

**EPA Superfund  
Explanation of Significant Differences:**

**UNITED CHROME PRODUCTS, INC.  
EPA ID: ORD009043001  
OU 01  
CORVALLIS, OR  
12/20/1991**

## EXPLANATION OF SIGNIFICANT DIFFERENCES

### INTRODUCTION

**Site name and location:**

United Chrome Products  
Corvallis, Oregon

**Lead and support agencies:**

U.S. Environmental Protection Agency (EPA)  
Oregon Department of Environmental Quality (DEQ)

**Statutes that require Explanation of Significant Differences (ESD):**

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 117(c) and National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Section 300.435(c)(2)(i)

**Need for an ESD:**

On September 12, 1986, EPA signed the Record of Decision (ROD) for the United Chrome Products Superfund site. Since that time, largely as a result of information obtained during remedial action, there were five significant changes to components of the remedy during the construction phase. Specifically, the United Chrome building was demolished; the surface drainage ditch was rerouted; an infiltration trench was installed; injection wells were installed; and the number of wells was increased. These changes from the ROD were necessary to improve the performance of the remedy.

EPA plans a sixth significant change to a component of the remedy, largely as a result of information provided by the principal Potentially Responsible Party for the site, the City of Corvallis, during remedial action. The publicly owned treatment works (POTW) will be relied upon to treat the partially treated groundwater from the site. This change from the ROD will significantly reduce the cost of the cleanup.

A seventh significant change will occur as a result of EPA's revision of the maximum contaminant level (MCL) and maximum contaminant level goal (MCLG) for chromium. The cleanup standard for the site will be altered to be consistent with new regulations when they go into effect in 1992.

Extraction and treatment of contaminated groundwater remains the hazardous waste management approach for the United Chrome site. The remedial action will continue to be protective of human health and the environment and consistent with the NCP.

**Administrative Record:**

This ESD will become part of the Administrative Record for the United Chrome Superfund site, which is available to the public at the following two locations:

U.S. Environmental Protection Agency  
1200 Sixth Avenue, HW-113  
Seattle, Washington 98101

Corvallis Public Library  
645 N.W. Monroe  
Corvallis, Oregon 97330

SITE BACKGROUND

The United Chrome Products site consisted of a single building on approximately 1.5 acres of land in an industrial complex, which is located about 3.5 miles south of the City of Corvallis, Oregon. The company leased the property from the city and began industrial hard chrome plating operations there in 1956. In the same year, the operators created a disposal pit in the area west of the building then at the site.

In 1982, accumulated sludges were removed from plating tanks at United Chrome Products and disposed of under DEQ guidance. In 1983, as a result of two DEQ Notices of Violation, the company removed chrome sludge from the disposal pit area and put it in drums that were later disposed of at a RCRA-permitted land disposal facility. EPA placed the site on the National Priorities List (NPL) on September 21, 1984, because of contamination of the surface water, soils, and groundwater.

United Chrome Products ceased all operations in early 1985 and sold its equipment and contents of the facility building in May 1985. EPA conducted a removal action at the site from July to November 1985. Activities included the removal of 8,130 gallons of chromium-contaminated liquids and 11,000 pounds of chromium-contaminated solids.

REMEDIAL INVESTIGATION (RI) AND CONTAMINATION PROBLEMS

Ecology and Environment, Inc. conducted an RI for EPA from November 1984 to February 1985 to characterize the nature and extent of contamination at the site and to develop a data base to support the Feasibility Study (FS). The bulk of the RI was field work for site characterization, which included construction of 2 shallow monitoring wells and 5 deep monitoring wells, and

collection and analysis of soil, sediment, and groundwater samples.

As a result of leaching from the disposal pit and the plating tank areas, there was considerable chromium contamination in the soil beneath and around the building and in both the upper unconfined groundwater zone and the lower confined aquifer. Because United Chrome Products was still active during the RI, contamination beneath the facility could not be directly characterized, and the magnitude could only be inferred from concentration distributions around the building perimeter.

Concentrations of total chromium in monitoring wells in the upper zone ranged from 142 to 689 milligrams per liter (mg/l). Although concentrations in the deep aquifer were generally an order of magnitude lower, numerous deep well samples exceeded the drinking water standard of 0.05 mg/l. The groundwater plume extended approximately 300 feet north from the vicinity of the disposal pit, and surface water contamination had migrated more than two miles off site in the local drainage network.

#### REMEDY SELECTED IN THE ROD

In August 1985, EPA provided the Public Comment Draft FS and presented soil flushing/unconfined zone groundwater extraction as the preferred remedial alternative. The general response from DEQ, the City of Corvallis, and others was for a more thorough cleanup than EPA had tentatively selected. After evaluation of comments and numerous discussions with DEQ for several months, EPA revised its position to recommend soil flushing/unconfined zone groundwater extraction/confined aquifer groundwater extraction as the final alternative.

The remedy selected in the ROD consisted of the following major elements:

- \* Installation of culverts in the open drainage ditch to isolate the surface drainage system from contaminated surface and groundwater flow from the site.
- \* Construction of two percolation basins in the areas of the former disposal pit and plating tanks to flush the contaminated soil. Included removal and recycling or disposal of plating tanks and residual sludge, and excavation and disposal of contaminated soil.
- \* Installation of approximately 15 shallow wells and 5 deep wells to extract chromium-contaminated groundwater from the upper unconfined zone and the deep confined aquifer.

- \* Installation of on-site treatment system to remove chromium contamination from extracted groundwater prior to discharge to Muddy Creek or the City of Corvallis wastewater treatment facility.

The FS had included discharge to Muddy Creek as an alternative because there was then no sewer line to the industrial complex where the site is located. The study mentioned transportation by truck to the POTW as a backup that could be used if the treated groundwater did not meet water quality standards. In a letter dated October 23, 1985, the City of Corvallis expressed a number of concerns about discharge to Muddy Creek and stated that some of them had also been raised by the Corvallis City Council, other city entities, and the general public.

As a result of these concerns, EPA stated in the Responsiveness Summary for the ROD that discharge to Muddy Creek would be carefully evaluated during remedial design. During design work in 1987, EPA decided to discharge to the POTW because sewer service was expected to be available to the site later that year. This decision was in conformance with the ROD.

#### SIGNIFICANT DIFFERENCES AND BASIS FOR THEM

##### Demolition of United Chrome Products building:

When United Chrome was listed on the NPL, the City of Corvallis, owner of the site, was uncertain about future use of the facility building. Although EPA favored demolition of the building, the city believed that the decision should be postponed. The ROD did not consider demolition, but the Responsiveness Summary attached to the ROD noted that EPA's consultant would examine the relative costs of cleaning the contaminated portion of the building versus demolishing the entire structure.

Subsequently, EPA and DEQ determined that it was necessary to totally demolish the building, and the city supported the decision. Dust sampling confirmed that EP Toxicity levels were exceeded in over 90% of the building, which therefore presented an environmental risk to the public. The old wood frame structure was a fire hazard to the cleanup project, and partial demolition would have been a safety hazard to the work crew. With the building gone, it has not been necessary for treatment system operators to wear level "C" protective suits, which otherwise would have been required for monitoring the infiltration basins and servicing interior extraction wells. Furthermore, removal of the building and all contaminated surface debris has prevented the site from requiring future actions under the Resource Conservation and Recovery Act.

The building was demolished in March 1988. Further discussion of the rationale for demolition and documentation of the cost effectiveness of demolition are contained in a March 31, 1988, memo from Loren McPhillips, Superfund Site Manager, to the United Chrome files.

Rerouting of surface drainage ditch:

The United Chrome ROD stated that culverts would be installed in the "open drainage ditch to isolate the surface drainage system from the inflow of contaminated surface water and groundwater flow from the site." Information collected after ROD signature indicated that installation of culverts would not alone be sufficient to accomplish this aim of the ROD.

In the July 1989 Predesign Report for Surface Drainage Remediation, EPA's consultant CH2M Hill discussed the portions of the site drainage ditch that already had culverts: "The pipe joints are believed to be unsealed, presumably allowing flow into the pipe. The chromium plume currently surrounds a portion of the culvert; therefore, it is likely that the chromium-contaminated groundwater is entering the surface drainage ditch through the culvert joints." CH2M Hill further noted that the sediment within the existing culvert had failed the EP Toxicity test with respect to chromium.

The report then provided an analysis of alternatives that would accomplish the surface drainage remediation specified in the ROD. The recommended alternative was bypassing the contaminated ditch by constructing a new one to the north of the site and cleaning the existing culvert. EPA rerouted the ditch in January and February 1990, and the City of Corvallis cleaned the old culvert in September 1991.

Installation of infiltration trench:

In accordance with the United Chrome ROD, two infiltration basins were constructed to flush chromium from the heavily contaminated soils near the former disposal pit and plating tank areas. Since they began operating in August 1988, they have enhanced the groundwater extraction process by allowing the wells with the highest chromium concentrations to be pumped continuously.

In an April 6, 1990, letter to EPA, the City of Corvallis, operator of the treatment system, submitted a proposal to construct an additional infiltration site, specifically a trench along the axis of the plume of contamination in the upper groundwater zone. An April 23 response from EPA to the city expressed agreement by EPA, DEQ, and CH2M Hill that the proposed trench to improve infiltration could enhance the cleanup of the

site. EPA formally approved construction of the trench in a May 31, 1990, letter to the city, and the city installed it in the following month.

In 1991, EPA, DEQ, the City of Corvallis, and CH2M Hill agreed that additional infiltration trenches might be warranted to improve the production from low-yielding wells. Consequently, one or more supplementary trenches may be added to further enhance groundwater extraction.

#### Installation of injection wells:

The United Chrome ROD specified that the objective of the selected alternative was "to remove contamination in the confined aquifer and control the migration of further contamination from the upper unconfined zone." In January 1991, CH2M Hill submitted the Predesign Report for the Deep Aquifer Remediation of the United Chrome Products Site to present a design for deep aquifer cleanup that was consistent with the objective of the ROD.

The predesign report examined various deep aquifer cleanup scenarios in detail, including some that used injection wells. The results showed that these wells could reduce or reverse downward groundwater flow during the pumping of the deep aquifer. Maintenance of an upward vertical gradient could minimize the movement of hexavalent chromium from the upper groundwater zone and the aquitard to the deep aquifer and thereby provide a measure of protection against continued contamination of the deep aquifer during remediation.

The predesign report concluded that two injection wells would be necessary for an effective cleanup of the deep aquifer that minimized downward migration of contamination. In addition, these wells can supplement the other infiltration sites to accelerate the cleanup. Consequently, EPA had two deep wells plumbed as injection wells in June 1991, and they began operating as part of the deep aquifer remediation system in July 1991.

#### Increase in the number of wells:

The United Chrome ROD provided for the installation of approximately 15 shallow wells to extract chromium-contaminated groundwater from the upper unconfined zone and approximately 5 deep wells to extract chromium-contaminated groundwater from the deep confined aquifer. Installation of shallow wells was part of Phase I of the site cleanup, and installation of deep wells was part of Phase II of the cleanup.

CH2M Hill produced a Drilling Implementation Plan for the first phase in January 1988, which included a drilling sequence for extraction wells and the rationale for adjusting well placement. Data obtained from sampling each well would indicate

the magnitude of the groundwater contamination in the area of the sampled well and help determine placement of subsequent wells. As described in a December 4, 1987, memo from CH2M Hill, adjustments would be made "to achieve efficient coverage of the contaminated groundwater plume and to optimize the effectiveness of the extraction system." This approach was especially important for wells in the area north of the facility building site, where the northern edge of the contamination plume was not well defined.

In accordance with the sequencing specified in the Drilling Implementation Plan, 15 shallow extraction wells were installed in January and early February 1988. Subsequent sampling showed that hexavalent chromium concentrations in the plume were higher than anticipated and that the contamination plume extended farther toward the northeast than previously indicated. Consequently, in a February 4, 1988, memorandum, CH2M Hill proposed installing up to 11 more potential shallow extraction wells, again in accordance with the sequencing in the Drilling Implementation Plan, to define the lateral boundaries of the plume and ensure that the highest chromium concentrations were targeted. EPA and DEQ agreed with this approach, and 11 additional shallow wells were installed in February and early March 1988.

Sampling after the March 1988 removal of the chrome plating tanks indicated that hexavalent chromium concentrations in that area were significantly higher than previously characterized, as high as 19,000 mg/l. Due to the magnitude of this source of chromium contamination, CH2M Hill recommended in an April 15, 1988, memorandum that 3 more shallow wells be installed to extract directly from the plating tank area. This localized extraction was expected to reduce the overall project duration and cost. EPA and DEQ agreed to this approach, and the final 3 shallow extraction wells were installed in April 1988.

Details concerning the rationale for constructing these 29 shallow wells at the United Chrome site are contained in memoranda from CH2M Hill dated December 4, 1987, and February 4 and May 9, 1988, and in CH2M Hill Technical Status Reports for the months of January, February, March, and April 1988. Construction is documented by the August 1988 Well Installation Sampling and Analysis Report by CH2M Hill.

Twenty-three of these 29 shallow wells were plumbed into the shallow groundwater extraction system, and the remaining 6 are used as monitoring wells. This system has been successfully removing hexavalent chromium from the upper groundwater zone since August 1988.

The approach for installing deep aquifer wells in Phase II of the cleanup was similar to the approach for installing shallow

zone wells in Phase I. As described in detail in the November 1989 Phase II Field Operations Plan, prepared by CH2M Hill, deep wells would be drilled first within the upper zone source area. Data obtained would be evaluated. If necessary, additional wells would be progressively located downgradient from the source area until they captured the groundwater contaminated with total chromium at or above 0.05 mg/l, the deep aquifer cleanup objective in the ROD. This progressive drilling would be the most cost-effective method of meeting the ROD objective.

Following the approach outlined in the Phase II Field Operations Plan, 5 deep wells were drilled from January to March 1990. Sampling found hexavalent chromium contamination at levels greater than the deep aquifer cleanup objective of 0.05 mg/l. The January 1990 Deep Aquifer Data Report and the June 1990 Stage 1 Technical Report, both prepared for EPA by CH2M Hill, presented further information to determine the need for additional deep aquifer wells. With approval from EPA, 7 more deep wells were progressively drilled from June through August 1990. CH2M Hill summarized the deep well drilling activities in Technical Status Reports for January, February, June, July, and August 1990.

Because of the complexity and expense of the deep aquifer wells, each of the 12 installed in 1990 was designed to be capable of functioning as a monitoring, extraction, or injection well. The Predesign Report for the Deep Aquifer Remediation considered the most effective way to use these 12 wells in combination with 5 deep monitoring wells drilled during the RI. As indicated above, 2 were plumbed as injection wells. From May to July 1991, 7 were plumbed as extraction wells concentrated along the axis of the contamination plume, and those remaining became monitoring wells. The deep aquifer system began operating in July 1991.

#### Treatment by the POTW:

The description of groundwater treatment in the United Chrome ROD included reduction of hexavalent chromium to trivalent chromium, removal and disposal of sludge at a RCRA-permitted facility, and discharge of treated effluent to Muddy Creek or the POTW. The time required to achieve the cleanup was estimated to be five years, possibly as few as three years.

During negotiations with EPA in 1989, the City of Corvallis proposed to study the suitability of using the POTW, rather than the on-site treatment plant, to treat the partially treated groundwater from the site. In response, the Third Amendment to the Administrative Order included a provision to establish a Study Committee to consider a POTW study. The amendment was issued to the city by EPA on November 1, 1989, primarily to continue city operation of the on-site treatment plant.

With approval from EPA, the City of Corvallis conducted a POTW study from October 1, 1990, through December 20, 1990, and submitted the results to EPA on January 25, 1991, in the Report on the Study to Demonstrate the Capacity of the Corvallis POTW to Accept Pretreated Wastes from United Chrome. Sampling and monitoring results from the three-month study indicated that 82% of the chromium from the wastewater entering the POTW was removed and contained in the sludge.

On January 28, 1991, the City of Corvallis submitted its Proposal to Discharge Pretreated Wastes from the United Chrome Superfund Site to the Corvallis POTW. EPA and DEQ reviewed and rejected the city's original proposal. As indicated in a letter from EPA to the city on April 23, 1991, the proposal "would allow significant amounts of chromium to re-enter the environment through discharge from the POTW into the Willamette River and application of sludge to agricultural fields."

The city responded in June 1991 with a Feasibility Study for Using the Corvallis POTW for the Treatment of United Chrome Superfund Waste. After considering the Feasibility Study and additional information on sludge quality, EPA and DEQ agreed to accept a modified proposal that would result in less chromium discharge to the environment. The POTW could be used to augment and possibly eventually replace the on-site treatment plant. Conversion of hexavalent chromium to trivalent chromium would continue on site. The remedy would continue to be protective of human health and the environment.

EPA presented this position in letters to the city dated August 1 and September 20, 1991. A major reason for this change from the ROD is that the pounds per day of chromium extracted from the groundwater at United Chrome are expected to begin leveling off by early 1992. Concurrently the cost per pound for removal of the chromium from the groundwater is expected to double, increasing to as much as \$100 per pound. The reduction in chromium concentrations will result in a high quality sludge, which can be added to soils in the Corvallis area without raising background chromium concentrations as high as national averages.

EPA is including future treatment by the POTW instead of the on-site treatment plant as a part of the consent decree being negotiated with the City of Corvallis in 1991.

Change in the cleanup standard:

The ROD specified that the cleanup standard for the deep aquifer would be 0.05 mg/l chromium, the federal drinking water standard, because this aquifer was considered a drinking water source and is in direct hydraulic connection to the local drinking water supply wells. EPA has since revised the National

Primary Drinking Water Regulations for both the MCL and the MCLG for chromium to 0.1 mg/l (56 Fed. Reg. 3526, 3528 (1991)).

The revised MCL and MCLG will become effective on July 30, 1992. Accordingly, 0.1 mg/l will replace 0.05 mg/l chromium as the cleanup standard for the deep aquifer at United Chrome on July 30, 1992.

SUPPORT AGENCY COMMENTS

Consistent with EPA guidance, DEQ reviewed this ESD and suggested two changes to the section titled "Treatment by the POTW." Those changes have been incorporated into the text.

AFFIRMATION OF STATUTORY DETERMINATIONS

Considering the new information developed during the remedial action and the resulting changes made to the selected remedy, EPA and DEQ believe that the remedy remains protective of human health and the environment. The revised remedy utilizes permanent solutions to the maximum extent practicable for this site and is cost-effective. It complies with the NCP and other federal and state requirements that are applicable or relevant and appropriate to this remedial action.

PUBLIC PARTICIPATION ACTIVITIES

This ESD, supporting information, and EPA's response to any comments from the public will become a part of the Administrative Record for the site. For additional information regarding this ESD, please contact the Superfund Site Manager for the United Chrome site:

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Loren McPhillips, Superfund Site Manager      12-17-91  
Date

Approved by:

  
Philip G. Millam, Chief, Superfund Branch      Dec. 20, 1991  
Date