WATKINS GLEN REFINERY

BRINEFIELD SUMMARY

INITIALLY PREPARED BY

THOMAS EYERMANN

SEPTEMBER, 1979

INTERNATIONAL SALT COMPANY

A PART OF Akzona INC

INTERNAL CORRESPONDENCE

DATE: October 7, 1982

TO: Mr. A. J. Edwards

FROM: Marshall S. Held

LOCATION: Watkins Glen Refinery

SUBJECT: Revisions to Brinefield Summary

The attached revisions dated September 30, 1982 include recent data on the testing and workover of well #45 and are intended as a suppliment to the Watkins Glen Refinery Brinefield Summary Report dated September, 1979.

MSH

MSH:bdf
Attachments:
xc: Mr. J. A. Loose

BRINEFIELD SUMMARY

This report consists of data sheets for each well in the Watkins Glen Brinefield. These sheets summarize the completion work and current status of each well. The report also contains data sheets for each gallery in the brinefield, excluding the galleries labeled "South Cavity" and "North Cavity", which were developed in the upper salt by trump-type operations. Additional and more complete information on the brinefield is available in the brinefield files at Watkins Glen.

WELL NUMBER 18 USE Abandoned DATE 12/31/79

DRILLING HISTORY

DATE DRILLED 10/36 TD 2494 ELEVATION KB GL 687

HOLE SIZE SURFACE: PRODUCTION: 14" to 600', 9" to 1702', 7" to 2494.

CORED SIZE

CASING SURFACE: PRODUCTION:

CEMENTED

FRACTURING HISTORY

DATE CONNECTION Trump

LOGGING

DATE	FILE NO.	GAMMA	NEUTRON	CALIPER	TEMP.	CIL	3-D CBL	OTHER
6/30/77	18-1	X		X				

TUBING

SIZE DATE REASON

PACKER SETTING DEPTH STINGER

MISC. Abandoned 1942.
Plugged 7/1/77 with 550 sks. Halliburton Light from 1904'.

GALLERY 10 USE Brine DATE 12/31/79
Revised 7/23/82

WELL	52	57
LAST WORKOVER	10/78	10/78
LAST LOGGING	6/22/82	6/22/82
LAST SONAR	-	-
CASING BOTTOM	8 5/8" - 2733	8 5/8" - 2742
CAVITY TOP	2730 - 2736	2676 - 2742
METER TYPE	Halliburton	-

Comments Cleaned out both Well 52 and Well 57 due to no flow through cavity. Subsequently pumped through.

WELL NUMBER 52 USE Brine DATE 12/31/79
REVISED 7/23/82

DRILLING HISTORY

DATE DRILLED 9/27-10/15/72 TD 2782 ELEVATION KB 697
GL 687

HOLE SIZE SURFACE: 17-1/2-45' PRODUCTION: 12-1/4-2755

CORED 2025 - 2782 SIZE 6-3/4 x 3-1/2

CASING SURFACE: H40, 48 lb, 13-3/8-44' PRODUCTION: K55, 32 lb, LT&C, R3, 8-5/8"-2750'.

CEMENTED 850 sks. Halliburton Light, 100 sks. Common with returns.

FRACTURING HISTORY

DATE 11/7/73
5/78

CONNECTION None
Well 57 - Gallery 10

LOGGING

DATE	FILE NO.	GAMMA	NEUTRON	CALIPER	TEMP.	CIL	3-D CBL	OTHER
10/12/72	52-1 *	X	X		X			
10/12/72	52-2 *						X	
11/13/79	52-3	X		X				
7/25/75	52-4 *	X		X				
7/25/72	52-5 *						X	
10/3/77	52-6 *				X			
4/27/78	52-7 *	X		X				
6/22/82	52-8 *			X				
6/22/82	52-9 *	X	X					
6/22/82	52-10 *					X		

TUBING

SIZE DATE REASON

PACKER SETTING DEPTH STINGER

MISC. Formation plugged 2015' w/100 sks. Common, 1980' w/100 sks. Common.

WELL NUMBER 57 USE Water DATE 12/31/79
Revised 7/23/82

DRILLING HISTORY

DATE DRILLED 8/22-9/16/77 TD 2770 ELEVATION KB GL 695

HOLE SIZE SURFACE: 18" - 80' PRODUCTION: 12-1/4 - 2770

CORED SIZE

CASING SURFACE: 14" - 80' PRODUCTION: K55, 32 lb, LT&C, R2, 8-5/8" - 2764'.

CEMENTED 1100 sks. Pozmix w/brine - returns.

FRACTURING HISTORY

DATE 4/24-5/3/78 CONNECTION Well 52 - Gallery 10
Very weak connection in 15 hrs. Alternated pumping 57-52-57 to wash through.

LOGGING

DATE	FILE NO.	GAMMA	NEUTRON	CALIPER	TEMP.	CIL	3-D CBL	OTHER
9/6/77	57-1 *							Incl.
9/12/77	57-2 *	X	X	X	X			
10/5/77	57-3	X						
10/10/77	57-4	X						Perf.
6/22/82	57-5 *			X				
6/22/82	57-6 *	X	X					
6/22/82	57-7 *					X		

TUBING

SIZE DATE REASON

PACKER SETTING DEPTH STINGER

MISC. Plugged back for lost circulation w/350 sks. Halliburton Light at 2020'. Drilled with air to 2100'.

No. 1[illegible] Well

Drilled by C.F.Gobel, completed drilling Oct. 17, 1936

Record of drilling as follows:

Soil	0'	-	8'
Rock	8'	-	17'
Slate	17'	-	31'
Lime (broken)	31'	-	134'
Slate & Shells	134'	-	228'
Grey slate	228'	-	318'
Light brown shale	318'	-	334'
Lime	334'	-	344'
Grey slate	344'	-	365'
Light brown shale	365'	-	501'
Tully lime	501'	-	534'
Slate	534'	-	554'
White Mud	554'	-	592'
Brown Shale	592'	-	625'
Slate & shells	625'	-	807'
Brown shale	807'	-	966'
White shale	966'	-	983'
Brown shale	983'	-	1463'
Marcellus shale	1463'	-	1488'
Niagara lime	1488'	-	1576'
White lime	1576'	-	1992'
Lime shells	1992'	-	2022'
Salt	2022'	-	2226'
Slate	2226'	-	2259'
Salt	2259'	-	2320'
Slate	2[illegible]'	-	2332'
Lime	2332'	-	2347'
Slate & shells	2347'	-	2381'
Salt	2381'	-	2410'
Slate	2410'	-	2423'
Salt	2423'	-	2429'
Slate	2429'	-	2464'

Total Depth 2464'

(Steel line measurement)

Water at	72'
" "	1[illegible]'
" "	23[illegible]'

Section No. 2

Well No. 18

Location:

Date drilled	1936 - Oct.
Abandoned	1942
Distance to salt	2022 feet
Total depth	2,94 feet

Last record of piping

Oct. 1936 - Cased

52 joints 31' - 6"	piece of 6¼"	1111 feet
27 joints 10'	tiede of 10"	568 feet
	Total -	1679 feet

May 1939 - Tubed:

76 joints of 3 inch		1728 feet 5 inches
17 joints of 6 inch		368 feet
	Total -	2096 feet 5 inches
	Cut off	5 feet
	Total -	2091 feet

Record of interruptions - 2

Sterling pump No. S -2492 - 20 Hr moved to ?

NOTE: Well should have plug in drive pipe to prevent debris being thrown in the hole. This well approximately 186 feet above lake level. At one time 2000 feet of tubing was dropped 200 feet, and at present there is about 500 feet of 3 inch tubing in the hole. About 500 feet of 12 inch hole drilled to take 10 inch pipe. When abandoned all casing and tubing was removed except the 200 feet distorted by dropping.
Derrick still standing at this well.

Section No. 2

Well No. 19

Location:

Hole never drilled. Derrick was put up and well partly completed.
Abandoned because of maintenance problems with Nos. 17 and 18 and overrunning money appropriated.
Derrick was razed and sent to Cayuga.

Mr. R. W. Wrighton Wells

F. J. Fox February 26, 1958

Old No. 1 Well casing out but not plugged. Plug in top of drive pipe.

New No. 1 Well casing tubing pulled. Well plugged.

No. 2 Well. One or two joints of casing hung in top of hole. Well not plugged.

No. 3 Well. Casing and packer pulled and plugged at 1450°.

No. 4 Well. Active. Casing in bad shape. Broken into is the casing.

No. 5 Old Well. Casing was pulled and hole plugged.

New No. 5 Well pulled tubing and casing, well plugged at 1500' second plug at 450' plus a concrete capon top of hole.

No. 6 Well casing was left in well, was not plugged.

Old No. 7 Well casing not pulled. Casing in bad shape. Well not plugged.

New No. 7 Well. Active.

No. 8 Well Some tubing was left in also a packer and the casing this well was not plugged.

Old No. 9 Casing was left in. The well was not plugged.

New No. 9 Well casing left in well was not plugged.

No. 10 Well 6 to 700' of 6" casing left in well. Well was not plugged.

No. 11 Well all tubing and casing removed and well plugged.

Old No. 12 Well casing left in well plugged below casing.

New No. 12 Well active. Packer on casing relieve to be not set. Water leaking by casing sometimes.

Old No. 13 Well tubing and casing left in well.

New No. 13 Well tubing and casing pulled. Well Plugged.

Mr. R. W. Brighton Wells

F. J. Fox February 26, 1958

1st. No. 14 Well. Casing left in well. Well used to put water in cavity.

2nd No. 14 Well. Casing left in well. This casing leaks by packer or there is a hole in casing.

3rd No. 14 Well. Casing and tubing pulled. Well plugged at 1500' also at 460' and a concrete cap at top.

No. 15 Well. Casing and tubing left in well. Well caved and casing leaks.

Old No. 16 Well. Casing and tubing pulled out. Well plugged.

New No. 16 Well. Active.

No. 17 Well. Casing and tubing pulled out of well. Wooden plug in top of drive pipe.

No. 18 Well. Casing and tubing pulled out of well. Wooden plug in top of drive pipe.

No, 19 Well. Never drilled.

1st No. 20 Well. Casing and tubing pulled out of well. Well plugged at 1497'.

2nd No. 20 Well. Casing and tubing left in well. This well now being used to feed water to cavity. Casing or packer leaks.

No. 21 Well. Some casing and tubing left in well. Well plugged 1280' to 1305'.

No. 22 Well. Tubing pulled out. Casing left in well. Packer also leaks on this well.

No. 23 Well. Tubing pulled out of well. Casing left in well. This casing is cemented in.

No. 24 Well. Tubing pulled out of well, casing left in well. This casing is also cemented in.

FJF/mls
CC: Mr. H. E. Zieniewski

INTERNATIONAL SALT COMPANY
A PART OF AKZONA INC

DATE: July 23, 1982

TO: Brinefield Summary Report

FROM: Marshall S. Held

LOCATION: Watkins Glen Refinery

SUBJECT: Geophysical Surveying of Galleries 3 and 4, 5 and 6, 7, 8, 9, 10 Plus Wells 51 and 7

Listed below is a summary of the data generated from geophysical surveys recently performed by Gearhart.

GALLERY 3 and 4

Well #	Date	Type Log	Depth-Logger (ft.)	Bottom Logged Interval (ft.)	Top Logged Interval (ft.)	Casing/ Liner(in):	From/ To(ft.)
34	6/23/82	Caliper	2411	2410	SURF	5 1/2":	2350/SURF
		GR-Neutron		2352	SURF		
		Inspection		2344	SURF		
43	6/24/82	Caliper	2312	2310	SURF	5 1/2":	2219/SURF
		GR-Neutron		2224	SURF		
		Inspection		2218	SURF		
44	6/22/82	Caliper	2586	2584	SURF	8 5/8":	2572/SURF
		GR-Neutron		2574	SURF		
		Inspection		2570	SURF		

GALLERY 5 and 6

35	7/7/82	Caliper	2667	2664	SURF	8 5/8":	2667/SURF
						5 1/2":	2561/SURF
		GR-Neutron		2554	SURF		
		Inspection		2570	SURF		
36	6/25/82	Caliper	2382	2380	SURF	8 5/8":	2360/SURF
		GR-Neutron		2362	SURF		
		Inspection		2359	SURF		

GALLERY 5 and 6 (continued)

Well #	Date	Type Log	Depth-Logger (ft.)	Bottom Logged Interval (ft.)	Top Logged Interval (ft.)	Casing/ Liner(in):	From/ To(ft.)
38	6/25/82	Caliper	2535	2532	SURF	5 1/2":	2508/SURF
		GR-Neutron		2510	SURF		
		Inspection		2506	SURF		
41	6/28/82	Caliper	2551	2548	SURF	8 5/8":	2551/SURF
		GR-Neutron		2550	SURF		
		Inspection		2551	SURF		

GALLERY 7

40	7/7/82	Caliper	2516	2512	SURF	8 5/8":	2451/SURF
		GR-Neutron		2450	SURF		
		Inspection		2450	SURF		
42	7/8/82	Caliper	2533	2530	SURF	8 5/8":	2533/SURF
		Inspection		1790	SURF	5 1/2":	1791/SURF

GALLERY 8

48	7/6/82	Caliper	2812	2808	SURF	8 5/8":	2812/SURF
		GR-Neutron		2810	SURF		
		Inspection		2809	SURF		
50	6/30/82	Caliper	2835	2832	SURF	8 5/8":	2835/SURF
		GR-Neutron		2834	SURF		
		Inspection		2833	SURF		

GALLERY 9

47	6/30/82	Caliper	2714	2712	SURF	8 5/8":	2714/SURF
		GR-Neutron		2712	SURF		
		Inspection		2712	SURF		

GALLERY 9 (continued)

Well #	Date	Type Log	Depth-Logger (ft.)	Bottom Logged Interval (ft.)	Top Logged Interval (ft.)	Casing/Liner(in): From/To(ft.)
55	7/2/82	Caliper	2876	2874	SURF	8 5/8": 2876/SURF
		GR-Neutron		2876	SURF	
		Inspection		2875	SURF	
56	7/1/82	Caliper	2840	2838	SURF	8 5/8": 2840/SURF
		GR-Neutron		2770	SURF	
		Inspection		2779	SURF	

GALLERY 10

52	6/22/82	Caliper	2736	2734	SURF	8 5/8": 2733/SURF
		GR-Neutron		2736	SURF	
		Inspection		2732	SURF	
57	6/22/82	Caliper	2742	2740	SURF	8 5/8": 2742/SURF
		GR-Neutron		2742	SURF	
		Inspection		2740	SURF	

51	6/29/82	Caliper	2777	2774	SURF	8 5/8": 2777/SURF
		GR-Neutron		2776	SURF	
		Inspection		2772	SURF	
7	7/8/82	Caliper	1323	1320	SURF	7" : 1150/SURF
		GR-Neutron		1134	SURF	5 1/2": 1133/SURF
		Inspection		1133	SURF	

WELL # — US SALT - WATKINS GLEN, NY BRINE WELLS — Original Supplied by Larry Sevenker in 2008. — Recent corrections & updates by DACrea.

12/8/2010 is latest Revision. — See "Updating/Correction Notes" at bottom of file.

YEAR	1	1A	2	3	3A	3B	4	5	5A	6	7	7A	8	9	9A	10	11	12	12A	13	13A	14	14A	14B	15	16	16A	17	18	19	20	20A
1893	AL		AL																													
1894	AL		AL																													
1895	AL		AL																													
1896	AL		AL	AL																												
1897	AL		AL	AL																												
1898	AL		AL	AL																												
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1905	AL		AL	AL			AL	AL																								
1906	AL		AL	AL			AL	AL		AL																						
1907	AL		AL	AL			AL	AL		AL	AL																					
1908	AL		AL	AL			AL	AL		AL	AL																					
1909	AL		AL	AL			AL	AL		AL	AL																					
1910	AL		AL	A	AL		AL	AL		AL	AL		D																			
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1965					DP	DP	S	S	TI	S	S	TI	TI	TI	TI	TI	TI	BW	TI	TI																							
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1972							S	S		S	S	TI	TI	TI	TI	TI	TI	BW	AI	TI	TI	BW	TI	TI	S	S	TI	TI	TI	TI	TI	TI											
1973							S	S		S	S	TI	TI	TI	TI	TI	TI	BW	AI	TI	TI	BW	TI	TI	S	S	TI	TI	AI	TI	AI	TI											
1974					L		S	S		S	S	TI	TI	TI	TI	TI	TI	BW	AI	TI	TI	BW	TI	TI	S	S	TI	TI	AI	TI	AI	TI											

- A — ABANDONED
- AI — ANNULUS INJ
- AL — AIR LIFT
- AP — AIR PAD
- BW — BRINE WELL
- D — DRILLED
- DH — DRILLED HORIZONTAL
- DOP — DRILLED-OUT PLUG
- DI — DISPOSAL INJ
- DP — DEEP WELL PUMP
- GS — GAS STORAGE
- L — LOGGED
- ND — NOT DRILLED
- O — OBSERVATION
- PA — PLUGGED & ABANDONED
- S — STORAGE
- SBI — SPENT BRINE INJECTION
- TI — TUBING INJ
- W/B — WATER/BRINE
- WI — WATER INJ
- WO — WORK OVER

1975							DI					DI																										
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1975	S	S		S	S	TI	TI	TI	TI	TI	TI	BW	AI	TI	TI	BW	TI	TI	S	S	TI	TI	AI	TI	AI	TI											
1976	S	S		S	S	TI	PA	TI	TI	TI	TI	BW	O	TI	TI	BW	TI	TI	S	S	TI	TI	AI	TI	AI	TI	DI	DI	DI								
1977	S	S		S	S	TI		TI	TI	TI	A	BW	O	TI	TI	BW	TI	TI	S	S	BW	TI	TI	TI	AI	TI	O	DI	DI	TI	TI	TI					
1978	S	S		S	S	TI		TI	TI	TI		BW	O	TI	TI	BW	TI	TI	S	S	BW	TI	TI	TI	AI	TI	O	O	O	TI	TI	TI					
1979	S	S		S	S	PA		TI	TI	TI		BW	O	TI	TI	BW	TI	TI	S	S	BW	TI	TI	TI	O	TI	O	O	O	TI	TI	TI					
1980	S	S		S	S			TI	TI	TI		BW	O	TI	TI	BW	TI	TI	S	S	WI	TI	TI	TI	O	WI	O	O	O	TI	BW	BW					
1981	S	S		S	S			TI	TI	TI		BW	O	TI	TI	BW	TI	TI	S	S	WI	TI	TI	TI	O	WI	O	O	O	TI	BW	BW					
1982	S	S		S	S			TI	WI	BW		WI	O	BW	TI	WI	TI	TI	S	S	WI	TI	TI	TI	O	WI	O	O	O	TI	BW	BW					
1983	S	S		S	S			TI	WI	BW		WI	O	BW	TI	WI	TI	TI	S	S	WI	TI	TI	TI	O	WI	O	O	O	TI	BW	BW					
1984	S	S		S	S			TI	WI	BW		WI	O	BW	BW	WI	TI	TI	S	S	WI	TI	TI	TI	O	WI	O	O	O	TI	BW	BW					
1985								TI	O	BW		WI	O	BW	O	WI	TI	TI			WI	TI	TI	TI	O	BW	O	O	O	O	O	WI					
1986								TI	O	BW		WI	O	BW	O	WI	TI	TI			WI	TI	TI	TI	O	BW	O	O	O	O	O	WI					
1987								TI	O	BW		WI	O	BW	O	WI	TI	TI			WI	TI	TI	TI	O	BW	O	O	O	O	O	WI					
1988								BW	O	BW		WI	O	BW	O	WI	O	WI			O	O	O	TI	O	BW	O	O	O	O	O	WI					
1989	PA	PA		PA	PA			BW	O	BW	PA	WI	O	BW	O	WI	O	WI	PA	PA	O	O	O	TI	O	BW	O	O	O	O	O	WI					
1990								BW	BW	BW		WI	O	BW	O	WI	O	WI			O	O	O	TI	O	BW	O	O	O	O	O	WI					
1991								BW	BW	BW		WI	O	BW	O	WI	O	WI			O	O	O	TI	O	BW	O	O	O	O	O	WI					
1992								BW	BW	BW		WI	O	BW	O	WI	O	WI			O	O	O	DH	O	BW	O	O	O	O	O	WI	DH				
1993								BW	BW	BW		WI	O	BW	O	WI	O	WI			O	O	O	TI	O	BW	O	O	O	O	O	WI	BW				
1994								BW	BW	BW		WI	O	BW	O	WI	O	WI			O	O	O	TI	O	BW	PA	PA	PA	O	O	WI	BW				
1995								BW	BW	BW		WI	O	BW	O	WI	O	WI			O	O	O	TI	L	BW				O	O	WI	BW	GS			
1996								BW	BW	BW		WI	O	BW	O	WI	O	WI			O	O	O	TI	TI	PA				O	O	PA	BW	GS			
1997		GS		GS	GS			BW	BW	BW		WI	O	BW	PA	SBI	O	WI	GS	GS	O	O	O	BW	TI					O	O		BW	GS			
1998		GS		GS	GS			BW	PA	PA		PA	PA	O		SBI	O	WI	GS	GS	BW	BW	O	SBI	BW					O	SBI		BW	GS			
1999		GS		GS	GS			BW						O		O	O	WI	GS	GS	PA	BW	PA	SBI	BW					PA	SBI		BW	GS		TI	
2000		GS		GS	GS			BW						O		O	O	WI	GS	GS		BW		SBI	BW						SBI		BW	GS		AI	
2001		GS		GS	GS			BW						O		O	O	WI	GS	GS		BW		SBI	BW						SBI		O	GS		AI	
2002		GS		GS	GS			BW						O		O	O	WI	GS	GS		BW		SBI	BW						SBI		O	GS		AI	
2003		GS		GS	GS			BW						O		O	O	WI	GS	GS		BW		SBI	BW						SBI		PA	GS	TI	AI	
2004		GS		GS	GS			PA						PA		PA	PA	PA	GS	GS		SBI		BW	SBI						BW			GS	WI	BW	
2005		GS		GS	GS														GS	GS		SBI		BW	SBI						BW			GS	WI	BW	
2006		GS		GS	GS														GS	GS		SBI		BW	SBI						BW			GS	W/E	BW	
2007		GS		GS	GS														GS	GS		SBI		BW	SBI						BW			GS	BW	O	WI
2008		GS		GS	GS			DOP			DOI	DOP					WO	DOI	GS	GS		SBI/BW		BW	SBI						BW			GS	BW	O	WI
2009		GS		GS	GS		WO	O			–	O					O	WO	GS	GS	DOP	WO/BW.		BW	SBI	DOP				DOP	SBI		DOP	GS	WO	BW	WI
2010		GS					O	O				O					O	O	?	GS	SBI	SBI		BW	BW	O				O	SBI		WI	GS	BW	O	WI

Updating/Correction Notes:

1	12/09; General Update to show 2009 status & use; 6-5/8" lining of 48 & 50. DAC.
2	1/10/10: Solution Mining Reports showed Well 42 "Received Insols" in 1997 & 1998, so was marked "SBI" for Spent Brine Injection" from "WI" and "O" for Water Injection & Observation respectively. DAC, conf'd w/ LS.
3	1/11/10: Added "DOP" code for "Drilled-Out Plug", and applied that to wells 33, 34, 43, 44, 47, 52, 55, 58. DAC.
4	1/10/10: Solution Mining Reports show Well 35 as producing brine in 1990-1997, so it was marked "BW" for Brine Well from "O" for Observation. DAC, conf'd w/ LS; was during Mike Shumacher period.
5	1/13/10: Added various notes to cells to capture dates of switch-over from Injection to Production use, and Workover details (re-lining at 48 & 50), etc.
6	1/22/10: Added Well 59, that was put in by NYSEG for Storage-Cavity use (to replace Well 46? ...which Larry's record says was plugged, as well as 45 (which the Map shows as plugged?)...Was 46 never plugged or was drilled-out??
7	12/8/10: Well 27 was listed as 'GS' for Gas Storage '97-'09, but it is actually plugged. Corrected

A History and Description

of the

"Glen" Plant and Area Salt Deposit

also

History and Log of Plant and Area Wells Drilled

by

Leon R. GrosJean

Year
1946

(Brought up to date in 1951)

EARLY HISTORY

The Glen Salt Company was organized May 22nd, 1893 with George C. Otis as President and John A. Clute as Secretary and Treasurer. Joseph C. Buxton also was interested in the corporation. The land, consisting of 40 acres, was purchased from the Nelson Cowan Estate on December 5th, 1892. The site had formerly been used by the Morris Run Coal Company as a trans-shipment point, and they in turn had bought the property from G. R. Corbett in the autumn of 1863. On this property the drilling of the first well was begun in February 1893. The salt bed was struck at a depth of 1760 feet from the surface and continued for 94 feet in solid salt, at which depth (1854 feet) the drilling was stopped and the well finished, although the bottom of the salt bed had not been reached. The geological formation in which the salt is found is the shales of the lower part of the Portage group. The strata dips slightly towards the north, the degree of dip being about 10 feet per mile.

With the mention of one other well from which salt was never made (International's well No. 12) the history of salt in Schuyler County could be completed. This was a test well sunk with the hope of finding salt at Corbett's Point, three quarters of a mile north of the Glen Plant. The well was sunk during the year 1904, and for the first 325 feet the bore was 10 inches in diameter. From this point down to 1250 feet an 8 inch bore was used, and below 1250 feet a 6½ inch bore was used down to the extreme depth of 1725 feet. Gas was met with considerable volume throughout the lower formations of the shales. The International pulled the pipe from this well during July 1934 and finished drilling to the salt bed in November 1934. The first brine pumped from the well was March 1st, 1935.

Early history also records other interesting information concerning this No. 12 well and reads as follows: "The salt bed at Corbett's Point is 1791 feet below the surface of Seneca Lake and is nearly 300 feet in the thickness of its greatest deposit. Superimposed upon the saline group are the limestone formations for some 450 feet, composing an enduring rock roof. The Hamilton shales and sandstones extend above for 1000 feet capped with 25 feet of Tully limestone. The black slates of the Genesee formation are next in order for 150 feet, and 100 feet of the Portage shales lead up to the face of the waters. The central New York salt field has been outlined from the wells of Tully east of Skaneateles Lake to the wells of the Warsaw district west of the Genesee. Seneca Lake is about in the center of this section, and the drill has demonstrated that the bed deepens towards its head, from its eastern, western and northern limits. The Onondaga Salt Group is the mother-lode of the saline deposit, but the rocks of this formation are rising about 32 feet to the mile to the northward and thinning in that direction, and outcrop at the foot of the Seneca 37 miles from the head, devoid of all salt evidence save springs of brine.

The Seneca and Cayuga fields have been considered somewhat in the light of rivalry as to salt manufacturing locations, but in depth and purity of water and in extent and position of the salt

deposit, the former greatly outclasses the latter. Seneca Lake is 447 feet above tide, and the salt bed is about 1800 feet beneath its surface with a thickness in the upper layer of about 100 feet. Cayuga Lake is 378 feet above tide, but the salt bed at Ithaca is found at a depth of over 2100 feet.

History Concerning Maintenance and Drilling
Covering Only International Wells

The first well drilled in the original field was completed in April 1893, having been drilled to a depth of 1854 feet. The top of the salt vein is 1775 feet. In August 1933 the well was abandoned. During the 40 years in production records show 40 interruptions, renewing tubing, air lines and casing repairs.

It appears the majority of these interruptions could have been eliminated had management renewed the casing as leaks developed. The leaks allowed H_2S to enter the cavity. The drillings record a brown shale strata around 1250 feet at which point Hydrogen Sulphide enters.

During September 1933 the management learned that aireating the brine would reduce the H_2S content from 25 to 30 P.P.M. lbs. to from 2 to 3 P.P.M. Starting aireating at this time retarded rapid deteriation of pans and piping, but extensive damage had already been done. At this point, and in connection with H_2S, it seems well to note the management's efforts to keep H_2S from entering the cavity by putting water pressure on the bed. A large Cameron Pump forced water into the cavity, and 350 lbs. pressure was developed. At the time it developed water was forced back through the black shale strata and seriously affected gas wells of the Glen Springs Corp. two miles distant. It was also discovered Seneca Salt Co's. test well, our No. 12 now in the new brine field, had started to flow. In that this pressure resulted in low gravity brine, probably due to short circulting, the practice was discontinued.

EARLY HISTORY

On May 25th, 1904 the Reciever's Sale of the National Salt Company was held, and the Glen Works came into possession of the International Salt Company, a corporation formed for the purpose of taking over and operating the plants which had belonged to the National Salt Company.

During 1907-8 the Glen Plant was entirely rebuilt.

HISTORY COVERING PAST AND PRESENT PRODUCTION METHODS

Starting in 1893 ditches led from the lake to wells 1, 2, 3, 4, 5, 8 and 9; openings were cut in the casing, which allowed water to enter the cavity by gravity. This method is at present used by the Watkins Salt Company and has been used by them since 1898 when their plant was built.

During 1907 a pump was purchased, and water was first pumped in No. 4 well close to our boiler room. Later it was pumped in No. 8 well at the extreme south end of our field. There has been no means of supplying water to wells in the plant area since 1933 when deep well pumps were installed at each well.

From 1893 until 1933 brine was forced from the different wells by air pressure. A 3/4 inch air line was lowered in the tubing to a depth of approximately 1200 feet. From 90 to 100 lbs. air pressure was maintained, which forced brine into a tank near the top of each derrick; from here it flowed by gravity to a common receiving tank.

The first deep well pumps were installed during 1933 in wells No's 4, 7, 10 and 11 in the old field. Starting in 1935, as wells No's 12, 13, 14, 15, 16, 17 and 18 were drilled in the new field, deep well pumps were installed, and this method is used at the present time.

During 1944 TRUMP method of production was introduced, and drilling of No. 20 well was started. This calls for an individual air compressor at the well and maintaining an air cushion at the roof of the cavity, this to prevent dissolving of salt and interruptions by caving around brine supply piping.