002. *Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils.*

TABLE 1
Direct Comparison Between the 1995 Toxicity Values used in the Supplemental HRA and Current USEPA Region 9 Values
Risk Assessment and Toxicology Analysis, Stringfellow Superfund Site

Chemical	Ingestion Exposure				Inhalation Exposure			
	RfDo mg/kg/day		SFo (mg/kg/day)$^{-1}$		RfDi mg/kg/day		SFi (mg/kg/day)$^{-1}$	
	Table 3[a]	Region 9[b]	Table 3[a]	Region 9[b]	Table 3[a]	Region 9[b]	Table 3[a]	Region 9[b]
Chlorobenzene	0.02	0.02	NA	NA	0.0057	0.017	NA	NA
Chloroform	0.01	0.01	0.0061	NA	0.01	0.014	0.081	0.081
1,2-Dichlorobenzene	0.09	0.09	NA	NA	0.057	0.057	NA	NA
1,4-Dichlorobenzene	0.23	0.03	0.024	0.024	0.23	0.23	0.024	0.022
Nitrate	1.6	1.6	NA	NA	NA	NA	NA	NA
Sulfate	80	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	0.006	0.0003	0.011	0.013/0.4[c]	0.006	0.01	0.006	0.007/0.4[c]

Notes:

a From Table 3 of the Supplemental Health Risk Assessment for Zone 4, Stringfellow NPL Site in Riverside County, California (ChemRisk, 1995).

b Toxicity values as they appear on the October 2004 USEPA Region 9 Table of Preliminary Remediation Goals.

c Slope factors provided for trichloroethene are from Cal EPA (first value) and NCEA (second value).