

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

PH0692841

FOR NPS USE ONLY  
RECEIVED DEC 5 1978  
DATE ENTERED JAN 25 1979

NATIONAL REGISTER OF HISTORIC PLACES  
INVENTORY -- NOMINATION FORM

SEE INSTRUCTIONS IN HOW TO COMPLETE NATIONAL REGISTER FORMS  
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

**1 NAME**

HISTORIC  
Blaisdell Slow Sand Filter Washing Machine  
AND/OR COMMON

**2 LOCATION**

STREET & NUMBER  
-Yuma Water Treatment Plant, North Jones Street  
CITY, TOWN  
Yuma  
STATE  
Arizona  
VICINITY OF  
CODE  
044  
CONGRESSIONAL DISTRICT  
3  
COUNTY  
Yuma  
CODE  
027

**3 CLASSIFICATION**

CATEGORY	OWNERSHIP	STATUS	PRESENT USE
<input type="checkbox"/> DISTRICT	<input checked="" type="checkbox"/> PUBLIC	<input type="checkbox"/> OCCUPIED	<input type="checkbox"/> AGRICULTURE
<input type="checkbox"/> BUILDING(S)	<input type="checkbox"/> PRIVATE	<input checked="" type="checkbox"/> UNOCCUPIED	<input type="checkbox"/> MUSEUM
<input type="checkbox"/> STRUCTURE	<input type="checkbox"/> BOTH	<input type="checkbox"/> WORK IN PROGRESS	<input type="checkbox"/> COMMERCIAL
<input type="checkbox"/> SITE	<input type="checkbox"/> PUBLIC ACQUISITION	<input type="checkbox"/> ACCESSIBLE	<input type="checkbox"/> EDUCATIONAL
<input checked="" type="checkbox"/> OBJECT	<input type="checkbox"/> IN PROCESS	<input checked="" type="checkbox"/> YES: RESTRICTED	<input type="checkbox"/> ENTERTAINMENT
	<input type="checkbox"/> BEING CONSIDERED	<input type="checkbox"/> YES: UNRESTRICTED	<input type="checkbox"/> GOVERNMENT
		<input type="checkbox"/> NO	<input checked="" type="checkbox"/> INDUSTRIAL
			<input type="checkbox"/> MILITARY
			<input type="checkbox"/> PARK
			<input type="checkbox"/> PRIVATE RESIDENCE
			<input type="checkbox"/> RELIGIOUS
			<input type="checkbox"/> SCIENTIFIC
			<input type="checkbox"/> TRANSPORTATION
			<input type="checkbox"/> OTHER:

**4 OWNER OF PROPERTY**

NAME  
Water Division, City of Yuma, Arizona  
STREET & NUMBER  
P.O. Box 912  
CITY, TOWN  
Yuma  
STATE  
Arizona

**5 LOCATION OF LEGAL DESCRIPTION**

COURTHOUSE,  
REGISTRY OF DEEDS, ETC.  
Yuma County Courthouse  
STREET & NUMBER  
168 South 2nd Avenue  
CITY, TOWN  
Yuma  
STATE  
Arizona

**6 REPRESENTATION IN EXISTING SURVEYS**

TITLE  
Yuma Crossing  
DATE  
National Register of Historic Places  FEDERAL  STATE  COUNTY  LOCAL  
DEPOSITORY FOR  
SURVEY RECORDS  
Heritage Conservation and Recreation Service  
CITY, TOWN  
Washington  
STATE  
D.C.

## 7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
<input type="checkbox"/> EXCELLENT	<input type="checkbox"/> DETERIORATED	<input checked="" type="checkbox"/> UNALTERED	<input checked="" type="checkbox"/> ORIGINAL SITE
<input checked="" type="checkbox"/> GOOD	<input type="checkbox"/> RUINS	<input type="checkbox"/> ALTERED	<input type="checkbox"/> MOVED DATE _____
<input type="checkbox"/> FAIR	<input type="checkbox"/> UNEXPOSED		

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### DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The Blaisdell Slow Sand Filter Washing Machine, invented by Hiram W. Blaisdell at the Yuma, Arizona, Waterworks circa 1902, constituted an early breakthrough in the development of machinery for the cleaning of sand filters used in the purification of drinking water. The machine in Yuma is the original prototype for Blaisdell's invention upon which he received seven patents and which was used in numerous locations in the United States in subsequent years.

The Blaisdell filter washing machine at Yuma consists of a gantry crane travelling on steel tracks mounted on the top of the walls of rectangular filter basins. This crane supports the entire machine, but most importantly it supports the washing chamber, the most significant portion of the machine. This washing chamber consists of a steel "box" about five feet wide, two feet deep, and six feet long which contains a four-foot rotating circular washing unit. In operation the "box" was sunk under the water of the filter to the surface of the sand and held in that position by electric machinery on the operating platform above. The washing unit within the "box" consists of a hollow axle and hollow head from which hollow teeth project from eight to eighteen inches downward into the sand at any desired depth.

Through the use of electric motors on the platform, all under the control of a single operator, the "box" could be raised or lowered and the platform could be moved back and forth across the filter, while the entire gantry crane could be moved up and down the long rectangular filter beds. As the washer "box" traveled across the surface of the sand filter beds, the hollow head and hollow teeth of the washing unit revolved slowly, stirring the surface of the sand mechanically. Water under pressure of 10 to 20 pounds per square inch was introduced through the axle to the hollow teeth and in fine jets stirred the sand by passing directly into it.

Two suction pumps connected with the top of the "box" then drew away slightly more water than was supplied through the axle and teeth. They drew away the dirt and impurities which were stirred and washed from the sand and discharged them through a flexible hose into a sewer trough at the north side of the filter bed. Because a small amount of water was drawn inward into the "box" from under its edges, none of the dirty water was allowed to escape into the filter chamber itself, for all was carried away into the sewer.

The "box," supported from the gantry, moved slowly ahead over the sand. The operator sat in a small operator's cabinet with convenient electric controls for all the machinery. The seat in the cabinet was of the type used in early twentieth-century theaters and motion picture establishments. A corrugated steel roof provided shade from the desert sun as well as the elements for the entire platform area with its operator's cabinet, controls, motors, pumps, and other machinery. Normally the Blaisdell filter washing machine at Yuma required four or five "runs" up or down a filter to clean it, thus taking a mere 45 minutes to wash one of the beds completely. An electric cut-off mechanism at the north end of the gantry crane allowed the washing machine to stop automatically at the end of a filter bed on occasions when the operator might be called away to do other work.

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Although the Blaisdell Slow Sand Filter Washing Machine at the Yuma Waterworks has not been used since 1954, it remains intact and in near operating condition at the present time. The aridity of the region, combined with minimal care from the employees of the Yuma Water Division, have served to preserve the machine in this high state. Even the oil can, grease bucket, and spare parts remain where they were left when the machine ceased normal operation two and a half decades ago. Although plans are under way for the construction of a new water treatment facility for the City of Yuma, officials in the Water Division plan to preserve the old Blaisdell Filter Washing Machine at the new plant.

# 8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW				
<input type="checkbox"/> PREHISTORIC	<input type="checkbox"/> ARCHEOLOGY-PREHISTORIC	<input type="checkbox"/> COMMUNITY PLANNING	<input type="checkbox"/> LANDSCAPE ARCHITECTURE	<input type="checkbox"/> RELIGION	
<input type="checkbox"/> 1400-1499	<input type="checkbox"/> ARCHEOLOGY-HISTORIC	<input type="checkbox"/> CONSERVATION	<input type="checkbox"/> LAW	<input type="checkbox"/> SCIENCE	
<input type="checkbox"/> 1500-1599	<input type="checkbox"/> AGRICULTURE	<input type="checkbox"/> ECONOMICS	<input type="checkbox"/> LITERATURE	<input type="checkbox"/> SCULPTURE	
<input type="checkbox"/> 1600-1699	<input type="checkbox"/> ARCHITECTURE	<input type="checkbox"/> EDUCATION	<input type="checkbox"/> MILITARY	<input type="checkbox"/> SOCIAL/HUMANITARIAN	
<input type="checkbox"/> 1700-1799	<input type="checkbox"/> ART	<input type="checkbox"/> ENGINEERING	<input type="checkbox"/> MUSIC	<input type="checkbox"/> THEATER	
<input type="checkbox"/> 1800-1899	<input type="checkbox"/> COMMERCE	<input type="checkbox"/> EXPLORATION/SETTLEMENT	<input type="checkbox"/> PHILOSOPHY	<input type="checkbox"/> TRANSPORTATION	
<input checked="" type="checkbox"/> 1900-	<input type="checkbox"/> COMMUNICATIONS	<input checked="" type="checkbox"/> INDUSTRY	<input type="checkbox"/> POLITICS/GOVERNMENT	<input type="checkbox"/> OTHER (SPECIFY)	
		<input checked="" type="checkbox"/> INVENTION			

SPECIFIC DATES     c. 1902

BUILDER/ARCHITECT     Hiram W. Blaisdell

STATEMENT OF SIGNIFICANCE

The Blaisdell Slow Sand Filter Washing Machine, the original example of which remains preserved at Yuma, Arizona, was an early breakthrough in the development of American machinery for cleaning sand filters used in the purification of domestic drinking water. The significance of this machine, invented just after the turn of the century and patented in 1903 and 1904, can best be understood in the context of the rise of water treatment in the United States and the history of Blaisdell's privately-owned waterworks at Yuma.

The years between 1890 and 1900 were marked by an increase in the knowledge about water purification technology and by the practical application of these methods to domestic water supply. The method of water treatment practiced by those American cities which chose to treat water in the mid-nineteenth century was known as slow sand filtration. By this method water was passed through sand at a rate generally no faster than three million gallons per acre daily. To purify more water in less time, however, a method known as mechanical filtration was developed in the second half of the nineteenth century. By this method higher volumes of water passed through the sand filters, but at the same time a coagulant, usually alum, was added to the raw water. This agent coagulated the impurities and allowed them to be removed more quickly. The mechanical filters were covered by patents and most often companies operating under these patents made private contracts with cities to treat municipal water supplies. Great debates were held among sanitary engineers over the merits of slow sand and mechanical filtration, with the result that by the turn of the century each was recognized as having its own particular merits and limitations.

The great increase in the use of filtration to purify domestic water supplies is shown by the dramatic rise in the number and size of such plants. In 1890 slow sand filters in America had a total area of only about an acre and a half, while within the decade this area had increased to some nineteen acres with a capacity of 57,000,000 gallons daily. The increase in the use of mechanical filters was no less striking, with approximately 20,000 square feet of these filters in 1890 increasing to 90,000 square feet in 1900. The trend toward increased water purification was only to continue at a rapid pace into the twentieth century.

While other areas of the country were developing sand filter technology, the citizens of Yuma were awaiting the establishment of a waterworks. Their hopes were raised and dashed several times before they received the facility for which they had been waiting for years.

## 9 MAJOR BIBLIOGRAPHICAL REFERENCES

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Black & Veatch, Consulting Engineers, Kansas City, Mo. Report on Water Supply, Treatment and High Service Pumping for Yuma, Arizona. n.p.: Black & Veatch/Consulting Engineers, 1972.

## 10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY .5 acre

UTM REFERENCES

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B                    
 ZONE EASTING NORTHING

C                    
 ZONE EASTING NORTHING

D                    
 ZONE EASTING NORTHING

VERBAL BOUNDARY DESCRIPTION

The area encompassed by this nomination includes the remaining northern slow sand filter bed and the Blaisdell Filter Washing Machine mounted over this bed within the Yuma Water Division water treatment plant at North Jones Street in Yuma, Arizona.

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE

STATE	CODE	COUNTY	CODE

## 11 FORM PREPARED BY

NAME / TITLE

T. Lindsay Baker, Program Manager

ORGANIZATION

History of Engineering Program, Texas Tech University

DATE

June 25, 1978

STREET & NUMBER

P.O. Box 4089

TELEPHONE

806-742-3593

CITY OR TOWN

Lubbock

STATE

Texas

## 12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL

STATE

LOCAL

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

SIGNATURE

*Dorothy H. Hall*

TITLE

DATE

11-29-78

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

*Charles W. ...*  
 DIRECTOR, OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION

DATE

1-25-79

**KEEPER OF THE NATIONAL REGISTER**

ATTEST:

*J. ...*  
 KEEPER OF THE NATIONAL REGISTER

DATE

1-24-79

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CONTINUATION SHEET Significance ITEM NUMBER 8 PAGE one

The first domestic water supply at Yuma came directly from the Colorado River, with many residents dipping water from the stream in buckets. Those individuals who could afford the luxury paid laborers to carry the buckets or containers of water to their homes. Traditional folklore in Yuma ascribes the improvement of this system to two Mexicans named Chono Lorona and Ramon Zapata, who formed their own water business by mounting a disused whisky barrel on a cart, placing a tap in the side of the barrel, filling it at the river, and then selling water to residents who had water barrels outside their homes or businesses. Similarly, Yuma Indians were hired to fill the barrels at homes at a fee of 25¢ per barrel, and many residents had "favorite Indians" who kept their barrels filled at all times.

From the outset the heavy sediment of Colorado River water caused problems to consumers. Frequently it amounted to as much as one-fifth of the volume. The solution was to settle out the sediment. Thus water users often had two or three barrels at home, so that at least one would have "settled" water. The saloons, which were major water users, solved the problem of silt-laden water by "aerating" it overnight in shallow pans, from which cool, clear water was drawn away each morning in Mexican clay pitchers.

As early as 1877 the city council of Yuma granted a franchise to a private company to supply the town with water. It agreed to give the firm a franchise and two plots of land, provided that it laid a certain amount of water mains and actually furnished water within a year, but the company failed. As the local newspaper reported, the citizens "preferred the present method of hauling it from the river in carts."

In the same year, 1877, the Southern Pacific Railroad crossed the Colorado River into Arizona at Yuma, and within months the railway company had built its own private waterworks for the supply of its locomotives and yards. This system also served a limited number of private consumers in the town. The company erected a still-standing large four-basin silting reservoir near the river and railway tracks, and laid a wooden main to connect the reservoir with its yards and roundhouse on Madison Avenue. The company sold water to private users and to the county courthouse for a decade and a half, but these consumers constituted only a minority of the population of Yuma, most of whom continued to rely on hauled river water.

Again hopes were raised for the supply of domestic water to Yuma in 1889, when the Arizona Territorial Legislature appropriated \$10,000 for the construction of a waterworks to serve the Yuma Territorial Prison. The local press acclaimed the piece of legislation, which would, the editor believed, provide for a waterworks "of sufficient capacity to supply the town of Yuma with a never failing supply of good, pure water." That supply, however, was still three years away, for this system was only large enough to supply the prison.

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The construction of a waterworks at Yuma awaited the capital and ingenuity of Hiram W. Blaisdell, a mining and civil engineer from Massachusetts who moved to Yuma in late 1884. Soon Blaisdell became one of the most important entrepreneurs in the Yuma Valley, investing his monies and abilities in irrigation ventures, mining properties, and even an experimental orchard which introduced citrus culture to the Yuma area.

Construction of the first waterworks at Yuma was begun in August 1892 with the return of Blaisdell from an extended trip to the East and to San Francisco, where he purchased or contracted for all the equipment necessary for the building of the water system. The waterworks originally consisted of a pumping plant near the river, a system of mains, and a water storage reservoir. Connected with it was an electric light plant for the town. The pump had a 17-inch plunger with a 42-inch stroke which was connected directly to a Fitchberg Corliss steam engine. The engine was powered by a Whitney 72-inch horizontal boiler fueled by mesquite wood. Water was pumped from the river to a 26-inch main and then to a 24-inch redwood stave main which ran about two miles to the reservoir located near the site of the present-day intersection of 5th Avenue and 14th Place. Along the route of the water main Blaisdell had orange, pepper, and palm trees planted which he later turned over to the city. Water taps were placed in the main along this route specifically for watering the trees. Blaisdell's efforts are remembered today through the name still retained by "Orange Avenue" in the city.

The Blaisdell water system provided consumers with two types of water: silted water which was comparatively clear, and unsilted water which in reality was muddy and used only for such purposes as lawn watering and irrigation. The demands of the water users for higher quality water led to Blaisdell's development of the filter washing machine, as improved water quality was possible only through filtration.

Thus in the years at the turn of the century, Hiram W. Blaisdell, who was already engaged in such varied activities as running his waterworks and an electric light plant, serving as a director of irrigation companies and mining firms, and experimenting with citrus trees, also began tinkering with machinery for washing sand filter beds. At the time it was necessary when cleaning sand filter beds to drain off all the water from the surface of the filter and to send in workmen with shovels and wheel barrows to scrape off a thin layer of sand from the surface, replace the sand or clean it and replace it, restore the water level in the filter beds, re-start at slow rates of filtration, and finally restore the filter to normal operation after the filter had again "ripened" enough to run at normal rates. Several days were consumed for the cleaning of the filter in just one bed.

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Having previously turned his mind to inventing such machinery as conveyors and equipment for handling tailings at mines, within a few months Blaisdell had devised a machine which successfully cleaned the slow sand filter beds at his waterworks. Having developed the machinery, in 1903 and 1904 he took out seven U.S. patents to protect it, and within a short time he established the Blaisdell Filtration Company of Los Angeles to market the device. The machine was adopted for use in numerous locations in the United States during the early years of this century, including such locations as Wilmington, Delaware; El Centro, California; Pittsburgh and Philadelphia, Pennsylvania; and Rochester, New York.

The original Blaisdell Filter Washer remained in service at the Yuma Waterworks for half a century. During this time the ownership of the system changed hands several times, finally passing to the Arizona Water Company in 1954, when the use of the washer was discontinued. Then in 1966 the system was purchased by the City of Yuma, the present owners. Since its use ended, the Blaisdell Filter Washer has stood over a disused slow sand filter bed at the north side of the water treatment plant. The machine has received limited maintenance from the Water Division employees, but remains very well preserved. With a limited effort it could be returned to operating condition.



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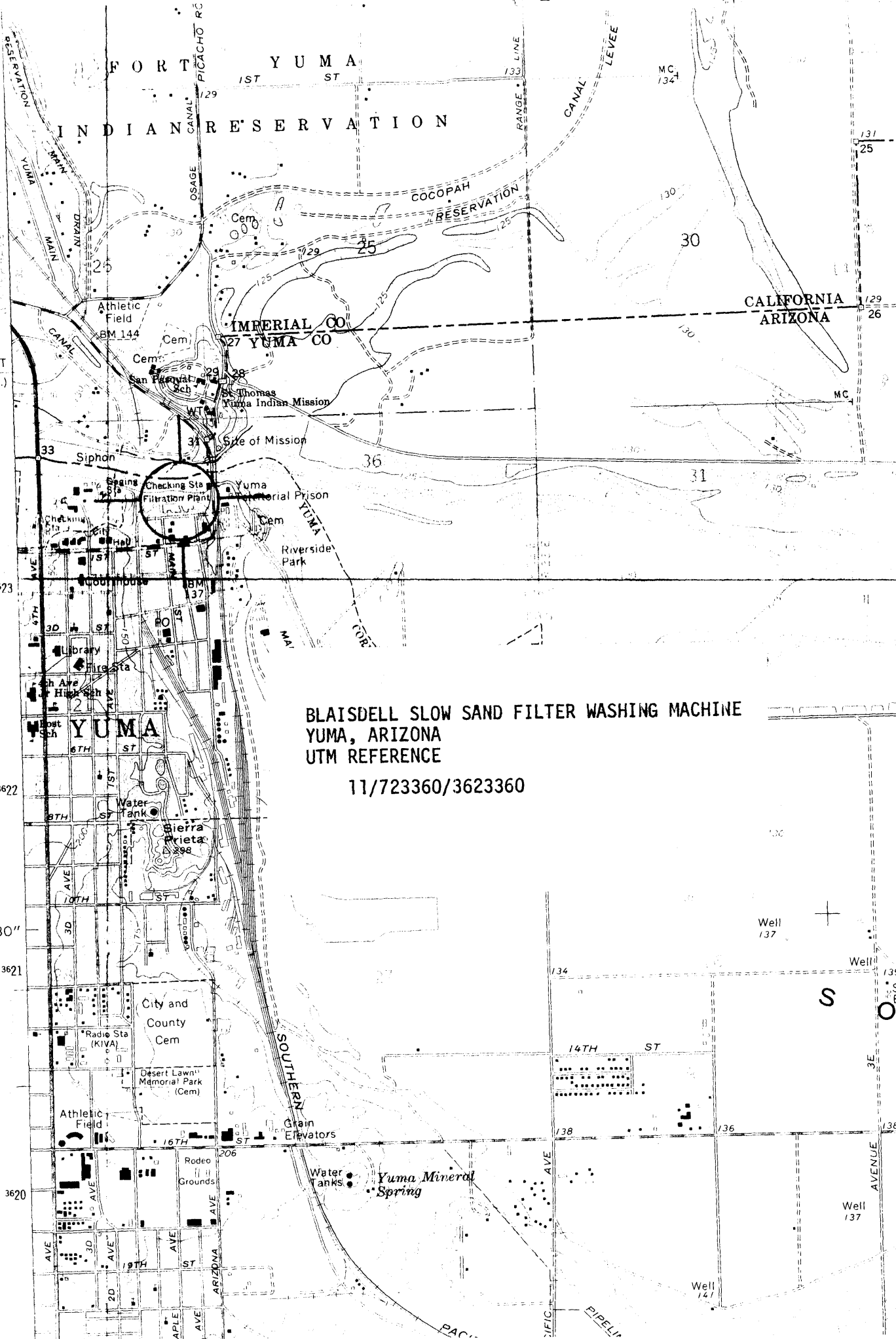
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**BLAISDELL SLOW SAND FILTER WASHING MACHINE**  
**YUMA, ARIZONA**  
**UTM REFERENCE**  
**11/723360/3623360**

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