IL-0189-09

Illinois Institute of Natural Resources

State Water Survey Division

05 East Springfield
O. Box 5050, Station A
Champaign, IL 61820
217/333-2210

Granite City

November 11, 1981

EPA Region 5 Records Ctr.
357016

Ms. Evelyn Brophy
DRXTH-TE-A
U.S. Army Toxic and Hazardous Materials Agency
Bldg. No. E 4585
Aberdeen Proving Ground, MD 21010

Dear Ms. Brophy:

This is in response to your telephone request to Richard Schicht, Assistant Chief, concerning water levels and direction of groundwater movement in the vicinity of the Granite City Army Depot. Currently, the direction of groundwater flow is controlled by seasonal water level variations in the area. During the period from September to February (see Figure 1), low Mississippi River stages combined with minimum groundwater withdrawal from nearby wells in Granite City cause groundwater to flow from the northeast to the southwest. Conversely, from March to August high Mississippi River stages and maximum groundwater withdrawal from the Granite City area reverse the direction of flow from southwest to northeast.

It is important to note that this seasonal flow condition is a fairly recent development. Groundwater withdrawals from the area have been reduced dramatically since 1956, when pumpage was greatest on record. As recently as 1978, pumpage in the Granite City area was large enough to cause groundwater flow from the southwest to the northeast throughout the entire year, regardless of the Mississippi River stage (see Figure 2).

The greatest single groundwater user in the Granite City area is the Granite City Steel Company. At one time, their entire water supply came from groundwater; however, now pumpage is limited to water for air conditioning. This is approximately 10% of their total water use, and it is pumped only during the spring and summer.

I also have provided copies of three figures which were published as part of a study by ISWS (ISWS, Report of Investigation 51, "Ground-Water Development in the East St. Louis Area, Illinois," by R. J. Schicht, 1965). The cross-section A-A' (Figure 7) illustrates the general geology of the area. Well number three represents a boring drilled during the construction of the Chain of Rocks Canal Lock No. 27. The groundwater surface (piezometric profile) in 1961 is shown and indicates flow from west to east.

The Water Survey has substantial additional data on file for the area of interest that may be of assistance to you. We also have an operational digital model of the area that is being used in a project we are conducting for the Corps of Engineers. The Water Survey also has developed a solute transport code that could be applied to assist you in your studies.

I have taken the liberty to enclose a brief description of the Groundwater Section activities. Depending on the nature of the problem at the Granite City Depot and your proposed plan of study or action, there may be an opportunity for us to enter into a cooperative effort.

If you have further questions or comments, feel free to contact us.

Very truly yours,
ILLINOIS STATE WATER SURVEY

James P. Gibb, Head
Groundwater Section
Phone: (217) 333-0236

JPG:psl

STATE OF ILLINOIS
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STATE GEOLOGICAL SURVEY DIVISION

LOCATED ON THE CAMPUS OF THE UNIVERSITY OF ILLINOIS

JOHN C. FRYE, CHIEF
NATURAL RESOURCES BUILDING
URBANA

May 12, 1959

GEOLOGIC REPORT ON THE SHALLOW GROUND-WATER CONDITIONS IN GRANITE CITY, T. 3 N., R. 10 W., MADISON COUNTY

By

Arthur J. Zeizel, Assistant Geologist
Section of Groundwater Geology and Geophysical Exploration

This report, prepared in response to a request from Mr. Harry F. Johnson, 2250 Iowa Ave., Granite City, Illinois, summarizes the geologic factors controlling the occurrence of ground water near 23rd and Iowa in Granite City. Mr. Johnson wants to know the depth necessary to drive a sand point in order to obtain a residential supply of ground water.

Any driven well would have to obtain its ground-water supply from water-yielding sand and gravel lenses in the valley fill material which has a thickness of about 110 feet beneath Granite City. We do not have any detailed records of wells in this immediate area; however, generally the valley fill material is silty and clayey in the upper part. Although deposits of sand and gravel may occur in the valley fill, our information shows that it would be necessary to penetrate 60 or more feet into the valley fill material in order to find suitable water-yielding zones.

In summary, a point would have to be driven to about 60 feet in the valley fill material in order to penetrate water-yielding lenses of sand and gravel. This depth is considerably deeper than the normal range in depth for most drive point wells.

Enclosed is a copy of Circular 225, "Groundwater Geology in Sath-Central Illinois", from which additional information on the occurrence of ground water in the general area can be obtained. The approximate location of Granite City is marked in red on the maps on pages 6, 12 and 14.

May 19, 1959

REPORT ON GROUND-WATER RESOURCES
NEAR 23rd. AND IOWA AVENUE IN
GRANITE CITY, MADISON COUNTY
by
R. C. Timblin, Engineering Assistant

This report is prepared at the request of Mr. Harry E. Johnson, 2250 Iowa Avenue, Granite City, Illinois, for information concerning available groundwater in the above area.

The typical well in this area is between 50 to 110 feet in depth and obtains its water from water yielding sand and gravel. It is doubtful that a drive point could be driven to the necessary depth at this location; there are no records of this type of well in our files.

A 6-inch well drilled in 1953 to a depth of 72 feet at a location 2 miles north of Granite City was reported to yield 10 gallons per minute. This well was cased with 6-inch pipe and no screen. The non-pumping water level was reported as 32.5 feet below the surface.

A well drilled to a depth of 84 feet for the City Ice and Fuel Company is located in Section 24, T3N, R10W. This well had a reported yield of 750 gpm in 1944. A mineral analysis showed it had a hardness of 712 parts per million (extremely hard) and total dissolved minerals of 825 ppm (fairly highly mineralized).

The chances of obtaining water from the sand and gravel are good.

This Division requests that it be furnished with the results of any new well construction such as well depth, casing size, water levels and yield.

MAD3N10W-25.8g

August 11, 1952

MINERAL ANALYSIS

Sample of water collected June 26, 1952 from a 95-foot test well owned by the Dow Chemical Company (Madison Division) at Madison, Illinois in Madison County. Location of well: Approximately 10 ft. E. and 800 ft. S. of the N.W. corner (extended) of Section 25 (extended within U.S. Survey No. 604), Twp. No. 3 N., Range 10 W. Depth: 95 feet.

LABORATORY NO. 129,560

		ppm.	epm.			ppm.	epm.
Iron (total)	Fe	22.6		Silica	SiO_2	45.0	
Manganese	Mn	3.0		Fluoride	F	0.3	
Calcium	Ca	162.0	8.10	Chloride	Cl	24.	.68
Magnesium	Mg	39.3	3.23	Nitrate	NO_3	.1	Tr.
Ammonium	NH_4	.7	.04	Sulfate	SO_4	257.9	5.37
Sodium	Na	35.9	1.56	Alkalinity (as $CaCO_3$)		344.	6.88
Turbidity		154		Hardness (as $CaCO_3$)		567.	11.33
Color		Fe		Residue		757.	
Odor		Tr.					

Temperature (Not reported)

ppm. = parts per million
epm. = equivalents per million
ppm. x .0583 = grains per gallon

STATE WATER SURVEY DIVISION

R. H. KING, Asst. Chemist

RHK:dm

March 14, 1966

WELL PRODUCTION TEST
NESTLES COMPANY, WELL NO. 3
MADISON COUNTY

by

E. G. Jones, State Water Survey
and
George Walker, Layne-Western Company

Owner:	Nestles Company (21st & Adams Streets, Granite City)
Location:	Approx 800'N and 800'W of the SE corner of Section 13, T. 3N., R. 10W. (located at Test Hole 2)
Date Completed:	March 1966
Date of Test:	March 14, 1966
Length of Test:	8 hours
Aquifer:	Sand and gravel

WELL DATA

PUMPED WELL

Well No:	3
Driller:	Layne-Western Co., Kirkwood, Mo.
Depth:	115 1/2'
Hole Record:	40" 0-115 1/2' (reverse rotary)
Casing Record:	16" pipe coated inside and outside with "Epom" 10' of casing at top of screen is stainless steel, 36" outer casing 0-30' (cemented in)
Screen Record:	16" 80.5-115.5 Layne shutter type (gravel packed with Merramec gravel)
Pump and Power:	Test equipment, Fairbanks-Morse turbine; gasoline engine
Ground Elevation at Well:	425± mean sea level (topographic map)
Measuring Point:	Top of casing 2' above ground surface
Measuring Equipment:	Electric dropline, Layne 10 x 7" orifice
Static Level:	39.4

Remarks: Specifications for permanent equipment to be installed: Layne vertical turbine, rated at 750 gpm against 340' total dynamic head; 100 hp 1800 rpm oil lubricated motor; 80' of 8" column pipe; 5 stage 12" bowls (6 or 7' long); 80' airline.

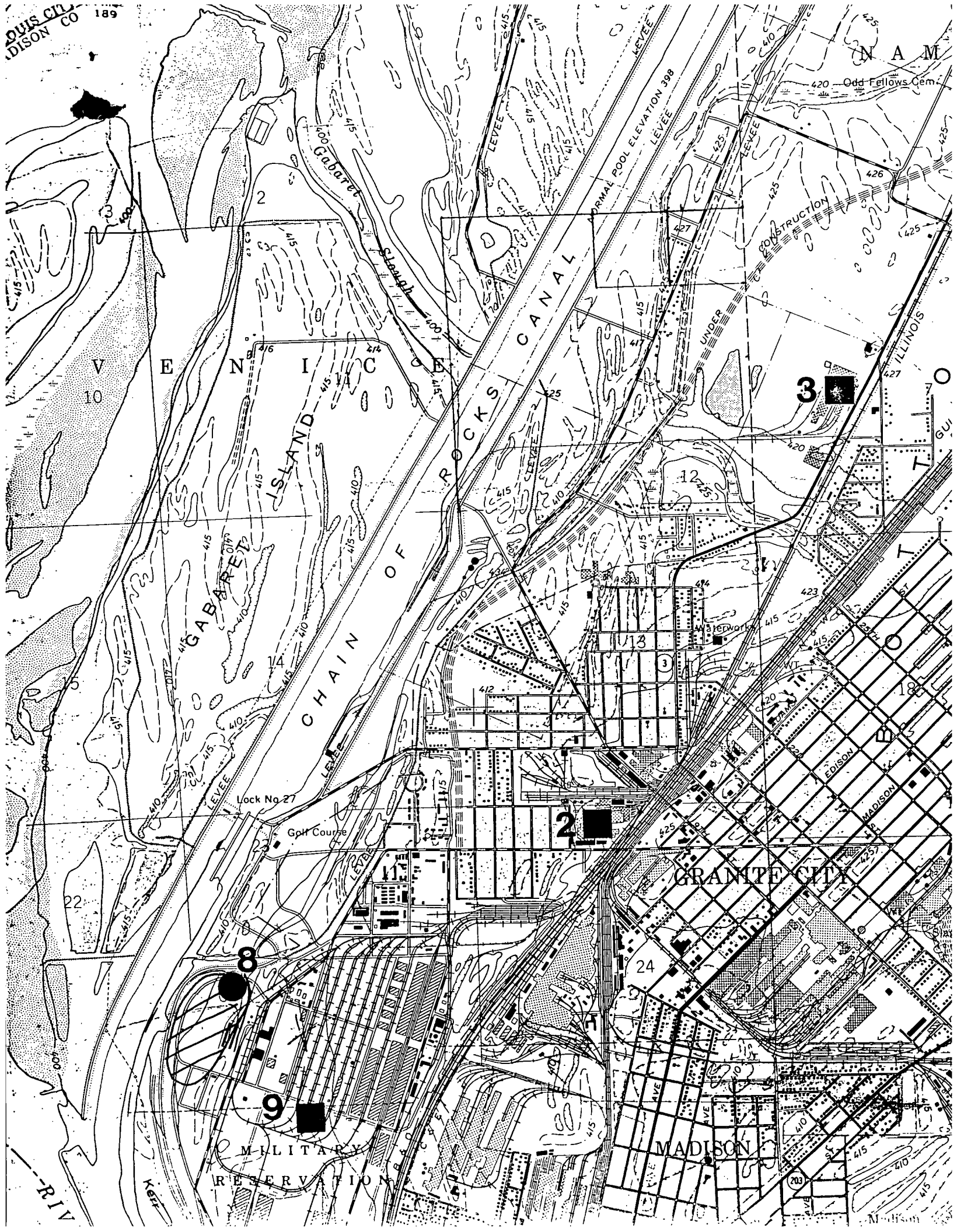
MEASUREMENTS

PUMPED WELL

Date 1966	Hour	Time (min)	Depth to water (ft)	Draw-down (ft)	Pump. rate (gpm)	Remarks
3-14	7:55A		39			
	8:00	0				Started pumping
	8:15	15	48.1	9.1	1124	
	8:25	25	47.9	8.9	1134	
	8:30	30	47.8	8.8	1134	
	8:45	45	48	9.0	1143	
	9:00	60	48.1	9.1	1143	
	9:15	75	48	9.0	1143	
	9:30	90	48	9.0	1143	Temp 55.5°F
	9:45	105	48	9.0	1143	
	10:00	120	48.1	9.1	1143	
	10:15	135	48.1	9.1	1153	
	10:30	150	48.1	9.1	1153	
	10:45	165	48.25	9.25	1153	
	11:00	180	48.2	9.2	1153	
	11:15	195	48.2	9.2	1153	
	11:30	210	48.1	9.1	1153	
	11:45	225	48.1	9.1	1153	
	12:00N	240	48.2	9.2	1143	
	12:15P	255	48.25	9.25	1153	
	12:30	270	48.2	9.2	1153	
	12:45	285	48.25	9.25	1153	
	1:00	300	48.25	9.25	1153	
	1:15	315	48.25	9.25	1153	
	1:30	330	48.25	9.25	1153	Temp 55.5°F
	1:45	345	48.2	9.2	1153	
	2:00	360	48.2	9.2	1153	
	2:15	375	48.2	9.2	1153	
	2:30	390	48.25	9.25	1143	
	2:45	405	48.2	9.2	1134	
	3:00	420	48.2	9.2	1134	
	3:15	435	48.2	9.2	1134	
	3:30	450	48.2	9.2	1134	Temp 56°F
	3:45	465	48.2	9.2	1134	
	4:00	480	48.2	9.2	1134	Pumping stopped
			RECOVERY			
	4:05		39.8	0.8		
						End of test

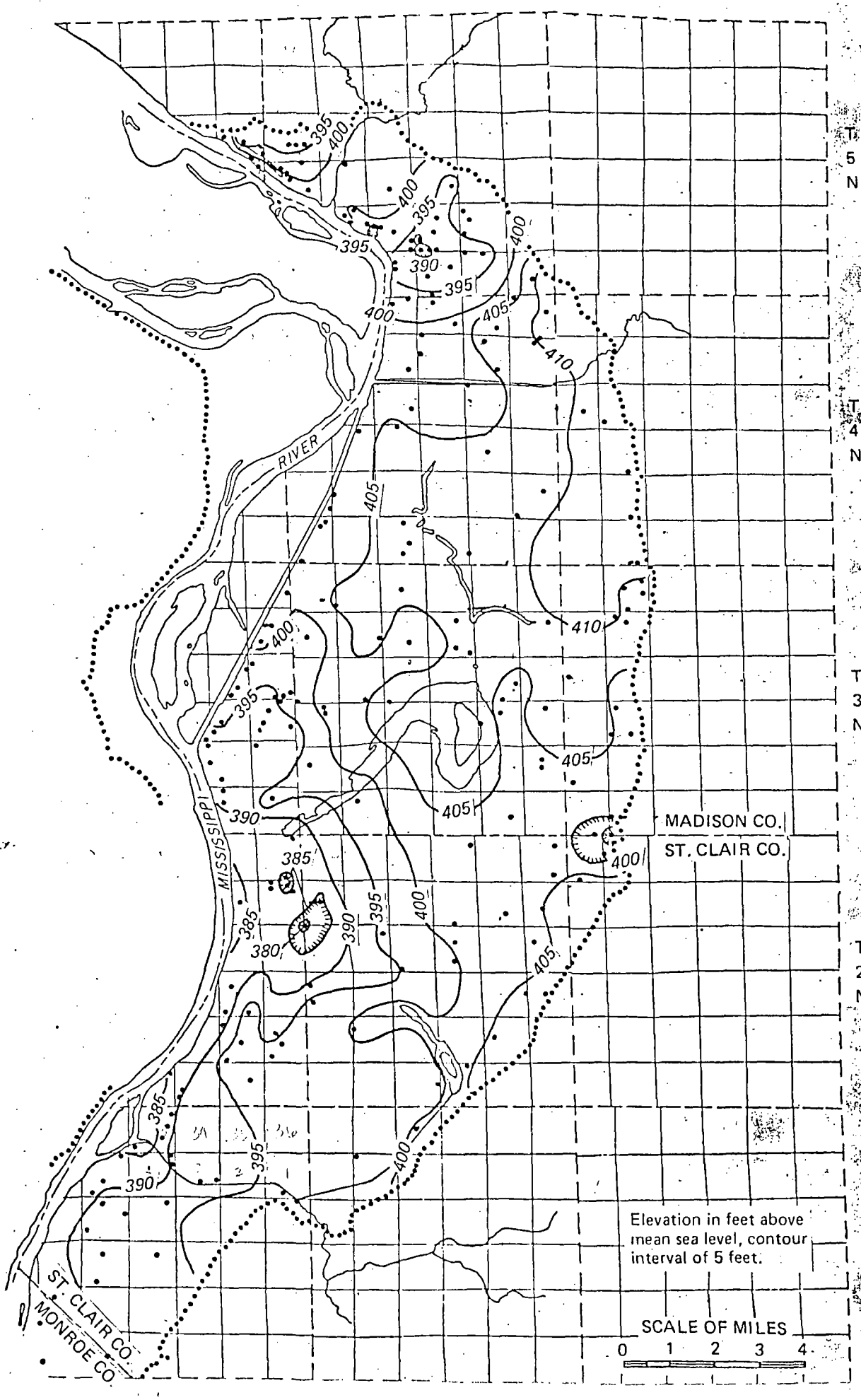
LOG OF WELL

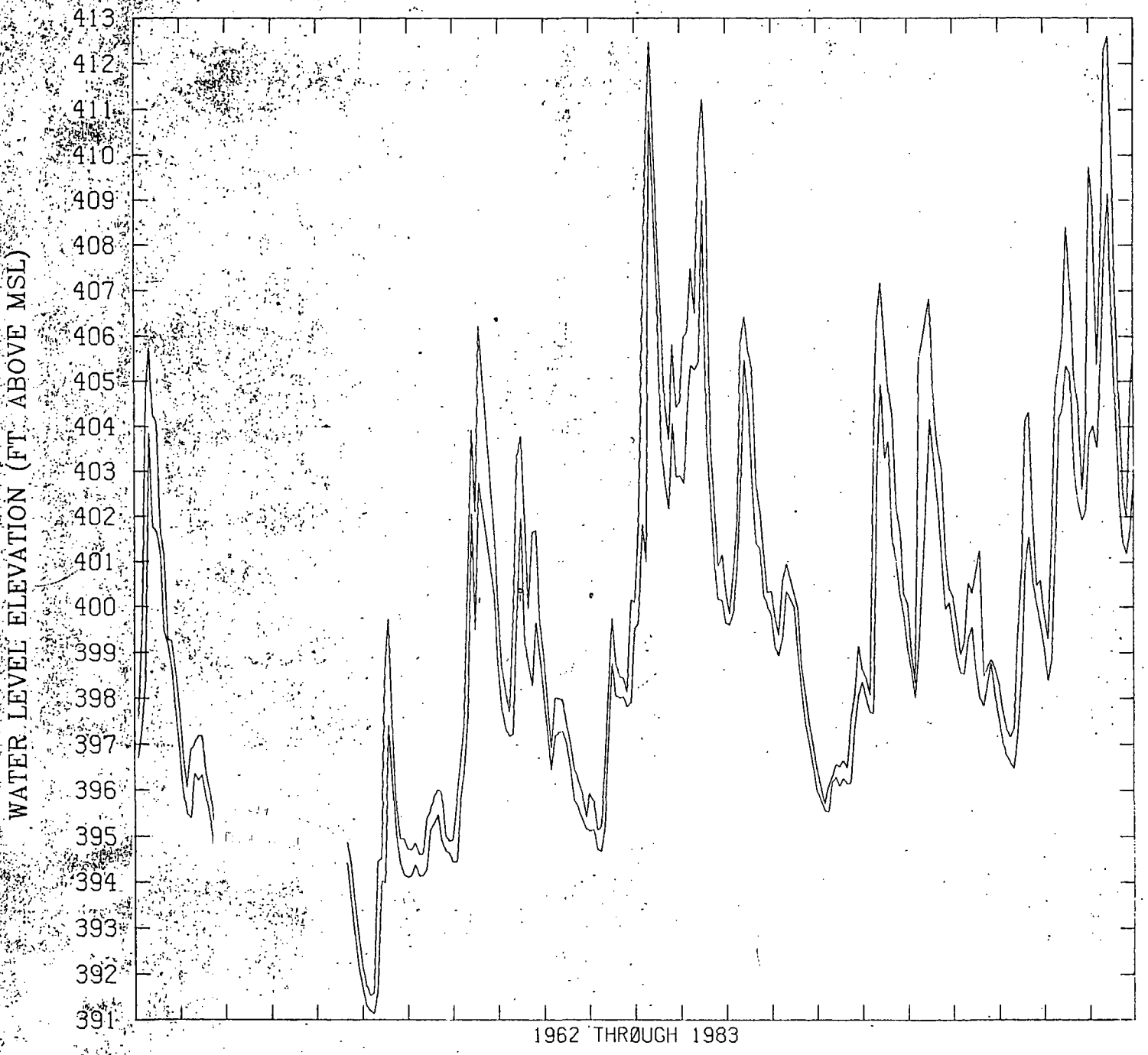
Formation	From	To
Cinder fill	0	2'
Fine sand & clay	2	15
Fine sand with clay streaks	15	30
Medium, brown sand; fine gravel	30	50
Medium brown sand	50	65
Coarse, gray sand with small gravel	65	95
Limestone layer	95	96
Medium sand & boulders	96	115 1/2



LOUIS CITY
MADISON CO
189
N A M
Odd Fellows Cem
NORMAL POOL ELEVATION 398
LEVEE
Gabaret Slough
CONSTRUCTION
UNDER
ILLINOIS
V E N I C E
GABARET ISLAND
CHAIN OF ROCKS CANAL
Waterworks
Lock No 27
Golf Course
GRANITE CITY
EDISON
MADISON
MILITARY RESERVATION
MADISON
RIV
3
2
8
9

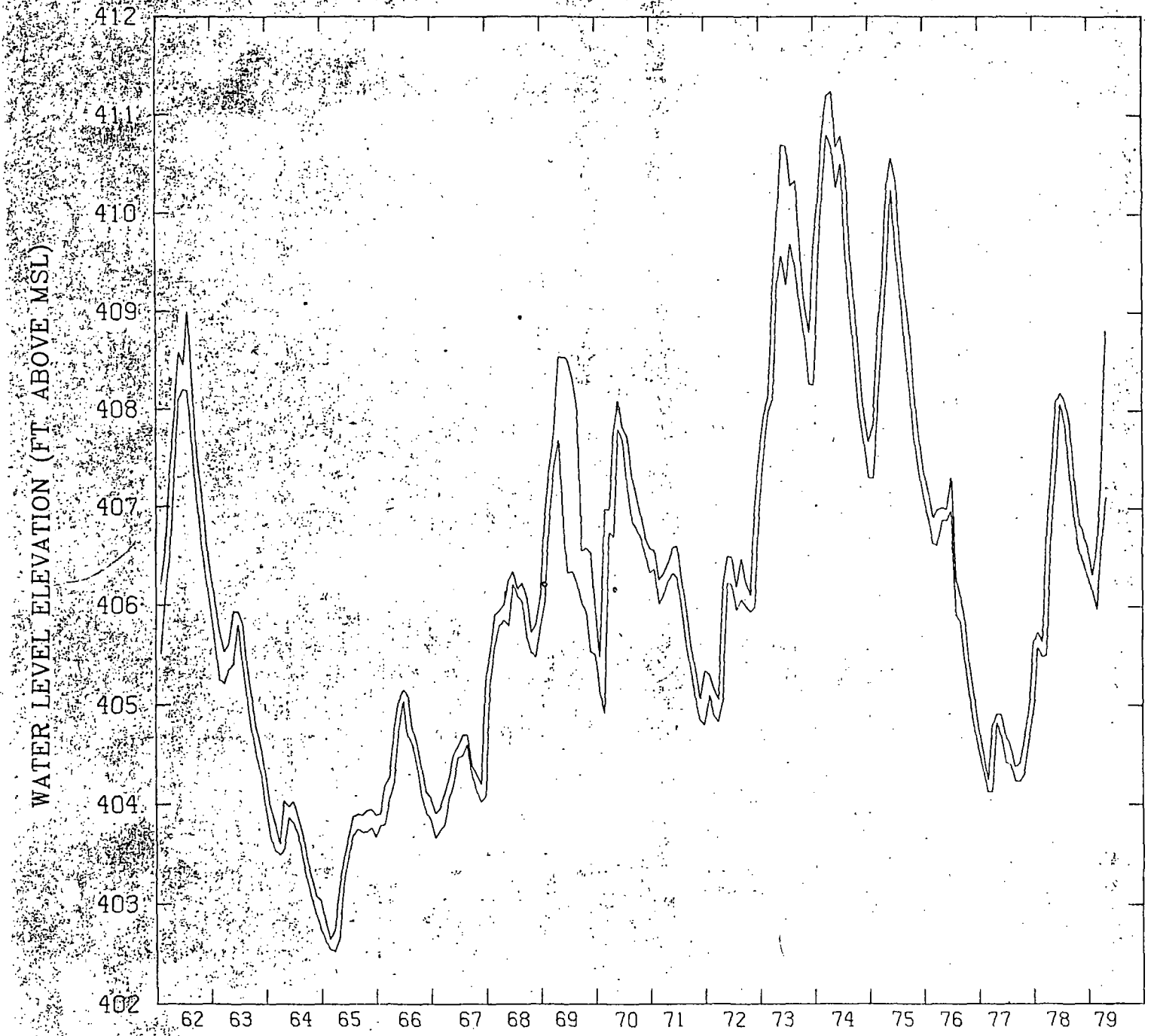
Approximate Elevation of Piezometric Surface, November 1980





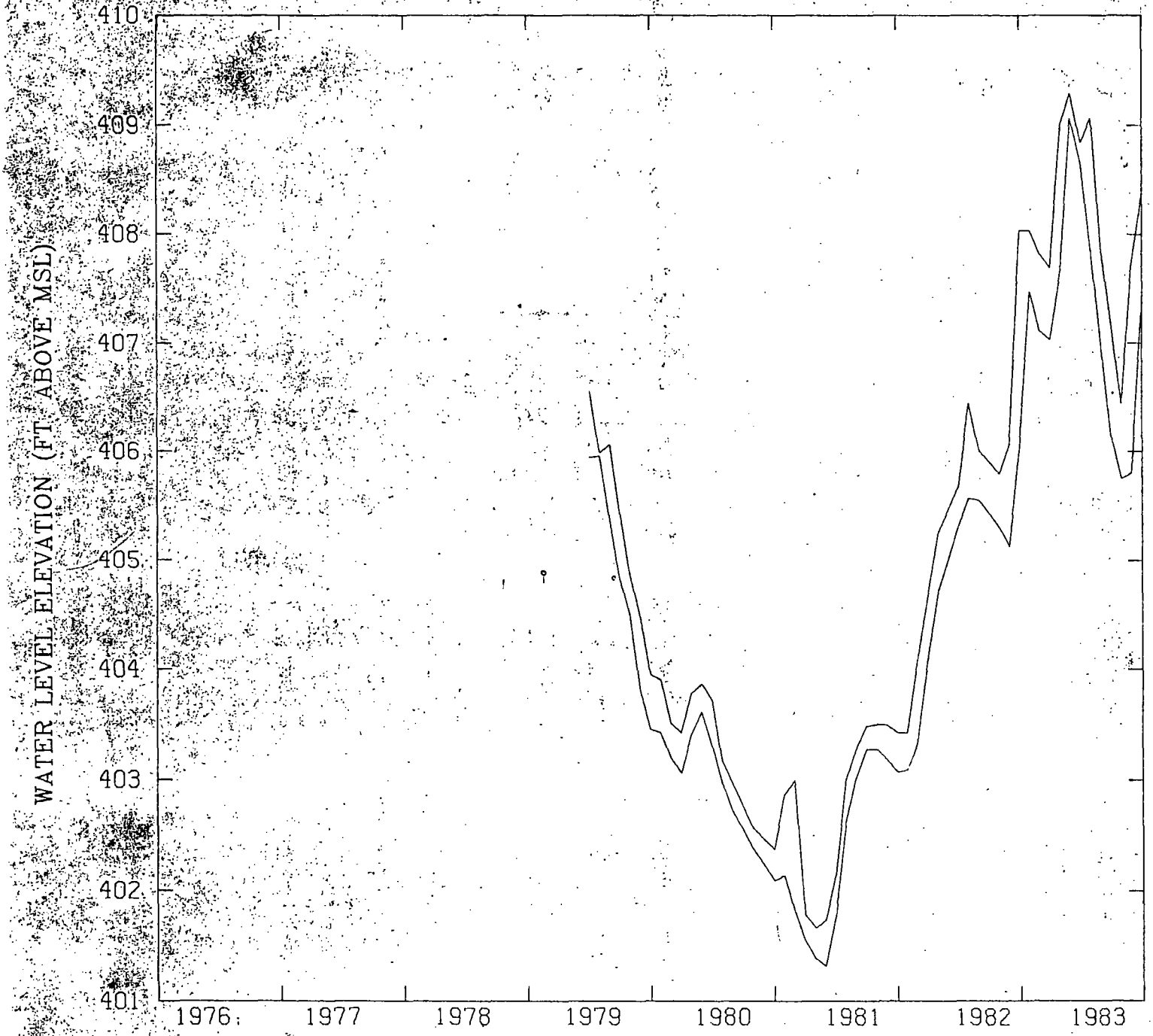
CORPS OF ENG, RW-18 MAD 3N10W-14.4B ID= 1075

DEPTH(FT)= 68 DIAM(IN)=08 LSD(FT)=410.99



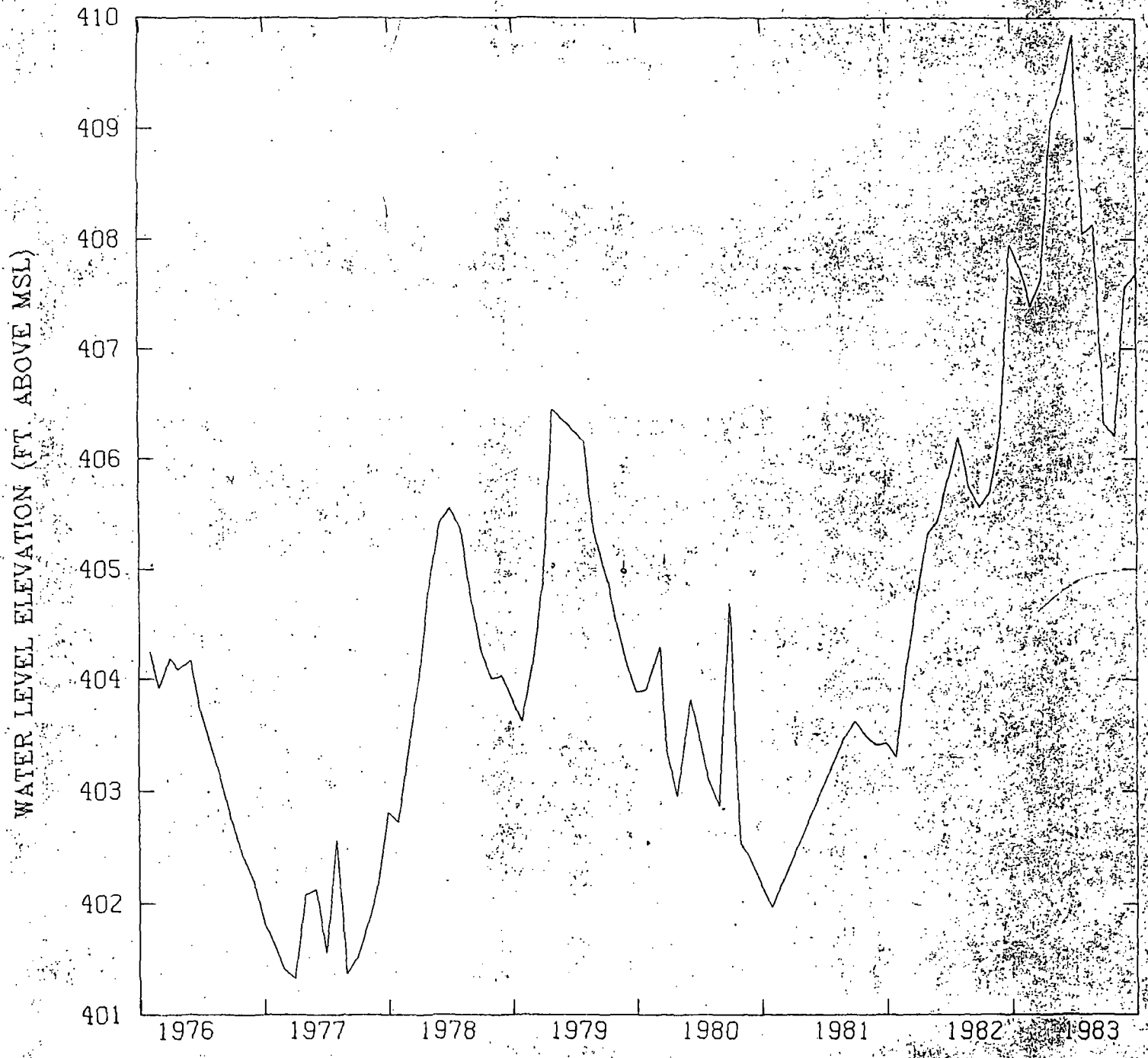
SWS NO.3(NMKI FIRE STA) MAD 3N9W-8.5G ID= 1223

DEPTH(FT)= 81 DIAM(IN)=08 LSD(FT)=418.84



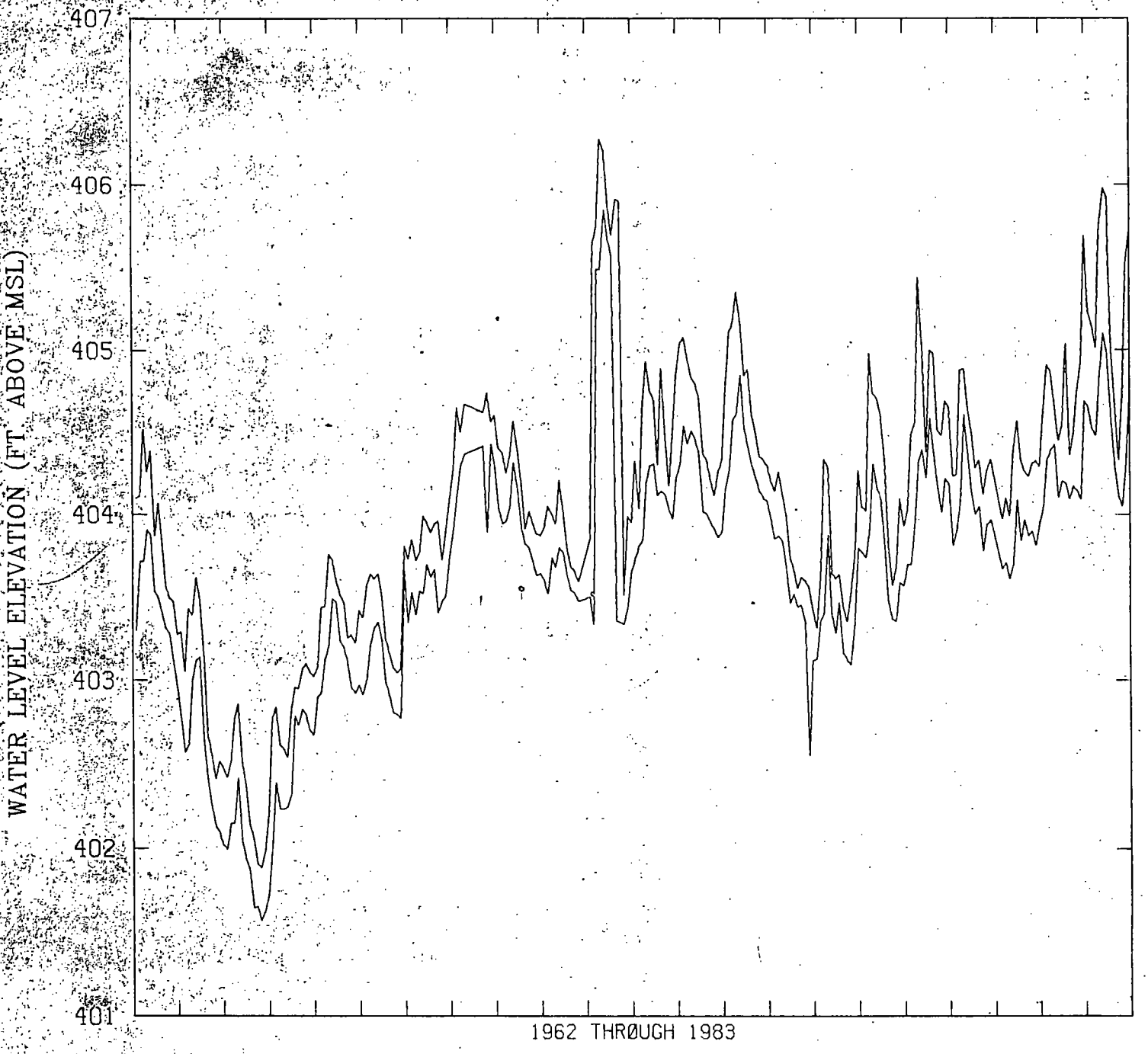
NAMEOKI P3B MAD 3N9W-8.5G1 ID= 1080

DEPTH(FT)= 64 DIAM(IN)=03 LSD(FT)=415.



NAMEOKI P3A MAD 3N9W-8.5G3 ID= 1079

DEPTH(FT)= 32 DIAM(IN)=06 LSD(FT)=415.0



BLAST FRNCE E-1(GRT CTY) MAD 3N9W-16.8A ID= 1074

DEPTH(FT)= 119 DIAM(IN)=06 LSD(FT)=411.67

MAD 03N09W-7.7c

May 31, 1967

PARTIAL CHEMICAL ANALYSIS

Sample of water collected May 19, 1967 from Well No. 1 owned by Royal Crown Cola, near Granite City, Illinois in Madison County. Location of well: 2100'S and 1500'W of the SW corner of Section 7, T3N, R9W. Depth of well: 100 feet. Sample collected 3 hours after pumping began while pumping at a rate of 317 gpm.

LABORATORY NO. 171847

		ppm.	epm.			ppm.	epm.
Iron (total)	Fe	9.6		Chloride	Cl	8.	.23
				Alkalinity	(as $CaCO_3$)	272.	5.44
Turbidity		67		Hardness	(as $CaCO_3$)	390.	7.80
Color		0					
Odor		0					
Temp. (reported)		58°F		Total Dissolved Minerals		478.	

ppm. = parts per million
epm. = equivalents per million
ppm. x .0583 = grains per gallon

ILLINOIS STATE WATER SURVEY

Laurel M. Honley
Associate Chemist

LMH/bb

D-1

MA D3N10W-1 d

December 8, 1953

PARTIAL CHEMICAL ANALYSIS

Sample of water collected November 21, 1953, 4:30 P.M., from well owned by J.X. Snyder of Rural Route #1, Granite City, Illinois in Madison County. Location of well: Approximately 500' W and 2000' N of SE corner Section 1, T. 3 N, R. 10 W. Depth of well: 72 feet.

LABORATORY NO. 133412

	ppm.	epm.			ppm.	epm.
Iron (total)	Fe	10.1	Chloride	Cl	25.	0.71
			Sulfate	SO_4	138.2	2.88
			Alkalinity (as $CaCO_3$)		376.	7.52
Turbidity		103.	Hardness (as $CaCO_3$)		528.	10.56
Color		0				
Odor		0				
Solids (reported)		56.5	Total Mineral Content		580	

ppm. = parts per million
epm. = equivalents per million
ppm. x .0583 = grains per gallon

STATE WATER SURVEY DIVISION

H. M. King
Assistant Chemist

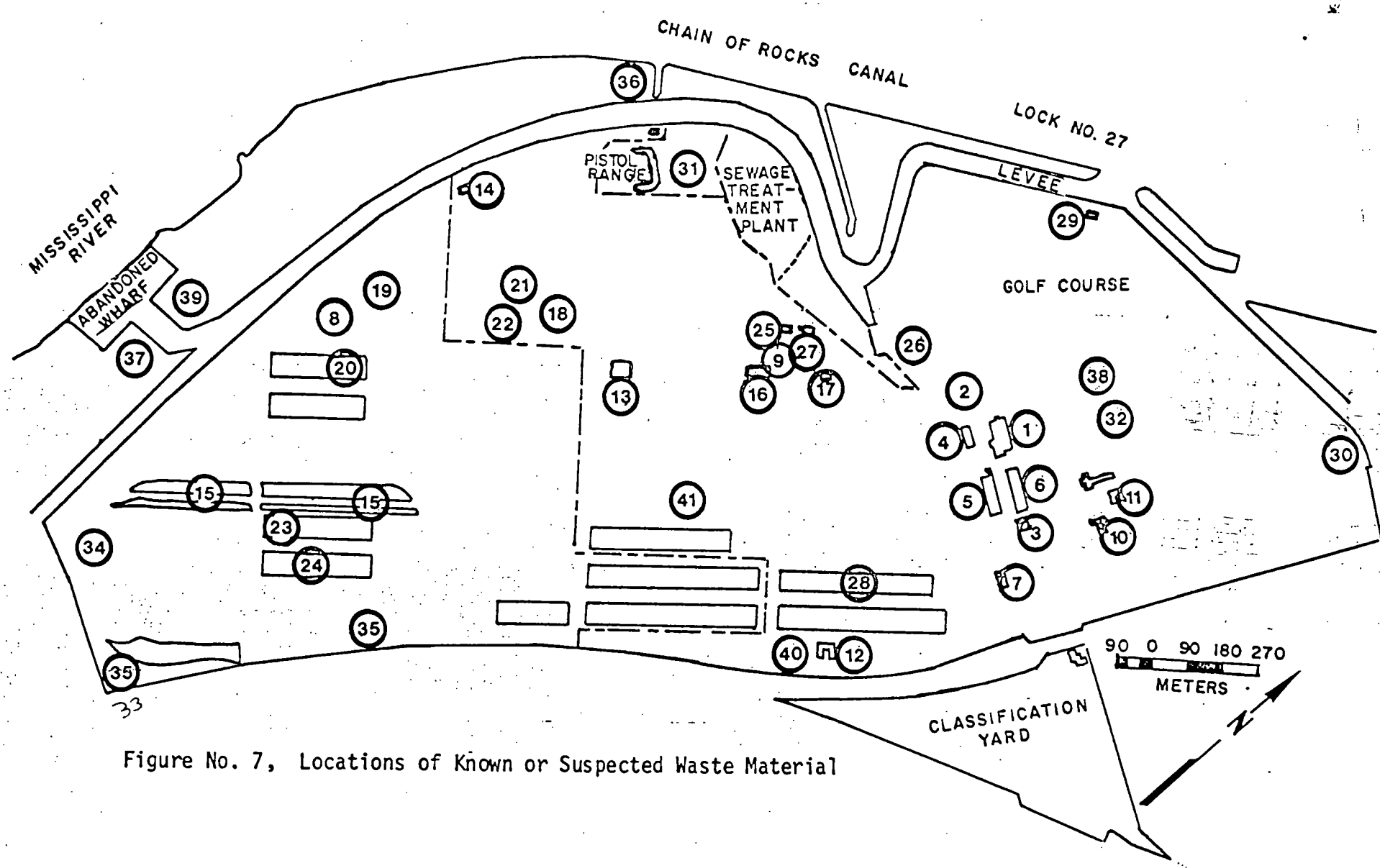


Figure No. 7, Locations of Known or Suspected Waste Material

LEGEND - FIGURE 7

discharged to the sanitary sewer ceased in 1970-71

1. Bldg 231 - Former Plating Operation Location. presently the commissary / former photo lab / basement firing range until mid 1970's
   3 solution tanks — Engine Parts
2. Bldg 209 - Former Plating Operation Location.
   solution tanks — chromium plating + cadmium + other metals
3. Bldg 211 - Former Plating Operation Location.
   solution tanks — chromium plating + cadmium + other metals
4. Bldg 206 - Former NIKE Maintenance Facility.
   old motor maintenance shop — Nike Missile Maintenance during 1960's
   no warhead or missile maintenance performed on site — only electronics & mechanical
5. Bldg 203 - Former Heavy Equipment Maintenance Shop, Current Motor Pool Shop. machining parts, forging parts, engine cleaning, welding, painting, vehicle body work.
   waste solvents + oils collected in drums or underground tanks - sold to contractors - batteries serviced until 1970's, untreated battery electrolyte was dumped behind 203
6. Bldg 204 - Former Heavy Equipment Maintenance Shop. now the Post Exchange
   Some waste oil burned as fuel in 7 boiler / some oil used for dust control / waste anti freeze recycled in 204

presently the motorpool waste solvents + oils recycled by contractor

7. Bldg 202 - Boiler Plant.
   ~~waste anti freeze poured on the ground~~ - large quantities of fuel oil stored → zeolite ion exchanger waste down sewers
8. Vehicle Engine Test Area.
   waste anti-freeze poured on the ground - non recyclable
9. Facilities Engineer Area.
   Mechanical Shop, Electrical Shop, Roads + Grounds Shop, Carpenters Shop. } include welding, painting + general facility upkeep
   wastes are disposed of by refuse contractor —
10. Dispensary.
    has a laboratory for processing x-ray film — wastes sent out for silver recovery
11. Hobby Shop, Library. 1979-1980
    ~~Since 1979~~, Black + white photo lab — waste chemicals discharged to the sanitary sewer
12. Bldg 327 - Former Photo Laboratory Location.
    torn down
13. Bldg 414 - Former Photo Laboratory Location.
    support maintenance shop
14. Bldg 591 - Protective Mask Training Facility.
    agent CN used + stored in the facility — used as a stable in the 70's, torn down 1979
15. Bauxite Piles.
    small arms firing until mid 70's
16. Bldg 444 - Transformer Storage.
    11 transformers + a capacitor some contain Askerel
17. Bldg 400 - Former Compass Storage.
    1950's - early 60's contained radioactive luminous cmpds
18. Bldg 558 - Former Compass Storage. } contained radium + ~~Th~~ tritium
    early 60's Compasses + Meters
19. Bldg 556 - Former Compass Storage. } buildings demolish in early 1970 — final disposition unknown
    late 60's - to early 70's
20. Bldg 573 - Former Compass Storage. - open shop
    60,000 compasses - @ 75 millicuries of tritium — late 60's removed off post prior to 1971
21. Strategic Ore Storage Area. 1957 - mid 60's
    polyethelene bags in 55 gal drums
22. Thorium Residue Storage. 1957-66
    ~3000 of thorium residues stored in the open!
    Some leaked - readings 100-200 counts/min.

LEGEND - FIGURE 7
(Continued)

23. Columbium - Tantalum Ore Storage. mid 60's
100 drums final disposition unknown
24. Columbium - Tantalum Ore Storage.
1000 35 gal drums - removed to Evansville Ind in 1978
25. Bldg 403 - Pesticide Facility/Herbicide - After 1978, curb + no floor drains, overhead loads
Mixing
26. Bldg 197 - Fungicide/Fertilizer Storage. for golf course
27. Bldg 404 - Former Pesticide Facility. prior 1978 in an undermeded, poorly ventilated area
28. Bldg 309 - DDT Storage. NO FLOOR DRAINS
transferred to Shiloh IL in 1974 - in the past - pesticide containers were landfilled off site after being punctured but not triple rinsed.
29. Bldg T-198 - Active Septic Tank.
Golf course clubhouse
30. Old City Landfill.
trash, granite pots, industrial wastes - prior to 1942
31. Largest Landfill (1942-1970).
Near pistol range - hand tools, general refuse, trash, grease, oils, asbestos, scrap metal, open burning -
32. Landfill (1942-1955).
general trash + refuse, building rubble
33. Landfill (1942-1975).
building rubble
34. Surface Dump/Burning Area.
burning of tree limbs, bushes, grass cuttings, empty crates, old furniture, old paint containers, general household trash - used for fire fighting training
35. Landfill (1949-early 1950's).
general trash + refuse
36. Landfill (1947-1949). Corp of Engineers
grease + oil cans, garage, general refuse + dunnage
37. Rubble Landfill (1948-1950).
building rubble
38. Dog Tag Burial Site.
39. EOD Demolition Area (early 1950's-1978).
used for the destruction of ammunition, explosives + explosive devices
40. Potable Water Reservoir.
3785 m^3 concrete storage reservoir
41. Elevated Water Tank.
757 m^3 elevated tank.