UNITED STATES
DEPARTMENT OF THE INTERIOR
Geological Survey
Albuquerque, New Mexico

FLOOD OF SEPTEMBER 3, 1972, IN HILLSBORO, NEW MEXICO

By

Loyd A. Waite

Open-file report

Prepared by the U.S. Geological Survey

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ILLUSTRATIONS

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ABSTRACT

Four deaths, two persons seriously injured, and property damage estimated at $846,500 resulted from a flood that struck the village of Hillsboro, N. Mex. during the early morning hours of September 3, 1972.

Hillsboro is situated at the confluence of Percha Creek and its main tributary, North Percha Creek. Heavy rainfall in the drainage basin upstream from Hillsboro occurred during the night of September 2-3. Peak discharge computed by slope-area measurements indicated that Percha Creek carried a maximum flow of 12,200 cubic feet per second (346 cubic meters per second) and that North Percha Creek carried a flow of 20,900 cubic feet per second (592 cubic meters per second) at points just upstream from Hillsboro. Flood-control facilities in Hillsboro consisting of levees on the south bank of Percha Creek failed and flood waters reached depths of 6 feet (1.8 meters) in Hillsboro.

Hillsboro was declared a disaster area by Governor Bruce King and by President Richard Nixon.

INTRODUCTION

During the early morning hours of September 3, 1972, the small mountain village of Hillsboro, in Sierra County, southwestern New Mexico, (fig. 1) was struck by a large flood that caused four deaths and extensive property damage. The 1972 flood was Hillsboro's third large flood in less than a century. Hillsboro was established in 1877, shortly after gold was discovered in the area, and had existed for a decade before suffering its first recorded flood. This flood, in 1887, caused the loss of three lives and did much damage to property (Stanley, 1964, p. 5). A second large flood on June 10, 1914, caused the loss of one life and did considerable property damage (Albuquerque Morning Journal, June 13, 1914).

Discharge data and estimates of maximum peaks are not available for the floods of 1887 and 1914, however, historical accounts indicate that these floods probably were of the same order of magnitude as the flood of September 3, 1972.

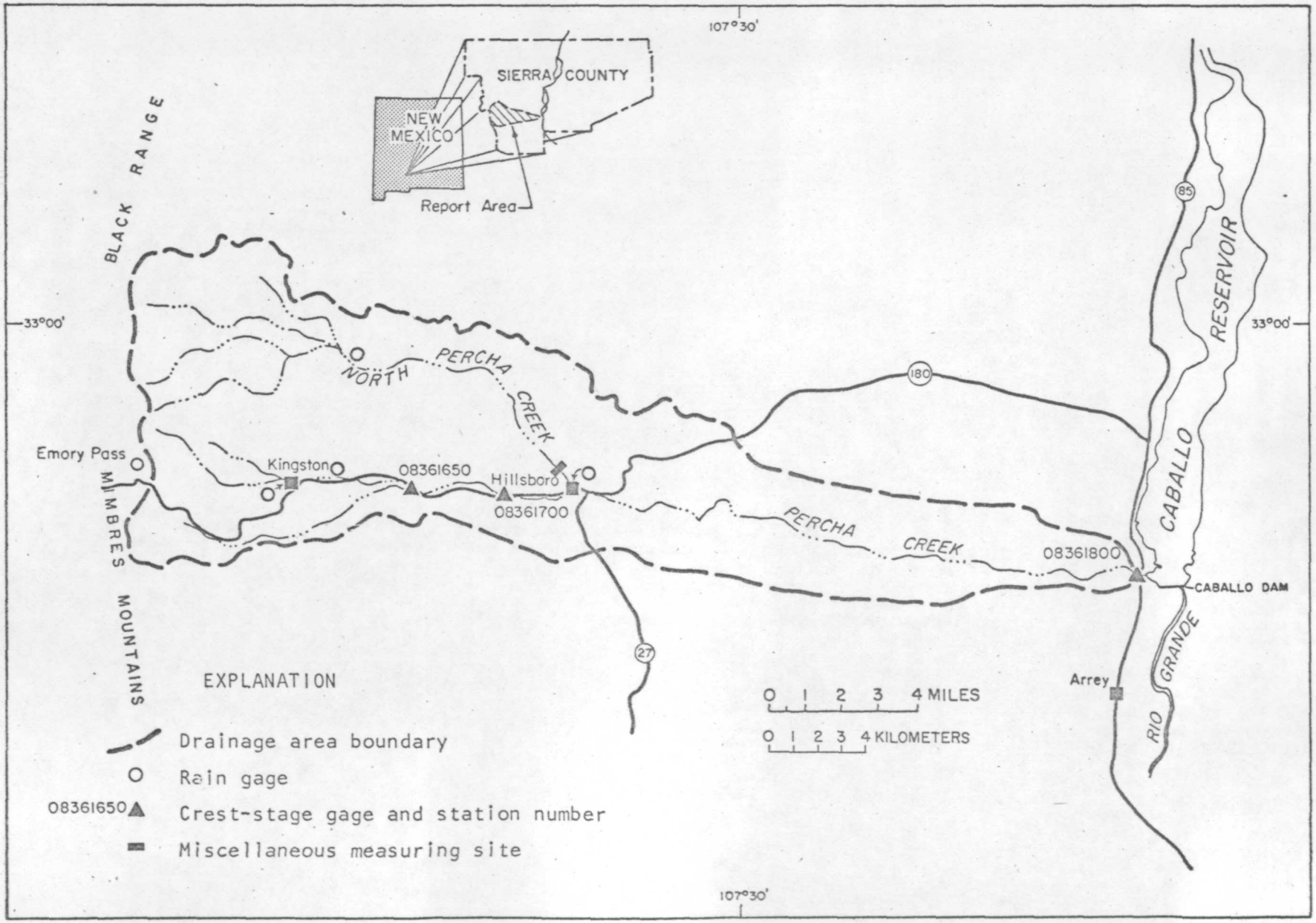

Figure 1.--Percha Creek drainage basin (modified from map by U.S. Army Corps of Engineers).

Percha Creek and its tributaries are in the Mimbres Mountains of the Black Range, west of Caballo Reservoir (fig. 1). The Percha Creek drainage basin above Hillsboro ranges in altitude from 5,277 feet (1608 m) at the west edge of Hillsboro to 8,228 feet (2508 m) at Emory Pass. Hilly grasslands occur in the lower part of the drainage basin; the upper part is sparsely covered with Ponderosa pine. The Black Range is plagued periodically by forest fires, but according to Mr. George Burfrind, U.S. Forest Service (oral commun., 1972), no significant fires have occurred within the Percha Creek drainage basin during the past 20 years; hence, burnover was not a contributing factor to the flood of September 3, 1972.

"The Hillsboro storm was apparently caused by high moisture content due to the transport of air from the Gulf of Mexico, orographic uplift of the surface southeasterly flow, convergence near the surface front, and the southward movement of the upper air cyclonic circulation." (U.S. Army Corps of Engineers, 1972, p. 2.).

The mean annual precipitation at Hillsboro is 10.98 inches (279 mm) (U.S. Department of Commerce, 1971, p. 220). Five rain gages are reported (U.S. Army Corps of Engineers, 1972, p. 3) to be in the Percha Creek drainage basin (fig. 1). At Hillsboro an official National Weather Service rain gage recorded 1.64 inches (42 mm) on September 2 and 1.35 inches (34 mm) on September 3. A Geological Survey rain gage at Emory Pass recorded 2.0 inches (51 mm) of precipitation during the period August 17-September 6. The U.S. Forest Service has a recording rain gage about 1.2 miles (1.9 km) east of Kingston, but official records have not been kept there since May 1972. However, an unofficial amount at this location was obtained from an observer. This was a total of 4.45 inches (113 mm) during an approximate 2-hour period during the night of September 2 (U.S. Army Corps of Engineers, 1972, p. 3). Reported rainfall at unofficial gages at Kingston and at a site 3.9 miles (6.3 km) northeast of Kingston in the North Percha Creek drainage basin were 2.1 inches (53 mm) and 6.0 inches (152 mm), respectively.

The purpose of this report is to provide a description of the flood and data on the flood stage, discharge, frequency, and damages.

In this report, figures for measures are given both in English units and in metric units (with the exception of tables, which contain English units only). The following table contains selected conversion factors of the dual system of metric "The International System of Units (SI)" and English units:

inches x 25.4	=	millimeters (mm)
feet x 0.3048	=	meters (m)
miles x 1.60934	=	kilometers (km)
square miles x 2.59	=	square kilometers (km^2)
cubic feet per second x 0.02832	=	cubic meters per second (m^3/s)

ACKNOWLEDGMENTS

Records of discharge contained in this report were collected through cooperative programs between the U.S. Geological Survey and the New Mexico State Highway Department. The U.S. Army Corps of Engineers furnished the bulk of information on property damages. Data were collected and compiled by personnel of the U.S. Geological Survey in Santa Fe and Albuquerque, N. Mex., under the general supervision of W. E. Hale, District Chief.

DESCRIPTION OF THE FLOOD

Floodwaters from Percha Creek and North Percha Creek joined at the west edge of Hillsboro and inundated 75 percent of the village; high-water marks about 6 feet (1.8 m) above street level were left on buildings. Three crest-stage gages along Percha Creek (fig. 1), which routinely record maximum peak stages, were overtopped. After the flood, measurements of discharge by slope-area methods were made near these gages. These gage stations are number 08361650, Percha Creek near Kingston, N. Mex.; number 08361700, Percha Creek near Hillsboro, N. Mex.; and number 08361800, Percha Creek at Caballo Dam near Arrey, N. Mex. A fourth computation of maximum discharge was made at a miscellaneous measuring site on North Percha Creek near Hillsboro (fig. 1). These discharge measurements, and previous measured peaks of records, are listed in the following table.

Station No.	Stream and place of determination	Drainage area (sq mi)	Period of record	Maximum previously known			Maximum September 3, 1972		
				Year	Gage height (ft)	Discharge (ft^3/sec)	Gage height (ft)	Discharge (ft^3/s)	Ratio to 50-yr flood
08361650	Percha Creek near Kingston, N. Mex.	21.5	1953-72	1955	-	2,260	15.8	3,740	1.3
08361700	Percha Creek near Hillsboro, N. Mex.	35.4	1957-72	1962	7.05	4,100	11.7	12,200	3.2
08361800	Percha Creek at Caballo Dam near Arrey, N. Mex.	119	1953-72	1958	4.31	7,260	10.2	15,400	2.1
-	North Percha Creek near Hillsboro, N. Mex.	41.4	-	-	-	-	-	20,900	4.9

Flood frequency usually is expressed in terms of the recurrence interval which is defined as the average number of years within which a flood of a certain magnitude will be equaled or exceeded once. The probability that a flood of certain magnitude will be exceeded in a given year is the reciprocal of that flood's recurrence interval. For example, the probability of a 50-year flood magnitude being exceeded in any given year is 0.02, or 2 percent.

Peak discharge during the flood of September 3 exceeded the 50-year magnitude by varying amounts at each of the four sites where discharge was determined. The ratio of measured peak to the 50-year peak is listed in the table on the preceding page. Computations of 50-year flood magnitude were based on data contained in Water-Supply Paper 1682, "Magnitude and frequency of floods in the United States--Part 8, Western Gulf of Mexico basins," p. 1-18, by James L. Patterson, 1965.

CASUALTIES

Four deaths, and serious injuries to two other persons, were attributed to the flood. One male resident of Hillsboro died when the raging waters collapsed the heavy walls of his adobe home, burying him in the debris. Another man drowned when floodwater swept away his vehicle as he drove along Highway 180 in Hillsboro. A man and wife, camping in the area, were carried into Percha Creek and drowned; their bodies were found in the creek downstream from Hillsboro. A man and wife in Hillsboro were seriously injured when their 103-year old home was destroyed (U.S. Army Corps of Engineers, 1972, p. 6).

PROPERTY DAMAGE

Most of the property damage caused by the flood (about 95 percent of the total damage) occurred within Hillsboro. Flood-control facilities along the south side of Percha Creek were not adequate to contain the floodwaters. An 8-foot (2.4 m) levee with riprap slopes, extending along Percha Creek through Hillsboro, was completely destroyed (fig. 2). The upper end of a levee, extending west of Hillsboro and varying in height from 5 to 8 feet (1.5 to 2.4 m), was washed out, causing flooding south of State Highway 180.

Lesser amounts of property damage occurred along Percha Creek downstream from Hillsboro to Caballo Reservoir. This downstream area contains agricultural land that was damaged by soil erosion or by sediment deposition.

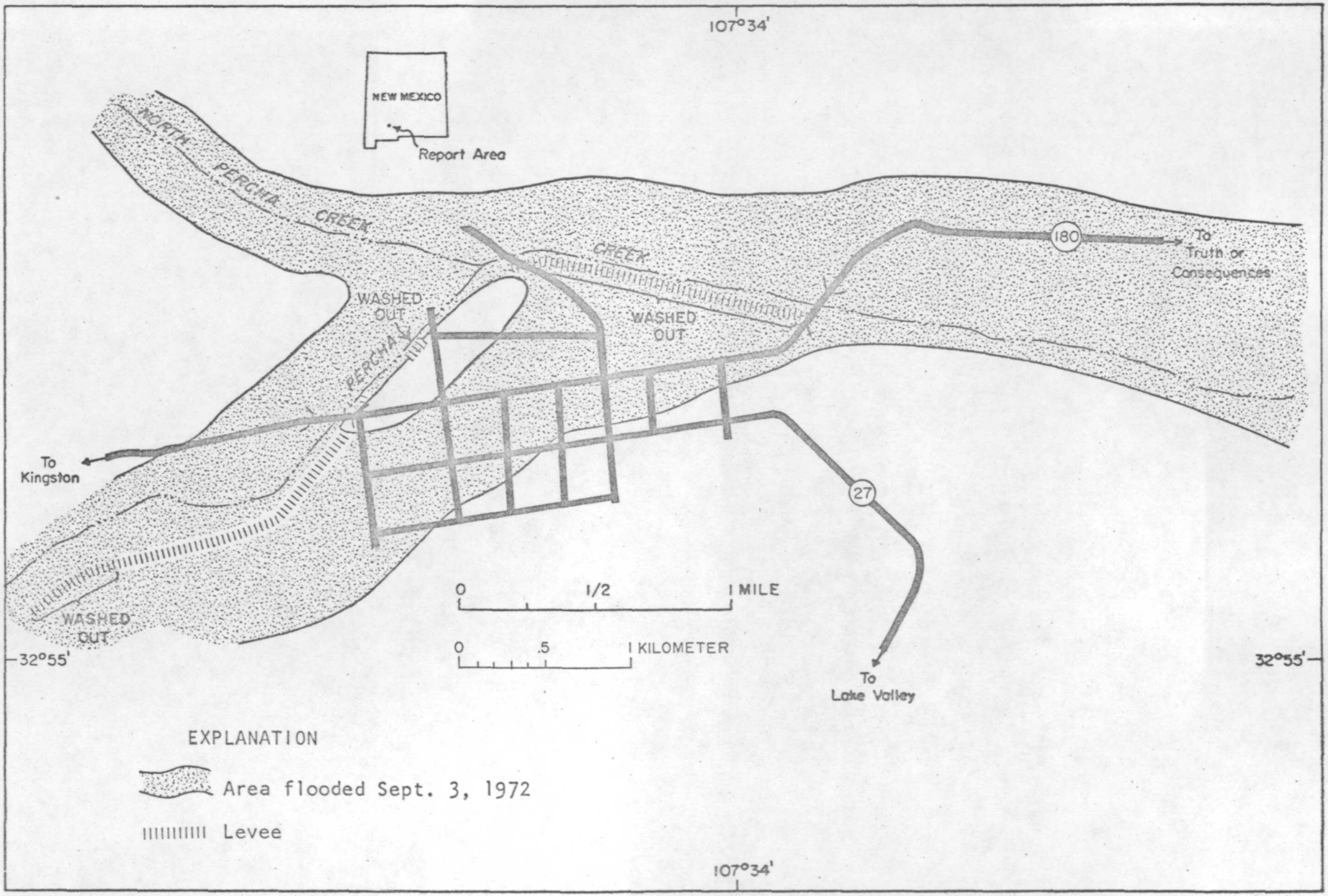

Figure 2.--Location of flooded area in Hillsboro (modified from map by U.S. Army Corps of Engineers).

Telephone and electrical utilities in Hillsboro were severely damaged. Flooding and sediment deposition damaged 11 business establishments and caused destruction of inventories and equipment. Most of the streets in Hillsboro are improved dirt roads, and these were damaged by debris, sediment accumulation, and erosion. About 40 homes were damaged; some were completely destroyed. Household furnishings, automobiles, lawns, driveways, and landscaping were severely damaged. The downstream side of the east bridge on State Highway 180 in Hillsboro was damaged because of a cracked bridge floor beam that weakened the bridge deck. Abutments were eroded also. Because of the extensive damage to life and property in this small community, Hillsboro was declared a disaster area by Governor Bruce King and by President Nixon. The following table lists the major flood damage (U.S. Army Corps of Engineers, 1972, p. 7).

HILLSBORO

Description	Structural damage	Damage to contents	Total damages
Residential	$151,000	$145,000	$314,000 1/
Businesses	102,000	245,000	347,000
Public property	42,000	24,000	66,000
Flood control structures	40,000	-	40,000
Debris removal	30,000	-	30,000
Roads and bridges - State Highway 180 and bridge at Hillsboro	15,000	-	15,000
Subtotal			$812,000

RURAL

Agricultural - land, crops, and pasture	$ 3,800
Releveling irrigated land	2,000
Irrigation facilities	1,000
Fence replacement	5,300
Repair dikes on agricultural land	1,600
Cleamup work	2,500
Livestock, feed, farm equipment, and supplies	9,200
Sediment - reworking agricultural land	5,500
Indirect damages	3,100
County roads	500
Subtotal	$ 34,500
Total	$846,500

1/ Includes $18,000 in miscellaneous damages to fences, walls, landscaping, etc.

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