Water System Facilities
Automation Projects, Phase II

Final Project Report
R18AP00226

City of Big Bear Lake, Department of Water and Power
41972 Garstin Drive / P.O. Box 1929
Big Bear Lake, Ca. 92315

October 30, 2020

1. **Recipient Information:**

Recipient Name:
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Project Name: Water System Facilities Automation Projects, Phase II

Assistance Agreement No.: R18AP00226

Date of Award: March 7, 2019

Estimated Completion Date: December 31, 2020

Actual Completion Date: September 30, 2020

2. Final Funding Information:	**Funding Amount:**
Non-Federal Entities: DWP	$132,596.53
Non-Federal Subtotal:	$132,596.53
Requested Reclamation Funding:	$ 74,000.00
Total Project Funding:	$206,596.53

3. **Project Summary:**

The DWP used the grant funds for the automation of multiple efficiency projects that modernized its existing infrastructure. First, the DWP upgraded and installed the Main Base Supervisory Control and Data Acquisition (SCADA) Server, which gave the DWP the ability to collect field data quicker and with more accuracy. The faster main base SCADA server provides substantially improved reporting and alarm abilities, allowing the DWP to respond expediently to problems and emergencies, preventing water loss. Next, the DWP equipped four of its existing pumping plant controls with new Variable Frequency Drive (VFD) units, including pressure sensors and water level monitoring controls. The Wells equipped with new VFD units include the Lassen Well #4, Sand Canyon Well, Middle School Well, and the Oak Well. Once the Wells were equipped with VFDs, the DWP installed new telemetry components at all four sites in order to more accurately control and monitor water use and fluctuations using the new technology. Additionally, the DWP staff installed a new six-inch well production meter at the Maple Well, a new four-inch well production meter at the McAllister Well, and a new

four-inch well production meter at the Lassen Bypass. Lastly, the DWP installed SCADA radios at the Seminole Well, Cherokee Well, RV Park Well, and Cedar Tank.

4. Final Project Description:

Components for the Water System Facilities Automation Project, Phase II include:

(1) Upgrade and installation of a Main Base SCADA Server
(2) Installation of four (4) VFDs and pump controls on the following Wells: Lassen Well #4, Sand Canyon Well, Middle School Well, and the Oak Well
(3) Installation of telemetry on the following four (4) Wells: Lassen Well #4, Sand Canyon Well, Middle School Well, and the Oak Well
(4) Installation of three (3) new well production meters including: one (1) six-inch well production meter on the Maple Well; one (1) four-inch well production meter on the McAllister Well; and one (1) four-inch well production meter on the Lassen Bypass
(5) Installation of four (4) SCADA radios at the following DWP facilities: Seminole Well, Cherokee Well, RV Park Well, and Cedar Tank

A map of the multiple project locations at DWP facilities is included in Attachment A.

In March 2020, the project scope was modified to remove the rebuild/upgrade of six (6) well production meters because DWP's Water Production Supervisor found that the existing well production meters are in good working condition and thus, unnecessary to replace them. We advised USBR of the modification and requested a budget amendment. USBR determined that an amendment is unnecessary because the final DWP cost share will be at least 50% at the end of the project.

In May 2020, DWP's Water Production Supervisor identified four (4) DWP facilities that needed SCADA radios and as such, radios were installed on the Seminole Well, Cherokee Well, RV Park Well, and Cedar Tank and included in this project.

5. Accomplishment of Project Goals:

The goals and objectives of the Water System Facilities Automation Project, Phase II are to enable the DWP staff to better manage:

(1) Irregular drops in reservoir water levels which are often indicative of a large-scale water loss
(2) Increases in water use which is commonly experienced on high-traffic holiday weekends
(3) Water production as compared to water consumption to isolate sources of water loss

(4) Improvements in energy efficiency
(5) Remote control and monitoring of each pumping plant based on system needs and aquifer water levels
(6) Accurate monthly production and water loss reports for California State mandated reporting

All of the project goals and objectives were accomplished.

6. Discussion of the Amount of Water Conserved, Marketed, or Better Managed:

A. Recipient's total annual average water supply in acre-feet per year:

Well Site	Technology Employed	Average AFY (2015-2019)
Lassen Well and Bypass	VFD, Telemetry, & Well Production Meter	50.93
Sand Canyon	VFD & Telemetry	55.80
Middle School	VFD & Telemetry	66.27
Oak	VFD & Telemetry	53.07
Maple	Well Production Meter	209.79
McAllister	Well Production Meter	55.55
Seminole	SCADA Radio	27.37
Cherokee	SCADA Radio	5.31
RV Park	SCADA Radio	11.00

B. Amount of water conserved, marketed, or better managed as a result of this project in acre-feet per year:

The water better managed as a result of this project is 535.08 AFY from 2015-2019. Prior to the installation of the VFDs, the well pumps would run at 100% capacity no matter how much water was in the water table. The VFDs enable the pumps to run more efficiently, adjusting the flows per water level in the wells. This allows us to pump the maximum amount of water without harming the aquifer or the pumping equipment.

The SCADA upgrades and radios enable the DWP to make decisions remotely and timely respond to water production issues and demands.

The well production meters compare water produced to water consumed for the area that the well supplies. This information enables the DWP to quickly determine potential water loss and its general location if more water is produced than consumed.

C. Describe how the amounts stated in response to 6.B were calculated or estimated:

1) **Describe the information/data being relied on to calculate/estimate the project benefits.**

   Monthly, the DWP measures the water produced in each of the wells. Using this data, we calculated the production (AFY) of the wells that received new technology. The water production in each of these wells is better managed because of the new technology.

2) **As appropriate, please include an explanation of any concerns or factors affecting the reliability of the data/information relied on.**

   No concerns.

3) **Attach any relevant data, reports or other support relied on in the calculation/estimate of project benefits, if available.**

   Not applicable.

D. Use of Conserved Water:

The better managed water allows the water the remain stored in the aquifers and in DWP's water supply for emergency needs such as fire suppression. This is important and beneficial because the DWP does not use imported water to meet its water demand. The Bear Valley Basin lies, on average, 6,750 feet above sea level at the eastern end of the San Bernardino Mountains in San Bernardino County. Importing water into the Bear Valley would be extremely costly and is not a viable option.

E. Future tracking of project benefits:

The DWP tracks the benefits of the installed VFDs, SCADA upgrades, and production meters by evaluating the water levels of the Wells every few months. Additionally, the new equipment and technology enhances the longevity of the pumping equipment.

7. Discussion of Amount of Renewable Energy Added:

Not Applicable to this project.

8. Describe how the project demonstrates collaboration, stakeholder involvement or the formation of partnerships, if applicable:

The project was made possible by the 50% funding match up to $75,000 provided by the Bureau of Reclamation.

9. Describe any other pertinent issues regarding the project:

No issues have been identified.

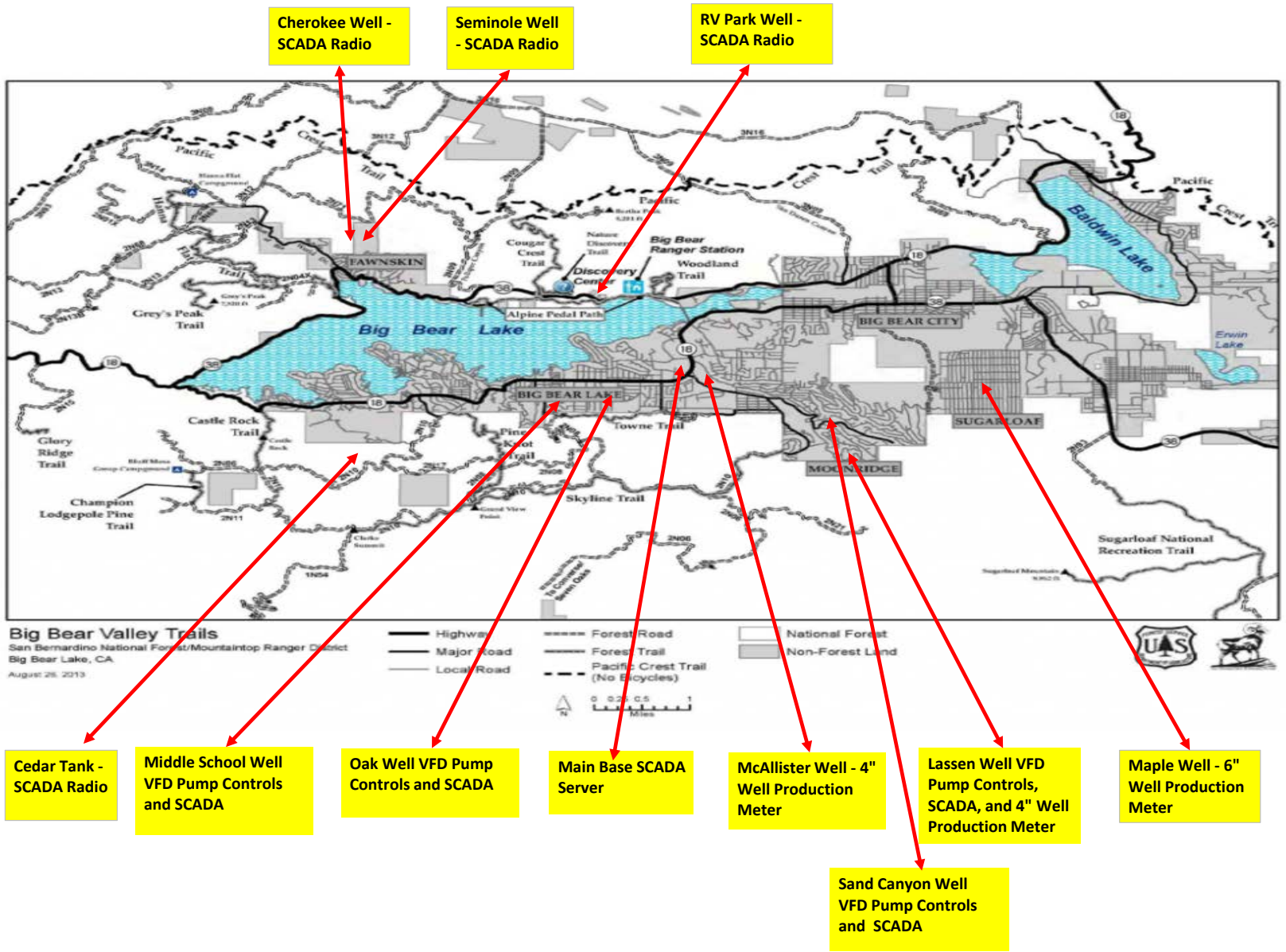
10. Feedback to Reclamation regarding the WaterSMART Program:

DWP's experience in applying for the Bureau of Reclamation WaterSMART grants has been great. We have found the Funding Opportunity Announcements are clear with detailed descriptions of the different grant opportunities. The Announcements provide examples of eligible projects and requirements. On the occasion that we need to ask additional questions, the USBR contacts have been responsive and helpful.

11. Attachments:

A. Map showing the multiple project locations at DWP's facilities
B. Project photographs
C. Table showing the total expenditures for the completed project

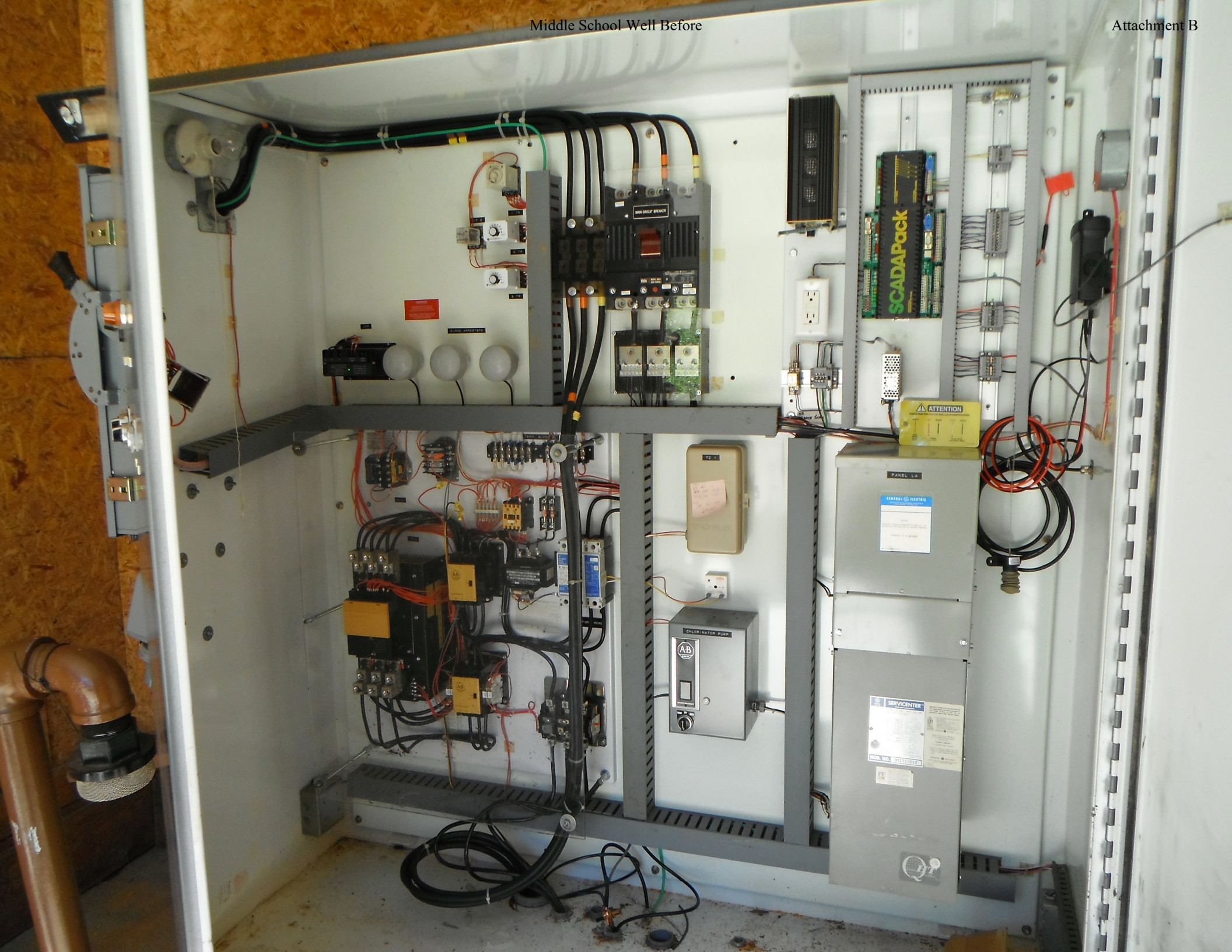
Attachment A



Lassen Well #4 Before

Attachment B


AQUAVAR
UTILITY CO. POWER
OFF
GENERATOR POWER
ON
OFF
ON

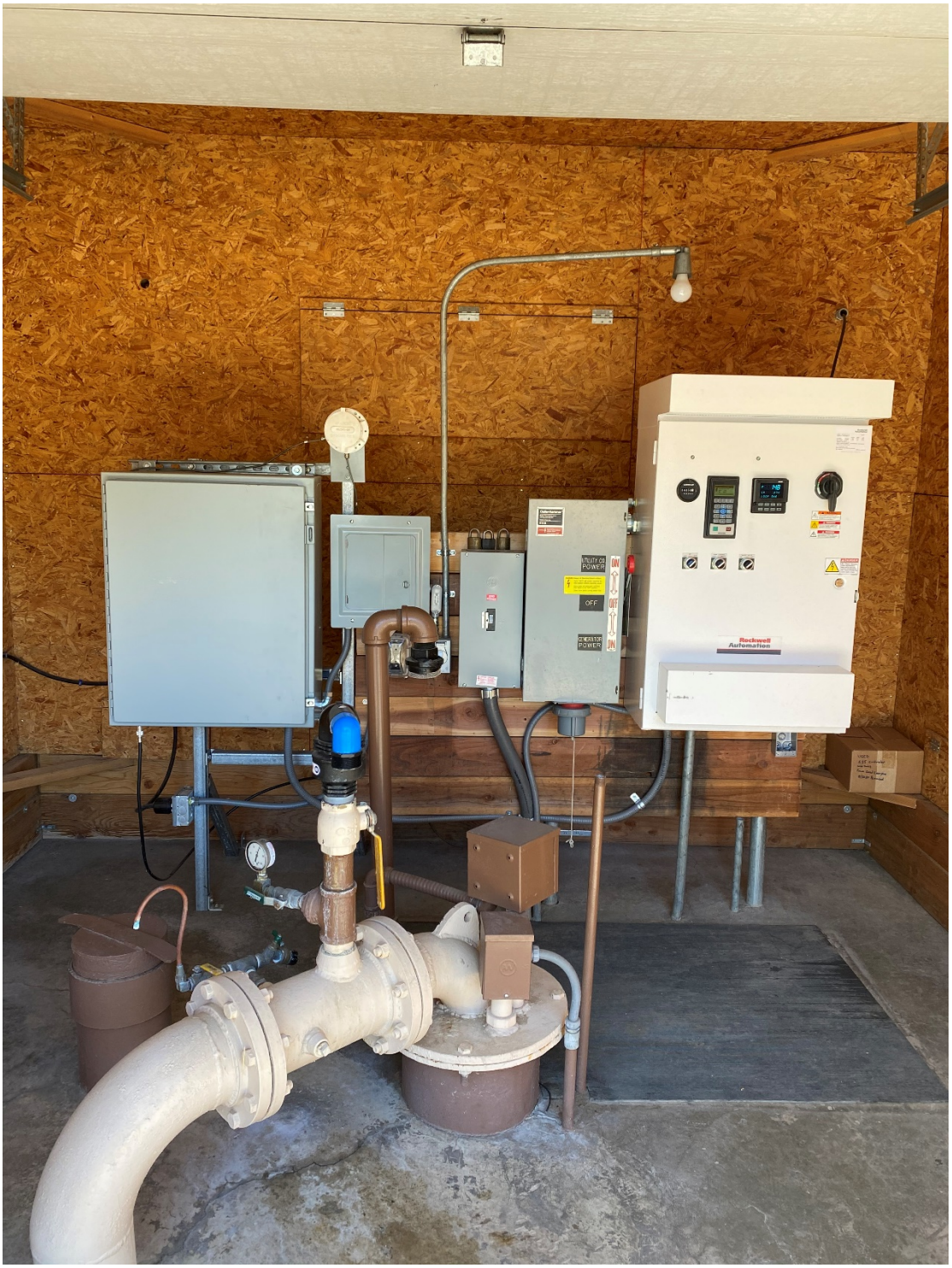

SCADAPack
ATTENTION
PANEL LA
SERVICENTER
CHLORINATOR PUMP

Oak Well Before

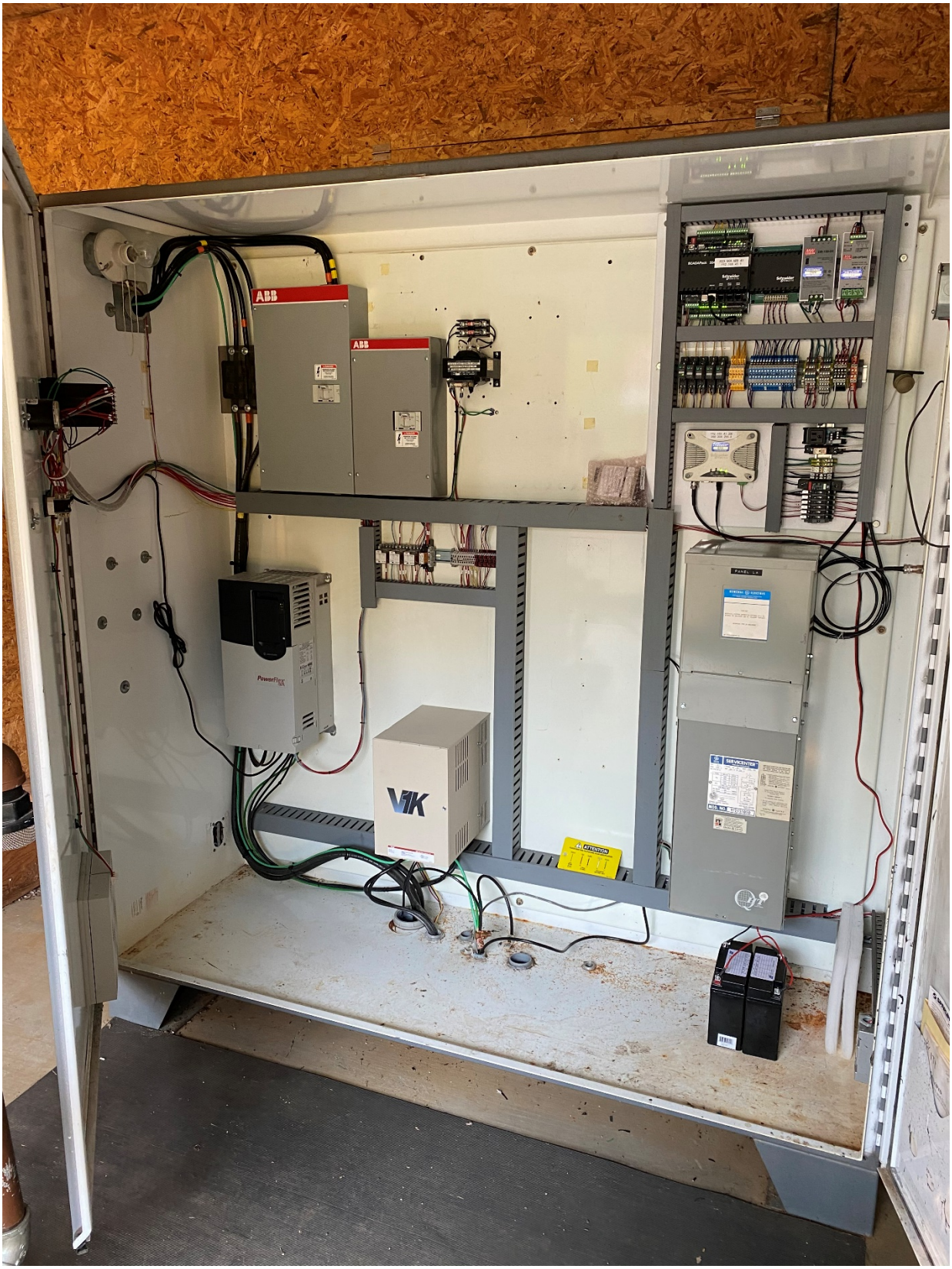
Attachment B

Lassen Well #4 After

Sand Canyon Well



Middle School Well After



Oak Well After

New Telemetry Panels

Maple Well Six-Inch Well Production Meter

Lassen Booster Four-Inch Well Production Meter

New SCADA Radios

Salaries and wages				
Fringe Benefits				
Equipment				
Supplies/materials				
	$3,271.29			$3,271.26
Four Inch Well Production Meter (McAllister Well)	2,551.55	1	each	2,551.55
Meter (Lassen Booster)				
Total Supplies/materials				**$8,927.09**
Contractual/construction				
VFD and Pump Controls	$16,139.00			$18,513.56
VFD and Pump Controls Sand Canyon Well	22,500.00	1	each	22,500.00
VFD and Pump Controls Oak Well	20,328.00	1	each	20,328.00
Subtotal VFDs and				**$87,365.56**
Main Base SCADA Server	$49,157.16	1	each	$49,157.16
	11,818.22			
SCADA Upgrade Sand Canyon Well	5,306.08	1	each	5,306,.08
SCADA Upgrade Oak Well	11,818.22	1	each	12,956.80
SCADA Radios-Seminole,				19,247.40
Subtotal SCADA Upgrades				**$110,303.88**
				$197,669.44
				$206,596.53
Indirect costs				
Total Project Costs				**$206,596.53**