PRELIMINARY Public Health Assessment for

ANACONDA ALUMINUM/MILGO ELECTRONICS
MIAMI, DADE COUNTY, FLORIDA
CERCLIS NO. FLD020536538
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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry

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Prepared by:

Florida Department of Health and Rehabilitative Services (HRS)
Under a cooperative agreement with:
Agency for Toxic Substances and Disease Registry

SUMMARY

The Expanded Site Investigation of the Anaconda Aluminum/Milgo Electronics site in northwest Miami, Florida, conducted by NUS Corporation for EPA, showed contamination of soil and ground water with metals. Chromium, cadmium, and lead were present in concentrations that could be a health hazard to humans, if exposure occurred. There are insufficient data to conclusively determine if and in what direction contaminated ground water has left the site. The heavy aluminum contamination of soil and ground water may provide a marker that could be used to monitor the movement of the contaminated plume off the site.

There are currently no completed pathways for exposure to human populations to the contaminated soil or ground water associated with this site. Human exposure to the hazardous metals in soil is not likely to occur, unless the disposal areas are disturbed by construction or remediation. Human exposure through the use of contaminated ground water is also not likely, since there are no private wells within 4 miles of the site and the site is outside the influence of the nearest municipal wells. There are not sufficient data to determine the extent, if any, of past exposure to ground water, which may have been contaminated. Based on available information, this site is an indeterminate public health hazard.

The data and information developed in the Anaconda Aluminum/Milgo Electronics Public Health Assessment has been evaluated for appropriate public health actions. There are no indications humans have been or are being exposed to on-site and/or off-site contaminants at levels of public health concern. Therefore, this site is not being considered for follow-up activities at this time.

BACKGROUND

A. SITE DESCRIPTION AND HISTORY

The Anaconda/Milgo site is composed of two dump areas that are located about 350 feet from each other on opposite sides of NW 76th Street, just west of NW 36th Avenue in Miami, Florida. Preliminary testing, conducted in 1985 by the Environmental Protection Agency's (EPA) Environmental Services Division as part of the Florida Prototype Rapid Sample Screening Project, showed the presence of heavy metal contamination at both locations (NUS, 1988). An Expanded Site Investigation was conducted for EPA by NUS Corporation in 1987 (NUS, 1988).

The on-site disposal of metal-containing liquid waste contaminated the Biscayne Aquifer. This aquifer is the primary source of drinking water for Florida south of southern Palm Beach County (NUS, 1988). This Preliminary Public Health Assessment is the first Agency for Toxic Substances and Disease Registry (ATSDR) document to address this National Priority List (NPL) site.

That portion of the site that was previously occupied by Anaconda Aluminum is currently owned by Dade Metal Corporation, Miami, Florida 33127 (Neville, 1990). Anaconda Aluminum operated at the address of 3610 NW 76th Street, Miami, Florida. The building at this location is currently occupied by King Metal Company and is not included in the NPL site. That area of the property previously used for waste dumping, which is located on the southwest corner of the intersection of NW 76th Street and NW 36th Avenue (Figure 1), is enclosed by an locked chain-link fence and has been paved. An unoccupied trailer is also on the site (Site Visit, 1990).

Anaconda Aluminum used acids and aluminum laden caustic base to produce a protective oxide film on aluminum surfaces from May 1957 to February 1983. Prior to June 1, 1967, chromic acid was one of the acids used in this process. The process water contained the ions of aluminum, sodium, sulfate, hydrogen, hydroxyl, and ammonia, in addition to the metal salts in dissolved and particulate forms. The waste treatment process neutralized the acid to precipitate the metal salts. The waste water was pumped into a series of interconnected baffled holding tanks. About every 48 hours, the liquid was transferred to a neutralization and gravity separation tank, where the pH was raised to pH 8-8.5 with caustic soda. The waste was allowed to stand for 12 to 24 hours while the metal salts precipitated. The clarified liquid was transferred to an unlined pit and allowed to percolate through two feet of sand and two feet of gravel into the Biscayne Aquifer. The disposal pit was originally 300 square feet, but was reduced to 63 square feet in 1978. The solid sludge that remained in the gravity separation tank was periodically transported by truck to the Dade County landfill at NW 215th Street and 47th Avenue (NUS, 1988).

That portion of the site that was occupied by Milgo Electronics is currently owned by Report Investment Corporation, (Neville, 1991). The building currently houses Allied Industrial Coatings (NUS, 1988), which cleans and paints metal frames for lawn furniture. Milgo Electronics had an official address at 3601 NW 76th Street, Miami, Florida, located on the northwest corner at the intersection of NW 76th Street and NW 36th Avenue (Figure 1). The parking lot between the building and 76th Street and the eastern area of the property are enclosed in a chain-link fence. At the time of the site visit, during normal operating hours, the fence gates remained open. The alley between Allied and the Elgin Watch building, where the underground waste pit is located, could be reached by walking around the east side of the building.

At its peak operation, Milgo Electronics occupied all the buildings on the north side of 76th street from 36th to 37th Avenue and two buildings on the west side of 36th Avenue immediately north of the 3601 building, the first building on the right when heading west on NW 76th Street (Neville, 1990). From 1961 to June 1, 1984, the company electroplated data processing equipment and manufactured, painted, packaged, and stored equipment cabinets. Waste water from chemical rinses, metal plating, and spray coating was treated on site. The treating solution from the electro-plating process was recycled by precipitating the trivalent chromium out of the solution and recharging the solution to maintain the sodium sulfite concentration at 100 ppm and the pH between 8 and 9.5. When the treating solution was finally discarded, the pH of the solution was raised to 8 and the metal salts allowed to settle. The clarified liquid was decanted into the underground disposal pit and allowed to percolate through the surficial sands into the Biscayne Aquifer. The solid material from the treatment tanks and the "settling tank" were collected by a "scavenging tank truck" for disposal. The location for the disposal of this sediment was not reported (NUS, 1988).

During the summer of 1991, Atlantic Richfield Company (ARCO), the Potential Responsible Party for the Anaconda Aluminum area, contacted EPA to indicate an interest in conducting an emergency removal of the contaminated soil in that area. Removal of the contaminated soil is now planned for 1992 after additional studies to better identify the size of the contaminated area are completed.

B. SITE VISIT

A site visit was conducted by Dr. Joe Sekerke of the Florida Department of Health and Rehabilitative Services' (HRS) Office of

Toxicology and Hazard Assessment and Ms Dora Ann Danner, EPA Region IV, on September 13, 1990 from 10 AM to 4 PM. The Milgo area was visited with the property manager, who also provide information on the history of the site. The president of Dade Metal left immediately after providing access to the Anaconda Aluminum area. Both disposal areas were examined and the locations of the monitoring wells and some of the "temporary" wells were determined in relation to the disposal sites. No environmental samples were collected during this site visit. An attempt to identify the location of the 300 square foot disposal pit that was used by Anaconda Aluminum from 1953 until 1978 was unsuccessful since all identifying structures and topography were destroyed when the area was paved (Site Visit, 1990). Therefore, the location of this disposal area as defined in the Expanded Site Investigation (ESI) was used throughout this report (NUS, 1988).

C. DEMOGRAPHICS, LAND USE, AND NATURAL RESOURCES USE

The site is located 1.75 miles south of the Little River Canal and 2.0 miles northeast of the Miami Canal (NUS, 1989). Contamination is limited to subsurface soil and ground water, direct contamination of surface water is not possible. Movement of the contaminants off site in ground water has not been demonstrated. Regional flow of ground water is to the southeast. Alteration of ground water flow by well pumping or canals is unlikely at this site. Thus, recharge of surface water by contaminated ground water is also not likely (Harris, 1991). Ground water is not currently used for residential or business purposes around the site (Wallace, 1990).

The Miami Heights trailer park is approximately 40 feet east of the site. The closest trailer is approximately 80 - 100 feet from the area of waste disposal in the Milgo area. Approximately equal numbers of the trailers are occupied by retired people and families with young children. The number of trailers at the park is estimated to be 200. The remainder of the immediately adjacent properties are occupied by light industry. The more distant land south of the site is also used for light industry and retail. The more distant land east and north of the site is used by a mix of commercial and residential properties. Residential areas of Hialeah, Florida are about three to four blocks to the west (Site Visit, 1990). The estimated total population for 1990 in the zip code where the site is located and the three adjacent zip codes is approximately 175,000 people. Most of these people live within 2 miles of the site and none live more than 4 miles from the site (CACI, 1981). One thousand people work within 1 mile of the site (NUS, 1990).

Two elementary schools and a junior high school are located within 1 mile of the site. The Broadmoor Elementary School and the Markson Junior High School are adjacent to each other northeast of the site. The western boundary of the school grounds is NW 35th Avenue, the southern boundary is NW 83th Street and the northern boundary is NW 87th Street. The Flamingo Elementary School is northwest of the site in Hialeah at the corner of LeJeune Avenue and East 9th Street (Site Visit, 1990). A total of 11 additional schools are located between 1 and 2 miles from the site.

D. HEALTH OUTCOME DATA

No health data bases were searched because there is no current human exposure to chemicals from the site. There are insufficient data to demonstrate that human exposure has occurred in the past.

COMMUNITY HEALTH CONCERNS

The HRS Dade County Public Health Unit receives community health concerns about environmental contamination for the area near the site. The HRS Dade County Public Health Unit has not received any reports of health concerns by citizens that live or work around the site. Furthermore, no increase in specific adverse health effects have been reported to or observed by the county public health unit (Ragland, 1990a).

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

The Toxic Chemical Release Inventories (TRI) for 1987, 1988, and 1989 were searched to determine other possible sources for the chromium, lead, and cadmium found in the soil and ground water at the Anaconda Aluminum/Milgo Electronics site. TRI was developed by the EPA from the chemical release information into air, water, and soil by certain industries. Since the Anaconda Aluminum/Milgo Electronics site is located near the junction of four zip codes, TRI searches were made in zip codes 33013, 33147, 33010, and 33142. Industries reported the release of potentially hazardous chemicals from 33 sites in 1987, from 38 sites in 1988, and from 50 sites in 1989. None of the chemicals of concern for the Anaconda Aluminum/Milgo Electronics site was included in these releases. Thus, none of the contaminants found at this site can be attributed to other known sources.

In April 1987, NUS collected surface soil, subsurface soil, and ground water samples and analyzed for the priority pollutants. Metals were found in each of these media. No contamination by organic chemicals was detected.

The "on-site" locations for this site will be divided into two areas, the Milgo area and the Anaconda area. The Milgo area is the area on the north side of 76th Street that is bounded on the south and east by the chain link fence (see Figure 1), on the north by the Elgin Watch building, and on the west by the building at the end of the alley. The Anaconda area is on the south side of 76th Street and is bounded by a locked chain-link fence on all sides (see Figure 1). All other samples are considered off site, although some samples were taken on property that was occupied by Milgo or Anaconda during their peak business activities. Because portions of the Anaconda area are hydrologically down gradient from the Milgo area, the presence of contaminants in these locations may represent movement of contaminants "off-site" from the Milgo area. All information and sampling data for the On-Site Contamination and Off-Site Contamination sections are from the NUS 1988 report listed in the References section.

A. ON-SITE CONTAMINATION

Ground water

Three metals (chromium, cadmium, and lead) were present in ground water under the site at levels that exceeded the Florida and EPA drinking water standards. These standards are also the Florida Ground Water Standards. A fourth metal, aluminum, while not of human health concern, may provide a marker to monitor the movement of contamination off the site.

The greatest concentrations of these metals were found in the very shallow ground water at one or both of the sites of the waste disposal areas (pits) (Table 1). Chromium (Figure 2) and aluminum (Figure 3) were found in concentrations well above background concentrations at both pits. Elevated concentrations of cadmium
(Figure 4) were found only at the Milgo pit. Elevated concentrations of lead (Figure 5) were found at the Milgo pit, at one location southeast, and one location just off-site that is south-southwest of this pit.

Sampling of ground water in deeper parts of the aquifer showed some concentrations of chromium (Figure 6) and aluminum (Figure 7) above the maximum background concentration for south Florida. The highest concentration of both metals was found in the deepest sample (70 feet) collected at the Milgo pit. The only concentration of lead that exceeded the limits of detection was also found in this sample and was at the maximum background concentration for the region. None of the cadmium concentrations exceeded the limits of detection.

Soil

The single surface soil sample collected at the Milgo pit showed heavy contamination with chromium, cadmium, lead, and aluminum (Table 2). All three surface soil samples collect in the Anaconda area showed concentrations of chromium (Figure 8) and

Table 1

On-Site Metal Contamination (ppb) of Ground Water for the Anaconda Aluminum/Milgo Electronic NPL Site.

	Very Shallow (2-12 ft)	Shallow (20 ft)	Inter-mediate (40 ft)	Deep (70ft)	South Florida Back-ground-Average (max) (a)	Florida Ground-water Standard
Milgo						
Samples Analyzed	8	1	1	1		
Cadmium(b)	4 - 97	nd	nd	nd	0.3 (4)	10(c)
Chromium (total)	nd-2900	nd	10	31	2.2 (14)	50
Lead	nd-600	nd	nd	34	7.5 (33)	50(d)
Aluminum	nd-38,000	840	2600	6200	(<1000)	
Anaconda						
Samples Analyzed	6	1	0	0		
Cadmium(e)	6	nd	ns	ns	0.3 (4)	10(b)
Chromium (total)	6-1000	7	ns	ns	2.2 (14)	50
Lead	nd-130	nd	ns	ns	7.5 (33)	50(c)
Aluminum	nd-73,000	200	ns	ns	(<1000)	

max Maximum concentration found
nd Concentration below detection limit of the method
ns No samples collected or analyzed
ppb Parts per billion
a - DER, 1990.
b - Only three samples of the eight collected yielded usable results (see Quality Assurance and Quality Control).
c - ATSDR has proposed a new Minimal Risk Level for cadmium of 0.2 μg/kg/day. The Florida standard will be reduced in 1992 to meet the new EPA standard of 5 ppb.
d - New EPA proposed standard of 15 ppb now used as target
e - Only one sample of the six collected yielded usable results (see Quality Assurance and Quality Control).

Table 2
On-Site Metal Contamination (ppm) of Surface Soil and Subsurface Soil for the Anaconda Aluminum/Milgo Electronic NPL Site.

	Surface Soil (ppm)	Subsurface Soil (ppm)	South Florida Background(a) (ppm)
Milgo			
Samples Analyzed	1	4	
Cadmium(b)	140	81	< 5
Chromium (total)	350	nd-260	< 5
Lead	350	nd-450	≤ 10
Aluminum	96,000	67-43,000	< 3,000
Anaconda			
Samples Analyzed	3	5	
Cadmium(c)	4.5	unusable	< 5
Chromium (total)	9.9-62	9.8-430	< 5
Lead	15-790	nd	≤ 10
Aluminum	700-6,700	1,600-25,000	< 3,000

a - Shacklette and Boerngen, 1984.
b - The results of the analysis for three of four subsurface soil samples were unusable. No explanation was provided.
c - The results of the analysis for two of three surface soil and all five subsurface samples were unusable. No explanation was provided.
ppm - parts per million.

lead (Figure 9) that were above the background for these metals in the soil of south Florida. The highest concentration of these metals was in the sample collected in the southeast corner of the Anaconda area. The only aluminum (Figure 10) concentration that exceeded the background for soil samples in Florida was also found in this sample (see Quality Assurance Section for possible explanation of these results). The only usable result for cadmium from the Anaconda area was within the range of background concentrations for south Florida.

The subsurface sample collected at the Milgo pit also showed heavy contamination with chromium, cadmium, lead, and aluminum (Table 2). The remaining samples collected from the Milgo area had concentrations of chromium and aluminum within the background range. Only one of the remaining samples, which was collected at the border of the Milgo area and 36th Street, had elevated concentrations of lead. The cadmium results for all the remaining samples were unusable (see Quality Assurance and Quality Control Section).

The subsurface sample collected at the Anaconda pit and in the southeast corner of the Anaconda area showed heavy contamination with chromium and aluminum (Table 2 and Figures 11 and 12, respectively). The remaining three samples collected within the Anaconda area showed slight to moderate contamination with chromium, but the aluminum concentrations were within the background range. None of the samples had detectable concentrations of lead; all of the cadmium results were unusable (see Quality Assurance and Quality Control).

B. OFF-SITE CONTAMINATION

Details of the concentrations of metals found in the soil and ground water defined as "off site" are presented below. These data are insufficient to conclusively determine if, and in what direction, contaminated groundwater has left the site.

Ground water

The cadmium concentrations in two samples taken from the very shallow ground water northeast of the Milgo area were slightly greater than the maximum background. The other sample taken from this ground water and all samples taken from the deeper ground water were below detection.

Chromium concentrations in the very shallow ground water collected from off-site locations all exceeded the average background concentration for the region (Table 3 and Figure 3). Samples collected in all directions from the Milgo area and to east and west of the Anaconda area had chromium concentrations that exceeded the maximum background concentration for the

Table 3
Off-Site Metal Contamination (ppb) of Ground Water for the Anaconda Aluminum/Milgo Electronic NPL Site.

	Very Shallow (2-12 ft)	Shallow (20 ft)	Inter-mediate (40 ft)	Deep (70 ft)	South Florida Back-ground-Average (max) (a)	Florida Ground-water Standard
Samples Analyzed	10	4	2	2		
Cadmium	nd(b)	nd	nd	nd	0.3 (4)	10(c)
Chromium (total)	6-120	nd-12	10, 15	14, 19	2.2 (14)	50
Lead	nd-61	nd	nd	nd	7.5 (33)	50(d)
Aluminum	820-33,000	nd-4,000	630, 4,300	180, 980	(<1000)	

a - DER, 1990
b - only one samples of the 10 collected yielded usable results
c - ATSDR has proposed a new Minimal Risk Level for cadmium of 0.2 μg/kg/day which would result in a water comparison value of 7 ppb. The Florida standard will be reduced in 1992 to meet the new EPA standard of 5 ppb.
d - New EPA proposed standard of 15 ppb is now used as target concentration
ppb - parts per billion

region. No samples were collected off-site to the north and only one sample was collected due south of the Anaconda area. These data suggest a local change in the flow pattern in the aquifer, called a "mound effect," exists under each disposal pit (see Environmental Pathways for further evidence of the presence of a "mound effect"). The chromium concentrations in each of the three "deep" aquifer samples (70 ft) and for the "intermediate" aquifer sample (40 ft) taken up gradient (northwest) of the sites were equal to or above the maximum background concentration for the region (Figure 6).

One sample collected from the very shallow ground water due east of the Anaconda area had lead concentrations that exceeded the maximum background concentration for the region. This sample is the third sample in a line extending from the Milgo pit (see Environmental Pathways). All other lead samples collected from the very shallow ground water and all other ground water were below the limits of detection.

The concentration of aluminum found in samples taken from the very shallow ground water showed a pattern similar to that seen with chromium in the same ground water zone (Figure 3). The presence of aluminum concentrations from equal to or well above the maximum background concentrations in all directions from the disposal pits is further evidence for the "mound effect" in the ground water zone. Only the intermediate and deep samples collected south of the Anaconda area had aluminum concentrations that exceeded the maximum background concentrations for ground water in this region of Florida (Figure 7).

Soil

A single surface soil sample was collected northwest of the site (Table 4). The lead concentration was 2.5 times the background upper limit (Figure 6); chromium concentration was slightly above the background upper limit (Figure 8). The cadmium results were not usable and the aluminum results were within the background range for south Florida.

Six of the nine subsurface soil samples had concentrations of chromium that were slightly to moderately above the upper limit of the background range (Table 4 and Figure 11). Each of the samples that showed contamination was collected from soil in the saturation zone; each sample without contamination was above the saturation zone. Samples with two of the three highest concentrations of chromium were taken from locations that were part of the Milgo manufacturing operation at its peak production during the 1960's. However, the other sample with a high concentration was collected due west of the Anaconda site. One sample collected on the east side of 36th Avenue, due east of the Milgo pit showed heavy contamination with lead; all other samples had lead concentrations below the detection limit. The two samples with usable cadmium results had concentrations within the background range. All the aluminum concentrations in subsurface soil were below or slightly greater than the maximum background concentrations found in Florida (Figure 12).

Table 4
Off-Site Metal Contamination (PPM) of Surface Soil and Subsurface Soil for Anaconda Aluminum/Milgo Electronic NPL Site.

	Surface Soil (ppm)	Subsurface Soil (ppm)	South Florida Background (a) (ppm)
Samples Analyzed	1	9	
Cadmium (b)	unusable	0.9, 4.5	< 5
Chromium (total)	7.3	nd - 41	< 5
Lead	nd	nd - 220	≤ 10
Aluminum	1,300	490 - 4,800	< 3,000

a Shacklette and Boerngen, 1984
b The results of the analysis for the single surface soil and seven of nine subsurface samples were unusable. No explanation was provided.
ppm parts per million

C. QUALITY ASSURANCE AND QUALITY CONTROL

In reviewing the data present in the Expanded Site Investigation (ESI) (NUS, 1990), several problems were identified with the quality of the sampling and analysis data obtained in 1987. The analytical results for most of the cadmium and all the analytical results for arsenic and selenium for samples of surface soil, subsurface soil, and the very shallow aquifer were unusable. No explanation was provided for this problem. Therefore, there are not sufficient data to determine the extent of contamination from these metals.

The results of the analyses of surface soil samples AAME-21S and AAME-22S, as reported in Table 3-1 (Surface Soil Samples) of the Expanded Site Investigation report (NUS, 1988), are inconsistent with the location of the sampling and the concentrations of metals reported for the subsurface soil and ground water samples taken at these locations. The order of presentation of data for these samples is reverse from the order in all other tables in the NUS report. The results reported in Table 3-1 of the ESI agree with the raw data reported by the laboratory (Vassar, 1991). Possible explanations for this apparent discrepancy are the surface soil contamination is unrelated to the site activities or is the result of migration from the disposal pit. The possibility of the samples being mislabeled in the field cannot be ruled out. The data were used as presented in the NUS report in preparing this report.

In preparing this public health assessment, data from the Final Expanded Site Investigation, Anaconda Aluminum/Milgo Electronics Site, May 1988 prepared for EPA by the NUS Corporation was used (NUS, 1988). Quality assurance and quality control (QA/QC) information was not available in that report. It is assumed that adequate quality assurance and quality control measures were followed with regard to chain-of-custody, laboratory procedures, and data reporting, except as noted above. The validity of the analysis and conclusions drawn for this public health assessment is determined by the completeness and reliability of the NUS report.

D. PHYSICAL AND OTHER HAZARDS

The Anaconda Aluminum location consists of a paved lot with a house trailer in one corner. No physical or other hazards exist on this location (Site Visit, 1990). The Milgo location is occupied by a company that cleans and paints metal furniture. The actual area of the disposal drain-field is not used in this process, but is accessible from the plant. The only physical hazards that exist would be related to the current commercial activity on the site. The hazards noted outside the building were metal racks outside the building used for the storage of various small machinery and parts. Inside the building, an active manufacturing line for cleaning and painting lawn furniture frames was operating. As part of this process, frames were carried between the steps of the process by an overhead system that allowed the bottom of the frame to swing freely. A physical hazard would exist for the workers at this facility and any worker attempting to remediate this site (Site Visit, 1990).

PATHWAY ANALYSES

Disposal of metal plating waste liquids in on-site waste water systems at both Anaconda Aluminum and Milgo Electronics has caused soil and ground-water contamination. Due to the porous nature of the soil and the shallow depth to ground water, this practice caused contamination of the Biscayne Aquifer under and possibly adjacent to the site. Analyses of the environmental and human pathways associated with this site are discussed in the following subsections.

A. ENVIRONMENTAL PATHWAYS (FATE AND TRANSPORT)

Both soil and ground water contained elevated concentrations of the contaminants of concern: chromium, lead, cadmium, and aluminum. Although the air at this site has not been tested, it is not expected to be contaminated since operations ceased in 1984 and no obvious source of air contamination remains. Since the contaminated soil has either been paved, is overgrown with vegetation, or lies below the ground surface, it is not expected to be transported to the air unless disturbed. There is no surface water associated with the site.

There is no current movement of contaminated surface soil, since the Milgo area is covered with heavy vegetation and is located in a semi-enclosed alleyway and the Anaconda area is covered with pavement. If the soil of these areas is disturbed during remediation or construction, wind blown dust could move off the site.

The metals have been leached by waste water and/or rainwater into the shallow Biscayne aquifer. Ground water of the Biscayne Aquifer has been contaminated at concentrations exceeding Florida and EPA drinking water standards at depths ranging from 2 to 11 feet below ground level (BGL). One sample taken at a depth of 70 feet under the Milgo pit showed contamination with chromium, aluminum, and possibly lead at concentrations exceeding Florida and EPA drinking water standards. If the waste liquid released at this site had a high specific gravity, the liquid could have settled to the bottom of the aquifer before substantial dilution occurred, thereby resulting in contamination of the ground water at 70 feet. The composition of the soil changes from a mixed sand and limestone gravel to all sand about 18 feet BGL under the site.

Contaminated ground water may have moved off site. The distance ground water contamination extends from the site is unknown since temporary and shallow monitor wells were confined to the site or not properly located off site. The high porosity and low organic content of the soil in Biscayne aquifer is compatible with movement of contaminants off site. Analytical data collected during the ESI suggests a plume of contaminants moving to the southeast from both "dumping areas" (NUS, 1990).

Additional sampling more distant from the disposal pits is needed to evaluate movement of contaminants off site. There is evidence that a "mound effect" exists at the location of both disposal pits. The "mound effect" is defined as an outflow of water in all directions from a point of recharge by rainwater that results in a local disruption of the regional ground water flow. The alley where the pit is located is the only unpaved area on the block occupied by Milgo Electronics. The movement of chromium and aluminum in very shallow ground water appears to be in all directions. The water table under the Milgo pit is raised (2 feet BGL vs 6 to 9 feet BGL at the rest of the site).

The suggestion of a mound effect also exists at the Anaconda pit. There is less definitive movement of chromium from the Anaconda pit. Even though there is pavement over the pit, there is evidence that rainwater recharge is still occurring at the pit.

Two depressions in the pavement exist within the fenced area. In the area that is not over the disposal pit, rainwater remained standing (Site Visit, 1990). However, in the depression over the pit only water marks were present and the pavement was broken in the center of the depression. This indicates that the water from this depression is lost more rapidly than in the other depression, possibly into the ground through the pavement. These observations suggest the possibility of a "mound effect" under this pit as well (Site Visit, 1990).

There are no private or municipal wells located in the direction of the regional water flow, the southeast, from the site to the Biscayne Bay. All residences within a 2 mile radius of the site have municipal water service. The service has been available since before dumping began at the site, 1957, in the northwest and southwest quadrants from the site. Municipal water service was introduced into most of the users in the southeast quadrant before dumping began. Municipal water service was introduced into the northeast quadrant in stages. The area 3 to 4 blocks north and 2 miles east of the site was provided municipal water service prior to 1957. This service was expanded to the north up to 10 blocks from the site in the mid 1960s and to the remainder of the quadrant by the mid-1970s (Wallace, 1991). Ground water was used for residential and business purposes in the northeast quadrant prior to municipal service. If the "mound effects" are confirmed for the site, the possibility of past exposure to ground water that may have been contaminated must be reevaluated since mounding affects ground-water flow direction.

B. HUMAN EXPOSURE PATHWAYS

Human exposure (by ingestion, dermal contact, or inhalation) to the contaminated ground water is unlikely since residents and businesses down gradient from the site are supplied by city water (Ragland, 1990b). Four municipal well fields that are within 3 miles of the site have not been used as a drinking water source since 1984 because they have been contaminated with vinyl chloride (Tool, 1990). Air strippers have been installed on these wells to allow their future use as a drinking water source (EPA, 1991). This site lies outside the Well Protection Area for the proposed normal daily pumping rate of these well fields, but just inside the Well Protection Area for the maximum daily pumping rate. At the proposed maximum daily pumping rate, ground water would move from under this site toward these well fields at a rate that would take a minimum of eight years to reach the well field. The migration of the metals contained in the ground water would take longer to migrate. Since current plans call for pumping rates below the estimated daily pumping rate used to define the Well Protection Area, contamination of these well fields from this site is unlikely (Harris, 1991).

Influence of ground-water flow under this site by drawdown from these well fields is also unlikely. However, prior to the use of water from these well fields, the Dade County Department of Environment Resource Management will use a ground-water model to examine the influence of pumping from these wells on ground water flow under this site (Harris, 1991). In the unlikely event that this model shows any influence on ground-water movement toward these wells, the potential impact on human health risk will be re-evaluated.

Any residences or businesses that are currently using or that install private ground-water wells in the future may be exposed to chromium, cadmium, or lead that may migrate off the site. No such usage is currently known. The Florida Department of Environmental Regulation is currently developing regulations to restrict the use of contaminated ground water near NPL sites.

Exposure to contaminated soil, either via inhalation or dermal absorption, is unlikely unless the soil is disturbed during remediation or construction at the site. Currently, exposure to contaminated soil disturbed by blowing wind can be ruled out since the Anaconda location is paved and the Milgo location is enclosed on three sides by buildings and on the fourth side by heavy vegetative growth.

If the contaminated soil at this site is disturbed by remediation or construction activity that would generate dust or uncover the contaminated soil, people in businesses on or residences and businesses surrounding the site could be exposed via inhalation or dermal contact to the soilborne metals. Also, construction workers or workers conducting remediation at this site could be exposed to contaminated soil by dermal contact or inhalation of airborne dust.

The estimated total population for 1990 in the zip code where the site is located and the three adjacent zip codes (33010, 33013, 33142, 33147) is approximately 175,000 people. Most of these people live within 2 miles of the site and none live more than 4 miles from the site (CACI, 1981). Approximately 1,000 people work in businesses within 1 mile of the site (NUS, 1988).

PUBLIC HEALTH IMPLICATIONS

A. TOXICOLOGICAL EVALUATION

There are currently no completed pathways for exposure to human populations to the contaminated soil or ground water associated with this site. There are currently insufficient data to determine if any past exposure to contaminated ground water as a drinking water source occurred before municipal water was available to the areas surrounding the site. Exposure to workers at these facilities may have occurred when they were operational.

However, there are insufficient data available at this time to identify the workers or to determine the extent, if any, of their exposure.

Human exposure to contaminated airborne soil during remediation or construction may occur. Human exposure to contaminated ground water may occur in the unlikely event that wells are placed in the contaminated portion of the aquifer.

If past exposure has occurred or if one of the potential pathways leads to human exposure, toxicity from exposure to chromium, lead, or cadmium could result. Chromium was found in the ground water at this site at concentrations from below the detection limit to 330 ppb. The Florida Ground Water Standard for chromium is 50 ppb. EPA has raised the primary drinking water standard for chromium to 100 ppb (EPA, 1991). The long-term human health effects from the consumption of water contaminated with low levels of chromium are not known (ATSDR, 1988b).

Lead was found in the ground water at this site at concentrations from below the detection limit to 600 ppb. The Florida Ground Water Standard for lead is 50 ppb. EPA has a target concentration for lead of 15 ppb for drinking water, which becomes the new drinking water standard after a two year phase-in. Lead may damage sperm or other parts of the male reproductive system. Exposure to low levels of lead can cause brain damage in adults and children. Exposure to lead is especially dangerous for unborn children because their bodies can be harmed while they are being formed. If a pregnant woman is exposed to lead, it can be carried to the unborn child and cause premature birth, low birth weight, or even spontaneous abortion. For infants or young children, lead exposure has been shown to decrease intelligence (IQ) scores, slow their growth, and cause hearing problems. These effects can last as children get older and interfere with successful performance in school (ATSDR 1988c).

Cadmium was found in the ground water at this site at concentrations from below the detection limit to 97 ppb. The Florida Ground Water Standard for cadmium is 10 ppb. EPA has proposed lowering the primary drinking water standard for cadmium to 5 ppb. This is supported by an EPA lifetime health advisory of 5 ppb for cadmium based on observations of kidney dysfunction in humans and extrapolation from animal tests. Kidney damage may result from chronic exposure to low levels of cadmium in the drinking water (EPA, 1987).

Aluminum was found in the ground water at this site at concentrations from below the detection limit to 73,000 ppb. There have been several studies that suggest a correlation between exposure to aluminum and dementia. However, none of these studies establish a cause and effect relationship (ATSDR, 1988a).

B. HEALTH OUTCOME DATA EVALUATION

No evaluation of health outcome data has been conducted since there are no current human exposures and there are insufficient data to demonstrate that human exposure occurred in the past. No specific health concerns have been raised by the residents near this site.

CONCLUSION

This site is an indeterminate public health hazard. The available data do not indicate any human health impact associated with this site since there are no completed pathways for exposure. There are insufficient data to determine the extent of past exposure, if any, to contaminated ground water. Exposure in the direction of regional ground water flow, the southeast, is unlikely since most users in this quadrant received municipal water prior to 1957. There is also insufficient data to determine the possibility of past exposure to ground water that may have been contaminated in the northeast quadrant before municipal water service was fully available in the mid 1970s. There are insufficient data to determine the extent of soil and ground water contamination at the site from cadmium, arsenic, or selenium.

Exposure to workers at the site and residents or workers near the site could occur during remediation or construction that disturbs the contaminated soil. The risk would be greater for workers performing the remediation or construction at the site. These exposures may be minimized by the use of appropriate protective equipment and work techniques.

Exposure to contaminated ground water could occur in the unlikely event that wells are placed in the contaminated aquifer.

The current data do not indicate that any health effects studies should be undertaken. If additional data become available that show past or present exposure to specific populations through contaminated ground water, the need for health effects studies should be re-evaluated.

RECOMMENDATIONS

1) Conduct additional sampling of ground water to determine the extent of the ground water contamination on and around the site and to determine the direction of migration of the contaminated ground water.

2) Use modeling or other means to estimate the movement of contamination off this site in the southeast and northeast quadrants.

3) If the data from Recommendation 2 demonstrate that contaminated ground water could have been used for residential or business purposes prior to installation of the public water supply, make a more detailed determination of ground water versus municipal water usage to determine the extent, if any, of human exposure to contaminated water.

4) Conduct additional testing of ground water and soil to determine the extent and distribution of cadmium, arsenic, and selenium at the site.

5) Restrict any activity at the site that would expose the contaminated soil. If remediation is undertaken at the site, protective clothing should be worn by the workers at the site. Additionally, dust abatement procedures should be undertaken to reduce inhalation exposure of the workers at the site, in surrounding business, and the surrounding residents. Air samples should be collected down wind of these operations to document the dust abatement.

6) The appropriate local, state, or federal agencies should assure no future wells are placed in this aquifer where contamination from this site is likely to occur until this site is remediated.

7) The data and information developed in the Anaconda Aluminum/Milgo Electronics Public Health Assessment has been evaluated for appropriate public health actions. There are no indications humans have been or are being exposed to on-site and/or off-site contaminants at levels of public health concern. Therefore, this site is not being considered for follow-up activities at this time. However, if data become available suggesting that human exposures to hazardous substances at levels of public health concern is occurring or has occurred in the past, ATSDR will re-evaluate this site for health follow-up activities.

PUBLIC HEALTH ACTIONS

Based on the conclusions and recommendations of the state health assessors and the ATSDR Health Activities Recommendation Panel (HARP), no follow-up public health actions will be performed by Florida HRS and ATSDR. However, Florida HRS, in cooperation wit ATSDR, will evaluate additional environmental data, health outcome data, and community health concerns and conduct follow-u health activities when indicated by public health needs.

State health assessors will work with the Dade County Department of Environment Resource Management to examine the influence of pumping municipal well fields on ground water flow under the site.

Florida HRS will work with the Florida Department of Environmental Regulation to develop regulations to restrict the use of contaminated ground water near NPL sites.

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CERTIFICATION

This Preliminary Public Health Assessment was prepared by the Florida Department of Health and Rehabilitative Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It is in accordance with approved methodology and procedures existing at the time the public health assessment was initiated.

Technical Project Officer, SPS, RPB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this Public Health Assessment and concurs with its findings.

Director, DHAC, ATSDR

REFERENCES

ATSDR, 1988a	Toxicological Profile for Aluminum, ATSDR/TP-88/08. Agency for Toxic Substances and Disease Registry.
ATSDR, 1988b	Toxicological Profile for Chromium ATSDR/TP-88/10. Agency for Toxic Substances and Disease Registry.
ATSDR, 1988c	Toxicological Profile for Lead. ATSDR/TP-88/17. Agency for Toxic Substances and Disease Registry.
CACI, 1990	CACI Marketing System Population File 1990, California Analysis Center, Inc. Fairfax, Virginia, 1990
DER, 1990	Ground Water Monitoring Network., Florida Department of Environmental Regulation, publication delayed due to funding shortfall.
EPA, 1987	Health Advisory for Cadmium. Office of Drinking Water, Environmental Protection Agency.
Harris, 1991	Personal Communication with Nancy Harris, Dade County Department of Environmental Resources Management, October, 1991.
Neville, 1990	Personal Communication with Arthur Neville, Property Manager for Report Investments, Inc., 1990.
Neville, 1991	Personal Communication with Arthur Neville, Property Manager for Report Investments, Inc., 1991.
NUS, 1988	Expanded Site Investigation Anaconda Aluminum/Milgo Electronics EPA TDD No.F4-8701-04, May 1988.
Ragland, 1990a	Personal communication from Donna Ragland, Environmental Supervisor, Dade County Public Health Office, Miami, Florida, 1990.
Ragland, 1990b	Survey of the Area Surrounding (sic) the Anaconda Aluminum/Milgo Electronics site, Donna Ragland, Environmental Supervisor, Dade

County Public Health Office, Miami, Florida. October 4, 1990.

Shacklette and Boerngen, 1984 — Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States. United States Geological Survey Professional Paper #1270. United States Government Printing Office. Washington, 1984.

Site Visit, 1990 — HRS Site Visit Report - Anaconda Aluminum/Milgo Electronics. September 1990

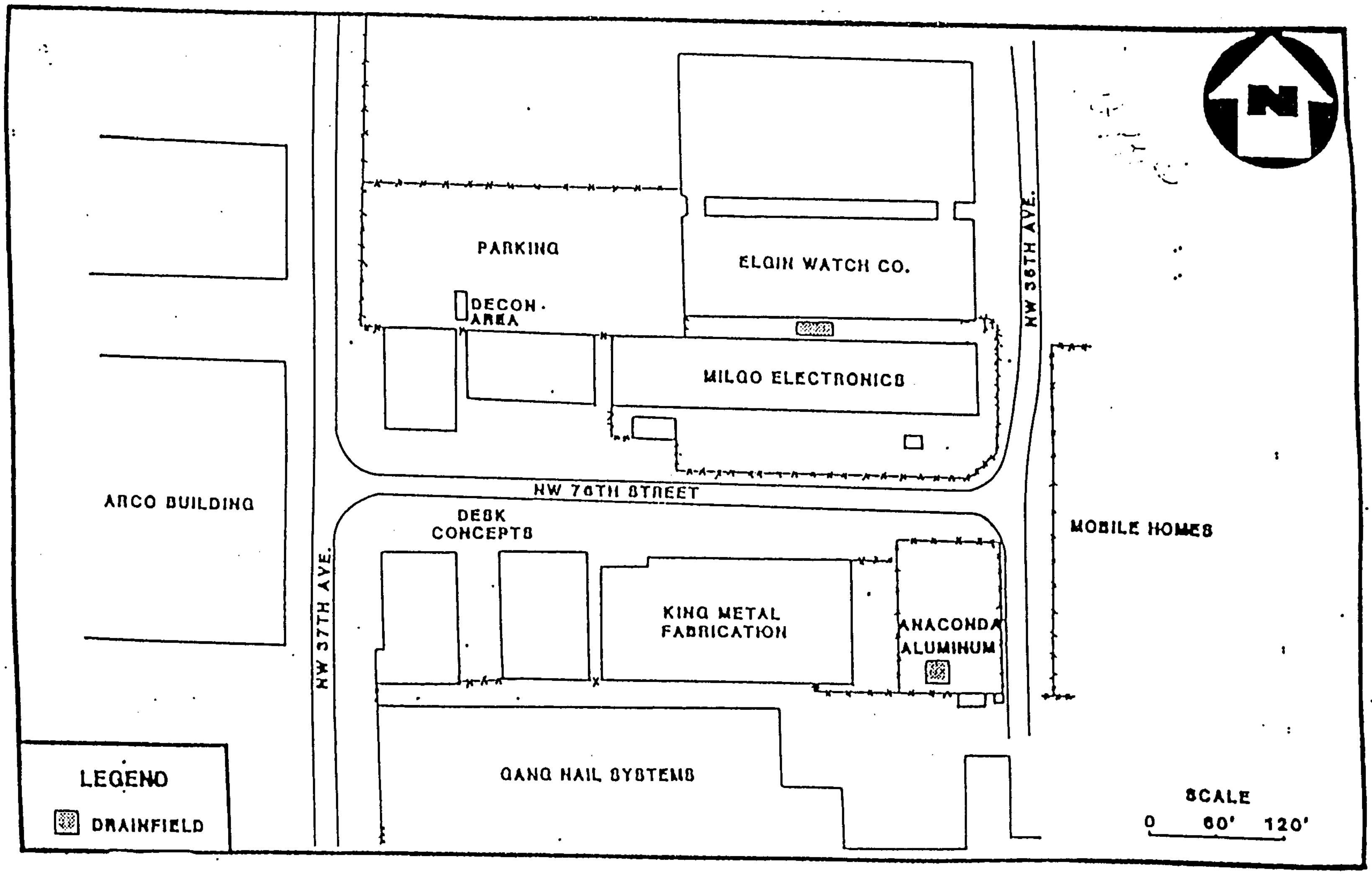
Tools, 1990 — Personal communications with Jerry Tools, Environmental Engineer, Dade County Public Health Office, Miami, Florida, 1990.

Vassar, 1991 — Personal Communication with Ed Vassar of NUS, 1991.

Wallace, 1991 — Personal Communication with Thomas Wallace, Engineer, Hialeah Water Department, Hialeah, Florida, 1991.

Appendix

Figures and Public Comments/Response



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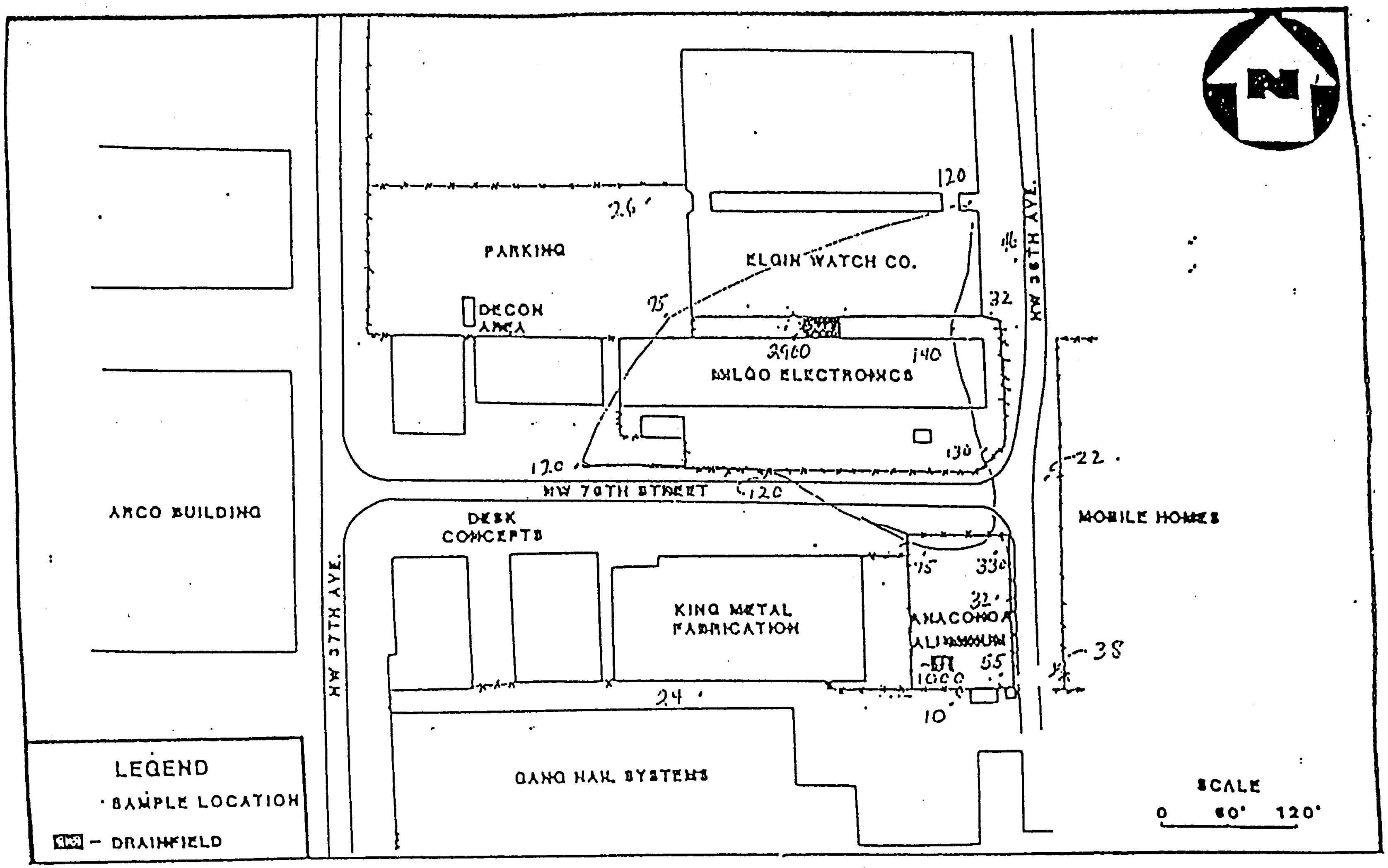
SITE SKETCH
ANACONDA ALUMINUM/MILCO ELECTRONICS

MIAMI, FLORIDA
(MODIFIED FROM EIS, 1988)

FIGURE 1

fig. 2



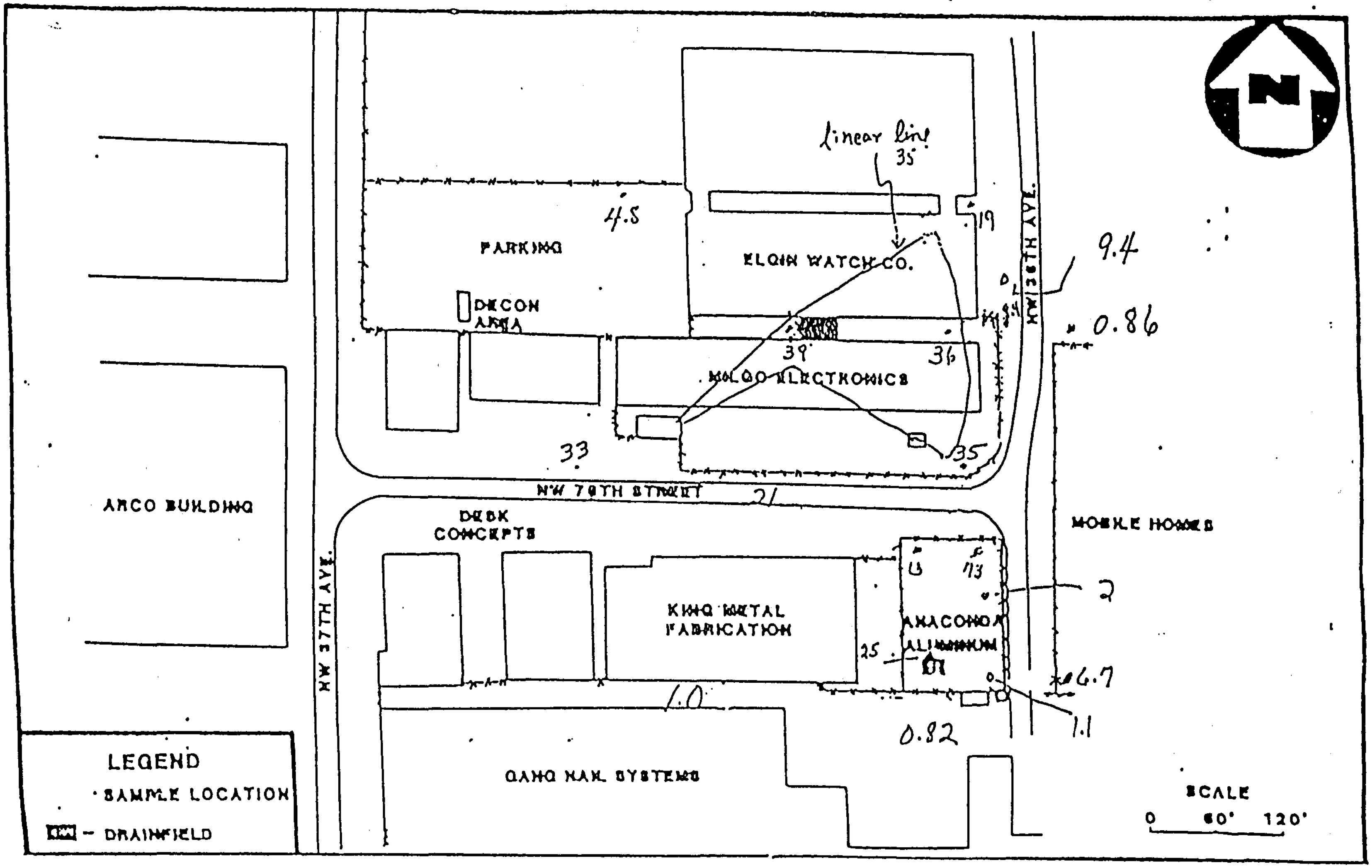
CHROMIUM (PPB) FROM VERY SHALLOW GROUND WATER

SAMPLES TAKEN 1 FT. BELOW THE TOP OF THE WATER TABLE FROM TEMPORARY WELLS

DEPTH OF SAMPLING RANGED FROM 2 FT. - 11.5 FT. BELOW LAND SURFACE

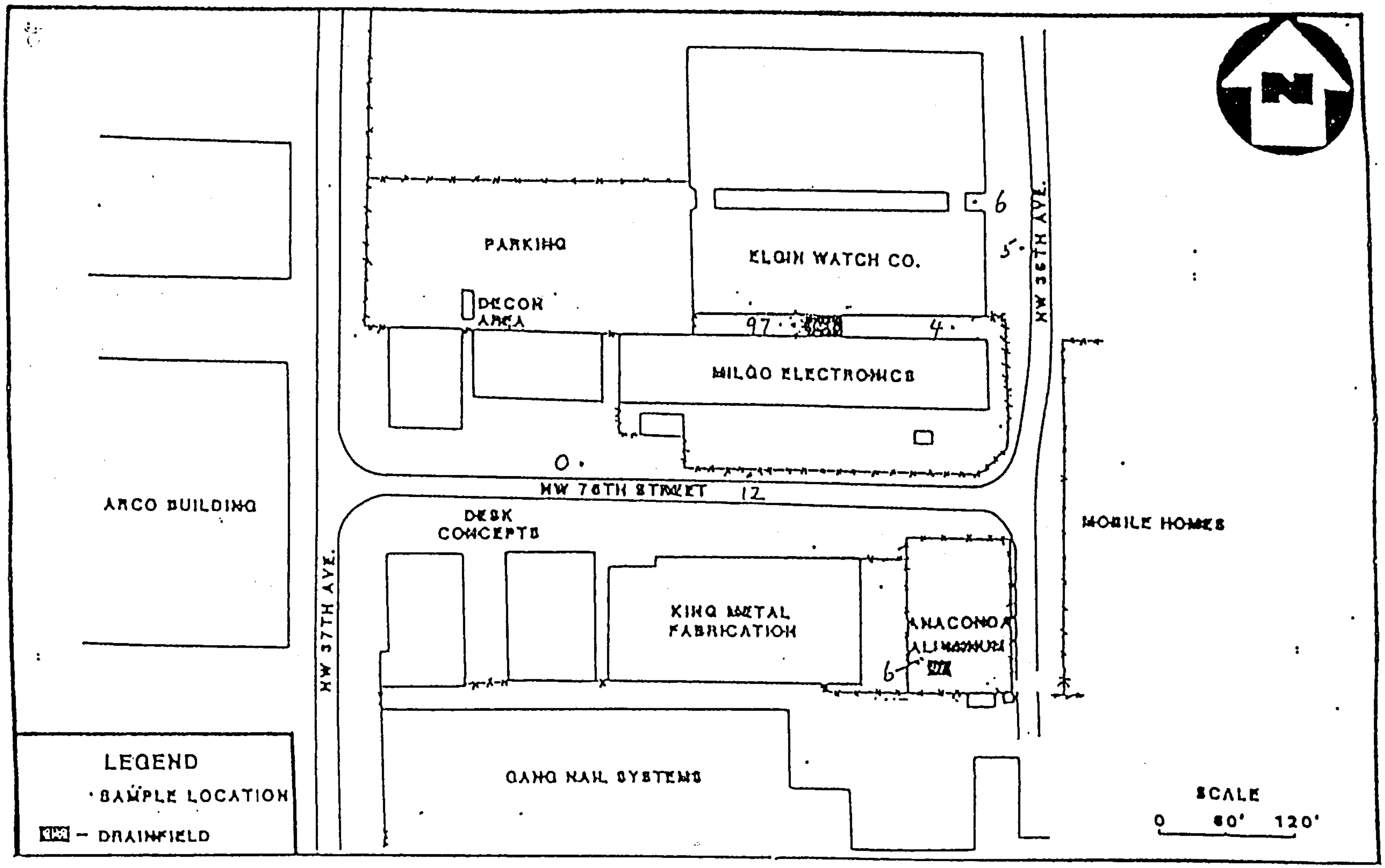
FIGURE 2

Fig. 3



ALUMINUM (X 1000 PPB) FROM VERY SHALLOW GROUND WATER SAMPLED AS CHROMIUM SAMPLES (FIGURE 2)

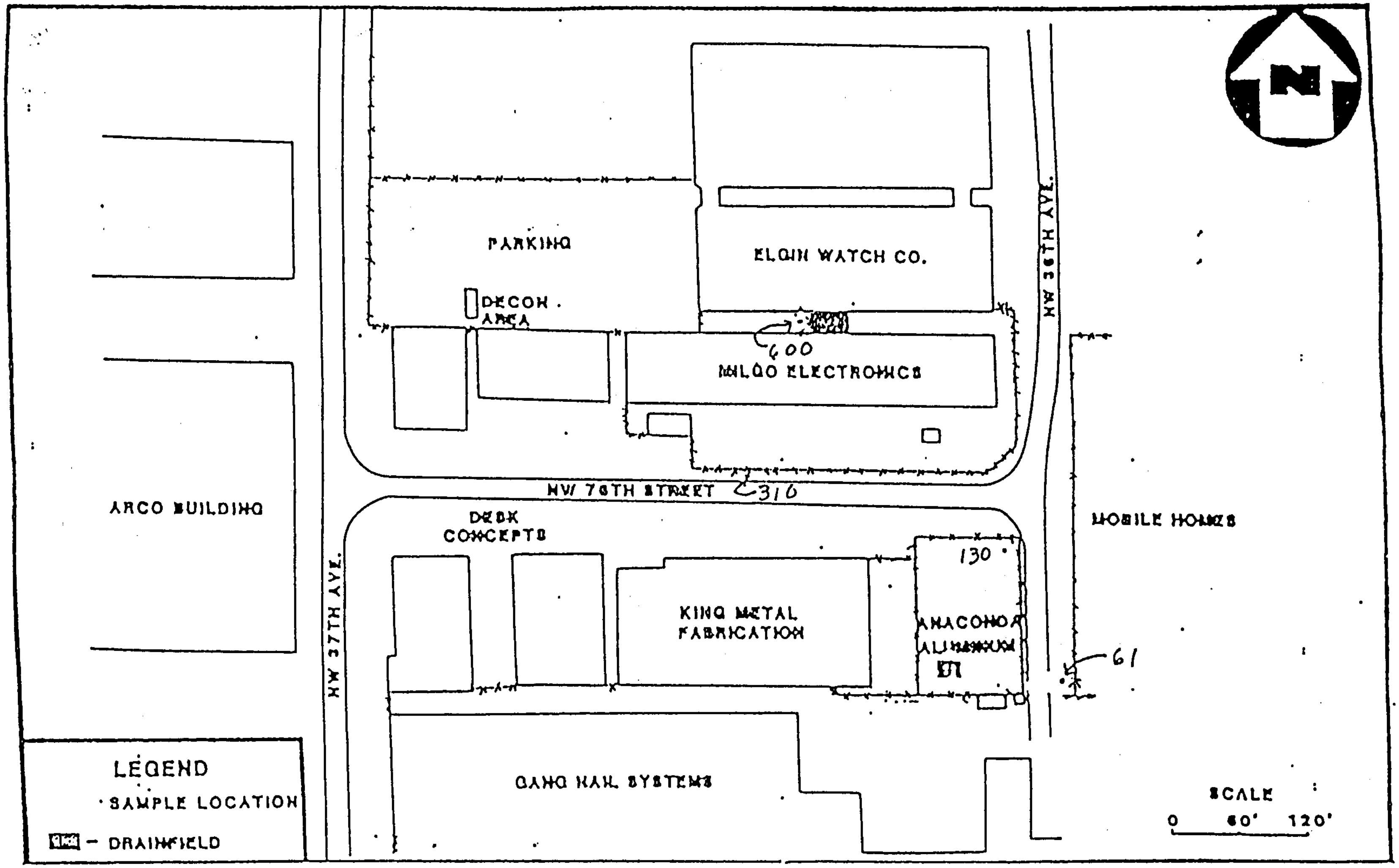
FIGURE 3



CADMIUM (PPB) IN VERY SHALLOW GROUND WATER
SAMPLED AS CHROMIUM SAMPLES (FIGURE 2)

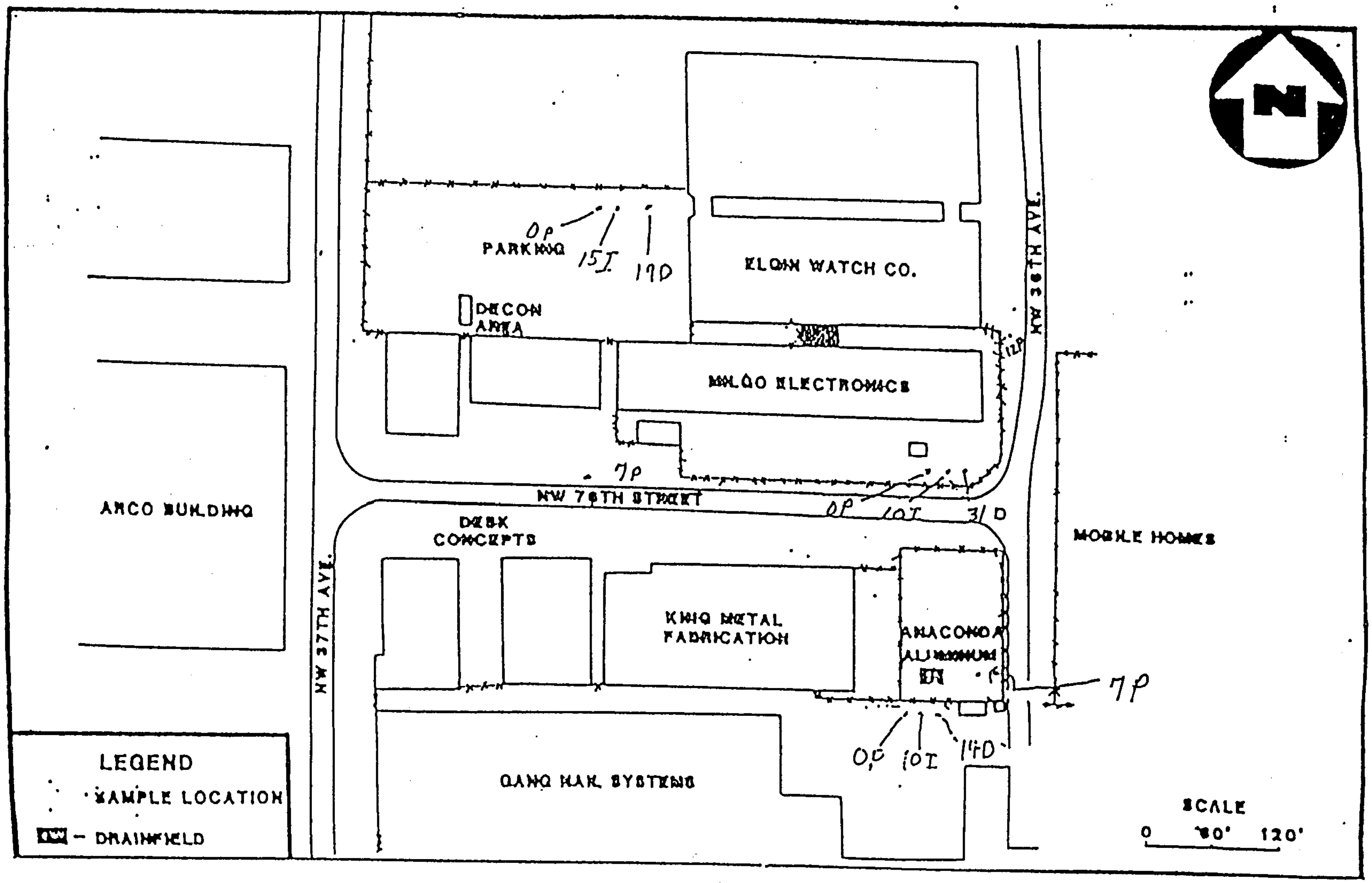
FIGURE 4

Fig. 5



LEAD (PPB) IN VERY SHALLOW GROUND WATER
SAMPLED AS CHROMIUM SAMPLES (FIGURE 2)

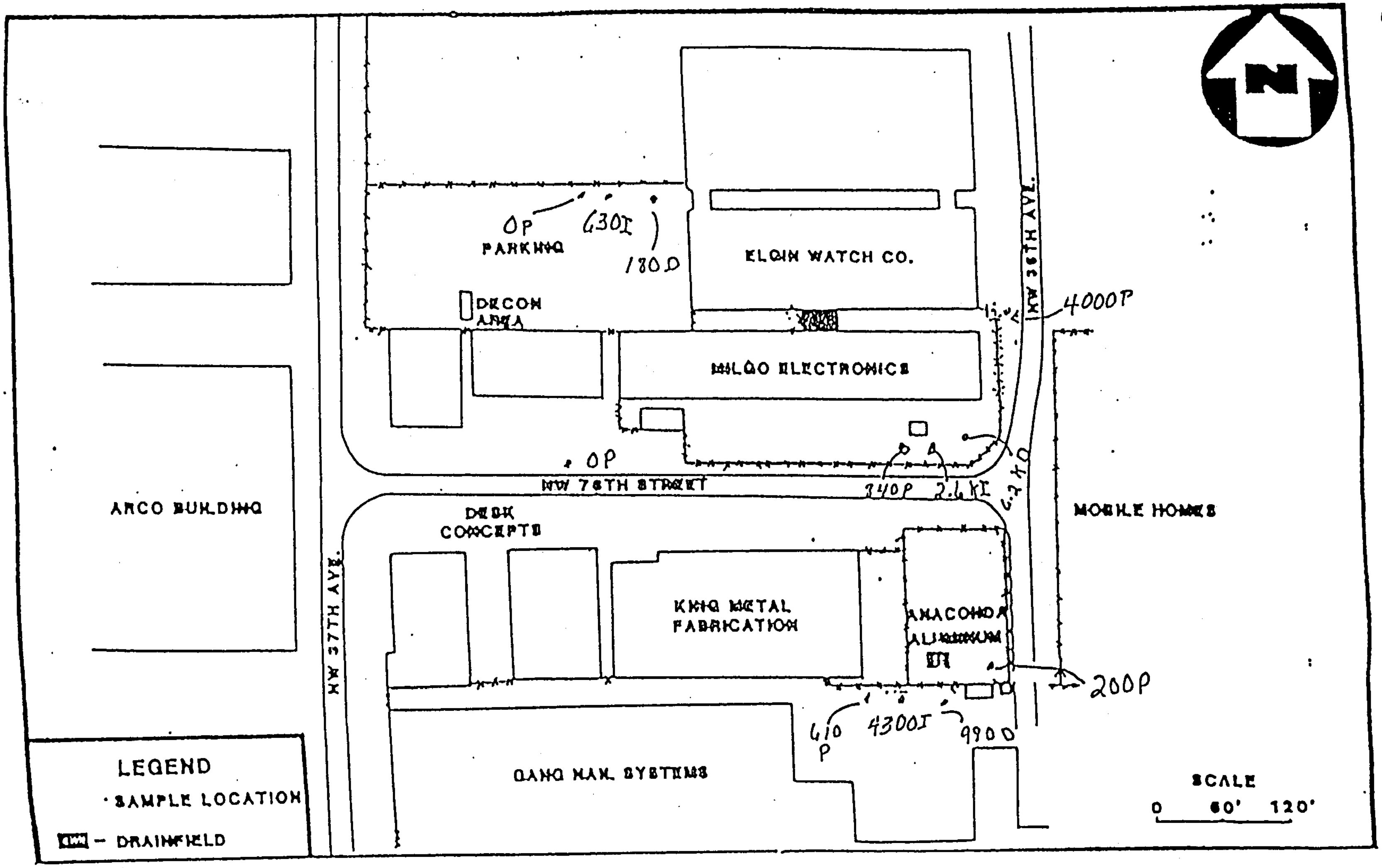
FIGURE 5



CHROMIUM (PPB) SHALLOW "P" (20 FT.) INTERMEDIATE "I" (40 FT.) AND DEEP "D" (70 FT.) GROUND WATER FROM PERMANENT WELLS

FIGURE 6

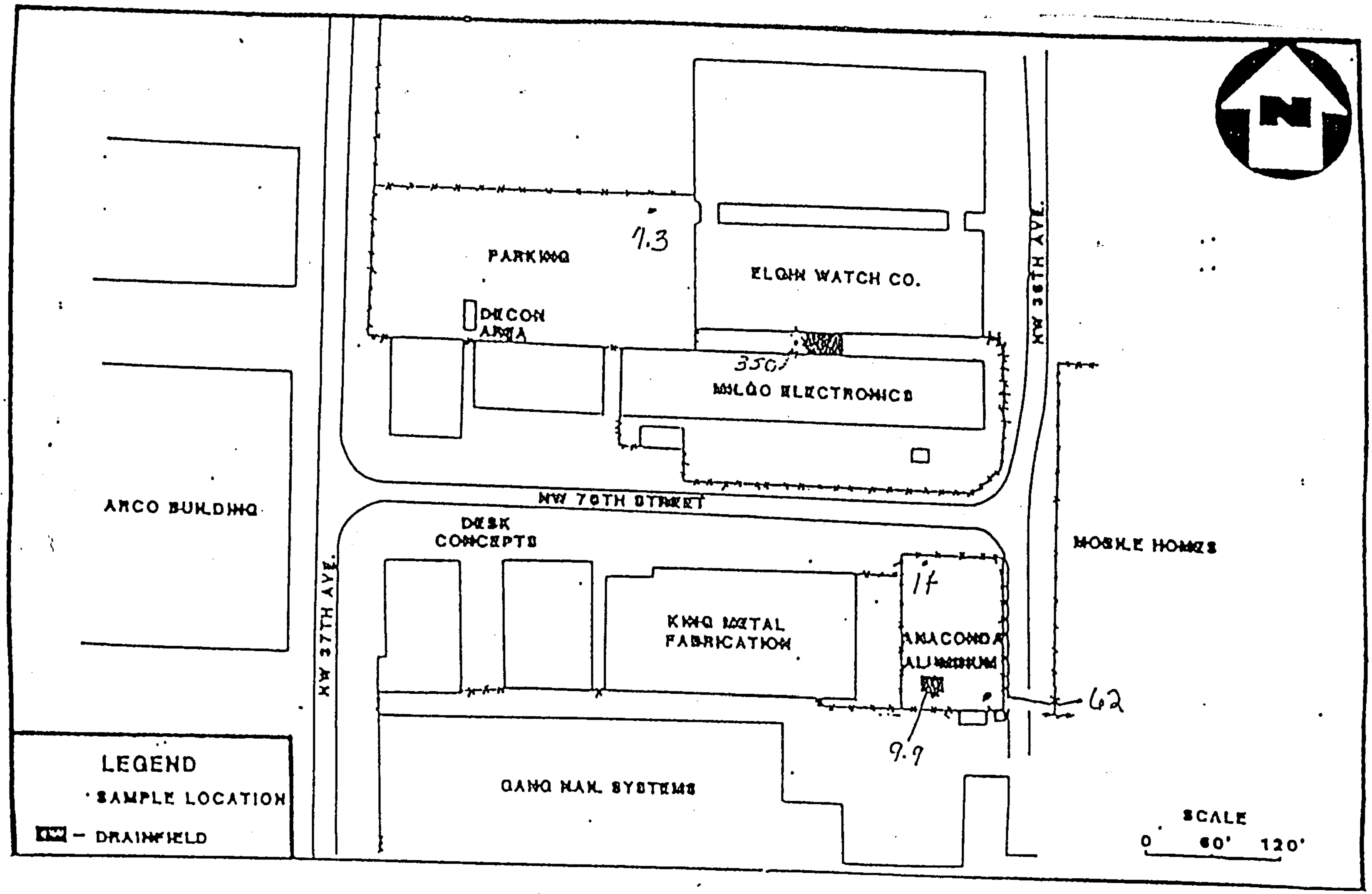
fig. 7



ALUMINUM (PPM) IN SHALLOW "P" (20 FT.) INTERMEDIATE "I" (40 FT.) AND DEEP "D" (70 FT.) GROUNDWATER FROM PERMANENT WELLS

FIGURE 7

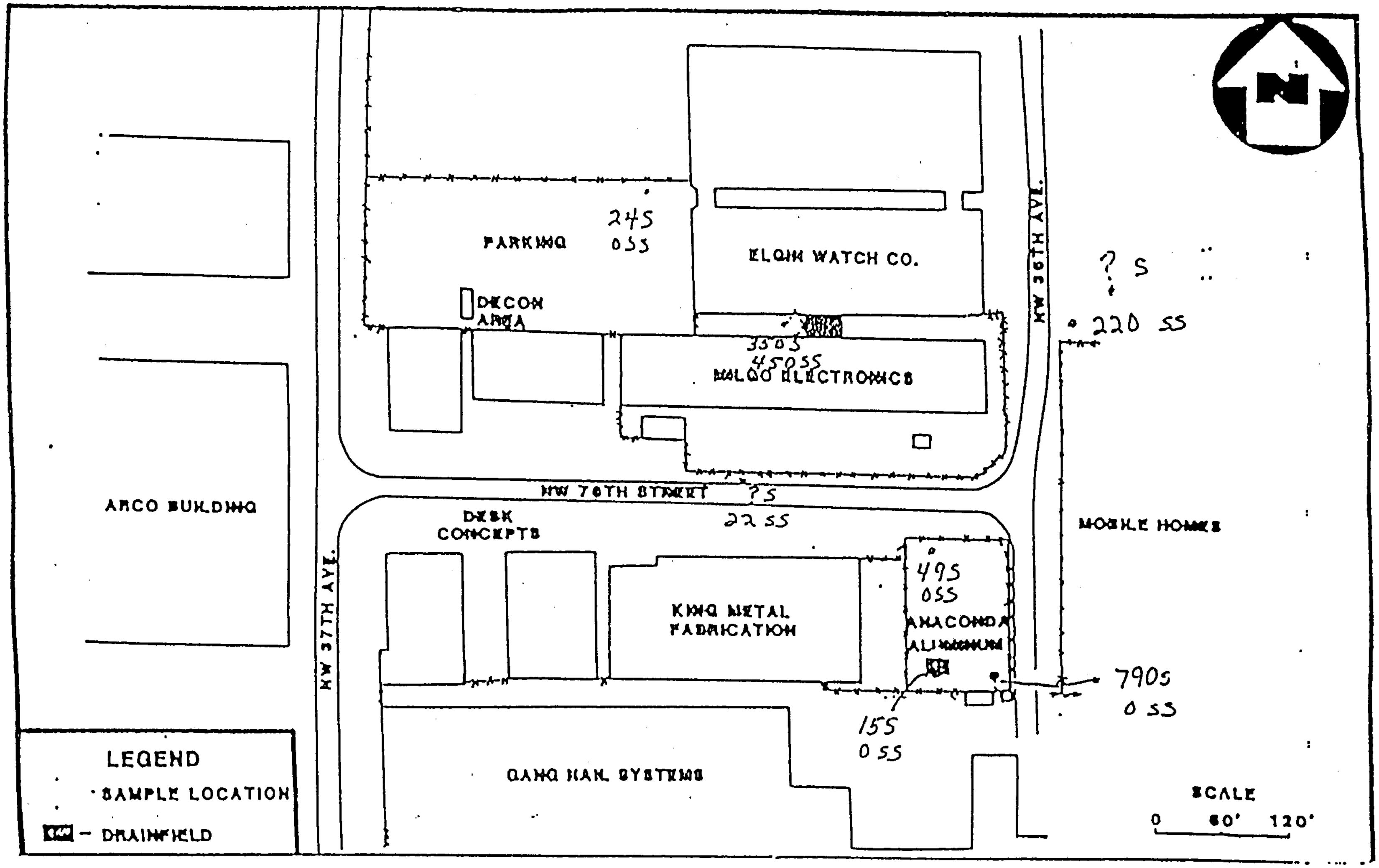
Fig. 8



CHROMIUM (PPM) IN SURFACE SOIL SAMPLES

FIGURE 8

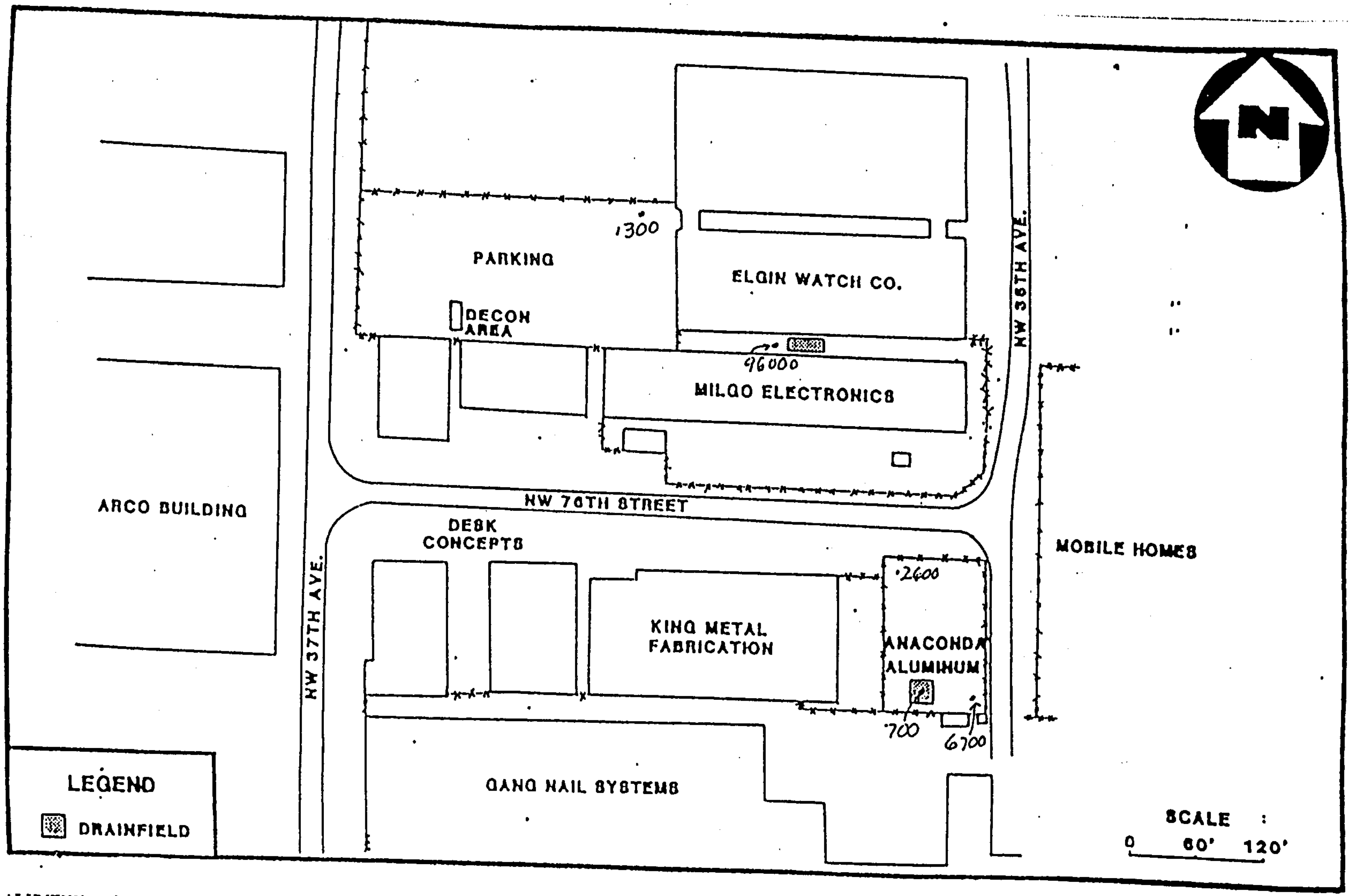
fig. 9



LEAD (PPM) IN SURFACE (S) AND SUBSURFACE (SS) SOIL SAMPLES
?- SAMPLE NOT TAKEN AT THIS LOCATION

FIGURE 9

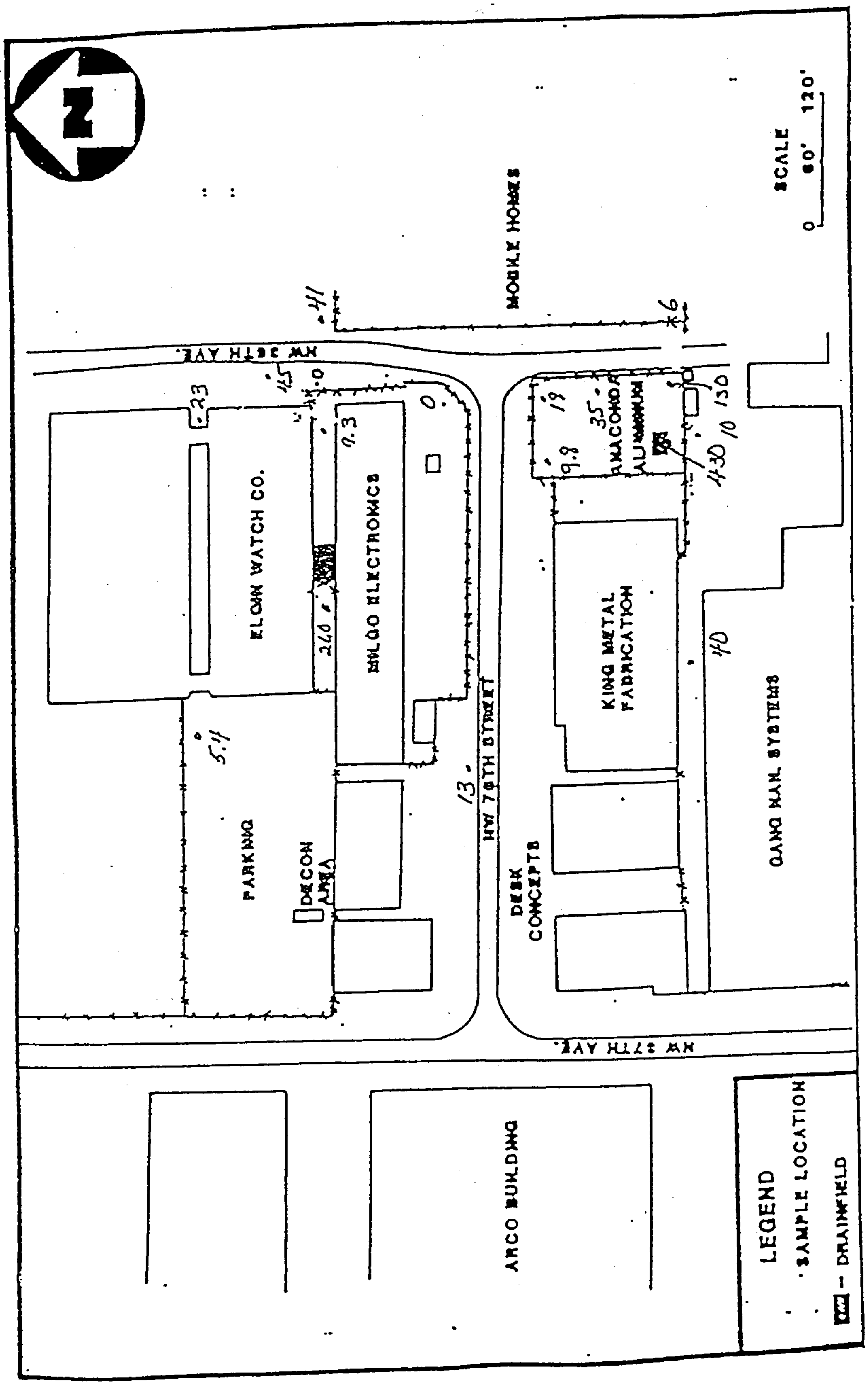
fig. 10



ALUMINUM (PPM) SURFACE SOIL

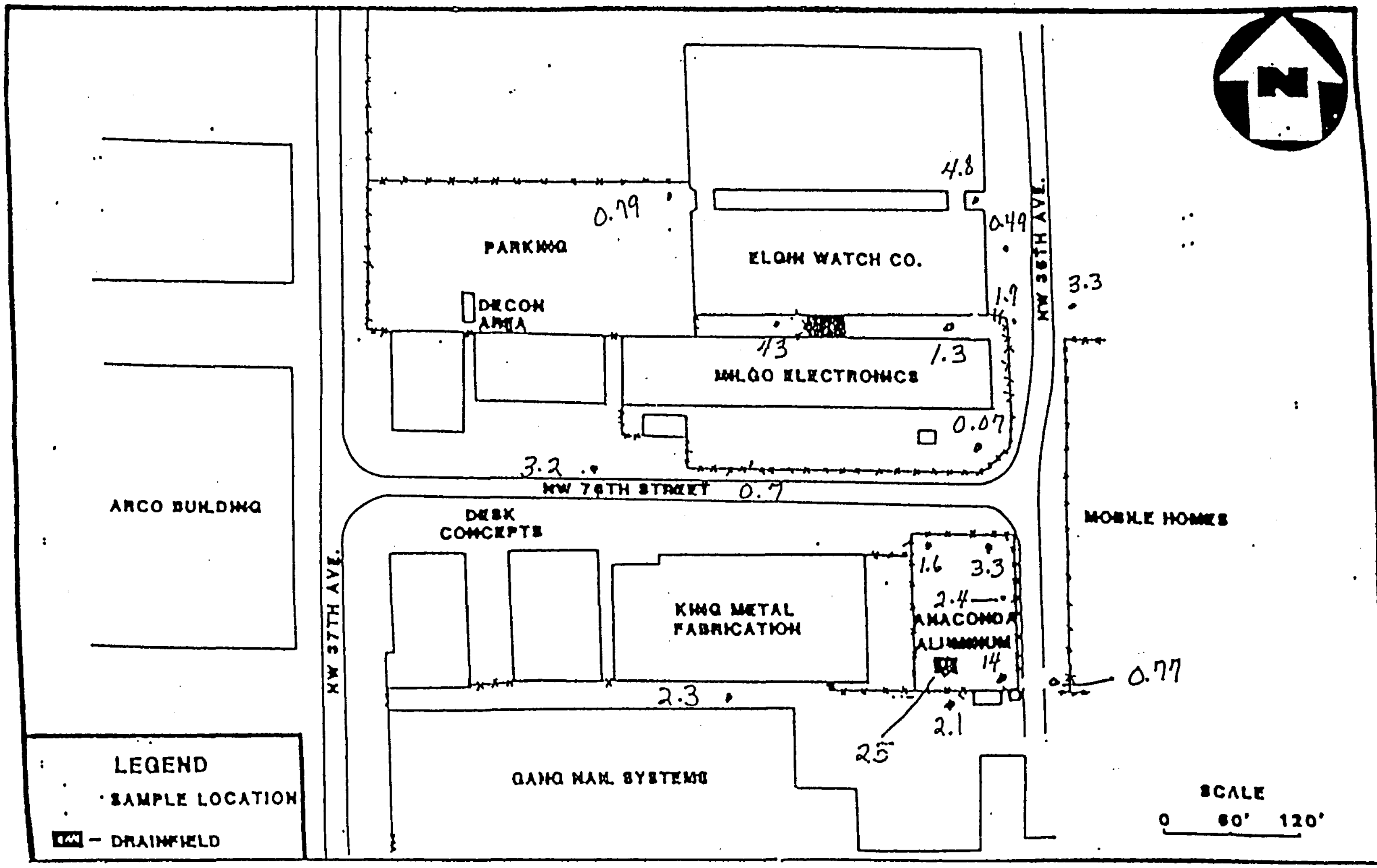
FIGURE 10

fig. 11



CHROMIUM (PPM) SUBSURFACE SOIL SAMPLES

FIGURE 11



ALUMINUM (X 1000 PPM) SUBSURFACE SOIL

FIGURE 12

Public Comments of Preliminary Health Assessment
for
Anaconda Aluminum/Milgo Electronics NPL Site

The following comments were received from Mr. W. Steven Jones, Manager, Environmental Remediation Assessments, ARCO in a letter for H. Joseph Sekerke, Jr. dated August 16, 1991.

ARCO Comment	Response
On pages 2, 3, and 15 you refer to "Dumping" at the site. The Anaconda site contained only a percolation pit which was, in fact, permitted for such use. The site was not used for "waste dumping."	Waste supernatant containing heavy metals was discarded into a "percolation pit." This meets the dictionary definition of "dump." Therefore, no changes were made in the text.
There is apparently evidence that a disposal pit was in use on the Anaconda site as early as 1953. However, Anaconda did not operate the site as early as your site history states on page 4. There was a previous owner/operator.	The date of operations for the Anaconda Aluminum plant give on pg 4 under Site Visit is a typo, it has been changed to read"...1957 to 1978..."

The Environmental Pathways discussion beginning on page 14 contains a number of highly speculative conclusions. In the first of these, you suggest that wind blown soil may have been a past problem on the site based on contaminated soil found "west of the Anaconda pit" in light of the prevailing easterlies in South Florida. Since the report earlier states you were unable to locate the pit (the site now being paved) and there is no data to support your observation about the winds, the suggestion of a blowing dust problem is almost wholly unfounded. While we understand you [sic] charge to assess all possible contamination pathways, this suggestion appears so speculative as to warrant deletion.	The statement referred to is in the Site Visit Report that the location of the disposal pit could not be identified during the visit by physical features. The location of the pit and the soil sample referenced here was provided by maps of the site presented in the ESI. It was this information that is the basis for the statement that **one possible explanation** for the presence of chromium and aluminum in the sample was wind blown dust.
Similarly, the discussion later contains an unsupported statement regarding the "unrestricted movement of the water" within the Biscayne Aquifer. It is our understanding that the Aquifer is actually quite heterogeneous and that vertical movement at any one site would be a function of the specific conditions existing at that site. Without knowledge of those conditions, any suggestion about the fate of contaminants entering the Aquifer from the site is inappropriate.	The movement within the Biscayne Aquifer is not unrestricted. This statement has been removed. However, there is no doubt that contaminates are present in the aquifer under the site. The available data were not sufficient to show movement of contaminates off site. However, there is a suggestion that aluminum, and possibly chromium and lead, have moved off the site. Therefore, Mr. Jones' last statement is incorrect.

Equally speculative is the suggestion that "high porosity and low organic content" of soil in the Aquifer favor contaminant movement. Without a discussion of the type of contamination and evaluation of factors other than porosity and organic content (e.g. pH, alkalinity, gradient and soil affinity) such a conclusion is unwarranted. This is particularly true when discussing metal movement through an aquifer containing carbonate limestone. For example, the ESI on the site states: "The contaminants cadmium, chromium, and lead are susceptible to carbonate absorption in an alkaline environment. The soils and very shallow groundwater in the site area contained extremely high concentrations of calcium carbonate from the dissolution of the Miami Limestone. This would likely lead to the retention of cadmium, chromium, and lead near the surface thereby inhibiting their migration to deeper groundwater."	This statement has been revised, although the pH of the samples collected for the aquifer indicate relatively little calcium carbonate, most samples with pH 6.5 - 7.3., Mr. Jones' quote from the ESI indicates that movement of cadmium, chromium, and lead is not likely. However, in the same section the ESI states: "...higher levels of contaminants were detected in wells located to the southeast of the site..." and "... there is sufficient analytical support of contaminant migration from the site. There appears to be a plume of contaminants migrating in a southeasterly direction from both study areas."

The Public Health Implications and Conclusions portions of the Assessment contain a discussion of possible historic human exposure to contaminants via groundwater usage. To raise such an inference from the data available is unjustifiable. It requires guessing at the nature of the contaminants from unrecorded operations that occurred more than 34 years ago, postulating an undocumented groundwater movement mechanism (the "mounding effects," note even existing data are inconclusive about gradient) and placing unknown users of unknown wells with unknown locations and depths in the path of this speculative contamination. Given the absence of any real information and indeed, the questionable accuracy of the groundwater data from the site itself (see attached affidavit), presentation of such a discussion serve little purpose. Accordingly, this discussion and Recommendation 2 and 3 should be deleted from the Assessment.	The public Health Implications indicated that further data should be collected to determine if past exposure has occurred through the use of groundwater as a drinking water source. If previous use was documented, consideration should be given to conducting a health effects study. Therefore, Recommendations 2 and 3 will remain.

Tom Kowalczyk's, a former employee of Anaconda Aluminum, affidavit attached to ARCO comments states: The temporary wells were dug by hand. I did not observe a drill rig. Once the temporary wells were dug, an effort was made to purge the wells with a pump. The pump that was used was a small capacity peristaltic pump which did not adequately purge the wells.	It is doubtful that Mr. Kowalczyk observed the digging of all the wells that were used for sampling. The depth of the wells dug by NUS ranged from 10 to 70 feet. While a 20-foot well may have been dug by hand, digging deeper wells is not possible by hand equipment.
I observed samples obtained from the temporary wells. They were turbid and murky. The samples also were not filtered.	The NUS report states that the groundwater was turbid due to dissolved limestone. Florida Administrative Code Rule 17-3.401(b) states that groundwater samples are NOT to be filtered unless data are available to show that similar results are obtained from filtered and unfiltered samples.
Currently, I am a manager of an analytical laboratory certified by the State of Florida Department of Environmental Regulation. In this capacity, I am involved directly in preparing and implementing proper well purging and groundwater sampling protocols. The samples that I observed taken from the temporary wells by the NUS Corp. personnel did not satisfy regulatory protocols for groundwater sampling.	DER does not certify analytical laboratories. The DER reviews and approves QA/QC plans for laboratories that plan to test for certification through the Department of Health and Rehabilitative Services. Mr. Kowalczyk's laboratory has not successfully completed the HRS certification program. The QA/QC plan for his laboratory is no longer current.