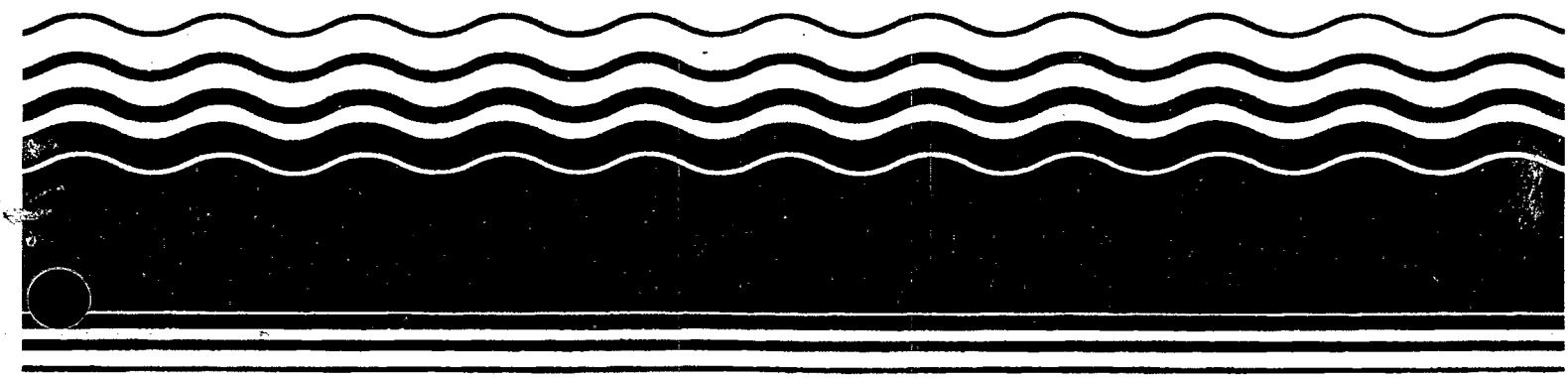
PB99-963117
EPA541-R99-074
1999

EPA Superfund
Record of Decision Amendment:

Quality Plating Site
Sikeston, MO
9/28/1999



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

SEP 28 1999

MEMORANDUM

SUBJECT: Record of Decision (ROD) Amendment for the Quality Plating Superfund Site

FROM: Steven Kinser, RPM
MOKS

THRU: Steve Kovac, Chief
MOKS

TO: Michael Sanderson, Director
SUPR

Attached is the Record of Decision (ROD) Amendment for the Quality Plating Superfund site. The response action selected in this ROD Amendment is the final remedy for the site and will address groundwater contamination not addressed during the soil removal action.

The site is located north of Sikeston, Missouri, and was the location of a former manufacturing facility which disposed of chromium-contaminated waste water and sludge on the grounds of the facility. The original ROD was signed January 24, 1995, and selected pump and treat for the groundwater contamination. Groundwater sampling conducted during the remedial design revealed a significant decrease in hexavalent chromium contamination. Based on the new information, this ROD Amendment selects monitored natural attenuation and institutional controls. The community supports the remedy selected in the ROD Amendment, and the state of Missouri has concurred on the amendment.

Since the remedy selected in this ROD Amendment does not require physical construction, the site qualifies for inclusion on the Construction Completion List upon signature of the ROD Amendment.

We recommend your approval of this ROD Amendment. If you have any questions or need additional information, please call me at x7728 or Steve Kovac at x7698. Thank you for your attention to this action.

Attachment

RECORD OF DECISION
AMENDMENT

For the

QUALITY PLATING SITE
SIKESTON, MISSOURI

Prepared by:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VII
KANSAS CITY, KANSAS

September 1999

DECLARATION

SITE NAME AND LOCATION

Quality Plating Site
Sikeston, Missouri

STATEMENT OF BASIS AND PURPOSE

This decision document amends the Record of Decision (ROD) and presents the new selected remedial action for the Quality Plating site north of Sikeston, Missouri, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable the National Contingency Plan (NCP), 40 C.F.R. Part 300. This decision is based on the Administrative Record File for the site.

The state of Missouri concurs with the selected remedy. A letter from the state of Missouri stating its concurrence is included in this ROD Amendment.

ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect the public health and welfare or the environment from actual or threatened releases of hazardous substances into the environment from the Quality Plating site.

DESCRIPTION OF THE SELECTED REMEDY

The response action selected in this ROD Amendment is the final remedy for the site and will address the contamination at the site not addressed during the soil removal action. This response action involves reducing hexavalent chromium (the primary contaminant of concern) concentration in groundwater to below the preliminary remediation goal (PRG) for the site. The health risk-based PRG established for the site is 18 micrograms per liter (µg/L). Reducing the hexavalent chromium concentration in groundwater to below the PRG will return the groundwater at the site to its beneficial uses.

The selected remedy for the site is monitored natural attenuation (MNA) and institutional controls. The selected remedy includes three components:

- Natural attenuation processes that act without human intervention to transform hexavalent chromium to the less toxic trivalent form. Trivalent chromium is less soluble, and thus less mobile, than hexavalent chromium. Under alkaline to slightly acidic conditions, it precipitates as a fairly insoluble hydroxide;

- Annual groundwater monitoring to demonstrate that: natural attenuation is occurring; plume is not expanding; there are no significant impacts to down gradient receptors; and institutional controls are effective. If future site data indicate the need for a change in monitoring frequency or the addition of new monitoring wells, then such measures should be taken to ensure the achievement of the monitoring goals. Furthermore, monitoring should continue for a minimum of three years after the PRG for the site has been achieved to ensure that concentration levels are stable; and

- Institutional controls will be implemented to ensure that no drinking water wells will be installed in the contaminated plume. This may be achieved through monitoring and by executing an agreement with the current property owners.

In the event that groundwater monitoring reveals no significant decrease in hexavalent concentration after five years of monitoring and the plume appears to be expanding and threatening down gradient receptors, a contingency remedy will be implemented. The remedy selected in the original ROD is the contingency remedy for the site. It includes four components:

- Extraction of the contaminated groundwater through the use of the two installed extraction wells;

- Treatment of the extracted groundwater by reduction/precipitation to meet the discharge limit. However, if chromium concentration at the time of contingency remedy implementation is less than the discharge limit, treatment will not be necessary;

- Discharge of the treated groundwater to Ditch Number 4, approximately 4,000 feet east of the site, under a state operating permit; and

- Groundwater monitoring to monitor the plume and remediation process.

STATUTORY DETERMINATIONS

The selected remedy for the Quality Plating site is protective of human health and the environment, complies with federal and state applicable or relevant and appropriate requirements (ARARs), is cost-effective, and utilizes permanent solutions and alternative technologies to the maximum extent practicable. In addition, the selected remedy meets the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

This remedy will not result in hazardous substances remaining on the site above health-based levels. A review will be conducted to ensure that the remedial action for the Quality Plating site continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action.

DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary Section of this ROD Amendment. Additional information can be found in the Administrative Record File for the site:

- Chemicals of concern (COCs) and their concentrations;
- Clean-up levels established for COCs;
- Land and groundwater use that will be available at the site as a result of the selected remedy;
- Estimated capital, operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected; and
- Decisive factors that led to selecting the remedy.

However, this Amendment does not include the following information, since it is included in the original ROD:

- Baseline risk represented by the COCs;
- The basis for the clean-up levels established for the COCs; and
- Current and future land and groundwater use assumptions used in the baseline risk assessment and the ROD.

The EPA has determined that its future response at this site does not require physical construction. Therefore, the site now qualifies for inclusion on the Construction Completion List.

Michael J. Sanderson
Director
Superfund Division

9/23/99
Date

DECISION SUMMARY

A. INTRODUCTION

The Quality Plating Superfund site (CERCLIS No. MOD980860555) is located on Scott County Highway 448, north of Sikeston, Missouri, as shown on Figure 1. The site occupies portions of the NW 1/4, NW 1/4, Section 28, and portions of the NE 1/4, NE 1/4, Section 29, Township 27 North, Range 14 East, of the Sikeston Quadrangle 7.5 Minute Topographic Map.

The Missouri Department of Natural Resources (DNR) is the lead agency for site activities. The Environmental Protection Agency (EPA) is the support agency for this response action. This Amendment is issued to fulfill the requirements of Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA), and Section 300.435(c)(2)(ii) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The Record of Decision (ROD), selecting the groundwater remedy, was signed by EPA on January 24, 1995. The remedy selected was to extract contaminated groundwater through two extraction wells, treat the groundwater by reduction/precipitation, and discharge the treated groundwater to Ditch Number 4, approximately 4,000 feet east of the site. Groundwater sampling conducted during the remedial design revealed a significant decrease in hexavalent chromium concentration. Based on this new information, it was concluded that the selected remedy might not be the most appropriate and cost-effective alternative to address groundwater contamination at the site. This ROD Amendment selects a new remedy based on the new information. The implementation of the remedy will be financed with federal and state funds.

The ROD Amendment will become part of the Administrative Record File for the site, as required by Section 300.825(a)(2) of the NCP. The Administrative Record File is available at the following locations:

Sikeston Public Library
121 East North Street
Sikeston, MO 63801
(573) 471-4140
Hours: Mon. - Thurs. 10 a.m. - 8 p.m.
Fri. 10 a.m. - 6 p.m.
Sat. 10 a.m. - 4 p.m.

Missouri Department of Natural Resources
Hazardous Waste Program
1738 East Elm Street
Jefferson City, Missouri 65101
(573) 751-3176
Hours: Mon. - Fri. 8 a.m. - 5 p.m.

U.S. Environmental Protection Agency
Region VII
Docket Room
901 N. 5th Street
Kansas City, Kansas 66101
(913) 551-7477
Hours: Mon. - Fri. 8:30 a.m. - 4:30 p.m.

B. REASONS FOR ISSUING THE ROD AMENDMENT

The ROD, selecting the groundwater remedy, was signed by EPA on January 24, 1995. The remedy selected was to extract contaminated groundwater through two extraction wells, treat the groundwater by reduction/precipitation, and discharge the treated groundwater to Ditch Number 4, approximately 4,000 feet east of the site. The source of contamination was a former manufacturing facility which dumped chromium contaminated waste water and sludge on the grounds of the facility.

Remedial Design (RD) activities were initiated in April 1997. The initial phases of the RD entailed the installation and sampling of the extraction and monitoring wells to understand the current groundwater conditions and contaminant levels. Analytical results of the groundwater samples showed that although the size of the plume has not changed, the concentration of hexavalent chromium has decreased, especially in the area of high concentrations (see Figure 2). This area of high concentration occurs in the 25 feet below ground surface zone of the aquifer. In 1993, concentrations from this zone were approximately 1,000 micrograms per liter (μg/L) compared to approximately 100 μg/L in July 1997. Another round of sampling conducted in October 1997 confirmed these results. To further confirm that the area of high concentration has not migrated, another monitoring well (OW-5B) was installed down gradient of the plume. OW-5B was sampled in March 1999. Analytical results were non-detect for hexavalent chromium. Results of all sampling events are included in the Administrative Record File.

The decrease in maximum hexavalent chromium concentrations at the site may be attributable to the soil removal action conducted in 1993. Prior to the soil removal action, elevated levels of hexavalent chromium in the sludge pit area could have acted

as a source of continuous aquifer contamination from infiltrating water passing through this area into the aquifer. Since the source has been removed, it is possible that the residual contamination in the groundwater has dispersed to the current levels. Another possibility for the decreased hexavalent chromium in the aquifer is that hexavalent chromium, through a natural process, may be reducing to trivalent chromium and precipitating out of solution. The precipitated trivalent chromium, which is relatively insoluble in water, would adsorb to soils and not be detected in groundwater samples.

Based on this new information, it was concluded that the selected remedy might no longer be the most appropriate and cost-effective alternative to address groundwater contamination at the site. In addition, since the signing of the ROD, new treatment technologies have become available; and more knowledge of the natural attenuation process has been gained. As a result, a determination was made to reevaluate the remedial action in light of the new information. The reevaluation resulted in the selection of a new remedy, Monitored Natural Attenuation and Institutional Controls.

The DNR conducted the following public participation efforts to the Quality Plating site since the signing of the original ROD on January 24, 1995.

1. Issued a press release on July 10, 1997, to inform the public of the startup of the RD activities and the scheduled date for field activities.

2. A public availability session was held on April 1, 1998, to inform the public of the observed decrease in hexavalent chromium concentration at the site and the alternate course of action being considered. A notice was placed in the Sikeston Standard Democrat on March 25, 1998, to announce the meeting. In addition, copies of the notice were sent to residents on the site mailing list.

3. The Administrative Record File for the site was updated on June 25, 1999. Documents developed after January 24, 1995, and pertinent to the basis for the selection of the response action were sent to the Sikeston Public Library, 121 East North Street, Sikeston, Missouri.

4. A public notice was placed in the Sikeston Standard Democrat on June 30, 1999, that described the public comment period, public hearing, and the availability of the Administrative Record File including the new Proposed Plan. The notice was also printed on July 7, 1999. In addition, copies of the public notice were sent to residents on the site mailing list on June 25, 1999.

5. The public comment period started on June 28, 1999, and ended on July 30, 1999. A public hearing was held on July 8, 1999, at the Best Western Coach House in Sikeston, Missouri. Only two area residents attended the hearing. They were in agreement with the preferred remedy. No written comments were received.

C. SCOPE AND ROLE OF RESPONSE ACTION

The response action selected in this ROD Amendment will address the contamination at the site not addressed during the soil removal action. This response action involves reducing hexavalent chromium (the primary contaminant of concern) concentration in groundwater to below the preliminary remediation goal (PRG) for the site. The health risk-based PRG established for the site is 18 μg/L. Reducing the hexavalent chromium concentration in groundwater to below the PRG will return the groundwater at the site to its beneficial uses.

The remedial action selected in this ROD Amendment is intended to address the entire site with regard to the principal threats to human health and the environment posed by contamination at the site as indicated in the risk assessment. The findings of the risk assessment are included in the Administrative Record and are summarized in the original ROD.

D. REMEDIAL ACTION OBJECTIVES

There are two significant remedial action objectives for this site:

1. Treat the plume and restore groundwater to its beneficial use; and

2. Prevent exposure to contaminated water, through the use of institutional controls until such time that the contaminant levels fall within the acceptable range.

There is limited potential for land use change in the vicinity of the site, but care must be taken to ensure that any new development which may take place does not use contaminated groundwater for drinking. There is potential for residential development down gradient of the plume, but site data indicate that it will not reach that area before attenuation.

E. DESCRIPTION OF THE NEW ALTERNATIVES

This section presents a narrative summary of the alternatives considered in this Proposed Plan. Present worth cost estimates are based on a 7 percent discount rate. Four alternatives have been evaluated. They include:

- Alternative 1: No Action;
- Alternative 2 :Active Restoration/Reduction/Precipitation;
- Alternative 3: Monitored Natural Attenuation and Institutional Controls; and
- Alternative 4: Treatment Wall.

Alternative 1: No Action

Development of the no action alternative is required by CERCLA. It serves as a baseline for comparison with clean-up alternatives. Under this alternative, no action would be taken to remove the groundwater contaminants. In addition, no groundwater monitoring or institutional controls will be implemented to prevent human exposure to the contaminated groundwater. Consequently, this alternative is not protective of human health and the environment. Under this alternative, however, a five-year review would be required under CERCLA. Thus funds would be expended to conduct the review.

Capital Costs:	$0
Annual Operation & Maintenance:	$2,600
Total Present Worth:	$10,700
Implementation Time:	Immediate

Alternative 2: Active Restoration/Reduction/Precipitation

This is the remedy selected in the 1995 ROD. It entails extraction of contaminated groundwater through the use of the two installed extraction wells (EX-1 and EX-2), treatment of contaminated groundwater by chemical reduction/precipitation, and discharge of treated groundwater to Ditch Number 4, approximately 4,000 feet east of the site.

Each extraction well would be pumped at 75 gallons/minute, for a total flow rate of 150 gallons/minute. Two primary treatment processes could be used to reduce the hexavalent chromium to a less toxic form, trivalent chromium: chemical reduction; or electrochemical reduction. During RD, tests would be completed to determine which process is more appropriate for this specific site. Treatment would be needed to provide a treated discharge lower than the 0.28 milligrams per liter (mg/L) total chromium effluent limit. Based on the current chromium concentrations in the groundwater, treatment may not be necessary. However, for evaluation purposes, it is assumed that chemical reduction would be used.

In the chemical reduction system, the extracted groundwater would be pumped from the extraction wells to the influent holding tank for flow equalization. Groundwater would then be discharged to the chemical reduction tank where sulfuric acid would be added to reduce the pH of the groundwater. With the addition of a chemical, such as ferrous sulfate, the treatment system would then reduce the hexavalent chromium to the less toxic trivalent chromium. Trivalent chromium would be precipitated out of solution as chromium hydroxide and pumped to a sludge holding tank where the sludge would be dewatered using a filter press and then sent off site for disposal.

A groundwater monitoring program would be implemented to monitor the plume and the effectiveness of the remediation process. The existing monitoring well network would be sampled quarterly.

Capital Costs:	$1,000,000
Annual Operation & Maintenance:	$ 91,000
Total Present Worth:	$1,166,000
Implementation Time:	
Set-up:	1 year
Treatment:	2 years

Alternative 3: Monitored Natural Attenuation and Institutional Controls

This alternative relies on natural attenuation processes, with groundwater monitoring and institutional controls, to achieve the site remediation objectives. Natural attenuation processes include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the dissolved concentrations and/or toxic forms of contaminants in soil and groundwater. Several natural reductants are known to transform hexavalent chromium to the less toxic trivalent form. Trivalent chromium is less soluble, and thus less mobile, than hexavalent chromium. Under alkaline to slightly acidic conditions, it precipitates as a fairly insoluble hydroxide.

Natural reductants commonly found in soils include aqueous ferrous iron, ferrous iron minerals, reduced sulfur, and soil organic matter. Numerous minerals in geologic materials contain ferrous iron that is potentially available for the reduction of hexavalent chromium. Subsurface soil sampling conducted during the remedial investigation (RI) found iron concentration in site soils to be in the range of 4,000-5,000 milligrams per kilogram (mg/kg). Furthermore, iron was detected in the groundwater samples collected from the extraction wells (300-500 µg/L). Another important natural reductant that is available in site soils is organic matter. Hexavalent chromium can react with soil organic carbon. The reaction result in the reduction of chromium and its precipitation as chromium hydroxide or it may bind to the remaining organic matter. Soil sampling conducted during the RI found organic matter in site soils to range from 31.2 percent (at one- to three-foot depth) to 5.7 percent (at nine feet below ground surface).

As discussed earlier, historical groundwater data demonstrate a clear and significant decrease in hexavalent chromium concentration at the site. Furthermore, the migration of the plume over the past 20 years has been relatively limited and is not expected to change. This is based on the aquifer's potential for natural attenuation, the relatively low levels of hexavalent chromium remaining in the groundwater, and the fact that the plume has been stable in the last five years.

Monitored natural attenuation (MNA) results in the generation of lesser volume of remediation wastes and reduced potential for cross-media transfer of contaminants, commonly associated with other technologies. This would result in reduced risk of human exposure to contaminants, contaminated media, and other hazards and reduced disturbances to ecological receptors. In addition, MNA has lower overall remediation costs than those associated with active remediation.

However, longer time frames may be required to achieve remediation objectives; thus, requiring long-term performance monitoring. Furthermore, institutional controls are necessary to ensure long-term protectiveness. Also, since this alternative does not provide for control of on-site contaminated groundwater, the potential exists for continued contaminant migration. However, as discussed above, the plume has been stable and contaminant migration is expected to be very limited. In fact, based on the observed decrease in hexavalent chromium concentration (one order of magnitude), it is possible (assuming that the observed attenuation rate continues) that the clean-up goal may be achieved in less than five years. However, it is important to note that as contaminant levels decrease, the attenuation rate may also decrease.

Any evaluation of the natural attenuation of hexavalent chromium must also consider the potential oxidation of the trivalent chromium to the toxic hexavalent form. Only two constituents in the environment are known to oxidize trivalent chromium: dissolved oxygen; and manganese oxides. The oxidation by dissolved oxygen, however, is not considered to be an important mechanism. This makes oxidation by manganese

oxides the only mechanism for the oxidation of trivalent chromium. It is important to note that manganese was detected in site soils at levels ranging from 100-500 mg/kg. When manganese oxides are present, it is possible that a portion of the precipitated trivalent chromium may be oxidized back to the hexavalent form. Eventually an equilibrium concentration will be reached. It is possible that this steady-state concentration may be above the clean-up goal for the site. Estimating this concentration is very difficult, however, since it depends on the applicable oxidation and reduction rates that are not yet well understood by scientists.

Because of the uncertainties associated with natural attenuation, long-term groundwater monitoring is of greater importance for this alternative. Long-term groundwater monitoring must be conducted to evaluate whether the remedy is performing as expected and is capable of attaining the remediation objectives. The existing site monitoring wells would be sampled annually to demonstrate the following:

- Demonstrate that natural attenuation is occurring;
- Verify that the plume is not expanding;
- Verify no unacceptable impacts to down gradient receptors; and
- Demonstrate the efficacy of institutional controls.

Current site information indicates that annual sampling of the existing monitoring network should be sufficient to achieve the long-term monitoring objectives. However, if future site data indicate the need for more frequent monitoring or the addition of new monitoring wells, then such measures should be taken to ensure the achievement of the long-term monitoring goals. Furthermore, groundwater monitoring should continue for a minimum of three years after the remediation objectives have been achieved to ensure that concentration levels are stable and remain below the clean-up level.

Institutional controls will be implemented to prevent exposure to site contaminants. Since the source of the contamination has been removed, the only remaining exposure pathway is through exposure to the contaminated groundwater. Therefore, the institutional controls should ensure that no drinking water wells would be installed in the contaminated plume. This may be achieved through monitoring and by executing an agreement with the current property owners. Institutional controls will be initiated and executed by the state of Missouri.

Public health evaluations would be conducted every five years to assess the ongoing risks to human health and the environment posed by the site. As required by the NCP, a risk re-evaluation using groundwater analytical data would be conducted every five years. The evaluations would be based on the analytical data collected from the groundwater monitoring activities.

This alternative does not require any additional construction activities. The existing site monitoring wells would be used for groundwater sampling and monitoring over a period of ten years. The costs associated with monitored natural attenuation include the annual costs of groundwater sampling and analysis.

Capital Cost:	None
Annual Operation and Maintenance	$ 10,000
Total Cost (present worth):	$ 70,000
Implementation Time:	
Setup:	Immediate
Groundwater Monitoring:	10 years

Alternative 4: Treatment Wall

Under this alternative, a permeable treatment wall would be constructed across the path of the contaminant plume. As the contaminated groundwater moves passively through the treatment wall, hexavalent chromium would be reduced and removed from solution by forming insoluble trivalent chromium.

Permeable treatment walls have several advantages over conventional pump-and-treat methods for groundwater remediation. Treatment walls can immobilize contaminants in situ without any need to bring them up to the surface. They also do not require continuous input of energy because a natural gradient of groundwater flow is used to carry the contaminants through the treatment zone. Only periodic replacement or rejuvenation of the treatment medium might be required after its capacity is exhausted or it is clogged by precipitants. Furthermore, technical and regulatory problems related to ultimate discharge requirements of effluents from pump-and-treat systems are avoided with this technology.

Treatability studies would be needed for the design of the treatment wall, to select the appropriate material and porosity of the treatment media. However, it is expected that native aquifer material, amended with iron filings, would be used to construct the treatment wall. Most experience with installation of treatment walls pertains to relatively shallow emplacements using standard construction approaches. Considering the depth of contamination at the site and the aquifer material (sand), other installation technologies would be needed. Soil mixing processes that rely on soil augers to drill into the soil and inject and mix reagents are more appropriate for this site.

For evaluation purposes, and considering the relatively low level of contamination remaining in the groundwater, it is assumed that the treatment media would not be exhausted during the lifetime of the project. Therefore, periodic replacement of the treatment media would not be needed.

This alternative assumes that natural attenuation processes are not occurring. As a result, remediation time would be equal to the time needed for the contaminated plume to travel through the treatment wall. Based on the natural gradient, this is expected to take approximately 30 years. A long-term groundwater monitoring plan would be implemented to evaluate whether the remedy is performing as expected and is capable of attaining the remediation objectives.

Institutional controls would be implemented to prevent exposure to site contaminants. Since the source of the contamination has been removed, the only remaining exposure pathway is through exposure to the contaminated groundwater. Therefore, the institutional controls should ensure that no drinking water wells would be installed in the contaminated plume. Institutional controls would be initiated and executed by the state of Missouri.

Capital Cost:	$500,000
Annual Operation & Maintenance:	$ 10,000
Total Cost (Present Worth):	$624,000
Implementation Time:	
Setup:	1 Year
Treatment:	30 years

F. EVALUATION OF ALTERNATIVES

Alternative remedial actions were developed to respond to the contamination at the Quality Plating site. The alternatives described in the preceding section were evaluated using criteria related to the factors set forth in Section 121 of CERCLA and the NCP. The nine criteria are described below.

Threshold Criteria

1) Overall Protection of Human Health and the Environment:
Discusses whether or not a remedy provides adequate protection and describes how risks through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2) Compliance with Applicable or Appropriate and Relevant Requirements (ARARs) :
Addresses whether a remedy will meet all of the ARARs of federal and state environmental statutes and/or provide grounds for invoking a waiver.

Balancing Criteria

3) Long-Term Effectiveness and Permanence:
This criterion relates to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once clean-up goals have been met.

4) Reduction of Toxicity, Mobility, or Volume through Treatment:
This criterion relates to the anticipated performance of the treatment technologies that may be employed in a remedy.

5) Short-Term Effectiveness:
This criterion relates to the speed with which the remedy achieves protection, as well as the remedy's potential for adverse impacts on human health and the environment that may come about during the construction and implementation period.

6) Implementability:
This criterion relates to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

7) Cost:
Includes capital and operation and maintenance costs.

Modifying Criteria

8) State Acceptance:
This criterion indicates whether the state, based on its review of the Proposed Plan, concurs with, opposes, or has no comment on the preferred remedy.

9) Community Acceptance:
This criterion assesses the degree of community acceptance of a remedy. The degree of community acceptance can generally be determined as a result of a review of comments received during the public comment period.

1. Overall Protection of Human Health and the Environment

Alternative 2 is highly protective of the human health and the environment by eliminating, reducing, or controlling risk through active restoration and treatment. It would achieve the remediation goal and meet the discharge requirements for the

treated groundwater. Alternatives 3 and 4 provide adequate protection by eliminating, reducing, or controlling risk through in-situ treatment and institutional control. Alternative 1 is not protective of the public health and the environment. Therefore, it is not considered further in this analysis as an option for the site.

2. Compliance with ARARs

All alternatives (except No Action) would comply with federal and state ARARs. Disposal of the sludge and solid wastes generated at the site under Alternative 7 would need to be managed in accordance with the Solid Waste Disposal Act, Department of Transportation Hazardous Materials Transportation Act, and Missouri Solid and Hazardous Waste Laws and Rules. Discharges of treated groundwater from the site would need to be managed in accordance with the Clean Water Act, Missouri Clean Water Law, Missouri Water Quality Standards, and Missouri Water Pollution Control Regulations. All activities at the site must comply with the Occupational Safety and Health Act (OSHA).

3. Long-Term Effectiveness

Alternative 2 would eliminate the long-term risks associated with the contaminated groundwater and achieve remediation goals sooner than the other alternatives. The long-term effectiveness of Alternatives 3 and 4 would need to be demonstrated by monitoring.

4. Reduction of Toxicity, Mobility or Volume through Treatment

All alternatives should reduce the toxicity and mobility of chromium. However, only Alternative 2 would also reduce the volume of chromium at the site.

5. Short-term Effectiveness

Alternative 3 causes no community or site worker risks during implementation of the remedy. Community risk would be low during the construction of the treatment facility or the treatment wall. There would be a greater risk to workers, but compliance with OSHA requirements and guidelines for hazardous waste site activities would minimize these. Environmental impacts resulting from the installation of the wells and treatment system would include noise pollution and minimal fugitive dust emissions during construction.

6. Implementability

Alternative 3 could be implemented relatively easy, while Alternative 2 would be harder to implement. Alternative 4 may be difficult to construct due to the depth of contamination and the aquifer material.

7. Cost

Alternative 2 has the highest estimated total present worth cost ($1,166,000). Alternative 3 has the lowest estimated total present worth cost ($70,000).

8. State Acceptance

DNR prepared the Proposed Plan for this site on which this ROD Amendment is based. Furthermore, DNR concurs with this ROD Amendment.

9. Community Acceptance

Community acceptance is specifically addressed in the attached Responsiveness Summary. The Responsiveness Summary provides a thorough review of the significant public comments received on the Proposed Plan, and responses to the comments. The community has indicated agreement with the remedy selected in this ROD Amendment.

G. SELECTED REMEDY

Description of the Selected Remedy

Based upon consideration of the requirements of CERCLA and the NCP, the evaluation of the relative performance of each alternative with respect to the nine criteria, and consideration of comments received during the public comment period, EPA has determined that Alternative 3, Monitored Natural Attenuation and Institutional Controls, is the selected remedy. The remedy includes three components.

- Natural attenuation processes that act without human intervention to transform hexavalent chromium to the less toxic trivalent form. Trivalent chromium is less soluble, and thus less mobile, than hexavalent chromium. Under alkaline to slightly acidic conditions, it precipitates as a fairly insoluble hydroxide. Natural reductants available at the site include ferrous iron and organic matter. Furthermore, historical groundwater data demonstrate a

clear and significant decrease in hexavalent chromium concentration at the site. Based on this observed decrease, it is possible that the groundwater clean-up goal (18 µg/L) may be achieved in less than five years. However, it is important to note that as contaminant levels decrease, the attenuation rate may also decrease.

- Annual groundwater monitoring to demonstrate that: natural attenuation is occurring; plume is not expanding; there are no significant impacts to down gradient receptors; and institutional controls are effective. If future site data indicate the need for a change in monitoring frequency, or the addition of new monitoring wells, then such measures should be taken to ensure the achievement of the monitoring goals. Furthermore, monitoring should continue for a minimum of three years after the PRG for the site has been achieved to ensure that concentration levels are stable.

- Institutional controls will be implemented to prevent exposure to site contaminants. Since the source of the contamination has been removed, the only remaining exposure pathway is through exposure to the contaminated groundwater. Therefore, the institutional controls should ensure that no drinking water wells will be installed in the contaminated plume. This may be achieved through monitoring and by executing an agreement with the current property owners.

Evaluations to determine the effectiveness and continued protectiveness of the remedy will be conducted every five years to assess the ongoing risks to human health and the environment posed by the site. As required by the NCP, a risk re-evaluation using groundwater analytical data will be conducted every five years. Because of the uncertainties associated with natural attenuation, a contingency remedy is also necessary. In the event that groundwater monitoring reveals no significant decrease in hexavalent chromium concentration after five years of monitoring and the plume appears to be expanding and threatening down gradient receptors, the contingency remedy discussed below will be implemented. The remedy selected in the original ROD is the contingency remedy for the site. It includes four components:

- Extraction of the contaminated groundwater through the use of the two installed extraction wells;

- Treatment of the extracted groundwater by reduction/precipitation to meet the discharge limit. However, if chromium concentration at the time of contingency remedy implementation is less than the discharge limit, treatment will not be necessary;

- Discharge of the treated groundwater to Ditch Number 4, approximately 4,000 feet east of the site, under a state operating permit; and

- Groundwater monitoring to monitor the plume and remediation process.

Cost Estimates for the Selected Remedy

This alternative does not require any additional construction activities. The existing site monitoring wells will be used for groundwater sampling and monitoring over an estimated period of ten years. The estimated costs associated with MNA are listed below. The present worth cost is based on a discount rate of seven percent.

Capital Cost:	None
Annual Operation and Maintenance	$ 10,000
Total Cost (present worth):	$ 70,000
Implementation Time:	
Setup:	Immediate
Groundwater Monitoring:	10 years

Estimated Outcome of Selected Remedy

The land at the site has been available for agricultural and residential use since the completion of the soil removal action; however, the groundwater at the site is not available for beneficial uses. Reducing the hexavalent chromium concentration in groundwater to below the health risk-based PRG established for the site (18 µg/L) will return the groundwater at the site to its beneficial uses, both agricultural and residential.

H. STATUTORY DETERMINATIONS

Under its legal authority, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for the site must comply with ARARs unless a statutory waiver is justified. The selected remedial action must also be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatments that permanently and significantly reduce the volume, toxicity, or mobility of the hazardous waste as their principal element.

The following subsections discuss how the selected remedy for the Quality Plating site meets these statutory requirements of Section 121 of CERCLA, as amended by SARA, and to the maximum extent practicable, the NCP.

1. Protection of Human Health and the Environment

The selected remedy would reduce risks presented by the site to human health and the environment by, in the short-term, implementing institutional controls to prevent exposure to the contaminated groundwater. In the long-term, the concentration of hexavalent chromium in the groundwater would be reduced to below the health risk-based PRG established for the site.

2. Compliance with ARARs

The selected remedy will comply with all ARARs. No waiver of an ARAR is being sought or invoked for the selected remedy. The ARARs of concern are included in the original ROD.

3. Cost-Effectiveness

The selected remedy has the lowest estimated total present worth cost ($70,000) when compared with alternatives that are protective of the human health and the environment.

4. Utilization of Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable.

Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that this selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability, and cost.

5. Preference for Treatment as a Principal Element

The selected remedy satisfies, in part, the statutory preference for treatment as a principal element by use of a passive treatment method. Hexavalent chromium will be reduced to a less toxic form, trivalent chromium, through natural attenuation processes. Trivalent chromium is less soluble, and thus less mobile, than hexavalent chromium. Under alkaline to slightly acidic conditions, it precipitates as a fairly insoluble hydroxide.

Reproduced by NTIS

National Technical Information Service
Springfield, VA 22161

This report was printed specifically for your order from nearly 3 million titles available in our collection.

For economy and efficiency, NTIS does not maintain stock of its vast collection of technical reports. Rather, most documents are printed for each order. Documents that are not in electronic format are reproduced from master archival copies and are the best possible reproductions available. If you have any questions concerning this document or any order you have placed with NTIS, please call our Customer Service Department at (703) 605-6050.

About NTIS

NTIS collects scientific, technical, engineering, and business related information — then organizes, maintains, and disseminates that information in a variety of formats — from microfiche to online services. The NTIS collection of nearly 3 million titles includes reports describing research conducted or sponsored by federal agencies and their contractors; statistical and business information; U.S. military publications; multimedia/training products; computer software and electronic databases developed by federal agencies; training tools; and technical reports prepared by research organizations worldwide. Approximately 100,000 *new* titles are added and indexed into the NTIS collection annually.

For more information about NTIS products and services, call NTIS at 1-800-553-NTIS (6847) or (703) 605-6000 and request the free *NTIS Products Catalog,* PR-827LPG, or visit the NTIS Web site **http://www.ntis.gov**.

NTIS
Your indispensable resource for government-sponsored information—U.S. and worldwide