WELLTON-MOHAWK IRRIGATION SYSTEM, PUMPING PLANT
NO. 3
South of Interstate 8
Wellton vicinity
Yuma County
Arizona

HAER AZ-68-C
AZ-68-C

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
INTERMOUNTAIN REGIONAL OFFICE
National Park Service
U.S. Department of the Interior
PO Box 728
Santa Fe, NM 87505

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Wellton-Mohawk Irrigation System, Pumping Plant No. 3

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Location: Pumping Plant No. 3 is located at the terminus of the Wellton-Mohawk Canal, Wellton vicinity, Yuma County, Arizona. Interstate 8 bounds the plant approximately one-half mile to the north. The Mohawk Canal begins at the afterbay of Pumping Plant No. 3.

The pumping plant lies within the NE 1/4 of the NW 1/4 of the SE 1/4 of Section 16, Township 9 South, Range 19 West, on the 1965 Wellton, Arizona, 7.5-minute U.S. Geological Survey (USGS) quadrangle (photorevised 1982). Universal Transverse Mercator Coordinates: Zone 11, N 3614736 E 761353.

Present Owner: U.S. Department of the Interior, Bureau of Reclamation
Lower Colorado Regional Office
Boulder City, Nevada

Present Use: Pumping Plant on the Wellton-Mohawk Canal.

Significance: Construction of the Wellton-Mohawk Division of the Gila Project began in 1949 and was essentially completed in 1957. With the completion of the irrigation system, Colorado River water was delivered to previously arid lands in the lower Gila River valley. The Wellton-Mohawk Canal was the first of several main canals constructed in association with the Wellton-Mohawk Division of the Gila Project. Engineers with the U.S. Department of the Interior, Bureau of Reclamation designed the gravity-fed system to carry water up the Gila River valley, opposite the river's flow. This required the construction of three pumping plants along the Wellton-Mohawk Canal to lift the water approximately 170'. Pumping Plant No. 3 is an integral part of the Wellton-Mohawk irrigation system and is eligible for listing in the National Register of Historic Places under Criteria a and c (Thompson and Sterner 2005:106). It is eligible under Criterion a for its role in regulating the flow of Colorado River water in the canals for distribution to lands under cultivation. The pumping plant is a major feature on the system and is significant under Criterion c for its design and operational characteristics.

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Date: September 2006

I. PHYSICAL HISTORY

See AZ-68-A for information pertaining to the physical history of Pumping Plant Nos. 1–3.

II. CONSTRUCTION OF PUMPING PLANT NOS. 1, 2, AND 3

Please refer to AZ-68-A for a chronology of construction and discussions of pumping-plant operations and modifications to the structures.

III. ARCHITECTURAL AND ENGINEERING INFORMATION

Pumping Plant No. 3, located at the terminus of the Wellton-Mohawk Canal, is one of three pumping plants in a series that has a combined lift of about 170' (Figure 1). The Mohawk Canal begins at the discharge side of Pumping Plant No. 3. Seven pumps (four indoor, three outdoor) draw water from the canal forebay. The water is lifted about 55' in elevation then released into the Mohawk Canal through five discharge pipes. Like the two other pumping stations, the plant structure consists of three levels: an intake level, a pump-room level, and a motor-room level. A wing adjacent to the motor room houses the control room that is used to operate and monitor the pumping units on-site.

The pumping plant is a concrete structure with a generally L-shaped plan. The two uppermost levels of the plant measure 127'-4" x 30'-4" in plan with a wing that forms an "L" that measures 41'-0" x 17'-0". The intake level, or substructure, measures 127'-4" x 50'-4".

The lower structures that lie below grade are constructed of reinforced concrete. The superstructure, which makes up the motor-room level, is constructed of structural steel framing with reinforced-concrete walls. As originally constructed, the roof consisted of a wood plank decking, overlaid with insulation board and topped with four-ply, coal-tar-felt built-up roofing (Dayton 1953:4). As part of the periodic maintenance schedule, WMIDD workers have replaced the outer layer with modern roll-roofing material (Kenneth Baughman, personal communication 2005).

The following sections describe the plant interior and exterior.

A. Description of Intake Level

The intake level lies below grade and is constructed of reinforced concrete. There are four intake structures that allow water in the canal forebay to enter the plant system. The number of intakes corresponds to the number of pumping units in the plant. A 24"-wide concrete pier stands in the center of each intake

opening. These four piers support the pump-room floor above. Precast-concrete suction tubes with 90° bends extend from the rear of the intake structures to allow water to be drawn up by the pumps.

Surrounding the intake structures on the south, west, and north are a series of compartments with reinforced-concrete interior walls and concrete floors. The compartments are connected by openings and are known collectively as the subbasement. The compartment along the west wall serves as an air duct for transferring conditioned air from the evaporative-cooling system to the pump and motor rooms via floor grates. The subbasement floors are sloped to allow collected water to flow into floor drains. A drainage sump is located near the north wall of the subbasement structure. Ladders provide access to the subbasement.

B. Description of Pump-Room Level

The pump-room level lies below grade and is constructed of reinforced concrete. The floor is finished concrete. Pumping Plant No. 3 has four indoor, vertical-shaft, centrifugal-type pumping units manufactured by the Worthington Pump and Machinery Company. Each pump has a capacity of 226 cubic feet per second (cfs) and is connected to a discharge pipe that channels water to the afterbay. The pumps are separated by load-bearing, reinforced-concrete partitions that extend from the floor to the ceiling. (Note: Similar to the other pumping plants, this site has three outdoor, vertical turbine-type pumping units. Each unit is rated at 55 cfs and is powered by a 450-horsepower [hp] electric motor.)

There are two power distribution cabinets along the east interior wall. Two concrete staircases—located along the west wall directly across from Units 1 and 4—lead to exterior doors that provide access to the operating deck above the intakes.

Immediately south of the pumps is the service-bay area that houses a battery bank and transformer that supply direct current power to the control equipment and emergency lighting. The vacuum pump for Priming Unit 1 is mounted on the floor adjacent to the concrete partition that separates the service-bay area from Unit 1. Two ventilation fans associated with the evaporative-cooling system are located along the east wall of the service bay. There is a sump pump along the north wall on this level for pumping water from the subbasement to the forebay.

Access between the pump-room and motor-room levels is by way of two concrete stairways: one is located in the northwest corner of the plant structure, the other in the northwest corner.

C. Description of Motor-Room Level

The motor-room level sits above grade and has a steel-frame construction with precast, reinforced-concrete walls. The floor is finished concrete. There are six pairs of steel columns along the length of the motor-room level. Five pairs are evenly spaced, set 19'-0" on center along the portion of the building that

houses the motors. Each pair of columns supports a steel I-beam. These primary beams join smaller, steel secondary beams that run perpendicular to the larger beams. The primary and secondary beams support the wood-plank roof deck. The reinforced-concrete walls of the superstructure are anchored to the steel columns and the ends of the secondary support beams. Construction crews cast the walls on-site in sections, raised them into place, then anchored them to the steel frame.

The main entrance to the motor room is through the large, folding double doors on the south side of the plant. Just inside the doors is the service bay, which measures about 40' x 30' in plan. The service bay flows uninterrupted into the area where the electric motors for Pump Units 1–4 lie in a line from south to north. Each synchronous pump motor is rated at 1,850 hp. All four units were manufactured by the Electric Products Company of Cleveland, Ohio. The motors are original.

On the motor-room level of Pumping Plant No. 3 is a three-motor, floor-controlled, overhead traveling crane capable of hoisting up to 25 tons. The hook travel on the trolley hoist is 35'-0". Maintenance crews use the crane for removing a motor when servicing a pump. The crane operates on a runway above the motor floor that travels the length of the motor room. Two steel beams, each running the length of the building and attached to the steel columns, provide support and act as a track for the crane bridge. The trolley hoist has a variable-speed, 20-hp motor. The trolley is driven by a 2-hp motor, and a separate motor drives the crane bridge along the runway. Crane operation is controlled from the floor using pendant cords suspended from the controllers. A walkway runs the entire length of the bridge, providing access to the drive mechanism and trolley. The walkway is accessible from a ladder located at the north end of the motor-room floor. The Craneveyor Corporation of Los Angeles, California, was awarded the contract to manufacture the crane assembly for $13,843 (Dayton 1953:III).

D. Description of Control Room

The control room is located off the motor room in the wing portion of the superstructure and contains the switchgear for operating the pumps and motors and other equipment for providing instrumentation and metering data (Dayton 1953:5). The wing that houses the control room is rectangular in plan and measures 41'-0" x 17'-0". A reinforced-concrete interior wall with double doors separates the control room from the service bay. The sash-type doors have a glazed upper section. Two steel I-beams, each about 16' long, are attached to the east and west interior walls of the control room, just beneath the ceiling. Shorter lengths of steel I-beams are bolted perpendicularly to the primary beams, forming a grid to support the wood-plank roof deck.

Metal cabinets house the switchgear that controls the motors and pumping units at the plant. All of the switchgear is original (Kenneth Baughman, personal communication 2005).

E. Description of Exterior, East Facade

Metal trash racks cover the intake to the indoor pumping units and prevent plant matter and other debris from interfering with pumping operations. Maintenance crews clean the trash racks from the concrete operating deck above the intake to the indoor pumping units.

Stop-log slots, covered by metal grates, are found on the concrete operating deck above the trash racks. As originally designed, 6" x 6" timber stop logs were used to seal off the pump suction tube opening when a pumping unit was taken out of service for maintenance, repair, or inspection. In the 1970s, the WMIDD fabricated aluminum stop logs resembling large doors to block the flow of water into the suction tube openings (Mages et al. 1978:4).

Six windows are in use along the east facade, or intake side, of the plant superstructure. There are four multipane, metal-frame industrial windows on the motor-room level and two windows of identical type on the pump-room level. Each window is 4'-1" high x 12'-9" wide. Four louvered vents, each of which measures about 2' x 2', are in place directly beneath the roof line.

There are two entrances to the pump room, one on either side of the industrial windows. Exterior access to these doors is by means of a concrete operating deck above the trash racks. There are three, three-pane, metal-frame windows on the east facade of the control-room wing. Each window measures 4'-1" high x 5'-1" wide. A small, louvered vent is in use on the east facade of the control-room wing, at the pump-room level. The two large, louvered vents located above the grade line on the control-room wing are now part of the evaporative-cooling system and are no longer visible.

There are three vertical turbine-type pumping units adjacent to the forebay near the north end of the pumping plant. Each outdoor unit has a capacity of 55 cfs and is powered by a 450-hp electric motor. The pumps lift water about 55' from the canal forebay to the canal afterbay through a single underground discharge pipe.

F. Description of Exterior, North Facade

There is a single multipane, metal-frame window on the north facade of the superstructure at the motor-room level. The window measures 4'-1" x 12'-9". A louvered vent is in place above the window and just below the roof line. The vent is about 2' x 2'. There is a three-pane, metal-frame window on the north facade of the control-room wing that measures 4'-1" x 5'-1".

G. Description of Exterior, South Facade

The main folding double doors on the south facade of the plant provide access to the motor-room level and are made of metal with a divided, glazed section. Each door is 17'-0" high x 7'-0" wide. There is an approximately 2' x 2' louvered vent above the doors and below the roof line. On the east end of the south facade there is a metal door with a glazed section that serves as an entrance to the control room.

H. Description of Exterior, West Facade

Along the west facade on the motor-room level are six multipane, metal-frame industrial windows. Five of the windows are 4'-1" high x 12'-9" wide. The sixth window, located near the south end of the west facade, measures 4'-1" x 8'-6". Four louvered vents are in use and are positioned high on the exterior wall just below the roof. Each vent measures approximately 2' x 2'.

I. Description of Afterbay Section

At Pumping Plant No. 3, water is lifted from the canal forebay about 55' in elevation and then discharged into the afterbay. The afterbay section consists of five discharge channels: four for the discharge pipes connected to the indoor pumping units and one for the discharge pipe associated with the three outdoor, turbine-type pumps. A concrete deck with four hydraulic gate-check cylinders sits atop the discharge channels. Each hydraulic gate check is linked to a flap gate and prevents the flap gate from slamming shut when the pump corresponding to that discharge pipe is not in operation.

Stop-log grooves, covered by metal grates, are found on the concrete deck of the afterbay structure. Initially, WMIDD personnel used 6" x 6" timber stop logs to seal off the discharge openings in the afterbay structure so that they could service the flap gates. Beginning in the 1970s, the WMIDD fabricated aluminum stop logs resembling large doors to block the flow of water, allowing maintenance crews to service a flap gate while the others are in operation (Mages et al. 1978:4; Reclamation 1952:131).

J. General Description of Plant Exterior

The grade line around the plant superstructure varies. It generally slopes upward along the north elevation toward the outlet side. On the south side of the plant, the ground elevation is level with the motor-room floor to facilitate the transport of large equipment through the folding double doors. The service yard around the pumping plant has a bituminous surface, and the side slopes are sparsely covered with desert vegetation to minimize the effects of erosion.

K. Current Condition of Plant

WMIDD employees perform routine maintenance and cleaning at Pumping Plant No. 3. The interior and exterior are well maintained and in good condition. The plant has been in service for over 50 years and the concrete structures (e.g., walls and floors) show signs of normal surface deterioration. Nevertheless, the concrete structure is in satisfactory condition.

IV. REFERENCES CITED

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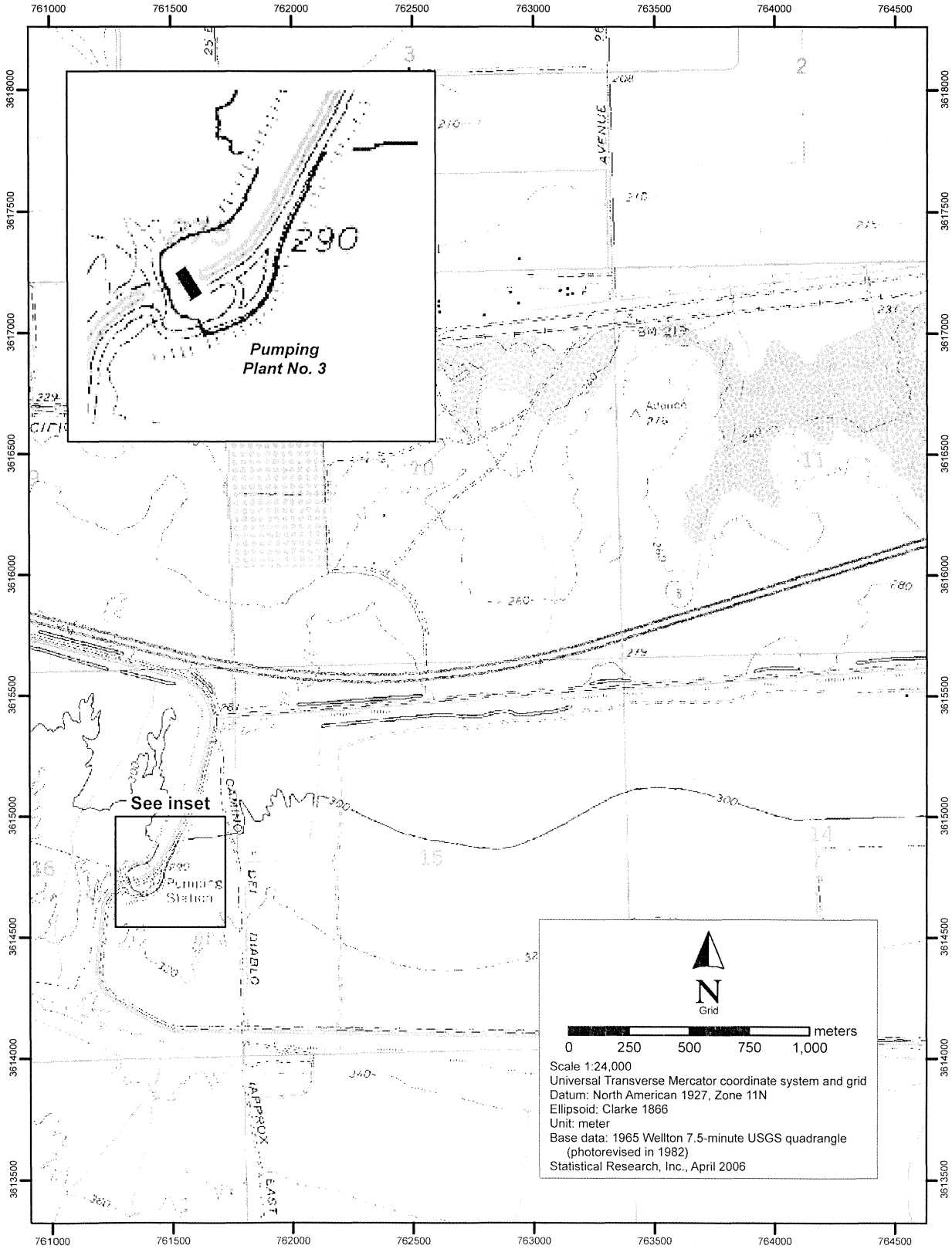

Figure 1. Project location (1965 Wellton, Arizona, 7.5-minute USGS quadrangle [photorevised 1982]).