Reactivation of wells for research into responses of mule deer to experimental manipulation of water sources in Mojave National Preserve

Five wells have been selected for reactivation as part of a research project into mule deer response to artificial water. The research proposal is available at

http://www.nps.gov/moja/naturescience/upload/kstewart%20mojave%20proposal.pdf

These wells are Gold King, Petit, Government Holes - East, Eagle, and Hogaboom as shown in Figure 1. As an option there is a sixth well (Government Holes - West) that maybe reactivated in place of or in addition to Government Holes – East. The final decision on which of the two Government Holes wells to reactivate has not been made. The work to be accomplished is to repair and install windmills, pipelines, storage tanks, and troughs so that year around reliable surface water will be available to mule deer at these locations. Work needed is described as follows for each well.



Figure 1. Wells to be reactivated for mule deer research

Gold King

Gold King has an existing windmill tower erected over a metal-cased well. Mojave National Preserve staff measured the depth of this well at 134 feet and water at 42 feet below ground surface (BGS), for a saturated thickness of 92 feet. The casing is presently

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open at the surface. There are two storage tanks at this site and one of the tanks appears to be in good shape. This well casing collapsed a few years ago and is obstructed at a depth of about 134 feet. Total well depth is known to be at least 156 feet BGS. The USGS reported measuring this well in August of 1981 with depth of the well as 175 feet BGS and the depth to water at 41.64 feet BGS. The USGS reported the elevation of this well as 4,860 feet above sea level.

Work Needed – The existing casing is approximately 8 inches in diameter. A 6 inch casing will be inserted on the inside of the existing casing to a depth of 156 feet and a cylinder, steel pipe and rod lowered to below the static water level. A windmill will be attached onto the existing tower and connected to the pipe and rod. The existing storage tank appears to be in good shape but it may need to be patched, a trough installed, and a pipe laid between the storage tank and trough. A float valve will be installed on the trough and adjusted for the proper water height in the trough.



<u>Petit Well</u>

Petit Well is on the east side of Black Canyon Road just north of the intersection with Wild Horse Canyon Road. Mojave National Preserve staff measured water at 5 feet BGS at Petit well and depth at 90 feet BGS in the spring of 2008. The USGS reported measuring the depth to water at 6.82 feet BGS in this well in September of 1981 but did



not report a depth for the well. This well could be activated by repairing the windmill and lowering a polyethylene storage tank down inside the existing corrugated metal tank. The USGS reported the elevation of this well as 5,270 feet above sea level.

Work Needed – This windmill needs a new tail spring, Pitman rod, platform, oil, brake handle, brake wire, and leathers for the cylinder. A polyethylene storage tank will be fit inside the existing corrugated metal tank and piped from the windmill riser. Approximately 400 feet of flexible pipe is needed to connect the storage tank to the trough. The trough will need a new float valve, a cover built, cleaned and drained.

<u>Government Holes - East</u>



The windmill tower at Government Holes –East sits over an open, hand-dug well several feet wide. This creates a hazardous condition where animals or humans can fall in. Mojave National Preserve staff measured the water level at 8 feet BGS in spring of 2008. Total well depth is 28 feet BGS. There is an existing concrete tank about 300 feet or so down gradient but there does not appear to be any pipe. The USGS has data on this well starting in 1917. According to the USGS, this well is 30 feet deep. The USGS recorded the water levels as 15 feet BGS in 1917, 26 feet BGS in 1953, 22 feet BGS in 1955, 26 feet BGS in 1960, and 9 feet BGS in 1981. The USGS reported the elevation of this well as 5,040 feet above sea level. Work at site this site includes repairing the windmill in keeping with the historic setting, covering the open hole, and installing a low profile polyethylene storage tank inside the existing corrugated metal storage tank.

Work Needed – This windmill needs a new bonnet, oil, Pitman rod, and leathers for the cylinder. A well cover needs to be constructed over the open pit well and the existing trees trimmed back. A low profile polyethylene tank will be lowered into the existing corrugated metal tank and piped to the existing concrete trough with about 300 feet of flexible pipe. The concrete trough needs to be patched, cleaned, and the float valve adjusted.

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Eagle Well

Eagle well is located in Lanfair Valley approximately 2 ¹/₂ miles east of Ivanpah Road. The USGS reported the elevation of this well as 3,980 feet above sea level. There is a



windmill tower at the site but no fan, head, or pipe. The well head is welded shut. USGS has data on this well starting in 1937. According to the USGS, Eagle well is 700 feet deep. The USGS recorded the water levels as 570 feet BGS in 1937, 518 feet BGS in 1980, 510 feet BGS in January 1980, 521 feet BGS on September 1980, and 510 feet BGS in November 1983. There are two corrugated metal storage tanks at the site in poor condition. The well and casing are at least 70 years old.

Work Needed – A polyethylene storage tank will be installed inside one of the existing corrugated metal storage tanks and piped to a trough. Flow from the storage tank to the trough will be by gravity controlled at the trough with a float valve. Water will be hauled to the site and pumped into the storage tank but not as part of this contract.

Hogaboom Well

The only structures remaining at the site of the Hogaboom (Vontrigger) well are three metal cased boreholes. These three cased boreholes are located approximately 500 to



1000 feet from Lanfair Road in Lanfair Valley. The USGS reported the elevation of these wells as 3,590 feet above sea level. Two of boreholes are open and the third borehole has a piece of metal welded over the top of it. This well, closest to Lanfair Road, is the one to be reactivated. The diameter of the casing is about 6 inches. The depth of the well was measured at 149.3' BGS and water was measured at 69.6 feet BGS in the spring of 2008. A complete windmill with a tower, propeller, rods and pipes will be erected over the 149.3 feet deep most westerly well.

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Work Needed – A new or used steel windmill tower will be erected over the existing metal cased well. A smaller diameter PVC or steel casing will be perforated through the saturated interval and inserted down the inside of the existing casing. A windmill will be installed on the tower and a cylinder, steel pipe, and rod lowered down to below static water level. The well riser will be connected by pipe to a polyethylene storage tank. The storage tank will then be piped to a trough equipped with a float valve.

Government Holes – West (optional well)

The only structure remaining at the site of the Government Holes - West well is a 6 inch diameter metal cased borehole that sticks up about 1 foot above the ground surface. A metal plate has been welded to the top of the casing and there is a hole in the side of the casing for checking the water level of the well. The cased borehole is approximately 2,300 feet to the west of the Government Holes – East well. The USGS reported the elevation of this well as 5,060 feet above sea level. The depth of the well was measured at 94.1feet BGS and water was measured at 16.6 feet BGS in the spring of 2008. The USGS reported measuring this well in the summer of 1981. They reported the depth of the well as 147 feet BGS and water was measured at 29.4 feet BGS. If the option to reactivate this well is exercised, then a complete windmill with a tower, propeller, rods and pipes will be erected over the 94 feet deep well.

Work Needed – If the option to reactivate this well is exercised, then a new or used steel windmill tower will be erected over the existing metal cased well. A smaller diameter PVC or steel casing will be perforated through the saturated interval and inserted down the inside of the existing casing. A windmill will be installed on the tower and a cylinder, steel pipe, and rod lowered down to below static water level. The well riser will be connected by pipe to a polyethylene storage tank. The storage tank will then be piped to a trough equipped with a float valve.

