

# RECLAMATION

*Managing Water in the West*

**OPERATION  
AND  
MAINTENANCE  
REPORT**

**REPUBLICAN RIVER  
COMPACT MEETING**

**PHILLIPSBURG, KANSAS**



**U.S. Department of the Interior  
Bureau of Reclamation  
Great Plains Region  
Nebraska-Kansas Area Office**

**August 10, 2006**

# REPUBLICAN RIVER COMPACT MEETING

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## 2005 Operations

As shown on the attached Table 1, precipitation in the Republican River Basin varied from 98 percent of normal at Harlan County Dam to 113 percent of normal at Red Willow Dam. Total precipitation at Reclamation dams ranged from 18.23 inches at Bonny Dam to 28.07 inches at Lovewell Dam.

Inflows varied from 29 percent of the most probable forecast at Enders Reservoir to 88 percent of the most probable forecast at Harry Strunk Lake. Inflows into Harlan County Lake totaled 53,682 AF while inflows at Lovewell Reservoir totaled 44,291 AF.

Average farm delivery values for each irrigated acre were as follows:

<u>District</u>	<u>Farm Delivery</u>
Frenchman Valley	0.6 inches
H&RW	0.0 inches
Frenchman-Cambridge	
- Meeker-Driftwood, Bartley, Red Willow	0.0 inches
- Cambridge Canal	6.7 inches
Almena	0.0 inches
Bostwick in NE	
- Franklin, Franklin Pump, Naponee, Courtland	0.0 inches
- Superior Canal	3.0 inches
Kansas-Bostwick	
- Above Lovewell	0.5 inches
- Below Lovewell	5.0 inches

## 2005 Operation Notes

**Bonny Reservoir**--Started the year 17.6 feet below the top of conservation. Annual computed inflow of 7,353 AF. Below normal inflows were recorded during every month of the year. As directed by the Colorado Water Commissioner, 89 AF of reservoir inflows were passed through the reservoir into Hale Ditch for irrigation purposes. The end of year elevation was at an historical low, 19.0 feet below the top of active conservation.

**Enders Reservoir**--Started the year 26.0 feet below the top of conservation. Annual computed inflow of 4,649 AF was the lowest ever recorded. Storage water was not released from Enders Reservoir for either Frenchman Valley or H&RW irrigation districts. This was the fourth consecutive year that H&RW Irrigation District did not divert water due to the extremely low water supply. Frenchman Valley Irrigation District diverted water under their natural flow water right. The end of the year elevation was 26.1 feet below the top of conservation.

**Swanson, Hugh Butler, and Harry Strunk Lakes**—Swanson, Hugh Butler and Harry Strunk lakes started the year 22.5 feet, 13.2 feet and 9.8 feet below the top of conservation. Annual computed inflows were the lowest ever recorded at Hugh Butler Lake and the third lowest at Swanson Lake. Harry Strunk Lake reached the top of conservation pool ( 2366.1 feet) on June 7<sup>th</sup>. Due to the low water supply, releases were not made from Swanson or Hugh Butler lakes for diversion into Meeker-Driftwood, Bartley and Red Willow canals (third consecutive year). At the end of the year, Swanson Lake was 20.6 feet below the top of conservation, Hugh Butler Lake was 11.5 feet below and Harry Strunk Lake was 5.4 feet below.

**Keith Sebelius Lake**—The lake elevation at the first of the year was 2286.38 feet (17.9 feet below full). The annual inflow of 4,555 AF was between the dry and normal-year forecasts. The reservoir level peaked at elevation 2287.65 feet on June 13<sup>th</sup>. Due to the low water supply, irrigation releases were not made from the lake. In May of 2004, the Kansas Department of Wildlife and Parks and the Almena Irrigation District entered into a Memorandum of Agreement (MOA) that provided for no irrigation releases during 2004 and 2005 when the reservoir level was below 2288.0 feet. The reservoir ended the year 17.8 feet below conservation.

**Harlan County Lake**—The lake elevation at the beginning of 2005 was at an historical low level, 20.3 feet below the top of conservation. Inflow for the year totaled 53,682 AF. Due to the extremely low water supply available, no water was released from Harlan County Lake in 2005. “Water-Short Year Administration” was in effect. This was the second consecutive year that irrigation releases were not made from the lake. The lake level at the end of the year was 1928.31 feet (17.4 feet below full).

**Lovewell Reservoir**—The reservoir level was 8.3 feet below the top of conservation at the beginning of the year. Inflows from White Rock Creek and diversion of Republican River flows via Courtland Canal combined to fill the reservoir conservation pool (elevation 1582.6 feet) on May 13<sup>th</sup>. Following approval from the Corps of Engineers, the reservoir was allowed to fill to elevation 1584.20 feet on June 20<sup>th</sup>. Irrigation demands reduced the pool elevation to 1576.04 feet on August 23<sup>rd</sup>. The water surface elevation at the end of the year was 3.6 feet below the top of conservation at 1578.98 feet.

### Current Operations

Table 2 shows a summary of data for the first seven months of 2006.

**Bonny Reservoir** – Currently 20.0 feet from full. Reservoir level is 2.4 feet below last year at this time. Reservoir storage continues to decline as inflows remain at or near historic lows.

**Swanson Lake** – Currently 19.5 feet from full. Inflows for 2006 are only 29% of most probable. Lake level is 0.2 feet below last year at this time. Frenchman-Cambridge Irrigation District is not irrigating from Swanson Lake for the fourth consecutive year due to the low water supply.

**Enders Reservoir** - Currently 26.5 feet from full. Inflows for 2006 are only 28% of most probable. Reservoir level is only 1.3 feet below last year at this time. Due to the water supply shortage, H&RW Irrigation District is not irrigating for the fifth year in a row. This is third consecutive year that Frenchman-Valley Irrigation District has not received storage water for irrigation.

**Hugh Butler Lake** – Currently 17.3 feet from full. Lake level is 6.0 feet below last year at this time. Irrigation releases began on June 24<sup>th</sup>. Frenchman-Cambridge Irrigation District expects to deliver 8 inches to the acres served by Bartley Canal.

**Harry Strunk Lake** – Currently 8.8 feet below the top of conservation. Lake filled on May 19<sup>th</sup> (elevation 2366.1 feet). Irrigation releases began on June 25<sup>th</sup>. Frenchman-Cambridge Irrigation District expects to deliver 8 inches to acres served by Cambridge Canal.

**Keith Sebelius Lake** – Currently 18.0 feet below full. Lake level is 0.4 foot below last year at this time. This is the third consecutive year that Almena Irrigation District has not requested release for irrigation due to the short water supply.

**Harlan County Lake** – Currently 18.4 feet below full. Lake level is 2.2 feet below last year at this time. Inflow for first seven months of 2006 was only 24% of most probable. The available irrigation supply from Harlan County Lake on June 30<sup>th</sup> was only 14,400 acre-feet, indicating that “Water-Short Year Administration” would be in effect. Irrigation releases began on June 22<sup>nd</sup> for the irrigation of Kansas Bostwick Irrigation District lands above Lovewell Reservoir. Irrigation releases were not made from Harlan County Lake for Bostwick Irrigation District in Nebraska in 2006. This is the third consecutive year that irrigation releases have not been made from Harlan County Lake for Bostwick Irrigation District in Nebraska.

**Lovewell Reservoir** – Currently 5.0 feet below the top of conservation pool. Lake was filled on April 4<sup>th</sup> by diverting Republican River flows via Courtland Canal. Corps of Engineers allowed storing 10 percent in flood pool (elevation 1584.2 feet) just prior to irrigation season. Irrigation releases began on June 14<sup>th</sup>. Kansas Bostwick Irrigation District expects to deliver 5 inches below Lovewell.

## Other Items

### Inspections

Periodic Facility Reviews (PFR) were conducted at Bonny, Norton, Kirwin, Webster and Cedar Bluff dams in 2005. Annual inspections were conducted at the remaining project dams in 2005.

### Safety of Dams

Virginia Smith Dam - In 2002 the drain system under the river outlet works structure was determined to have failed. This system was grouted shut in the spring of 2003. A similar drainage system is located beneath the spillway outlet structure. A risk analysis completed in September 2003 recommended that the drain system under the spillway basin be grouted. Grouting of the drains was completed in October 2005.

Norton Dam - At the present time there are concerns related to seepage through the left abutment foundation. A final issue evaluation report of findings in 2003 concluded that action should be taken to reduce risk. Topographic surveys and additional instrumentation were installed near the outlet works in 2004. Design of a filter drain system is scheduled for completion in 2006 with construction beginning in 2007.

Enders Dam - A small depression was discovered near the outlet works stilling basin in August of 2004. Reclamation has installed instrumentation in the area to collect additional data. A risk assessment and additional analysis are scheduled for completion in 2006.

Red Willow Dam - The river outlet stilling basin was dewatered and inspected in July 2005. During the inspection a small quantity of fine, clean sand was discovered near the right drain outlet indicating a small amount of material being transported. A stability analysis of the basin was completed in September 2005 which indicated that plugging or grouting of the drains could impact the stability of the basin against uplift pressure when the basin is in an unwatered condition. Additional analysis of the drain system is scheduled to be completed in 2006.

#### Emergency Management Operations

Orientation Meetings are held annually to discuss the Emergency Action Plan (EAP) for all NKAO dams. Federal, state, county and local organizations that would be impacted by an emergency at NKAO dams are invited to attend. Radios which contact the downstream 24-hour warning points are tested monthly.

Tabletop exercises were held for the Emergency Action Plans (EAP) of Box Butte, Trenton, Red Willow, and Medicine Creek dams in 2005. A functional exercise was held for the EAP of Merritt Dam.

#### Standing Operating Procedures

The Standing Operating Procedures (SOP) for Lovewell, Glen Elder, Merritt and Virginia Smith dams were republished in 2005. All the SOP's for the 15 dams are scheduled to be republished by the end of 2006.

#### Water Conservation

Increased emphasis is being placed on water conservation by Reclamation. A full time employee is available in the Area Office to work with the irrigation districts on their water conservation efforts.

#### Security

Security at all Reclamation dams has increased since September 11, 2001. We have installed or are installing security fencing around the critical facilities at nearly all of the NKAO dams and maintaining close communication with local law enforcement at all sites. A threat assessment leading to a risk analysis is underway on project dams. Once the risk analyses are complete, we will make structural and non-structural changes to ensure a proper level of security and safety.

**TABLE 1**  
**NEBRASKA-KANSAS PROJECTS**  
**Summary of Precipitation, Reservoir Storage and Inflows**  
**CALENDAR YEAR 2005**

Reservoir	Total Precip. Inches	Percent Of Average %	Storage 12-31-04		Storage 12-31-05	Gain or Loss		Maximum Storage Content		Storage Date		Minimum Storage Content		Storage Date	Total Inflow AF	Percent Of Most Probable %
			AF	AF		AF	AF	AF	AF	AF	AF					
Box Butte	17.78	104	7,768	9,167	9,167	1,399	15,179	JUN 29	5,270	SEP 3	16,464	99				
Merritt	28.18	140	61,370	61,370	0	67,749	APR 24	35,051	SEP 9	178,277	95					
Calamus	21.99	93	100,649	100,561	-88	123,495	MAR 30	66,625	SEP 28	251,935	96					
Davis Creek	23.91	101	9,345	9,196	-149	31,462	JUN 26	8,813	APR 14	48,226	99					
Bonny	18.23	106	13,754	12,265	-1,489	14,916	JUN 13	12,173	DEC 9	7,353	56					
Enders	21.03	111	11,632	11,566	-66	12,981	JUN 22	11,174	OGT 9	4,649	29					
Swanson	20.66	103	30,489	35,068	4,579	40,193	JUN 21	30,559	JAN 1	15,542	35					
Hugh Butler	22.15	113	18,387	20,242	1,855	21,630	JUN 17	18,397	JAN 1	9,090	59					
Harry Strunk	22.32	108	21,177	26,833	5,656	36,707	JUN 21	20,310	AUG 31	30,861	88					
Keith Sebelius	27.69	112	8,247	8,322	75	9,342	JUN 13	8,091	NOV 22	4,555	60					
Harlan County	22.51	98	107,050	128,111	21,061	141,360	JUN 26	106,981	JAN 3	53,682	42					
Lovewell	28.07	103	15,904	25,836	9,932	41,060	JUN 20	15,994	JAN 1	44,291	60					
Kinwin	33.61	143	14,414	19,252	4,838	19,252	DEC 31	14,307	JAN 2	10,440	48					
Webster	26.94	114	10,153	10,327	174	12,405	JUN 17	18,060	NOV 25	5,967	33					
Waconda	27.38	106	159,801	161,594	1,793	176,227	JUN 14	159,603	JAN 2	63,624	44					
Cedar Bluff	19.51	92	117,211	101,181	-16,030	117,999	FEB 13	101,181	DEC 31	8,134	60					

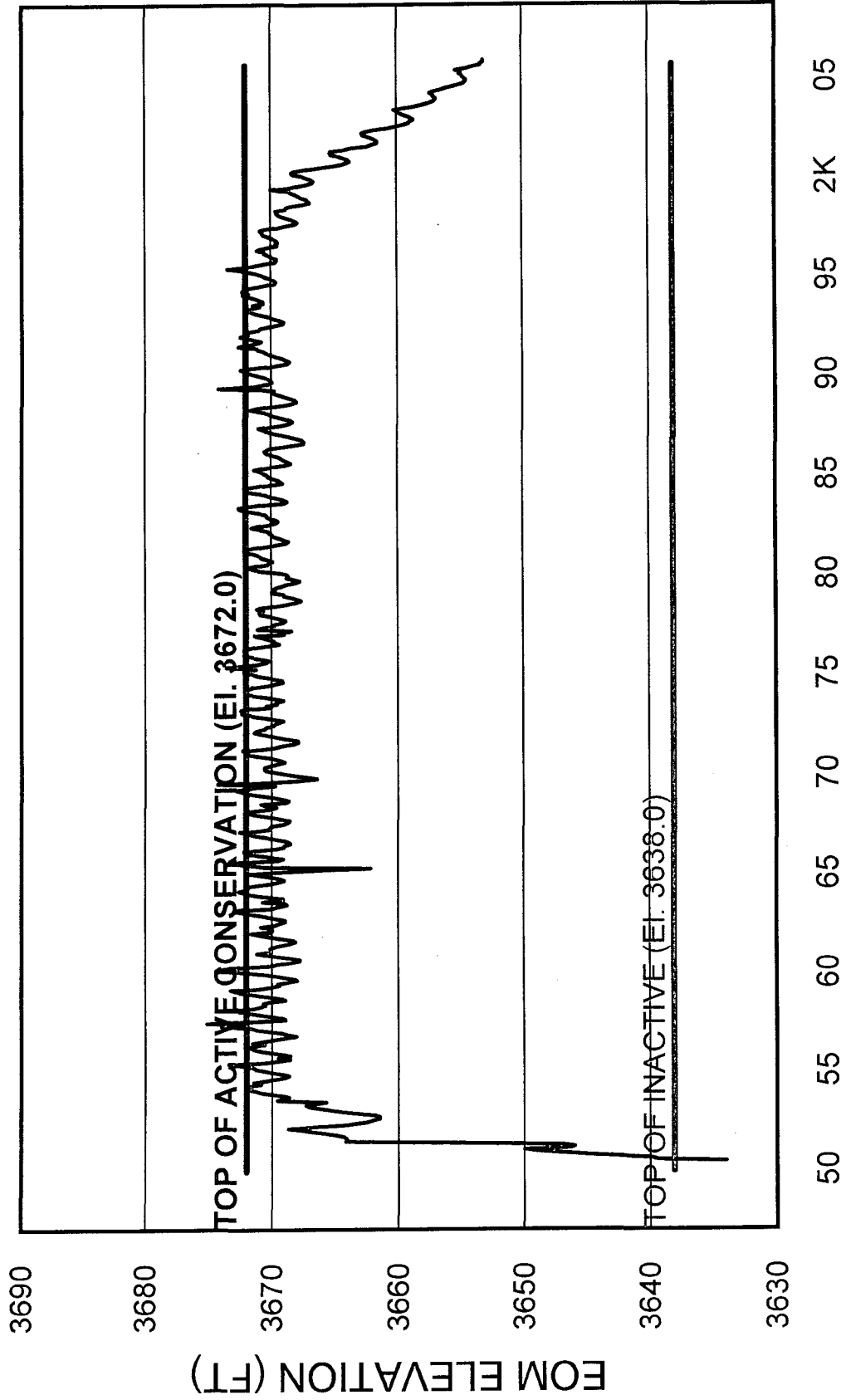
**TABLE 2**  
**NEBRASKA-KANSAS AREA OFFICE**  
**Summary of Precipitation, Reservoir Storage and Inflows**

**JANUARY - JULY 2006**

Reservoir	Precip. Inches	Percent Of Average %	Storage 7/31/2005		Storage 7/31/2006		Gain or Loss		Inflow		Percent Of Most Probable %
			AF	AF	AF	AF	AF	AF	AF	AF	
Bonny	9.25	79	13,370	11,160	(2,210)	4,318	45				
Enders	11.07	85	12,228	11,253	(975)	2,727	28				
Swanson	8.78	65	38,447	37,959	(488)	10,220	29				
Hugh Butler	9.44	73	20,448	14,230	(6,218)	4,791	47				
Harry Strunk	10.63	77	25,952	22,427	(3,525)	15,993	68				
Keith Sebelius	14.22	88	8,549	8,206	(343)	2,840	51				
Harlan County	11.07	74	137,717	120,744	(16,973)	21,881	24				
Lovewell	12.03	70	24,343	22,495	(1,848)	21,531	68				
Kirwin	11.40	75	17,824	19,300	1,476	4,120	25				
Webster	10.91	71	11,064	8,775	(2,289)	1,872	13				
Waconda	12.11	74	173,132	138,294	(34,838)	19,261	17				
Cedar Bluff	8.13	58	109,726	91,277	(18,449)	4,144	42				

# BONNY RESERVOIR

## END OF MONTH ELEVATION

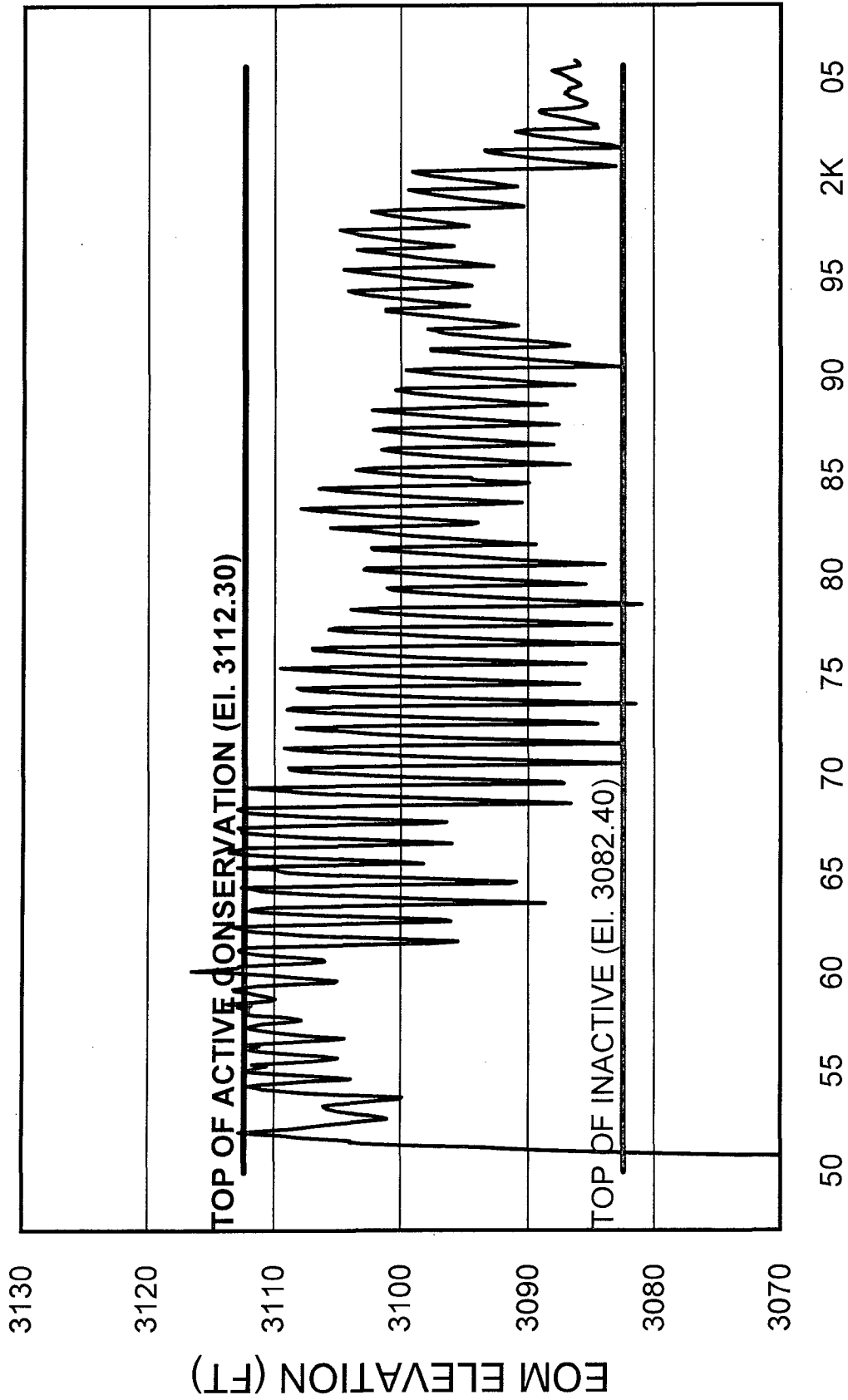


JUL 1950 THROUGH DEC 2005



# ENDERS RESERVOIR

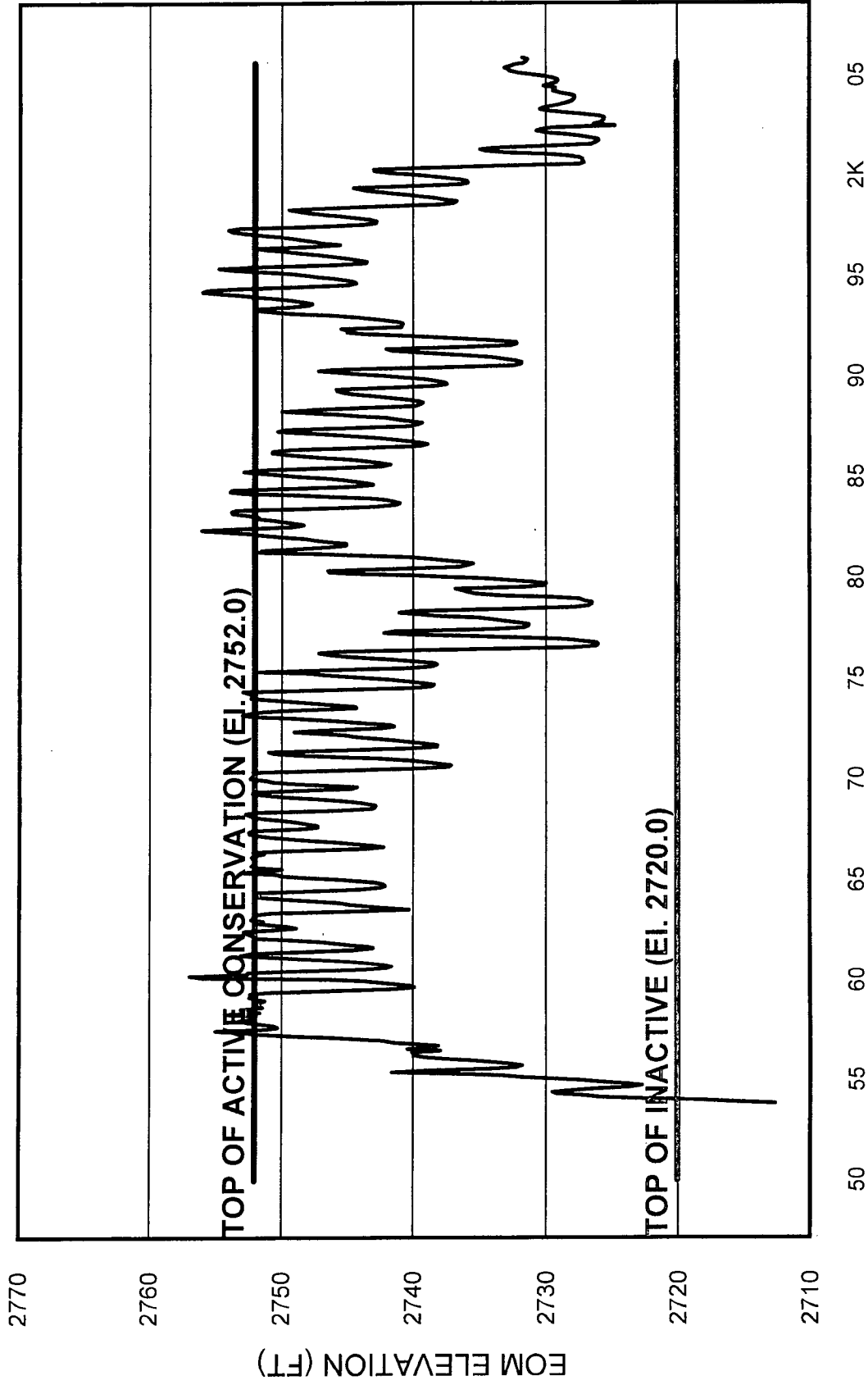
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OCT 1950 THROUGH DEC 2005

# SWANSON LAKE

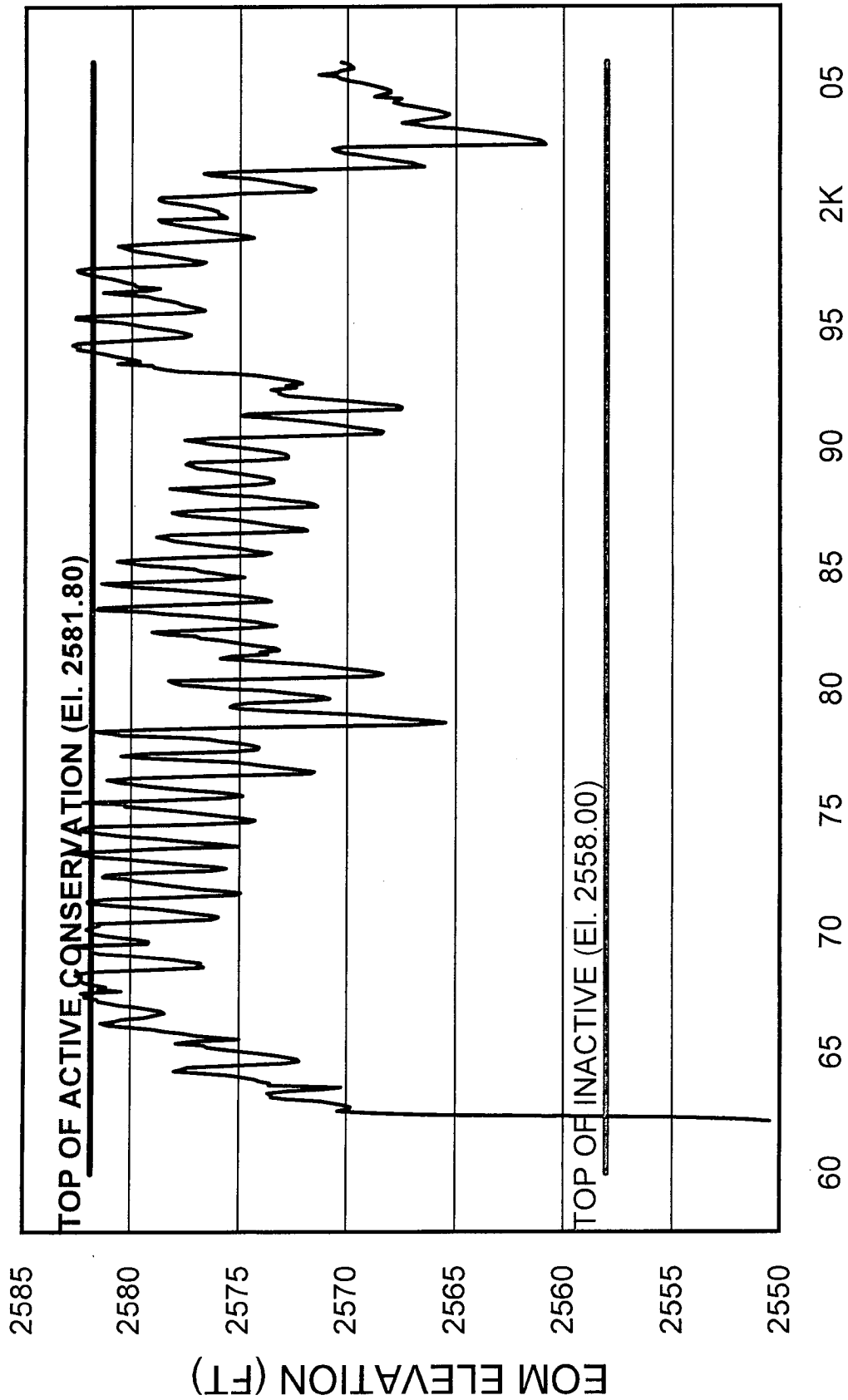
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NOV 1953 THROUGH DEC 2005

# HUGH BUTLER LAKE

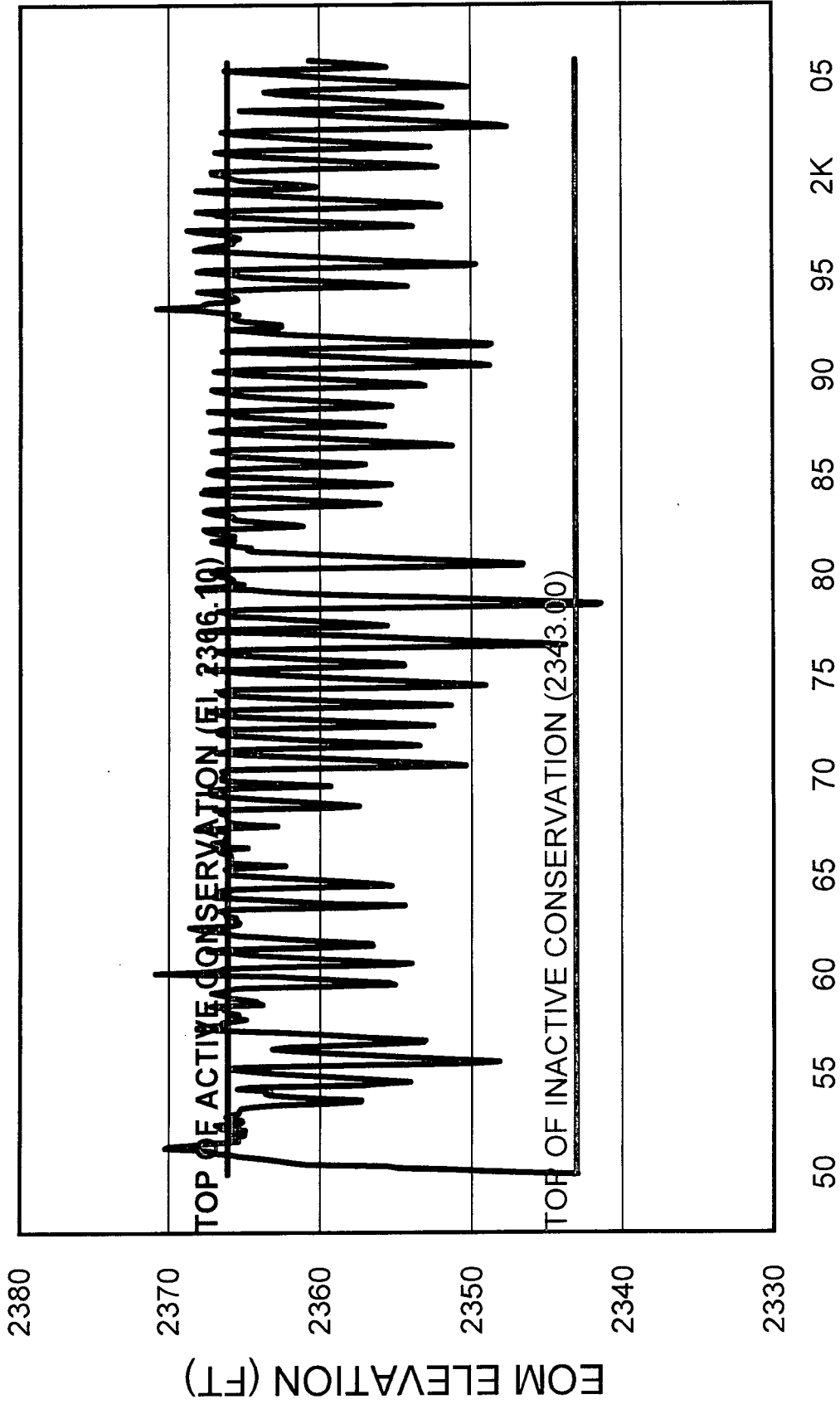
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MAR 1962 THOROUGH DEC 2005

# HARRY STRUNK LAKE

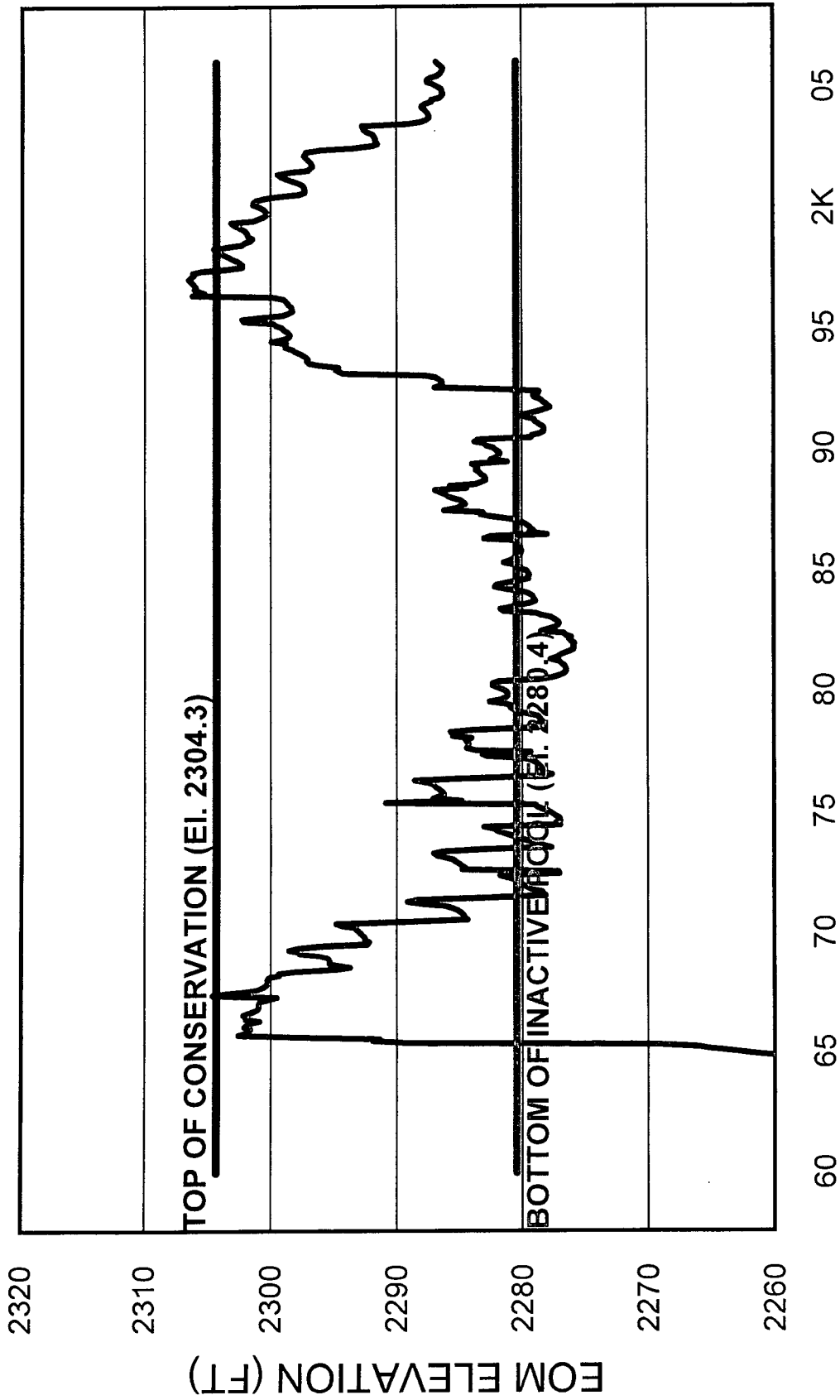
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JAN 1950 THROUGH DEC 2005

# KEITH SEBELIUS LAKE

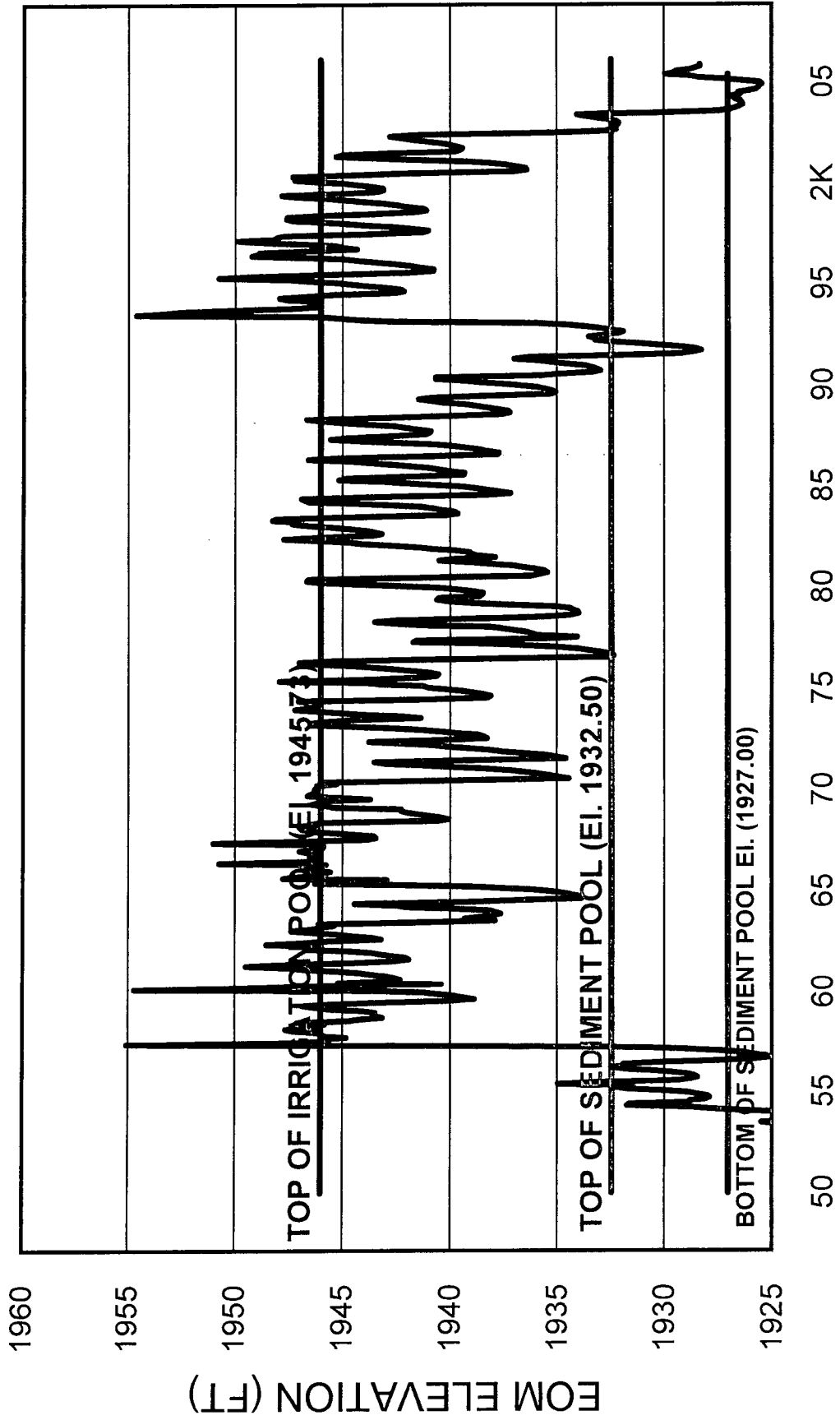
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OCT 1964 THROUGH DEC 2005

# HARLAN COUNTY LAKE

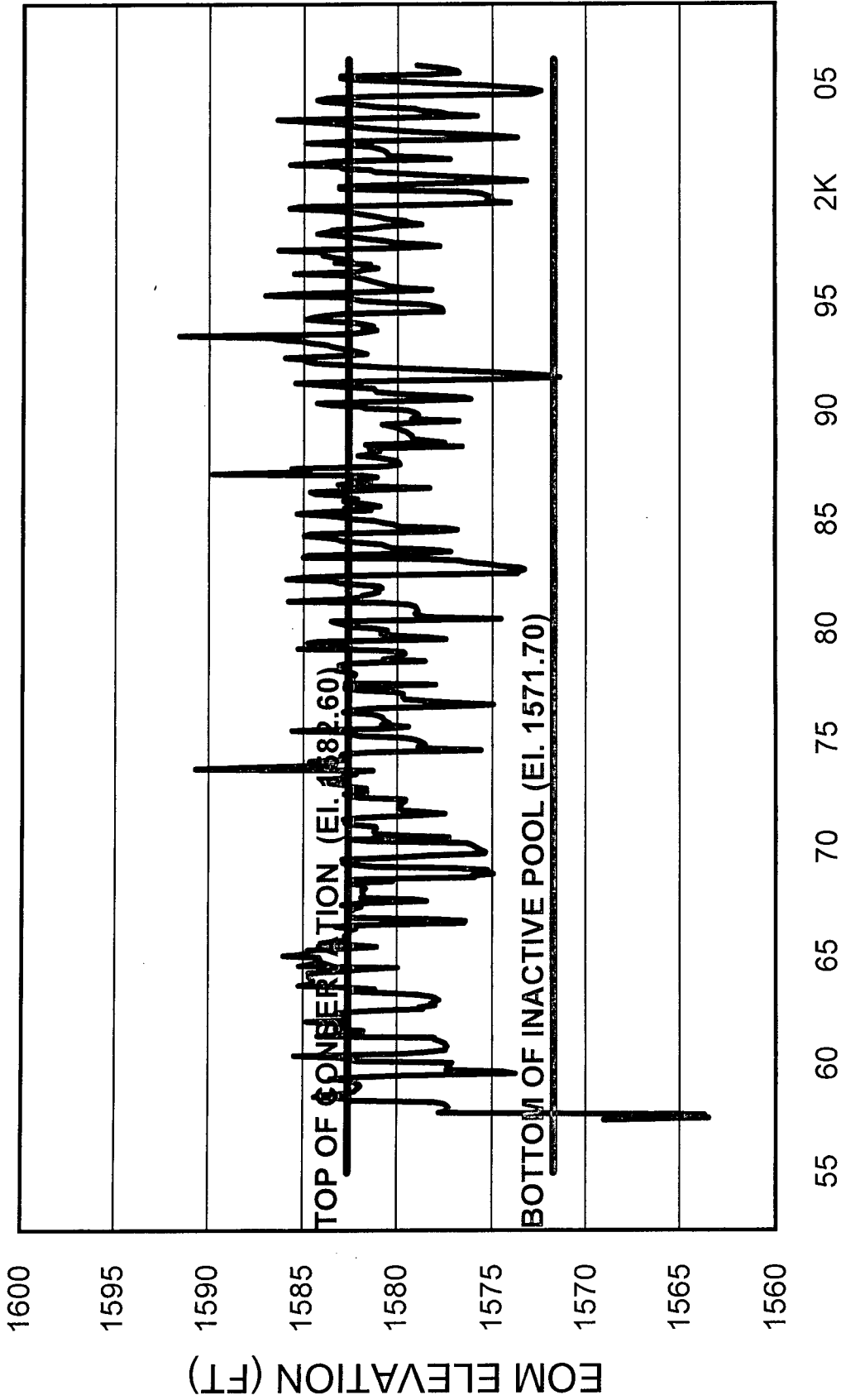
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NOV 1952 THROUGH DEC 2005

# LOVEWELL RESERVOIR

## END OF MONTH ELEVATION



JUN 1957 THROUGH DEC 2005