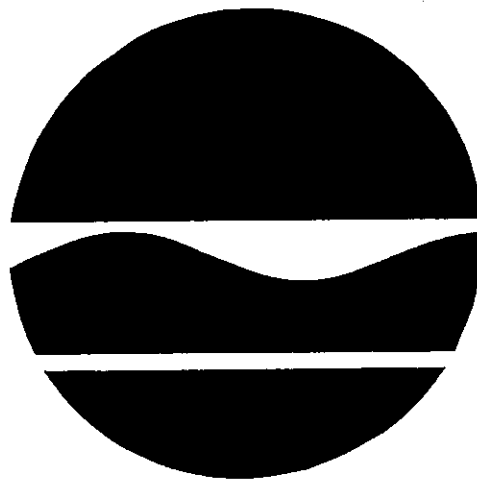


**R.D.Specialties, Inc.**  
**Site No. 8-28-062**

**RECORD OF DECISION**

**March 1991**



**Prepared By**

**New York State Department of  
Environmental conservation**

## DECLARATION STATEMENT - RECORD OF DECISION

### Site Name and Location:

R.D. Specialties Site  
Town of Webster, Monroe County, New York  
Site Registry No. 8-28-062  
Classification Code: 2

### Statement of Purpose:

This Record of Decision sets forth the selected remedial action plan for the R.D. Specialties Site. This remedial action plan was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and the New York State Environmental Conservation Law (ECL). The selected remedial plan complies to the maximum extent practicable with Applicable or Relevant and Appropriate Requirements (ARARs) of Federal and State environmental statutes and would be protective of human health and the environment.

### Statement of Basis:

This decision is based upon the Administrative Record for the R.D. Specialties Site and upon public input to the Proposal Remedial Action Plan (PRAP). A copy of the Administrative Record is available at the New York State Department of Environmental Conservation, 50 Wolf Road, Albany, New York and copies of the Feasibility Study Report are available at the Town of Webster Public Library, 1 Van Ingen Drive, Webster, New York. A bibliography of those documents included as part of the Administrative Record is contained in Appendix B. A Responsiveness Summary that documents the public's expressed concerns and related correspondence from other State and local government agencies has been included as Appendix A.

### Description of the Selected Remedy:

The selected remedial action provides for protection of public health and safety, protection of the environment, technical feasibility and performance, and compliance with statutory requirements. Briefly, the selected remedial action includes:

- Excavation of contaminated soil identified at the site having an approximate volume of 345 cubic yards. Disposal of the contaminated soil at an off-site permitted RCRA landfill.
- Long-term groundwater monitoring for chromium contamination.

The two (2) basic reasons for selecting the preferred remedial action are:

1. The volume of the contaminated soil to be excavated (approximately 345 cubic yards) is not large enough to implement an economical treatment technology on-site.

2. The groundwater beneath the site is moving very slowly and the contamination in the groundwater is found to be contained within the boundary of the site. By removing the source of contamination (excavation of contaminated soil) the chromium contamination in groundwater is expected to decrease to non-detect levels by natural attenuation.

Declaration:

The selected remedial action will meet State and Federal ARARs by removing the contaminated soil from the site. The chromium contamination in groundwater at the site is expected to attenuate over time to background levels. The remedy will satisfy, to the maximum extent practicable, the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principle element.

The selected remedial action will result in a small increase in short-term risks. Workers involved in its implementation will have the potential for increased exposure to chemical contaminants at the site. The community may also be exposed to increased risks due to exposure to air-borne contaminants which may escape from the site during the implementation of the selected remedial action. Engineering controls such as instrument monitoring and water spray for dust controls will be employed to minimize the short-term risks.

The selected remedial action has been used successfully at other hazardous sites. Because the selected remedial action will not remove the groundwater contamination immediately, long-term groundwater monitoring is required. Additionally, to ensure that the remedy continues to provide adequate protection of human health and the environment, a review of the effectiveness of the remedy will be conducted every five years, or at any time the monitoring data indicates an increase in the existing groundwater contamination at the site.

3/21/91  
Date

  
\_\_\_\_\_  
Edward O. Sullivan  
Deputy Commissioner

## I. Site Location and Description

The R.D. Specialties, Inc. Site is located at 500 Salt Road in the Town of Webster, Monroe County, New York. Figure 1 shows the location of R.D. Specialties Site in Webster. The site is on a rectangular lot measuring approximately 567 feet x 1191 feet. The portion of the site which is of concern is the developed half of the property with a manufacturing building and a two-story house. The manufacturing building has been expanded numerous times by the addition of cement slabs and wooden framed additions.

A small ditch is located on the property and runs in an easterly direction away from the southeast corner of the manufacturing building. An intermittent stream, located approximately 120 feet southeast to the end of the drainage ditch, traverses the property from the southwest to northeast. The intermittent stream does not connect with the drainage ditch. A small marshy pond is located north of the drainage ditch.

To the west of the R.D. Specialties Site lie various manufacturing units of Xerox Corporation Company. Salt Road is to the west, Basket Road is to the east and Schlegel Road is to the north of the R.D. Specialties Site. Moderately dense residential areas lie to the north, east and west of the site.

## II. Site History

R.D. Specialties began plating rods with chrome in a plating unit at the manufacturing facility in 1966. By 1968, two plating units were in operation at the facility. Chromium-plated rods were rinsed in a rinse tank which was drained into a dry sump located at the rear of the manufacturing building. In 1977, a third plating unit was installed at the facility and the initial unit (installed in 1966) was taken out of service. Sometime between 1970 and 1980, approximately 40 to 50 gallons of plating solution, that may have contained up to 47 pounds of chromium, was released into the dry sump. Plating rinse water was discharged into the dry sump until 1982 at which time the dry sump was removed.

After 1982, chromium plating rinse water was treated to reduce hexavalent chromium [Cr (VI)] to trivalent chromium [Cr (III)] which was then precipitated out of solution. The aqueous portion of the rinse water solution was decanted, and the trivalent chromium precipitate was dried and transported off-site for disposal. The aqueous portion was discharged into a new cement containment structure that was located in the area of the former dry sump. The treated rinse water was discharged from the containment structure through an underground pipe into a drainage ditch which extends southeast of the manufacturing facility. All discharge of plating rinse water to the environment was stopped by 1985.

As a result of the past chromium handling practices at the manufacturing facility, chromium appears to have been released into soils in the area of the former dry sump, along the drainage ditch, and in a portion of the wooded area at the end of the drainage ditch. These soils are believed to be impacting groundwater quality in localized areas of the site. Groundwater may be affected by infiltration of precipitation through soils containing chromium and by the fluctuation of groundwater levels at the site which may flush chromium compounds from the affected soils.

### III. Current Status

1. Preliminary Site Investigation - September 1985 - Lozier Architects and Engineers. Following are the conclusions made upon completion of the investigation:

- Elevated chromium levels at the site were detected in soil and surface water/leachate samples collected in the dry sump area. The soil sample showed 596 ppm of chromium and the surface water sample showed 66.3 ppm chromium.
- Based on the limited investigation, it appears that chromium enriched groundwater is migrating in a northeast direction from the waste disposal area/dry sump.

2. Remedial Investigation - March 1989 - Blasland, Bouck and Lee Consulting Engineers.

The work plan submitted by the consultant for conducting a Remedial Investigation (RI) at the site was approved in November 1988 by NYSDEC. The field work at the site began in March 1989. Twenty-three soil and sediment samples were collected at depths ranging from the ground surface to three feet at the locations shown on Figure 2. All samples were analyzed for total metals, hexavalent chromium and volatile organics. The results of these analyses showed that volatile organics and hexavalent chromium were not present in the detectable limits in any soil samples. Total chromium and copper were detected above background levels. Total chromium concentrations observed in soils on-site are shown in Table 6. Table 4 presents the analytical results from soil sample analyses.

A total of eight monitoring wells were installed for the purpose of groundwater sampling. Two surface water and eight groundwater samples were collected for chemical analyses in March and July 1989. All samples were analyzed for total and hexavalent chromium. The split samples of groundwater were taken by NYSDEC for volatile organics analyses. Volatile organics were not detected in any of the groundwater and surface water samples. Total chromium was observed above the detection limit in five of ten samples and hexavalent chromium was observed in six of the groundwater samples. Table 7 presents a summary of the concentrations of total and hexavalent chromium in groundwater and surface water.

According to the investigation, soils at the site are of glacial origin and consist primarily of fine to medium sand and silt with a lesser fraction of gravel. The bedrock ranges in depth below grade from 1 to 6 1/2 feet and slopes southwest across the site. Assuming an effective porosity of 0.2 and a compacted hydraulic conductivity of  $1.3 \times 10^{-4}$  to  $4.9 \times 10^{-4}$  cm/sec, groundwater flow velocities were determined to vary between 7 and 25 feet/year.

The groundwater discharges to low-lying areas during those seasons which typically experience a high water table. Although the depth to the water table changes with the seasons, the configuration of groundwater flow paths at the site remain approximately the same. The groundwater flow direction beneath the site is towards the north.

3. The RI and the Risk Assessment (RA) Report - November 1989 - Blasland, Bouck and Lee Consulting Engineers.

This report detailed on the contamination assessment, exposure assessment, toxicity assessment and finally risk assessment which were calculated based on the results of the RI. The contamination assessment was done to screen the contamination found at the site. The objective of this assessment was to identify the chemical contamination of concern at the site. This was done by comparing the analytical results:

- (a) With background concentrations and/or available data from other studies.
- (b) With the action levels developed by various government agencies for chemical contamination in soil and groundwater.
- (c) With available and applicable standards and/or guidance.

The contamination assessment concluded that most metal concentrations observed on-site can be explained as natural background levels. However, total chromium and copper was further examined as chemicals of concern in soils, and total chromium and Cr(VI) were examined as chemicals of concern in groundwater. Soil contamination was confined to an area adjacent to the dry sump and in the drainage area. Groundwater contamination appeared to be localized, in that it was only observed in the four wells near the manufacturing building.

The objectives of the exposure assessment were to identify potential receptor populations and exposure pathways by which these receptors may be exposed to the site contamination. The report considered only on-site workers as potential receptors of on-site soil and groundwater contamination. The exposure pathways considered for soil contamination were via dermal contact and incidental ingestion. Only dermal exposure was considered for groundwater contamination.

The risk characterization calculated the total exposure (from soil and groundwater contamination) to the potential receptor using the EPA guidelines and the toxic characteristics of the chemicals of concern at the site. An Hazard Index was calculated for soil and groundwater. The results were much less than one (unity) which is the level of concern for EPA.

The report concluded that the existing levels of chromium and copper in the soils and groundwater at the R.D. Specialties Site do not pose a potential risk to employees engaged in maintenance. The manufacturing business on-site is expected to continue its current operation, and additional release of chromium to soils and groundwater is not foreseen. Judging from the groundwater monitoring data for downgradient and upgradient wells, as well as levels of chromium observed in surface water, no off-site transport of chromium appears to be occurring.

The RI and HA report submitted in November, 1989 by the consultant finally concluded that the contamination in soil and groundwater found at the site is only to a limited extent and based on the fact that the RA calculations demonstrates that the contamination levels at the site will not effect the human health or the environment, remedial activities appears to be unwarranted at this site.

4. Interim discussions between consultant and the NYSDEC - December 1989 and January 1990.

NYSDEC submitted the comments on the RI and RA Report to the consultant on December 27, 1989. The major comment was that the conclusion made by the report on taking a no-action alternative at the site for remediation was not acceptable. This is because a Feasibility Study discussing the possible and potential remedial alternatives based on a Health Risk Assessment (HRA) was not done by the consultant. The comment letter pointed out that the risk assessment calculations did not consider 1) children as possible receptors, 2) future development of the property and 3) fugitive dust emission as a possible exposure. The calculations were not acceptable because of these reasons.

The RI and RA report considered an action level of 100 ppm for chromium in soil based on the soil action levels developed by the New Jersey Department of Environmental Protection. NYSDEC did not accept this action level and suggested that an action level should be selected based on the site specific background concentrations in soil and/or more detailed risk assessment calculations should be done.

On January 3, 1990 a meeting was held between the consultant, NYSDEC and NYSDOH to discuss the various issues on the comment letter. At this meeting NYSDEC stressed the fact that the consultant should prepare an FS report to determine the need for a Remedial Action at the site. The NYSDEC and NYSDOH wanted the consultant to recalculate the risk assessment taking into consideration children as possible receptors for soil and groundwater contamination. As requested by NYSDEC the consultant agreed to do the FS Report and offered to do a additional soil sampling around the dry sump and the drainage ditch area. This sampling would help to determine the volume of the contaminated soil at the site. The supplemental soil sampling program was conducted between April 11, 1990 and May 3, 1990.

5. Feasibility Study Report - Blasland, Bouck and Lee - August 1990.

The FS Report gave details of the supplemental RA and soil sampling program. An action level of 31 ppm for chromium in soil was established for this site based on a revised RA calculations taking into consideration the children also as possible receptors of contamination from the site. The results of the soil sampling program showed that approximately 375 cubic yards of contaminated soil (having a chromium concentration of 31 ppm or more) has to be remediated. The details of the potential remedial alternatives considered and the rationale for the selection of preferred remedial alternatives are discussed in the latter sections of this document.

IV. Enforcement Status

The NYSDEC has entered into a consent agreement with the R.D. Specialties under Article 27, Title 13 of the Environmental Conservation Law entitled "Inactive Hazardous Waste Disposal Sites." The consent agreement was signed by the Commissioner of NYSDEC on December 20, 1988. The purpose of this agreement was to provide for the implementation of an RI/FS at the site and the selection of final remedial alternative.

After NYSDEC accepted the final remedial alternative, the PRP expressed that he would not be able to implement the final remediation at one time with his current financial resources. He offered to do it in phases. He also suggested that if NYSDEC is willing to do the final remediation at the site he would pay the expenses incurred by NYSDEC in installments. This approach has been accepted by the NYSDEC and negotiations are proceeding. Once the Record of Decision is signed by the Deputy Commissioner of NYSDEC finalizing the remedial alternative, a new consent agreement will be negotiated with the PRP. This new agreement will be to implement the selected remedial alternative at the site by NYSDEC and will list the terms by which the PRP will repay the expenses incurred by NYSDEC.

V. Goals for the Remedial Action

Objectives of any remedial actions taken at the site must address the problems defined earlier. Ideally, the appropriate remedial action would eliminate or minimize problems that have been defined with the site. Specific remedial activity goals include:

- (a) The remedial action objective for the soils at the site is to reduce the concentration of total chromium to below 31 ppm (determined action level) by soil removal or treatment.
- (b) The remedial action objective for groundwater at the site is to control, minimize or eliminate the migration of contaminants from the site.



## VI. Summary of the evaluation of the Remedial Alternatives:

Regulations established by the State and Federal Governments which deal with the remediation of inactive hazardous waste sites require that the selected remedial alternative be protective of human health and the environment, cost effective and comply with statutory requirements. A comprehensive list of remedial technologies established by the USEPA was utilized to determine potentially feasible remedial alternatives.

A preliminary screening of remedial alternatives identified four (4) alternatives for contaminated soils and five (5) alternatives for contaminated groundwater.

### Remedial Alternatives for Soil:

- No Action Alternative
- Stabilization/Solidification
- Soil Washing
- Removal and Off-Site Disposal

### Remedial Alternatives for Groundwater:

- No Action Alternative
- Precipitation/Flocculation
- Ion Exchange
- Off-Site Treatment at POTW
- Off-Site Treatment at RCRA Facility

### Soil Remediation:

No Action Alternative - This alternative would not utilize any active remedial technology for the site soils. Under this action, institutional controls (access and deed restrictions) would be implemented at the site to minimize potential human exposure to the soils.

Stabilization/Solidification - Stabilization, also known as solidification and fixation, is a process by which stabilization agents are mixed into contaminated soils to alter the physical and/or chemical state of the hazardous compounds in the soil thus rendering the soil less toxic and the contaminants less leachable.

Soil Washing - This process involves the use of liquid medium to wash contaminants from soils. The soil washing technology is based on the principle that contaminants adhere mostly to fines present in the soil matrix. The resultant contaminated fines are either treated or are disposed off-site.

Removal and Off-Site Disposal - This alternative consists of excavating the site contaminated soils that are above the determined clean up level and transporting to an off-site RCRA landfill for disposal. The excavated areas would be backfilled with clean fill material.

Groundwater Remediation:

No-Action Alternative - This alternative would not utilize any active remedial technology for the site groundwater. Under this alternative, a groundwater monitoring program (sampling and analysis) would be implemented to determine the concentration and migration of chromium in groundwater over time.

Precipitation/Flocculation - The treatment of groundwater using precipitation involves the use of precipitant chemicals to convert inorganic chromium into insoluble precipitates which are settled out of the wastewater stream thereby reducing the concentration of inorganic heavy metals in the groundwater.

Ion-Exchange - This alternative involves the use of ion-exchange resins to treat extracted groundwater. The principles of ion-exchange treatment for the removal of heavy metals (i.e. chromium) from water are based on the transfer ionic compounds (inorganic contaminant) in solution to a receptive medium (resins) in exchange for non-hazardous ions (H+).

Off-Site Treatment at POTW - This alternative involves the withdrawal of site groundwater and treatment at Publicly Owned Treatment Waste (POTW). The extracted and collected groundwater would be transported off-site using tanker trucks to the Town of Webster Publicly Owned Treatment Works (POTW), Webster, New York, for necessary treatment.

Off-Site Treatment at RCRA Facility - This alternative involves the withdrawal of site groundwater and treatment at permitted Resource Conservation and Recovery Act (RCRA) hazardous waste treatment, storage and disposal facility. The extracted and collected groundwater would be transported off-site using tanker trucks to a permitted RCRA wastewater treatment facility.

The Preferred Alternative:

The preferred alternative based on the available information is:

- excavate the contaminated soil,
- disposal at an off-site RCRA landfill and
- long-term monitoring of groundwater.

The two (2) basic reasons for selecting the preferred alternative are:

1. The volume of the contaminated soil to be excavated (approximately 375 cubic yards) is not large enough to implement an economical treatment technology on-site.
2. The groundwater beneath the site is moving very slowly and the chromium contamination in groundwater is found to be contained within the boundary of the site. By removing the source of contamination (excavation of contaminated soil) the chromium contamination in groundwater is expected to decrease to non-detect levels by natural attenuation.

Natural attenuation is a process by which the severity of the groundwater contamination shall be decreased. This is achieved by two ways:

- One is by the dilution effect. The existing contaminated groundwater will be diluted with non contaminated water from the precipitation events seeping through the non contaminated soil over time.
- Second is by dispersion process. Some of the chromium contamination existing in the groundwater at the site will disperse into the soil by absorption or adsorption process. With the dispersion of contaminants and the recharge of groundwater by non contaminated water, the contamination in groundwater at the site is expected to decrease.

The long-term groundwater monitoring will involve quaterly sampling for the first year following the completion of final remediation and for the next four years semi-annual sampling will be done. At the end of five years the effectiveness of the remedial action will be reviewed. If the results shows the groundwater contamination is not reducing or stabilizing the off-site disposal to POTW will be implemented. If the results proves that the remediation is effective the frequency of the sampling to be done will be determined at that time.

#### Rationale for Selection:

The final alternatives were evaluated against the following eight (8) criteria: 1) compliance with New York State Standards, Criteria and Guidelines (SCGs), 2) reduction of toxicity, mobility or volume, 3) short-term impacts, 4) long-term effectiveness and permanence, 5) implementability, 6) cost, 7) community acceptance, and 8) overall protection of human health and environment.

- Compliance with SCGs  
The preferred alternative will meet New York State SCGs by removing the contaminated soil from the site and the chromium contamination in groundwater is expected to attenuate over time to background levels.
- Reduction of Toxicity, Mobility or Volume  
The preferred alternative will effectively remove the contaminated soil from the site, thereby reducing the toxicity and mobility of the soil. The toxicity, mobility or volume of the chromium present in the groundwater would not be immediately reduced but the chromium present in the groundwater (toxicity) is expected to attenuate overtime to non-hazardous levels.
- Short-Term Impacts  
The preferred alternative will result in a small increase in short-term risks. Workers involved in excavation and transportation of contaminated soil will have the potential for increased exposure to chemical contaminants at the site. The community may also be exposed to increased risks due to exposure to air-borne contaminants which may escape from the site during the implementation of the preferred alternative. Engineering controls such as instrument monitoring and water spray for dust control will be employed to minimize the short-term impacts.

- Long-Term Effectiveness and Permanence  
The preferred alternative would effectively remove the contaminated soil from the site, thereby isolating the chromium present in the site soils above clean-up level. The groundwater is expected to stabilize with time. A long-term monitoring plan will be implemented to ensure the effectiveness of the final remediation. If the long-term monitoring shows the groundwater contamination is not reducing then the off-site disposal at POTW will be implemented.
- Implementability  
The preferred alternative has been successfully implemented at other hazardous waste sites. It employs relatively basic engineering technology which will provide a high degree of operational reliability.
- Cost  
The preferred alternative is the most cost-effective of the alternatives evaluated based on the small volume of contaminated soil present at the site and the groundwater contamination is contained within the site boundary. A detailed cost analysis for each alternative is presented in the FS Report.
- Community Acceptance  
Community concerns are believed to focus on a remedial alternative which will be most protective of public health. A full assessment of community attitudes toward the preferred alternative and the other alternatives evaluated will be made following the formal public comment period and public informational meeting.
- Overall Protection of Public Health and the Environment  
Considering all factors involved in the evaluation of remedial alternatives, the preferred alternative is the most favorable. It will be protective of public health in that direct contact to contaminated soil is eliminated by removing and disposing the contaminated soil. Danger to the environment through the migration of contaminants off-site via the groundwater will be mitigated with the soil removal which is believed to be the source contributing contamination to the groundwater.

#### VII. Summary of the Government's Decision:

The NYSDEC's significant concern regarding the RI Report was that the soil and groundwater contamination were not being addressed. This concern along with other comments were presented at a meeting held between the consultant, NYSDEC and NYSDOH. The consultant agreed to prepare a Feasibility Study Report to respond to this concern.

The FS Report submitted by the consultant evaluated different remedial strategies and proposed a referred remedial alternative which consists of:

- excavate the contaminated soil
- disposal at an off-site RCRA landfill and

- long-term monitoring of groundwater.

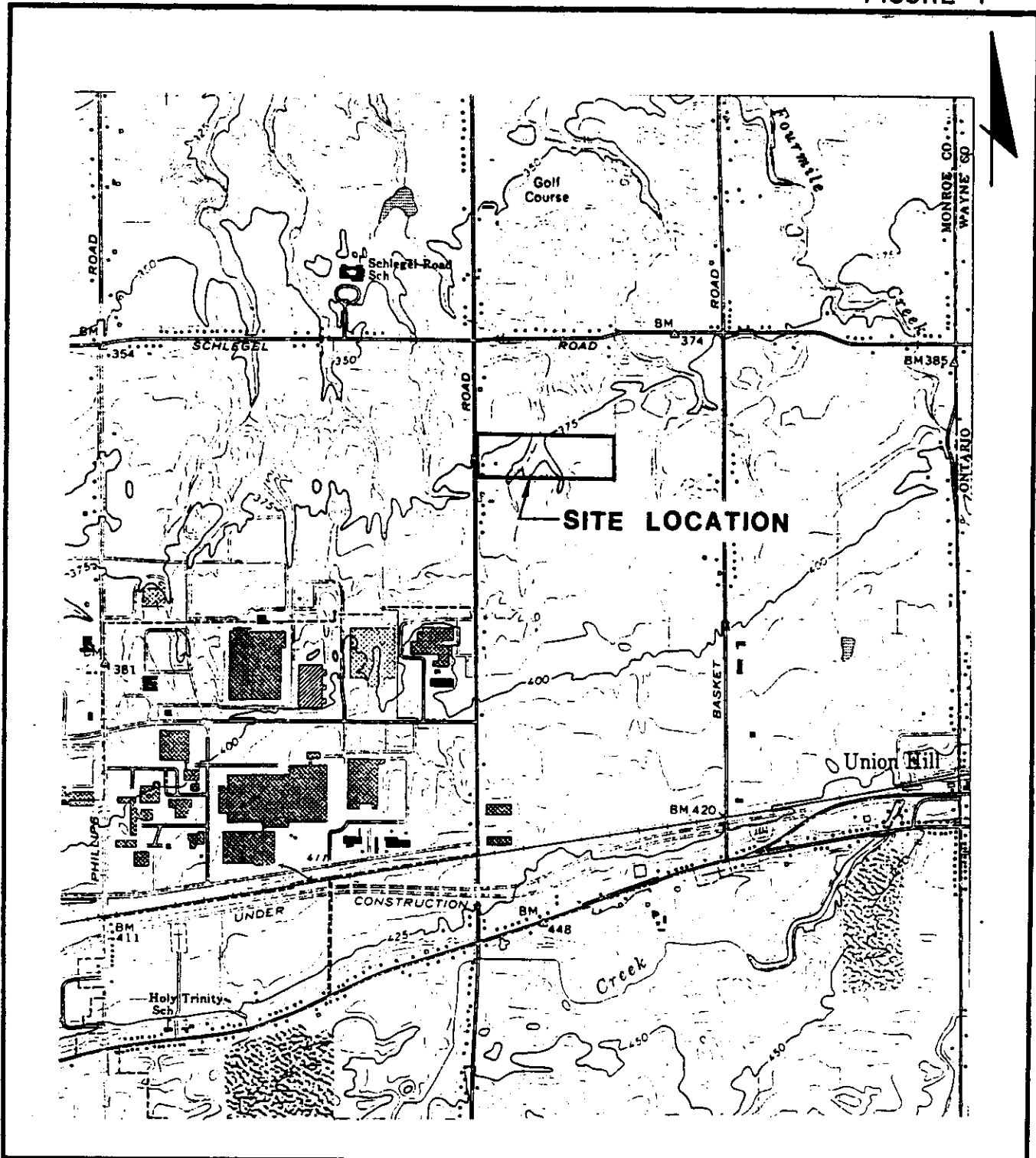
The groundwater contamination is expected to decrease to non-detect levels by natural attenuation.

The NYSDEC and the NYSDOH accepted the proposed remedial alternative as the final remedial alternative for the site. In summary, at this time the preferred alternative is believed to provide the best balance among alternatives with respect to the criteria used to evaluate remedies. Based on the information available at this time, it is believed that the preferred alternative would be protective of human health and the environment, would be in compliance with applicable or relevant and appropriate requirements of other Federal and State environmental statutes and would be cost-effective.

On February 26, 1991, a public participation meeting was held at the Town of Webster Parks/Recreation Facility. A Responsiveness Summary was prepared by the NYSDEC summarizing the public comments and the responses related to RI/FS work at the RD Specialties Site. No significant changes and/or modifications to the preferred remedial action alternative were suggested during the public meeting.

The copies of the correspondence between the NYSDEC and RD Specialties regarding the review of the RI/FS Reports are contained in the Administrative Record. The copy of the letter from the NYSDOH supporting the preferred remedial action alternative is also contained in the Administrative Record.

FIGURE 1



RD SPECIALTIES INC.  
WEBSTER N.Y.

FEASIBILITY STUDY

SITE LOCATION MAP



BLASLAND & BOUCK  
ENGINEERS, P.C.

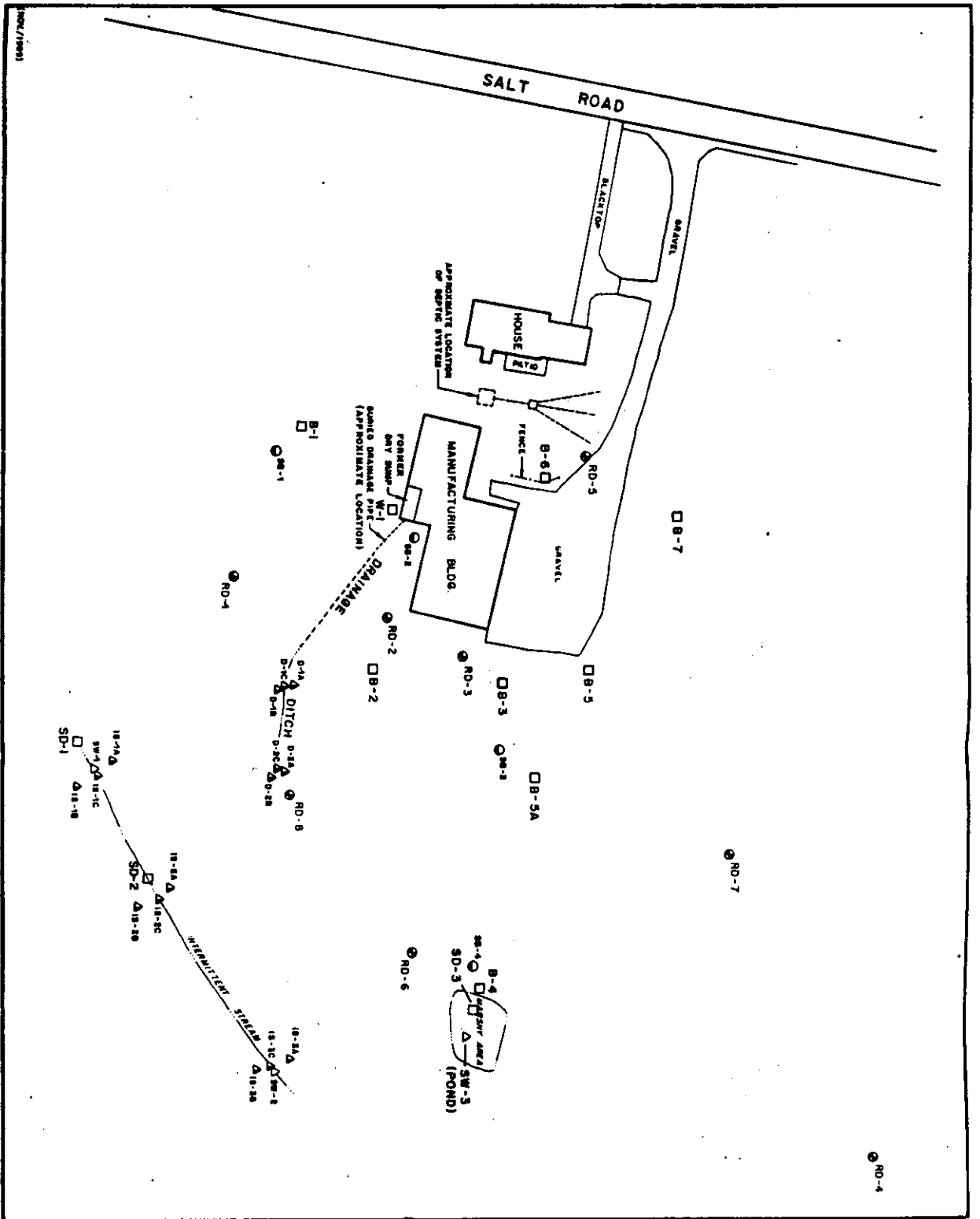


FIGURE 2



**LEGEND**

- MONITORING WELL
- SOIL BORING
- △ SOIL SAMPLE
- △ SURFACE WATER SAMPLE
- SOIL SAMPLE LOZIER, 1986

RD SPECIALTIES INC.  
WEBSTER, NEW YORK

**FEASIBILITY STUDY**

**SAMPLING  
LOCATION PLAN**



BARLAND & SORCE ENGINEERS, P.C.  
TEMPLETON & CLARK ENGINEERS



(NOV/1993)

TABLE 4 (Cont'd.)

Parameter (mg/l)	D2C	IS2A	IS2B	IS2C	IS3A	IS3B	IS3C
Sample Depth (ft.)	Surface	1-3	1-3	Surface	1-3	1-3	Surface
Chromium Hexavalent (mg/kg)	<1.5	<1.3	<1.2	<2.0	<1.6	<1.2	<1.3
Total Metals (mg/kg):							
Aluminum	7180.	9620.	7780.	13000.	6630.	10800.	7380.
Antimony	<9.2	<7.8	<7.2	<12.	<9.4	<7.5	<7.9
Arsenic	1.3	0.84	1.3	4.3	2.8	2.9	1.8
Barium	<31.	43.1	32.2	74.0	42.9	49.9	32.7
Beryllium	0.921	0.739	0.679	1.18	0.954	0.669	0.788
Cadmium	<0.77	<0.65	<0.60	<1.0	<0.78	<0.62	<0.66
Calcium	3190.	4830.	2070.	5380.	4040.	2560.	2140.
Chromium	1050.	26.2	11.0	16.0	10.3	15.6	23.2
Cobalt	<7.7	<6.5	<6.0	<10.	<7.8	7.53	<6.6
Copper	80.0	10.5	7.68	18.8	9.80	6.76	5.68
Iron	7960.	10700.	13000.	16500.	10500.	20800.	11300.
Lead	18.2	5.87	3.92	34.1	18.2	7.84	3.76
Mercury	<0.15	<0.13	<0.12	<0.20	<0.16	<0.12	<0.13
Magnesium	1070.	2440.	2510.	2530.	1480.	3460.	1970.
Manganese	131.	178.	141.	841.	502.	725.	136.
Nickel	<6.1	9.38	9.94	10.7	6.47	14.3	8.13
Potassium	<766.	937.	1200.	1610.	<783.	1710.	1050.
Selenium	<0.77	<0.65	<0.60	<1.0	<0.78	<0.62	<0.66
Silver	<1.5	<1.3	<1.2	<2.0	<1.6	4.31	<1.3
Sodium	<766.	<647.	<598.	<1010.	<796.	<622.	<661.
Thallium	<1.5	<1.3	<1.2	<2.0	<1.6	<1.2	<1.3
Vanadium	15.1	19.3	18.5	26.4	16.3	25.4	14.4
Zinc	58.2	36.1	25.4	87.8	47.5	33.2	38.6



TABLE 4 (Cont'd.)

Sample Depth (ft.)	SB4B	SB1A	SB1B	IS1A	IS1B	IS1C	D2A	D2B
	3	1	3	1-3	1-3	Surface	1-3	1-3
Chromium Hexavalent (mg/kg)	<1.2	<1.3	<1.3	<1.2	<1.4	<1.9	<1.5	<1.4
Total Metals (mg/kg):								
Aluminum	10000.	12200.	11100.	6020.	12100.	7100.	9640.	7390.
Antimony	<7.29	<8.0	<7.7	<7.3	<8.4	<11.	<8.7	<8.2
Arsenic	0.91	1.6	1.3	1.4	5.8	3.2	1.4	0.82
Barium	42.0	<27.	<26.	<24.	72.2	47.3	39.2	31.9
Beryllium	0.657	0.737	0.715	0.703	0.735	1.11	0.856	0.815
Cadmium	<0.61	<0.67	<0.64	<0.61	<0.70	<0.93	<0.73	<0.69
Calcium	6670.	<667.	735.	9800.	2940.	3880.	2640.	3240.
Chromium	14.7	9.50	10.8	10.6	17.4	10.3	332.	394.
Cobalt	6.76	<6.7	<6.4	<6.1	<7.0	<9.3	<7.3	<6.9
Copper	6.89	6.47	7.16	7.04	7.77	11.4	12.3	27.2
Iron	15100.	13700.	14000.	12200.	28000.	12100.	9240.	6910.
Lead	3.09	8.41	5.08	2.80	4.94	18.1	8.50	8.31
Mercury	<0.12	<0.13	<0.13	<0.12	<0.14	<0.19	<0.15	<0.14
Magnesium	4180.	1090.	2120.	3040.	3010.	1540.	1580.	1170.
Manganese	271.	64.4	136.	257.	623.	806.	98.5	93.8
Nickel	13.6	<5.3	9.25	8.82	12.5	<7.4	7.64	<5.5
Potassium	1970.	<667.	<638.	<611.	1100.	<925.	<727.	<689.
Selenium	<3.0	<0.67	<0.64	<0.61	<0.70	<0.93	<0.73	<0.69
Silver	<1.2	<1.3	<1.3	<1.2	<1.4	<1.9	<1.5	<1.4
Sodium	<608.	<667.	<638.	<611.	<696.	<925.	<727.	<689.
Thallium	<1.2	<1.3	<1.3	<1.2	<1.4	<1.9	<1.5	<1.4
Vanadium	24.3	24.1	24.1	17.5	30.9	18.6	17.4	15.4
Zinc	25.5	31.9	41.6	26.8	86.9	61.7	33.8	32.7

TABLE 4

SOIL AND SEDIMENT ANALYSIS

R.D. SPECIALTIES  
WEBSTER, NEW YORK  
MARCH 1989

Sample Depth (ft.)	D1A	D1B	D1C	SB2A	SB2B	SB3A	SB3B	SB4A
	1-2	1-2.5	Surface	1	3	1	2.5	1
Chromium Hexavalent (mg/kg)	<1.23	<1.20	<1.4	<1.36	<1.22	<1.28	<1.26	<1.24
Total Metals (mg/kg):								
Aluminum	11400.	10400.	9980.	12000.	8930.	11300.	8000.	9810.
Antimony	<7.41	<7.21	13.3	<7.76	<7.30	<7.68	<7.55	<7.42
Arsenic	<0.62	0.77	3.0	2.1	1.2	0.72	0.72	0.87
Barium	26.6	32.3	39.9	55.8	37.2	38.7	34.0	42.1
Beryllium	0.685	0.680	0.770	0.716	0.679	0.701	0.711	0.680
Cadmium	<0.62	<0.60	0.751	<0.65	<0.61	<0.64	<0.63	<0.62
Calcium	960.	940.	2720.	2880.	1290.	1750.	3210.	2020.
Chromium	34.3	17.5	1540.	209.	39.9	12.5	18.3	12.7
Cobalt	<6.2	<6.0	<6.8	<6.5	<6.1	<6.4	<6.3	<6.2
Copper	12.2	5.27	265.	29.1	9.15	4.61	7.30	4.63
Iron	14400.	13500.	13400.	35300.	14300.	12800.	11300.	14100.
Lead	2.69	3.65	164.	86.7	14.7	8.32	14.3	4.13
Mercury	<0.12	<0.12	<0.14	<0.13	<0.12	<0.13	<0.13	<0.12
Magnesium	2900.	2420.	2140.	2260.	2250.	1850.	2220.	2570.
Manganese	147.	216.	196.	312.	221.	131.	185.	152.
Nickel	12.6	12.6	15.5	23.9	12.2	9.36	9.73	13.4
Potassium	833.	1030.	945.	<646.	1090.	1050.	1310.	1340.
Selenium	<3.1	<3.0	<3.4	<3.2	<3.0	<3.2	<3.1	<3.1
Silver	<1.2	<1.2	<1.4	<1.3	<1.2	<1.3	<1.3	<1.2
Sodium	<617.	<601.	<678.	<647.	<608.	<640.	<629.	<618.
Thallium	<1.2	<1.2	<1.4	<1.3	<1.2	<1.3	<1.3	<1.2
Vanadium	21.8	19.0	21.2	23.2	20.8	24.2	20.0	22.8
Zinc	25.2	25.0	120.	85.7	32.9	31.5	25.5	24.6

TABLE 6  
 HEXAVALENT AND TOTAL CHROMIUM IN SOILS

R.D. SPECIALTIES  
 WEBSTER, NEW YORK

MARCH 20, 1989

<u>Sampling Location</u>	<u>Hexavalent (mg/kg)</u>	<u>Total (mg/kg)</u>
D1A	< 1.23	34.3
D1B	< 1.20	17.5
D1C	< 1.4	1,540
SB2A	< 1.36	209
SB2B	< 1.22	39.9
SB3A	< 1.28	12.5
SB3B	< 1.26	18.3
SB4A	< 1.24	12.7
SB4B	< 1.2	14.7
D2A	< 1.5	332
D2B	< 1.4	394
D2C	< 1.5	1,050
SB1A	< 1.3	9.50
SB1B	< 1.3	10.8
IS1A	< 1.2	10.6
IS1B	< 1.4	17.4
IS1C	< 1.9	10.3
IS2A	< 1.3	26.2
IS2B	< 1.2	11.0
IS2C	< 2.0	16.0
IS3A	< 1.6	10.3
IS3B	< 1.2	15.6
IS3C	< 1.3	23.2

TABLE 7  
 HEXAVALENT AND TOTAL CHROMIUM IN WATER.

R.D. SPECIALTIES  
 WEBSTER, NEW YORK

Sampling Point	3/22/89		7/12/89	
	Hexavalent (mg/l)	Total (mg/l)	Hexavalent (mg/l)	Total (mg/l)
RD-1	.02	<0.05	<0.01	<0.01
RD-2	0.17	0.19	0.05	0.07
RD-3	0.17	0.23	0.70	0.75
RD-4	<0.01	<0.05	*	*
RD-5	1.9	2.0	0.25	0.34
RD-6	<0.01	<0.05	*	*
RD-7	<0.01	<0.05	*	*
RD-8	3.7	4.7	1.2	1.0
SW-1	<0.01	<0.05	*	*
SW-2	0.04	0.05	*	*
Pond	*	*	<0.01	<0.01
Field Blank	<0.01	<0.01	<0.01	<0.01

Note:

\* Sample was not obtained.

**RD SPECIALTIES SITE**

Record of Decision

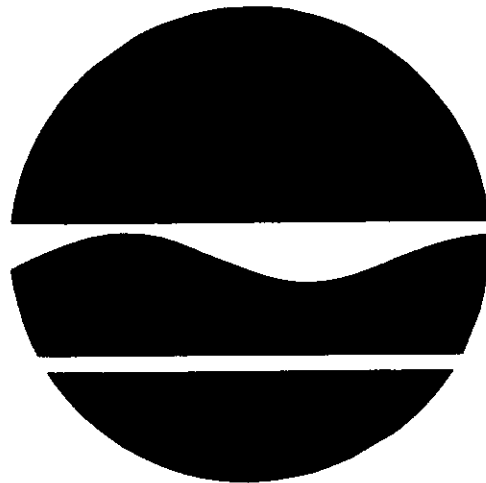
Appendix A

**R.D.Specialties, Inc.**

**Site No. 8-28-062**

**RESPONSIVENESS SUMMARY**

**March 1991**



**Prepared By**

**New York State Department of  
Environmental conservation**

## Introduction:

This report summarizes the public comments expressed at the Public Participation Meeting held on February 26, 1991 at the Town of Webster and the responses relative to the Remedial Investigation/Feasibility Study (RI/FS) Report for the R.D. Specialties Site. No other written comments were received during the public comment period which ran from February 13, 1991 to March 14, 1991. This report will be incorporated into the Record of Decision (ROD) as an attachment. The ROD is a document which formalizes the final remedial action plan and selection of the remediation. The ROD is expected to be signed by the Deputy Commissioner of the New York State Department of Environmental Conservation (NYSDEC) by the end of March 1991.

A series of remedial investigations conducted by R.D. Specialties in 1989 found contamination in shallow soil adjacent to the manufacturing building and in groundwater beneath and adjacent to the manufacturing facility. The primary contaminant was found to be chromium in soil and groundwater. Based on the results of the investigations, a FS Report was prepared by the consultant under contract with R.D. Specialties. The preliminary screening done in the FS identified applicable remedial response actions for soil and groundwater remediation. Those found to be applicable or possibly applicable were: no action, stabilization/solidification, soil washing, removal and disposal, precipitation/flocculation, ion-exchange and off-site treatment.

Based on the evaluation done in the FS, the preferred alternative proposed consists of:

- Excavation of contaminated soil.
- Disposal of contaminated soil at an off-site landfill.
- Long-term groundwater monitoring.

The chromium contamination in groundwater is expected to decrease to non-detect levels by natural attenuation. Natural attenuation is accomplished in two ways:

1. Contaminated groundwater is diluted over time by natural precipitation seeping through non-contaminated soil.
2. Some of the chromium will disperse into the soil by absorption or and/or adsorption process.

Groundwater contamination is thus lessened by the combination of dispersion of chromium and recharge with uncontaminated water.

The long-term groundwater monitoring will involve quarterly sampling for the first year following the completion of final remediation and for the next four years semi-annual sampling will be done. At the end of five years the effectiveness of the remedial action will be reviewed. If the results show the groundwater contamination is not being reduced or stabilized, the off-site disposal to Publicly Owned Treatment Works (POTW) will be implemented. If the results prove that the remediation is effective the frequency of the sampling to be done will be determined at that time.

- Q1. Please refer to Page 2 of the Proposed Remedial Action Plan (PRAP), Section III Current Status, Item 1 - The surface water sample showed 663 ppm chromium. What is the current status of this surface water contamination? Any remediation will be undertaken for surface water contamination?
- A1. The 663 ppm of chromium was found out to be a typing error. It should be 66.3 ppm of total chromium. This will be corrected in the ROD. The surface water sample refers to the standing water sampled in the waste disposal area (drainage ditch area). The surface water sample does not refer to sampling at the intermittent stream. Only sediment samples (three) were sampled in the intermittent stream as shown in Figure 2 of the PRAP. The Lozier Architects sampled one soil sample and one surface water/sediment sample from the waste disposal area which showed chromium contamination of 596 ppm and 66.3 respectively. Other samples analyzed from the locations represented as a square in Figure 2 of the PRAP came out clean. The surface water samples collected and analyzed from the intermittent stream by Blasland and Bouck Engineers showed no contamination. No remediation is required for surface water because contamination was not detected.
- Q2. Please refer to Page 7 of the PRAP, off-site treatment at POTW: The POTW is operated by the Town of Webster and not the Monroe County.
- A2. This will be corrected in the ROD.
- Q3. What is the depth of on-site monitoring wells?
- A3. Ten to twelve feet, screened in the bedrock.
- Q4. Did you install wells deep enough to determine the contamination in the bedrock region?
- A4. Yes. The site has only a small single source area and not a multiple source area contributing contamination to groundwater. It can be readily assumed that the contamination would have migrated from the source area only to a minimum distance vertically and horizontally. This is supported by the fact that the site has only a bedrock aquifer which is less permeable than an overburden aquifer. This is because of the tighter formation of the bedrock aquifer. Once the contaminated soil is removed from the source area, the localized contamination in the bedrock aquifer is expected to decrease to non-detect levels by natural attenuation.
- Q5. What is the direction of the groundwater flow at the site?
- A5. To the north.



Q6. If the groundwater flows to the north, why were wells placed in the south and east direction?

A6. When an investigation is initiated on a site, wells will be placed in locations where disposal activities have occurred. From historical information and site geology, the direction of groundwater flow shall be assumed. One well will be placed in an upgradient location to assess the background information. At R.D. Specialties Site a well to the the south of the manufacturing facility was installed for this reason. To characterize the site completely, wells in the direction of groundwater flow and wells in other directions are placed. Because of the characteristics of contaminants present at the site and because of the nature of geological conditions existing at the site, the contamination could have migrated in the direction other than the groundwater flow. To verify this, wells were placed at the site to the east of the facility.

Q7. Did you take any split spoon samples during the installation of monitoring wells?

A7. Yes.

Q8. Did you find any volatile organic compounds in the soil samples?

A8. No.

Q9. Did the manufacturing process at R.D. Specialties use any volatile organic compounds?

A9. If volatiles were used it was not extensive. All the soil and groundwater samples were analyzed for volatile organic compounds. The analyses did not detect any volatile organic compounds in soil and groundwater samples.

Q10. What is the health problem with chromium?

A10. The effects of exposure to any chemical substance depend primarily on the amount of chemicals to which the individual is exposed and the frequency and length of each exposure. Exposure to hexavalent chromium may result in ulcers of the skin, irritation of the nasal mucosa and gastrinintestinal tract, and adverse effects in the kidney and liver. Hexavalent chromium should also be regarded as a probable cancer-causing substance in humans exposed by inhalation. A section of the Toxicological Profile for Chromium that was prepared for the Agency for Toxic Substances and Disease Registry of the United States Public Health Service is attached. It provides useful information about sources of chromium, potential exposure routes and levels of exposure that may result in an increased risk of adverse health effects.

Q11. I have a well two (2) miles northeast of the site. Two to three years from now, will the site contamination reach this well?

A11. From the groundwater sampling results it is evident that the contamination in groundwater is contained within the site. The farthest wells RD-4 and RD-7 did not show contamination. After the excavation of contaminated soil at the site, all the wells will be periodically monitored. If contamination is detected at RD-4/RD-7 in any of the sampling events, the final remediation will be re-evaluated and a proper treatment of groundwater shall be implemented. It is believed that by removing the source of contamination (excavation of contaminated soil) the groundwater contamination will decrease over time by natural attenuation.

Q12. What is the groundwater movement at the site?

A12. Based on a calculated hydraulic gradient of  $.01$  foot/foot, hydraulic conductivity of bedrock ranging from  $1.3 \times 10^{-4}$  to  $4.9 \times 10^{-4}$  cm/sec and an effective porosity of 0.2 the flow velocities of groundwater at the site were found to vary from 7 feet/year to 25 feet/year. The groundwater flow is to the north of the site based on the water level measurements taken on two occasions.

Q13. Are the placing of the monitoring wells correct and justified?

A13. Yes, the locations of the wells are justified. For long-term monitoring, a well may be placed in the northwest direction to check whether the contamination detected in Well No. RD-5 is moving in that direction.

Q14. Are there any other hazardous waste sites in this area?

A14. Yes. The seven inactive hazardous waste sites located in the Town of Webster and listed in the NYSDEC registry are:

1. R.D. Specialties
2. Dewitt Road Landfill
3. Xerox Inactive Landfill
4. Xerox Salt Road Complex
5. Xerox Building No. 209
6. Xerox Building No. 201
7. Xerox - Nursery Area

Sites 1, 2 and 3 are handled by the Division of Hazardous Waste Remediation of the NYSDEC under the Superfund laws. Sites 4, 5, 6 and 7 are handled by the Division of Hazardous Substances Regulation of the NYSDEC under the Resource Conservation and Recovery Act.

Q15. If contaminated groundwater is trucked to local POTW for treatment and disposal, then the POTW has to obtain a Treatment, Storage and Disposal Facility (TSDF) license. Is that correct?

- A15. Yes, only if the groundwater contamination is caused by the disposal of a listed hazardous waste. On the other hand, if the groundwater is pumped from the site and discharged to a sanitary sewer, then the groundwater discharged should meet the sewer discharge limitations of the POTW such as volume and concentrations of various chemicals.
- Q16. Please refer to Table 7 in the PRAP. Why the second round of sampling did not include sampling the groundwater at RD-4, 6 and 7 and surface water sampling at SW-1 and SW-2?
- A16. During the first round of sampling the NYSDEC split all the groundwater samples from the consultants. The results of the analyses performed by two different laboratories were similar. So, the results obtained were taken as correct and true. Also because of the chromium concentrations detected at these points were so low, it was decided that these points are relatively clean and need not be sampled again. But during the long-term groundwater monitoring which will begin after the implementation of final remediation all the wells will be sampled and analyzed.
- Q17. How are costs for conducting these studies at the site handled? Were there any penalties or fines imposed against the company?
- A17. In this instance, there were no penalties. The owner of the company voluntarily disclosed the facts to the NYSDEC and agreed to conduct an RI/FS at the site. The NYSDEC entered into an "Order on Consent" with the owner of the site for this study. The owner funded the proceedings of this investigation and paid the administrative costs incurred by the NYSDEC. The owner will provide funds to implement the final remediation at the site and for long-term monitoring.
- Q18. Was there any modelling done at the site to determine that the chromium contamination in groundwater is not moving off-site?
- A18. No. Basically, the only aquifer existing at the site is the bedrock aquifer. This aquifer is not a rich water-bearing aquifer to conduct a pump test which can be utilized later to develop a groundwater model. The problem at the site is simple and clear. Chromium is the only contamination at the site in soil and groundwater posing hazard to public health and the environment. The single source of contamination at the site is small in volume and confined to one area at the site. Based on the findings that the bedrock aquifer is not very permeable and the characteristics of chromium adhering to rock and solid particles it can be readily assessed that the groundwater contamination has not moved considerably. This is confirmed with the results of the chemical analyses of groundwater samples.

## 1. PUBLIC HEALTH STATEMENT

### 1.1 WHAT IS CHROMIUM?

Chromium is a naturally occurring element that is found in soil and in volcanic dust and gases. It is found in the environment in three major states: chromium(0), chromium(III), and chromium(VI). Chromium (III) occurs naturally in the environment, while chromium(VI) and chromium(0) are generally produced by industrial processes. The metal [chromium(0)] is a steel-gray solid with a high melting point. Chromium is used mainly for making steel and other alloys. In the form of the mineral chromite, it is used by the refractory industry to make bricks for metallurgical furnaces. Chromium compounds produced by the chemical industry are used for chrome plating, the manufacture of pigments, leather tanning, wood treatment, and water treatment.

### 1.2 HOW MIGHT I BE EXPOSED TO CHROMIUM?

For most persons, exposure to small amounts of chromium results from breathing air and ingesting drinking water and food containing chromium. Chromium has been found in at least 386 of 1,177 hazardous waste sites on the National Priorities List (NPL). Much higher exposure to chromium occurs to people working in certain chromium industries (occupational exposure) and to people who smoke cigarettes. The two largest sources of chromium emission in the atmosphere are from the chemical manufacturing industry and combustion of natural gas, oil, and coal. Other sources of chromium exposure are as follows:

- cement-producing plants, since cement contains chromium;
- the wearing down of asbestos brake linings from automobiles or similar sources of wind-carried asbestos, since asbestos contains chromium;
- incineration of municipal refuse and sewage sludge;
- exhaust emission from catalytic converters in automobiles;
- emissions from air conditioning cooling towers that use chromium compounds as rust inhibitors;
- wastewaters from electroplating, leather tanning, and textile industries when discharged into lakes and rivers; and
- solid wastes from the manufacture of chromium compounds, or ashes from municipal incineration, when disposed of improperly in landfill sites.

## 2 Section 1

Some consumer products that contain small amounts of chromium are:

- some inks, paints, and paper;
- some rubber and composition floor coverings;
- some leather materials;
- magnetic tapes;
- stainless steel and a few other metal alloys; and
- some toner powders used in copying machines.

Occupational sources of chromium exposure mainly occur in industries that produce the following:

- stainless steel products (from welding),
- chromates (chemicals made from chromium and used in chemical industries),
- chrome plated products,
- ferrochrome alloys,
- chrome pigments, and
- leather (from tanning).

Examples of additional occupations that have potential for chromium exposure include:

- painters
- workers involved in the maintenance and servicing of copying machines and in the disposal of some toner powders from copying machines
- battery makers,
- candle makers,
- dye makers,
- printers, and
- rubber makers.

### 1.3 HOW DOES CHROMIUM GET INTO MY BODY?

- Because small amounts of chromium occur in many foods, most chromium enters the body from dietary intake.
- Some chromium exposure occurs from breathing air and drinking water, but exposure from these sources is normally small compared to intake from food. However, exposure from breathing chromium may increase for people living near industrial sites where chromate is produced or used, and exposure from drinking water may increase due to passage of corrosive water through steel alloy pipes or plumbing containing chromium.

#### 1.4 HOW DOES CHROMIUM AFFECT MY HEALTH?

Chromium is considered to be an essential nutrient that helps to maintain normal metabolism of glucose, cholesterol, and fat in humans. Signs of chromium deficiency in humans include weight loss and impairment of the body's ability to remove glucose from the blood, as measured by the glucose tolerance test. The minimum human daily requirement of chromium for optimal health is not known, but a daily ingestion of 50-200 micrograms ( $\mu\text{g}$ ) per day (0.0007-0.003 milligram of chromium per kilogram of body weight per day) has been estimated to be safe and adequate. Brewer's yeast and fresh foods are good sources of chromium. Individuals eating diets containing large amounts of highly processed foods, especially white bread and refined sugar, may consume less than the suggested dietary level of chromium. The long-term effects of eating diets low in chromium are difficult to evaluate.

There are three major forms of chromium, which differ in their effects on health. One major form, hexavalent chromium [chromium(VI)], is irritating, and short-term high-level exposure can result in adverse effects at the site of contact, such as ulcers of the skin, irritation of the nasal mucosa and perforation of the nasal septum, and irritation of the gastrointestinal tract. Chromium(VI) may also cause adverse effects in the kidney and liver. The second major form of chromium, trivalent chromium [chromium(III)], does not result in these effects and is the form that is thought to be an essential food nutrient when ingested in small amounts, although very large doses may be harmful. Chromium in food is mostly trivalent. The third major form is metallic chromium [chromium(0)]. Exposure to chromium(0) is less common and is not well characterized in terms of levels of exposure or potential health effects.

Long-term exposure of workers to airborne levels of chromium higher than those in the natural environment has been associated with lung cancer. Lung cancer may occur long after exposure to chromium has ended. Although it is not clear which form of chromium is responsible for this effect in workers, only compounds of chromium(VI) have been found to cause cancer in animal studies. Based on evidence in humans and animals, compounds of chromium(VI) should be regarded as probable cancer-causing substances in humans exposed by inhalation. Evidence for other chromium compounds is inconclusive. Inhalation exposure to chromium may result in additional adverse effects on the respiratory system and may affect the immune system. Whether the effects on the immune system seen in experiments with animals would change a person's resistance to disease is not known.

Long-term studies in which animals were exposed to low levels of chromium compounds [particularly chromium(III) compounds] in food or water have not resulted in harmful health effects.

#### 1.5 IS THERE A MEDICAL TEST TO DETERMINE IF I HAVE BEEN EXPOSED TO CHROMIUM?

Chromium (III and VI) can be measured in the hair, urine, serum, and red blood cells, but, because chromium(III) is normally present at

low levels in these tissues and fluids, measurements for chromium are not very useful for determining slight elevations in chromium exposure over the low levels normally present in the environment. With relatively high exposure levels (usually occupational), chromium levels in the urine and red blood cells provide indications of exposure to compounds of hexavalent chromium but not trivalent chromium compounds.

#### 1.6 WHAT LEVELS OF EXPOSURE HAVE RESULTED IN HARMFUL HEALTH EFFECTS?

Figures 1.1, 1.2, and 1.3 show the relationship between exposure to chromium and known health effects. In the first set of graphs, labeled "Health effects from breathing chromium," exposure is measured in milligrams of chromium per cubic meter of air ( $\text{mg}/\text{m}^3$ ). In the second and third sets of graphs, the same relationship is represented for the known "Health effects from ingesting chromium" and "Health effects from skin contact with chromium." Exposures are measured in milligrams of chromium per kilogram of body weight per day ( $\text{mg}/\text{kg}/\text{day}$ ).

In all graphs, effects in animals are shown on the left side, effects in humans on the right. The first column, called short-term, represents health effects from exposure lasting for 14 days or less. The second column, long-term, represents health effects for exposures lasting more than 14 days. The levels marked on the graphs as anticipated to be associated with minimal risk for health effects other than cancer are based on information that is currently available, but some uncertainty still exists. Based on data from humans exposed to hexavalent chromium compounds at work, estimates by EPA (1984a) indicate lifetime exposure to 1 microgram chromium(VI) per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ) would result in 120 or 120,000 additional cases of cancer in a population of 10,000 or 10,000,000 people, respectively. It should be noted that these risk values are plausible upper-limit estimates. Actual risk levels are unlikely to be higher and may be lower.

Figure 1.2 represents the known health effects from eating or drinking foods containing chromium. Exposure is measured in milligrams of chromium per kilogram of body weight per day. These units,  $\text{mg}/\text{kg}/\text{day}$ , are common units for expressing this kind of exposure. As indicated on the short-term graph, a single dose of a chromium(VI) compound is more toxic (causes death at a lower exposure level) than a single dose of a chromium(III) compound. Long-term exposure of animals to chromium compounds [particularly chromium(III) compounds] in the drinking water or in the diet has not resulted in any adverse effects. The chromium doses used in the long-term experiments with animals are much higher than chromium levels considered safe and adequate (see Fig. 1.2) to prevent chromium deficiency in humans.

Figure 1.3 represents the known health effects from absorbing chromium through the skin. As indicated in the figure, not much information on skin absorption is available. The most common effect of skin exposure to chromium is skin allergy in sensitive individuals. The exposures that result in this effect have not been adequately measured.

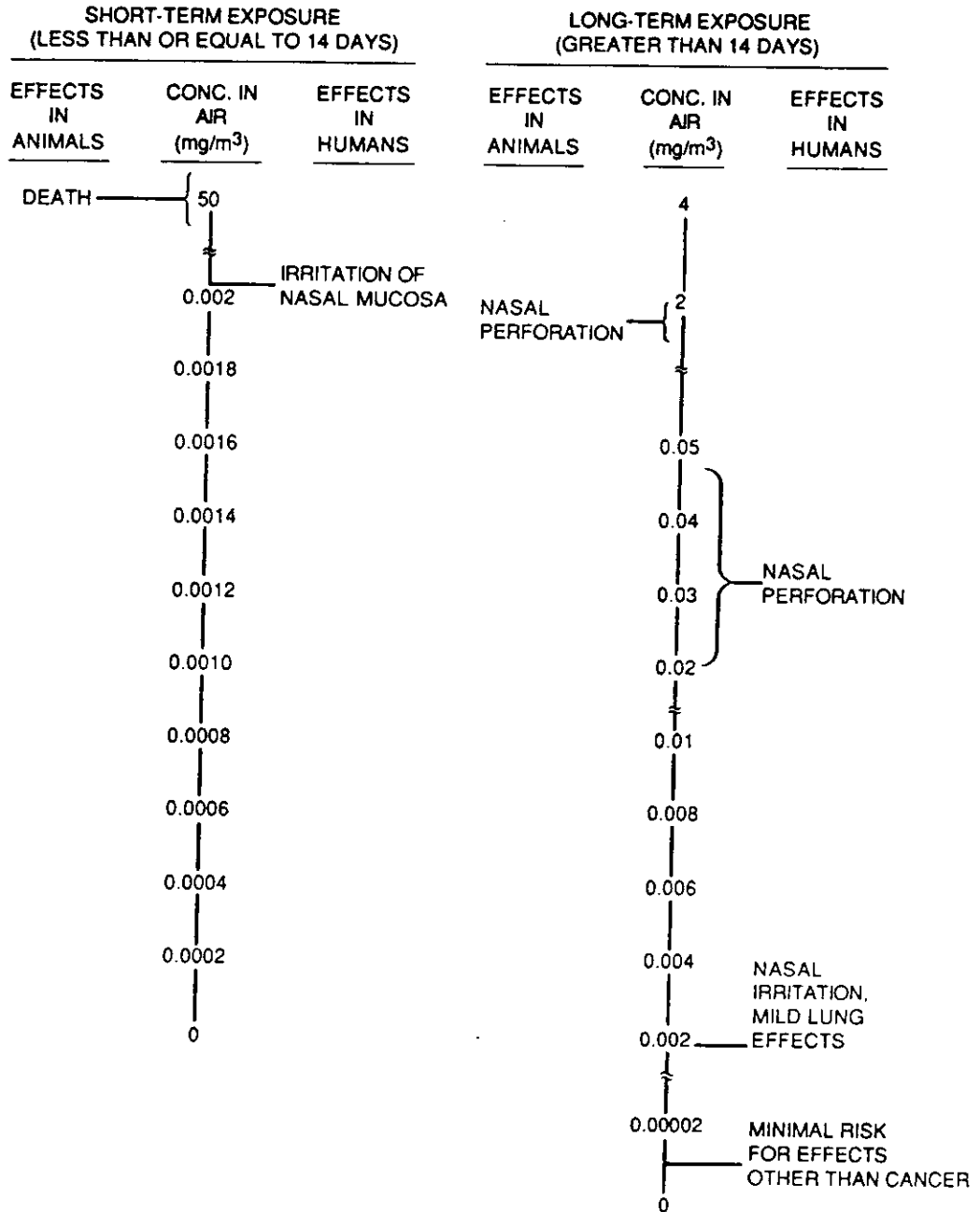


Fig. 1.1. Health effects from breathing chromium [primarily chromium(VI)].



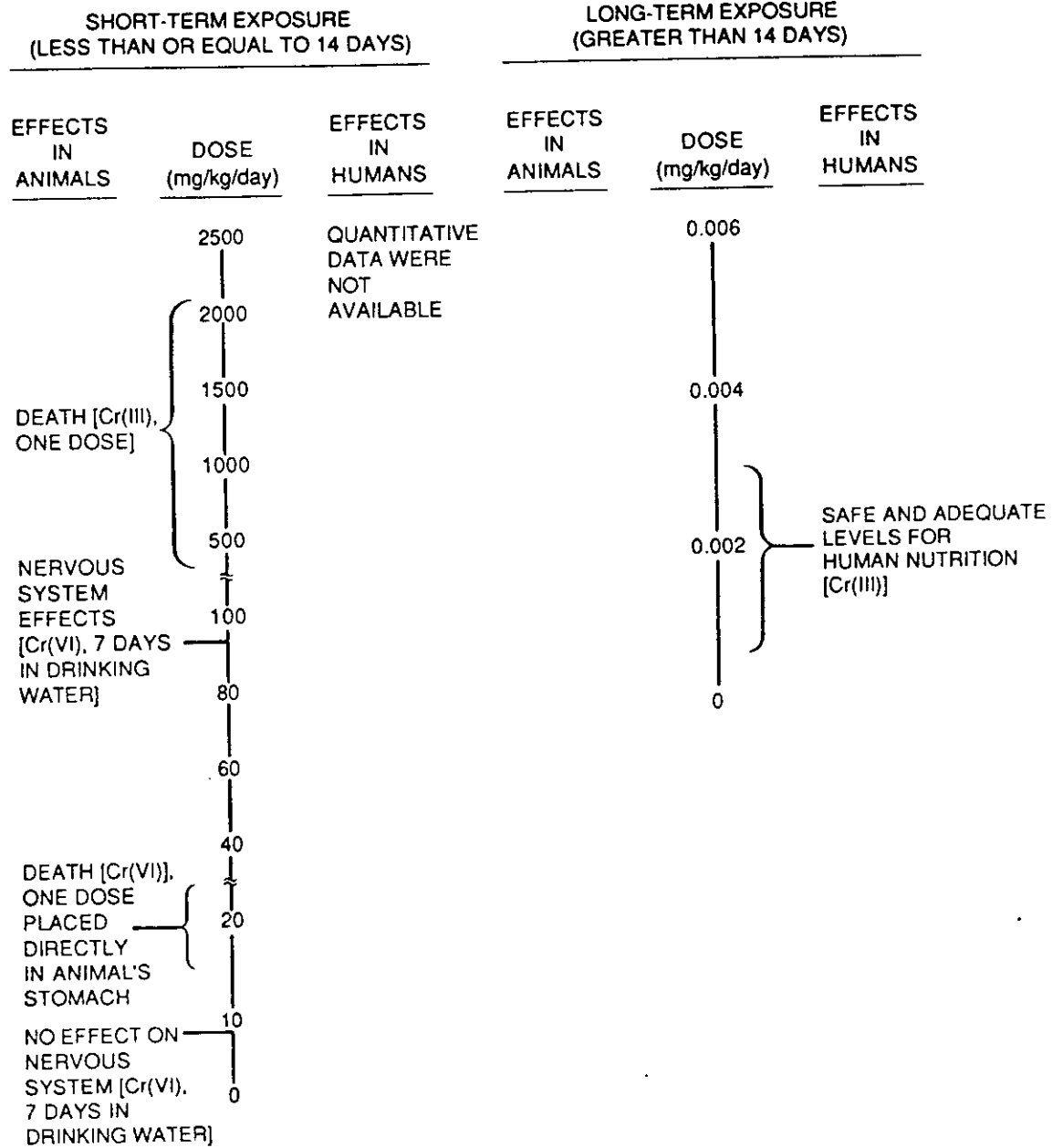


Fig. 1.2. Health effects from ingesting chromium [primarily chromium(III) and chromium(VI)].

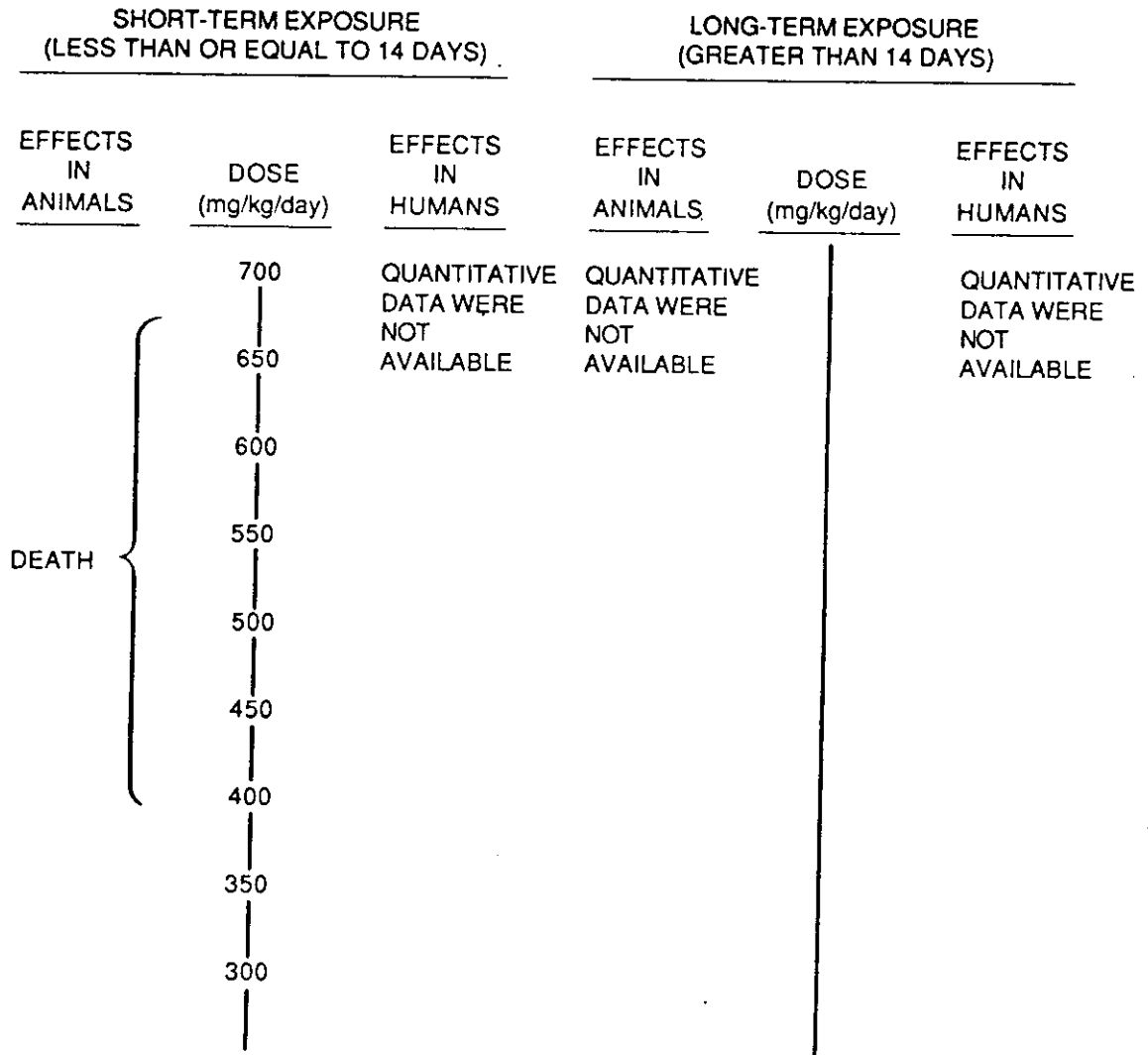


Fig. 1.3. Health effects from skin contact with chromium [primarily chromium(VI)].

**1.7 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?**

The current national interim primary drinking water regulation for hexavalent chromium proposed by the U.S. Environmental Protection Agency (EPA) is 0.05 milligram per liter (mg/L). The EPA advises that for exposure via drinking water, the following concentrations of hexavalent chromium are levels at which adverse effects would not be anticipated to occur: 1.4 mg chromium(VI) per liter of water for 10 days for exposure of children, 0.24 mg chromium(VI) per liter of water for longer-term exposure for children, 0.84 mg chromium(VI) per liter of water for longer-term exposure for adults, and 0.120 mg per liter of water for lifetime exposure for adults.

Chromium levels in the workplace are regulated by the Occupational Safety and Health Administration (OSHA). The occupational exposure limits for an 8-hour workday, 40-hour workweek are 0.5 mg/m<sup>3</sup> chromium for soluble chromic [chromium(III)] or chromous [chromium(II)] salts, 1 mg/m<sup>3</sup> chromium as insoluble salts or chromium metal, and 0.1 mg/m<sup>3</sup> as a ceiling for chromic acid [chromium(VI)] and chromates [chromium(VI)].

The National Institute for Occupational Safety and Health (NIOSH) recommends an exposure limit of 0.05 mg/m<sup>3</sup> chromic acid for an 8-hour workday, 40-hour workweek. Chromic acid concentrations should not exceed 0.2 mg/m<sup>3</sup> in any 15-minute period. NIOSH recommends an exposure limit of 25 µg/m<sup>3</sup> chromium(VI) for chromium(VI) compounds that NIOSH considers to be noncarcinogenic (chromates and dichromates of hydrogen, lithium, sodium, potassium, rubidium, cesium, and ammonium and chromic acid anhydride) for a 10-hour workday, 40-hour workweek. During any 15-minute period, NIOSH recommends that the occupational exposure level to chromium(VI) from the noncarcinogenic compounds should not exceed 50 µg/m<sup>3</sup>. NIOSH also recommends that carcinogenic chromium(VI) compounds [any and all chromium(VI) materials not included in the noncarcinogenic group above] not exceed 1 µg/m<sup>3</sup> chromium(VI).

Bibliography  
Administrative Record  
for the  
Remedial Program

**RD SPECIALTIES SITE**

Site No. 8-28-062

Prepared by: NYSDEC

1. Site Investigation at RD Specialties -  
Lozier Architects/Engineers - October 1985
2. Remedial Investigation and Risk Assessment -  
Blasland & Bouck Engineers, P.C. - November 1989
3. Interim Report, Engineering Feasibility Study -  
Blasland & Bouck Engineers, P.C. - May 1990
4. Feasibility Study (Two Volumes) -  
Blasland & Bouck Engineers, P.C. - August 1990
5. Letter to Tyler Gass, Blasland & Bouck Engineers  
from Vivek Nattanmai, NYSDEC - December 27, 1989
6. Letter to Tyler Gass, Blasland & Bouck Engineers  
from Vivek Nattanmai, NYSDEC - January 11, 1990
7. Letter to Edward R. Lynch, Blasland & Bouck Engineers  
from Vivek Nattanmai, NYSDEC - May 10, 1990
8. Letter to Vivek Nattanmai, NYSDEC from  
Charles J. Amento, NYSDOH - August 22, 1990
9. Letter to Edward Belmore, NYSDEC from  
Ronald Tramontano, NYSDOH - February 13, 1991