ILLINOIS ■ INDIANA ■ KENTUCKY ■ NEW YORK ■ OHIO ■ PENNSYLVANIA ■ VIRGINIA ■ WEST VIRGINIA

REGISTRY OF WELLS FOR USE IN UNDERGROUND INJECTION OF WASTEWATER 1972-1975

a summary of operational characteristics of injection wells in the ohio valley region

compiled by the
OHIO RIVER VALLEY WATER SANITATION COMMISSION

with the assistance of a grant from the
UNITED STATES GEOLOGICAL SURVEY

JULY 1976

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FOREWORD

In 1970, the Ohio River Valley Water Sanitation Commission (ORSANCO) established an Advisory Committee on Underground Injection of Wastewaters to provide guidance in the use of sub-surface disposal of industrial wastewaters. At that time, it was determined that a registry of wells constructed within the signatory states for the underground disposal of fluid wastes would be compiled. The initial Registry, published in March, 1974, contains information on well activity which dates to June, 1972. At that time, information had been gathered on 53 wells in the compass of the compact states, several of which were merely exploratory or experimental, others of which had failed. This report takes those wells which have been active or in the process of being developed from July 1, 1972, through June of 1975. The number of wells in the current census is 52, and of this number, 26 are within Ohio River Basin boundaries.

The Registry serves as a central repository of disposal well information. It includes the owner's name, location, geologic and geophysical logs, test results and operational characteristics of the wells in question. It is also a revision of portions of the 1974 report, and as such extends and corrects data sets where new information was found. In most cases, however, the current information on injectivity is a continuation of that previously reported.

This Registry has been prepared by Russell A. Brant, staff geologist; acknowledgement is made to the state enforcement agencies for providing or making raw data available and for assisting in its development. In publishing this report, the Commission acknowledges with appreciation the efforts of those who contributed to its formulation, and to the United States Geological Survey for underwriting a substantial portion of the cost in developing the Registry and associated appraisals. The work was completed under U. S. Geological Grant No. 14-08-0001-G42.

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* Well numbers are not presented sequentially in this case. Rather, the immediately related wells, those of the same operator, are reported together regardless of date or number.

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** As all Pennsylvania wells are indicated as abandoned, they are not discussed in this volume. Reference should be made to Registry of Wells (1974).

SUMMARY

This report summarizes and updates through June, 1975 information on the waste injection wells operating in the compact district states and contained in the first Registry of Wells published by ORSANCO in March 1975. Wells used from June, 1972 through June, 1975 are listed in this publication. Data on waste injection wells abandoned prior to June of 1972 appear in the March, 1974 Registry.

The prior report contains information on 53 wells, 28 of which were active. The remainder were either in a stage of planning, development and testing, or they were in the process of being abandoned. In contrast, the present survey indicates 37 wells at the beginning of the present reporting period (6/72-6/75), 32 of which are active, two abandoned and plugged in West Virginia, and 4 currently extant in New York, three of these never having been utilized. Of the 32 active wells, 16 are within the Ohio basin and among those, one in Indiana (IN-4) is of unknown status, believed to be inactive but open. One outside the basin is still being prepared for use (OH-10). Thus, for all practical purposes 30 wells are actively used. It should be noted, however, that some wells operate as a pair either alternately or synchronously (IN-1&2, IN-6&7, OH-1&4) and in one system three wells (OH-3,6&9) constitute the basic injecting unit. Most wells are singular, but two operators in Illinois (see IL-1 and IL-2) are developing a second well for increased injection capacity and standby capability.

Wells operating from the present back through June, 1972, generally continue with similar injection characteristics. Two of these wells have been rejuvenated by means of inserting new casing strings and cementing these to the old former long string. This action was taken

because of the discovery of corroded casing apparently caused by leakage from the injection tubing (wells OH-1 and W-5). As a result, Well W-5 is now on a "standby" basis only. Four of these wells operate in connection with the production and processing of NaCl from the Silurian Salina Salt Beds. Two of the wells are a part of artificial brine production and are used to return wastes from the salt processing to the salt cavity in alkali manufacture (W-6 and W-7). A well in Ohio (OH-8) returns brine which has seeped into the open shaft of a salt mine to its origin (the Oriskany). It does not transport what is usually considered a waste. A well in New York disposes of excess brines in connection with the artificial brining of the salt formation (NY-1). In this instance, however, the excess brine is injected into the overlying Cherry Valley member of the Marcellus Shale.

Operating pressures range from 0 or negative pressure to somewhat over 1500 psig at the well head: 17 wells operate at 0 to 100 psig; one at 101 to 250 psig; three at 251 to 500; ten at 501 to 1000 psig; and one in the 1001 to 1500 plus psig range. The vacuum or very low head pressure wells generally inject into the Mt. Simon at moderate volumes (1 million gallons/month or about 23 gpm). Higher pressures are encountered by wells injecting large volumes (5 to 15 million gallons per month or about 100 to 250 gpm). The higher pressures are also indicated in wells with lower transmissabilities (lower permeability values).

Stratigraphically the largest portion of the waste water is stored or disposed into the unnamed Devonian formations (see table--page 8). The well pair (IN-1&2) at Michigan City has contributed about 5.5 billion gallons out of approximately 5.9 billion or 93% of the total amount injected into Devonian formations. The wells in Michigan City are also the shallowest

(255' and 270' below the land surface) of any of the known wells used for injection of waste water. Approximately 3 billion gallons of waste fluid have been injected into Cambrian formations, principally the Mt. Simon sandstone; Indiana wells account for about 1 billion gallons of waste injected fluids, Ohio about 1.4 billion, and Illinois about .75 billion. Silurian rocks have received about 1.3 billion gallons of waste fluids. Approximately 1.1 billion gallons were injected in Pennsylvania through wells now abandoned and plugged. The remainder has been injected (.2 billion gallons) to the Silurian formations in West Virginia wells. Smaller amounts of waste have been received by the Pennsylvanian Salt Sands formation in West Virginia and total about 225 million gallons. Mississippian has received approximately 220 million gallons of waste through Indiana wells. The Ordovician rocks (Knox dolomite) have received about 112 million gallons of Hydrochloric acid waste through two wells in Kentucky.

It may be stated that all Paleozoic systems older than Permian have received waste water to a greater or lesser extent. In each one of the systems, permeable beds, zones or formations are generally demonstrably contained or capped by thick impermeable beds. No evidence of formation plugging by reactions with the injected fluids is recorded in reports or indicated by the injection characteristics.

Wells are out of service for significant periods of time because of production shutdown, plugging of filters, corrosion of surface equipment, corrosion of well casing or failure of the injection tubing or its attendant equipment.

Well operation records were supplied by the state agencies with permitting authority. When records were incomplete, contact was made

with the well operator so that additional or supplemental information could be supplied. Geophysical logs for several of the wells were also acquired during the 1975 census of the wells and placed in the ORSANCO Registry file.

ACCUMULATED WASTE INJECTED
(gallons)

	Within Ohio Basin	Formation or System	Outside Ohio Basin
IL-1	133,000,000	Devonian	
IL-2	82,990,197	Mt. Simon	
IL-3		Mt. Simon	50,697,035
IL-5		Eminence-Potosi	560,133,000
IL-6	117,610,104	Devonian	
IL-7	62,043,000	Mt. Simon	
IL-9		Mt. Simon	3,394,900
	395,643,301		614,224,935
IN-1&2		Devonian	5,548,006,000
IN-3	1,692,000	Bethel	
IN-4	26,000,000	Mt. Simon	
IN-5		Mt. Simon	60,209,859
IN-6		Mt. Simon	402,033,928
IN-7		Mt. Simon	
IN-8		Mt. Simon	172,392,921
IN-9		Mt. Simon	167,286,451
IN-10	117,749,850	Bethel	
IN-11		Mt. Simon	171,961,109
IN-12		Mt. Simon	29,296,528
IN-13	100,669,830	Bethel	
	246,111,680		6,551,186,796
KY-2	112,420,520	Knox	
KY-3			
KY-1	Unknown but considered to be small		
	112,420,520		-0-
OH-1	55,410,837	Mt. Simon	
OH-2	17,702,133	Mt. Simon	
OH-3		Mt. Simon	389,551,769
OH-4	47,352,279	Mt. Simon	
OH-5	239,280,163	Mt. Simon	
OH-6		Mt. Simon	489,844,593
OH-7		Mt. Simon & Maynardsville	2,717,068
OH-8		Oriskany	6,971,200
OH-9		Mt. Simon	175,306,536
OH-10	Not yet injecting		
	359,745,412		1,064,391,166
P-1	33,087,000	Oriskany & Onondaga	
P-2	446,422,700	Bass Islands	
P-3	297,872,300	Bass Islands	
P-4		Silurian	15,000
P-5	-0-	Burgoon S.S.	
P-6	-0-	Warren & Queen Speechley SS	
P-7	-0-		
P-8	353,965,700	Bass Islands	
P-9	-0-	Salt Sands	
	1,131,347,700		15,000

Accumulated Waste (continued)

	Within Ohio Basin	Formation or System	Outside Ohio Basin
W-1	4,587,970	Pennsylvanian Saltsands	
W-2	122,591,900	Pennsylvanian Saltsands	
W-3	202,745,680	Williamsport Dolomite	
W-4	-0-		
W-5	96,007,248	Onondaga Limestone	
W-6	Salt brine & waste; fluids recycled; no net accumulation		
W-7	Salt brine & waste; fluids recycled; no net accumulation		
	425,932,798		-0-
Total	1,572,940,711		9,361,165,597

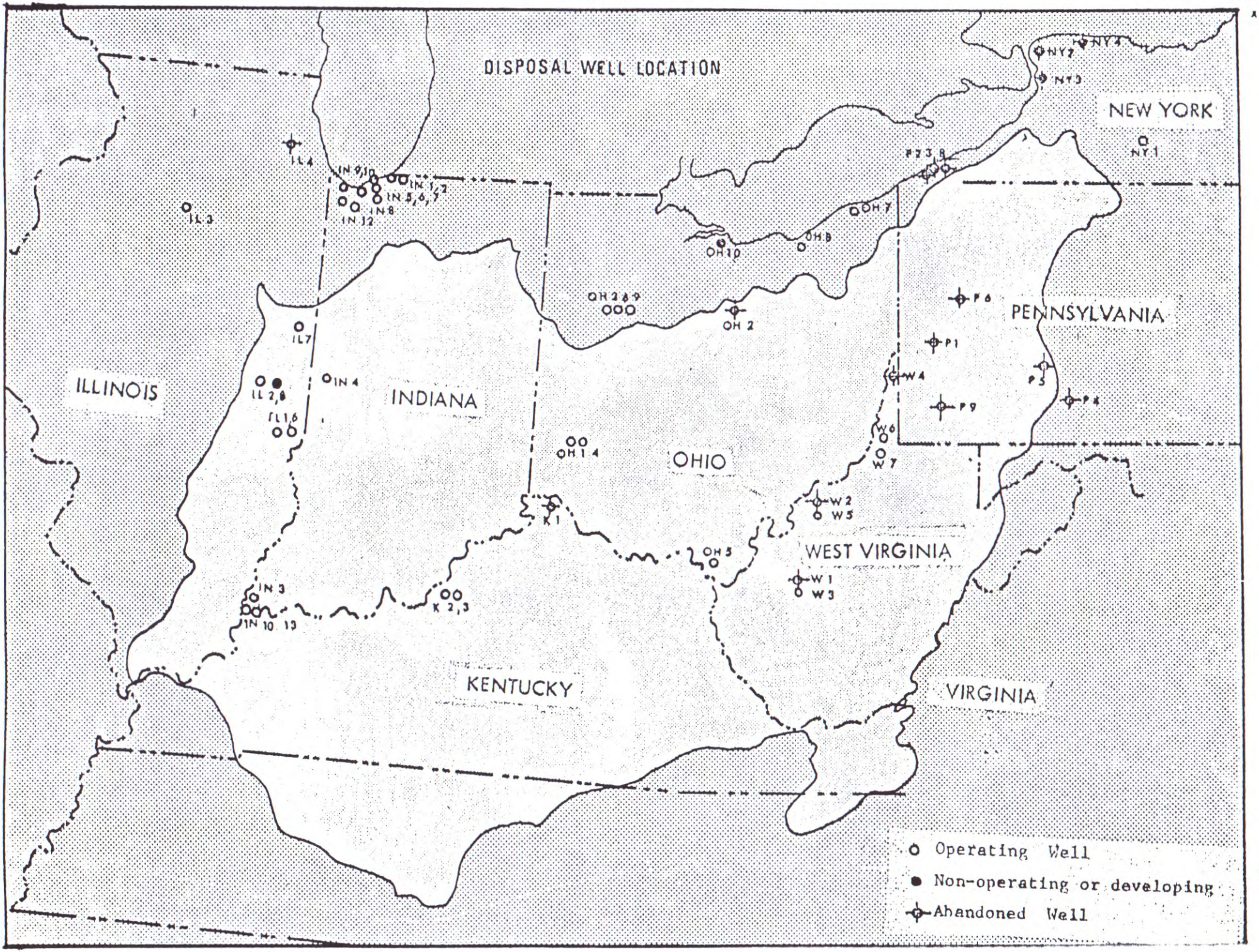
CENSUS OF INJECTION WELLS
July, 1975

Illinois Registry No.	Operator	Address (City, County)	Status
IL-1	Velsicol Chemical Co.	Marshall, Clark	(2)
IL-2	Cabot Corp.	Tuscola, Douglas	(1)
IL-3	Jones & Laughlin Steel Co.	Hennepin, Putnam	(1)
IL-4	American Potash & Chemical	Not an injection well	-
IL-5	U.S.I. Chemicals Co.	Tuscola, Douglas	(1)
IL-6	Velsicol Chemical Co.	Marshall, Clark	(1)
IL-7	Allied Chemical Co.	Danville, Vermilion	(1)
IL-8	Cabot Corporation	Tuscola, Douglas	(4)
IL-9	National Gas Pipeline Co. of America	St. Elmo, Fayette	(1)
Indiana			
IN-1	American Cyanamid Co.	Michigan City, LaPorte	(1)
IN-2	American Cyanamid Co.	Michigan City, LaPorte	(1)
IN-3	Indiana Farm Bureau	Mt. Vernon, Posey	(1)
IN-4	FMC Corp.	Newport, Vermillion	(2 or 3)
IN-5	Bethlehem Steel Co.	Chesterton, Porter	(1)
IN-6	Bethlehem Steel Co.	Chesterton, Porter	(1)
IN-7	Bethlehem Steel Co.	Chesterton, Porter	(1)
IN-8	Midwest Steel Div.	Portage, Porter	(1)
IN-9	U.S. Steel Co.	Gary, Lake	(1)
IN-10	General Electric Co.	Mt. Vernon, Posey	(1)
IN-11	Inland Steel Corp.	East Chicago, Lake	(1)
IN-12	Indiana General Corp.	Valparaiso, Porter	(1)
IN-13	General Electric Co.	Mt. Vernon, Posey	(1)
Kentucky			
KY-1	Abandoned		
KY-2	E.I. DuPont deNemours & Co.	Louisville, Jefferson	(1)
KY-3	E.I. DuPont deNemours & Co.	Louisville, Jefferson	(1)
New York			
NY-1	International Salt Co.	Watkin Glen, Schuyler	(1)
NY-2	Abandoned - Never operational		(3)
NY-3	Abandoned - Never operational		(3)
NY-4	Abandoned - Never operational		(3)
Ohio			
OH-1	Armco Steel Corp.	Middletown, Butler	(1)
OH-2	Abandoned		(3)
OH-3	Vistron Corp.	Lima, Allen	(1)
OH-4	Armco Steel Corp.	Middletown, Butler	(1)
OH-5	U.S. Chemicals Co.	Haverhill, Scioto	(1)
OH-6	Vistron Corp.	Lima, Allen	(1)
OH-7	Calhio Chemicals, Inc.	Perry, Lake	(1)
OH-8	International Salt Co.	Cleveland, Cuyahoga	(1)

(continued)

Ohio	Operator	Address (City, County)	Status
OH-9	Vistron Corp.	Lima, Allen	(1)
OH-10	Ohio Liquid Disposal Co.	Fremont, Sandusky	(4)
Pennsylvania			
P-1	Abandoned		(3)
P-2	Abandoned		(3)
P-3	Abandoned		(3)
P-4	Abandoned		(3)
P-5	Abandoned		(3)
P-6	Abandoned		(3)
P-7	Abandoned		(3)
P-8	Abandoned		(3)
P-9	Abandoned		(3)
West Virginia			
W-1	Abandoned		
W-2	Abandoned		
W-3	E.I. DuPont deNemours & Co.	Belle, Kanawha	(1)
W-4	Abandoned		
W-5	E.I. DuPont deNemours & Co.	Parkersburg, Wood	(1)
W-6	PPG Industries	Natrium, Marshall	(1)
W-7	Allied Chemical	Moundsville, Marshall	(1)

(1) Active (2) Standby (3) Abandoned (4) Under development


DISPOSAL WELL LOCATION
NEW YORK
NY 1
NY 2
NY 3
NY 4
PENNSYLVANIA
P 1
P 3
P 4
P 5
P 6
P 9
ILLINOIS
IL 1
IL 2,8
IL 3
IL 4
IL 6
IL 7
INDIANA
IN 1,2
IN 3
IN 4
IN 5,6,7
IN 8
IN 9,10
IN 10, 13
IN 12
OHIO
OH 1,4
OH 2
OH 2,8,9
OH 3
OH 7
OH 8
OH 10
WEST VIRGINIA
W 1
W 2
W 3
W 4
W 5
W 6
W 7
KENTUCKY
K 1
K 2,3
VIRGINIA
Operating Well
Non-operating or developing
Abandoned Well

ILLINOIS INJECTION WELLS

IL-1. Velsicol Chemical Corporation
Marshall, Clark County

Completed--April, 1965
In use--September, 1965
Status--Standby

Comments: Although the original injection zone was a Devonian dolomite at 2370' to 2620', considerable reworking of the well and its injection zones took place between startup and reworking for standby later in 1972. In 1969 perforations were made in the casing at 1710'-1748', 1620'-1650' and 1542' to 1582'. This was followed by additional treatments of the injection zones with hydrochloric acid and the setting of a cement plug in the well at the 1764'-2007' interval just prior to placement on standby status in June, 1972. Regular injection ceased in March. A letter dated December 29, 1972, indicates that 133,000,000 gallons of waste liquid were injected into the well.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
1965-1970			113,583,009 (Deduced)		
Jan. 1971	30	3,080,160	116,663,169	69	71
March	31	2,410,560	119,073,729	54	105
June	30	2,246,400	121,320,129	52	123
Oct.	31	2,276,640	123,596,769	51	139
Dec.	31	2,232,000	125,828,769	50	154
Jan. 1972	31	2,232,000	128,060,769	50	156
Feb.	29	2,171,520	130,232,289	52	172
March	31	2,767,711	133,000,000	62	-

IL-6. Velsicol Chemical Corporation
Marshall, Clark County

Completed--December, 1971
In use--As of March, 1972
Status--Current

Comments: The following is a reported analysis of the injected fluids:

*NaCl 12%; NaOH 2%; NaOCl 2%.

The injection zone spans 2440' to 2737' (297') in Devonian limestone and dolomite. This well was drilled to 6000' in an unsuccessful search for other zones of satisfactory permeability and porosity. After it was tested the well was plugged back to 2737'. This well replaced IL-1 (Velsicol No. 1) as the principal injection well in March, 1972. At that time, well No. 1 was prepared for use as a standby. Copies of the geophysical logs are in the ORSANCO Registry file.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
March 1972	16	1,396,080	1,396,080	69.6	12.5
April		No report			
May	31	2,248,416	3,824,496	54	25
June	30	2,846,880	6,671,376	66	59
July	31	2,236,464	8,907,840	50	67
Aug.	31	1,986,480	10,894,320	45	75
Sept.		No report			
Oct.	31	2,213,352	13,206,672	52	74
Nov.	30	2,039,040	15,245,712	-	-
Dec.	31	No report	17,000,000		
Jan. 1973	31	1,794,528	18,794,528	40	81
Feb.	28	1,584,576	20,379,104	39	85
March	31	1,553,472	21,923,576	35	93
April	31	1,687,392	23,610,968	40	92
May	31	2,227,536	25,838,504	50	98
June	30	6,717,600	32,556,104	156	244
July	31	11,160,000	43,716,104	250	320
Aug.		No report			
Sept.		No report			
Oct.		No report			
Nov.		No report			
Dec.		No report			

* See table on pages 53-54 for symbol explanations.

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Jan.-July 1974		No reports			
Aug.		Not reported			
Sept.		Not reported			
Oct.		Not reported			
Nov.		Not reported			
Dec.		Not reported			
Jan. 1975	31	12,500,000	unknown	294	276
Feb.	28	10,400,000	unknown	272	270
March	28	11,700,000	unknown	304	324
April	29	11,700,000	unknown	302	336
May	29	11,400,000	unknown	290	392
June	28	9,460,000	unknown	249	342
July	29	6,734,000	unknown	203	276

73,894,000 gallons Jan.-July 1975

A minimum of 117,610,104 gallons is the only volumetric value established during this period (March, 1972-July, 1975), because reports and data are lacking for August, 1973 through December, 1974 and other months during which the data were not recorded.

IL-2. Cabot Corporation
Tuscola, Douglas County

Completed--May, 1966
In use--August, 1966
Status--Current

Comments: A letter to the Cabot Corporation from the Sanitary Water Board dated August 16, 1967 indicates the approximated starting date of operation. However, gaps exist in the data set from 11-66 to 3-72, and these records were not found; it is also a notable feature of this well that not only are the owner's wastes injected into it but those of two other firms as well.

Wastes of the Cabot Corp. consist of: Hydrochloric acid, chloride salts and silicon dioxide particulates. 98.8% by weight total injection.

Wastes of the R.R. Donnelley Co. consist of: Nitric acid, zinc nitrate, trisodium phosphate and aromatic solvent. 0.5% by weight total injection.

Wastes of the A.E. Staley Mfg. Co.: Chlorides, sulphates and cornstarch. 0.7% by weight total injection.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
March 1972		2,267,104	2,267,104	or as indicated	0
April		2,276,543	4,453,647		0
May		2,412,917	6,956,564		0
June		2,370,902	9,327,466		0
July		2,227,142	11,554,608		0
Aug.		1,971,516	13,526,124		0
Oct.		1,968,042	15,494,166		0
Nov.		No data			
Dec.		No data			
Jan.-Oct. 1973		No data or well activity indicated			
Nov.	30	2,944,250	18,438,416	126	15 (Max)
Dec.		No data			
Jan. 1974	31	4,456,040	22,894,456	123	0-14
Feb.	28	3,483,800	26,378,256	109	0-11
March	31	3,782,990	30,161,246	116	15 (Max)
April	28	3,510,450	33,671,696	118	14 (Max)
May	31	4,317,240	37,988,936	127	19 (Max)
June	30	3,908,280	41,897,216	114	25 (Max)
July	31	3,122,620	45,019,836	82	17-35
Aug.	30	3,073,440	48,093,276	90	0-19
Sept.	30	2,792,030	50,885,306	94	1-3
Oct	31	3,037,461	53,922,767	81	0-4
Nov.	29	2,715,780	56,638,547	86	Instr. Malf.
Dec.	31	3,707,730	60,346,277	100	0-6
Jan. 1975	31	4,151,530	64,497,807	104	0-6
Feb.	28	3,983,210	68,481,017	102	1-9
March	31	4,274,230	72,755,247	104	0-26
April	19	2,190,850	74,946,097	104	Instr. Malf.
May	30	3,261,730	78,207,827	100	0-47
June	30	4,782,370	82,990,197	126	Instr. Malf.

IL-8. Cabot Corporation
Tuscola, Douglas County

Under development--June, 1975

IL-3. Jones and Laughlin Steel Corp.
Hennepin Works
Hennepin, Putnam County

Completed--December, 1967
In use--Same
Status--Current

Comments: This well is used for the injection of waste pickle liquors. The injection zone is approximately 1700' of Mt. Simon sandstone; the top of the formation is at 3109'. Data from 1968 through August of 1970 was derived from U.S. Bureau of Mines RI7804.

Injection Record

Year Month	Days Oper.	Injected Volume (gallons) Waste	Annulus	Accumulated Volume	Avg. rate of injection	Avg. press. psig
Oct. 1968		350,846	44,370	395,215	60	260
Nov.		186,985	38,465	620,665	30	120
Dec.		520,000	45,233	1,207,898	20	130
Jan. 1969		430,270	43,500	1,681,668	21	75
Feb.		474,115	45,000	2,200,783	137	287
March		481,480	41,764	2,724,027	153	239
April		415,277	28,652	3,269,956	190	265
May		494,260	32,353	3,694,569	193	230
June		377,843	25,000	4,097,412	188	209
July		454,022	36,498	4,587,932	159	173
Aug.		316,500	25,205	4,929,637	156	208
Sept.		512,076	37,396	5,479,109	164	216
Oct.		507,822	39,308	6,026,239	166	242
Nov.		462,656	36,859	6,525,754	170	250
Dec.		438,965	36,589	7,001,308	155	254
Jan. 1970		411,490	29,618	7,442,416	173*	234**
Feb.		263,075	19,656	7,725,147	195	252
March		405,050	27,812	8,158,009	199	236
April		218,060	15,528	8,391,597	179	177
May		411,140	31,592	8,834,329	175	124
June		364,000	24,424	9,222,753	199	148
July		329,174	23,504	9,575,431	189	187
Aug.		298,070	26,782	9,896,718	161	155
Sept.		306,536	23,217	10,226,471	174	210
Oct.		387,484		10,139,955	244/409	153/13
Nov.		232,030		10,845,985	118/275	147/13
Dec.		Data lacking				

Year Month	Days Oper.	Injected Volume (gallons) Waste	Annulus	Accumulated Volume	Avg. rate of injection	Avg. press. psig
Jan. 1971	3	510,951		11,356,936	179/13	225/329
Feb.	6	696,359		12,053,295	141/13	206/355
March	8	808,448		12,861,743	136/13	232/396
April	7	764,517		13,626,260	156/13	240/413
May	5	470,097		14,096,357	139/13	138/274
June	7	625,523		14,721,880	150/13	225/445
July	3	448,023		15,169,903	135/13	265/470
Aug.	1	144,671		15,314,574	131/13	270/470
Sept.	2	139,712		15,454,286	140/13	275/445
Oct.	3	427,993		15,882,279	95/13	312/470
Nov.	6	687,695		16,569,974	92/13	308/456
Dec.	6	749,290		17,319,264	90/13	376/484
Jan. 1972	4	640,310		17,959,574	9	313/465
Feb.	10	898,633		18,858,207	76/13	305/500
March	8	860,656		19,718,863	87/13	300/485
April	8	850,904		20,569,767	108/13	226/545
May	7	882,841		21,452,608	101/13	- /501
June	9	618,287		22,070,895	113/13	294/563
July		No report				
Aug.		No report				
Sept.		No report				
Oct.		By letter dated 11/30/72		28,346,725		
Nov.		No data				
Dec.	13	807,602		29,882,118	181/13	265/546
Jan. 1973	15	1,112,941		30,995,059	194/13	234/509
Feb.	7	818,971		31,814,030	159/13	193/444
March	15	1,111,855		32,925,885	213/13	120/390
April	14	1,179,460		34,105,345	191/13	53/284
May		No report				
June		No report				
July	7	518,722		36,661,466	194/13	112/315
Aug.	9	920,236		37,581,709	169/13	75/303
Sept.	6	766,639		38,348,348	141/13	58/229
Oct.		No report				
Nov.	6	714,609		40,084,217	160/13	26/218
Dec.	8	788,228		40,872,445	114/13	- /128
Jan. 1974	6	1,231,416		42,103,861	149/13	0/101
Feb.		No report				
March		No report				
April	4	554,654		44,573,195	153/13	54/190
May	5	727,042		45,300,237	153/13	89/244
June	6	631,380		45,922,617	137/13	28/185
July	4	551,934		46,591,688	139	0/24
Aug.	4	554,006		47,145,694	134	0
Sept.	5	578,861		47,724,555	206	164
Oct.	3	493,676		48,218,231	210	157
Nov.	5	850,733		49,068,964	201	130
Dec.		478,216		49,547,180	-	-

Year Month	Days Oper.	Injected Volume (gallons) Waste	Annulus	Accumulated Volume	Avg. rate of injection	Avg. press. psig
Jan. 1975	6	835,400		50,382,580	160	205
Feb.	3	314,455		50,697,035	260/265	230/280
March-June		No reports				

* Under "Rate" first number is Waste Pickle Liquor rate, second number is Annulus water injection.

** Under "Pressure" same reference where only one value is given it may be assumed to be on the injection tubing.

IL-4. American Potash & Chemical Co.
West Chicago

This well was plugged back and used for fresh waster supply as reported previously (March, 1974).

IL-5. U.S.I. Chemicals Co.
Tuscola, Douglas County

Completed--May 1970

In use--September 1970
Status--Current

Comments: This well injects into the Eminence-Potosi interval at a depth of 5015' to 5524'. The accumulated injected wastes totaled 226,320,000 gallons through June of 1972. Present waste consists of leachate from $CaSO_4$ $2H_2O$ (gypsum) piles, ion exchange regeneration salts, boiler and cooling tower blowdown water and wastes from production of alcohol and Ethylene and laboratory wastes including Mercury compounds. An analysis of the waste stream for February, 1974 showed the following ranges:

Sp. Gr.	1.016	-	1.024
pH	1.7	-	1.9
T.D.S.	10,980 mg/l	-	17,702 mg/l
T.O.C.	178 mg/l	-	183 mg/l
S.S.	25 mg/l	-	44 mg/l
P	1,565 mg/l	-	2,348 mg/l
SO_4	3,960 mg/l	-	5,920 mg/l
F	671 mg/l	-	1,040 mg/l
Cl	10 mg/l	-	50 mg/l
Ca	26 mg/l	-	32 mg/l
Mg	46 mg/l	-	100 mg/l

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Aug. 1972	31	11,450,000	226,320,000	236	10/50
Sept.		No report			
Oct.		No report			
Nov.		No report			
Dec.		No report			
Jan. 1973		No report			
Feb.		No report			
March		No report			
April		No report			
May		No report			
June 1973	27	8,571,000	329,675,000	278	31/49
July	29	10,146,000	339,821,000	144	31/46
Aug.	31	11,006,000	350,827,000	296	33/50
Sept.	29	10,127,000	360,954,000	272	33/52
Oct.		No report			
Nov.		No report			
Dec.		No report			
Jan. 1974		No report			
Feb.	28	10,058,000	411,410,000	275	35/55
March	31	10,441,000	421,851,000	275	35/150
April	30	10,709,000	432,560,000	265	35/118
May	31	10,881,000	443,441,000	265	35/70
June	29	9,189,000	452,630,000	260	35/58
July	31	10,438,000	463,068,000	270	36/ -
Aug.	30	10,612,000	473,680,000	275	35/ -
Sept.	29	11,325,000	485,005,000	280	35/ -
Oct.	22	8,934,000	493,939,000	280	35/ -
Nov.	12	4,631,000	498,570,000	280	35/ -
Dec.	0	0	498,570,000	0	0
Jan. 1975	22	7,908,000	506,748,000	260	38/ -
Feb.	28	10,856,000	517,604,000	280	40/ -
March	31	11,400,000	529,004,000	280	40/ -
April	12	4,500,000	533,504,000	260	40/ -
May	24	8,664,000	542,168,000	280	38/ -
June	30	10,793,000	552,961,000	285	33/ -
July	22	7,172,000	560,133,000	285	37/ -

Rates are given in gpm (gallons per minute). Under "Pressure", the first number before the slash (/) refers to tubing pressure (injection pressure) and the second number, pressure in the annular space. In this system no flow is maintained in the annular space and a pressure of about 50 psig is maintained; in both sets of data maximum values are recorded.

IL-7. Allied Chemical Co.
Danville, Vermilion County

Completed--October 1972
In use--May 1973
Status--Current

Comments: This well was drilled and developed to a depth of 6668 feet. In September of 1973, downhole problems of unknown nature required reworking of the well. A new permit was issued and an acid-proof cement plug set at 4025'-4154' depth. This well was reconditioned with a 4½" casing of fiberglass and acid-proof cement. The injection zone selected was the Potosi formation consisting of about 308' of interbedded sandstone and dolomite. This formation is overlain by the Prairie du Chien group, which serves as a cap. Since the repair and changeover the injection pressures at the head have declined from pressure of up to 375 psig to values of vacuum to 50 psig at the head.

Injection Record

Year Month	Days Oper.	Injected Volume (Injection into Mt. Simon)	Accumulated Volume	Avg. rate gpm	Avg. press. psig (range)
May 1973	6	548,020	548,020	56-98	312-375
June	10	562,860	1,110,880	40-70	0-320
July	17	740,770	1,851,650	55-150	0-384
Aug.	31	788,102	2,639,752	54-96	345-370
Sept.	-	224,630	2,864,382	-	-
Oct.		Repairs--No injection (injection into Potosi)			
Nov.	3	639,890	3,504,272	85-94	0
Dec.	29	2,235,490	5,739,762	30-126	0-50
Jan. 1974		3,327,540	9,018,302	150	-
Feb.	28	3,809,118	12,827,420	-	Vac-50
March	31	2,788,170	15,615,590	122	Vac-50
April	27	2,735,760	18,351,350	123	Vac-55
May	31	3,538,650	21,890,000	120	Vac-54
June	29	2,659,700	14,549,700	109	Vac-27
July	30	2,737,800	27,287,500	118 (Max)	48 (Max)
Aug.	29	2,295,550	29,583,050	106 (Max)	50
Sept.	30	3,138,930	32,721,980	106 (Max)	58
Oct.	31	2,569,760	35,291,780	110 (Max)	42
Nov.	29	2,492,910	37,784,650	107 (Max)	46
Dec.	31	2,755,350	40,540,000	98 (Max)	27

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Jan. 1975	28	1,999,500	42,539,500	100	34
Feb.	28	2,829,500	45,369,000	100	30
March	31	2,768,850	48,137,850	85	47
April	30	2,882,750	51,020,600	93	45
May	30	3,418,400	54,439,000	99	50
June	30	3,969,000	58,408,000	107	52

IL-9. Natural Gas Pipeline Co. of America
St. Elmo, Fayette County

Completed--October 1968 (salt water disposal)
In use--October, 1974 (waste disposal)
Status--Current

Comments: This well is developed in a gas storage pool and receives wastes from the gas storage pool operation, including Mt. Simon formation water, boiler and cooling tower blowdown, process water and blowdown from Stretford process sulphur recovery plant. The waste is injected into a portion of the Mt. Simon formation (159 feet thick) at a depth of 2601'.

Characteristics of the Injected Fluids
(December 1972)

Characteristic	Concentration (mg/l)
Hardness	11,900
Alkalinity	335
Sulphate	2,767
Chloride	44,000
Calcium	2,843
Magnesium	1,191
Silica	30
Iron	250
Dissolved Solids	76,800
Sodium thiosulphate/Sulphate	54,976
Anthraquinone disulphonic acid	665
Sodium ammonium vanadate as Vd	200
Sodium citrate	1,134
Sodium carbonate	6,647

Sp. Gr. 1.063 pH 7.6 Turbidity 320 JTU

Injection Characteristics

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Oct. 1974	14	326,750	326,750	22.6	157
Nov.	20	500,330	827,080	22	153
Dec.	19	409,080	1,236,160	28	135
Jan. 1975	19	743,670	1,979,830	28	130
Feb.	-	-	-	-	-
March	25	681,210	3,394,900	117	32

INDIANA WASTE INJECTION WELLS

Few changes in well status have taken place since the publication of the first Registry of Wells. In 1972 a new well was drilled and completed near Mt. Vernon by General Electric Company. The following updates the listing of injection characteristics of waste water wells in Indiana.

IN-1&2. American Cyanamid Company
Michigan City, Laporte County

Completed--1950-1951
In use--Same
Status--Current

Comments: These wells inject ammonium and sodium sulphate liquors from the preparation of petroleum catalysts (see page 31--1974 Registry). Accumulation from startup in 1950 through June of 1972 was estimated at 5,000,000,000 gallons. In wells 1 and 2 respectively, injection is to Devonian limestones and dolomites at depths of 270 and 255 feet. Indiana Department of Health, Industrial Pollution Control Section records indicate that injection has continued utilizing the two wells at 500 gpm at 20 psig. It has been reported that these wells have operated continuously through February, 1975, when injection pressures of 55 psig and back pressures of 22-26 psig were indicated. During January and February, injections totaled 10,400,000 and 12,005,700 gallons respectively. Because the injection activity is reported as nil for March through June of 1975, a possible conclusion is that rate of injection was slackening during January and February. For purposes of this report, it is assumed that the injection rate averages 400 gpm on a continuous basis from July, 1972 through December, 1974 (30 months) plus January and February, 1975 as

reported. 400 gpm X 1440 (min/day) X 365 (days) X 2 (years) = 525,600,000 gallons through December, 1975. As there appears to have been some intermittent activity, the value of a possible maximum accumulation of 5,548,005,700 is estimated over the entire span of operation.

IN-3. Indiana Farm Bureau Coop. Assoc., Inc.
Mt. Vernon, Posey County

Completed--1950
In use--1950
Status--Current

Comments: Reports indicate intermittent injection of about 6000 gallons per month of spent refinery catalysts. Accumulation through June, 1975 is estimated at 1,692,000 gallons. No pressure or rate data are available. This well injects into the Mississippian Tar Springs formation.

IN-4. FMC Corporation (DOD Arsenal)
Newport, Vermillion County

Completed--1960
In use--1960
Status--Inactive since 1962

Comments: The injection zone is the Mt. Simon sandstone.

IN-5. Bethlehem Steel Corporation
Chesterton, Porter County

Completed--1965 (drilled and equipped from 1963 through 1965)
In use--1967
Status--Current

Comments: This well is designated as "the acid well" into which spent pickle liquors are discharged. The injection record is not entirely intact. The 1974 Registry shows data for the years 1971 through 1972. Additional examination has revealed data extending back through October, 1969.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Oct. 1969		2,654,606	2,654,606+	Well operates at Vacuum Head Press.	
Nov.		1,724,199	4,378,805	HCl - 0-1.12%	
Dec.		2,263,987	6,642,792	$FeCl_2$ - 6.8-19.3	
Jan. 1970		2,040,816	8,683,608		
Feb.		2,258,043	10,941,651		
March		No report			
April		1,590,708	12,532,360		
May		1,079,419	13,611,779		
June		1,421,697	15,033,476		
July		1,790,541	16,824,017		
Aug.		1,083,630	17,907,647		
Sept.		1,780,281	19,687,928		
Oct.		546,532	20,234,460		
Nov.		1,133,752	21,368,212		
Dec.		1,160,192	22,528,404		
Jan. 1971		982,683	12,511,087		
Feb.		806,367	24,317,454		
March		386,876	24,704,330		
April		756,961	25,461,291		
May		1,049,110	26,510,401		
June		923,899	27,434,300		
July		771,923	28,206,223		
Aug.		303,646	28,509,869		
Sept.		328,624	28,838,493		
Oct.		203,150	29,041,643		
Nov.		282,222	29,323,865		
Dec.		457,321	29,781,185		
Jan. 1972		760,120	30,541,306		
Feb.		1,352,650	31,893,956		
March		963,065	32,857,021		
April		649,267	33,506,288		
May		440,948	33,947,236		
June		334,946	34,282,182		
July	23	340,992	34,623,174		
Aug.	27	781,359	35,404,533		
Sept.	24	1,033,282	36,437,815		
Oct.	28	1,139,400	37,577,215		
Nov.	24	1,046,671	38,623,886		
Dec.	28	1,112,103	39,735,989		
Jan. 1973	28	1,008,236	40,744,225		
Feb.	26	968,373	41,712,598		
March	27	775,413	42,488,011		
April	26	753,525	43,241,536		
May	30	1,150,260	44,391,796		
June	30	631,457	45,023,253		
July	30	917,373	45,940,626		
Aug.	30	907,709	46,848,335		

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig	
Sept.	30	805,310	47,653,645			
Oct.	30	719,900	48,373,545			
Nov.	28	1,132,110	49,505,655			
Dec.	26	586,386	50,092,041			
Jan. 1974	29	717,425	50,809,466			
Feb.	23	569,800	51,379,266			
March	27	584,967	51,964,233			
April	27	513,361	52,477,594			
May	31	585,200	53,062,794			
June	30	455,300	53,518,094			
July	30	728,875	54,246,969			
Aug.	29	741,781	54,988,750			
Sept.	27	675,924	55,664,674			
Oct.	26	644,308	56,308,982			
Nov.	25	372,068	58,681,050			
Dec.	25	633,484	57,314,534			
Jan. 1975	23	362,444	57,676,978	Notes indicate injection of		
Feb.	11	92,724	57,769,702	waste at 0 (vacuum). Lake		
March	4	27,739	57,797,441	water is injected during non-		
April	4	38,305	57,835,746	waste periods. During 1975		
May	7	62,080	57,897,826	2,312,033 gallons of lake water		
June	Standby Water	2,312,033	60,209,859	at pressures of up to 57 psig.		

This record appends and corrects the data appearing in the 1974 Registry. Although a hiatus in data still exists from 1967 to late in 1969, the estimated volume during this period will probably account only for approximately 15% of the total accumulation through May, 1975. This well has operated virtually continuously through its history, and standby freshwater was injected during low production periods only.

IN-6. & IN-7. Bethlehem Steel Corp.
Chesterton, Porter County

Completed-- March-April, 1968
In use--
Status--Current

Comments: The wells are operated as a unit, sometimes alternately,

sometimes simultaneously. As the Table shows, comparatively large volumes are injected into the "Ammonia" wells as opposed to the "Acid Well" (IN-5). The main constituents injected are: NH_4 compounds up to 9,800 mg/l, phenols 400-5,600 mg/l; CN 3-52 mg/l; CNS 1,050-2,600 mg/l. The following listing amplifies the previous injection record. It includes data from September, 1969, and it brings the record forward through May, 1975. This record may still be incomplete, but as indicated in the reportage on well IN-5, the percentage of total volume attributable to the hiatus is small.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Sept. 1969	12	692,466	692,466+		
Oct.	31	2,936,978	3,629,444		310-420
Nov.	30	3,571,487	7,200,931		
Dec.	31	4,652,204	11,853,135		
Jan. 1970	31	4,652,204	16,505,339		
Feb.	28	3,032,328	19,537,667		
March	31	2,937,706	22,475,373		
April	30	2,789,836	25,265,209		
May	31	3,738,183	29,003,392		
June	30	3,604,841	32,608,233		
July	31	4,077,214	36,685,447		410-770
Aug.	31	4,292,360	40,977,807		420-950
Sept.	30	3,944,362	44,922,169		800-1280
Oct.	31	4,111,915	49,034,084		90-170
Nov.	30	3,488,281	52,522,365		75-160
Dec.	31	3,349,806	55,872,171		
Jan. 1971		3,712,773	59,584,944		360-650
Feb.		3,655,871	63,240,815		390-550
March		3,618,865	66,859,680		410-550
April		3,369,969	70,229,649		400-620
May		3,578,246	73,807,895		570-655
June		3,478,749	77,286,644		520-740
July		3,824,333	81,110,977		140-750
Aug.		3,525,829	84,636,806		140-800
Sept.		3,467,168	88,103,974		290-770

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Oct.		3,873,424	91,977,398		650-780
Nov.		3,198,634	95,176,092		550-720
Dec.		3,515,423	98,691,455		450-730
Jan. 1972		3,686,019	102,377,474		480-700
Feb.		5,368,990	107,746,464		450-780
March		7,004,523	114,750,987		595-980
April		6,207,783	120,958,770		360-960
May		6,582,300	127,541,070		400-820
June		6,532,100	134,073,170		380-1040
July	31	6,794,300	140,867,470		0-750
Aug.	31	6,488,500	147,355,970		620-800
Sept.	30	6,649,330	154,005,300		550-1020
Oct.	31	7,173,932	161,179,232		360-1130
Nov.	30	7,288,500	168,467,732		360-800
Dec.	31	7,182,237	175,649,969		400-860
Jan. 1973	31	8,037,400	183,687,369		500-860
Feb.	28	7,807,410	191,494,779		420-828
March	31	7,777,246	199,272,025		420-828
April	30	6,548,615	205,820,640		320-820
May	31	6,522,450	212,343,090		72-870
June	30	7,293,579	219,636,669		160-900
July	31	7,578,448	227,215,117		250-700
Aug.	31	8,115,660	235,330,777		310-710
Sept.	30	7,381,600	242,712,377		310-770
Oct.	31	6,443,300	249,155,677		350-520
Nov.	30	6,951,200	256,106,877	165	320-600
Dec.	31	8,371,860	264,478,737		
Jan. 1974	31	9,504,600	273,983,337		310-590
Feb.	28	8,364,120	282,347,457		260-560
March	31	8,057,310	290,404,767		260-610
April	30	8,151,911	298,556,678		260-600
May	31	8,186,358	306,743,036		290-430
June	30	7,583,909	314,326,945		230-500
July	31	8,535,011	322,861,956		290-630
Aug.	30	7,737,100	330,599,056		200-550
Sept.	30	6,381,295	336,980,351		350-540
Oct.	30	6,793,475	343,773,826		380-780
Nov.	30	6,230,900	350,004,726		80-1020
Dec.	31	6,013,083	356,017,809		50-570
Jan. 1975	31	8,893,614	364,911,423		360-1030
Feb.	28	8,558,116	373,469,539		740-1030
March	31	10,104,579	383,574,118		380-1120
April	30	9,197,940	392,772,058		779-960
May	31	9,261,870	402,033,928		940-1220

IN-8. Midwest Steel Company
Portage, Porter County

Completed--1965
In use--August, 1965
Status--Current

Comment: The well has continued to be used for injection of waste pickle liquor (sulphuric acid), H_2SO_4 6-10%, $FeSO_4$ 14-18%, $Na_2Cr_2O_7$(some), Sp.Gr. 1.14. At vacuum, the well operates at flows of 50 to 75 gpm. Previously reported annulus pressures ranged from 30 to 160 psig. The accumulated injected volume at the end of June, 1972 was 111,378,620 gallons.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
July 1972	31	1,824,750	113,203,370		
Aug.	31	2,020,950	115,224,320	51-61	
Sept.	30	1,732,055	116,956,375		
Oct.	31	1,368,450	118,324,825		
Nov.	30	1,639,935	119,964,760		
Dec.	31	1,482,975	121,447,735		160 Annulus pressur
Jan. 1973	31	1,800,585	123,248,320	1-55	Some pressure
Feb.	28	1,586,565	124,834,885		on the injection
March	31	1,793,160	126,628,045		tube.
April	30	1,527,885	128,155,930		
May	31	1,376,415	129,532,345		
June	30	1,342,665	130,875,010		
July	31	772,716	131,647,726	5-69	
Aug.	31	1,303,695	132,850,421		
Sept.	30	1,605,510	134,455,931	10-47	
Oct.	31	1,505,205	135,961,135	14-50	
Nov.	30	1,573,515	137,534,651	18-53	
Dec.	31	2,095,020	139,629,671	8-16	
Jan. 1974	31	2,221,155	141,850,826	14-77	"Seal Water"
Feb.	28	1,940,535	143,791,361	38-70	(annulus) at 220
March	31	2,216,250	146,007,611	16-72	psig during high
April	30	1,924,720	147,932,331	6-71	flows.
May	31	2,338,155	150,270,486	16-70	
June	30	2,177,145	152,447,631	15-71	
July	31	2,133,945	154,581,576	8-74	
Aug.	31	2,304,945	156,886,521	38-71	
Sept.	30	1,840,875	158,727,396	2-70	
Oct.	31	2,732,490	161,459,886	35-70	
Nov.	30	2,119,275	163,579,161	8-75	
Dec.	31	2,425,455	166,004,616	30-75	

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Jan. 1975	31	2,260,485	169,265,101	51	Max. Pressure
Feb.	27	2,130,780	170,395,881	53	Annulus = 220
March	31	1,997,040	172,392,921	45	Well head = Vac.

IN-9. U.S. Steel Company
Gary, Lake County

Completed--January, 1965
In use--Shortly thereafter
Status--Current

Comments: The Wastes are injected into 1700 feet of the Mt. Simon sandstone, which forms the basal unit in the 4300' deep well and consist of steel mill waste pickle liquor from Hydrochloric acid process. No records were found prior to 1971; therefore, an approximate value of 18,000,000 gallons per annum is arbitrarily assigned for the period 1965-1970 inclusively. Values reported for 1970 are summarized, and these are added to those of the 1974 report, which covers 1971 through June, 1972.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
1965-1969 incl.		18,000,000per yr	90,000,000		
1970		18,473,605	108,473,605		25-270 annulus
1971-June 1972		24,949,714	133,423,319		15-242 annulus
July 1972	16	1,160,207	134,583,526		Annulus pressure
Aug.	17	1,163,906	135,747,432		averages range
Sept.	17	1,293,207	137,040,639		from 100 to 275 psig.
Oct.	19	948,161	137,988,800		Head pressure not
Nov.	19	1,127,328	139,116,128		reported.
Dec.	17	1,158,989	140,275,117		
Jan. 1973	11	1,021,797	141,296,914		Annulus pressures
Feb.	15	1,201,908	142,498,822		range from 40 to
March	11	953,167	143,451,989		275 psig. Head
April	1	Missing record			pressures not
May	14	1,084,756	144,536,745		reported. All

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
June	9	704,611	145,241,356		Wastes Hydrochloric
July	10	660,634	145,901,990		acid and $FeCl_2$.
Aug.	12	452,541	146,354,531		In July, waste was
Sept.	14	661,436	147,015,967		reported as 12%
Oct.	20	1,195,505	148,211,472		Sulphuric acid and
Nov.	30	2,310,691	150,522,163		$FeSO_4$.
Dec.	26	2,124,718	152,646,881		
Jan. 1974	28	2,059,779	154,706,660		January report
Feb.	23	1,339,465	156,046,125		indicates Sulphuric
March	28	1,758,534	157,804,659		acid (12%) and $FeSO_4$.
April	28	1,800,152	159,604,811		
May		Missing			
June	29	1,892,866	161,497,677		
July	24	1,305,612	162,803,289		
Aug.	22	1,004,081	163,807,370		
Sept.	27	1,334,217	165,141,587		
Oct.	23	1,161,564	166,303,151		
Nov.		Missing			
Dec.	15	606,709	166,909,860		
Jan. 1975		Missing			
Feb.		Missing			
March		Missing			
April	4	352,849	167,262,709		
May	1	23,742	167,286,451	approx.	

IN-10. General Electric Company
Mt. Vernon, Posey County

Completed--
In use--1966
Status--Current

Comments: As previously reported (Registry, 1974), the waste consists of chlorides, sulphates, calcium hardness, minor ferric compounds, phenol and bisphenol "A".

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Brought forward			77,798,000		
Jan. 1972	31	711,326	78,509,326		320-340
Feb.	29	788,249	79,297,757		315-335
March	31	1,141,513	80,439,088		325-345
April	30	933,000	81,372,088		330-370
May	31	765,979	82,138,067		370-410
June	30	860,684	82,998,751		420-475
July	31	828,289	83,270,040		460-490
Aug.	31	842,053	84,669,093		385-410
Sept.	30	572,460	85,241,553		400-510
Oct.	31	445,718	85,687,271		490-575
Nov.	30	123,300	85,810,571		570-635
Dec.	31	663,648	86,474,219		625-650
Jan. 1973	31	837,279	87,311,498	18.75	600-740
Feb.	28	809,844	88,121,342		640-740
March	31	1,077,095	89,198,437		660-750
April	30	1,426,830	90,625,267		670-770
May	31	1,245,084	91,870,351		630-730
June	30	1,113,510	92,983,861		680-775
July	29	1,114,383	94,098,244		710-790
Aug.	28	1,108,912	95,207,156		490-550
Sept.	30	1,038,870	96,246,026		550-590
Oct.	31	1,225,585	97,471,611		530-650
Nov.	30	1,152,420	98,624,031		600-700
Dec.	31	1,397,976	100,022,007		700-850
Jan. 1974	31	1,301,969	101,323,976		580-740
Feb.	28	1,267,672	102,591,648		515-600
March	31	1,398,348	103,989,996		500-535
April	27	1,181,493	105,171,489		535-550
May	31	1,409,012	106,589,501		555-595
June	28	1,260,056	107,840,557		575-615
July	25	1,291,500	108,132,057		615-630
Aug.	21	984,018	109,116,075		700-860
Sept.	23	1,043,901	110,159,976		520-550
Oct.	26	1,205,126	111,365,102		560-675
Nov.	26	1,086,748	112,451,850		540-610
Dec.	15	224,000	112,675,850		560-680
Jan. 1975	27	1,134,000	113,809,850	17-18	550-590
Feb.	24	840,000	114,649,850		210-560
March	27	972,000	115,621,850		535-600
April	17	578,000	116,199,850		220-750
May	20	500,000	116,699,850		590-650
June	25	800,000	117,749,850		400-720

IN-11. Inland Steel Company
East Chicago, Lake County

Completed--March, 1968
In use--Same
Status--Current continuous

Comments: This well is used for disposal of waste pickle liquors, ten percent of which 10% are sulphate, 90% chlorides. The 1974 Registry lists injection characteristics through June of 1972. No unusual characteristics are revealed in the reports. Injection is into the Mt. Simon sandstone. The following tabulation is from the files of the Indiana Division of Water Pollution Control.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
1968 thru June, 1972			92,539,699	50-75	0
July 1972	31	1,908,780	94,447,479	80	0
Aug.	31	1,992,700	96,440,179	85	0
Sept.	30	1,705,500	98,145,679	75	0
Oct.	31	1,979,600	100,125,279	85	0
Nov.	30	1,675,900	101,801,179	85	0
Dec.	31	1,689,040	103,490,219	90	0
Jan. 1973	31	2,238,260	105,728,479	90	0
Feb.	28	2,047,130	107,775,609	85	0
March	31	2,470,570	110,246,179	80	0
April	30	2,256,700	112,502,879	85	0
May	31	2,053,500	114,556,379	75	0
June	30	3,590,400	118,146,779	60	0
July	31	2,121,280	120,268,059	55	0
Aug.	31	2,101,120	122,369,179	50	0
Sept.	30	2,304,400	124,673,579	45	0
Oct.	31	2,185,200	126,858,779	45	0
Nov.	30	2,199,500	129,058,279	40	0
Dec.	31	2,409,500	131,146,779	38	0
Jan. 1974	31	2,705,500	134,171,279	40	0
Feb.	28	2,246,800	136,418,079	20	0
March	31	2,195,300	138,609,279	45	0
April	30	2,191,200	140,800,479	35	0
May	31	2,287,548	143,088,027	75	0
June	31	2,015,835	145,103,862	75	0
July		4,679	145,108,541	75	0

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Aug.	31	1,974,168	147,082,709	250	0
Sept.	30	2,794,100	149,876,809	120	0
Oct.	31	3,161,600	153,038,409	82	0
Nov.	30	2,883,700	155,922,109	85	0
Dec.	31	2,861,700	158,783,809	80	0
Jan. 1975	31	2,951,370	161,735,119	75	0
Feb.	28	2,614,230	164,349,409	70	0
March	31	2,599,880	166,949,289	75	0
April	30	2,469,320	169,418,609	75	0
May	31	2,542,500	171,961,109	70	0

1974 analysis of pickle liquors follows:

H_2SO_4 pickle liquor: H_2SO_4 8.5%, $FeSO_4$ 13.0%, Sp. Gr. 1.134

HCl pickle liquor: HCl 0.5%, $FeCl_2$ 17.4%, Sp. Gr. 1.25

90% of the injection is waste HCl pickle liquor, and the remaining 10% is from H_2SO_4.

IN-12. Indiana General Corporation
Valparaiso, Porter County

Completed--1969
In use--1970
Status--Current

Comments: The disposal constituents are ammonium chloride (NH_4Dl) wastes.

A 1973 waste analysis characterizes these as follows:

NH_4Cl	3.7 to 18.1%
pH	7.4 - 8.1
Temp	82 - 125° F

A subsequent analysis of July, 1975 adds the following:

F	0.35	Cl	407.5	TDS	1184
NO_3	2.15	NH_4	0.24	SS	10
Fe	0.09	pH	7.75	all in mg/l	

Injection is into the Mt. Simon sandstone at 2360' to the top and 1733' thick.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
1970 thru June, 1972			4,269,827	50	10
July 1972		No data			
Aug.	12	35,550	4,305,377	50	0
Sept.	0	0	4,305,377		0
Oct.	16	612,286	4,917,633		0
Nov.	9	402,491	5,320,154		0
Dec.	5	175,609	5,495,763		0
Jan. 1973	11	552,450	6,048,213	40-80	0
Feb.	11	679,744	6,727,957		0
March	22	594,673	7,322,630		0
April	21	989,394	8,312,024		0
May	22	807,268	9,119,292		0
June	23	412,319	9,531,611		0
July	9	412,319	9,943,930		0
Aug.	20	581,015	10,525,249		0
Sept.		No report			
Oct.	23	1,336,761	11,862,010		0
Nov.	20	1,028,381	12,890,391		0
Dec.	18	708,959	13,599,350		0
Jan. 1974	23	1,274,224	14,873,574		0
Feb.	21	1,088,048	15,961,622		Annulus pressure
March	21	928,207	16,889,829		82-122 psig
April	20	1,055,037	17,944,866		0
May	21	1,123,887	19,068,753		0
June	21	1,119,676	20,188,429		0
July	19	162,212	20,350,641		0
Aug.	1	2,824	20,353,465		0
Sept.	3	15,933	20,369,398		0
Oct.	23	311,050	20,680,448		0
Nov.	19	925,531	21,605,979		0
Dec.	18	589,738	22,195,717		0
Jan. 1975	22	1,083,091	23,278,808		0
Feb.	21	1,387,228	24,666,036		Annulus
March	25	1,705,231	26,371,267		38-99 psig
April	25	1,873,432	28,244,699		0
May	20	489,997	28,734,696		0
June		No report			
July	17	561,832	29,296,528		0

IN-13. General Electric
Mt. Vernon, Posey County

Completed--1972 (drilled in June, 1972)
In use--September, 1972
Status--Current

Comments: This well was completed in the Cypress and Bethel formations (Mississippian). The depth to the top of the injection zone is 2622'. The waste is caustic brine generated from polycarbonate plastics production. Analysis revealed the following ranges in values.

pH	5.5 - 11.0
Chlorides	35,262 - 86,190 mg/l
Bisphenol "A"	113 - 607 mg/l
phenol	13 - 32 mg/l
phenolics	23 - 326 mg/l
SS	13 - 401 mg/l
Temp	93 - 128° F
Na_2CO_3	5,892 - 16,933 mg/l

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Sept. 1972		3,191,030	3,191,030	74	480
Oct.		4,710,570	7,901,600	105	540
Nov.		8,996,500	16,898,100	208	615
Dec.		10,242,400	27,140,500	229	516
Jan. 1973		9,784,220	36,924,720	219	765
Feb.		6,285,000	43,209,720	145	908
March		5,910,770	49,120,490	132	667
April		5,718,300	54,838,790	132	694
May		5,270,000	60,108,790	118	859
June		4,284,000	64,392,790	99	767

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
July		4,253,200	68,645,990	95	697
Aug.		4,665,500	73,311,490	104	781
Sept.		2,967,000	76,278,490	69	562
Oct.		2,746,600	79,025,090	62	546
Nov.		3,285,000	82,310,090	76	607
Dec.		2,591,600	84,901,690	58	519
Jan. 1974	19	1,853,800	86,755,490	42	382
Feb.		204,740	86,960,230	5	228
March		-	86,960,230	-	-
April		-	86,960,230	-	-
May		-	86,960,230	-	-
June		No injection	86,960,230		
July		No injection	86,960,230		
Aug.	6	640,800	87,601,030		650-800
Sept.	11	1,018,600	88,619,630	64	550-850
Oct.	13	1,560,000	90,179,630	-	-
Nov.		No report	90,179,630		
Dec.	6	553,200	90,732,830	64	400-720
Jan. 1975	28	2,660,000	93,392,830	66	400-600
Feb.	18	1,098,000	94,490,830	42	400-700
March	21	1,743,000	96,233,830	58	410-700
April	21	2,247,000	98,480,830	74	450-850
May	19	1,254,000	99,725,830	46	100-800
June	16	944,000	100,669,830	41	350-500

KENTUCKY WASTE INJECTION WELLS

KY-2, KY-3. E.I. DuPont deNemours & Co.
Louisville, Jefferson County

Completed--1972
In use--1973
Status--Current

Comments: These are the only operating injection wells in Kentucky. Two wells constitute the injection system, each drilled into the Knox Dolomite. The Knox is 1710' below the surface and is 2590' thick. The Mt. Simon section was drilled, tested and found to be deficient in permeability. The waste contains up to 20% HCl and trace amounts of

organic compounds. The two wells, in use since February, 1973, are about 1520' apart. The No. 2 well is used as a standby but it operates for the most part as a formation monitor in connection with Well No. 1. A third well 200' deep and used for monitoring shallow ground water is north of Well No. 2 1388' and west of Well No. 1 448'.

"No pressure or chemical effects were observed in Well No. 2 (KY-3) until May 21, 1974, when backflow stopped. On September 10, 1974, a bottom-hole sample taken showed chloride 39,000 ppm (up from 9,000-10,000) and pH 6.5, down from average 7.1, supporting the theory that the waste slug had reached Well No. 2, neutralized, and its greater density precluded continuance of flow. The Zone of Influence and rate of fill-up has had to be re-examined.

The shallow monitor well has been unaffected."

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig absolute*
Feb. 1973	10	925,720	925,720	0-100	3.0-35.0
March	31	3,616,840	4,542,560	0-125	2.0-4.5
April	30	3,607,000	8,149,560	0-140	4.5-9.5
May	31	4,104,590	12,254,150	0-140	4.0-8.0
June	30	4,082,640	16,336,790	0-180	5.0-42.0
July	31	3,795,460	20,132,250	0-250	5.4-20.0
Aug.	31	3,737,400	23,869,650	0-120	5.0-38.0
Sept.	30	3,612,180	27,481,830	0-120	25.0-42.0
Oct.	31	3,572,560	31,054,390	0-110	23.7-42.5
Nov.	30	3,478,000	34,532,390	0-100	32.0-44.5
Dec.	31	3,572,940	38,105,330	70-85	25.0-44.5
Jan. 1974	31	3,828,680	41,934,010	60-120	5.5-29.8
Feb.	28	3,646,040	45,580,050	60-80	1.0-29.2
March	31	4,191,700	49,771,750	60-85	5.0-25.0
April	29	4,250,800	54,022,550	40-110	5.5-32.5
May	31	4,889,000	58,911,550	60-150	4.9-25.9
June	30	5,153,500	64,065,050	60-180	4.9-26.9
July	31	5,088,240	69,153,290	0-130	14.7-24.4
Aug.	31	5,195,200	74,348,490	40-140	4.4-27.9
Sept.	30	5,376,640	79,725,130	0-130	4.4-25.0
Oct.	31	5,451,740	85,176,870	60-150	4.9-26.4
Nov.	30	5,293,600	90,470,470	60-150	-
Dec.	31	4,340,520	94,810,990	50-130	4.9-46.7
Jan. 1975	31	3,089,040	97,900,030	45-115	1.0-34.7
Feb.	28	2,575,080	100,475,110	40-110	1.0-24.8
March	31	3,388,910	103,864,020	35-120	2.4-21.1
April	27	2,163,890	106,027,910	30-110	1.0-23.5
May	31	3,084,230	109,112,140	40-120	2.4-34.7
June	30	3,308,400	112,420,520	30-135	2.4-29.7

* absolute pressure = gauge pressure + atmospheric pressure (14.7 psig avg.)

Generally, during periods of higher head pressures, water was being pumped in lieu of waste. The specific gravity of the waste was at 1.106 maximum.

NEW YORK WASTE INJECTION WELLS

All four of New York waste injection wells are located outside of the Ohio Basin; two are in Niagara County, one in Erie County and one in Schuyler County. Those in Niagara and Erie counties are not and have never been operational. The Schuyler County well of the International Salt Company (NY-1) injects saturated brine into Cherry Valley member (limestone).

OHIO WASTE INJECTION WELLS

OH-1. Armco Steel Corporation
Middletown, Butler County

Completed--
In use--1969
Status--Current

Comments: Wastes are injected into the Mt. Simon sandstone 282' thick at a depth of 2954'.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
June, 1969 through June, 1972			24,456,652		
July, 1972 through Nov., 1972		Intermittent injection--No records Not working--well worked over			
Dec.	14	564,887	29,502,400	30 (Max)	20 (Max)
Jan. 1973	26	992,193	30,494,597	35 (Max)	25 (Max)
Feb.	20	912,138	31,406,735	45 (Max)	80 (Max)
March	13	592,779	31,999,514	40 (Max)	30 (Max)
April	9	279,147	32,278,661	42 (Max)	30 (Max)
May	10	631,004	32,909,665	49 (Max)	23 (Max)
June	8	505,382	33,415,047	55 (Max)	25 (Max)
July	11	728,348	34,143,395	48 (Max)	25 (Max)

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Aug.	19	1,248,815	35,428,210	50 (Max)	25 (Max)
Sept.	16	924,509	36,352,719	47 (Max)	25 (Max)
Oct.	3	414,796	36,767,515	70 (Max)	25 (Max)
Nov.	19	1,171,198	38,398,598	60 (Max)	25 (Max)
Dec.	17	1,046,208	39,444,806	59 (Max)	90 (Max)
Jan. 1974	16	1,065,863	40,510,669	55 (Max)	25 (Max)
Feb.	18	1,062,025	41,572,694	50 (Max)	25 (Max)
March	22	1,255,817	42,828,511	50 (Max)	25 (Max)
April	22	1,307,560	44,136,071	55 (Max)	25 (Max)
May	20	1,226,030	45,402,101	55 (Max)	25 (Max)
June	15	1,027,563	46,429,163	60 (Max)	25 (Max)
July	18	1,261,793	47,691,456	55 (Max)	25 (Max)
Aug.	19	1,219,610	48,911,066	55 (Max)	25 (Max)
Sept.	21	1,285,392	50,196,458	50 (Max)	25 (Max)
Oct.	24	1,480,702	51,677,160	50 (Max)	25 (Max)
Nov.	22	1,384,191	53,061,351	52 (Max)	25 (Max)
Dec.	21	1,336,103	54,397,454	55 (Max)	25 (Max)
Jan. 1975	6	365,765	54,763,219	60 (Max)	25 (Max)
Feb.	8	633,251	55,396,470	55 (Max)	25 (Max)
March		Not operated			
April	1	14,367	55,410,837	40 (Max)	25 (Max)
May		Not operated			
June		Not operated	55,410,837		

* See Note

OH-4. Armco Steel Corporation
Hamilton, Butler County

Completed--1969 (as companion to OH-1)
In use--(no date) simultaneously with OH-1
Status--Current

Comments: OH-4 injects waste pickle liquor into the Mt. Simon sandstone at and below a depth of 2954'; the sandstone is estimated to be 339' thick in this well.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
1972 through June			34,154,310		
June through Nov.		Intermittent operation - workover	36,334,558	75 (Max)	20 (Max)
Dec.			37,711,232	75 (Max)	20 (Max)
Jan. 1973	26	1,174,133	38,885,365	43	25
Feb.	11	554,635	39,440,000	56	70
March	15	886,615	40,326,615	55	30
April	26	1,181,871	41,508,486	70	30
May	9	667,153	42,175,639	75	25
June	11	806,237	42,981,876	70	25
July	5	558,426	43,540,302	75	25
Aug.	2	208,837	43,749,139	71	25
Sept.	4	380,748	44,129,887	67	25
Oct.	12	874,681	44,544,683	60	25
Nov.	1	53,154	44,597,837	58	25
Dec.	2	141,681	44,739,518	75	90
Jan. 1974	5	346,953	45,068,471	70	25
Feb.	2	75,153	45,161,625	50	25
March	1	10,167	45,171,791	15	25
April		On standby	45,171,791	-	-
May		On standby	45,171,791	-	-
June		On standby	45,171,791	-	-
July		0	45,171,791	-	-
Aug.		0	45,171,791	-	-
Sept.		0	45,171,791	-	-
Oct.		0	45,171,791	-	-
Nov.		149,019	45,325,629	55 (Max)	25 (Max)
Dec.		34,890	45,360,519	60	25
Jan. 1975		330,068	45,690,587	60	25
Feb.		45,617	45,736,204	55	25
March		371,234	46,107,438	55	25
April		448,525	46,555,963	55	25
May		402,649	46,958,612	60	25
June		393,467	47,352,279	60	25

OH-2. Empire-Reeves Steel Division
Mansfield, Richland County

Completed--
In use--November, 1968-May, 1970
Status--Abandoned and plugged

Comments: The accumulated volume, which includes pickle liquor and fresh

water, is 7,702,133 gallons. The disposal zone was in the Mt. Simon sandstone (82' thick) at a depth of 4982'.

OH-3, OH-6, OH-9. Vistron Corporation
Lima, Allen County

Completed--February 1968, July 1969, May 1972
In use--July, 1968, November, 1969, August, 1972, respectively (as a single unit)
Status--Current

Comments: Data from the previous Registry summarizes activity for wells OH-3 and OH-6 through January 1972. OH-9 was completed in early 1972 into the Mt. Simon and is similar to OH-3 and OH-6. Injection for each of the three wells is to the Mt. Simon sandstone. The top of the sandstone is at about 2800' and about 380 feet thick. The wastes consist of saline liquors containing cyanides, nitriles, sulfates and NH_4 compounds from the manufacture of acrylonitrile plastics.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Through June, 1972			282,910,444		
July	16	2,799,310	285,709,754	121	800 (Max)
Aug.		3,279,337	288,989,091		850 (Max)
Sept.	13	2,224,687	291,233,778		820 (Max)
Oct.	18	3,097,360	294,331,138		810 (Max)
Nov.	26	4,957,840	299,288,978		830 (Max)
Dec.	14	2,953,272	302,242,250		820 (Max)
Jan. 1973	17	2,710,440	305,012,660		820 (Max)
Feb.		No report			
March	15	2,544,168	310,789,318		810
April	11	1,993,661	312,782,979		840
March	24	4,665,741	317,448,820		840
June	17	2,882,710	320,331,530		840
July	12	1,493,180	321,824,710		820
Aug.	14	2,530,217	324,354,927		820
Sept.	6	949,828	325,304,755		820
Oct.	9	1,105,752	326,410,507		820
Nov.	4	500,465	326,910,972		820
Dec.	26	2,843,470	329,754,442		830

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Jan. 1974	30	3,051,209	332,805,651		840
Feb.	28	3,846,172	336,651,823		840
March	31	4,094,457	340,745,740		835
April	28	2,744,138	343,489,878		845
May	28	1,996,562	345,486,440		830
June	28	1,765,793	347,252,233		860
July	14	985,382	348,237,615		870
Aug.	29	6,972,304	355,209,919		840
Sept.	27	5,449,878	360,659,797		830
Oct.	19	4,287,682	364,946,479		835
Nov.	14	2,109,040	367,055,519		807
Dec.	12	2,299,459	369,354,978		800
Jan. 1975	18	3,183,984	372,538,971		790
Feb.	18	4,218,114	376,757,085		780
March	13	2,609,080	379,366,165		780
April	11	2,645,149	382,011,314		780
May	16	4,051,341	386,062,628		790
June	19	3,489,141	389,551,769		800

Maximum pressures are indicated and average somewhat less, a limitation of 840 psig injection pressure has been applied to this well.

Injection Record
OH-6.

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Through June, 1972			162,082,571		1010 (Max)
July	31	8,914,760	170,997,331	200	740 (Max)
Aug.	31	8,682,806	179,680,137		780
Sept.	30	9,798,564	189,478,701		760
Oct.	31	10,127,524	199,606,225		740
Nov.	30	9,833,040	209,439,265		660
Dec.	31	10,719,650	220,158,915		630
Jan. 1973	27	8,105,350	228,264,265		700
Feb.		No report			
March	31	10,770,156	239,009,501		690
April	30	9,130,834	248,140,335		690

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
May	31	8,632,385	256,772,720		690
June	30	9,920,005	270,692,725		690
July	31	10,373,610	281,066,335		650
Aug.	31	9,653,160	290,719,495		650
Sept.	30	9,857,539	304,577,034		660
Oct.	20	6,041,311	310,618,345		660
Nov.	30	9,986,895	320,605,240		640
Dec.	31	10,279,125	330,884,365		655
Jan. 1974	31	9,808,086	340,692,451		640
Feb.	28	8,727,904	349,420,355		660
March	31	9,875,308	359,295,663		680
April	30	9,871,540	369,167,203		680
May	31	10,139,993	379,307,196		690
June	30	9,966,806	389,274,002		760
July	29	10,108,881	399,392,883		770
Aug.	28	9,265,779	408,648,662		710
Sept.	30	9,571,920	418,220,582		740
Oct.	31	10,153,470	428,374,052		710
Nov.	30	9,675,880	438,049,932		720
Dec.	31	10,237,995	448,287,927		710
Jan. 1975	23	7,654,153	455,942,080		630
Feb.	20	8,326,326	464,268,406		555
March	31	10,359,146	474,807,552		670
April	19	5,628,978	480,436,530		720
May	3	870,000	481,306,530		720
June	29	8,538,063	489,844,593		825

Injection Record
OH-9.

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Aug. 1972		5,087,840	5,087,840		690
Sept.		Not operated			
Oct.		Not operated			
Nov.		Not operated			
Dec.	15	3,634,140	8,721,980		640
Jan. 1973		5,204,900	13,926,880		600
Feb.		No report			
March	16	4,411,330	18,338,210		590

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
April	21	5,372,750	23,710,960		590
May	9	2,534,030	26,244,990		580
June	16	3,658,670	29,883,660		600
July	19	5,016,800	34,900,460		620
Aug.	14	3,753,140	38,653,600		610
Sept.	22	7,712,360	46,365,960		640
Oct.	20	5,526,240	51,892,200		615
Nov.	18	6,052,770	57,944,970		600
Dec.	23	6,766,550	64,711,520		595
Jan. 1974	31	8,382,420	73,093,940		640 (Max)
Feb.	21	6,483,287	79,577,277		640
March	31	9,804,130	89,381,380		665
April	30	9,528,050	98,909,430		640
May	31	10,809,420	109,718,850		665
June	30	9,382,170	119,101,020		670
July	31	8,429,980	127,531,000		660
Aug.	31	8,205,886	135,718,886		680
Sept.	28	7,971,548	143,690,434		680
Oct.	27	8,818,152	152,508,586		675
Nov.	30	8,757,670	161,266,256		685
Dec.	3	869,580	162,135,836		640
Jan. 1975	2	576,050	162,711,886		540
Feb.	8	2,230,000	165,031,886		555
March	5	1,944,290	166,976,176		540
April	10	3,444,410	170,420,586		530
May	1	340,000	170,760,000		490
June	17	4,545,090	175,306,536		550

The total injected volume reported for these three well systems is 1,054,702,898 gallons.

OH-5. U.S.S. Chemicals
Haverhill, Scioto County

Completed--1968
In use--October, 1969
Status--Current

Comments: The injection zone is 5514' deep and 66' thick in the Mt. Simon. The wastes consist of brines containing phenolics, acetone, Na_2SO_4, $NaHCO_3$, NaCOH and cumene hydroperoxide.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Through June, 1972			129,353,382		1750 (Max)
July	31	2,534,945	131,888,327		1550
Aug.	31	3,204,813	135,093,140		1575
Sept.	30	3,292,315	138,385,455		1510
Oct.	31	3,257,967	141,643,422		1550
Nov.	30	2,766,945	144,410,367		1475
Dec.	31	3,322,955	147,733,322		1500
Jan. 1973	31	2,912,696	150,646,018		1475
Feb.	28	3,328,636	153,974,654		1390
March	31	3,642,054	157,616,708		1425
April	30	3,445,093	161,061,800		1475
May	31	3,183,405	164,245,205		1525
June	31	2,939,140	167,184,345		1650
July	31	3,761,580	170,945,925		1660
Aug.	31	2,421,596	173,367,521		1660
Sept.	30	2,308,319	175,696,340		1590
Oct.	31	2,741,171	178,417,511		1600
Nov.	30	3,579,299	181,966,810		1550
Dec.	31	2,730,118	184,726,928		1550
Jan. 1974	31	3,455,840	188,182,768		1500
Feb.	28	2,649,679	190,832,447		1475
March	31	3,390,201	194,222,648		1525
April	30	3,294,065	197,519,713		1550
May	31	3,105,425	200,625,138		1550
June	30	3,298,319	203,923,457		1530
July	31	3,424,524	207,347,981		1520
Aug.	31	3,325,967	210,673,948		1520
Sept.	30	3,401,885	214,075,833		1510
Oct.	31	3,136,575	217,212,408		1505
Nov.	30	2,238,415	219,450,823		1505
Dec.	31	3,047,424	222,498,247		1500
Jan. 1975	31	2,889,411	225,387,658		1490
Feb.	28	2,700,675	228,088,333		1480
March	31	3,076,400	231,164,733		1470
April	30	2,973,334	234,138,067		1470
May	31	2,545,193	236,683,260		1500
June	30	2,596,903	239,280,163		1510

Accumulated volume 239,280,163 gallons

OH-7. Calhio Chemicals, Inc.
Perry Township, Lake County

Completed--April, 1971
In use--May 16, 1974
Status--Inactive

Comments: Presumably injection was primarily into Maynardsville and Mt. Simon formations. 2,717,068 gallons of waste were injected from May 16 to July 14, 1974 when injection operations were halted because of above ground equipment failures, namely rapid plugging of the leaf filters. Head pressures during the injection period reached 880 psig and averaged 673 psig over the 36 day period of operation. Wastes are produced from the manufacture of fungicides (Phaltan and Captan) and have the following characteristics:

NaCl	25,000 ppm	Hexane soluble	10 ppm
Na_2SO_4	2,000 ppm	Chloroform soluble	3000 ppm
Fe^{++}	300 ppm	MEK soluble	1200 ppm
Ca^{++}	100 ppm	Suspended SS solids	Nil
Mg^{++}	10 ppm	BOD	3000 ppm
		COD	4000 ppm
		Sp. Gr.	1.025
		pH	7.0 - 7.5

OH-8. International Salt Company
Cleveland, Cuyahoga County

Completed--1971
In use--1972
Status--Current

Comments: Injection is into the 87 foot thickness of Oriskany sandstone at 1335' depth. The injected brine originates from the same formation as leakage around the mine shaft collar. Injection pressures at the well head range from 75-130 psig at rates of up to approximately 25 gallons per minute.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
				8.125 (mean)	135 (Max)
June 1972		259,200(to date)	259,200	9.4	125
July		Well startup		9.0	186
Aug.		Well startup		9.375	86
Sept.		Well startup			
Oct.		Well startup			
Nov.		Well startup			
Dec.		Well startup			
Jan. 1973		Well startup			
Feb.		Well startup			
March		Well startup		8.125	135
April		Well startup		5.95	125
May		Well startup	259,200	8.13	135
June		Well startup	527,040	9.0	86
July		401,760	786,240	9.0	86
Aug.		267,840	1,321,920	9.375	86
Sept.	30	405,000	1,726,920	9.375	92
Oct.	30	405,000	1,994,760	9.375	95
Nov.		267,840	2,253,960	11.97	95
Dec.		267,840	2,521,800	14.58	94
Jan. 1974		267,840	2,789,640	20.83	75
Feb.		267,840	3,031,560	19.7	95
March		259,200	3,299,400	19.32	90
April		267,840	3,558,600	21.8	90
May		259,200	3,826,440	17.5	80
June		267,840	4,085,640	22.92	85
July		267,840	4,353,480	21.87	85
Aug.		267,840	4,621,320	25	80
Sept.		259,200	4,880,520	20.835	80
Oct.		267,840	5,148,360	18.7	85
Nov.		259,200	5,407,560	16.65	90
Dec.		267,840	5,675,400	15.62	80
Jan. 1975		267,840	5,943,240	16.60	80
Feb.		241,920	6,185,160	21.87	85
March		60,480	6,456,640	18.75	85
April		259,200	6,504,840	17.19	90
May		207,160	6,712,000	16.66	75
June		259,200	6,971,200	12.5	75

OH-10. Ohio Liquid Disposal, Inc.
Riley Township, Sandusky County

Completed--1972 (use prevented by the Ohio Pollution Control Board, 9/12/72)
In use--June, 1975 (permit granted 1974, but above-ground installation incomplete at that time)
Status--Current (no history)

Comments: The well is to be used to inject diverse wastes from various industries including acid waste pickle liquors, chemical wastes and oily wastes which are presently stored in lagoons. Acid wastes are used to break the emulsified oils so that these may be recovered. Analysis shows high BOD, dissolved iron, sulphates, phenols, oils and dissolved solids. Metallic salts such as those of aluminum, copper and zinc are also present.

WEST VIRGINIA WASTE INJECTION WELLS

Seven wells in West Virginia are listed in the previous Registry as injection wells. W-4 of that list was never used. Wells W-6 (PPG Industries, Inc.) at Procter and W-7 (Allied Chemical Co.) at Moundsville are used in connection with artificial brining (solution mining) operations. However, both are used to inject wastes resulting from sodium chloride production and processing into the brine cavity; W-6 waste includes solids such as $CaCO_3$ and $Mg(OH)_2$, sulphates and NaCl. The other brine operation Well, W-7, receives process wastes and in addition mercury is listed in concentrations of from 2 to 20 mg/l.

Two wells are abandoned--the DuPont well (W-1) at Belle (plugged), and the DuPont well (W-2) at Parkersburg. Both of these are "Salt Sand" wells Pennsylvanian, about 1300' depth and in approximately 200' thickness of injection zone.

W-1. E.I. DuPont deNemours & Company
Belle, Kanawha County

Completed--1968
In use--Reported through April, 1972
Status--Plugged in 1975

Comments: This well is completed into the Pennsylvanian Salt Sands to a total depth of 1525', shot from 770-826; acidized, 770-818. The well was operated for a short time after the "in use" date and accumulated a total of 4,634,994 gallons of waste fluids (through 12/1/72). The well was held apparently on standby until it was plugged. Over its period of use, the maximum pressure recorded was 700 psig and the rate of injection 26,300 gpd (16+ gpm).

W-3. E.I. DuPont deNemours & Company
Belle, Kanawha County

Completed--1967
In use--1970
Status--Current

Comments: Injection of waste from nylon manufacture was the initial use of the well. Then wastes were reported as: 1.5% nitric acid, 4.0% mono and dibasic organic acids and 0.03% heavy metal salts. In 1972 the additional wastes from the manufacture of new products resulted in the organics being increased to 4.5% and included sulfonated, chlorinated and bromonated ring compounds with a brine strength of 20%. The well went out of service in September, 1971 and was reworked because this well used the Onondaga to Salina section for disposal until problems developed. In June 1972, disposal was in the Devonian Shales from 3950-5300, with some in the Onondaga. After further work, the disposal zones in February 1974 were in the Shale (3891') and Onondaga (4360-65).

In July of 1975 three leaks were found in the casing from 3416-3735 (all in the shale section).

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Through Sept. 28, 1971			164,717,400	260	1056 (Max)
Sept., 1971 - April, 1972			Well reworked and reconditioned		
May 1972		54,000	164,809,400	-	245
June		65,000	164,815,900	-	180
July		No injection			
Aug.		No injection			
Sept.	7	184,200	165,000,100	18	195 (Max)
Oct.		No report			
Nov.		No report			
Dec.	26		167,525,442	49	500
Jan. 1973	14	1,000,524	168,525,966	67	500
Feb.	16	722,652	169,248,618	54	435
March	26	800,772	170,049,390	39	380
April	21	825,594	170,874,984	42	380
May	9	266,742	171,141,726	25	340
June		No data			
July		No data			
Aug.		No data			
Sept.		No data			
Oct.		No data			
Nov.		No data			
Dec.		No data			
Jan. 1974	18		178,278,408	45	230
Feb.	27		187,318,614	58	330
March		No data			
April		No data			
May		No data			
June		No data			
July	21		192,034,878	49	390
Aug.		No data			
Sept.	27		194,436,186	50	450
Oct.	26	575,422	195,011,608	27	450
Nov.	26	1,928,048	196,939,656	52	400
Dec.	17	979,128	197,918,784	40	400
Jan. 1975	25	1,341,648	199,260,432	58	425
Feb.	13	646,446	199,906,878	56	380
March		224,302	200,141,180	-	-
April	13	646,860	200,798,040	59	290
May	14	728,168	201,526,208	53	375
June	25	1,219,472	202,745,680	52	350

W-2. E.I. DuPont deNemours & Company
Parkersburg, Wood County

Completed--1966
In use--
Status--Standby (plugged 1976)

Comments: This well was completed to a depth of 1490'. The lower 200' of the completed hole which occurs in the Pannsylvanian "Salt Sands" or basal sandstone units was used to inject waste Hydrochloric acid from Chloro-organics manufacture. The following comment was viewed from the W. Va. Geological Survey:

"Dupont's shallow Parkersburg well is as confusing to ORSANCO as it is to us. The original TD was 1682' and was plugged back to 1490'. The well was perforated from 1334'-1448' but effective disposal was between 1412' and 1448'. This well was plugged in December 1967, re-worked in October 1968 and again in June 1970, at which time it was plugged back to 1318' and redrilled to 1487'. Disposal was between 1323' and 1439'. We received a report for January 1976 indicating the well was still on standby at that time and had not been plugged in 1975. Total volume by 6/30/75 was 129,426,270 gallons because the well had been used in the fall of 1974 and May and early June, 1975."

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Through May, 1972			103,470,710		583-940 range
June	30	3,595,340	107,066,370	83	990
July	31	3,450,000	110,516,370	77	975
Aug.	28	2,473,080	113,089,450	61	1000
Sept.	6	691,960	113,781,410	80	1000
Oct.	3	336,720	114,118,130	78	910
Nov.		Well shut down			
Dec.		Well shut down			
Jan. 1973		Well shut down			
Feb.	27	659,520	115,546,190	17	515
March	31	1,717,920	117,264,110	38	515
April	30	1,499,040	118,763,150	35	515
May	31	1,308,272	120,071,422	29	515
June	30	1,245,598	121,317,020	29	510
July	31	1,274,880	122,591,900	29	510

W-5. E.I. DuPont deNemours & Company
Parkersburg, Wood County

Completed--1970
In use--March, 1972
Status--Standby

Comments: This well has replaced the shallow well but was drilled to a TD of 4105', the top of the Oriskany. The Onondaga was perforated from 4018'-4082' for disposal. After problems developed, the disposal zone was moved up to 3525'-3559', probably in the Harrell.

Injection Record

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Through April, 1972			2,440,800		434 (Max)
May		Not operated			
June		Not operated			
July		Not operated			
Aug.	4	514,200	2,955,000	-	560
Sept.	25	3,914,440	6,869,440	-	740
Oct.	29	4,569,120	11,432,560	109	740
Nov.	30	4,479,840	15,912,400	104	760
Dec.	31	5,139,360	21,051,760	115	740
Jan. 1973	31	4,904,640	25,956,400	61	710
Feb.	2	255,600	26,212,000	-	-
March		Well down for repairs			
April		Well down for repairs			
May		Well down for repairs			
June		Well down for repairs			
July		Well down for repairs			
Aug.		No data			
Sept.		No data			
Oct.		No data			
Nov.		No data			
Dec.		No data			
Jan. 1974		No record			
Feb.		4,382,420	35,334,880		
March	31	4,251,620	39,717,300	140 (Max)	860 (Max)
April	30	4,073,980	43,791,280	128	795
May	29	3,408,990	47,200,270	130	840
June	29	3,821,890	51,022,160	120	840
July	31	4,173,940	55,196,100	116	870
Aug.	31	4,494,150	59,690,290	118	910

Year Month	Days Oper.	Injected Volume	Accumulated Volume	Avg. rate gpm	Avg. press. psig
Sept.	30	2,284,845	63,505,285	115	880
Oct.	31	2,284,845	65,790,130	120	880
Nov.		3,012,185	68,802,315	-	-
Dec.	31	4,703,440	73,505,755	128	920
Jan. 1975	31	3,998,250	77,504,005	160	890
Feb.	28	4,642,560	82,146,565	140	910
March	31	5,104,860	87,251,425	148	940
April	30	3,017,080	90,268,505	130	920
May	23	3,172,730	93,441,235	130	945
June	30	2,566,013	96,007,248	130	935

W-6. PPG Industries
Proctor, Marshall County

Completed--
In use--
Status--Current

Comments: This well is a part of a salt brining operation for the production of salt (NaCl) by solution mining. This particular well injects the solution cavity of the halite with wastes that consist of precipitates from the pretreatment of the produced brine. The daily injection of sludge bearing brine ranges up to 80,000 gallons per day. Composition of the injected fluid as reported in 1974 follows: total suspended solids in the return amount to 5% ($CaCO_3$ 95%, $Mg(OH)_2$ 5%), and dissolved solids NaCl 25%, NaOH 0.19%, Na_2CO_3 0.05%, Na_2SO_4 0.566%; Sp. Gr. 1.20. The water phase of the system is recirculated, thus not amenable for volumetric estimations.

W-7. Allied Chemical Corp., Industrial Chem. Div.
Moundsville, Marshall County

Completed--
In use--1972
Status--Current

Comments: This is an injection well to the salt (halite zone) used in

the production of artificial brine. It is similar to W-6 in that it is a converted well in the brine field but is used for injection disposal of waste products; an analysis of the injected materials was reported as follows: Sp. Gr. 1.040, NaCl 57,529 mg/l, Ca 122 ppm, Mg 7 ppm, Fe 0.75 ppm, SO_4 1000 ppm, Hg 2 to 10 ppm. Because this is a closed system and the liquid phase recycled no net volumetric change can be related to volumetric injection data. Injection rates range approximately from 20,000 to 50,000 gallons per day.

OTHER WELL ACTIVITIES

A permit was issued to FMC late in 1974 to convert one of its old salt brine wells at Ben's Run for waste disposal. The old well (Tyler 385) produced salt brine from cavities between 6336'-6446' and 6462'-6481' (TD). It was drilled in 1974 and produced 1,135,000 tons of salt, creating a cavity of 16,820,000 ft^3. The waste sludge permitted was to be 5% settleable solids in a saturated brine solution, pH = 9.3, S.G. = 1.2, 10 gpm injection rate, and 1250 average psi. A permit was issued but no monthly reports have been received. This is similar to other brine operations where there is no net accumulation of fluid.

Abbreviations and Symbols

Acid	Compounds with replaceable or ionizable hydrogen
Avg.	Average
BOD	Biochemical oxygen demand
Ca	Calcium
$CaCl_2$	Calcium chloride
$CaSO_4$	Calcium sulphate
$CaSO_4$, $2H_2O$	Gypsum
Chrome	Chromium compounds
Cr	Chromium
Cl, Cl_2	Chloride
COD	Chemical oxygen demand
Cu	Copper
CN	Cyanide
CNS	Thiocyanate
CO_2	Carbon dioxide
CO_3	Carbonate
Fe	Iron
$FeCl_2$, $FeCl_3$	Ferrous chloride -- ferric chloride
$FeSO_4$, $Fe_2(SO_4)_3$	Ferrous sulphate -- ferric sulphate
fm	Formation
ft.	Feet
gal.	Gallon - 0.004 cubic meter
gpm	Gallons per minute 0.004 cubic meters per min.
HCO_3	Bicarbonate
H_2CO_3	Carbonic acid
HCl	Hydrochloric
H_2SO_4	Sulphuric acid
HCN	Hydrogen cyanide
HCOOH	Formic acid
HCHO	Formaldehyde
K	Potassium
mbr	Member
mg/l	Milligrams per liter
Mg	Magnesium
Na	Sodium
NaCl	Sodium chloride
Na_2SO_4	Sodium sulphate
NaOH	Sodium Hydroxide
Na_2CO_3	Sodium carbonate
NaOCl	Sodium hypochlorite
Na_2SO_3	Sodium sulphite
NH_3	Ammonia (usually is a reference to ammonium compounds)

NH_4	Ammonium
pH	Hydrogen ion concentration (activity)
ppm	Parts per million -- milligrams per kilogram
psi	Pounds per square inch -- 70.3 grams/cm^2
psig	Pounds per square inch gauge
pound	453.6 grams or .454 kilograms
press.	Pressure
Sp. Gr.	Specific gravity
ss	Suspended solids
T.D.S.	Total dissolved solids
V	Vanadium
Vol.	Volume

PROCEDURE FOR FUTURE MAINTENANCE OF ORSANCO INJECTION WELL REGISTRY *

The appropriate agency within each of the ORSANCO states should provide the Executive Director with:

1. A copy of the application for a construction permit for each new well.

2. A copy of each drilling or construction permit issued or notice of other action taken.

3. A copy of each well completion report filed.

4. A copy of each request for permission to operate a waste-water injection well.

5. A copy of each operating permit issued or notice of other action.

6. An annual summary for each operating well including the total volume of wastewater injected, the range of injection rates and pressures, and any change in wastewater character and well status.

7. A copy of the abandonment records for each abandoned well including the application for a permit to abandon, the permit to abandon, and the well plugging record.

Copies of each of the above listed documents should be sent to the Executive Director within 30 days of their receipt or issuance by the regulatory agency.

The Executive Director of ORSANCO should, in turn, periodically issue a report advising each of the member states of current activities in underground disposal and should make available to any interested party the information in the Registry.

* -- Recommendations to ORSANCO commissioners by the Advisory Committee on the Underground Injection of Wastewaters, January 11, 1973.

Information Sources

1. Illinois Environmental Protection Agency, Springfield, Illinois; Illinois Geological Survey, Urbana, Illinois.

2. Indiana Department of Health, Industrial Wastes Section, Indianapolis; Indiana Department of Conservation Geological Survey, Bloomington, Indiana.

3. Kentucky Geological Survey, Lexington, Kentucky; Kentucky Stream Pollution Control Commission, Frankfort, Kentucky.

4. New York Department of Environmental Conservation Information on waste disposal wells, Albany, New York.

5. Ohio Department of Natural Resources, Division of Oil and Gas, Division of Geological Survey, Columbus, Ohio.

6. Pennsylvania Department of Environmental Resources, Topographic and Geologic Survey, Harrisburg, Pennsylvania, Bureau of Water Quality Management.

7. West Virginia Department of Natural Resources, Division of Water, Charleston, West Virginia, Economic and Geological Survey, Morgantown, West Virginia.

8. Ohio River Valley Water Sanitation Commission, Registry of Wells for use in Underground Injection of Wastewater in the Ohio Valley Region, Cincinnati, 1974.

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