



CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
602-771-1601
<http://www.azgs.az.gov>
inquiries@azgs.az.gov

The following file is part of the Arimetco, Inc. Mining Collection

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX

75 Hawthorne Street
San Francisco, Ca. 94105-3901

1 - FEB 1994

Mr. Harrison Matson, Chief Geologist
Arimetco, Inc.
950 N. Finance Center Dr., Suite 180
Tucson, AZ 85710

Dear Mr. Matson:

This is in response to your December 17, 1993, letter regarding sampling modifications at the Zonia Mine. We agree to modify your sampling schedule as follows:

Location

21 parameter
Lab Test

French Gulch above Zonia Gulch	monthly
French Gulch below Zonia Gulch	monthly
French Gulch above Placerita Gulch	quarterly
French Gulch below Placerita Gulch	quarterly

If Zonia Gulch's flow is 10 gallons per minute (gpm) or greater in any 48-hour period, then the 21-parameter lab test will be conducted on samples from French Gulch above and below Zonia Gulch on a weekly basis. This accelerated testing will continue until the flow in Zonia Gulch is below 10 gpm for seven consecutive days. Sampling of discharges from other areas of the mine must still meet the requirements of our November 13, 1992, Finding of Violation and Order for Compliance.

Finally, the following data should continue to be recorded on a daily basis: flow in French Gulch and Zonia Gulch, rainfall on-site, depth to water for in-situ area wells Nos. 5 and 6, and volume pumped and duration of pumping from wells Nos. 5 and 6. If you have additional questions, please contact Enio Sebastiani at (415) 744-1876.

Sincerely,

Ken Greenberg, Chief
NPDES Compliance Section

cc: Peter Hyde, ADEQ
Ed Pond, ADEQ
Winn Winkyaw, ADEQ



NPDES Compliance Inspection Report

Form Approved.
OMB No. 2040-0057
Approval expires 4-30-88

Section A: National Data System Coding

Transaction Code 1 2 5 3 NONE NPDES 11 12 9/3/10 yr/mo/day 17 Inspection Type 18 C Inspector 19 R Fac Type 20 2

Remarks

Reserved 67 69 Facility Evaluation Rating 70 BI 71 OA 72 -----Reserved----- 73 74 75 80

Section B: Facility Data

Name and Location of Facility Inspected <u>Zonia Mine</u> <u>About Six miles east of Kirkland Junction and</u> <u>U.S. Highway 89 in Arizona.</u>		Entry Time <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM <u>9:40</u>	Permit Effective Date <u>NA</u>
		Exit Time/Date <u>2:00pm 5-21-93</u>	Permit Expiration Date <u>NA</u>
Name(s) of On-Site Representative(s) <u>Harrison Matson</u>		Title(s) <u>Chief Geologist at</u> <u>Arimetco International</u>	Phone No(s) <u>602-745-8882</u>
Name, Address of Responsible Official <u>W. Ray Hill</u> <u>Zonia Company, Inc.</u> <u>212 S. Marina St., Prescott, AZ 86303</u>		Title <u>President</u>	Phone No. <u>602-778-2101</u>
		Contacted <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Section C: Areas Evaluated During Inspection

(S = Satisfactory, M = Marginal, U = Unsatisfactory, N = Not Evaluated)

<u>NA</u>	Permit	<u>NA</u>	Flow Measurement	<u>NA</u>	Pretreatment	<u>S</u>	Operations & Maintenance
<u>S</u>	Records/Reports	<u>NA</u>	Laboratory	<u>U</u>	Compliance Schedules	<u>NA</u>	Sludge Disposal
<u>S</u>	Facility Site Review	<u>U</u>	Effluent/Receiving Waters	<u>S</u>	Self-Monitoring Program		Other:

Section D: Summary of Findings/Comments (Attach additional sheets if necessary)

See attached Inspection Report dated 8-2-93.

Name(s) and Signature(s) of Inspector(s) <u>Enio Sebastiani</u> <u>ENIO SEBASTIANI</u>	Agency/Office/Telephone <u>U.S. EPA, Region 9, (W-5-3)</u> <u>(415) 744-1876</u>	Date <u>8-2-93</u>
Signature of Reviewer <u>Ken Greenberg</u>	Agency/Office <u>EPA Region 9</u> <u>NPDES Compliance Section</u>	Date <u>8/9/93</u>
Regulatory Office Use Only		
Action Taken	Date	Compliance Status <input type="checkbox"/> Noncompliance <input type="checkbox"/> Compliance

U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION 9

Water Management Division

NPDES Compliance Monitoring Report

Name of Facility: Zonia Mine

NPDES Permit No.: None

Inspection Date: May 21, 1993

Inspection Participants:

EPA Region 9 Enio Sebastiani, Environmental Engineer
NPDES Compliance Section

Facility Harrison Matson, Chief Geologist
Arimetco International, Inc.

Prepared by: Enio Sebastiani

Date: August 2, 1993

TABLE OF CONTENTS

1. Introduction	1
2. Description of Facility	1
3. Operations History	2
4. Compliance History	3
5. Findings	5
6. Conclusions	7
7. Tables	9
8. Figures	10
9. Photographs	19

1. Introduction

On May 21, 1993, Enio Sebastiani of EPA Region 9 inspected the Zonia Mine which is owned by the Zonia Company, Inc. of Prescott, Arizona. Arimetco International is leasing Zonia Mine with the intention of resuming copper mining. The purpose of EPA's inspection was to determine compliance with the Clean Water Act (CWA). EPA was particularly interested in determining whether Zonia Mine was in compliance with EPA's section 309(a) Order No. IX-FY93-09 issued on November 13, 1992. This Order required, among other things, the Zonia Company to implement facility improvements that would eliminate discharges to waters of the United States.

2. Description of the Facility

The Zonia Mine is a non-operational copper mine that is currently owned by the Zonia Company and leased by Arimetco International, Inc.

a. Location

The Zonia Mine is located in a rural area about six miles east of Kirkland Junction and U.S. Highway 89 in Yavapai County, Arizona (Figure 1). The closest major town is Prescott, Arizona, located about 25 miles to the northeast. The general topography of the site is characterized as consisting of moderate relief. Elevations at the site range from 4,810 to 4,280 feet above mean sea level (Figure 2).

b. Surface Waters

The Zonia Mine is in the drainage basin of French Gulch, a nine mile long arroyo that runs through the mine site (Figure 2). French Gulch's drainage area is almost 14 square miles. A stretch of French Gulch downstream from most of the mine's facilities has natural perennial flow fed by groundwater springs. The rest of French Gulch is normally dry adjacent to the mine property. The flow of French Gulch varies with rainfall; historical data indicates flows ranging from 22 to 34 gallons per minute (gpm) in the vicinity of the springs.¹ However, flow estimates submitted in response to EPA's November 13, 1992, Order show flows of as much as 100-200 gpm in French Gulch at about the same point used to collect the 1980 data. Flow peaks of as much as 1000 gpm were recorded this past winter (Figure 8).

¹1980 data from: "Investigation of Water Quality French Gulch, Yavapai County, Arizona", by Leonard C. Halpenny and Sheldon D. Clark, January 1981.

Another small arroyo, Zonia Gulch, runs through the mine site and joins French Gulch downstream of most of the mine's facilities. About half of Zonia Gulch is normally dry; the other half, has variable perennial flow that is also fed by groundwater springs. The flow of Zonia Gulch in the vicinity of the springs also varies with rainfall; historical data (Halpenny and Clark, 1981) indicates flows ranging from 2 to 9 gpm. However, flows from this past winter were as high as 35 gpm (Figure 9). The perennial reach of Zonia Gulch runs from the Zonia Gulch-French Gulch confluence to a point about 1000 feet upstream (towards in-situ leach basin 5). Zonia Gulch used to flow through the area presently occupied by the open pit and the in-situ leach basins.

French Gulch joins the Hassayampa River approximately six miles down-gradient of the mine near the town of Wagoner. French Gulch and Zonia Gulch are protected by Arizona Water Quality Standards (AWQS) for the following uses: Fish Consumption (FC), Full Body Contact (FBC), Aquatic and Wildlife, warm water (A&W_w), Agricultural Irrigation (Agl), and Agricultural Livestock Watering (AgL).

3. Operations History

a. Mine Ownership

Mining in the Zonia area began in the late 1860's and extended intermittently to 1975. The mine was operated continuously from 1966 until March 25, 1975 by McAlester Fuel Company of McAlester, Oklahoma. McAlester produced 33,600,000 pounds of copper from low-grade oxide ores. A poor market for cement copper forced the mine to shut down in 1975. McAlester's assets were acquired by Enstar Petroleum, Inc. in the late 1970's or early 1980's.

Antioch Resources, Inc. became the property owner of the mine on November 21, 1983. The Zonia Company purchased the property from Antioch Resources, Inc. in October 1988. The Zonia Company has not conducted any mining operations to date. Zonia Company sold 200 of the mine's 700 patented acres to Zonia Landfill, Inc. of Prescott, Arizona in 1990. Zonia Landfill filed an Aquifer Protection Permit application for a proposed landfill with ADEQ, but the permit was denied.

Several companies that investigated the production potential of the mine from 1976 to 1988 have held lease interests in the mine. A partial list of these companies includes: Phelps-Dodge Corporation, Homestake Mining Co., NERCO, and Queenstake Resources U.S.A., Inc. On August 21, 1992, Arimetco leased the 500 acre portion of the mine site still owned by Zonia Company to explore the possibility of resuming copper mining. Arimetco has agreed to an "option" on the mine land which allows for the possibility of a land purchase instead of a lease. At this time,

it appears that mining will resume after Arimetco obtains a permanent Aquifer Protection Permit.

b. Mining Practice

There are seven heaps or leach basins (LB) on-site that were used for leaching ore from the open-pit, and they were referred to as LB 1-4 and LB 7-9. LB 1-4 (this basin is terraced into four levels and can actually be considered one basin) are centrally located directly above the mine recovery or processing plant. LB 1-4, which are asphalt-lined, cover 18.5 acres. LB 7-8 (actually one basin terraced into two levels) and LB9 are located on the southwest side of the mine. LB 7-8 cover 3.74 acres, and LB9 covers 26.9 acres. LB9 appears asphalt lined, but mine records do not indicate whether LB 7-8 are lined. Arimetco's new designations for these basins are as follows: LB1 (formerly LB 1-4) and LB3 (formerly LB 7-9).

The cost of mining and transporting ore became uneconomic in 1973 and in-situ mining was started and conducted until 1975. There are two leach basins on-site that were used for in-situ mining, LB 5-6. LB 5-6 are located on the east side of the Mine down gradient from the pit. LB5 covers 10.68 acres, and LB6 covers 4.77 acres. LB 5-6 have been renamed as LB2.

4. Compliance History

As early as April 1980, biologists from the U.S. Bureau of Land Management (BLM) observed copper precipitate and leachate discharges in French Gulch from the mine's leach basins. The Arizona Department of Health Services (ADHS), ADEQ's predecessor agency, conducted a water and sediment sampling inspection of the mine area on June 11, 1980. This inspection also revealed evidence of mine leachate discharge into French Gulch.

On August 27, 1980, ADHS informed McAlester Fuel Co. that, based on a June 11, 1980 inspection, McAlester's discharge to French Gulch violated State surface water quality and hazardous waste standards. ADHS required McAlester to submit a proposed abatement plan. McAlester submitted two reports discussing groundwater flows at the site and the potential impacts of LB 5-6 leachate. McAlester proposed extraction wells as the solution for groundwater discharges, via surface springs, caused by very wet winters. The reports and extraction well proposal were prepared by Water Development Corporation of Tucson, Arizona.

ADEQ conducted a compliance evaluation inspection on April 12, 1989 based on local complaints. After this inspection, ADEQ sent EPA a "NPDES Non-filer Report" that documented a 3-5 gallon per minute (gpm) discharge of mine leachate into French Gulch from the pipeline that used to carry leachate from LB 7-9 to the mine processing plant. ADEQ also observed evidence of past

discharge--the presence of a blue-white precipitate in French Gulch indicative of past leachate flow.

EPA inspected the Mine in 1986, 1989, 1990, and 1992. As discussed below, these inspections further produced evidence of discharge to French Gulch and possibly Zonia Gulch.

EPA received a written complaint and phone call from a local rancher regarding discharges to French Gulch in March 1989. In response to this complaint, Claire Elliot of EPA Region 9 and ADEQ staff inspected the Mine on May 25, 1989. This inspection team did not observe any on-going leachate discharge, but they did observe evidence of past discharge. Blue precipitate, indicative of the former presence of copper-laden leachate, lined the dry bed of French Gulch at two locations where the leachate conveyance pipe was broken.

EPA Region 9 and ADEQ staff inspected the Mine on April 5, 1990. These inspectors observed leachate entering French Gulch from broken pipes at LB 7-9. An administrative order issued by EPA Region 9 on July 13, 1990 pursuant to CWA section 309(a) required Zonia Company to perform the following remedial measures by January 1, 1991: 1) repair pipelines used to transport leachate from LB 7-9 to the processing plant, 2) restore and maintain operational pumps at LB 5-6, 3) test pond liners, 4) reconstruct the collection pond berm, and 5) install fencing around all ponds.²

On March 12, 1992, ADEQ's Point Source and Monitoring Unit received a telephone complaint from a local resident regarding discharges into French Gulch. ADEQ staff conducted site and sampling visits on March 16 and 23, 1992. ADEQ observed a discharge of leachate (pale-turquoise in color) from the base of LB9 down a small canyon (about 230 yards long) and into French Gulch. ADEQ measured a total flow of about 20 gpm from LB 9. Some of the flow came out of rocks at the base of LB9 and the remainder of the flow was leaking from valves on plastic pipes at the base of LB9. EPA and ADEQ staff observed this same sort of discharge during a September 1, 1992, inspection with Mr. W. Ray Hill, Zonia Company president.

Rainfall runoff percolates through the Mine's leach basins and continues to produce a leachate laden with minerals. During periods of rainy weather, there have been surface discharges of leachate from the mine into French Gulch. This discharge previously originated from two areas: (1) pipelines carrying leachate from LB 7-9 (eventually dismantled in response to EPA's

²The order originally required Zonia Company to complete these remedial measures by November 1, 1990. EPA Region 9 extended this deadline until January 1, 1991.

8/9/93

July 13, 1990 Order) and (2) from a rock pile and leaky pipe joints at the base of LB9. During the September 1, 1992, inspection, it also appeared that leachate could easily overflow a small containment berm below LB 7-8. In addition, there is evidence³ to suggest that mine leachate has been percolating into groundwater underlying the site in various locations and has been then transported into Zonia Gulch Springs and possibly French Gulch Springs.

The persistent CWA violations at Zonia Mine resulted in another Section 309(a) Order (November 13, 1992) with the following requirements: 1) cease all discharges to French and Zonia Gulches, 2) develop and implement site remediation plans, 3) resume in-situ basin pumping and flow monitoring in the Gulches, 4) monitor the water quality of all discharges, and 5) develop and implement a study to investigate subsurface contamination at the site.

5. Findings

On January 4, 1993, Arimetco began remediation and monitoring activities at the Zonia Mine on behalf of the Zonia Company. Arimetco also began exploratory activities to resume mining. Arimetco has conducted a number of activities to achieve compliance with EPA's November 13, 1992, Order and has spent at total of \$216,163 on environmental remediation. These activities are described below along with key findings of the inspection.

a. Monitoring

Weirs were observed in French Gulch near the mine headquarters and at the beginning of Zonia Gulch (Photos 2 and 57). These weirs had been damaged by winter storms. Therefore, monthly reported flows were visual estimates. The weir design in French Gulch also appeared to be susceptible to inaccurate flow measurement (weir was too close to the culvert and its notch was too close to the ground). French Gulch samples for metals analysis were preserved with acid, but they were stored in a standard refrigerator without a thermometer. Metals samples should be stored at 4°C according to Standard Methods.

b. Site Clean-up

Arimetco removed all of the dismantled (by Zonia Co.) plastic piping from the bed of French Gulch upstream of the mine

³The low pH and high metal content of Zonia Gulch have caused other studies to conclude contamination from LB5 (Halpenny and Clark, 1981, and Schmidt and Associates, "Hydrogeologic Conditions at the Proposed Zonia Landfill", 1989). ADEQ data leads to similar conclusions.

headquarters. Arimetco also removed the scrap iron from the Mine headquarters that had been used for copper precipitation (cementation).

c. Illegal Discharge Elimination from LB3

Arimetco received CWA Section 404 permits (March 23, 1993, Nationwide permit) to construct dams on two unnamed tributaries to French Gulch. One of these dams was constructed on the ravine leading from the toe of LB3 (or LB 7-9) to French Gulch. Unauthorized discharges were observed in this ravine on September 1, 1992, by EPA and by other inspectors in the past. The dam is about 40 feet wide at the crest and 200 feet long (Photos 16-17 and 19-20). The dam is tied to bedrock (Photo 19) and has a clay core. A pond has been compacted in front of the dam (Photos 21-22), and the dam's face will be lined with plastic (HDPE). This dam (about 7.2 million gallons of storage) is considered secondary containment since a smaller dam (about one million gallons of storage) will be constructed closer to the toe of LB3.

The toe of LB3 did not appear to leak during this inspection; however, residual leachate from previous discharges was visible in pits in the ravine (Photos 23, 25, and 33). These pits had been used as collection sumps for pumping during the winter and spring. Arimetco activity reports indicated cessation of discharge from LB3 on March 16, 1993.

d. LB1 Status

Leachate from LB1 is still contained by discharging into the holding bay and collection pond at the mine headquarters. This solution is subsequently pumped to the barren solution pond immediately east of LB1. The February 1993 activity report submitted by Arimetco indicated that the barren solution pond was completely full. This pond is currently unlined, but Mr. Matson of Arimetco stated that this pond will eventually be double-lined. Mr. Matson also hypothesized that the barren solution pond may be contributing to the contamination of French Gulch Springs.

e. In-situ Basin Status

One pump was installed and operational in each of the two in-situ leach basins (LB 5-6, Photos 43-47). These pumps are connected to a 4-inch plastic pipe that discharges into the discard solution reservoir (Photos 40 and 46). The in-situ basin water levels have dropped about 20 feet since pumping was initiated. During a July 19, 1993, phone conversation with Mr. Matson, he stated that in-situ pumping was now limited to four hours per day since water levels were falling below the well depths.

f. Water Quality in French and Zonia Gulches

The face of one spring in French Gulch in the vicinity of the andesite dike was stained with turquoise colored precipitate (Photos 52-53). However, precipitate was not visible in the stream bed at these points (Photos 54-55). At the confluence with Zonia Gulch, French Gulch's bed begins to be covered with a gelatinous, turquoise-colored precipitate. The beginning of Zonia Gulch (upstream of the weir, Photo 56) is a pool laden with a gray-colored precipitate. This precipitate appears to form on a filamentous algae in some places. The algal growth in Zonia Gulch may be encouraged by the high nitrate concentrations present which are indicative of the explosives used to create the in-situ leach basins.

On March 22, 1993, about 40 tons of 3/4" limestone were placed at the beginning of Zonia Gulch to raise its pH. The presence of the limestone appears partially responsible for the extensive precipitation that was observed. At the confluence of French Gulch and Cottonwood Springs (historically a high-quality water), French Gulch's bed was densely covered with precipitate which was observed to the location of the "core shed" (about 500 feet downstream from the confluence with Cottonwood Springs). The turquoise precipitate continued to cover the bed of French Gulch as it flowed downstream (Photos 58-62). The complete extent of the precipitation further downstream was not determined.

Water quality data for French Gulch (about 20 feet downstream of the confluence with Zonia Gulch) collected by Arimetco has been plotted in Figures 3-9. This data shows that increased metal concentrations correspond with the flow pattern in Zonia Gulch very well. For example, higher Zonia Gulch flow on March 11 led to higher metals while a decrease in Zonia's flow on May 10, with fairly constant flow upstream in French Gulch, corresponded with a significant decrease in metal concentrations.

Even though French Gulch has violated some water quality standards, it has historically been of better quality than Zonia Gulch. However, recent data (1992-1993) collected by ADEQ seems to indicate that French Gulch's water quality is deteriorating (Table 1). The reason for the drastic change in 1993 is not clear especially since an ADEQ sample of French Gulch in the vicinity of the andesite dike (upstream of the washed-out road and culvert) shows much better water quality on the same date.

6. Conclusions

1) The remedial measures undertaken by Arimetco have made some significant improvements to the Zonia Mine site. The clean-up activities, dam construction, and in-situ pump system are notable improvements. Categorizing the extent of subsurface

contamination and remediating its impact, along with properly containing leachate impoundments (holding bay, collection pond, barren solution pond, and discard solution reservoir), appear to be the major issues that now require attention.

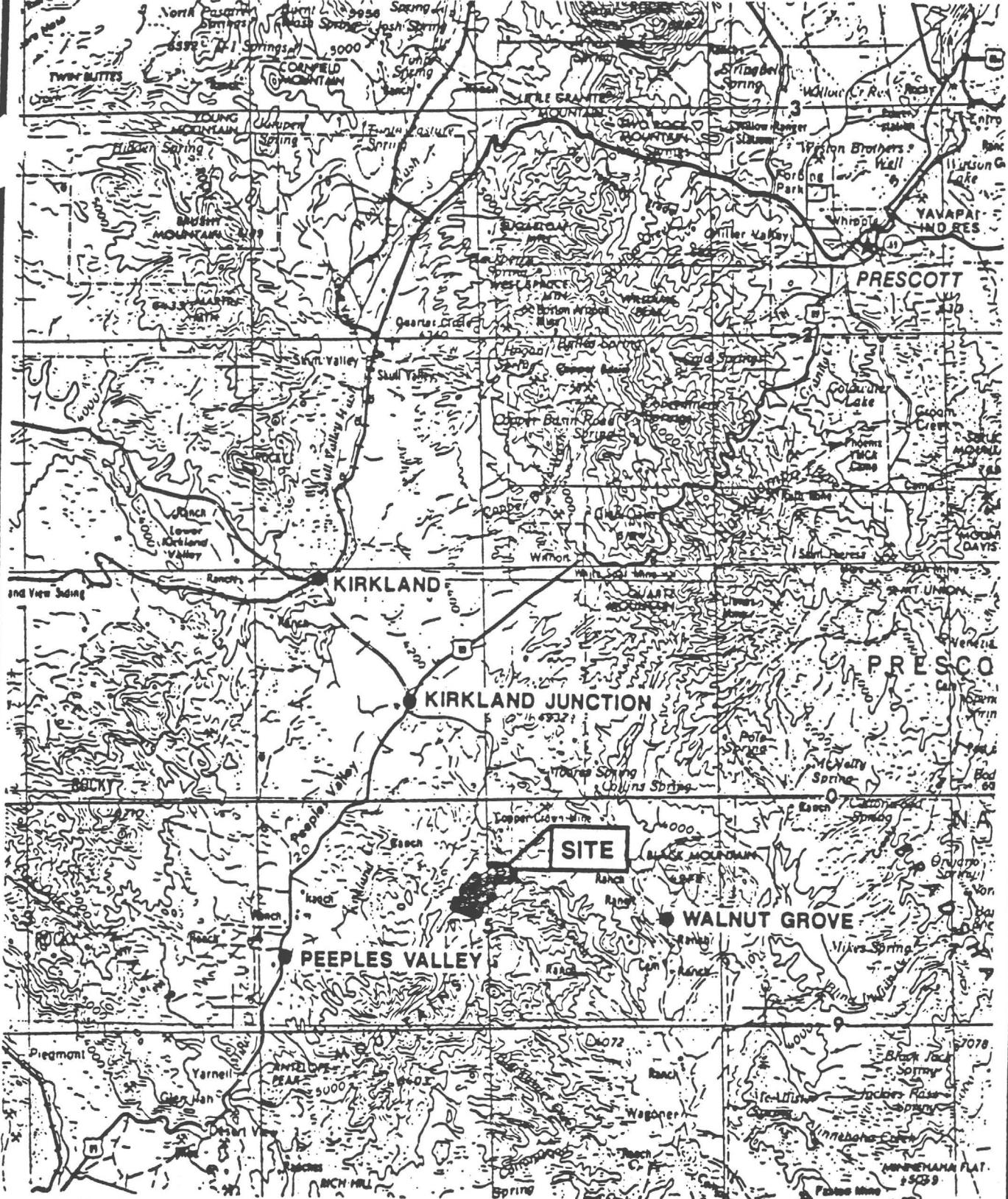
2) The water samples collected for metals analysis must be stored at 4°C as required by Standard Methods.

3) The Zonia Company must complete its investigation of subsurface contamination at the mine site as required by EPA's November 13, 1992, Order. This study was due on April 1, 1993. The Zonia Company's failure to submit this study constitutes a violation of the Clean Water Act. In addition, adequate characterization of subsurface contamination is necessary to obtain a permanent Aquifer Protection Permit.

Table 1. Annual ADEQ Monitoring of French Gulch⁴. All concentrations are for the total recoverable fraction in mg/L.

Parameter	1993	1992	1980-1991 Extreme	1980-1991 Average
alkalinity	164	207	227	252
nitrates	5.70	0.71	1.1	0.29
cadmium	0.200	0.0220	0.0120	0.0064
copper	84.0	1.07	0.60	0.17
iron	0.34	1.17	1.14	0.39
manganese	79.2	44.2	31.0	18.1
zinc	26.4	1.00	0.91	0.33

⁴French Gulch below beginning of perennial flow, just below washed-out road and culvert, also known as "French Gulch Springs".



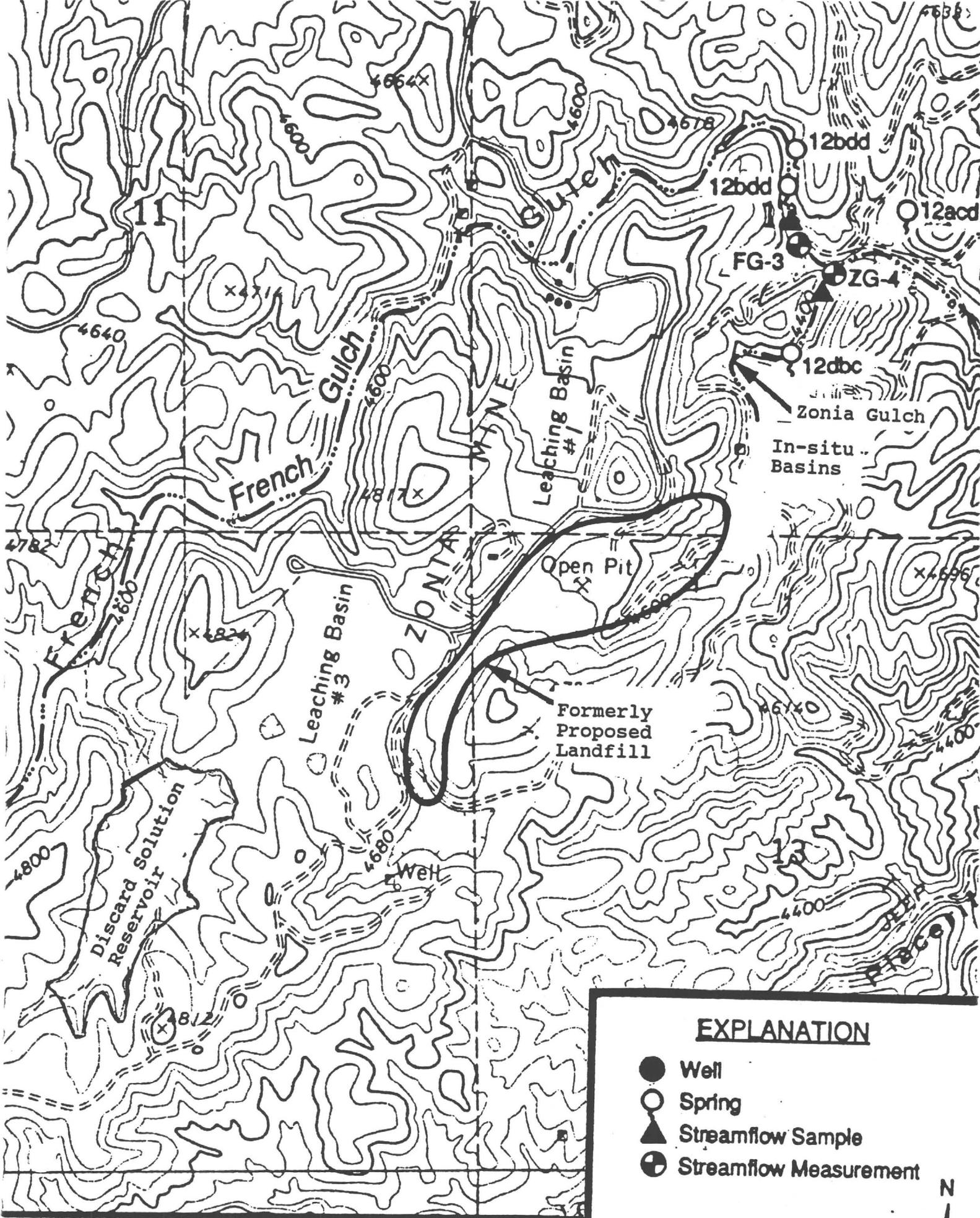
SCALE 1" = 250,000'



LOCATION MAP

REFERENCE: USGS 15 MINUTE QUADRANGLE MAP
 PRESCOTT 1954, REVISED 1970.

BY **Dames & Moore** Figure 1



EXPLANATION

- Well
- Spring
- ▲ Streamflow Sample
- ⊕ Streamflow Measurement

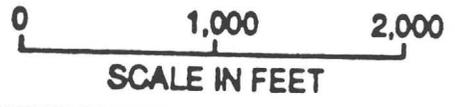


FIGURE 2

Figure 3. French Gulch metals.

Below confluence with Zonia Gulch.

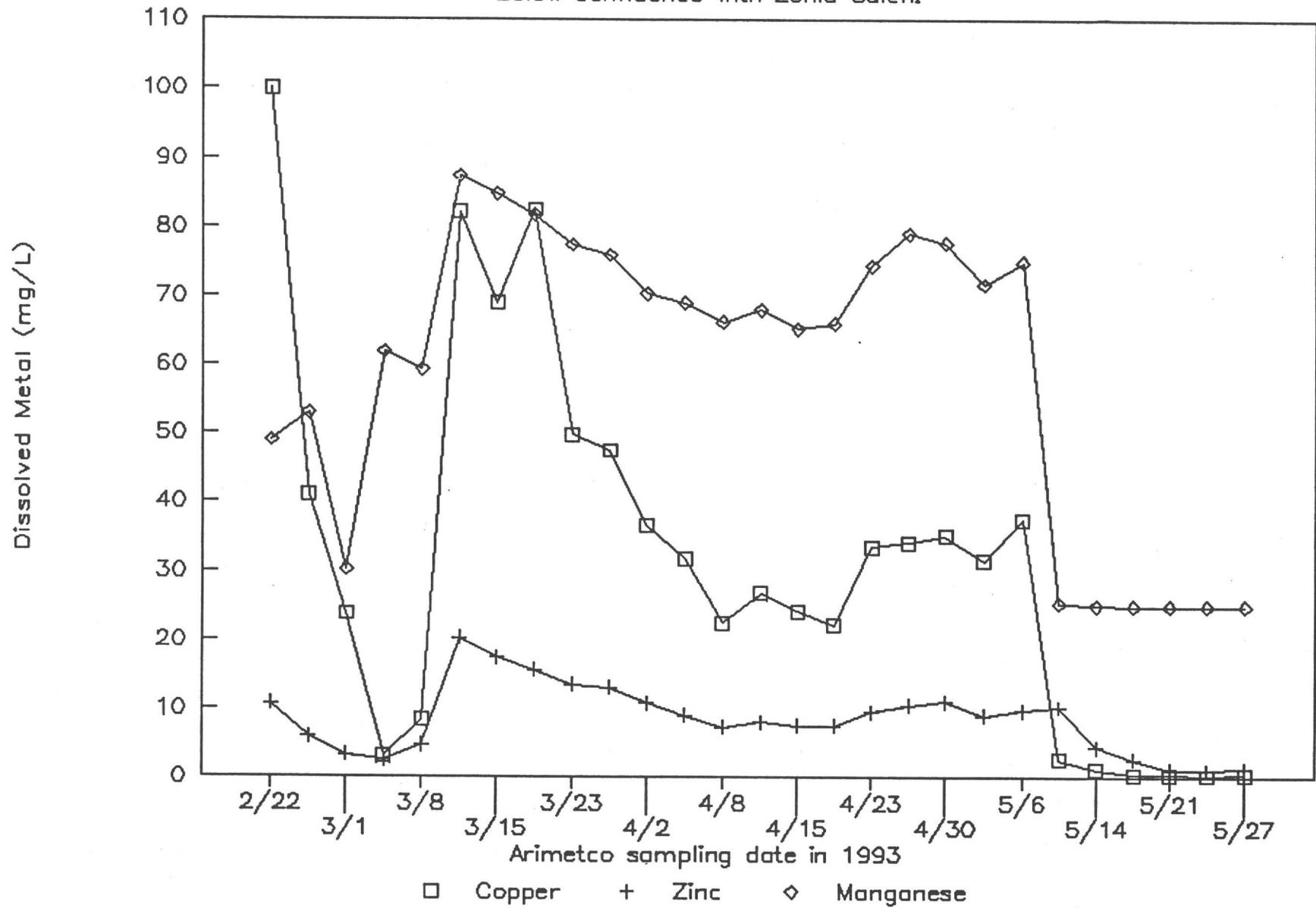


Figure 4. French Gulch metals.

Below confluence with Zonia Gulch.

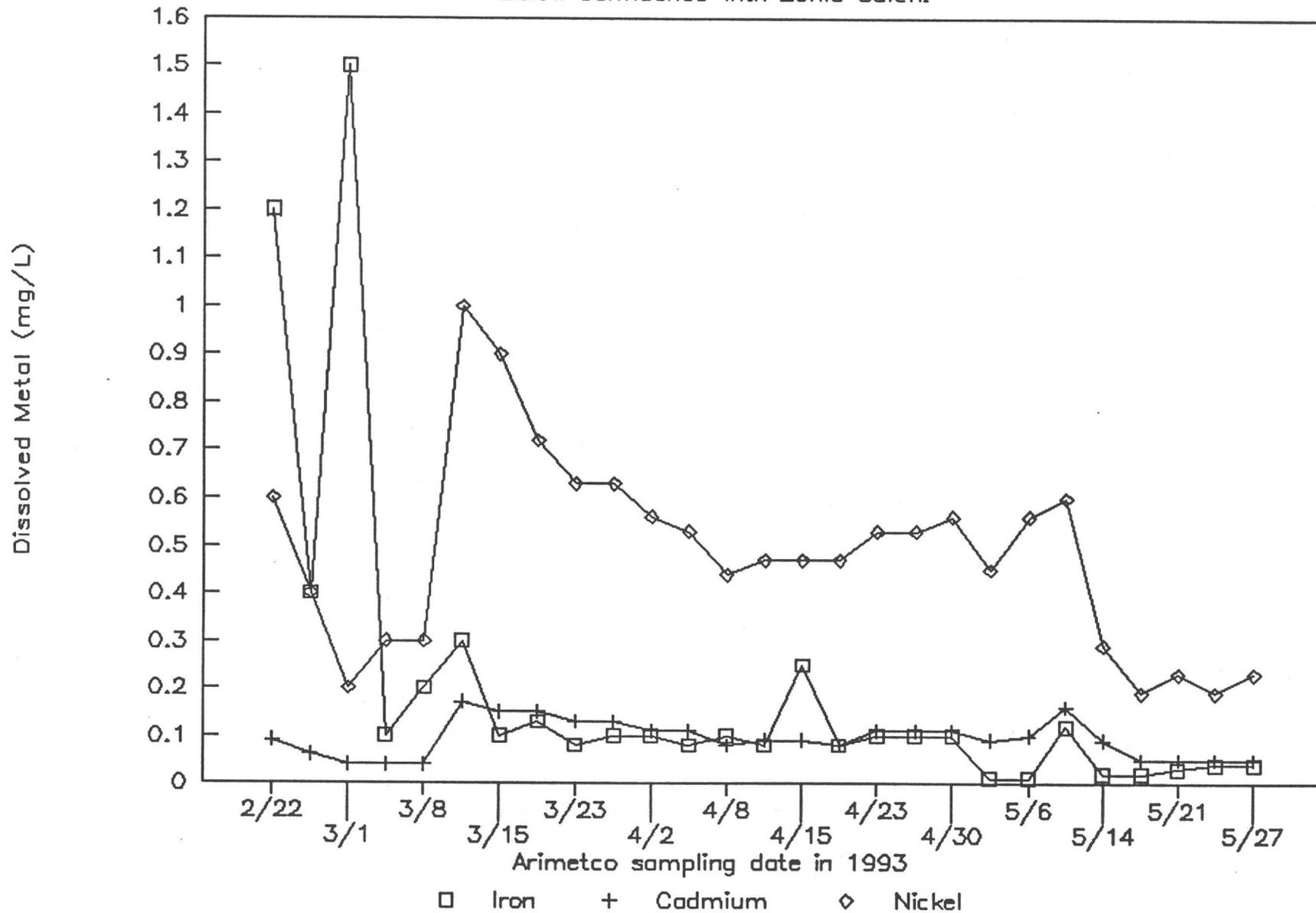


Figure 5. French Gulch TDS & sulfate.

Below confluence with Zonia Gulch.

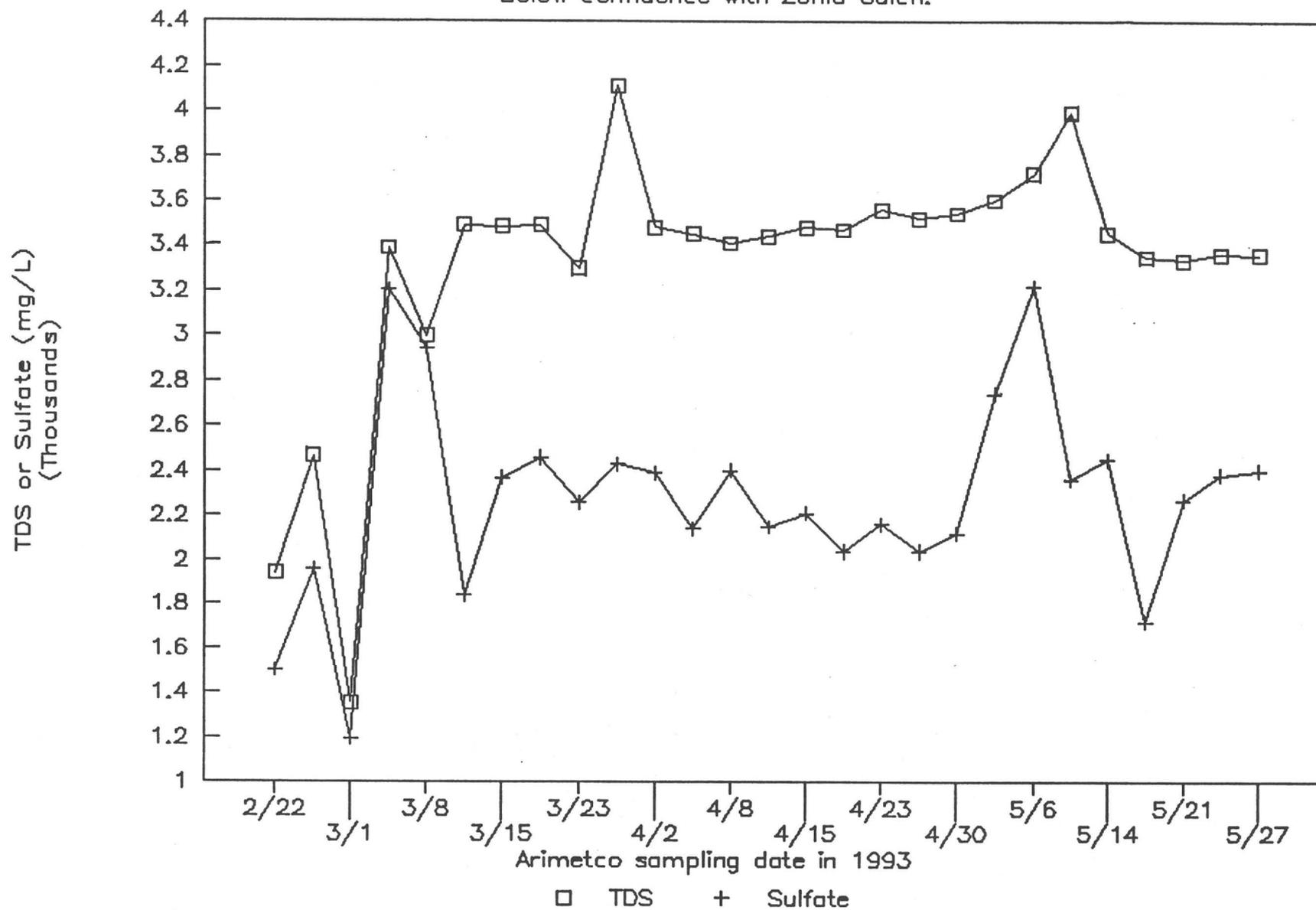


Figure 6. French Gulch Alkalinity.

Below confluence with Zonia Gulch.

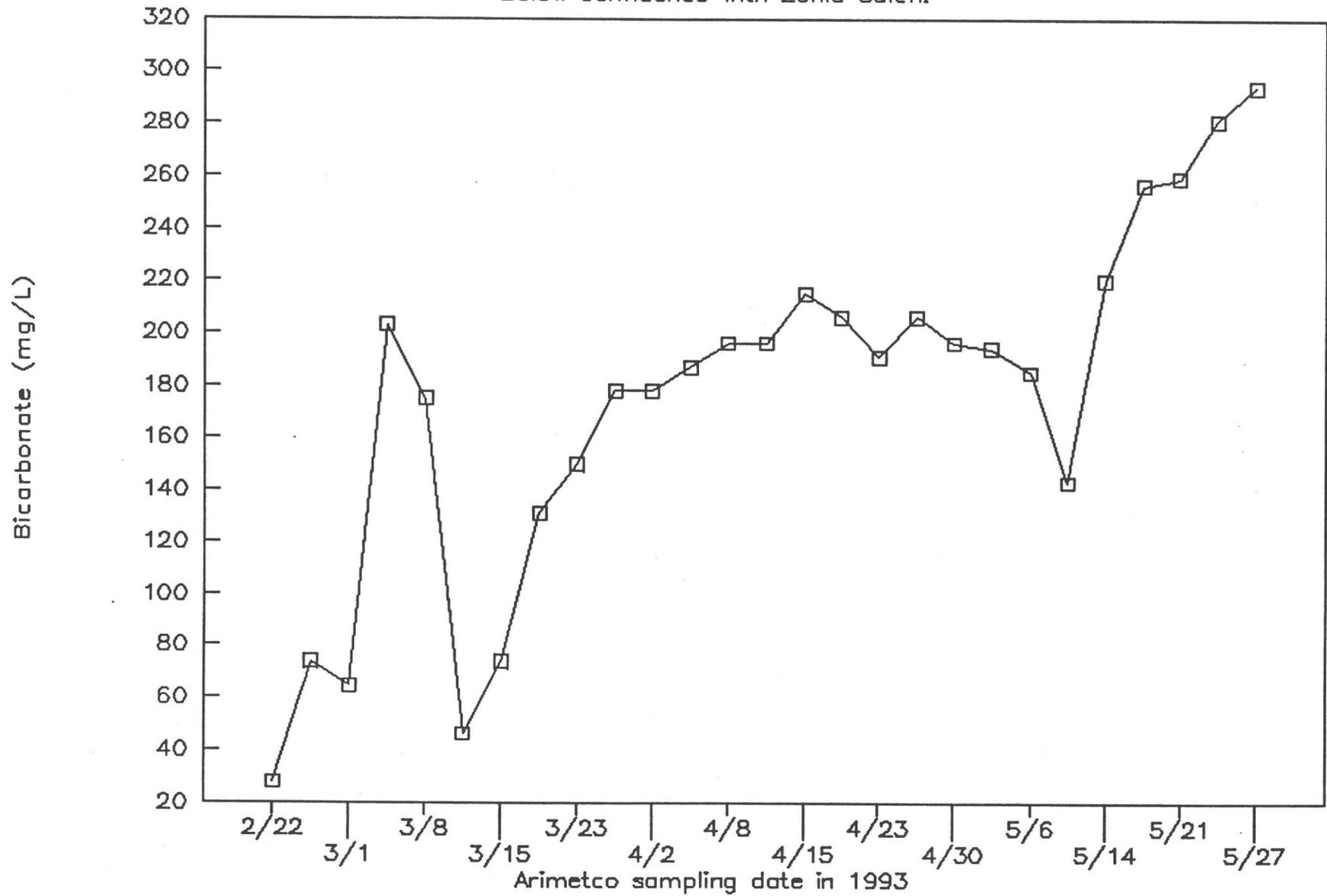


Figure 7. French Gulch pH.

Below confluence with Zonia Gulch.

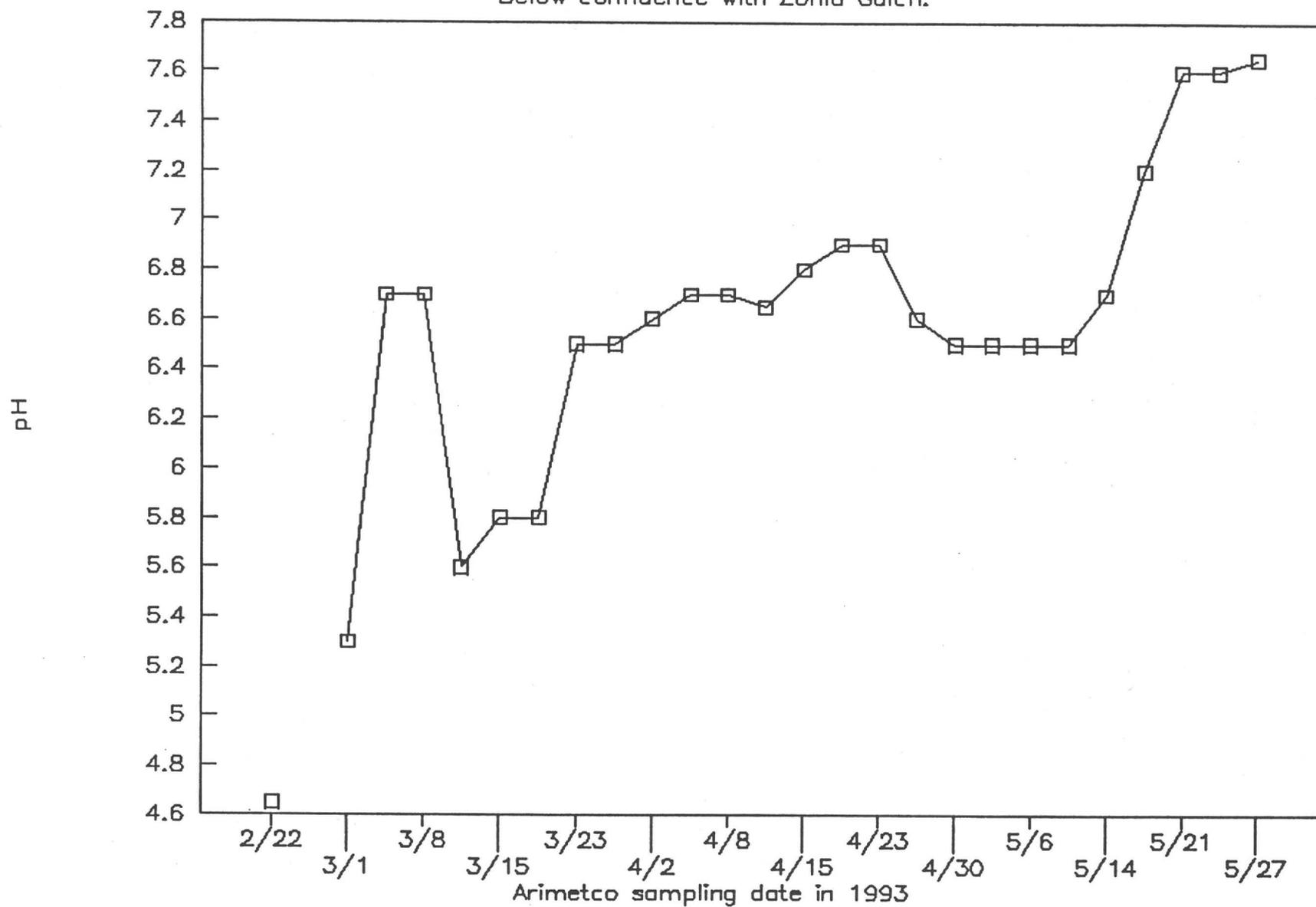


Figure 8. French Gulch Flow.

At washed-out culvert and road.

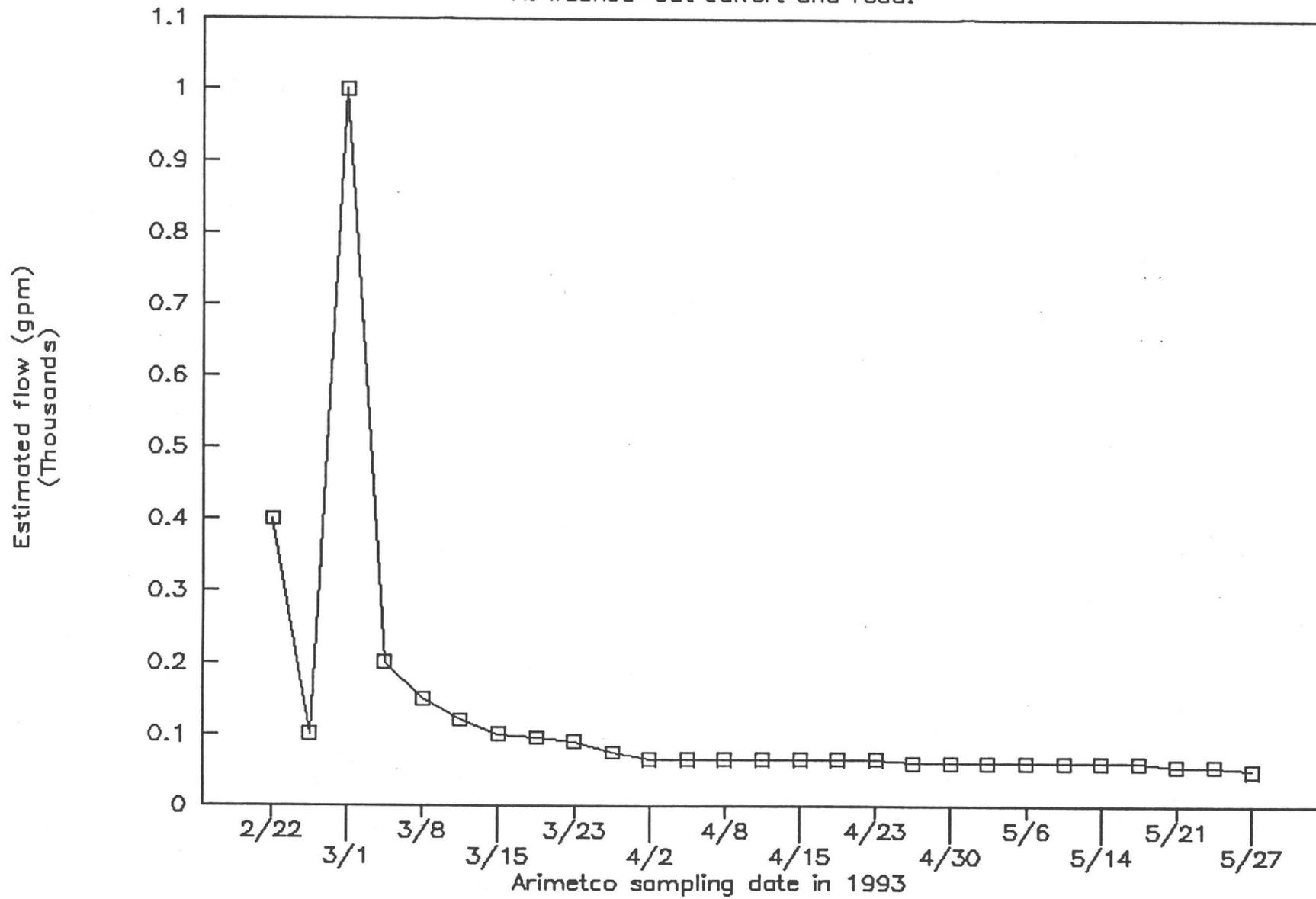
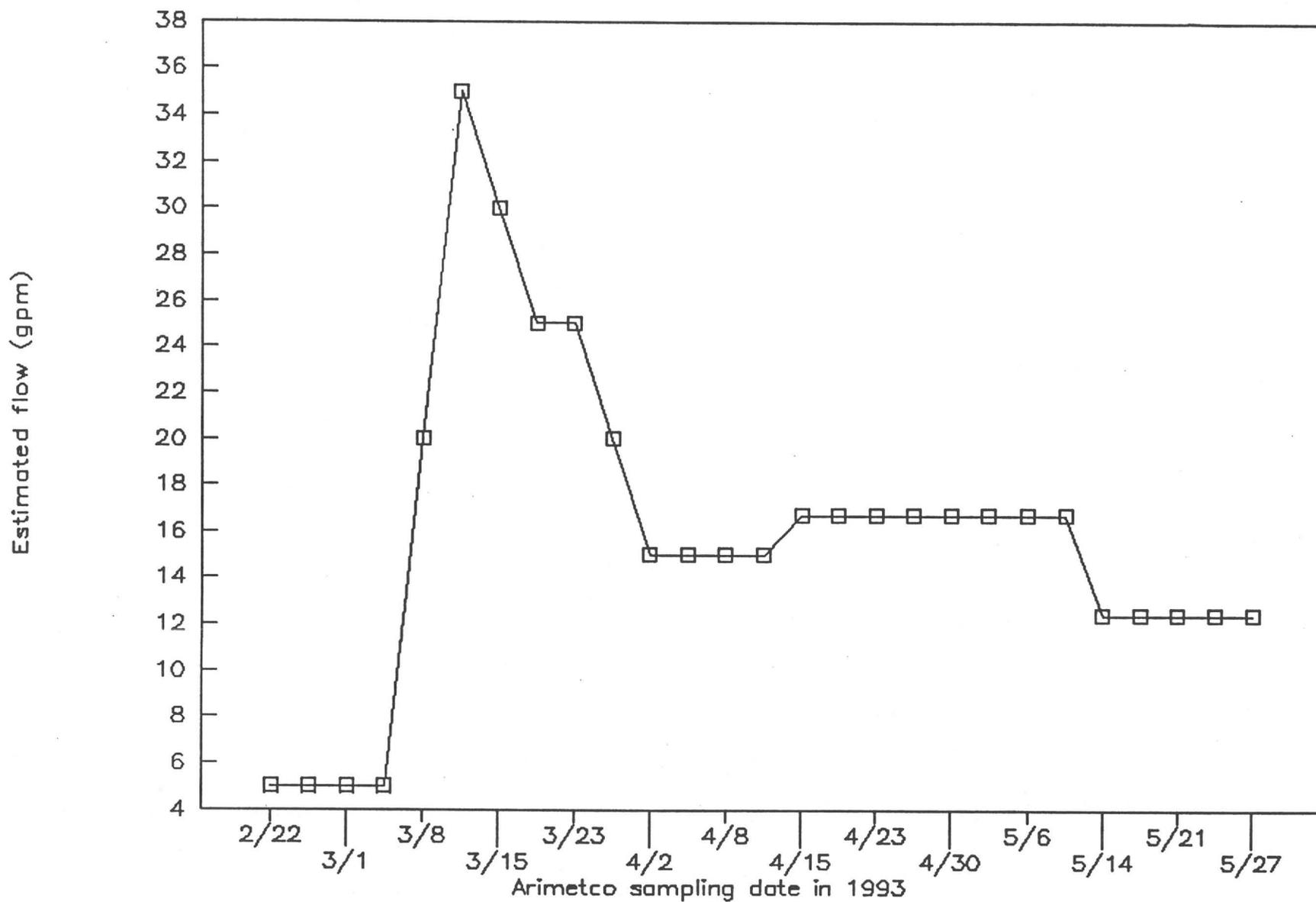


Figure 9. Zonia Gulch Flow.



ENVIRONMENTAL PROTECTION AGENCY

REGION 9

Water Management Division

NPDES Compliance Monitoring Report

Name of Facility: Zonia Mine

NPDES Permit No: none

Inspection Dates: April 5, 1990

Inspection Participants:

EPA Shirin Tolle, Engineer
Compliance Branch, EPA Region 9

State Cindy Carr
Hydrologist

Barry Abbot
Solid Waste Permits

Mike Milczarek
Compliance

Facility John Ruble
Site Manager

Ray Hill
Owner

Robert Bralhode
Consultant, Dames and Moore

Doug Bartlett
Consultant, Dames and Moore

Prepared by: Shirin Tolle
Date: May 1, 1990

1 INTRODUCTION

On April 5, 1990 Shirin Tolle of EPA and Cindy Carr, Barry Bott, Mike Milczarek of ADEQ conducted an inspection of the Zonia Mine. The purpose of the inspection was to determine the mines compliance with the Clean Water Act and to establish monitoring requirements for the Aquifer Protection Permit being developed by ADEQ for the Zonia mine landfill project.

Zonia mine is located approximately six miles southeast of Kirkland Junction off U.S. 89, south of Prescott AZ. Drainage from the mine area enters French Gulch, a tributary to the Hassayampa River. Downstream of where Zonia Gulch and French Gulch meet, east of the mining area, there are two springs and an Artesian well next to an old cabin (the cabin well). French Gulch and the Hassayampa River are protected by Arizona Water Quality Standards for the following uses: Aquatic and Wildlife, Incidental Human Contact, Agricultural Livestock Watering, Agricultural Irrigation.

DESCRIPTION OF THE FACILITY

McAlester Fuel Company originally operated the mine for pit leaching of copper oxide ore. A large open mine pit was dug at the head of Zonia Gulch which connects to French Gulch east of the mine. The ore from the mine pit was transferred to leach pits where water was applied to the ore and leachate collected by a series of pipes. The pipes led to a containment weir, then to the processing plant where pregnant solution was plated out. The barren solution from the processing plant went to a collection pond and originally to the barren solution pond. According to the current owner Ray Hill the discard solution pond at the top of the site was believed to be added later. A return line from the discard solution pond recycled barren solution through the plant (refer to the site map in Attachment II and the topographic map in Attachment III which shows location of monitoring wells).

There are nine leach basins at the site. Leach basins LB1, LB2, LB3 and LB4 are located directly above the processing plant. Leach basins LB7, LB8 and LB9 are located on the west side of the mine with LB9 at the highest elevation. Two in-situ leach areas, LB5 and LB6 are located on the east side of the mine below the open pit mine. The open pit mine is located at the original headwaters of Zonia Gulch. LB5 and LB6 are located below the open pit mine, also along the original flowpath of Zonia Gulch.

LB1-4 contains 3.6 million tons of ore with a surface area of 18.5 acres. LB7 contains 347,045 tons of ore within a 3.74 acre area. LB8 and LB9 covers 26.9 acres, but capacity data was not reported.

Leach heaps are apparently lined with two layers of as-
eparated by a layer of compacted fill, however this is an
ion based on drawings Queenstake located for LB1-4. No
s were located for LB7, LB8 or LB9. An aerial photograph
g in the mine office taken in the 1950's shows that LB9 is
Leachate is collected in perforated pipe underdrain sys-
and transported by gravity through pipelines to the collec-
weir. From the collection weir the leachate flows to the
ction pond.

The in-situ leach basins (LB5 and 6) were created by drill-
and blasting to fracture the ore. LB5 and LB6 cover a sur-
area of 10.68 and 4.77 acres respectively. According to a
ort from McAlester the blast, recorded to be the largest non-
lear explosion ever, rubblelized the ore to a depth of 250
ft. At first an acid solution was applied to the surface,
ter injection wells were used. The pregnant solution was pumped
recovery wells which were operated when fluid levels in the
ells rose above a certain level. The solution was then pumped
o the collection weir and processing plant.

The processing plant contains a series of copper plating
vats, a collection box for leachate from the leach heaps and the
lection reservoir. The collection reservoir has a capacity of
less than two million gallons and is clay lined. Leachate solu-
tion is currently being pumped from the collection reservoir to
the barren solution pond.

The barren solution pond has a 4.5 million gallon capacity,
and was constructed by damming a small wash. The dam has a per-
forated pipe on the exposed portion of the dam to collect and
facilitate withdrawal of seepage. McAlester used the barren
solution pond as temporary storage before pumping the solution to
the discard solution reservoir. The 21 acre discard solution
reservoir is located above the upper reaches of French Gulch. It
has a capacity of 90,254,000 gallons.

OPERATION HISTORY

The Zonia Mine was originally operated by McAlester Fuel
Company (McAlester) as an open pit mine, producing cement copper.
They operated the three leach heap areas (LB1-4, 7-8 and 9), be-
tween 1965 and 1975. The operation of the two in-situ leach areas
(LB5 and LB6) began in 1972. According to McAlester, recovery
from the in-situ leach area was difficult because the schist/clay
soil acted to prevent percolation of water through the leach
basins. McAlester shut down operation of the mine when it was no
longer profitable.

In April 1984, Antioch Resources Inc. purchased the
mine property and began a joint venture exploration program with
Queenstake Resources Ltd. to evaluate the potential for gold min-
ing at the site. In 1986 Queenstake Resources Ltd terminated its

ship with Antioch Resources leaving Antioch Resources with
proprietorship of Zonia Mine. Ray Hill bought the property
8 and formed the Zonia Company, consisting of partners Ray
and Geoffrey Alber.

ANCE HISTORY

In April 1980, a Bureau of Land Management (BLM) aquatic
logist, conducting a wildlife and fishery inventory in the
of the mine, discovered that the creek below the mine was
id of aquatic life, and that the substrate of the creek
rench Gulch) was covered with an azure blue precipitate. In
e of the same year, BLM and Arizona Department of Health Serv-
s, ADHS (now Arizona Department of Environmental Quality,
Q) conducted a sampling inspection of the mine area.

The report from that inspection documents that there was no
ow in French Gulch upstream of the mine and that the bright
ue green precipitate was present in the Gulch for seven
ilometers below the mine (see photos 1-4). The results of
analyses of water samples from French Gulch showed that the State
water quality standards for copper and manganese were exceeded.
The sulfate concentration at the sampling site just below the
mine exceeded the concentration at which cattle have been known
die as a result of long term consumption. The levels of cop-
per in the sediment were nearly 5 percent, and the sediment con-
centrations of cadmium, chromium, lead and selenium exceeded the
levels at which the State designated solids as hazardous waste.

On June 19 1980, EPA issued a CWA Section 308 request for
information to McAlester Fuel Company, the current owner of the
mine at that time. The 308 letter requested information on mine
processes and any discharges which had occurred over the last two
years. McAlester responded by stating that the mine had been
closed since 1975 and only rainwater runoff and possibly seepage
from the leach basins have the potential to enter French Gulch.
The company was not aware that any runoff or seepage had reached
a "flowing water course".

On August 27, 1980 ADHS sent a letter to McAlester informing
them of the results of the June 19, 1980 investigation, and
notifying them that these findings constituted violations of
State regulations. The ADHS letter required the McAlester to
submit a proposed abatement plan.

McAlester responded to ADHS in a letter transmitting two
reports by Leonard Halpenny of the Water Development Corporation.
The first of these reports is dated September, 1972 and was a
result of a study conducted before in-situ mining began. The
report outlined the likelihood of groundwater contamination from
in-situ mining. The other of these reports was prepared in

January, 1981 in response to the ADHS letter, and is titled "Investigation of Water Quality in French Gulch, Yavapai County, Arizona.

The first report recommends that although the possibility of groundwater contamination is low, a groundwater monitoring well should be installed downgradient of the in-situ area to monitor for any escaped pregnant solution. The second report explained that abnormally high precipitation (falling during the winters of 1979, 1980 and 1981) plus the cessation of the in-situ leach basin pumping had caused the level of solution in the two in-situ leach basins to rise. This solution, consisting of a mixture of groundwater and residual pregnant liquor, had reached a level 42 and 77 feet above the former water table levels in LB5 and LB6 respectively. The report speculated that the rise in fluid levels in LB5 may have contributed to the flow of the spring in Zonia Gulch and recommended that McAlester continue pumping and monitoring flow rates and water quality in Zonia Gulch.

The pumping that was done between September and December 1980, moved 7,739,000 gallons from these leach basins into a discard solution reservoir. This lowered the solution levels in the leachate basins by approximately 25 feet.

On March 12 1986, EPA sent a CWA Section 308 information request to Queenstake Resources Ltd., who had purchased the property in a partnership with Antioch Resources in 1984. The 308 letter requested information on the process water, wastewater and stormwater management at the site, including information on any past discharges by the mine to any water of the United States. A response was received on April 18, 1986 from Queenstake indicating that they had delivered notice of termination of their joint venture to Antioch Resources and that future inquiries should be addressed to Antioch Resources.

On April 29, 1986 Antioch responded to the 308 request. This response and Queenstake's response are attached as Attachment IV to this report. Antioch was at that time continuing the "groundwater control program" (pumping of in-situ leach basin solution to the discard solution reservoir). Antioch stated that they were preparing a Notice of Disposal for filing with ADEQ's groundwater permitting section. EPA first inspected the mine in December 1986, as a follow-up to this response. At that time Queenstake Resources was employing Paul Alanis, to maintain and operate the wastewater management system. The EPA report noted that maintenance of the pumps which pump the leachate solution to the discard ponds was needed to protect French Gulch from contamination.

In March of 1989, EPA received a written complaint from a rancher in the area of the mine, that drainage from a broken pipe line at the facility was contaminating French Gulch. ADEQ conducted a compliance evaluation inspection on April 17 1989, and

sent EPA an "NPDES Non-filer Report" which indicated that the Zonia Mine had violated the CWA by discharging pollutants (leach solution) to waters of the United States with the discharge not having been authorized by a National Pollutant Discharge Elimination System (NPDES) permit.

No direct discharges were taking place at the time of the ADEQ inspection. However, there was evidence in the bed of the Gulch of more than one broken drainage pipe. ADEQ reviewed past activities at the mine and the results from sampling the springs downstream of Zonia Gulch and concluded that there was a potential for ongoing contamination of surface and ground water below the mine site.

On May 25, 1989, Claire Elliott, of the U.S. EPA Region 9, Micahael Lowry, and Tim Levandowsky, of the Arizona Department of Environmental Quality, conducted a compliance sampling inspection of the Zonia Mine. No discharge of leachate from the collection pipes was observed at the time of the inspection. However, blue precipitate was observed in French Gulch at two locations where the pipe conveying leach solution had broken (see photos 5-9). According to Ray Hill expansion and contraction caused by changes in temperature were responsible for the ruptures. He stated that he has had to repair the pipes a number of times. Each of the ruptures that have allowed leach solution to enter French Gulch have resulted in violations of the Clean Water Act.

Results from the sampling of Zonia Gulch Spring (see Attachment I) show significantly higher concentrations of copper, manganese, zinc and sulfate and lower pH and alkalinity than found in the French Gulch Spring. The same constituents that are found in higher concentrations in Zonia Gulch are found in very high concentrations in the leach solution. The lower pH and alkalinity in Zonia Gulch can also be explained by contamination with lead solution which had a very low pH (2.96) and alkalinity (less than 2 mg/l).

FINDINGS

Upon arrival on the site, Shirin Tolle met with John Ruble, partner of the Zonia mine and Robert Bralhode and Doug Bartlett of Dames and Moore, consultants retained by the Zonia mine. Mr. Bralhode and Doug Bartlett provided detailed site maps of the Zonia mine and pointed out mine features such as wells, flow paths, piping and leach basins (see Appendix I and II).

John Ruble did not know whether any of the nine leach basins on the property were lined. LB5 and LB6 are in situ leach basins. Discharge from LB1 through 4 flows by gravity along a pipeline flowing directly into the weir at the head of the old plant. LB7, 8 and 9 are drained by gravity flow by a pipeline that follows the path of French Gulch to the weir. The in-situ

leach basins are not currently being pumped. The reason given for not pumping LB5 and 6 was given by John Ruble to be the low rainfall in the area for the past two years.

According to John Ruble the water table at the in-situ leach site has dropped approximately 40 feet since 1982. The monitoring well data taken for the winter of 1989 for LB5 from the Dames and Moore report shows the following:

Well	Elevation	Depth to Groundwater
LB5-3	4,598.8 ft	204.2 ft
LB5-10	4,411.8 ft	27.8 ft

The Zonia mine operators are not aware of the depth the groundwater must reach in LB5 and 6 before pumping is required. McAlester and Antioch, the two former owners, both engaged in periodic pumping of the in-situ leach basins.

Photo 10 shows the barren solution pond with piping going upgrade to the discard solution pond. At the current time no solution is being pumped to the discard solution pond. John Ruble said that the Zonia Company has never pumped to the discard solution pond and does not know when pumping was discontinued.

Photo 11, due NW, shows the division between the north and south drainages at the mine pit, located at the former headwater of Zonia Gulch. Flow to the north flows to Zonia Gulch, flow to the south fills a collection reservoir which drains into the Placerita watershed. Just before the Placerita watershed there is a holding pond and dam in the arroyo. There is a level area behind the dam consisting of overburden taken from the mine pit. The holding pond was completely dry at the time of the inspection.

Photo 12, taken NW, shows the discard solution pond. The discard solution pond does not appear to be lined. However, the bottom and sides of the pond consist of clay covered by a thin layer of alluvial soil. The leaching operation at the mine was never successful due to the high clay content of the clay/schist material dug at the site. This same material may act as a natural liner for the discard solution pond.

Photo 13, taken NNE, shows LB6 with overburden piles in the background. The overburden would be used as cover for the landfill. At LB6 there is a pump station with two electrical panels (see photo 14). John Ruble was not aware whether the panels or pumps were in working order, and could not recall when the system was last tested. At LB5 there is the same pump configuration which also has not been run since the new owners took over Zonia mine.

Photo 15, showing leach basin lines draining to upper weir. Gravity flow from LB1,2,3 and 4 and leachate, when pumped, from LB5 and 6 are collected in the upper weir. Not all the pipe lines are identifiable. The Zonia Company has not pumped leachate from LB5 and 6 since taking over the property. The effluent flows from this upper weir to a lower weir shown in photo 16.

At the lower weir there are a sump pump and booster pump. The sump pump takes from the collection pond and delivers it to the lower weir. The booster pump delivers effluent from lower weir to the barren solution pond. The Zonia company pumps solution from the lower weir to the barren solution pond on a regular basis.

Photo 17, shows the collection pond below the holding tank for the lower weir. Drainage from LB7,8 and 9 drains directly into the collection pond by gravity. Smaller pipe is from LB9. The pipeline for LB7, 8 and 9 travels down the bed of French Gulch for approximately a mile.

Photo 18, shows brush piled up on the pipe line from LB7-9 in French Gulch. Photos 19 and 20 show repairs to the LB7-9 pipeline.

The LB7-9 pipeline travels up French Gulch to the base of LB9, here the pipeline splits into a T. One section of pipe drains LB9 and the other section of pipe travels up a steep gully to drain LB7 and LB8. Near the top of the gully the single LB7-8 pipeline joins a manifold. The manifold accepts leachate from three pipelines leading from the leach basins, none of the pipelines are identified as to origin. At the time of the inspection erosion in the gully had broken the manifold. Photos 21 and 22 show the broken manifold from LB7 and LB8. Separate samples were taken from each discharging pipe (see Attachment I for sample results). French Gulch shows evidence of surface water below the point of discharge.

CONCLUSIONS

1. The discharge of leachate from the broken LB7-9 pipelines constitutes a violation of section 301(a) of the Clean Water Act which prohibits discharge of pollutants to Waters of the United States without a valid NPDES (National Pollution Discharge Elimination System) permit. Both French Gulch and the Hassayampa River are Waters of the United States as defined by Section 502 of the Clean Water Act. In order to comply with the Clean Water Act the Zonia Company must either cease all discharges from pipelines at the Zonia Mine or seek a NPDES permit for the mine.

Due to the lack of flowing water in French Gulch at the time of the discharge of leachate there was no dilution of effluent flowing to French Gulch. Therefore the results from

The samples taken at the discharge point show violations of the Arizona Water Quality Standards and federal fresh water acute standards for Copper, Zinc and Cadmium (see Attachment I showing the results of sample analysis and comparison with water quality standards.

The temporary repairs to the leachate pipeline in French Gulch should be permanently repaired with PVC gaskets. The entire pipeline should be braced so that separate sections of pipeline remain level with each other at the joints of the pipeline and the joints supported in a rigid manner. Proper support of the pipeline may be achieved by burying the pipeline. The entire length of the pipeline should be buried out of the immediate stream bed of French Gulch.

At the time of the inspection the pipeline was supported and repaired in a manner insufficient to withstand breakage due to a summer storm or winter snowmelt. Each discharge from a broken pipeline in French Gulch constitutes a violation of Section 301(a) of the Clean Water Act.

3. The manifold line from LB7 and LB8 should be immediately repaired. The lines should be firmly braced and supported in a rigid manner. The broken pipes are located in a drainage which is badly eroded. The lines should be re-located into a non-drainage pathway down the slope of the leach basins. Measures should be taken to reduce erosion down the slope of the leach basin at the location of the manifold. Proper technical assistance by a qualified engineer is advised in regards to designing an erosion proof piping system.
 4. The origin of all operational drainage pipes should be documented, including all the pipes discharging to the weirs
 5. A serious concern at Zonia Mine is surface and groundwater contamination, especially from the in-situ leach area. McAlester Fuel Co. specified in its 1972 report that pumping from the two wells in the in-situ area should be continued to prevent migration of contaminated water. The study also recommended that a monitoring well be drilled downgradient of the in-situ leach basins to monitor for migration of the leachate. The Zonia Company is presently not aware of whether the monitoring well was ever installed and is not pumping from the wells in the in-situ area due to the drought conditions in 1988 and 1989.
- There is evidence that leach solution from LB5 and/or 6 has contaminated Zonia Gulch Spring in the past. As mentioned the 1981 study (Investigation of Water Quality, French Gulch, Yavapai Co., AZ) submitted to ADHS by McAlester Fuels

speculated that high levels of solution in LB5, due to heavy rains and lack of pumping, was contributing to the flow in the Zonia Gulch Spring

ADEQ is currently reviewing the Zonia Company's application for an aquifer protection permit (APP) and are involved in a groundwater monitoring survey to determine the amount of present groundwater contamination at the site. After the results of this survey are available remediation of contaminated groundwater may be required as part of the APP.

6. Groundwater contamination from areas other than the in-situ leach area is also a concern. As mentioned Antioch resources, in response to EPA's information request, indicated that drawings found for LB1-4 showed the leach basins to be lined with asphalt. It can not be assumed that LB7 and LB8 are lined, or that the asphalt liner is still intact and preventing subsurface migration of leach solution.

The ponds also represent a threat to groundwater quality. The clay liner in the collection pond appears to only cover the bottom and a short way up the sides of the pond. During times of heavy run-off the level in the pond probably is higher than the level which appeared to be lined. Percolation of solutions may also occur from the collection pond, barren solution pond and discard solution pond. Depending upon the results of ADEQ's groundwater monitoring survey Zonia Mine may be required to seek technical assistance in remediating the ponds.

7. The pumping stations at LB5 and LB6 should be immediately tested and maintained in working order. Zonia Company should find out at what level the water in the LB5 and LB6 should reach before pumping is necessary. Proper records should be kept both of the water levels in the wells and of any pumping done. Actual pumping of the in-situ leach basins should be postponed until ADEQ completes its groundwater monitoring survey.
8. The berm below the collection pond is low and badly eroded. This is a potential source of discharge during a storm event, it should be reinforced and strengthened.
9. The pond areas did not appear to be fenced to prevent livestock and wildlife from using the ponds. It is recommended that fences be installed around the ponds to reduce the threat to animals which may drink from these ponds.

APPENDIX 1.a

COMPLIANCE INSPECTION RESULTS
 SAMPLING OF BROKEN LB7-8 MANIFOLD PIPES

April 5, 1990

TABLE 1

	Pipe 1	Pipe 2	Pipe 3	AWQS
Arsenic	0.003	0.003	0.003	
Cadmium	0.24	0.24	0.22	0.05
Chromium	0.039	0.043	0.038	
Copper	430.0	380.0	390.0	0.05
Lead	0.009	0.003	0.003	
Mercury	0.0006	0.0002	0.0002	
Nickel	2.80	1.30	1.30	
Silver	0.01	0.01	0.01	
Zinc	39.0	31.0	32.0	0.02

French Gulch is tributary to the Hassayampa River, both bodies of water are protected under Arizona Water Quality Standards for the following uses: Aquatic and Wildlife, Incidental Human Contact, Agricultural Livestock Watering, Agricultural Irrigation. The AWQS for Aquatic and Wildlife use is the standard used in this chart for comparison.

From the data on this chart the leachate discharged into French Gulch at the time of the inspection exceeded AWQS by the following factors:

Copper	860	760	780
Cadmium	24	24	22
Zinc	1,950	1,550	1,600

CERTIFIED MAIL NO. P-000-583-267
 RETURN RECEIPT REQUESTED

18 JUL 1990

In Reply
 Refer to: IX-FY90-27

W. Ray Hill
 President
 Zonia Company
 212 S. Marina St.
 Prescott, AZ 86303

Dear Mr Hill:

Enclosed is a Finding of Violation made by me and an Order based on that Finding, pursuant to Sections 308 (a), 309 (a)(3), (a)(4), and (a)(5)(A) of the Clean Water Act as amended [33 U.S.C. sections 1318 (a), 1319 (a)(3), (a)(4) and (a)(5)(A)] ("Act").

The enclosed Finding and Order relates to violations of Section 301(a) of the Clean Water Act [33 U.S.C. section 1311(a)] found at Zonia Mine as a result of a joint ADEQ and EPA inspection on April 5, 1990.

On April 5, 1990 a discharge of leachate from three broken pipes leading from leach basin 9 (LB9) was observed and documented by EPA inspector Shirin Tolle. This discharge constitutes a violation of Section 301(a) which prohibits discharge of pollutants without a valid National Pollutant Discharge Elimination System (NPDES) permit.

As noted in the attached inspection report, the leachate was seen to be discharging to French Gulch which was dry at the time. Therefore, the dilution factor for the effluent was non-existent. Because of this, the levels of Copper, Cadmium and Zinc from effluent samples taken from three broken pipes were in violation of Arizona State Water Quality Standards. The concentration of Copper in the effluent exceeded Arizona Water Quality Standards (WQS) for Aquatic and Wildlife uses by an average of 800 times the standard. The WQS for Zinc and Cadmium were found to be an average of 1,700 and 24 times the standard.

A number of operations and maintenance deficiencies were observed during the April 5, 1990 inspection. The pipeline leading down through French Gulch was seen to be in eminent risk of damage from potential storm events and was seen to be poorly

CONCURRENCES

'BOL	6-4-1	6-4-1	6/4/5	W-1				
URNAME	Tolle	Fulla	Fulla,fermy	K				
DATE	7/13/90	7/13/90	7/13/90	7-13				

secured and repaired in several places. Other O&M problems included inadequate berming of the collection pond, inoperable pumping stations at leach basins 5 and 6 (LB5 and LB6) and lack of data on the origin of leachate lines and pond liners.

This Finding and Order includes a compliance schedule for the Zonia Company to follow in remediating the problems at the Zonia Mine. This schedule outlines completion dates for the following.

1. A completion date for the repair/replacement of the LB9 pipeline running through French Gulch to the collection pond.
2. A request for full photographic documentation of the repair to the manifold leading from LB7, LB8 and LB9 to the pipeline in French Gulch. All repair work is to be overseen and approved by a professional engineer registered in the state of Arizona.
3. Documentation of the origin of all active leach lines draining into the upper and lower weirs and collection pond.
4. The LB5 and LB6 leachate pumps are to be maintained in operating order. This includes a monthly start-up and test until the results of the groundwater survey conducted by ADEQ are available.
5. The pond lining for the collection pond, discard solution pond and barren solution pond are to be tested for permeability. This may be done by installing monitoring wells at the pond sites or by analysis of core samples.
6. An adequate berm for storm protection needs to be constructed around the collection pond and fencing around all pond areas installed to prevent livestock from drinking from the leachate ponds.
7. Further remediation may be advised as an addendum to this Finding and Order as a result of the groundwater contamination survey currently being conducted by ADEQ. As a result of this survey a schedule for pumping LB6 and LB7 may be necessary to prevent to further contamination of groundwater by leachate. If a significant amount of groundwater contamination is discovered it may also become necessary to install impermeable liners to the collection, discard and barren solution ponds.
8. Zonia Company will provide EPA with specific financial information including capital costs of operation and remediation as well as income tax data.

Any violation of the terms of the enclosed Order could subject the Zonia Company to a civil action for appropriate relief pursuant to Section 309(b) of the Act [33 U.S.C. section 1319 (b)] and/or civil penalties not to exceed \$25,000 per day for each violation of either the Order or the Act under Section 309 (d) of the Act [33 U.S.C. section 1319 (d)].

In addition, Section 309(c) of the Act [33 U.S.C. section 1319 (c)] provides for criminal penalties in the event of either negligent or knowing violations of the Act. Negligent violations of the Act are punishable by a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or imprisonment for not more than one year, or both [Section 309(c)(1)]. Knowing violations of the Act shall be punished by a fine of not less than \$5,000 nor more than \$50,000 per day of violation, or imprisonment for not more than three years, or by both [Section 309(c)(2)].

If you have any questions concerning this matter, please contact Shirin Tolle of my staff at (415) 705-2152.

Sincerely yours,

Original Signed by:

Keith Takate

Harry Seraydarian, Director
Water Management Division

Enclosure

cc: Ron Miller
Assistant Program Manager, Water Quality, ADEQ

Harley Hiett
Program Manager, NRO ADEQ

- 1) Section 301(a) of the Act prohibits the discharge of any pollutants to waters of the United States except in compliance with Section 301, 301, 306, 307, 318, 402, and 404 of the Act, [33 U.S.C. sections 1311, 1312, 1316, 1317, 1328, 1342] and any such discharge be authorized by a valid National Pollutant Discharge Elimination System (NPDES) permit.
- 2) The Zonia Company owns a non-operational mine called the Zonia Mine which is located approximately six miles southeast of Kirkland Junction, south of Prescott Arizona. The drainage of the mine area enters French Gulch, a tributary to the Hassayampa River. French Gulch and the Hassayampa River are "Waters of the United States" as defined by Section 502 (7) of the Act, 33 U.S.C. section 1326 (7), and by EPA regulations in 40 C.F.R. section 122.2.
- 3) Section 301(a) of the Act prohibits the discharge of any pollutants into water of the United States except in compliance with certain sections of the Act, including Section 402, 33 U.S.C. section 1342. Section 402 of the Act authorizes EPA to issue National Pollutant Discharge Elimination System (NPDES) permits allowing for the discharge of pollutants into waters of the United States. Compliance with Section 301 (a) of the Act therefore requires, inter alia, compliance with a valid NPDES permit.
- 4) In March of 1989, EPA responded to a written complaint from a rancher in the vicinity of the mine in regards to discharge from a broken pipeline. ADEQ conducted a compliance evaluation inspection of the Zonia Mine on April 7, 1989 and

sent EPA an "NPDES Non Filer Report" which indicated that Zonia Mine had violated Section 301(a) of the Clean Water Act by discharging pollutants not authorized by an NPDES permit.

- 5) On May 25, 1989 a joint EPA and ADEQ inspection was conducted at the Zonia Mine. Evidence of discharge in the form of blue precipitate was found in French Gulch, the result of breakages in the leachate line. Each rupture of the leachate pipeline which has allowed a discharge to enter French Gulch has resulted in a violation of Section 301(a) of the Clean Water Act.
- 6) Results from sampling at Zonia Gulch Spring show significantly higher concentrations of copper, manganese, zinc and sulfate and lower pH than found in French Gulch Spring. These constituents are found in very high concentrations in the leach solution from the in-situ leach basin. For a summary of this sampling data see Attachment IV of the April 5, 1990 inspection report included as part of this Finding.
- 7) On April 5, 1990 an joint ADEQ and EPA inspection was conducted at Zonia Mine. This inspection which is made part of this Finding discovered the following violations and deficiencies at Zonia Mine:
 - a. During a tour of the Zonia Mine a broken manifold leachate line from LB7, LB8 and LB9 was discovered to be discharging effluent into French Gulch. Due to the lack of flowing water in French Gulch no dilution of the effluent was occurring at that time. Analysis of samples from the three broken pipes leading into the

manifold showed violations of the Arizona State Water Quality Standards for Copper, Zinc and Cadmium. A summary of the water quality violations is contained in Attachment I of the inspection report which is made a part of this Finding.

- b. The leachate line in French Gulch was propped up and repaired in several places. These repairs did not serve as adequate protection from breakage of the line during storm events. The leachate line follows the contours of the stream bed of French Gulch with some parts of the line lying directly in the path of stream-carried debris.
- c. All active leachate lines were not identified as to origin.
- d. The existence or absence of pond liners was not known by the current mine owners.
- f. The berm around the containment pond was not adequate to protect from overflow during a 100 year storm event.
- g. The operational status of the LB5 and LB6 pumping stations was unknown.

ORDER FOR COMPLIANCE

Considering the foregoing Findings and the potential environmental and human health effects of the violations, EPA has determined that compliance in accordance with the following requirements is reasonable. Pursuant to the authority of Sections 308 and 309 of the Act, 33 U.S.C. section 1318 and section 1319, IT IS HEREBY ORDERED THAT the Zonia Company comply with the following requirements:

Correction Plan

- 1) By August 15, 1990 the Zonia Company shall submit a detailed and complete correction plan prepared by a professional engineer licensed in the State of Arizona, that describes the measures taken by the Zonia Company in order to comply with the requirements of Paragraph 1 of this Order. The plan at the minimum shall contain the information and construction schedules needed to comply with the following compliance schedule:
 - a. The permanent repair and re-location of the LB9 pipeline running through French Gulch to the collection pond is to be completed before November 1, 1990. The leachate line is to be re-located out of the 100 year storm flow path of French Gulch.
 - b. Full photographic documentation of the repair to the manifold leading from LB7, LB8 and LB9 to the pipeline in French Gulch shall be submitted by November 1, 1990. This stabilization of the manifold includes erosion control on the inclined face of LB9 to prevent undercutting of the manifold line. All repair work is to be overseen and signed off by a professional engineer registered in the state of Arizona.
 - c. Documentation of the origin of all active leach lines draining into the upper and lower weirs and collection pond will be submitted to EPA by October 1, 1990.
 - d. The LB5 and LB6 pump are to be maintained in operating order upon receipt of this Finding. This includes a monthly start-up and test until the results of the

groundwater survey conducted by ADEQ are available.

- e. The pond lining for the collection pond, discard solution pond and barren solution pond are to be tested for permeability as of October 1, 1990. This may be done by installing monitoring wells at the pond sites or by analysis of core samples.
- f. An adequate berm shall be constructed around the collection pond and fencing installed around all pond areas to prevent livestock from drinking from the leachate ponds as of October 1, 1990.
- g. Further remediation may be advised as an addendum to this Finding and Order as a result of the groundwater contamination survey currently being conducted by ADEQ.

Possible required measures include:

- I. A schedule for pumping LB6 and LB7 may be necessary to prevent to further contamination of groundwater by leachate.
- II. If a significant amount of groundwater contamination is discovered it may also become necessary to install impermeable liners to the collection, discard and barren solution ponds.
- III. Installation of a groundwater monitoring well down-gradient of the in-situ leach basin with attendant monthly groundwater sampling.
- IV. Monthly water quality and flow monitoring for Zonia Gulch.

- 2) By August 15, 1990, the Zonia Company will provide EPA with the following financial information.

- a. The capital cost of any improvements made to the Zonia Mine effluent containment and transport system since the acquisition of the Zonia Mine by the Zonia Company in 1988. These capital costs are to include the capital costs of piping, pumps, repairs and manpower. These costs are not to include the cost of consultants or monitoring wells for the Zonia Mine landfill project.
- b. The estimated capital cost of complying with the improvements outlined in the above compliance schedule.
- c. Projected or actual dates of installation of all equipment installed at the Zonia Mine since its acquisition by the Zonia Company extending to the November 15, 1990 compliance date.
- d. Projected or actual annual costs of operating and maintaining the effluent containment and transport system (O&M costs) for each year from 1984 to 1991.
- e. The Zonia Company as represented by its president Ray Hill shall submit copies of its U.S. Internal Revenue Service Form 1120 Schedule L, and Schedule M-1 for each year from 1987 to 1990 (fiscal and calendar).

Compliance Progress Reports

- 3) The Zonia Company shall submit a Compliance Progress Report every three months, beginning on August 1, 1990, until full compliance is achieved. Each report shall detail the progress made towards completing the compliance schedule outlined in this Order.

Other Requirements and Conditions

- 4) All reports submitted pursuant to this Order must be signed by a principal executive officer, ranking elected official or duly authorized representative of the Zonia Company [as specified by 40 C.F.R. section 122.22 (b)(2)] and shall include the following statement:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

- 5) All submissions except final construction plans and specifications, shall be mailed to the following addresses:

U.S. Environmental Protection Agency
Region 9
1235 Mission Street
San Francisco, California 94103
Attn: Steve Fuller (W-4-1)
Chief, AZ/HI/NV Compliance Section

Arizona Department of Environmental Quality
Office of Water Quality Management
2005 North Central Avenue
Phoenix, Arizona 85004
Attn: Sally Mapes
Manager, Compliance Section

Final construction plans and specifications shall be mailed to the following address:

Arizona Department of Environmental Quality
Office of Water Quality Management
2005 North Central Avenue
Phoenix Arizona 85004
Attn: Lyndon Hammon
Manager, Plan Review and Permits Section

All telephone inquiries should be made to Shirin Tolle at
(415) 705-2152.

- 6) This Order does not constitute a waiver or modification or in any way relieve the Zonia Company of obligations imposed by the Act or any other State or Federal law. EPA reserves the right to seek any and all remedies available under Section 309(b), (c), (d) or (g) of the Act [33 U.S.C. sections 1319 (b), (c), (d) or (g)] for any violation cited in this Order.
- 7) Issuance of an Order for Compliance shall not be deemed an election by EPA to forego any administrative, civil, or criminal action to seek penalties, fines, or other appropriate relief under the Act.
- 8) This Order shall become effective upon the date of receipt by the Zonia Company.

13 JUL 1990

Date

Keith Takahashi

Harry Seraydarian

Director, Water Management Division