Site Review And Update

SHIELD ALLOY CORPORATION

NEWFIELD, GLOUCESTER COUNTY, NEW JERSEY

CERCLIS NO. NJD002365930

SEPTEMBER 28, 1992

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Site Review and Update: A Note of Explanation

The purpose of the Site Review and Update is to discuss the current status of a hazardous waste site and to identify future ATSDR activities planned for the site. The SRU is generally reserved to update activities for those sites for which public health assessments have been previously prepared (it is not intended to be an addendum to a public health assessment). The SRU, in conjunction with the ATSDR Site Ranking Scheme, will be used to determine relative priorities for future ATSDR public health actions.

SITE REVIEW AND UPDATE

SHIELD ALLOY CORPORATION

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CERCLIS NO. NJD002365930

Prepared by

Remedial Programs Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

SUMMARY OF BACKGROUND AND HISTORY

The Shieldalloy Metallurgical Corporation (SMC) site is an operational manufacturing facility processing ores and minerals to produce primary metals, specialty metals, and ferroalloys. The SMC manufacturing facility consists of 60 acres in Newfield, Gloucester County, New Jersey. SMC also owns 7.5 acres of farmland approximately 2,000 feet southwest of the main facility in Vineland, Cumberland County, New Jersey. Figure 1 is a location map showing the topographic features of the site and the nearby surrounding area.

The SMC manufacturing (Newfield) facility is bounded to the north and west by the Conrail railroad line. To the north, east, and west of the site are woods, residential homes, and small businesses. Hudson Branch, a tributary of Burnt Mill Branch, flows along the southern portion of the manufacturing facility and through the southeast portion of the 7.5 acres of farmland in Cumberland County. Most of the Newfield facility is enclosed by a 10-ft high steel-wire fence. A map showing site boundaries and features described above is presented in Figure 2.

SMC (formerly known as Shieldalloy Corporation) has been operating at the Newfield, New Jersey, facility since 1955. Past production processes have included chromium metal and chromium oxide, vanadium pentoxide and ferrovanadium, uranium oxide, thorium oxide, ferrocolumbium, and columbium nickel production. From 1965 to 1967, SMC operated a titanium metal degreasing operation. Current (1991) production processes used by SMC include aluminothermic and reduction smelting of ores, which produce purified metal, slags, and various other by-products, co-products, and other materials. SMC products include aluminum master alloys, ferroalloys, crushing and grinding metal powders, and pressed metal briquettes. Raw materials currently stored at the facility and used in the manufacturing process include pyrochlore, columbium, (niobium), ferroboron, aluminum oxide, titanium oxide, strontium oxide, zirconium oxide, dolomite lime, steel slag, lead, nickel, ferromanganese, silicon, fluoride salts, and oxides of vanadium. As a result of these current and past manufacturing processes, SMC has generated by-products that include slag, dross, baghouse dust, and wastewaters.

Raw materials used in the manufacturing process of ferrocolumbium contain radioactive isotopes of thorium and uranium. Because of these naturally occurring radioactive isotopes, parts of the SMC Newfield facility are subject to regulation and licensing by the Nuclear Regulatory Commission (NRC). Slags and dusts generated during the manufacturing process contain low levels of radioactive isotopes and are stored as permitted in the NRC (controlled) areas (Figure 2). The NRC license for the SMC

facility expired in July 1985. SMC submitted a license renewal in July 1985, which was subsequently revised in 1988. As part of the license renewal process, the NRC required SMC to conduct a survey and field investigation to determine if any radioactive isotopes have migrated from the NRC controlled areas. An initial survey indicated that radioactive isotopes have migrated from the NRC controlled areas into the sediments of Hudson Branch (Oak Ridge Associated Universities 1988). Survey results also showed concentrations of radium-226, thorium-232, and uranium-238 in two slag piles at levels of up to 1,450 picocuries per gram.

Environmental investigations at the SMC facility have been ongoing since 1972. The first investigation took place in 1972 in response to the detection of hexavalent chromium contamination in a newly installed Newfield municipal supply well (Weston 1972). A 1973 study of groundwater, surface water, and resistivity resulted in the construction of an SMC ion-exchange plant to treat chromium-contaminated groundwater (Woodward-Moorehouse 1974). In 1983, 12 wells were installed downgradient of the SMC Newfield facility to evaluate off-site groundwater quality and the extent of hexavalent chromium contamination. The U.S. Environmental Protection Agency (USEPA) proposed the SMC site for inclusion on the National Priorities List (NPL) in September 1983; it became final in September 1984.

In a 1988 report, Raviv and Associates described results of a 4-year study of the impact on groundwater from the SMC site and evaluated remedial alternatives for the facility by use of the U.S. Geological Survey (USGS) numerical model MODFLOW (McDonald and Harbaugh 1988). The report authors also proposed a pumping schedule to control the migration and spread of hexavalent chromium contamination.

In October 1988, New Jersey Department of Environmental Protection (NJDEP) and SMC entered into an administrative consent order that required SMC to (1) operate a pump and treat system that would control the migration of hexavalent chromium; (2) treat the chromium using ion-exchange technology; and (3) conduct a remedial investigation/feasibility study (RI/FS). The pump and treat system began operation in May 1989, the RI work plan was finalized in October 1990 (TRC 1990), and a draft RI report was released in July 1991 (TRC 1991).

The Agency for Toxic Substances and Disease Registry (ATSDR) prepared a preliminary health assessment in November 1988 for the SMC site (ATSDR 1988). Based on the information reviewed, ATSDR concluded that the site was a potential public health concern because of the risk to human health caused by possibility of exposure to hazardous substances via groundwater, surface water, soils, sludges, airborne particulate, and ingestion of contaminated

fish. The following recommendations were made in the preliminary health assessment: (1) collect additional demographic information to identify those affected by the contamination; (2) identify radioactive areas; (3) post site warning signs as a public health preventative measure; and (4) provide additional environmental characterization of the site and of impacted off-site areas during the RI/FS investigation to address the environmental and human exposure pathways.

During the remedial investigation environmental media were analyzed for volatile organic compounds, inorganic compounds, and pesticides (TRC 1991). Samples were collected in groundwater, surface water, soil, and air. Examples of the distribution of trichloroethylene (TCE) and hexavalent chromium for the shallow and deep aquifers of the Cohansey Sand are given in Figures 3A, 3B, 4A, 4B, 5A, and 5B. The maximum contaminant levels found in the different environmental media are given in Appendix I.

ATSDR staff have surveyed the New Jersey Department of Health (NJDOH), the Gloucester County Health Department (GCHD), the Cumberland County Health Department (CCHD), and the Vineland Health Department (VHD) to identify records pertaining to community health concerns. Records in the GCHD indicate that in 1990 Newfield residents expressed health concerns about the effects on air quality caused by radioactive ores, odors, and dust from the storage piles at the SMC site. Additionally, the GCHD records show that a resident of Newfield, living close to the SMC site, had expressed concern about the increase in the number of cancer cases for the area (Schneider 1992). The VHD reported that in 1989 citizens expressed concern that contaminated groundwater was the cause of unspecified health problems.

CURRENT SITE CONDITIONS

Ms. Rosaline Dhara[1] and Mr. Jonathan Savrin with the Division of Occupational and Environmental Health, Environmental Health Section, NJDOH, visited the SMC site in Newfield on October 31, 1990. Representatives from the USEPA and the NJDEP and the Director of Environmental Services for the SMC plant were also present for the site visit. At the time of the visit, SMC employed approximately 250 people working on two shifts per day. During the visit the following conditions were observed:

- One guard was on duty for the entire site.

[1]Presently with the Community Health Branch, Division of Health Assessment and Consultation, ATSDR.

- The site was completely fenced, and the fence appeared to be in good condition with the exception of a cut in one part.

- Exposed drums were in various stages of deterioration.

- Uncovered piles of waste materials were in the back of the property.

- Groundwater beneath the site was being pumped, treated, and released to surface water.

- Titanium chips of varying sizes were scattered around the site.

- Off-site and to the south is a path leading to piles of waste slag that have been shown to be radiologically contaminated.

- An old thermal pond near the slag piles constitutes a physical hazard.

During the visit numerous manufacturing buildings, equipment, and treatment lagoons were inspected. In addition, exposed drums were observed in various stages of deterioration. All of the facilities and the drums pose potential physical hazards to trespassers at the site. Areas of dust inhalation and radiological concern, where protective equipment is needed, were not clearly marked. Of special interest at the site were the piles of waste materials near the back of the property. Waste materials included vanadium slag, columbium slag, and baghouse dust. A pile of chromium slag, previously at the site, had been removed. The piles of waste slag change in volume depending on SMC's operations and its ability to sell the slag. The baghouse dust slag is not recyclable and, therefore, continues to increase in volume. None of the slag piles were covered, and it was observed that the baghouse dust consisted of many fine particles that potentially could be resuspended. During the site visit, however, the amount of dust being resuspended did not appear to be significant. NJDEP representatives reported that, with the exception of the removed chromium slag pile, no waste piles have failed the extraction procedure-toxicity (EP-Tox) test, although not all of the waste piles have been tested. The slag in one of the on-site lagoons has exceeded the EP-Tox limit.

Groundwater beneath the site is being pumped from the Cohansey Sand, treated, and then released to surface water. Because of the severe chromium contamination, there is a well restriction area around the site and residents of the Newfield area are no longer on private wells.

South of the site is a path leading to several slag piles. Representatives from the NJDEP reported that these piles are radiologically contaminated.

On September 21, 1992 regional representatives from ATSDR accompanied by staff from the NJDOH made another site visit to the SMC facility in Newfield (Jones 1992). Site conditions were the same as previously reported. Also, it was noted that the groundwater treatment system was not operational and indications are that it is often not operating. It was observed that workers still come in contact with surface water, soils, and sludge, and that off-site contaminated sediments are still present. There are no signs indicating the presence of radioactivity of hazardous substances placed on the fence at the property boundary.

CURRENT ISSUES

Current issues pertaining to the site include the following:

(1) The remediation system continues to have performance problems. The system was originally designed to pump at a rate of 400 gallons per minute (gpm); currently, it is operating at only 200 gpm (Gaffigan 1992). This could lead to a further and more rapid migration of contaminants off-site, which could have an adverse effect on public health.

(2) The RI indicates migration of contaminants (TCE, total chromium, hexavalent chromium) in groundwater beyond the SMC property boundaries. The future extent of contamination, therefore, is a public health concern.

(3) Because Gloucester and Cumberland Counties depend 100 percent on groundwater for public and municipal water supplies, there is a public health concern that ineffective remediation of on-site contaminants could lead to potential contamination of public groundwater supplies.

(4) Planning documents for Cumberland County (Cumberland County Department of Planning and Development 1990) show that proposals for development indicate a potential for increase in construction of commercial and residential properties, with the city of Vineland leading all categories of potential growth. The increase in growth could lead to an increase in water use demand to serve future county growth. Increased withdrawals of groundwater could have a significant impact on the movement, direction, and spread of the area of contamination from the SMC site, and the effectiveness of the remediation system. This in turn could become a public health concern.

(5) The radioactive slag piles could pose a potential health concern if the SMC plant were to close and the slag piles are left unattended (Charp 1992).

(6) Analyses of airborne dust samples presented in the RI are of background pollution when the plant is not operating (e.g., on Sundays). It is anticipated that during plant operation pollution levels are higher. These higher levels could exceed certain health criteria, thereby presenting a possible health concern.

(7) In the past, citizens have indicated health concerns about air quality because of the radioactive ores, odors, and dust. Additionally, citizens have expressed concern about the increased number of cancer cases in an area close to the SMC (Newfield) site. Concerns have been raised about the contribution of groundwater pollution to undetermined health problems of the area. However, no records of current (1992) community health concerns were cited by any of the health departments contacted.

CONCLUSIONS

On the basis of available information, exposure to volatile organic compounds, inorganic compounds (heavy metals), including TCE, lead, total chromium, and hexavalent chromium at levels of public health concern, has occurred in the past through ingestion, dermal, or inhalation routes from well water, surface water, and ambient air. Since historical data pertaining to the duration and concentration of exposure are lacking, however, it currently is not possible to determine if this exposure constitutes a public health hazard without further evaluating the duration and concentration of this exposure.

The most recent data indicate on-site and off-site migration of TCE, total chromium, and hexavalent chromium. The remediation system that was designed to remove hexavalent chromium contamination from groundwater, however, has had continued performance problems owing to its current operating capacity of only 200 gpm (design operational capacity is 400 gpm). Therefore, future groundwater supplies could be affected.

Gloucester and Cumberland Counties rely 100 percent on groundwater. Increased commercial and residential development could require the installation of additional public water supply wells that tap the Cohansey Sand. These wells, although pumping uncontaminated groundwater, could alter the direction and magnitude of groundwater flow and contaminant migration in the vicinity of the SMC site, and therefore, significantly affect the efficiency and effectiveness of the designed remediation process. As a

consequence, this could lead to potential public health problems and risk to human health.

The site characterization data obtained during the RI process, as recommended in the preliminary health assessment (ATSDR 1988), provides additional support for the conclusion in the assessment that the site is a potential health concern because of the risk to human health caused by possible exposure to hazardous substances via environmental pathways of groundwater, surface water, soils, sludges, and airborne particulates. Exposure routes may include ingestion, inhalation, and dermal exposure.

RECOMMENDATIONS

Because of the remediation system's continued performance problems and the potential impact of contaminated environmental media on human health, a health consultation should be conducted during fiscal year 1993. This consultation should address issues such as the impact of contamination on the groundwater system and on the public's health under ideal remediation, ineffective remediation, and no remediation (system shutdown). The consultation should also address the issue of the potential extent and impact of groundwater contamination on the public's health. If these issues are to be successfully addressed during the consultation, sophisticated tools such as groundwater and contaminated transport modeling may need to be used.

Because of the need for further evaluation of the public health significance of past exposure to site-related contaminants, and the availability of significant data and information about the site (the RI), a public health assessment of the site should be conducted during fiscal year 1993.

Health Activities Recommendation Panel (HARP) Recommendation

The data and information developed in the Site Review and Update have been evaluated to determine if follow-up actions may be indicated. Further site evaluation is needed to determine public health actions.

DOCUMENTS REVIEWED

Documents reviewed by ATSDR for this summary are as follows:

Agency for Toxic Substances and Disease Registry. 1988. Preliminary health assessment, Shieldalloy Corporation, Gloucester County, New Jersey.

Charp, P.A. 1992. Written communication (June 16) to Morris L. Maslia, Agency for Toxic Substances and Disease Registry, regarding analysis of the Oak Ridge Associated Universities report "Radiological Survey of the Shieldalloy Corporation, Newfield, New Jersey."

Cumberland County Department of Planning and Development. 1990. Development review report. 16 pages.

Gaffigan, D.L. 1992. Written communication (May 28) to Morris L. Maslia, Agency for Toxic Substances and Disease Registry, regarding the Shieldalloy Metallurgical Corporation, Newfield, New Jersey.

Jones, S. 1992. Written communication (September 21) to Morris L. Maslia, Agency for Toxic Substances and Disease Registry, regarding site conditions at the Shieldalloy Metallurgical Corporation site in Newfield, New Jersey.

McDonald, M.G., Harbaugh, A.W. 1988. A modular three-dimensional finite-difference ground-water flow model. Techniques of water-resources investigations of the United States Geological Survey. Book 6, Chapter A1, 1988.

Oak Ridge Associated Universities. 1988. Radiological survey of the Shieldalloy Metallurgical Corporation Newfield, New Jersey facility.

Raviv, Dan and Associates. 1988. Evaluation of remediation alternatives - Shieldalloy Corporation - Newfield, New Jersey.

Schneider, D.C. 1992. Written communication (August 5) to Morris L. Maslia, Agency for Toxic Substances and Disease Registry, regarding health department files on community health concerns. Gloucester County Health Department, Woodbury, Gloucester County, New Jersey.

TRC Environmental Consultants, Inc. 1990. Remedial investigation work plan Shieldalloy Metallurgical Corporation - Newfield, New Jersey.

TRC Environmental Consultants, Inc. 1991. Remedial investigation technical report, draft final report, Shieldalloy Metallurgical

Corporation - Newfield, New Jersey.

Weston, Roy F., Inc. 1972. Hydrogeologic investigation of ground-water contamination for Shieldalloy Corporation.

Woodward-Moorehouse & Associates, Inc. 1974. Monitoring well program ground water contamination study 29 April - 14 June 1974 for Shieldalloy Corporation.

Preparer of the report:

M.L. Maslia, P.E., C.G.W.P.

LIST OF FIGURES

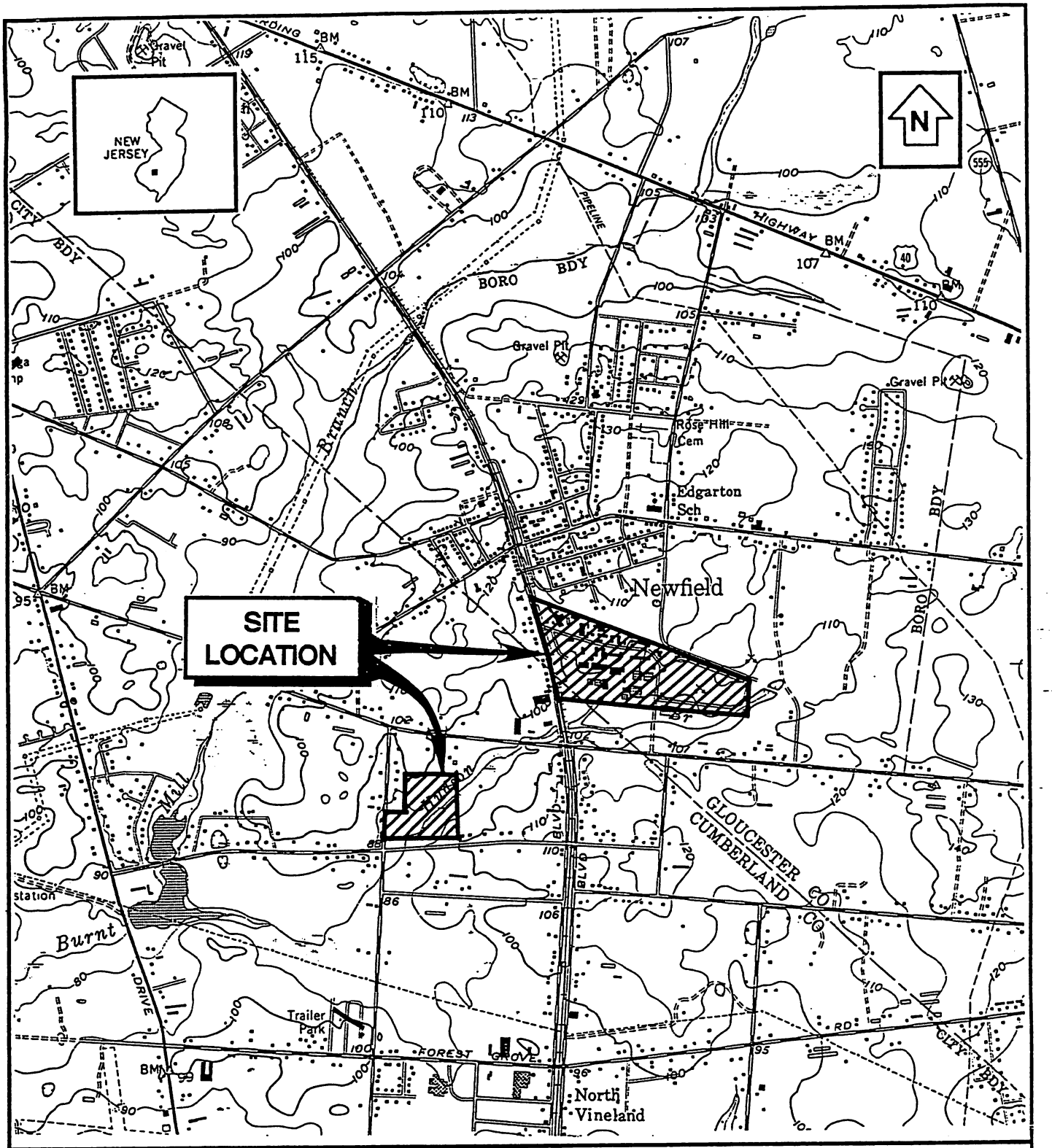
APPENDIX I

Examples of maximum contaminant levels found in groundwater of the Cohansey Sand during the December 1990 and the April 1991 sampling include but are not limited to 840 parts per billion (ppb) of TCE in the shallow aquifer (Figure 3A) and 430 ppb of TCE in the deep aquifer (Figure 3B); 20,800 and 108,000 ppb total chromium in the shallow (Figure 4A) and deep (Figure 4B) aquifers, respectively; 26,400 and 69,000 ppb hexavalent chromium in the shallow (Figure 5A) and deep (Figure 5B) aquifers, respectively; and 137 and 262 ppb lead in the shallow and deep aquifers, respectively. In addition, maximum concentrations for benzene, ethylbenzene, toluene, and xylene were found to be 65, 240, 2,000, and 810 ppb, respectively. Figures 3A and 3B show the distribution of TCE contamination in the shallow and deep aquifers, respectively, for April 1991. Figures 4A and 4B show the distribution of total chromium in the shallow and deep aquifers, respectively, for December 1990, and Figures 5A and 5B show the distribution of hexavalent chromium in the shallow and deep aquifers for the same period.

At surface water monitoring stations, maximum concentrations of the following constituents were: 468 ppb beryllium; 8,520 ppb total chromium; 618 ppb nickel; 151 ppb antimony; 1,240 ppb lead; and 116 ppb arsenic.

In soil, boring, and test pit samples, maximum concentrations for constituents were: 37 parts per million (ppm) 4,4-DDT; 60.1 ppm beryllium; 5,870 ppm total chromium; 201 ppm hexavalent chromium; 3,360 ppm nickel; 12,100 ppm vanadium; 760 ppm lead; and 1.9 ppm aroclor 1248.

Air samples were obtained to evaluate airborne releases (entrained dusts) associated with a by-product storage pile and on-site soils when the facility is nonoperational (e.g., on Sundays). These data probably reflect background pollution levels. Sample data indicated that hexavalent chromium frequently exceeded the ATSDR inhalation cancer risk evaluation guide (CREG), manganese exceeded the USEPA inhalation reference concentration (RfC), and nickel exceeded the USEPA intermediate minimal risk level (MRL).



0 2000 FT

SCALE

FROM NEWFIELD, NJ 7 1/2' USGS
TOPOGRAPHIC MAP, 1953
PHOTOREVISED 1986

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800 Connecticut Boulevard
East Hartford, CT 06108
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SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

FIGURE 1

SITE LOCATION MAP

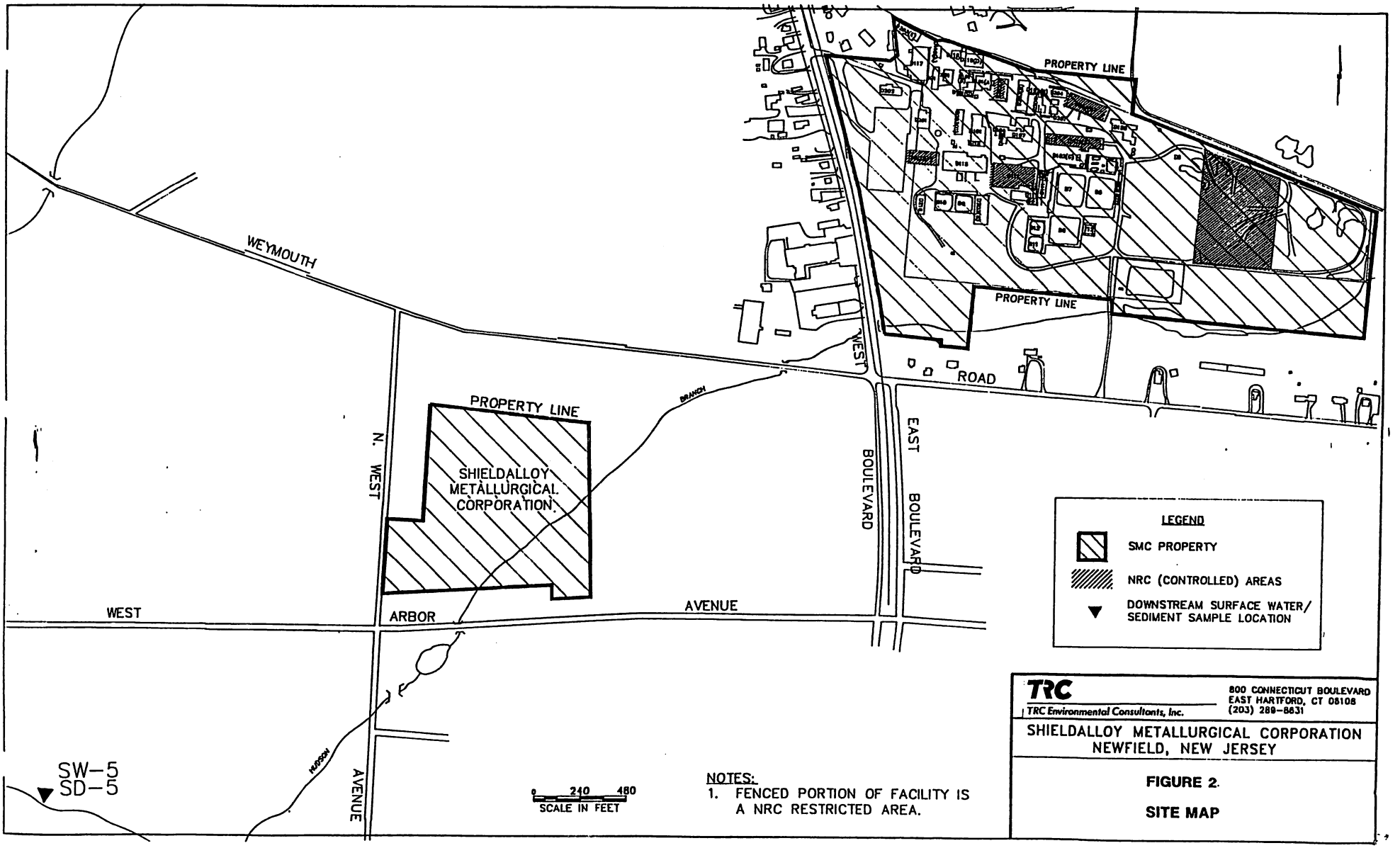
PROPERTY LINE
PROPERTY LINE
WEYMOUTH
WEST
ROAD
PROPERTY LINE
SHIELDALLOY METALLURGICAL CORPORATION
N. WEST
BOULEVARD
EAST BOULEVARD
WEST
ARBOR
AVENUE
AVENUE
SW-5
SD-5
0 240 480
SCALE IN FEET
LEGEND
SMC PROPERTY
NRC (CONTROLLED) AREAS
DOWNSTREAM SURFACE WATER/ SEDIMENT SAMPLE LOCATION
NOTES:
1. FENCED PORTION OF FACILITY IS A NRC RESTRICTED AREA.
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FIGURE 2.
SITE MAP

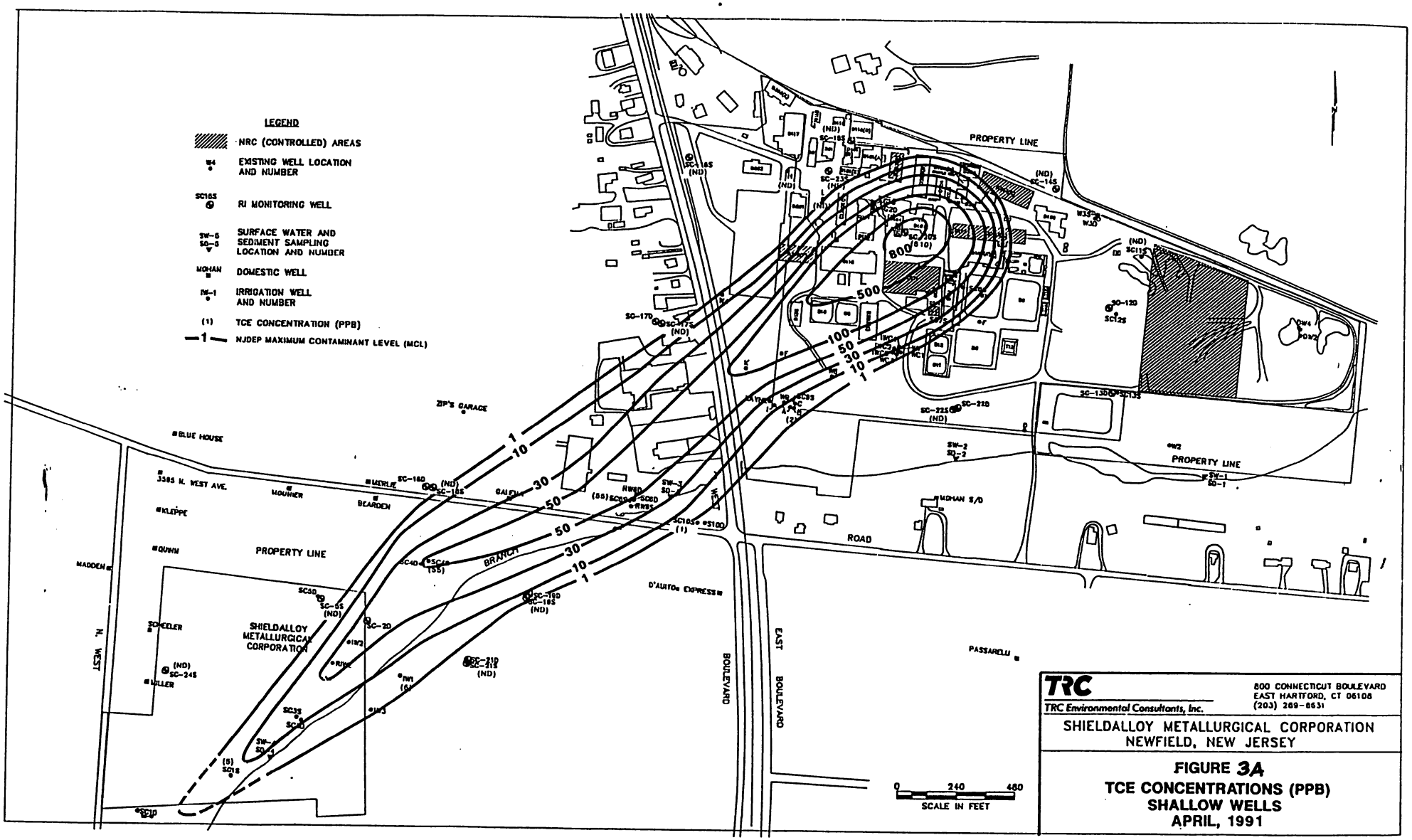

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FIGURE 3A
TCE CONCENTRATIONS (PPB)
SHALLOW WELLS
APRIL, 1991

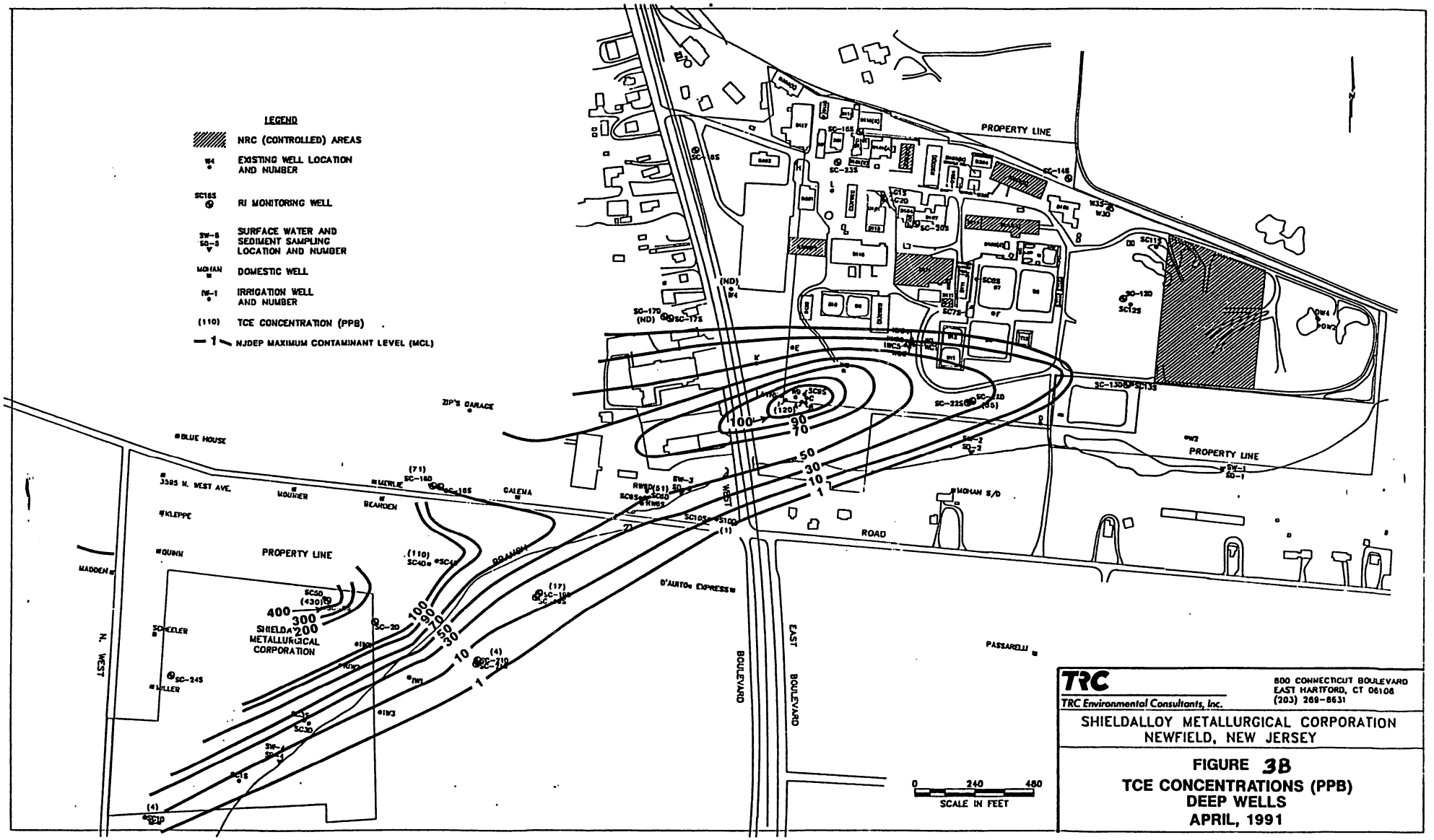

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FIGURE 3B
TCE CONCENTRATIONS (PPB)
DEEP WELLS
APRIL, 1991

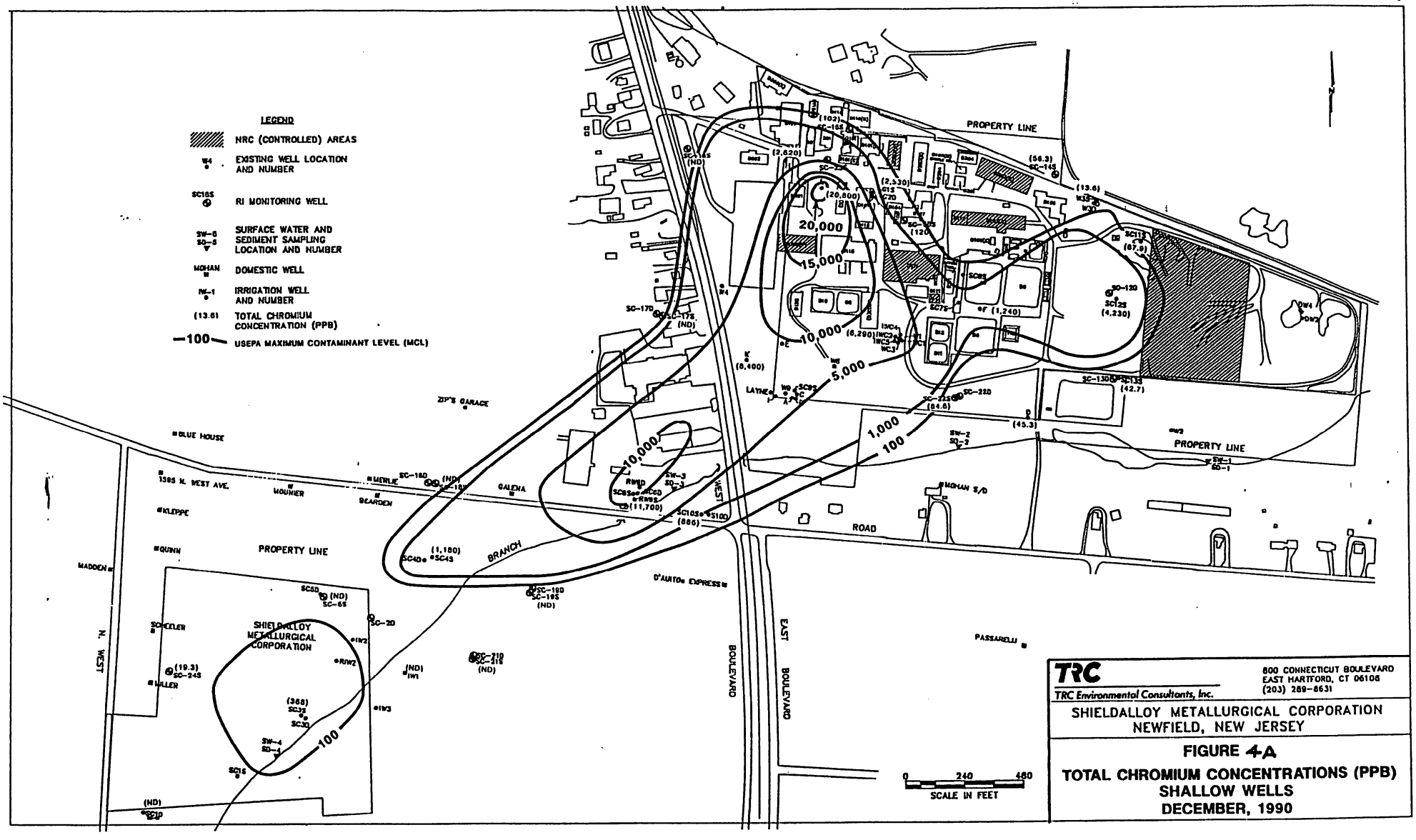

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FIGURE 4-A

TOTAL CHROMIUM CONCENTRATIONS (PPB)
SHALLOW WELLS
DECEMBER, 1990

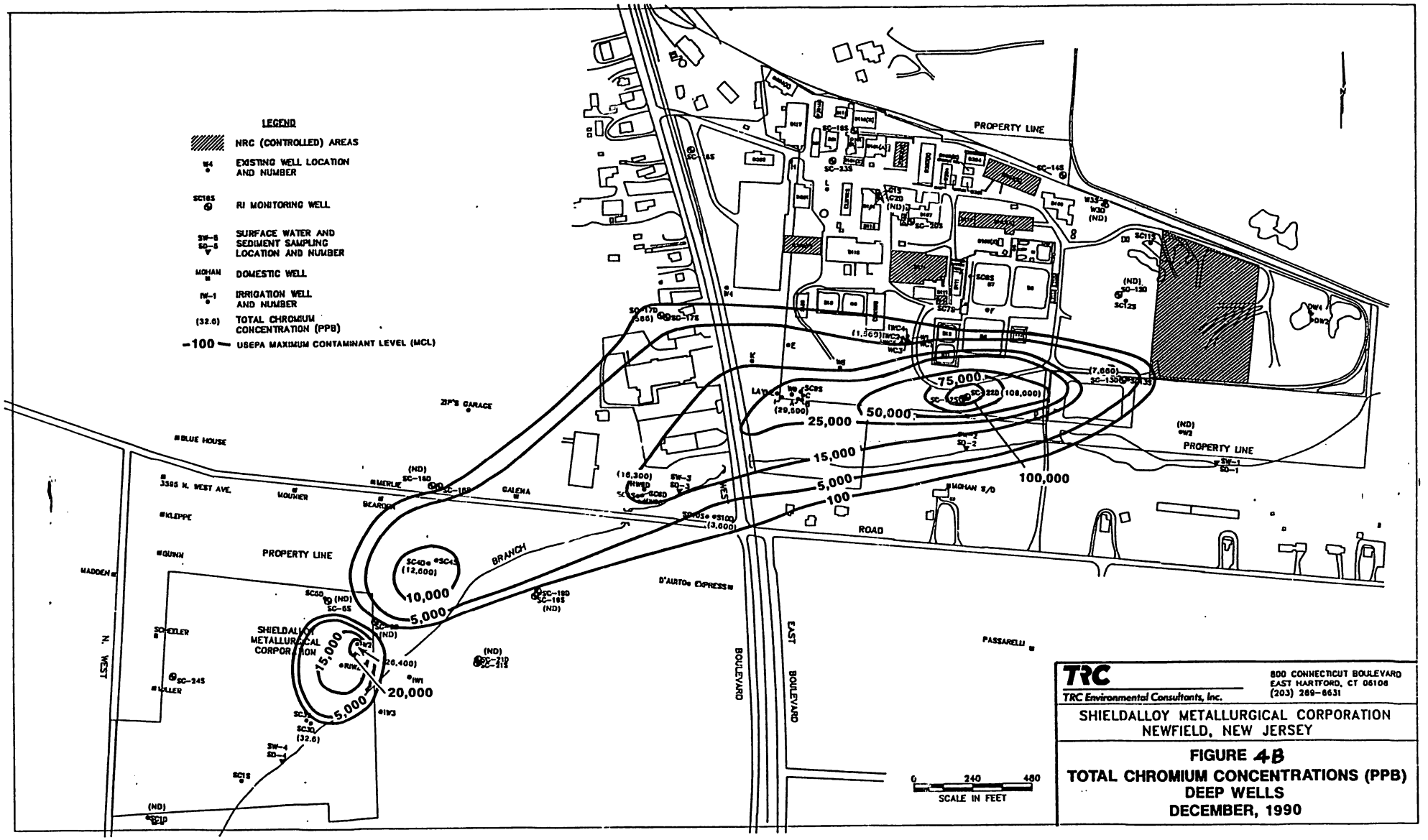

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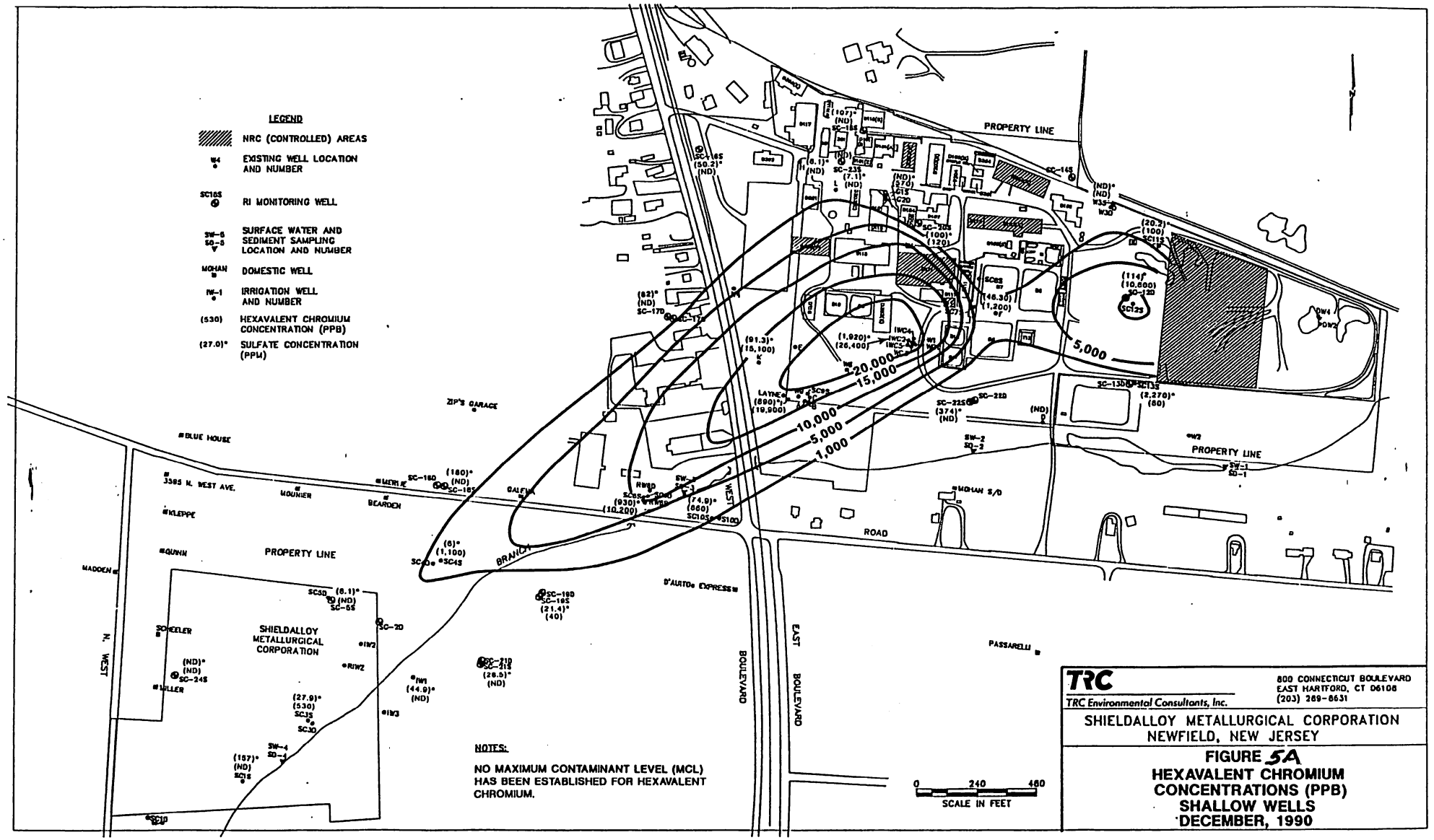
FIGURE 4B
TOTAL CHROMIUM CONCENTRATIONS (PPB)
DEEP WELLS
DECEMBER, 1990


LEGEND
NRC (CONTROLLED) AREAS
EXISTING WELL LOCATION AND NUMBER
RI MONITORING WELL
SURFACE WATER AND SEDIMENT SAMPLING LOCATION AND NUMBER
DOMESTIC WELL
IRRIGATION WELL AND NUMBER
HEXAVALENT CHROMIUM CONCENTRATION (PPB)
SULFATE CONCENTRATION (PPM)
PROPERTY LINE
SHIELDALLOY METALLURGICAL CORPORATION
ZIP'S GARAGE
BLUE HOUSE
3385 N. WEST AVE.
MOUNIER
MERLE
BEARDEN
KLEPPE
QUINN
MADDEN
SCHEELER
MILLER
GALFUN
BRANCH
WEST
ROAD
MOHAN S/D
D'AURIO EXPRESS
PASSARELLI
N. WEST
BOULEVARD
EAST BOULEVARD
5,000
10,000
15,000
20,000
NOTES:
NO MAXIMUM CONTAMINANT LEVEL (MCL) HAS BEEN ESTABLISHED FOR HEXAVALENT CHROMIUM.
0 240 480
SCALE IN FEET
TRC
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SHIELDALLOY METALLURGICAL CORPORATION
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FIGURE 5A
HEXAVALENT CHROMIUM CONCENTRATIONS (PPB)
SHALLOW WELLS
DECEMBER, 1990

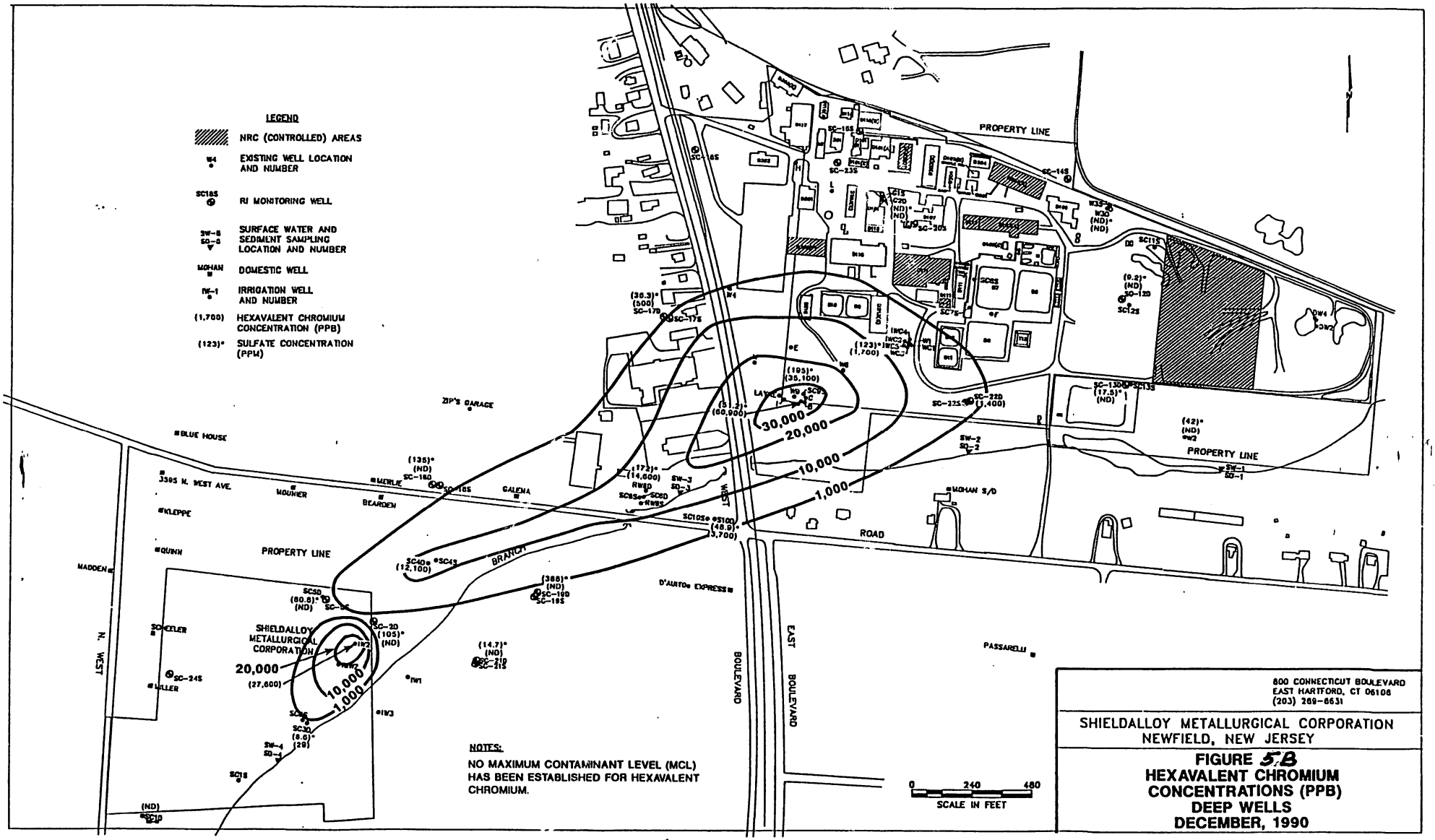
LEGEND
NRC (CONTROLLED) AREAS
EXISTING WELL LOCATION AND NUMBER
RI MONITORING WELL
SURFACE WATER AND SEDIMENT SAMPLING LOCATION AND NUMBER
DOMESTIC WELL
IRRIGATION WELL AND NUMBER
(1,700) HEXAVALENT CHROMIUM CONCENTRATION (PPB)
(123)* SULFATE CONCENTRATION (PPM)
PROPERTY LINE
SHIELDALLOY METALLURGICAL CORPORATION
BLUE HOUSE
ZIP'S GARAGE
3385 N. WEST AVE.
MOUNIER
MERLIE
BEARDEN
GALENA
KLEPPE
QUINN
MADDEN
SCHEELER
MILLER
N. WEST
WEST BRANCH
ROAD
D'ALATO EXPRESS
MOHAN S/D
BOULEVARD
EAST BOULEVARD
PASSARELLI
20,000
10,000
1,000
NOTES:
NO MAXIMUM CONTAMINANT LEVEL (MCL) HAS BEEN ESTABLISHED FOR HEXAVALENT CHROMIUM.
0 240 480
SCALE IN FEET
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FIGURE 5B
HEXAVALENT CHROMIUM CONCENTRATIONS (PPB)
DEEP WELLS
DECEMBER, 1990