City of Oak Ridge, Tennessee

PUMP STATION EVALUATION AND REPAIR PROGRAM

VOLUME I

APRIL 2012

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SECTION I

GENERAL

A. INTRODUCTION

Administrative Order No. CWA-04-2010-4772 was issued by the United States Environmental Protection Agency (EPA), dated September 27, 2010, to the City of Oak Ridge. The order was relative to NPDES permit No. TN0024155. The Order contained several major sections and numerous subsections. Section D deals with Management, Operation and Maintenance programs for the pumping stations and gravity sewers.

Section D IV (a) requires a pump station report within twelve (12) months after the approval of the Capacity Assessment Plan. That plan was approved May 3, 2011. Therefore, the pump station report is due no later than May 3, 2012. Other sections have other pump station related submittals, all of which have been submitted on time.

Information to be secured and submitted is as follows.

- Evaluation of the condition of each station and associated force mains
- Ability to operate at full design capacity
- Schedule of repairs for each station identified as in need of repair or, operating below design capacity
- Whether emergency (back up) electrical power is available
- Schedule for repair or replacement

The Pump Station Repair program as described in Section D IV (d) shall develop and implement a program to identify, prioritize, schedule, and repair pump stations on a timely basis once the station has deteriorated beyond the scope of the preventive maintenance programs. The operational and preventive maintenance programs have been developed and submitted to the EPA. The IMS programs as described in Section D are being implemented. The weekly preventive maintenance work orders began on January 2, 2012. During the first quarter of the activities, 598 weekly preventative maintenance work orders were generated and completed.

There are thirty-four (34) pumping stations in the Oak Ridge collection system regulated by NPDES No. TN0024155. Table I-1 identifies those stations by name, address, and type.

TABLE I-1
CITY OF OAK RIDGE
PUMP STATION EVALUATION AND REPAIR PROGRAM
STATION PUMP SUMMARY

MINI-SYSTEM	NAME	ADDRESS	TYPE
E13B	East Plant	151 Cairo Road	Wet well/Dry Well
E5B	Emory Valley	Emory Valley Rd/Baylor Dr. Int.	Wet well/Dry Well
E20	Marina	695 Melton Lake Drive	Submersible
E30	Gregory's	Melton Lake Drive-Parcel 94-D	Suction Lift
E28	Castlewood	Turnpike behind Castlewood Apts.	Suction Lift
E12	WATO	113 Eastburn Lane	Submersible
W29	Westview	129 Westview Lane	Suction Lift
W29	Williams	Williams Lane	Submersible
W29	Whippoorwill	104 Whippoorwill Lane	Submersible
E31	Palisades #4	40 Palisades Parkway	Suction Lift
E31	Palisades #3	28 Palisades Parkway	Suction Lift
E31	Palisades #2	18 Palisades Parkway	Suction Lift
E31	Palisades #1	10 Palisades Parkway	Suction Lift
E30	Riversway	120 Marywater Lane	Submersible
W26	Scarboro	Scarboro Rod	Wet well/Dry Well
W26A	Park Meade	1402 Edgemoor Road	Suction Lift
E29A	Rockbridge Green	117 Rock Bridge	Submersible
E29	Rolling Links	51 Rolling Links	Submersible
E29	Radisson Cove	Radisson Cove near Edgemoor Rd	Submersible
E29	Rivers Run	100 Rivers Run Blvd	Submersible
E13A	Warehouse Road	Warehouse Road	Submersible
E13A	Fairbanks	545 Oak Ridge Turnpike	Submersible

TABLE I-1 (continued)
CITY OF OAK RIDGE
PUMP STATION EVALUATION AND REPAIR PROGRAM
STATION PUMP SUMMARY

MINI-SYSTEM	NAME	ADDRESS	TYPE
E22	Emory Heights	Coe Road	Submersible
E7	Home Depot	Laboratory Drive	Submersible
W17	Oak Hills	Oak Ridge Turnpike/SR 58	Suction Lift
W20	Gum Hollow	197 Gum Hollow Road	Submersible
W8	Peach Orchard	105 Wedgewood Road	Submersible
W23	Summit Ridge	720 S. Illinois Ave.	Submersible
W27A	Southwood	East Southwood	Submersible
W20	Graceland	113 Graceland Road	Submersible
W26	Pump House Road	Pump House Road	Submersible
E3.7	Wolf Creek	108 Pavilion Drive	Submersible
W26A	Centennial Bluff	300A Centennial Bluff	Submersible
W22	West Outer	1129 W. Outer Drive	Submersible

The pumping stations are located in various drainage basins within the City's collection system and are designed to convey wastewater generated in these drainage basins to other (larger) pumping stations or, the interceptor sewers and, ultimately, to the wastewater treatment facility. There are two (2) major pumping systems within the City's main collection system. These systems collect and transport wastewater to interceptor sewers. The major pumping systems are given in Table I-2.

TABLE I-2

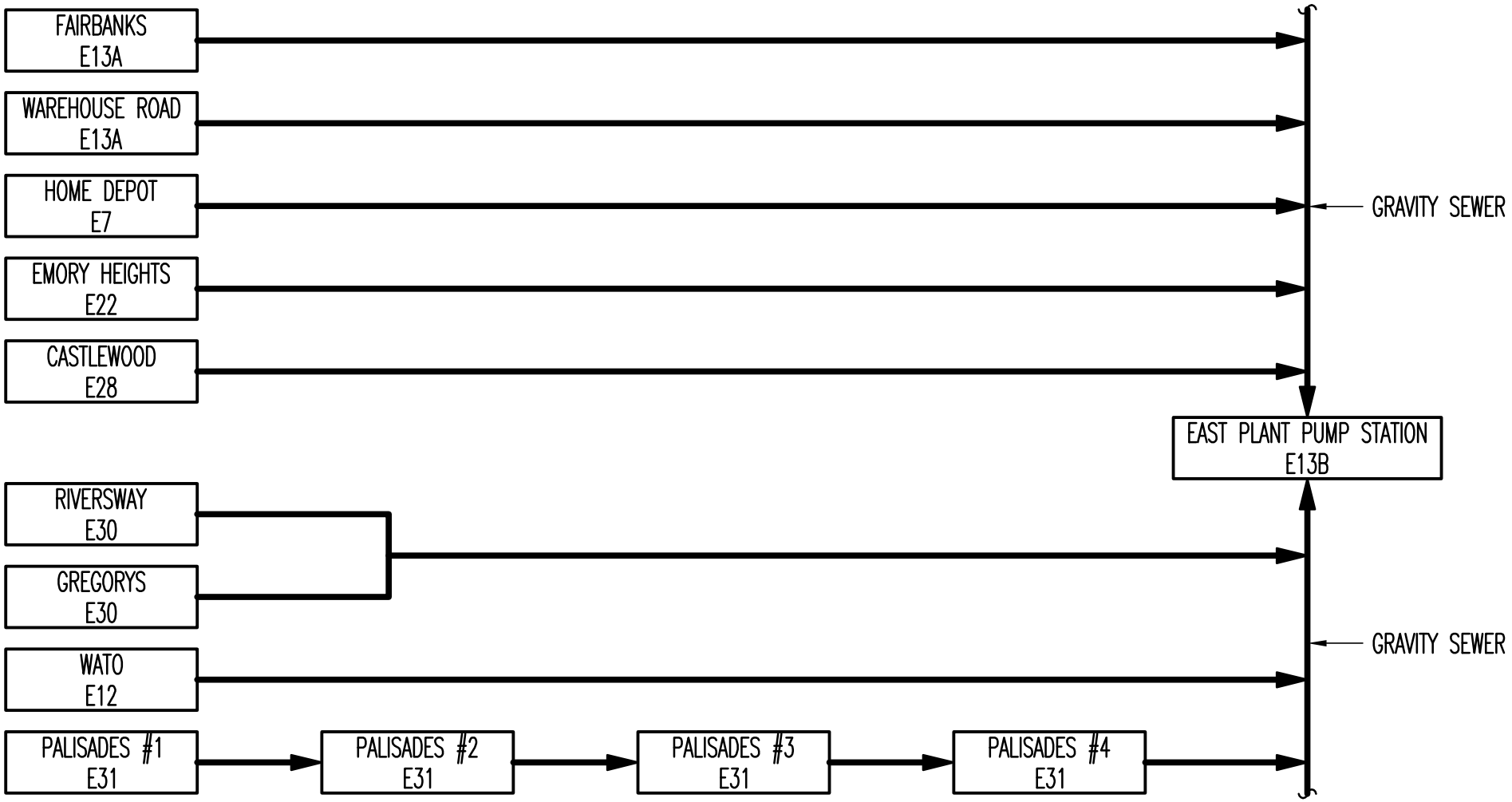
CITY OF OAK RIDGE
PUMP STATION EVALUATION AND REPAIR PROGRAM
MAJOR PUMPING SYSTEMS

MAJOR STATION	EAST PLANT	EMORY VALLEY
CONTRIBUTING STATIONS	Home Depot	Marina
	Fairbanks	Rivers Run
	Emory Heights	Radisson Cove
	Warehouse Road	Rolling Links
	Castlewood	Rockbridge Greens
	WATO	Wolf Creek
	Rivers Way	
	Gregory's	
	Palisades #1	
	Palisades #2	
	Palisades #3	
	Palisades #4	

The major pumping systems are depicted graphically on Figures I-1, and I-2.

The remaining pumping stations (not shown in Table I-2) serve drainage basins in various locations within the City's service area. These pumping stations typically serve isolated drainage basins and pump to gravity collector sewers which drain to interceptors, and ultimately to the wastewater treatment plant. The Wolf Creek and Centennial Bluff stations were designed to serve new developments and have not been accepted by the City. The Centennial Bluff station presently has approximately four (4) condominium units draining to it, while the Wolf Creek station is in an uncompleted subdivision.

The overall collection system pumping schematic is shown on Figure I-3.



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CITY OF OAK RIDGE
PUMP STATION EVALUATION
AND REPAIR PROGRAM
MAJOR PUMPING SYSTEMS
EAST PLANT SYSTEM
FIGURE I-1

DRAWN BY : JCG
FILE NO. COR146SE06SC11
SCALE : NO SCALE
DATE: 04-12

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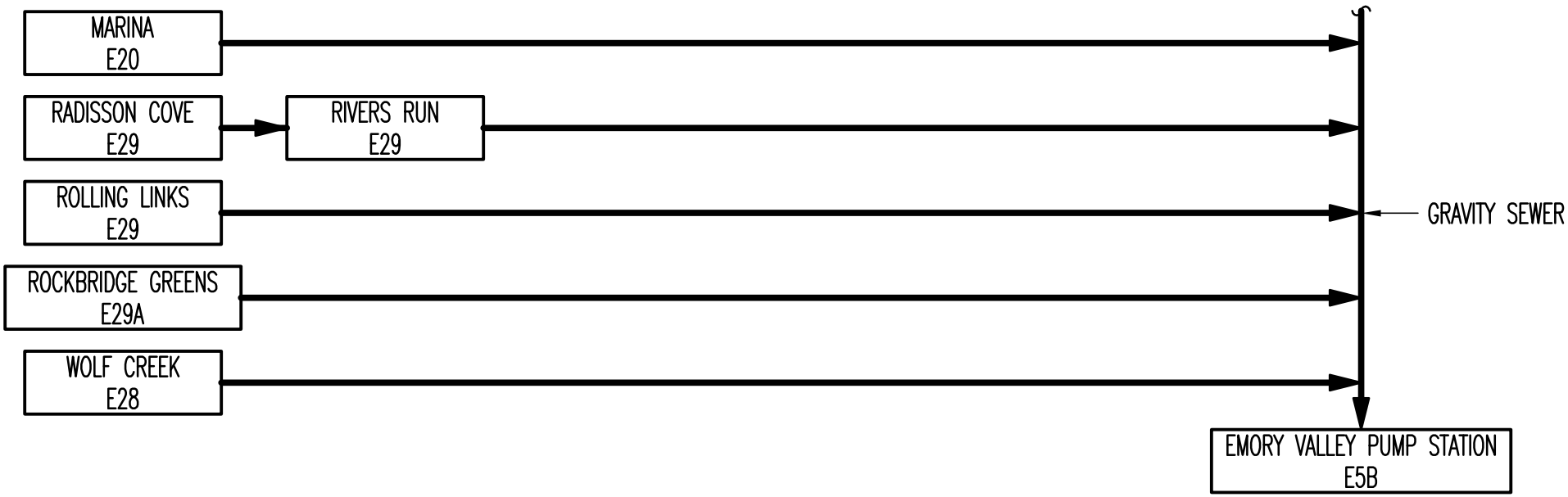

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CITY OF OAK RIDGE
PUMP STATION EVALUATION
AND REPAIR PROGRAM
MAJOR PUMPING SYSTEMS
EMORY VALLEY SYSTEM
FIGURE I-2

DRAWN BY : JCG
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SCALE : NO SCALE
DATE: 04-12

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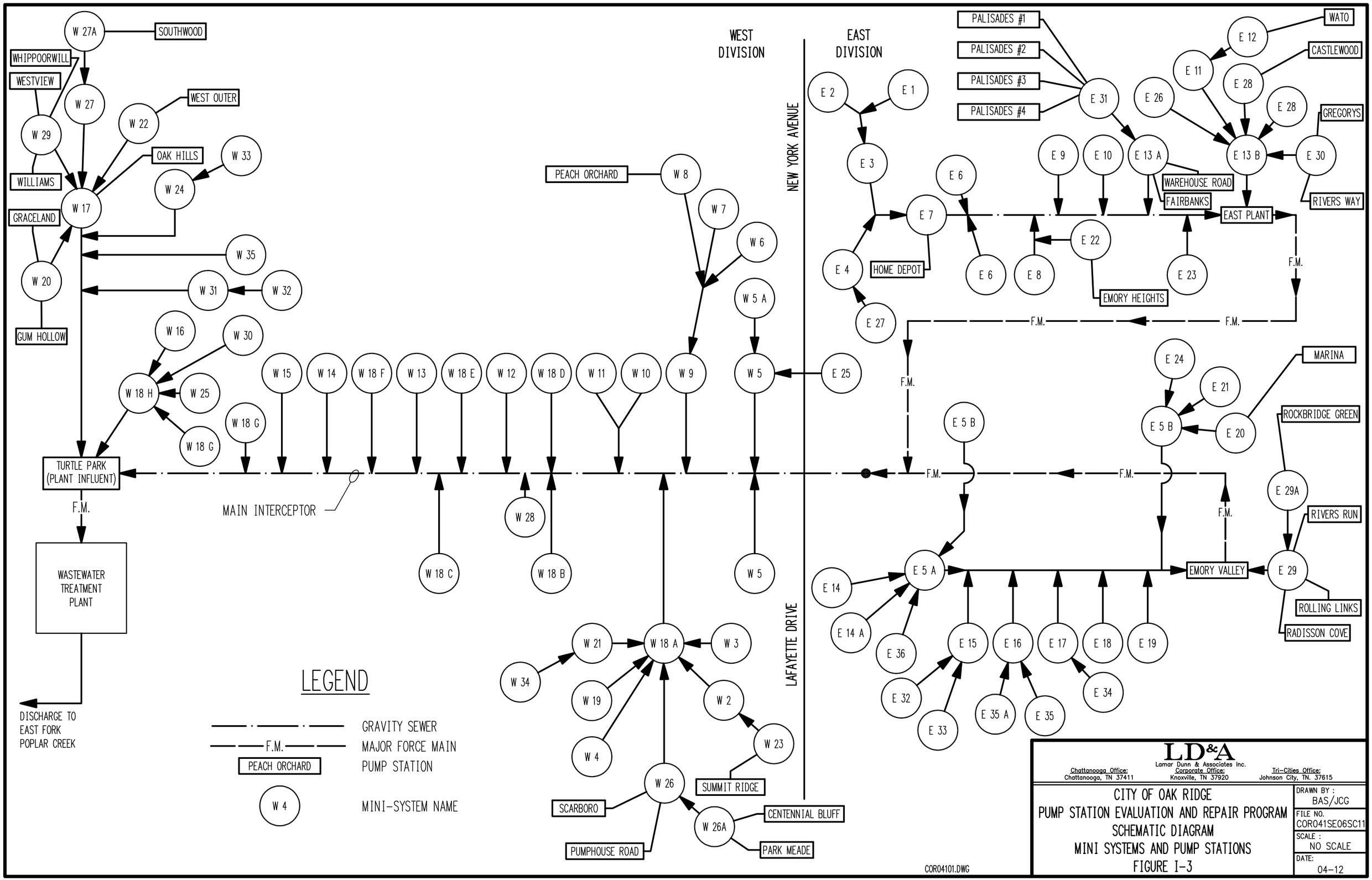

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CITY OF OAK RIDGE
PUMP STATION EVALUATION AND REPAIR PROGRAM
SCHEMATIC DIAGRAM
MINI SYSTEMS AND PUMP STATIONS
FIGURE I-3

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SCALE : NO SCALE
DATE: 04-12

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SECTION II

PUMP STATION AND FORCEMAIN EVALUATION

A. OVERVIEW

Pump station evaluation can be approached in a variety of ways, such as wet and dry weather capacities, pump and pump control condition, power availability, and other parameters as identified in Section I. Station capacity is also a very important factor in the determination of overall reliability. Force main reliability parameters are also very important, since the pumps cannot transport wastewater if the force main is out of service due to a failure. Force main reliability parameters include age, material, availability of repair parts, and historical failures.

Each of the City's pumping stations was visited and evaluated based on a number of parameters. Information provided by City personnel was also utilized in the overall evaluation. The station force mains were also evaluated based on information provided by City personnel. As a part of the evaluation, a numerical rating system was developed based on pertinent parameters. The rating system parameters and associated numerical assignments are shown in Table II-1. Each station is discussed in detail with respect to the scoring parameters in Section III of the report.

B. EVALUATION RATING SYSTEM

TABLE II-1
CITY OF OAK RIDGE
PUMP STATION EVALUATION AND REPAIR PROGRAM
EVALUATION RATING SYSTEM

CATEGORY	SUBCATEGORY		POINT VALUE	
		SUBCATEGORY	TOTAL AVAILABLE	UNACCEPTABLE LEVEL*
POWER	Source	4	10	7
	Backup	2		
SCADA			5	
SITE	Access	2	3	2
	Water/Lighting	1		
CONTROLS	Condition	8	10	7
	Redundancy	2		

TABLE II-1 continued CITY OF OAK RIDGE PUMP STATION EVALUATION AND REPAIR PROGRAM EVALUATION RATING SYSTEM				
PUMPS	Age	4	11	7
	Speed	1		
	Failure History	6		
	Type	2		
FORCE MAIN	Material	2	10	5
	Age	4		
	Replacement Parts	1		
	Failure History	3		
SCREENING			1	1
PRESSURE GAUGE/FLOW METER	2		2	1
PUMP SPARE PARTS	Standardization	3	5	3
	Availability	2		
SECURITY	Access Control	1	2	1
	Signage	1		
PERSONNEL AVAILABILITY			8	7
STATION CAPACITY	Dry Weather	5	10	10
	Wet Weather	5		

*** Scores below those given are considered unacceptable.**

SECTION III

PUMP STATION EVALUATIONS

A. CASTLEWOOD PUMPING STATION

The Castlewood Pumping Station is located behind a condominium building in the Castlewood Condominium complex. The condominium complex is accessed from Arcadia Lane, while the pumping station is accessed from the Oak Ridge Turnpike through a City owned ball field. The pumps are housed in a steel enclosure mounted on a concrete pad. The pad is poured around a 5' diameter precast concrete wet well. The discharge check valves, plug valves, air release valve and other mechanical appurtenances are located inside the enclosure. The electrical and instrumentation components are housed inside a panel which is mounted to a metal frame at one end of the enclosure.

The station presently contains two (2) suction lift pumps, which are mounted inside the enclosure directly over the wet well. The pumps take suction through vertical piping extending into the wet well. The existing pumps are Hydromatic pumps driven by 5 horsepower, 1155 RPM, General Electric motors. Each pump is rated at 200 GPM. No information concerning the rated pump head is available.

The station pumps through a 6" diameter PVC force main which extends 150 feet along the rear boundary of the condominium complex, and connects to a 6" cast iron force main that then extends 350 feet to the discharge manhole (on easement) north of the Oak Ridge Turnpike. The 6" PVC force main was apparently installed as a part of a relocation project, which included abandoning a gravity sewer and portion of the cast iron force main, to facilitate construction of additional condominium units. The discharge is at approximate elevation 831 feet MSL.

The pumping station site is accessed by a paved access road extending from the Oak Ridge Turnpike. The access road extends from the Turnpike across City owned property (portions of which are utilized as athletic fields) and crosses a stream to the site. The site is not fenced.

The pumping station power supply is 120/240V, 3-phase from a pad mounted transformer located adjacent to the pump station. Power enters the station underground from the transformer connecting directly to the control panel. There is no electrical disconnect. Each pump has a 20A breaker to shut power off to the pump.

Control of the pumps is initiated through 4 floats, mounted in the wet well, which initiate the on/off sequence for the pumps through rising and falling water levels in the wet well. No redundant level control system is available at the station. The station has no elapsed time meters to monitor pump run times. The station has an alarm light which flashes to notify of alarm conditions but, has no telemetry to transmit alarm or status conditions to the WWTP.

Mechanically, the station is rated “Replace” and it is also rated “Replace” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No redundant system for pump control is available.
- No yard hydrant for water to wash down the pumps or wet well is available.
- There is no electrical disconnect to kill power to the station.

The station presently receives flow from 96 single-family residential customers which are served by the collection lines in the basin draining to the station. Based on a theoretical design (250 gpcd) flow, the station should have a design capacity of no less than 38 gpm. The existing pumps are designed for 125 gpm at 25 feet TDH, which is greater than the calculated design flow. The station is currently being upgraded with new pumps and controls with a design capacity of 200 gpm to match the existing force main with adequate velocity for flushing purposes.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 34.

B. CENTENNIAL BLUFF PUMPING STATION

The Centennial Bluff pumping station is located at 300A Centennial Bluff Boulevard. At the time of the site visit, the station had not been accepted by the COR and little information was available with respect to the pump design conditions, force main sizing and routing, and other information.

Mechanically, the station is rated “Fair” and it is rated “Good” from an electrical standpoint. Items that were identified as potential maintenance concerns at the time of the inspection are as follows:

- The station has no remote telemetry to transmit alarm or other station conditions.
- One of the pumps was running continuously (no flow into the wet well) and was extremely hot to the touch.
- One of the pumps indicated a “fault” condition.
- The valve vault was flooded.

These issues other than remote telemetry have been addressed by City personnel. Based on the inspection and City provided data for the station and force main, the station has an overall score of 54.

C. EAST PLANT PUMPING STATION

The East Plant Pumping Station is located at 151 Cairo Road at the dead-end of the road. The station was installed to eliminate a Waste Water Treatment Plant that was originally constructed by the United States Government as a part of the Manhattan Project. The station includes a cast in place concrete structure that encompasses the wet well, dry well, influent channel with solids grinder, and pad for an emergency generator. The electrical and instrumentation components are housed inside a concrete block building.

The station presently contains 2 vertical mounted centrifugal pumps with water seals, which take suction from the cast-in-place concrete wet well. The pump motors are mounted on the main floor of the station which also houses the electrical and instrumentation control components. The pumps are driven through extended vertical shafts which extend from the motors on the operation floor down to the pumps. The existing pumps are Fairbanks Morse driven by 200 horsepower, 1,785 RPM, Reliance motors. Each pump is rated at 2,800 GPM at 195 FT total dynamic head. A connection for a future pump is available in the pump room.

The station pumps through a 16” diameter ductile iron force main which extends 10,560 feet and connects to an 18” pipe which extends an additional 3,700 feet to the discharge manhole near the intersection of Emory Valley and Fordham Roads. The 18” force main also carries flow from the Emory Valley pumping station.

The discharge is at approximate elevation 916 feet MSL. A connection to the force main for a bypass pump hose is located just outside the station building.

The pumping station site includes a gravel parking/storage area with a paved access off Cairo Road. The site is also utilized for pole storage by the City of Oak Ridge Electric Department.

The pumping station power supply is 460V, 3-phase from pad mounted transformers on-site. No information for the transformers was available as they are not labeled. Power enters the station underground to an 800A main circuit breaker mounted in a MCC. Emergency power is supplied by a Cummins diesel generator which is rated at 260 kW.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller which initiates the on/off sequence for the pumps. No redundant level control system is available at the station. The station is monitored by telemetry which transmits alarms to the WWTP. Flow from the station is measured through a magnetic flow meter, which is mounted in the discharge pipe inside the building. The station does not have elapsed time meters to record pump run times.

Prior to entering the wet well, flow travels through a hydraulic grinder unit which grinds large solids to smaller particles to prevent damage to the pumps. A bar screen, which is utilized to capture large solids when the solids grinder is out of service, is mounted in a bypass channel.

Mechanically, the station is rated “Good” and it is also rated “Good” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- The extended shafts from the motors to the pumps are a source of maintenance problems.
- No redundant system for pump control is available.
- Corrosion is evident on metal components inside the pump room (lower level of structure).
- Corrosion is evident on metal components near the influent flow channel. The corrosion is severe in places, including sections of the metal grating over the channel.
- Pump removal is difficult due to the lack of a bridge crane or trolley in the pump room.

The station presently receives flow from approximately 2,390 customers which are served by the collection lines in the basin draining to the station, as well as from the following pumping stations:

- Emory Heights
- Fairbanks
- Warehouse Road
- Castlewood

- Eastburn
- Palisades #4
- Gregory's
- Rivers Way
- Animal Shelter

Based on a theoretical design flow, the station should have a capacity of not less than 938 gpm. The existing station has a design capacity of 2,800 gpm.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 55.

D. EMORY HEIGHTS PUMPING STATION

The Emory Heights Pumping Station is located off Culver Road in Emory Heights Subdivision. The station is directly behind the home at 100 Coe Road. The pumps are mounted in a 6' diameter precast concrete wet well, and the discharge check valves, plug valves, air/vacuum valves, and other station piping are housed in a 6'X 6' precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4" discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are KSB pumps driven by 4.5 horsepower, 1,750 RPM motors. Each pump is rated at 180 GPM at 32 FT total dynamic head.

The station pumps through a 6" diameter cast iron force main which extends 583 feet north, crossing railroad tracks, Warehouse Road, a railroad spur, and Coal Mine Road, and discharges to a gravity interceptor pipe at a tee in the pipe. The discharge is at approximate elevation 830 feet MSL.

The pumping station is accessed along a gravity sewer easement from Culver Road. The access drive is gravel.

The pumping station power is 208V, 3-phase from 15 kVA pole mounted transformers located on-site. Power enters the station underground from the transformers to a 100A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps.

A 4-float redundant level control system provides back-up control of the pumps should the pressure transducer fail. The station has a dedicated elapsed time meter for each pump. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated “Fair” and it is also rated “Good” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No yard hydrant is available for pump and wet well wash down.
- Grease and hair buildup on the pumps was noted during the inspection.
- The wet well showed evidence of surcharge conditions, but there was no evidence of an overflow.

The station presently receives flow from approximately 180 customers which are served by the collection lines in the basin draining to the station. Based on a theoretical design flow, the station should have a capacity of not less than 95 gpm. The actual design capacity is 180 gpm.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 37.

E. EMORY VALLEY PUMPING STATION

The Emory Valley Pumping Station is located on Emory Valley Road at its intersection with Baylor Drive. The station includes a cast in place concrete structure that encompasses the wet well, dry well, influent channel with solids grinder, and pad for an emergency generator. The electrical and instrumentation components are housed inside a concrete block building.

The station presently contains 2 dry pit mounted submersible pumps, which take suction from the cast-in-place concrete wet well. The pumps are mounted on the lower floor of the station. The main floor of the station houses the electrical and instrumentation control components. The existing pumps are Flygt pumps driven by 70 horsepower, 1,775 RPM motors. Each pump is rated at 1,150 GPM at 160 FT total dynamic head. A connection for a future pump is available in the pump room.

The station pumps through parallel 10” and 12” diameter ductile iron force mains which extend 7,570 feet. One of the 10” force mains connects to the existing 18” force main from the East Plant Station. The second 10” transitions to a 12” diameter pipe and extends an additional 4,300 feet where it connects to the 18” force main from the East Plant Station, just outside its discharge manhole. The 18” force main discharges to a manhole near the intersection of Emory Valley and Fordham Roads. The discharge is at approximate elevation 916 feet MSL. A connection to the force main for a bypass pump hose is located just outside the station building.

The pumping station site includes a gravel parking area with a paved access off Emory Valley Road.

The pumping station power supply is 480V, 3-phase from pole mounted transformers located approximately 190 feet west of the site. Power enters the station underground to a 400A main circuit breaker mounted in an MCC. Emergency power is supplied by a Kohler diesel generator which is rated at 125 kW.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller which initiates the on/off sequence for the pumps. No redundant level control system is available at the station. The station is monitored by telemetry which transmits alarms to the WWTP. Flow from the station is measured through magnetic flow meters (1 per force main), which are mounted in the discharge pipes inside the building. The station does not have elapsed time meters to record pump run times.

Prior to entering the wet well, flow travels through a hydraulic grinder unit which grinds large solids to smaller particles to prevent damage to the pumps. A bar screen, which is utilized to capture large solids when the solids grinder is out of service, is mounted in a bypass channel. A blower is located outside the building which is utilized to keep solids entering the wet well suspended, preventing settlement and build-up in the wet well.

Mechanically, the station is rated “Good” and it is rated “Excellent” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- The slide gates which are utilized to divert influent sewage from the grinder channel to the bypass channel are very difficult to move. Operations personnel must lift the gates out by hand and relocate them to the grinder channel prior to performing maintenance or repairs to the grinder unit. No trolley or other hoist is available in the room to assist in lifting the gates, which are very difficult to unseat.
- No redundant system for pump control is available.
- Corrosion is evident on metal components near the influent flow channel.
- Pump removal is difficult due to the lack of a bridge crane or trolley in the pump room.
- A water mark approximately 6 feet above the lower floor, inside the influent channel room, indicates that the flow to the station has exceeded the pump capacity at some point.

The station presently receives flow from 1,150 customers which are served by the collection lines in the basin draining to the station, as well as from the following pumping stations:

- Marina
- Rivers Run

Based on a theoretical design flow, the station should have a capacity of not less than 686 gpm. The actual design capacity is 1,150 gpm. Based on the inspection and City provided data for the station and force main, the station has an overall score of 64.

F. FAIRBANKS PUMPING STATION

The Fairbanks Pumping Station is located at 545 Oak Ridge Turnpike within the R&R Properties commercial development. The pumps are mounted in a 4’ X 4’ concrete wet well and the discharge check valves, plug valves, and other station piping are housed in a 2’-9” X 2’-9” concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4” discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are Flygt pumps driven by 2.2 horsepower, 1,670 RPM motors. Each pump is rated at 175 GPM at 10 FT total dynamic head.

The station pumps through a 6” diameter ductile iron force main which extends 86 feet and discharges to a manhole north of the station within the commercial development. The discharge is at approximate elevation 837 feet MSL.

The pumping station is accessed from the parking lot of the commercial development. The site is not fenced. A yard hydrant is available for wash down of the pumps and wet well.

The pumping station power is 208V, 3-phase originating from an unknown location. Power enters the station underground through 60A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A 2-float redundant level control system provides back-up control of the pumps should the pressure transducer fail. The station has a dedicated elapsed time meter for each pump. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated “Fair” and it is rated “Good” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.

The station presently receives flow from 4 commercial customers which are served by the collection lines in the basin draining to the station. The design capacity of the station is 175 gpm, which is much greater than required.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 50.

G. GRACELAND PUMPING STATION

The Graceland Pumping Station is located at 113 Graceland Road. The pumps are mounted in an 8’ diameter precast concrete wet well, and the discharge check valves, plug valves, air/vacuum valves and, other station piping are housed in a 6’X 6’ precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4” discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are Flygt pumps driven by 20 horsepower, 1,750 RPM motors. Each pump is rated at 200 GPM at 100 FT total dynamic head.

The station pumps through a 6” diameter PVC force main which extends 2,059 feet along Graceland Road and Gum Hollow Road, and discharges to a manhole on the south side of Gum Hollow Road. The discharge is at approximate elevation 895 feet MSL.

The pumping station has a paved entrance and parking area. A Pur-A-Fil drum air scrubber at the site controls odors from the wet well. A diaphragm type pressure sensor, with gauge, is located in the valve vault. A yard hydrant is available for pump and wet well cleaning.

The pumping station power is 460V, 3-phase from 25 kVA pole mounted transformers located at the street. Power enters the station underground from the transformers to a 200A main with a 150A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a level probe, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A 5-float redundant level control system provides back-up control of the pumps should the level probe fail. The station has a dedicated elapsed time meter for each pump. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated “Excellent” and it is also rated “Excellent” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No vehicular access to the wet well is available.

The station presently receives flow from 49 customers which are served by the collection lines in the basin draining to the station.

Based on a theoretical design flow, the station should have a capacity of not less than 19 gpm. With a capacity of 200 gpm per pump, the station has excess capacity available.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 58.

H. GREGORY'S PUMPING STATION

The Gregory's Pumping Station is located on Tax Parcel 94D-E-24, which is in the River View Subdivision adjacent to Melton Lake Drive, directly adjacent to the Melton Hill Lake Peninsula. The pumps are housed in a steel enclosure mounted on a concrete pad. The pad is poured around a 5' diameter precast concrete wet well. The discharge check valves, plug valves, air release valve and other mechanical appurtenances are located inside the enclosure. The electrical and instrumentation components are housed inside a panel which is mounted to a metal frame which is at one end of the enclosure.

The station presently contains 2 suction pumping pumps, which are mounted inside the enclosure directly over the wet well. The pumps take suction through vertical piping extending into the wet well. The existing pumps are Hydromatic pumps driven by 15 horsepower, 1,735 RPM, General Electric motors. Each pump is rated at 230 GPM. No information concerning the rated pump head is available.

The station pumps through a 4" diameter PVC force main which extends 860 feet to the intersection of Melton Lake Drive and Meco Lane, where it connects to an 8" PVC force main that extends 800 feet to the discharge manhole (on easement) north of Meco Lane. The 8" PVC force main also transports the flow from the Rivers Way pumping station. The discharge is at approximate elevation 832 feet MSL.

The pumping station site does not have direct vehicular access. The city is presently addressing the access issue with new easements. Maintenance personnel must park on the adjacent property and access the site by foot. There is a railroad tie retaining wall on the south and west sides of the site, which is in a low area. The site is not fenced.

The pumping station power supply is 120/240V, 3-phase from a pad mounted transformer located adjacent to the pump station. Power enters the station underground from the transformer connecting directly to the control panel. There is no electrical disconnect.

Control of the pumps is initiated through 4 floats, mounted in the wet well, which initiate the on/off sequence for the pumps through rising and falling water levels in the wet well. No redundant level control system is available at the station. The station has no elapsed time meters to monitor pump run times.

Mechanically, the station is rated “Replace” and it is also rated “Replace” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No redundant system for pump control is available.
- No yard hydrant for water to wash down the pumps or wet well is available.
- Grease was noted in the wet well. A recurring grease buildup issue is apparently the result of a restaurant adjacent to the station.
- Station access is unacceptable.
- There is no electrical disconnect to kill power to the station.

The station presently receives flow from 53 customers which are served by the collection lines in the basin draining to the station. The estimated peak dry weather flow entering the station is approximately 21 GPM. With a capacity of 230 GPM per pump, the pumps are more than sufficient capacity. The pump rate, combined with the flow from the Rivers Way pumping station, provides flushing velocity in the section of 8” force main on Meco Lane.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 31. This station is being upgraded to address the issues identified in the inspections.

I. GUM HOLLOW PUMPING STATION

The Gum Hollow Pumping Station is located at 197 Gum Hollow Road. The station is directly adjacent to the road. The pumps are mounted in an 8’ diameter precast concrete wet well and the discharge check valves, plug valves, air/vacuum valves, and other station piping are housed in a 6’X 6’ precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4" discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are KSB pumps driven by 36 horsepower, 1,750 RPM motors. Each pump is rated at 300 GPM at 135 FT total dynamic head.

The station pumps through a 6" diameter AC force main which extends 4,323 feet along Gum Hollow Road, crossing Oak Ridge Turnpike, and discharges to a manhole on the north side of the Turnpike approximately 100 feet west of the Gum Hollow Road/ Oak Ridge Turnpike intersection. The discharge is at approximate elevation 797 feet MSL.

The pumping station does not have off-street parking. A Pur-A-Fil drum air scrubber at the site controls odors from the wet well. A diaphragm type pressure sensor, with gauge, is located in the valve vault.

The pumping station power is 460V, 3-phase from a pole mounted transformer. Power enters the station underground from the transformer to a 200A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A 5-float redundant level control system provides back-up control of the pumps should the pressure transducer fail. The station has a dedicated elapsed time meter for each pump. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated "Excellent" and it is rated "Good" from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- The wet well exhibits signs of surcharge, but no evidence of overflow was evident.
- A steady stream of clear water was flowing into the station at the time of the inspection, which may indicate I/I in the collection system upstream of the station.

The station presently receives flow from 191 customers which are served by the collection lines in the basin draining to the station, and the Graceland pumping station. The theoretical design flow entering the station should be no less than 275 GPM. With a capacity of 300 GPM per pump, the station has excess capacity available.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 52.

J. HOME DEPOT PUMPING STATION

The Home Depot Pumping Station is located directly adjacent to Laboratory Drive at the Home Depot entrance road. The pumps are mounted in a 6' diameter precast concrete wet well, and the discharge check valves, plug valves, air/vacuum valves and other station piping are housed in a 6'X 8' precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4" discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are Flygt pumps driven by 3 horsepower, 1,700 RPM motors.

The station pumps through a 4" diameter PVC force main which extends 478 feet along Laboratory Road and discharges to a manhole on the east side of Laboratory Road in front of 801 Laboratory Road. The discharge is at approximate elevation 858 feet MSL.

The pumping station is accessed by a gravel drive from the Home Depot entrance road. A yard hydrant is available for wash down of the pumps and wet well. A bypass pump connection is piped to the discharge piping in the valve vault.

The pumping station power is 120/240V, 3-phase from 15 kVA pole mounted transformers located on-site. Power enters the station underground from the transformers to a 35A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible level probe, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A 5-float redundant level control system provides back-up control of the pumps should the pressure transducer fail. The station has a dedicated elapsed time meter for each pump. The control panel has a horn and flashing light to signify alarm conditions.

Mechanically, the station is rated “Good” and it is also rated “Good” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- The valve vault had 6” of standing water in the bottom.
- The pressure gauge in the valve vault was inoperable.
- The wet well had a thick layer of a hardened substance in it that has adheres to the pumps, floats, cables, etc. and rendered the redundant float system inoperable.

The station presently receives flow from a single commercial customer which is served by the collection lines in the basin draining to the station. The field draw down tested showed a capacity of 300 gpm.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 59.

K. MARINA PUMPING STATION

The Marina Pumping Station is located at 695 Melton Lake Drive, directly adjacent to the Rowing Club building. The pumps are mounted in a 6’ diameter precast concrete wet well and the discharge check valves, plug valves, air release valves, and a diaphragm type pressure sensor are housed in a 6’ X 6’ precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4” discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are Flygt pumps driven by 10 horsepower, 1,735 RPM motors. Each pump is rated at 140 GPM at 87 FT total dynamic head.

The station pumps through a 4” diameter AC force main which extends 2,125 feet and discharges to a manhole at the end of Brockton Lane. The discharge is at approximate elevation 832 feet MSL.

The pumping station site includes a paved parking/turn around area with a paved access from Melton Lake Drive and the parking area for the Marina, Rowing Club, restaurant, and adjacent park. The site is not fenced.

The pumping station power supply is 120/240V, 3-phase from pole mounted transformers located on the opposite side of Melton Lake Drive from the station. The power meter for the station is also located on the pole. Power enters the station underground (crossing Melton Lake Drive) to a 100A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. No redundant level control system is available at the station. The station has a dedicated elapsed time meter for each pump. The control panel has an audible horn and flashing light to signify alarm conditions.

Mechanically, the station is rated “Good” and it is rated “Excellent” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No redundant system for pump control is available.
- No yard hydrant for water to wash down the pumps or wet well is available.
- Debris was noted in the wet well.
- Influent flow from a collection line entering the station from the north was very clear, indicating a potential I/I problem in the collection system draining to the station.
- The transite force main has been a recurring source of problems and should be replaced.

The station presently receives flow from 133 customers, which are served by the collection lines in the basin draining to the station. The theoretical design flow should not be less than 52 gpm. The station design capacity is 140 gpm.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 47.

L. OAK HILLS PUMPING STATION

The Oak Hills Pumping Station is located on the north side of Oak Ridge Turnpike approximately 1000 feet west of Oklahoma Avenue. The station perimeter fence is approximately 25 feet from the edge of pavement. The pumps are housed in a fiberglass enclosure mounted on a concrete pad. The pad is poured around a 9' diameter precast concrete wet well. The discharge check valves, plug valves, air release valves and other mechanical appurtenances are located inside the enclosure. The electrical and instrumentation components are housed in panels inside the enclosure. Suction and discharge pressure gauges for each pump are mounted near the pumps.

The station presently contains 2 suction pumping pumps, which are mounted inside the enclosure directly over the wet well. The pumps take suction through vertical piping extending into the wet well. The existing pumps are Gorman Rupp pumps driven by 25 horsepower, variable RPM motors. Each pump is rated at 350 GPM at 70 feet of head.

The station pumps through an 8" diameter PVC force main which extends 3,933 feet east along the Turnpike to the discharge manhole which is located approximately 180 feet east of Nebraska Avenue. The discharge is at approximate elevation 817 feet MSL.

The pumping station site is accessed by a paved drive from Oak Ridge Turnpike. The site is fenced and a yard hydrant is available for wash down of the wet well.

The pumping station power supply is 120/240V, 3-phase from the Turnpike. Power to the station is provided by 37.5 kvA and 25kVA pole mounted transformers. Power enters the station overhead from the transformers to a drop pole and down the pole to a 200A fused disconnect.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well level to a controller mounted inside the enclosure. The controller initiates the on/off sequence for the pumps through rising and falling water levels in the wet well. A 3-float redundant level control system controls pump operation if the submersible transducer system fails. The station has a dedicated elapsed time meter for each pump to monitor pump run times, and an alarm light to notify of alarm conditions, but has no telemetry to transmit alarm or status conditions to the WWTP.

Mechanically, the station is rated “Good” and it is rated “Fair” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- The station has no remote telemetry to transmit alarm or other station conditions.
- The discharge pressure gauge on one of the pumps is inoperable.
- The wet well exhibits signs of surcharge, but no signs of overflows were evident.

The station presently receives flow from 181 customers which are served by the collection lines in the basin draining to the station and the following pumping stations:

- Southwood
- Gum Hollow

The estimated theoretical design flow should not be less than 496 GPM. With a rated design capacity of 350 GPM per pump, the station capacity should be monitored with actual flow data. The two additional stations pumping to the gravity lines draining to the station have a combined capacity greater than Oak Hills. Since these stations pump to gravity lines, the impact of their contributions is buffered.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 49.

M. PALISADES #1 PUMPING STATION

The Palisades #1 Pumping Station is located at 10 Palisades Parkway at the back of the lot, behind and between 2 homes. The pumps are housed in a steel enclosure mounted on a concrete pad. The pad is poured around a 5’ diameter precast concrete wet well. The discharge check valves, plug valves, air release valve and other mechanical appurtenances are located inside the enclosure. The electrical and instrumentation components are housed inside a panel which is mounted to a metal frame at one end of the enclosure.

The station presently contains 2 suction lift pumps, which are mounted inside the enclosure directly over the wet well. The pumps take suction through vertical piping extending into the wet well. The existing pumps are Hydromatic pumps driven by 3 horsepower, 1,150 RPM, U.S. motors. Each pump is rated at 80 GPM. No information concerning the rated pump head is available.

The station pumps through a 4” diameter PVC force main which extends 488 feet along the rear boundary of the subdivision and discharges to the Palisades #2 pumping station. The discharge is at approximate elevation 797 feet MSL.

The pumping station site is accessed by the paved driveway between 10 and 12 Palisades Parkway. The site is not fenced. A yard hydrant is available for wash down of the wet well.

The pumping station power supply is 120/240V, single phase from Palisades Parkway. The location of the transformer feeding the station is unknown. Power enters the station underground from the street to a 50A fused disconnect.

Control of the pumps is initiated through 4 floats, mounted in the wet well, which initiate the on/off sequence for the pumps through rising and falling water levels in the wet well. No redundant level control system is available at the station. The station has a dedicated elapsed time meter for each pump to monitor pump run times. The station has an alarm light which flashes to notify of alarm conditions, but has no telemetry to transmit alarm or status conditions to the WWTP.

Mechanically, the station is rated “Poor” and it is rated “Fair” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No redundant system for pump control is available.
- Voids are present under three sides of the concrete slab supporting the station components.
- One of the pumps was inoperable at the time of the inspection.
- The floats were hanging from a wire at the time of the inspection.
- An exposed conduit/wire of unknown use was visible at the station.

The station presently receives flow from 9 customers which are served by the collection lines in the basin draining to the station. The theoretical design flow should be no less than 4 gpm. With a capacity of 80 GPM per pump, the pumps are sufficient.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 35, which warrants an early replacement.

N. PALISADES #2 PUMPING STATION

The Palisades #2 Pumping Station is located at 18 Palisades Parkway at the back of the lot, behind and between 2 homes. The pumps are housed in a steel enclosure mounted on a concrete pad. The pad is poured around a 5' diameter precast concrete wet well. The discharge check valves, plug valves, air release valve and other mechanical appurtenances are located inside the enclosure. The electrical and instrumentation components are housed inside a panel which is mounted to a metal frame at one end of the enclosure.

The station presently contains 2 suction lift pumps, which are mounted inside the enclosure directly over the wet well. The pumps take suction through vertical piping extending into the wet well. The existing pumps are Hydromatic pumps driven by 3 horsepower, 1,150 RPM, U.S. motors. Each pump is rated at 80 GPM. No information concerning the rated pump head is available.

The station pumps through a 4" diameter PVC force main which extends 528 feet along the rear boundary of the subdivision and discharges to a manhole behind 26 Palisades Parkway, which is just upstream of the Palisades #3 pumping station. The discharge is at approximate elevation 813 feet MSL.

The pumping station site is accessed by the paved driveway between 16 and 18 Palisades Parkway. The site is not fenced. A stone retaining wall on one side of the station prevents the fiberglass cover from being completely removed from the pumps. A yard hydrant is available for wash down of the wet well.

The pumping station power supply is 120/240V, single phase from Palisades Parkway. The location of the transformer feeding the station is unknown. Power enters the station underground from the street to a 50A fused disconnect.

Control of the pumps is initiated through 4 floats, mounted in the wet well, which initiate the on/off sequence for the pumps through rising and falling water levels in the wet well. No redundant level control system is available at the station. The station has a dedicated elapsed time meter for each pump to monitor pump run times. The station has an alarm light which flashes to notify of alarm conditions, but has no telemetry to transmit alarm or status conditions to the WWTP.

Mechanically, the station is rated “Fair” and it is rated “Good” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No redundant system for pump control is available.
- The aluminum hatch over the wet well needs to be replaced.
- The retaining wall makes it difficult to access the station equipment for removal and maintenance.

The station presently receives flow from 10 customers which are served by the collection lines in the basin draining to the station and the Palisades #1 pumping station. The theoretical design flow would be the pump rate of Palisades #1 plus 10 gpm. With a capacity of 80 gpm per pump, the pumps are borderline with respect to capacity and should be monitored for actual flow conditions.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 29, which warrants an early replacement.

O. PALISADES #3 PUMPING STATION

The Palisades #3 Pumping Station is located at 28 Palisades Parkway at the back of the lot, behind and between 2 homes. The pumps are housed in a steel enclosure mounted on a concrete pad. The pad is poured around a 6’ diameter precast concrete wet well. The discharge check valves, plug valves, air release valve and other mechanical appurtenances are located inside the enclosure. The electrical and instrumentation components are housed inside a panel which is mounted to a metal frame at one end of the enclosure.

The station presently contains 2 suction lift pumps, which are mounted inside the enclosure directly over the wet well. The pumps take suction through vertical piping extending into the wet well. The existing pumps are Hydromatic pumps driven by 7.5 horsepower, 1,740 RPM, U.S. motors.

The station pumps through a 4” diameter PVC force main which extends 780 feet along the rear boundary of the subdivision and discharges to the Palisades #4 pumping station. The discharge is at approximate elevation 801 feet MSL.

The pumping station site is accessed by a gravel drive between 28 and 30 Palisades Parkway. The site is not fenced. A yard hydrant is available for wash down of the wet well.

The pumping station power supply is 120/240V, 3-phase from 2-15kvA transformers on Palisades Parkway. Power enters the station underground from the transformers to a 70A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through 4 floats, mounted in the wet well, which initiate the on/off sequence for the pumps through rising and falling water levels in the wet well. No redundant level control system is available at the station. The station has a dedicated elapsed time meter for each pump to monitor pump run times. The station has an alarm light which flashes to notify of alarm conditions, but has no telemetry to transmit alarm or status conditions to the WWTP.

Mechanically, the station is rated “Fair” and it is rated “Good” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No redundant system for pump control is available.
- Mice were noted underneath the station cover.

The station presently receives flow from 18 single-family residential customers which are served by the collection lines in the basin draining to the station and, the Palisades #2 pumping station. The theoretical design flow entering the station is approximately 86 gpm. With a capacity of 115 gpm per pump, the pumps have sufficient capacity.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 34, which warrants replacement.

P. PALISADES #4 PUMPING STATION

The Palisades #4 Pumping Station is located at 40 Palisades Parkway at the back of the lot. The pumps are housed in a steel enclosure mounted on a concrete pad. The pad is poured around a 5' diameter precast concrete wet well. The discharge check valves, plug valves, air release valve and other mechanical appurtenances are located inside the enclosure. The electrical and instrumentation components are housed inside a panel which is mounted to a metal frame at one end of the enclosure.

The station presently contains 2 suction lift pumps, which are mounted inside the enclosure directly over the wet well. The pumps take suction through vertical piping extending into the wet well. The existing pumps are Hydromatic pumps driven by 3 horsepower, 1,150 RPM, U.S. motors. Each pump is rated at 80 GPM. No information concerning the rated pump head is available.

The station pumps through a 4" diameter PVC force main which extends 962 feet along the rear boundary of the subdivision and adjacent Tennessee Valley Authority property and discharges to a manhole west of the end of Cairo Lane (on easement). The discharge manhole is just upstream of the East Plant pumping station. The discharge is at approximate elevation 812 feet MSL.

The pumping station site is accessed by a paved drive adjacent to 42 Palisades Parkway. The site is not fenced. A yard hydrant is available for wash down of the wet well.

The pumping station power supply is 120/240V, single phase from Palisades Parkway. The location of the transformer feeding the station is unknown. Power enters the station underground from the street to a 30A fused main mounted adjacent to the control panel.

Control of the pumps is initiated through 4 floats, mounted in the wet well, which initiate the on/off sequence for the pumps through rising and falling water levels in the wet well. No redundant level control system is available at the station. The station has a dedicated elapsed time meter for each pump to monitor pump run times. The station has an alarm light which flashes to notify of alarm conditions, but has no telemetry to transmit alarm or status conditions to the WWTP.

Mechanically, the station is rated "Fair" and it is rated "Poor" from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.

- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No redundant system for pump control is available.
- Mice were noted underneath the station cover.
- The revenue meter is utilized as the electrical disconnect.

The station presently receives flow from 16 customers which are served by the collection lines in the basin draining to the station, and the Palisades #3 pumping station. The calculated design flow entering the station should be no less than 121 gpm. With a capacity of 80 gpm per pump, the pumps are questionable with respect to sufficient capacity. The station is taxed at times during peak flows due to the discharge from Palisades #3.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 28, which warrants replacement.

The four Palisades stations have varying mechanical and electrical issues. The stations have been in service in excess of 20 years, and are approaching the end of their normal expected useful lives. It is recommended that these stations be seriously considered for replacement.

Q. PARK MEADE PUMPING STATION

The Park Meade Pumping Station is located at 1402 Edgemoor Road. The pumps are housed in a fiberglass enclosure mounted on a concrete pad. The pad is poured around a 6’ diameter precast concrete wet well. The discharge check valves, plug valves, air release valve and other mechanical appurtenances are located inside the enclosure. The electrical and instrumentation components are housed in panels mounted on a uni-strut rack outside the station enclosure. Suction and discharge pressure gauges for each pump are mounted near the pumps.

The station presently contains 2 suction lift pumps, which are mounted inside the enclosure directly over the wet well. The pumps take suction through vertical piping extending into the wet well. The existing pumps are Gorman Rupp pumps driven by 50 horsepower, 1,765 RPM motors. Each pump is rated at 500 GPM at 80 feet of head.

The station pumps through a 10” ductile iron diameter force main, installed in 1994, which extends 10,278 feet along Edgemoor Road to Bethel Valley Road, crossing South Illinois Avenue to the discharge manhole which is located between Bethel Valley Road and a ramp to South Illinois Avenue. The discharge is at approximate elevation 812 feet MSL.

The pumping station site is accessed by a gravel drive from Edgemoor Road. The site is fenced and a yard hydrant is available for wash down of the wet well. The site also has an area light mounted on a pole for use in after hours maintenance and repairs.

The pumping station power supply is 460V, 3-phase from Edgemoor Road. A 112.5 kvA pad mounted transformer provides power to the station. Power enters the station underground from the transformer to a 250A circuit breaker. A 50 kW diesel powered Kohler generator provides immediate back up power to the station, through an automatic transfer switch, during power outages.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well level to a controller mounted inside the enclosure. The controller initiates the on/off sequence for the pumps through rising and falling water levels in the wet well. No redundant level control system is available at the station. The station has a dedicated elapsed time meter for each pump to monitor pump run times. The station has an alarm light which flashes to notify of alarm conditions, but has no telemetry to transmit alarm or status conditions to the WWTP.

Mechanically, the station is rated “Good” and it is also rated “Good” from an electrical standpoint. Items that were identified as potential maintenance concerns at the time of the inspection are as follows:

- No bypass pump connection to the force main is available*.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No redundant system for pump control is available.
- The discharge pressure gauge on pump #2 was missing, and the discharge pressure gauge on pump #1 was at its maximum pressure reading (pegged) while the pump was running.
- The retaining wall makes it difficult to access the station equipment for removal and maintenance.

*A bypass pump connection has been located at the station since the inspection date.

The station presently receives flow from 60 customers and a golf course which are served by the collection lines in the basin draining to the station. The calculated theoretical flow entering the station is approximately 24 gpm. With a capacity of 500 gpm per pump, the pumps have excess capacity available to handle sewage flows entering the station.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 57.

R. PEACH ORCHARD PUMPING STATION

The Peach Orchard Pumping Station is located at 105 Wedgewood Road at the rear of the lot. The pumps are mounted in a 6' diameter precast concrete wet well and the discharge check valves, plug valves, air/vacuum valves, and other station piping are housed in a 6'X6' precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4" discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are Flygt pumps driven by 10 horsepower, 1,735 RPM motors. Each pump is rated at 140 GPM at 76 FT total dynamic head.

The station pumps through a 4" diameter AC force main which extends 485 feet west and south, crossing Wedgewood Road, and discharges to a manhole on the south side of Wedgewood Road behind 396/398 West Outer Drive. The discharge is at approximate elevation 1,078 feet MSL.

The pumping station is accessed by a gravel drive from Wedgewood Road. The site is not fenced, but a gate prevents access to the gravel drive. A diaphragm type pressure sensor with gauge is located in the valve vault.

The pumping station power is 120/240V, 3-phase from 30 kVA pole mounted transformers located on-site. Power enters the station overhead from the transformers to a drop pole and down the pole to a 100A fused disconnect. Station controls are housed in a stainless steel control panel mounted on a uni-strut frame.

Control of the pumps is initiated through a submersible level probe, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A 5-float redundant level control system provides back-up control of the pumps should the pressure transducer fail. The station has a dedicated elapsed time meter for each pump. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated “Excellent” and it is also rated “Fair” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No yard hydrant is available for pump and wet cleaning.
- The latch for the disconnect switch is broken.

The station presently receives flow from approximately 30 residences which are served by the collection lines in the basin draining to the station. The calculated theoretical flow entering the station is 12 gpm. With a capacity of 85 gpm per pump, the station has excess capacity available.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 46. The AC force main should be replaced.

S. PUMP HOUSE ROAD PUMPING STATION

The Pump House Road Pumping Station is located adjacent to Pump House Road at Melton Hill Lake. The pumps are mounted in a 10’ diameter precast concrete wet well and the discharge check valves, plug valves, air/vacuum valves, and other station piping are housed in a 8’ X 10’ precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4” discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are Flygt pumps driven by 105 horsepower, 1750 RPM motors. Each pump is rated at 750 GPM at 200 FT total dynamic head. The pumps are controlled by variable frequency drives.

The station pumps through an 8” diameter cast iron force main which extends 3,038 feet along Pump House Road and Scarboro Road and discharges to the Scarboro Road pumping station wet well.

The pumping station is accessed by a gravel drive off of Pump House Road. A diaphragm type pressure sensor, with gauge, is located in the valve vault. A yard hydrant is available for pump and wet well cleaning and a yard light is available for night time work at the site.

The pumping station power is 460V, 3-phase from 100 kVA pole mounted transformers located at the street. Power enters the station overhead from the transformers to a drop pole and along the drop pole to a 400A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A 4-float redundant level control system provides back-up control of the pumps should the level probe fail. The station has a dedicated elapsed time meter for each pump. The control panel has a horn and flashing light to signify alarm conditions.

Mechanically, the station is rated “Excellent” and it is also rated “Excellent” from an electrical standpoint. Items that were identified as potential maintenance concerns at the time of inspection are as follows:

- No bypass pump connection to the force main is available*.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.

*A bypass pump connection has been added to the station since the inspection was performed.

The station presently receives flow from approximately 42 customers which are served by the collection lines in the basin draining to the station and, the Park Meade pumping station. The calculated theoretically flow entering the station is approximately 541 GPM. With a capacity of 750 GPM per pump, the station has excess capacity available.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 58. Due to its age and failure history, the force main should be replaced.

T. RADISSON COVE PUMPING STATION

The Radisson Cove Pumping Station is located adjacent to Melton Lake Drive east of the end of Radisson Cove. The pumps are mounted in a 6' diameter precast concrete wet well and the discharge check valves, plug valves, air/vacuum valves, and, other station piping are housed in a 7' X 7' precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4" discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are KSB pumps driven by 20 horsepower, 1765 RPM motors. Each pump is rated at 230 GPM at 110 FT total dynamic head.

The station pumps through an 8" diameter PVC force main which extends 1,160 feet and discharges to a manhole behind 26 Rivers Run Way (on easement). The discharge is at approximate elevation 891 feet MSL.

The pumping station site includes a paved parking/turn around area with paved access from Melton Lake Drive. The site is not fenced but, there is a gate at Melton Lake Drive that prevents unauthorized vehicular access. There is an interlocking block retaining wall on the south and east sides of the site.

The pumping station power is 120/240V, 3-phase from a pad mounted transformer located on-site. The transformer size is unknown. Power enters the station underground from the transformer to a 300A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A 4-float redundant level control system provides back-up control of the pumps should the pressure transducer fail. The station has a dedicated elapsed time meter for each pump. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated "Good" and it is also rated "Good" from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.

- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No yard hydrant is available for pump and wet well wash down.
- The piping in the valve vault is unsupported.

The station presently receives flow from approximately 11 customers which are served by the collection lines in the basin draining to the station. The calculated design flow entering the station is approximately 11 gpm. With a capacity of 230 gpm per pump, the station has excess capacity available. It apparently was sized to develop a scour velocity in the force main.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 54.

U. RIVERS RUN PUMPING STATION

The Rivers Run Pumping Station is located at 100 Rivers Run Boulevard. The station is directly adjacent to the road and behind the subdivision entrance sign and landscaping shrubs. The pumps are mounted in a 6' diameter precast concrete wet well and the discharge check valves, plug valves, air/vacuum valves, and other station piping are housed in a 6'X 6' precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4" discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are KSB pumps driven by 36 horsepower, 1,770 RPM motors. Each pump is rated at 250 GPM at 75 FT total dynamic head.

The station pumps through a 6" PVC diameter force main which extends 7,980 feet along Melton Lake Drive and Emory Valley Road and discharges to a manhole just upstream of the Emory Valley pumping station. The discharge is at approximate elevation 794 feet MSL.

The pumping station does not have off-street parking and cannot be directly accessed by service trucks. Pumps must be lifted across the shrubbery between the station and road when removed. A yard hydrant is available for wash down of the pumps and wet well. A Pur-A-Fil drum air scrubber at the site controls odors from the wet well.

The pumping station power is 460V, 3-phase from a 45 kVA pad mounted transformer located on-site. Power enters the station underground from the transformer to a 200A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A 5-float redundant level control system provides back-up control of the pumps should the pressure transducer fail. The station has a dedicated elapsed time meter for each pump. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated “Good” and it is also rated “Good” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- Pump #2 could not be removed during the inspection due to the float cables being wrapped around the pump.

The station presently receives flow from approximately 76 customers which are served by the collection lines in the basin draining to the station, and the Radisson Cove pumping station. The calculated design flow entering the station is approximately 230 gpm. With a capacity of 250 gpm per pump, the station has adequate capacity available. The station basically acts as an intermediate pumping station between Radisson Cove and Emory Valley.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 51.

V. RIVERSWAY PUMPING STATION

The Riversway Pumping Station is located at 120 Marywater Lane. The pumps are mounted in a 6' diameter precast concrete wet well and the discharge check valves, plug valves, air/vacuum valves, and other station piping are housed in a 4' X 8' precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4" discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are Flygt pumps driven by 10 horsepower, 1,735 RPM motors. Each pump is rated at 465 GPM at 51 FT total dynamic head, according to the curve supplied by the Flygt manufacturer's representative. The actual pump design point is not available. Drawdown tests for the pumps resulted in flow rates from 250 to 280 GPM, which represent 68 and 65 feet of head (based on the supplied curve), respectively.

The station pumps through a 6" diameter PVC force main which extends approximately 1,400 feet to the intersection of Melton Lake Drive and Meco Lane where it connects to an 8" PVC pipe, which extends approximately 800 feet to the discharge manhole adjacent to 104 Meco Lane (on easement). The discharge is at approximate elevation 825 feet MSL. The 8" force main also carries the flow from the Gregory's pumping station.

The pumping station site includes a concrete paved access from Marywater Lane. The site is not fenced. The station includes a yard hydrant that was inoperable at the time of the inspection. There is also a valve on the influent gravity line, presumably to shut the influent flow to the station off.

The pumping station power is 120/240V, 3-phase from 2- 25 kVA pad mounted transformers located on-site. Power enters the station underground from the transformers to an 80A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel that initiates the on/off sequence for the pumps. No redundant level control system to provide back-up control of the pumps is available. The station does not have elapsed time meters for the pumps. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated “Excellent” and it is rated “Good” from an electrical standpoint. Items that were identified as potential maintenance concerns at the time of the inspection are as follows:

- No bypass pump connection to the force main is available*.
- No connection for a portable generator or emergency generator is available at the site*.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No redundant system for pump control is available*.
- The yard hydrant was inoperable at the time of the site visit*.

*These items have been addressed by City personnel.

The station presently receives flow from approximately 33 residential customers which are served by the collection lines in the basin draining to the station. The calculated design flow entering the station is 13 gpm. With a rated capacity of 465 gpm and field tested capacity of 250 gpm per pump (based on the drawdown tests); the pump rate is more than sufficient to handle peak flow. The difference in rated capacity and draw down test relates to the common force main issue.

Based on the inspection and City provided data for the station and force main, the station had an overall score of 53 at the time of the inspection. After the improvements made by City personnel, the station now has an overall score of 64.

W. ROCKBRIDGE GREENS PUMPING STATION

The Rockbridge Greens Pumping Station is located at 117 Rockbridge Greens at the front common line of 115 and 117 Rockbridge Greens. The pumps are mounted in a 5’ diameter precast concrete wet well and, the discharge check valves, plug valves, air/vacuum valves, and other station piping are housed in a 4’ X 9’ cast-in-place concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4” discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are Flygt pumps. The actual pump design point is not available. Drawdown tests for the pumps resulted in flow rates of 208 GPM for each pump.

The station pumps through a 6” diameter PVC force main which extends approximately 1,887 feet to the discharge manhole at the intersection of Rockingham Lane and Rolling Links Boulevard. The discharge is at approximate elevation 975 feet MSL.

The pumping station site is directly adjacent to Rockbridge Greens in a heavily landscaped area. The site is not fenced. A yard hydrant is available for wash down of the pumps and wet well.

The pumping station power is 120/240V, 3-phase from a 300 kVA pad mounted transformer located on-site. Power enters the station underground from the transformer to a 100A circuit breaker mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel. The controller initiates the on/off sequence for the pumps. No redundant level control system to provide back-up control of the pumps is available. The station has dedicated elapsed time meters for the pumps. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated “Good” and it is rated “Good” from an electrical standpoint. Items that were identified as potential maintenance concerns at the time of the inspection are as follows:

- No bypass pump connection to the force main is available*.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No redundant system for pump control is available.
- The piping and valves inside the valve vault are too close to the vault walls, creating difficulty in accessing the valves for repair or replacement.
- The access hatches were covered with mulch at the time of the site visit. Mulch has been placed around the station at depths which has created a slope toward the openings, creating a safety hazard. The mulch is very slick, especially when wet.
- The discharge pipes from the pumps are installed in a location too close to the guide rails. When removing the pumps, the pump guide brackets wedge against the pipe flanges, making it difficult to pull the pumps.

*City personnel have installed a bypass pump connection.

The station presently receives flow from approximately 67 customers which are served by the collection lines in the basin draining to the station.

The calculated design flow entering the station is approximately 26 gpm. With a capacity of 200 gpm or more (based on the drawdown tests) per pump, the pump rate is more than sufficient.

Based on the inspection and City provided data for the station and force main, the station had an overall score of 48 at the time of the inspection. After the bypass pump connection was installed (with a pressure gauge connection), the station now has an overall score of 49.

X. ROLLING LINKS PUMPING STATION

The Rolling Links Pumping Station is located at 51 Rolling Links Boulevard at the back of the lot. The pumps are mounted in a 5' diameter precast concrete wet well and the discharge check valves, plug valves, and other station piping are housed in a 4' X 8' cast-in-place concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4" discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are Flygt pumps. The actual pump design point is not available. Drawdown tests for the pumps resulted in flow rates of 195 gpm for each pump.

The station pumps through a 6" diameter PVC force main which extends approximately 770 feet to the discharge manhole on Riverside Drive approximately 500 feet east of its intersection with Rolling Links Boulevard. The discharge is at approximate elevation 904 feet MSL.

The pumping station site is accessed by a gravel drive that extends approximately 120 feet from Rolling Links Boulevard. The site is not fenced. A yard hydrant is available for wash down of the pumps and wet well.

The pumping station power is 120/240V, 3-phase from two 25 kVA pad mounted transformers located on-site. Power enters the station underground from the transformer to a 100A circuit breaker mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel. The controller initiates the on/off sequence for the pumps. No redundant level control system to provide back-up control of the pumps is available.

The station has dedicated elapsed time meters for the pumps. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated “Good” and it is rated “Fair” from an electrical standpoint. Items that were identified as potential maintenance concerns at the time of the inspection are as follows:

- No bypass pump connection to the force main is available*.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No redundant system for pump control is available.
- There are no air valves on the pump discharge pipes.
- The wet well hatch is small for the application. The pumps barely clear the hatch when they are being pulled. Damage to the pumps or hatch could occur if maintenance personnel are not careful when pulling the pumps.
- The access hatch to the valve vault is almost 1’ below the surrounding ground. Water stands over the hatch during periods of rainfall. This could be a safety issue during the winter months as ice may form over the hatch, causing maintenance personnel to slip and fall.

*City personnel have installed a bypass pump connection.

The station presently receives flow from approximately 67 customers which are served by the collection lines in the basin draining to the station. The estimated design flow entering the station is approximately 43 gpm. With a capacity of 195 gpm or more (based on the drawdown tests) per pump, the pump rate is more than sufficient.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 50 at the time of the inspection. After the bypass pump connection was installed (with a pressure gauge connection), the station now has an overall score of 51.

Y. SCARBORO PUMPING STATION

The Scarboro Pumping Station is located on Scarboro Road, approximately 7,500 feet south of its intersection with Chesapeake Drive. The pumps are mounted in a 10’ diameter steel “can”, manufactured by the Clow Corporation, which is accessed through a 3 feet diameter steel access tube. The station piping, valves, and other mechanical and electrical equipment are also located in the “can”. A sump pump, dehumidifier, and exhaust fan are also located in the steel “can”.

The station presently contains 2 vertical mounted, solids handling centrifugal pumps, which take suction through dedicated pipes extending into the wet well. The existing pumps are Yeomans pumps driven by 50 horsepower, 1,750 RPM, Marathon motors. Each pump is rated at 650 GPM at 185 FT total dynamic head.

The station pumps through an 8" diameter cast iron force main which extends 4300 feet and discharges to a manhole approximately 200 feet south of the Scarboro Road/ Union Valley Road intersection. The discharge is at approximate elevation 913 feet MSL.

The pumping station site includes a grassed parking/turn around area with a gravel access drive from Scarboro Road. The site is fenced. Undergrowth is heavy on three sides of the site, outside the fence.

The pumping station power is 460V, 3-phase from pole mounted transformers located adjacent to the site. Power enters the station site overhead from the transformers to a drop pole through 175A fused disconnect mounted on the pole. Power to the station components is underground from the disconnect to the steel "can".

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel that initiates the on/off sequence for the pumps. A single high level float in the wet well will start a single pump should the pressure transducer fail. The station does not have elapsed time meters for the pumps. A telephone line transmitted telemetry signal provides alarms to the WWTP.

Mechanically, the station is rated "Replace" and it is rated "Poor" from an electrical standpoint. Items that were identified as potential maintenance concerns at the time of the inspection are as follows:

- No bypass pump connection to the force main is available*.
- No connection for a portable generator or emergency generator is available at the site.
- The piping and valves inside the station are corroded.
- Foam was noted in the wet well.
- The seals on both pumps were leaking.
- Access to the pumps, piping, valves, and electrical equipment is gained by climbing down a ladder, which creates potential safety hazards.
- The underground installation is damp, which is detrimental to the electrical components inside the station.
- There is minimal room for equipment maintenance and removal inside the station.

- At 20+ years old, the station is approaching the end of its useful life.
- At almost 70 years old, the force main is at the end of its useful life.

**City personnel have installed a bypass pump connection.

The station presently receives flow from the Pump House Road pumping station, and 12 customers within the Commerce Park development. The estimated design flow entering the station is approximately 750 gpm, which is the flow from Pump House Road. With a capacity of 650 gpm per pump, the pumps are undersized with respect to capacity to handle the sewage flows.

Since the major contributor of flow to the station is the Pump House Road station, the station pumps each time the Pump House Road station starts. At present, Pump House Road does not have excess inflow, which allows it to pump only a short time before shutting off. The wet well at Scarboro is able to dampen the flow sufficiently to prevent overflows. Should the load on Pump House Road increase significantly, problems would arise at Scarboro. The station should be scheduled for replacement before the load on Pump House Road increases.

Based on the inspection and City provided data for the station and force main, the station had an overall score of 31 at the time of the inspection. After the bypass pump connection was installed (with a pressure gauge connection), the station now has an overall score of 32.

Z. SOUTHWOOD PUMPING STATION

The Southwood Pumping Station is located south of East Southwood Lane at its intersection with Shagbark Lane. The pumps are mounted in a 6’ diameter precast concrete wet well and the discharge check valves, plug valves, and other station piping are housed in a 4’-8” X 5’-10” concrete block vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on galvanized steel guide rails and connected to the 4” discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are Flygt pumps driven by 10 horsepower, 1,735 RPM motors. Each pump is rated at 425 gpm at 45 FT total dynamic head. The drawdown test showed 100 gpm.

The station pumps through an 4" diameter PVC force main, installed in 2005, which extends 2,638 feet east along East Southwood Lane, cross country to Sweetgum Lane, and along the south side of Sweetgum Lane to a manhole at the end of the cul-de-sac. The discharge is at approximate elevation 792 feet MSL. The existing force main size explains the difference between design capacity (425 gpm) and drawdown tests (105 gpm). If a larger force main were to be installed in the future, the capacity will be increased with no change to the pumps.

The pumping station is at the front common corner of two lots and is accessed directly from the roadway. The site is not fenced. A yard hydrant is available for pump and wet well cleaning.

The pumping station power is 460V, 3-phase from 25 kVA pad mounted transformers located on-site. Power enters the station underground from the transformers to a 60A fused disconnect. Station controls are housed in a stainless steel control panel mounted on a uni-strut frame.

Control of the pumps is initiated through a submersible level probe, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A pressure transducer level control system provides back-up control of the pumps should the probe fail. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated "Fair" and it is rated "Poor" from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- The ground wire to the control panel is disconnected from the ground rod.
- The fused disconnect enclosure is severely corroded.
- The galvanized steel guide rails are corroded and in need of replacement.
- Pump #2 was very difficult to remove due to the corroded guide rails.
- The lifting rings on top of the wet well should be removed (tripping hazard).
- Grease buildup was noted in the wet well.

The station presently receives flow from approximately 64 single family residences which are served by the collection lines in the basin draining to the station.

The estimated design flow entering the station is approximately 25 gpm. With a capacity of 105 gpm (drawdown tests) and 425 gpm with a new force main, the station has excess capacity available.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 50.

AA. SUMMIT RIDGE PUMPING STATION

The Summit Ridge Pumping Station is located at 720 South Illinois Avenue in the Summit Ridge development. The pumps are mounted in an 6' diameter precast concrete wet well and the discharge check valves, plug valves, air/vacuum valves, and other station piping are housed in a 6'X 8' precast concrete vault. Both the wet well and valve vault have the XYPEX additive in the concrete. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4" discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are KSB pumps driven by 10 horsepower, 1745 RPM motors.

The station pumps through a 4" diameter PVC force main, installed in 2005, which extends 760 feet.

The pumping station is accessed from South Illinois Avenue along the paved access road to the Summit Ridge development. A diaphragm type pressure sensor, with gauge, is located in the valve vault. The gauge is unreadable. A yard hydrant is available for pump and wet well cleaning. A bypass pump connection is available in the valve vault.

The pumping station power is 460V, 3-phase from a 75 kVA pad mounted transformer located on-site. Power enters the station underground from the transformer to a 40A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A 5-float redundant level control system provides back-up control of the pumps should the pressure transducer fail. The station has a dedicated elapsed time meter for each pump. The control panel has a horn and flashing light to signify alarm conditions.

Mechanically, the station is rated “Excellent” and it is also rated “Excellent” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- The conduit seals in the wet well are failing.
- When the pumps were pulled, it appeared that there was mud in the wet well.
- The discharge pipe flanges interfere with pump removal.
- The air valve discharge is not piped out of the valve vault, creating the potential for corrosion of the metals in the vault.

The station presently receives flow from 1 commercial customer which is served by the collection lines in the basin draining to the station. The estimated flow entering the station is approximately 10 gpm. With a capacity of 54 gpm per pump, the station has excess capacity available.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 60.

BB. WAREHOUSE ROAD PUMPING STATION

The Warehouse Road Pumping Station is located adjacent to Warehouse Road approximately 250 feet east of Dresden Road. The station is surrounded on 3 sides by thick undergrowth. The pumps are mounted in a 4’ X 4’ concrete wet well and the discharge check valves, plug valves, and other station piping are housed in a 4’ X 4’ concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4” discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are Flygt pumps driven by 2.2 horsepower, 1,670 RPM motors. Each pump is rated at 175 GPM at 10 FT total dynamic head.

The station pumps through a 4” diameter cast iron force main which extends 90 feet and discharges to a manhole north of Warehouse Road and east of the station. The discharge is at approximate elevation 829 feet MSL.

The pumping station is accessed by a gravel drive from Warehouse Road. The site is fenced. A yard hydrant is available for wash down of the pumps and wet well. The wet well is accessed by a set of concrete steps.

The pumping station power is 120/240V, 3-phase from 25 kVA pad mounted transformers located adjacent to the site. Power enters the station overhead from the transformers to a drop pole and through 60A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible level probe, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A 2-float redundant level control system provides back-up control of the pumps should the pressure transducer fail. The station has a dedicated elapsed time meter for each pump. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated “Good” and it is also rated “Good” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- The fence surrounding the site is overgrown.
- A tree inside the fence interferes with service truck access to the station.
- An electrical pole guy wire on the site interferes with pump removal operations.
- The lock on the electrical disconnect was “frozen” and could not be opened.
- The force main, at 50 years old, it is at the end of its useful life.

The station presently receives flow from 2 commercial customers which are served by the collection lines in the basin draining to the station. The estimated design flow entering the station is approximately 5 gpm. With a capacity of 175 gpm per pump, the station has excess capacity available.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 51.

CC. WATO PUMPING STATION

The WATO Pumping Station is located at 113 Eastburn Lane, behind an abandoned radio station building. The pumps are mounted in a 4' X 4' concrete wet well and the discharge check valves, plug valves, and other station piping are housed in a 6' X 8' precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 4" discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are Flygt pumps driven by 3 horsepower, 1,700 RPM motors. Each pump is rated at 80 gpm at 34 FT total dynamic head.

The station pumps through a 4" diameter cast iron force main which extends 574 feet and discharges to a manhole west of the Eastburn Lane/ East Drive intersection (on easement). The discharge is at approximate elevation 853 feet MSL.

The pumping station site includes a gravel parking/turn around area with paved access from Eastburn Lane. The site is not fenced.

The pumping station power is 120/240V, 3-phase from pole mounted transformers located on-site. Power enters the station underground from the drop pole, which also supports the revenue meter, to a 100A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A 4-float redundant level control system provides back-up control of the pumps should the pressure transducer fail. The station has a dedicated elapsed time meter for each pump. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated "Excellent" and it is also rated "Excellent" from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.

- No yard hydrant for water to wash down the pumps or wet well is available.

The station presently receives flow from approximately 13 single-family residential customers and the radio station which are served by the collection lines in the basin draining to the station. The estimated flow entering the station is approximately 5 gpm. With a capacity of 80 gpm per pump, the pumps are sufficient to handle the sewage flows entering the station.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 48.

DD. WEST OUTER PUMPING STATION

The West Outer Pumping Station is located at 1129 West Outer Drive. The station is behind the homes at 1129 and 1127 West Outer Drive. The pumps are mounted in a 5' diameter precast concrete wet well and the discharge check valves, plug valves, air/vacuum valves, and other station piping are housed in a 6'X 6' precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide rails and connected to the 2" discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are KSB grinder pumps driven by 23 horsepower, 3500 RPM motors. Each pump is rated at 45 GPM at 224 FT total dynamic head.

The station pumps through a 3" diameter PVC force main which extends 2,644 feet along West Outer Drive, and discharges to a manhole behind 1096/1097 West Outer Drive. The discharge is at approximate elevation 1,088 feet MSL.

The pumping station is accessed through Oliver Springs from Sugar Road along a gravel access drive. The site is not fenced, but the access drive is gated. A yard hydrant is available for pump and wet well cleaning.

The pumping station power is 120/240V, 3-phase from pole mounted transformers located on West Outer Drive. Power enters the station underground from the transformers to a 200A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps.

The station has a dedicated elapsed time meter for each pump. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated “Fair” and it was rated “Poor” from an electrical standpoint at the time of the inspection. Items that were identified as potential maintenance concerns at the time of the inspection are as follows:

- No bypass pump connection to the force main is available*.
- No connection for a portable generator or emergency generator is available at the site*.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No redundant system for pump control is available*.
- Grease buildup is reported to be a problem at the station.
- The discharge from the air release valves is not piped out of the valve vault, creating the potential for excessive corrosion on the metal components in the vault.
- Vehicular access to the station requires COR personnel to travel outside the service area.

*These items have been addressed by City personnel.

The station presently receives flow from approximately 46 customers which are served by the collection lines in the basin draining to the station. The estimated design flow entering the station is approximately 45 gpm. With a capacity of 45 gpm per pump, the station has adequate capacity available.

Based on the inspection and City provided data for the station and force main, the station had an overall score of 40 at the time of the inspection. After the improvements made by City personnel, the station now has an overall score of 50.

EE. WESTVIEW PUMPING STATION

The Westview Pumping Station is located at 129 Westview Lane behind the home at 121 Westview Lane. The pumps are housed in a steel enclosure mounted on a concrete pad. The pad is poured around a 7’ diameter precast concrete wet well. The discharge check valves, plug valves, air release valve and other mechanical appurtenances are located inside the enclosure. The electrical and instrumentation components are housed inside a panel which is mounted to a metal frame at one end of the enclosure.

The station presently contains a “series” pumping arrangement with a total of 4 pumps; 2 pumps that take suction from the wet well are piped directly to 2 additional identical pumps, creating the series arrangement.

In order to generate the head necessary to pump sewage out of the wet well to the discharge manhole, 2 pumps are operated in series, one pumping to another, which generates the required head. All pumps and motors are mounted inside the fiberglass enclosure directly over the wet well. The existing pumps are Hydromatic pumps driven by 40 horsepower, variable RPM, US motors (each motor drives 2 pumps). Each pump is rated at 175 gpm at 93 feet of head. The total dynamic head is therefore 186 feet (2 X 93 feet).

The station pumps through a 6" diameter PVC force main which extends 720 feet along an easement to the discharge manhole (on easement) behind 103 Westview Lane. The discharge is at approximate elevation 1,145 feet MSL.

The pumping station site is accessed by a gravel access road extending from the paved street between 127 and 129 Westview Lane. The access road follows a right-of-way between 127 and 129 Westview and then generally follows a gravity sewer line to the station. The site is not fenced.

The pumping station power supply is 120/240V, 3-phase from a 50 kvA pad mounted transformer located adjacent to the pump station. Power enters the station underground from the transformer connecting to a revenue meter at the station, which acts as the disconnect. Each pump has a 150A main electrical feed.

Control of the pumps is initiated through 2 floats, mounted in the wet well, which initiate the on/off sequence for the pumps through rising and falling water levels in the wet well. No redundant level control system is available at the station. The station has dedicated elapsed time meters for each pump to monitor run times. The station has an alarm light which flashes to notify of alarm conditions, but has no telemetry to transmit alarm or status conditions to the WWTP.

Mechanically, the station is rated "Replace" and it is also rated "Replace" from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No redundant system for pump control is available.
- No yard hydrant for water to wash down the pumps or wet well is available.

- There is no electrical disconnect to kill power to the station.
- Rats have torn the majority of the insulation away from the fiberglass enclosure.

The station presently receives flow from approximately 29 single-family residential customers which are served by the collection lines in the basin draining to the station. The estimated design flow entering the station is approximately 11 gpm. With a capacity of 175 gpm per pump combination, the pumps are more than sufficient to handle the sewage flows.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 34. This station is currently being replaced with a 180 gpm station.

FF. WHIPPOORWILL PUMPING STATION

The Whippoorwill Pumping Station is located at 104 Whippoorwill Lane. The pumps are mounted in a 6' X 7' precast concrete wet well with a 6' diameter precast concrete riser mounted on top and the discharge check valves, plug valves, air/vacuum valves, and other station piping are housed in a 6' X 6' precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide cables and connected to the 4" discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are KSB pumps driven by 20 horsepower, 1750 RPM motors. Each pump is rated at 300 gpm at 96 FT total dynamic head.

The station pumps through a 6" diameter PVC force main which extends 566 feet and discharges to a manhole behind 1097 West Outer Drive (on easement). The discharge is at approximate elevation 812 feet MSL.

The pumping station site includes a gravel parking/turn around area with access from Whippoorwill Lane. The site is not fenced. The station includes a Pur-A-Fil drum air scrubber to control odors at the site.

The pumping station power is 460V, 3-phase from a 45 kVA pad mounted transformer located on-site. Power enters the station underground from the transformer to a 200A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A 5-float redundant level control system provides back-up control of the pumps should the pressure transducer fail. The station has a dedicated elapsed time meter for each pump. The control panel has a horn and flashing light to signify alarm conditions.

Mechanically, the station is rated “Good” and it is rated “Excellent” from an electrical standpoint. Items that are identified as potential maintenance concerns are as follows:

- No bypass pump connection to the force main is available.
- No connection for a portable generator or emergency generator is available at the site.
- The station has no remote telemetry to transmit alarm or other station conditions.
- No yard hydrant is available for pump and wet well wash down
- Debris was noted in the wet well.

The station presently receives flow from approximately 133 single-family residential customers which are served by the collection lines in the basin draining to the station, and the following pumping stations:

- William Lane
- Westview

The estimated design flow entering the station is approximately 347 gpm. With a capacity of 300 gpm per pump, the pump rate is borderline. However, the station has not experienced problems in handling the influent flow. When the Westview Station is replaced, the capacity of this station must be monitored relative to capacity.

Based on the inspection and City provided data for the station and force main, the station has an overall score of 53.

GG. WILLIAMS PUMPING STATION

The Williams Pumping Station is located at the end of William Lane, east of its intersection with Winchester Circle. The pumps are mounted in a 7’ diameter precast concrete wet well and the discharge check valves, plug valves, air/vacuum valves, and other station piping are housed in a 6’ X 7’ precast concrete vault. The electrical and instrumentation components are housed in a stainless steel cabinet mounted on a uni-strut frame adjacent to the station.

The station presently contains 2 submersible pumps, which are mounted on stainless steel guide cables and connected to the 4" discharge piping through a discharge elbow mounted to the bottom of the wet well. The existing pumps are KSB pumps driven by 49 horsepower, 1,750 RPM motors. Each pump is rated at 120 gpm at 210 FT total dynamic head.

The station pumps through a 4" PVC diameter force main which extends 1,454 feet and discharges to a manhole behind 108 Winchester Circle (on easement). The discharge is at approximate elevation 1,029 feet MSL.

The pumping station site includes a parking/turn around area with access from William Lane. The site is not fenced. A yard hydrant is available for pump and wet well wash down.

The pumping station power is 460V, 3-phase from a pad mounted transformer located on-site. Power enters the station underground from the transformer to a 200A fused disconnect mounted adjacent to the control panel.

Control of the pumps is initiated through a submersible pressure transducer, mounted in the wet well, which transmits the wet well water level to a controller mounted in the control panel which initiates the on/off sequence for the pumps. A 2-float redundant level control system provides back-up control of the pumps should the pressure transducer fail. The station has a dedicated elapsed time meter for each pump. The control panel has a flashing light to signify alarm conditions.

Mechanically, the station is rated "Good" and it is rated "Good" from an electrical standpoint. Items that were identified as potential maintenance concerns at the time of the inspection are as follows:

- No bypass pump connection to the force main is available*.
- No connection for a portable generator or emergency generator is available at the site*.
- The station has no remote telemetry to transmit alarm or other station conditions.
- The connection between the guide cables and concrete structure is heavily corroded, which could lead to failure of the connection.
- The pressure gauge connected to the diaphragm pressure sensor is inoperable*.

*These items have been addressed by City personnel.

The station presently receives flow from approximately 50 single-family residential customers which are served by the collection lines in the basin draining to the station. The estimated design flow entering the station is approximately 20 gpm. With a capacity of 120 gpm per pump, the pumps are sufficient to handle the sewage flows entering the station.

Based on the inspection and City provided data for the station and force main, the station had an overall score of 52 at the time of the inspection. After the improvements were made by City personnel, the station now has an overall score of 59.

HH. WOLF CREEK PUMPING STATION

The Wolf Creek pumping station is located at 108 Pavillion Drive. At this time, the station had not been accepted by the City of Oak Ridge, and little information was available with respect to the pump design conditions, force main sizing and routing, or other information.

The station pumps through a 4” PVC force main.

Mechanically, the station was rated “Poor” and it was rated “Good” from an electrical standpoint at the time of the inspection. Items that were identified as potential maintenance concerns are as follows:

- The station has no remote telemetry to transmit alarm or other station conditions.
- The check valve on pump #2 was inoperable, which was allowing flow from pump #1 to drain back into the wet well*.
- A pipe in the valve vault was broken at the valve due to no pipe supports under the valve*.
- No lock was installed on the wet well hatch*.

*These items have been addressed.

The station has an overall score of 53.

SECTION IV

EVALUATION SUMMARY

Table IV-1 displays the summary of the ratings of each pumping station. The ratings are based on the evaluation system shown in Section II.

Table IV-2 is a summary of the pumping station design flows and actual rated station capacity. It is clear that attention is needed to upgrade the system with SCADA. That work is in progress. The City is currently upgrading control panels and installing by-pass pumping arrangements.

TABLE IV-1
CITY OF OAK RIDGE, TENNESSEE
PUMP STATION RELIABILITY STUDY
PUMP STATION RATING

STATION	FORCE MAIN				DESIGN CAPACITY		SITE ACCESS	WATER / LIGHTING	SECURITY		PERSONNEL	PUMPS				SCREENING	PRESS GAUGE / FLOW METER	SPARE PARTS	POWER		CONTROLS			SCADA	TOTAL SCORE
	AGE	MATERIAL	REPL. PARTS	FAILURE HISTORY	WET	DRY			ACCESS CONTROL	SIGNAGE		AGE	MOTOR SPEED	FAILURE HISTORY	TYPE				SOURCE(S)	BACK-UP	NEMA RATING	CONDITION	REDUNDANCY		
	4	2	1	3	5	5	2	1	1	1	8	4	1	6	2	1	2	3	4	2	1	8	2	5	
PALISADES #4	2	2	1	3	2	2	1	1	0	0	8	1	1	2	0	0	0	0	2	0	0	0	0	0	28
PALISADES #2	2	2	1	3	2	2	2	1	0	0	8	1	1	2	0	0	0	0	2	0	0	0	0	0	29
GREGORY'S	2	2	1	3	5	5	0	0	0	0	8	1	1	1	0	0	0	0	1	0	0	1	0	0	31
SCARBORO	0	1	1	1	4	4	2	0	1	0	8	1	1	1	0	0	1	2	3	0	0	1	0	0	32
CASTLEWOOD	2	2	1	3	5	5	1	0	0	0	8	1	1	3	0	0	0	0	1	0	0	1	0	0	34
WESTVIEW	2	2	1	3	5	5	1	0	0	0	8	1	1	0	2	0	0	1	2	0	0	0	0	0	34
PALISADES #3	2	2	1	3	5	5	1	1	0	0	8	1	1	2	0	0	0	0	2	0	0	0	0	0	34
PALISADES #1	2	2	1	3	5	5	2	1	0	0	8	1	1	2	0	0	0	0	2	0	0	0	0	0	35
EMORY HEIGHTS	0	0	1	2	0	5	2	0	0	0	8	2	1	3	2	0	0	3	2	0	1	3	2	0	37
PEACH ORCHARD	0	0	0	1	5	5	1	0	0	0	8	3	1	6	2	0	0	3	3	0	1	5	2	0	46
MARINA	2	1	1	0	5	5	2	0	0	0	8	4	1	6	2	0	1	3	2	0	1	3	0	0	47
WATO	1	1	1	3	5	5	2	0	0	0	8	3	1	6	2	0	0	3	1	0	1	3	2	0	48
ROCKBRIDGE GREEN	4	2	1	3	5	5	0	1	0	0	8	4	1	4	2	0	1	3	2	0	1	2	0	0	49
OAK HILLS	4	2	1	3	0	5	2	1	1	0	8	2	1	4	1	0	1	2	4	0	1	4	2	0	49
WEST OUTER	2	2	1	3	5	5	0	1	0	0	8	3	0	2	0	0	1	3	2	2	1	8	2	0	50
SOUTHWOOD	3	2	1	3	5	5	2	1	0	0	8	2	1	4	2	0	0	3	3	0	1	2	2	0	50
FAIRBANKS	1	0	1	3	5	5	2	1	0	0	8	3	1	6	2	0	0	3	4	0	1	2	2	0	50
RIVERS RUN	3	1	1	3	3	5	0	1	0	0	8	3	1	6	2	0	0	3	3	0	1	5	2	0	51
WAREHOUSE ROAD	1	1	1	3	5	5	1	1	1	0	8	2	1	6	2	0	0	3	3	0	1	4	2	0	51
ROLLING LINKS	3	2	1	3	5	5	2	1	0	0	8	3	1	6	2	0	1	3	2	0	1	2	0	0	51
WHIPPOORWILL	3	2	1	3	3	3	2	0	0	0	8	3	1	6	2	0	0	3	3	0	1	7	2	0	53
WOLF CREEK	4	2	1	3	5	5	2	1	0	0	8	4	1	0	2	0	1	3	2	0	1	6	2	0	53
RADISSON COVE	2	1	1	3	5	5	2	0	1	0	8	4	1	6	2	0	0	3	2	0	1	5	2	0	54
CENTENNIAL BLF	4	2	1	3	5	5	2	1	0	0	8	4	1	0	2	0	1	3	2	0	1	7	2	0	54
EAST PLANT	2	1	1	3	5	5	2	1	1	1	8	1	1	3	2	1	1	1	2	2	1	6	0	4	55
PARK MEADE	3	1	1	3	5	5	2	1	1	0	8	3	1	6	0	0	1	3	3	2	1	6	1	0	57
PUMP HOUSE RD	1	1	1	2	5	5	2	1	1	0	8	4	1	6	2	0	1	3	3	0	1	8	2	0	58
GRACELAND	2	1	1	3	5	5	2	1	0	0	8	4	1	6	2	0	1	3	2	0	1	8	2	0	58
GUM HOLLOW	2	0	1	3	2	5	2	0	0	0	8	4	1	6	2	0	1	3	2	2	1	8	2	0	59
HOME DEPOT	4	2	1	3	5	5	2	1	0	0	8	4	1	6	2	0	1	3	4	0	1	4	2	0	59
WILLIAMS	2	1	1	3	5	5	2	1	0	0	8	3	1	6	2	0	1	3	2	2	1	3	2	0	59
SUMMIT RIDGE	4	2	1	3	5	5	2	1	0	0	8	4	1	6	2	0	1	3	2	0	1	7	2	0	60
RIVERSWAY	4	2	1	3	5	5	2	1	0	0	8	4	1	6	2	0	1	3	3	2	1	8	2	0	64
EMORY VALLEY	3	1	1	3	2	5	2	1	1	1	8	4	1	6	2	1	1	3	3	2	1	8	0	4	64

TABLE IV-2
CITY OF OAK RIDGE, TENNESSEE
PUMP STATION EVALUATION AND REPAIR PROGRAM
LIFT STATION CAPACITY SUMMARY

Name	Mini-System	Address	Rated Capacity (gpm)	Number of Houses	Calculated Theoretical Flow (gpm)
East Plant	E13B	151 Cairo Road	2,800	2,390	938
Emory Valley	E5B	Emory Valley Rd/Baylor Dr. Int.	1,150	1,749	686
Marina	E20	695 Melton Lake Drive	140	133	52
Gregory's	E30	Melton Lake Drive-Parcel 94-D	230	53	21
Castlewood	E28	Turnpike behind Castlewood Apts.	125	96	38
WATO	E12	113 Eastburn Lane	80	13	5
Westview	W29	129 Westview Lane	175	29	11
Williams	W29	Williams Lane	120	50	20
Whippoorwill	W29	104 Whippoorwill Lane	300	133	347
Palisades #4	E31	40 Palisades Parkway	80	16	121
Palisades #3	E31	28 Palisades Parkway	115	18	86
Palisades #2	E31	18 Palisades Parkway	80	10	84
Palisades #1	E31	10 Palisades Parkway	80	9	4
Scarboro	W26	Scarboro Rod	650	12	755
Wolf Creek	E37	108 Pavilion Drive	*	*	*

*Not yet accepted by the City.

TABLE IV-2 continued
CITY OF OAK RIDGE, TENNESSEE
PUMP STATION EVALUATION AND REPAIR PROGRAM
LIFT STATION CAPACITY SUMMARY

Name	Mini-System	Address	Rated Capacity (gpm)	Number of Houses	Calculated Theoretical Flow (gpm)
Rockbridge Green	E29A	117 Rockbridge Greens Blvd	200*	67	26
Rolling Links	E29	51 Rolling Links Blvd	195*	110	43
Radisson Cove	E29	Radisson Cove near Edgemoor Rd	230	11	4
Rivers Run	E29	100 Rivers Run Blvd	250	76	260
Warehouse Road	E13A	Warehouse Road	175	2	---
Fairbanks	E13A	545 Oak Ridge Turnpike	175	4	2
Emory Heights	E22	Coe Road	180	241	95
Home Depot	E7	Laboratory Drive	---	---	---
Oak Hills	W17	Oak Ridge Turnpike/SR 58	350	181	496
Gum Hollow	W20	197 Gum Hollow Road	300	191	275
Peach Orchard	W8	105 Wedgewood Road	140	30	12
Summit Ridge	W23	720 S. Illinois Ave.	100	1	---
Southwood	W27A	East Southwood	425**	64	25
Graceland	W20	113 Graceland Road	200	49	19
Riversway	E30	120 Mary Water Lane	465	33	13
Pump House Road	W26	Pump House Road	750	42	541
Centennial Bluff	W26A	300A Centennial Bluff	300	---	---
West Outer	W22	1129 W. Outer Drive	45	46	45

*drawdown test flow

**actual capacity is 100 gpm due to force main size

The majority of stations received low scores for power (backup), controls (condition and redundancy) and SCADA (lack of). Also, at the time of the field inspections, very few of the stations included connections for bypass pumps.

The City has purchased 23 new control panels to replace existing sub-standard panels. The new panels, all constructed under the newly developed set of standards, include the following appurtenances which will address deficiencies identified in the inspections:

- Connections for emergency power feed from portable generators.
- Totally redundant pump control systems including level probes and controllers.
- Circuitry and provisions for future SCADA connections.

The following stations will be retrofitted with new control panels:

- Centennial Bluff
- Emory Heights
- Fairbanks
- Graceland
- Gum Hollow
- Home Depot
- Marina
- Oak Hills
- Park Meade
- Peach Orchard
- Radisson Cove
- Rivers Run
- Riversway*
- Rolling Links
- Rock Bridge Green
- Southwood
- Summit Ridge
- W.A.T.O
- Warehouse Road
- West Outer Drive*
- Whippoorwhil Lane
- Williams Lane*
- Wolf Creek

*Completed at the time of the report.

New panels will be installed at the following stations as a part of overall station upgrades either underway or scheduled in the future:

- Castlewood
- Gregory's
- Palisades #1
- Palisades #2
- Palisades #3
- Palisades #4
- Westview

The Scarboro Station will not receive a new control panel since it is scheduled for retirement when a new larger diameter force main is constructed from the Pump House Road Station. The control panel at Pump House Road will be retrofitted to meet the new standards.

The following stations have been retrofitted with connections for portable pumps:

- Emory Heights
- Fairbanks
- Gum Hollow
- Home Depot
- Marina
- Oak Hills
- Park Meade
- Pump House Road
- Riversway
- Rock Bridge Green
- Rolling Links
- Scarboro Road
- Southwood
- Summit Ridge
- Warehouse Road
- W.A.T.O
- West Outer Drive
- Whipporwhil Lane
- Williams Lane
- Wolf Creek

(The portable pump connections include a connection for a pressure gauge).

The following stations are scheduled to be retrofitted with portable pump connections:

- Centennial Bluff
- Graceland
- Peach Orchard
- Radisson Cove
- Rivers Run

Portable pump connections will be installed at the following stations as part of overall station upgrades either underway or scheduled in the future:

- Castlewood
- Gregory's
- Palisades #1
- Palisades #2
- Palisades #3
- Palisades #4
- Westview

SECTION V

CONCLUSIONS AND RECOMMENDATIONS

A. OVERVIEW

The City of Oak Ridge maintains thirty-four sanitary sewer pumping stations, two of which (Centennial Bluff and Wolf Creek) are incomplete, and as of the date of this report, have not been accepted for ownership by the City.

The City has, over the past two decades, proceeded with a program to replace stations that were at the end of their useful lives. Many of these stations were either overloaded hydraulically or were experiencing mechanical problems.

This program of replacement and upgrades continues at the present time. Replacements for the Castlewood and Westview stations have been designed and are ready for construction. The Gregory's pumping station is being upgraded by City crews. These are three of the lowest scoring stations under the scoring system developed for the study.

The four Palisades stations, which act in conjunction with one another to transport flow from the Palisades Subdivision to the City's collection system, also scored very low in the rating system and should be upgraded/replaced in the next round of pump station construction.

The Scarboro Station scores very low in the rating system. As a part of the Pump House Road design effort, it was determined that the Scarboro Road station could be eliminated by designing the new Pump House Road station and a new force main to bypass the Scarboro Station.

Numerous stations received low scores under the "Controls" category. This was due to control panels that have aged, have no redundant control system, and other factors. The City has embarked on a control panel replacement program that includes replacement of 23 control panels with new, state of the art systems. At the time of this report, the panels have been ordered and delivery has begun. The new control panels will include many of the equipment and control items lacking in the existing station panels. These items include redundant controls for wet well level measurement and pump control, provisions for future SCADA connection and monitoring from the WWTP, and connections for emergency generators.

The panels will also be of a standardized design and construction which will eliminate the requirement for maintenance personnel to operate multiple types of control equipment.

The stations not receiving one of the new panels are those that are scheduled for replacement, and those that have newer panels that can be readily retrofitted to meet the City's newly developed standards. The stations that will not receive one of the new control panels are:

- Castlewood
- Gregory's
- Palisades #1
- Palisades #2
- Palisades #3
- Palisades #4
- Pump House Road
- Scarboro Road

As a part of the replacement program, the Scarboro Road Station will be retired in conjunction with the new force main from Pump House Road being installed. The Pump House Road control panel will be retrofitted to meet City standards. The remaining stations will have new control panels installed as a part of station upgrades presently planned.

City personnel have also begun a program to install bypass pump connections at all stations to provide a connection for one of their portable pumps in the case of a catastrophic failure at the station, or should the station mechanical components require maintenance or repairs that require a major shutdown. At the end of the program, all stations will include a bypass pump connection.

Other items that should be considered in the City's budgeting discussions for each station include:

- Yard hydrants
- Fences
- Lights
- Pressure gauges or, at a minimum, connections for gauges
- Flow meters at larger (capacity) stations
- Screening facilities where debris is an issue

Many of the existing stations have very few of these items and their rating scores reflect their lack of them.

The City is progressing with a comprehensive SCADA system to monitor the stations and provide better response time in the case of a problem.

Other parameters which impact the rating are the age and condition of force mains. Numerous stations have force mains that are at or near the end of their useful lives, and in some cases have experienced failures. The force mains to be considered for replacement are:

- Marina
- Castlewood (cast iron portion)
- WATO
- Pump House Road (installation of new force main and eliminate the Scarboro station)
- Warehouse Road
- Fairbanks
- Emory Heights
- Gum Hollow
- Peach Orchard

These force mains are either asbestos-cement (AC) or cast iron that are 30 to 50 years old. A schedule for replacement of the force mains should begin with the force mains that presently experience failures being addressed within the next twenty-four months, and the others within the following three years.

The City will, on an annual basis, review and update (by addendum), the pump station evaluation and repair program.

City of Oak Ridge, Tennessee

PUMP STATION EVALUATION AND REPAIR PROGRAM

VOLUME II

APRIL 2012

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City of Oak Ridge

Pump Station Inspection

Date:	11/10/10	Location:	Turnpike behind Castlewood Apts east of ball field-Arcadia Lane	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-02-43
Name of Station:	Castlewood			Longitude:	NS: 84-12-39

ID: 5

Mechanical Station Condition: Replace

Electrical Station Condition: Replace

Type:	Suction Lift	Power Source	UG fm pad mt resid	Level Control:	Floats
Number of Pumps:	2	Service:	UG	Control Manufacturer:	
Pump Brand:	Hydromatic	Transformer Number:		Redundant Level Control:	No
Serial Number:	19640,19639	Transformer Type:	Pad	Number / Type:	
Pump Curve:	Yes	Transformer Size:		Flowmeter Type:	None
Wet Well Diameter	5 ft	Voltage:	240/120	Lapse Time Meter:	No
Wet Well Storage Depth:	5.25 to infl ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:		Telemetry Type:	None
Pressure Gauge Dischrg:	No	Main Amps:		Alarm Type:	Light
FM Material:	Other	Motor Control Location:	Panel	Control Sequence:	Lead/Lag w/ floats (4)
FM Size:	6 (CI) in	Motor Controller	Across the Line		
FM Length	850 ft	HP	5-1155 rpm		
Discharge Elevation:	831.2	Motor Brand	GE		
Evidence of Overflow:	No	Motor Serial Number:	5K215DL356A	Other Station Equipment:	Heater (portable)
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Remarks: Drawdown 6-1/2 inches in 30 sec= 160 gpm (each pump); pump model # 40MMPC500-3-6, 9-1/8" impeller;ea pump has 20A 3P breaker;

City of Oak Ridge

Pump Station Inspection

Date:	01/05/11	Location:	300A Centennial Bluff	Date of Construction:	under construction	ID:	34
Inspector:	sh			Latitude:	EW: 36-01-15		
Name of Station:	Centennial Bluff			Longitude:	NS: 84-10-05		

Mechanical Station Condition:	Fair	Electrical Station Condition:	Good

Type:	Submersible	Power Source	Underground fm p	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	
Pump Brand:		Transformer Number:	2557	Redundant Level Control:	Yes
Serial Number:		Transformer Type:	Pad	Number / Type:	Probe
Pump Curve:		Transformer Size:	75 kVA	Flowmeter Type:	None
Wet Well Diameter	6 ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Circuit Breaker	Telemetry Type:	None
Pressure Gauge Dischrg:		Main Amps:	200	Alarm Type:	Horn/Light
FM Material:		Motor Control Location:	Panel		
FM Size:	in	Motor Controller	VFD		
FM Length	ft	HP			
Discharge Elevation:		Motor Brand			
Evidence of Overflow:		Motor Serial Number:			
Fence:	Yes	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on/off 50/10% Lag on/off 60/20%

Other Station Equipment: Yard hydrant;Pur-A-Fil scrubber;yard light

Remarks: VFD is Altivar 48; Valve vault is flloded; 1 pump running continuously (very hot) with no flow into wet well; 1 pump faulted; STATION NOT ACCEPTED BY COR AS OF INSPECTION DATE

City of Oak Ridge

Pump Station Inspection

Date:	11/03/10	Location:	End of Cairo Road-151 Cairo Road	Date of Construction:	
Inspector:	sb/sh/gh			Latitude:	EW: 36-02-23
Name of Station:	East Plant			Longitude:	NS: 84-12-36

ID: 1

Mechanical Station Condition: Good

Electrical Station Condition: Good

Type:	W-well/D-well	Power Source	Pad Mt Transforme	Level Control:	Pressure
Number of Pumps:	2	Service:	OH	Control Manufacturer:	US Filter/Sigma
Pump Brand:	Fairbanks Morse	Transformer Number:	8504	Redundant Level Control:	No
Serial Number:	No Nameplate	Transformer Type:	Pad	Number / Type:	
Pump Curve:	yes	Transformer Size:	unknown	Flowmeter Type:	Mag Meter
Wet Well Diameter	15x32x19 ft	Voltage:	460	Lapse Time Meter:	No
Wet Well Storage Depth:	12 ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Circuit Breaker	Telemetry Type:	
Pressure Gauge Dischrg:	No	Main Amps:	800A frame	Alarm Type:	Telemetry
FM Material:	DI	Motor Control Location:	MCC		
FM Size:	16/18 in	Motor Controller	Soft Start		
FM Length	10564/3703 ft	HP	200-1785 rpm		
Discharge Elevation:	915.82	Motor Brand	Reliance		
Evidence of Overflow:	No	Motor Serial Number:	IMA-497830-G2-XG		
Fence:	Yes	Aux Power:	Diesel		
		Generator Brand	Cummins		
		Generator kW	260		

Control Sequence: Lead on at 10 ft/ off at 6 ft Lag on at 10.5 ft / off at 6.5 ft

Other Station Equipment: Mufin monster hyd grinder w/bypass screen; power UG from drop pole to bldg;water seal sys (2-Aurora I4TBF;ser # 80-16282-1&2) for pumps; mercoid sw on chk valves (signal open);ext shafts to pumps;2 sump pumps to common 4";vent fan to lower level;

Remarks: Pumps are 10"X6"; Motors are: Frame-445HP,Type P, 1785 RPM, 60 Hz, Ins Cl B, 40 deg C, 223 FLA, Cont Duty, Des B, SF 1.0; Some corrosion on metals (pump bases,etc); some issues with ext shafts to pumps; hatch in floor for pump removal (no crane or trolley for pump removal); corrosion on metals at influent structure (severe in spots); name plate on Channel monster difficult to access (info kept at maint. Dept.); stub with valve for future pump

City of Oak Ridge

Pump Station Inspection

Date:	12/10/10	Location:	Coe Road in Emory Hts Subdv behind house, adj to RR tracks	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-01-54
Name of Station:	Emory Heights			Longitude:	NS: 84-13-25

ID: 23

Mechanical Station Condition:

Electrical Station Condition:

Type:	Submersible	Power Source	UG fm pole	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	Dig Cont Corp P/N
Pump Brand:	KSB	Transformer Number:	2722/2723/2724	Redundant Level Control:	Yes
Serial Number:	869018/869019	Transformer Type:	Pole	Number / Type:	4 FLOATS
Pump Curve:	Yes	Transformer Size:	15kVA ea	Flowmeter Type:	None
Wet Well Diameter	6 ft	Voltage:	208	Lapse Time Meter:	Yes
Wet Well Storage Depth:	5.8'/14.2' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	No	Main Amps:	100	Alarm Type:	Light
FM Material:	AC	Motor Control Location:	Panel		
FM Size:	6 in	Motor Controller	Across the Line		
FM Length	583 ft	HP	4.5		
Discharge Elevation:	830 +/- (tee in grav	Motor Brand			
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence:

Lead on 50%/off 28% Lag on 58%/off 30% High alarm 78% Low alarm 15%

Other Station Equipment:

Remarks: Gravel drive; PumpPak Control panel; valve vault 6' x 6' x 62" deep,4 " piping; wet well tot depth 170" , 100" to influent pipe; P1 10-1/2" in 60 sec=185+ GPM, P2 8-1/2 " in 60 sec=150 GPM (infl flow into station clear and at 20-30 gpm); evidence of surcharge to top of wet well, no evidence of overflow NEED A YARD HYDRANT HERE

City of Oak Ridge

Pump Station Inspection

Date:	11/03/10	Location:	Emory Valley Road at Baylor Drive	Date of Construction:	
Inspector:	sb/sh/gh			Latitude:	EW: 36-01-37
Name of Station:	Emory Valley			Longitude:	NS: 84-12-13

ID: 2

Mechanical Station Condition: Excellent

Electrical Station Condition: Excellent

Type:	W-well/D-well	Power Source	480V fm pole	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	US Filter
Pump Brand:	Flygt	Transformer Number:		Redundant Level Control:	No
Serial Number:	3202.180-1020089;	Transformer Type:	Pole	Number / Type:	
Pump Curve:	yes	Transformer Size:		Flowmeter Type:	Mag Meter
Wet Well Diameter	14x24x5 ft	Voltage:	460	Lapse Time Meter:	No
Wet Well Storage Depth:	5 ft	Phase:		Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Circuit Breaker	Telemetry Type:	
Pressure Gauge Dischrg:	No	Main Amps:	400	Alarm Type:	Telemetry
FM Material:	DI	Motor Control Location:	MCC		
FM Size:	SEE REMARKS in	Motor Controller	Soft Start		
FM Length	SEE REMARKS ft	HP	70-1775 rpm		
Discharge Elevation:	915.82	Motor Brand	subm pumps		
Evidence of Overflow:	No	Motor Serial Number:	N/A		
Fence:	Yes	Aux Power:	Diesel		
		Generator Brand	Kohler		
		Generator kW	125		

Control Sequence: Lead on at 6.5 ft/ off at 4 ft Lag on at 7.5 ft / off at 4 ft

Other Station Equipment: Muffin monster hyd grinder w/bypass screen; ASCO ATS;GA OL&W ck valves w/ mercoid position switch; 2 sump pumps to common 4"; vent fan to each level;Roots blower (33 URA-I, ser. #1005913652) for wet well mixing

Remarks: Power is UG from pole w/transformers approx 190 ft west of site; pumps are dry pit submersible; 10"X8" red el on pump suction/ 5" discharge; SST flex spool on disch of each pump; Roots blower keeps solids suspended in wet well; Manual slide gates for grinder bypass very difficult to move; Muffin Monster teeth and bearings replaced October 2010; Water mark 6' high on lower floor wall due to high flows; Force mains are: 8000 ft 10" ties to ex 18" from East Plant; 7500 ft new 10" and 4300 ft new 12" tieing to 18" fmain from East Plant just outside disch MH

City of Oak Ridge

Pump Station Inspection

Date:	12/10/10	Location:	545 Oak Ridge Turnpike in commercial development	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-02-30
Name of Station:	Fairbanks			Longitude:	NS: 84-14-06

ID: 22

Mechanical Station Condition: Fair

Electrical Station Condition: Good

Type:	Submersible	Power Source	UG from ???	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	Consol D152 w/ MI
Pump Brand:	Flygt	Transformer Number:	??	Redundant Level Control:	Yes
Serial Number:	9451251/9451252	Transformer Type:	Other	Number / Type:	2 floats
Pump Curve:	Yes	Transformer Size:	??	Flowmeter Type:	None
Wet Well Diameter	4'x4' ft	Voltage:	208	Lapse Time Meter:	Yes
Wet Well Storage Depth:	4.5'/16.2' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	No	Main Amps:	60	Alarm Type:	Light
FM Material:	DI	Motor Control Location:	Panel		
FM Size:	6 in	Motor Controller	Across the Line		
FM Length	86 ft	HP	2.2		
Discharge Elevation:	836.63	Motor Brand			
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence:

Lead on 3'/off 1.75'	Lag on
4'/off 2'	High Alarm
6'	Low Alarm 1-1/4'

Other Station Equipment: Yard Hydrant

Remarks: Wet well 4'x4' (CIP) w/3-1/2'x3-1/2' Al hatch, total depth 194" ,140" to influent; P1 5" in 30 sec=100 GPM, P2 5-1/2" in 30 sec=110 GPM; Pumps 3085.181-6244,FLS M15-07-4AA, 7.4 FLA, 1670 rpm, .85 PF

City of Oak Ridge

Pump Station Inspection

Date:	12/22/10	Location:	113 Graceland Rd	Date of Construction:	2008	ID:	31
Inspector:	sb/sh			Latitude:	EW: 36-57-52		
Name of Station:	Graceland			Longitude:	NS: 84-19-38		

Mechanical Station Condition:	Excellent	Electrical Station Condition:	Excellent

Type:	Submersible	Power Source	UG fm pole	Level Control:	Probe
Number of Pumps:	2	Service:	UG	Control Manufacturer:	
Pump Brand:	Flygt	Transformer Number:	11131/11132/1113	Redundant Level Control:	Yes
Serial Number:		Transformer Type:	Pole	Number / Type:	
Pump Curve:	Yes	Transformer Size:	3@ 25 kVA	Flowmeter Type:	None
Wet Well Diameter	8 ft	Voltage:	460	Lapse Time Meter:	Yes
Wet Well Storage Depth:	5.9'/17.3' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:	803.0	Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	Yes	Main Amps:	200/150 A brkr	Alarm Type:	Light
FM Material:		Motor Control Location:	Panel		
FM Size:	6 in	Motor Controller	Soft Start		
FM Length	2059 ft	HP	20		
Discharge Elevation:	894.7	Motor Brand	Flygt		
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: lead on 50/off 20% 60/off 20% 90/10% Lag on High/Low AL

Other Station Equipment: yard hydrant;Purafil DS500

Remarks: 35 psi stat/40 psi running; Purafil unit ser # L08-0199; ground very soft around station, needs access drive to pull pumps;valve vault 6'x6'x7.5' deep,4" piping, 2 ARV

City of Oak Ridge

Pump Station Inspection

Date:	11/03/10	Location:	Melton Lake Drive on Parcel 94D-E-24; ~310 ft fm Melton Lake Drive-Melton Lake Peninsula	Date of Construction:		ID:	4
Inspector:	sb/sh/gh			Latitude:	EW: 36-04-44		
Name of Station:	Greggory's			Longitude:	NS: 84-20-27		

Mechanical Station Condition: Replace

Electrical Station Condition: Replace

Type:	Suction Lift	Power Source	UG fm residential t	Level Control:	Floats
Number of Pumps:	2	Service:	UG	Control Manufacturer:	
Pump Brand:	Hydromatic	Transformer Number:	Unavailable	Redundant Level Control:	No
Serial Number:	24019,24020	Transformer Type:	Pad	Number / Type:	
Pump Curve:	Yes	Transformer Size:	Unavailable	Flowmeter Type:	None
Wet Well Diameter	5 ft	Voltage:	240/120	Lapse Time Meter:	No
Wet Well Storage Depth:	??/17' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:	781.5	Disconnect Type:		Telemetry Type:	
Pressure Gauge Dischrg:	No	Main Amps:	N/A	Alarm Type:	
FM Material:	PVC	Motor Control Location:	Other		
FM Size:	6"/8" in	Motor Controller	Across the Line		
FM Length	860'/800' ft	HP	15 -1735 rpm		
Discharge Elevation:	830	Motor Brand	GE		
Evidence of Overflow:	No	Motor Serial Number:	Unavailable		
Fence:	No	Aux Power:	None		
		Generator Brand	N/A		
		Generator kW	N/A		

Control Sequence: Unknown float levels

Other Station Equipment:

Remarks: Station very old, needs to be replaced; grease in wet well from restaurant; new plug valve/check valve combos installed recently; pump model $ 40MMPC 15003-4, 9-1/8" impeller; fiberglass hood over station; RR tie retaining wall on south and west sides; in back yard of condo; access by gravel drive off Melton lake Drive; 4 control floats; no electrical disconnect; drawdown test pump 1 ~ 210 gpm, pump 2 ~ 245 gpm (inflow unknown- could not see pipe)

City of Oak Ridge

Pump Station Inspection

Date:	12/15/10	Location:	197 Gum Hollow Road	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-58-31
Name of Station:	Gum Hollow			Longitude:	NS: 84-19-13

ID: 26

Mechanical Station Condition: Excellent

Electrical Station Condition: Excellent

Type:	Submersible	Power Source		Level Control:	Pressure
Number of Pumps:	2	Service:		Control Manufacturer:	Dig Cont P/N 1192
Pump Brand:	KSB	Transformer Number:		Redundant Level Control:	Yes
Serial Number:	874908/874909	Transformer Type:		Number / Type:	5 floats
Pump Curve:	Yes	Transformer Size:		Flowmeter Type:	None
Wet Well Diameter	8 ft	Voltage:		Lapse Time Meter:	Yes
Wet Well Storage Depth:	7.3'/14.8' total ft	Phase:		Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	Yes	Main Amps:	200	Alarm Type:	Light
FM Material:		Motor Control Location:	Panel		
FM Size:	6 in	Motor Controller	Soft Start		
FM Length	4323 ft	HP	36		
Discharge Elevation:	797.2	Motor Brand	KSB		
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on 65/off 28 % Lag on 70/ off 40% High/Low Al 80/20%

Other Station Equipment: Pur-A-Fil scrubber ser #I06-8019, model DS1005

Remarks: Pumps KRT F100-316/294XG-279 mm,DKN 814,29kW,1750 rpm,FLA 36/48,SF 1.1; wet well tot depth 177.5", 90" to infl (10"?), P1 14" in 1 min, P2 12" in 1 min, inflow 1.5" in 2 min; disch press 10-39 psi; valve vault 6'x6'x70" precast, 42"x42" hatch, 2 ARV (APCO) piped to wet well, OL&W ck valves, 4" piping; no yard hydrant; evidence of surcharge, no overflow;steqady stream of clear water in (2" deep in 10"? Pipe)

City of Oak Ridge

Pump Station Inspection

Date:	12/10/10	Location:	Laboratory Drive at Home Depot entrance	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-01-34
Name of Station:	Home Depot			Longitude:	NS: 84-14-02

ID: 24

Mechanical Station Condition: Good

Electrical Station Condition: Good

Type:	Submersible	Power Source	UG fm pole	Level Control:	Probe
Number of Pumps:	2	Service:	UG	Control Manufacturer:	Flygt
Pump Brand:	Flygt	Transformer Number:	562/1257/13068	Redundant Level Control:	Yes
Serial Number:	3085.182-001-638/	Transformer Type:	Pole	Number / Type:	5 floats
Pump Curve:	Yes	Transformer Size:	15kVA	Flowmeter Type:	None
Wet Well Diameter	6 ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	3.8'/10' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	Yes	Main Amps:	35	Alarm Type:	Horn/Light
FM Material:	PVC	Motor Control Location:	Panel		
FM Size:	4 in	Motor Controller	Across the Line		
FM Length	478 ft	HP	3		
Discharge Elevation:	858.0	Motor Brand			
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: ????? Could not determine

Other Station Equipment: Yard hydrant, bypass pump connectoin

Remarks: Valve vault 6'x8'x6-1/2' deep, 4'x6' al hatch,1 ARV, 6" water standing in vault, press gauge inoperable,4" piping, yard hydrant needs repairs; Pumps 3085.182-6005 414, 1700 rpm, 8.7 FLA,.83 PF; wet well total depth 120", 74" to influent; P1 10-1/2" in 30 sec=370 GPM, P2 8-1/2" in 30 sec=299 GPM; gravel drive;wet well has a substance in it that hardens and adheres to pumps, cables, floats, etc.;floats were inoperable due to substance

City of Oak Ridge

Pump Station Inspection

Date:	11/03/10	Location:	Melton Lake Drive at Marina-695 Melton Lake Drive	Date of Construction:		ID:	3
Inspector:	sb/sh/gh			Latitude:	EW: 36-01-57		
Name of Station:	Marina			Longitude:	NS: 84-11-39		

Mechanical Station Condition:	Good	Electrical Station Condition:	Excellent

Type:	Submersible	Power Source	UG crossing M Lake	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	ITT Flygt/US
Pump Brand:	Flygt	Transformer Number:		Redundant Level Control:	
Serial Number:	9860808,9860809	Transformer Type:	Pole	Number / Type:	
Pump Curve:	Yes	Transformer Size:		Flowmeter Type:	None
Wet Well Diameter	6 ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	3 ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	Yes	Main Amps:	100	Alarm Type:	Horn/Light
FM Material:	Other	Motor Control Location:	Panel		
FM Size:	4 (CI) in	Motor Controller	Across the Line		
FM Length	2125 ft	HP	10-1735 rpm		
Discharge Elevation:	832	Motor Brand	subm pumps		
Evidence of Overflow:	No	Motor Serial Number:	N/A		
Fence:	No	Aux Power:	None		
		Generator Brand	N/A		
		Generator kW	N/A		

Control Sequence: Lead on at 5.5 ft/ off at 2.5 ft Lag on at 6 ft/ off at 3.5 ft

Other Station Equipment: red valve press sensor (gauge inoperable)

Remarks: Disch press gauge inoperable; debris in wet well; clear infl flow from north; pwr to site UG (approx 100 ft) from pole across Melton Lake Dr; meter and disconnect on pole; Drawdown test- pump 1 ~ 110 gpm, pump 2 ~ 117 gpm (assumes 20 gpm inflow); valve vault is 6'X6' at 4'-10" inside depth; pump nameplate info: Y-service, 7.5 kW-10 hp, 460/230,13/25A,3 ph, 60 Hz, 1735 rpm, M21-12-4AL; static press-14 psi/ run press- 35 psi

City of Oak Ridge

Pump Station Inspection

Date:	12/15/10	Location:	OR Turnpike/SR 58	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-58-56
Name of Station:	Oak Hills			Longitude:	NS: 84-20-02

ID: 25

Mechanical Station Condition: Good

Electrical Station Condition: Fair

Type:	Suction Lift	Power Source	Pole mnt trans	Level Control:	Pressure
Number of Pumps:	2	Service:	OH	Control Manufacturer:	Gorman Rupp
Pump Brand:	Gorman Rupp	Transformer Number:	4433/4403	Redundant Level Control:	Yes
Serial Number:	1045838/1383004	Transformer Type:		Number / Type:	3 floats
Pump Curve:	Yes	Transformer Size:	37.5kVA/25kVA	Flowmeter Type:	None
Wet Well Diameter	9 ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	5.7'/17.3' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	Yes	Main Amps:	200	Alarm Type:	Horn/Light
FM Material:	Other	Motor Control Location:	Panel		
FM Size:	6 (CI) in	Motor Controller	Across the Line		
FM Length	3933 ft	HP	25		
Discharge Elevation:	816.9	Motor Brand	Gorman Rupp		
Evidence of Overflow:	No	Motor Serial Number:	94410044/944100		
Fence:	Yes	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on 4.6/ off 2.5 Lag on 5.4/ off 3.1 High Al on 10.0/ off 9.5 Low Al on 1.1/ off 1.5

Other Station Equipment: Yard hydrant,port heater, exhaust fan

Remarks: Lat is actually 35 58 56; Self priming pumps, GR ARV, Valmatic Pl valves, M&H OL&Spring Ck valves; Wet well has surcharged almost to top-no sign of overflow;disch ga on one pump doesn't work; wet well tot depth 207", 123" to top of infl pipe (16"? DIP); P1 6" in 1 min' P2 9" in 1 min; inflow 4-1/2" in 2 min;gravcel lot with asph drive, fence approx 25' off EOP

City of Oak Ridge

Pump Station Inspection

Date:	11/17/10	Location:	10 Pallisades Pkwy-behind/between houses	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-02-30
Name of Station:	Pallisades #1			Longitude:	NS: 84-12-16

ID: 13

Mechanical Station Condition: Fair

Electrical Station Condition: Good

Type:	Suction Lift	Power Source	UG fm street	Level Control:	Floats
Number of Pumps:	2	Service:	UG	Control Manufacturer:	
Pump Brand:	Hydromatic	Transformer Number:	N/A	Redundant Level Control:	No
Serial Number:	P1693,P1695	Transformer Type:		Number / Type:	4 floats
Pump Curve:	Yes	Transformer Size:		Flowmeter Type:	None
Wet Well Diameter	5 ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	4.3'/7.7' total ft	Phase:	1	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	No	Main Amps:	50	Alarm Type:	Light
FM Material:	PVC	Motor Control Location:	Panel		
FM Size:	4 in	Motor Controller	Across the Line		
FM Length	488 ft	HP	3		
Discharge Elevation:	797.59	Motor Brand	U.S.		
Evidence of Overflow:	No	Motor Serial Number:	F077A/U04F		
Fence:	Yes	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: 4 floats w/alternator

Other Station Equipment: yard hydrant, heater, exhaust fan

Remarks: void under slab on 3 sides;pump imp dia 8-13/32";pump model 30MP;motor 19.1 FLA;1 pump inoperable;exposed conduit/wire entering station (unknown use); pump 1 6-1/2" in 30 sec=159 GPM; float hanger needs work (hanging from wire)

City of Oak Ridge

Pump Station Inspection

Date:	11/17/10	Location:	18 Pallisades Pkwy- behind house	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-02-28
Name of Station:	Pallisades #2			Longitude:	NS: 84-12-20

ID: 12

Mechanical Station Condition: Fair

Electrical Station Condition: Good

Type:	Suction Lift	Power Source	UG fm street	Level Control:	Floats
Number of Pumps:	2	Service:	UG	Control Manufacturer:	
Pump Brand:	Hydromatic	Transformer Number:	N/A	Redundant Level Control:	No
Serial Number:	P1695/P169?	Transformer Type:	Other	Number / Type:	
Pump Curve:	Yes	Transformer Size:		Flowmeter Type:	None
Wet Well Diameter	5 ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	4.3'/8.9' total ft	Phase:	1	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	No	Main Amps:	50	Alarm Type:	Light
FM Material:	PVC	Motor Control Location:	Panel		
FM Size:	4 in	Motor Controller	Across the Line		
FM Length	528 ft	HP	3		
Discharge Elevation:	813.53	Motor Brand	US		
Evidence of Overflow:	No	Motor Serial Number:	F077A/V01F;		
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: 4 floats

Other Station Equipment: yard hydrant, heater, exhaust fan

Remarks: nameplate inaccessible on 1 pump;pump 1- 4" in 30 sec=98 GPM+, pump 2- 3" in 30 sec=74 GPM+ (10-15 gpm inflow);al hatch on wet well (needs replaced); stone ret wall on 1 side of station (hood can not be slid all the way off)

City of Oak Ridge

Pump Station Inspection

Date:	11/17/10	Location:	28 Pallisades Pkwy- behind house	Date of Construction:		ID:	11
Inspector:	sb/sh			Latitude:	EW: 36-02-25		
Name of Station:	Pallisades #3			Longitude:	NS: 84-12-27		

Mechanical Station Condition:	Fair	Electrical Station Condition:	Good

Type:	Suction Lift	Power Source	UG fm street	Level Control:	Floats
Number of Pumps:	2	Service:	UG	Control Manufacturer:	
Pump Brand:	Hydromatic	Transformer Number:	617/618	Redundant Level Control:	No
Serial Number:	P424/P427	Transformer Type:	Pad	Number / Type:	4 floats
Pump Curve:	Yes	Transformer Size:	2@15 kvA	Flowmeter Type:	None
Wet Well Diameter	6 ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	6.5'/10.3' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	No	Main Amps:	70	Alarm Type:	Light
FM Material:	PVC	Motor Control Location:	Panel	Control Sequence:	4 floats w/alternator
FM Size:	4 in	Motor Controller	Across the Line		
FM Length	780 ft	HP	7.5 1740 rpm		
Discharge Elevation:	801.38	Motor Brand	U.S		
Evidence of Overflow:	No	Motor Serial Number:	U05U028R021M	Other Station Equipment:	yard hydrant,heater, exhaust fan
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Remarks: mice under sta cover;suct pipe repl on 1 pump recently;pump 1- 6" in 30 sec=211 GPM;pump 2- 6.5 " in 30 sec=229 GPM; motor 208-230/460,SF 1.15;pump imp dia 9-5/32". Pump model 40MP;gravel access to site along side and rear lot lines

City of Oak Ridge

Pump Station Inspection

Date:	11/17/10	Location:	40 Pallisades Pkwy-behind houses	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-02-19
Name of Station:	Pallisades #4			Longitude:	NS: 84-12-34

ID: 10

Mechanical Station Condition: Fair

Electrical Station Condition: Poor

Type:	Suction Lift	Power Source	UG from street	Level Control:	Floats
Number of Pumps:	2	Service:	UG	Control Manufacturer:	
Pump Brand:	Hydromatic	Transformer Number:	N/A	Redundant Level Control:	No
Serial Number:	P1595/P1596	Transformer Type:	Other	Number / Type:	
Pump Curve:	Yes	Transformer Size:		Flowmeter Type:	None
Wet Well Diameter	5 ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	2.5'/8.6' total ft	Phase:	1	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	No	Main Amps:	30	Alarm Type:	Light
FM Material:	PVC	Motor Control Location:	Panel		
FM Size:	4 in	Motor Controller	Across the Line		
FM Length	962 ft	HP	3		
Discharge Elevation:	811.7	Motor Brand	U.S.		
Evidence of Overflow:	No	Motor Serial Number:	F077A/U04F		
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: 4 floats w/ alternator

Other Station Equipment: yard hydrant

Remarks: Meter is disconnect;w-well has alum hatch;mice in sta cover;pump 1-4.5" in 30 sec=110 GPM; pump 2- 4" in 30 sec=98 GPM;pump model # 30 MP,imp dia 8.13",motor 1735 rpm,19 FLA; paved access to site

City of Oak Ridge

Pump Station Inspection

Date:	12/02/10	Location:	1402 Edgemoor Road across from Melton Hill Lake	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-59-53
Name of Station:	Park Meade			Longitude:	NS: 84-11-07

ID: 16

Mechanical Station Condition: Good

Electrical Station Condition: Good

Type:	Suction Lift	Power Source	Pmount Trans	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	GR
Pump Brand:	Gorman Rupp	Transformer Number:	1888	Redundant Level Control:	No
Serial Number:	1083675N/108367	Transformer Type:	Pad	Number / Type:	
Pump Curve:	Yes	Transformer Size:	112.5kVA	Flowmeter Type:	None
Wet Well Diameter	6 ft	Voltage:	460	Lapse Time Meter:	Yes
Wet Well Storage Depth:	~7'/10.9' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Circuit Breaker	Telemetry Type:	None
Pressure Gauge Dischrg:	Yes	Main Amps:	250	Alarm Type:	Light
FM Material:		Motor Control Location:	Panel		
FM Size:	10 in	Motor Controller	Soft Start		
FM Length	10278 ft	HP	50 1765 RPM		
Discharge Elevation:	811.88	Motor Brand	G		
Evidence of Overflow:	No	Motor Serial Number:	Model B0504VLF10		
Fence:	Yes	Aux Power:	Diesel		
		Generator Brand	Kohler		
		Generator kW	50 ?		

Control Sequence:

Lead on 4.1'/off 2.1'	Lag on
6.1'/off 4.1'	Low Alarm
0.4'/off 1.3'	High Alarm 8.1'/off 7.0'

Other Station Equipment: ATS;yard hyd;yard light'port heater;exhaust fan;

Remarks: stat press 84/running 140+ (gauge pegged);suct and disch gauges on both pumps (disch gauge on P2 missing); GR ARV's (P2 valve disch cont during pump run test);ValMatic PL valves(model 58069);6" disch to 10" exiting sta. LAT ACTUALLY 35-59-53;sliding cover over sta good shape;motor amps 63A;total w well depth 131" (could not access infl pipe (approx 4' below gnd level);Drawdown P1 2.5" in 1 min(redo 35" in 2 min)=307 GPM;P2 7.5" in 1 min=132 GPM

City of Oak Ridge

Pump Station Inspection

Date:	12/15/10	Location:	105 Wedgewood Road/ behind houses	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-01-37
Name of Station:	Peach Orchard			Longitude:	NS: 84-16-03

ID: 27

Mechanical Station Condition: Excellent

Electrical Station Condition: Fair

Type:	Submersible	Power Source	Uverhead from We	Level Control:	Pressure
Number of Pumps:	2	Service:	OH	Control Manufacturer:	Us Filter D152
Pump Brand:	Flygt	Transformer Number:	N/A	Redundant Level Control:	Yes
Serial Number:	9880657/9880658	Transformer Type:	Pole	Number / Type:	5 floats
Pump Curve:	Yes	Transformer Size:	30kVA	Flowmeter Type:	None
Wet Well Diameter	6 ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	4'/14.5' ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	Yes	Main Amps:	100	Alarm Type:	Light
FM Material:	AC	Motor Control Location:	Panel		
FM Size:	4 in	Motor Controller	Across the Line		
FM Length	485 ft	HP	10		
Discharge Elevation:	1078.4	Motor Brand			
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on 3-1/4'/ off 2-1/2' Lag on 4' off 2-3/4' High Al on 5'/off 4-3/4' Low Al on 1-3/4'/ off 1-1/2'

Other Station Equipment: N/A

Remarks: Valve vault 6'x6'x67" deep, 42" sq al hatch, 2 ARV piped to wet well, OL&W ck valves;pumps 3127.180-3030 15mm,M21-12-4AL, 1735 rpm, 25 FLA; wet well tot depth = 174", 126" to infl pipe, 38"x48" al hatch, P1 3-1/2" in 30 sec, P2 3" in 30 sec; pressures 36psi stat, 45 psi running;disconnect switch latch is broken; access from Wedgewood along gravel drive(steel tube lift gate)

City of Oak Ridge

Pump Station Inspection

Date:	01/05/11	Location:	Pump House Road adjacent to Melton Hill Lake backwater	Date of Construction:	2008	ID:	32
Inspector:	sh			Latitude:	EW: 36-58-30		
Name of Station:	Pump House Road			Longitude:	NS: 84-13-33		

Mechanical Station Condition:	Excellent	Electrical Station Condition:	Excellent

Type:	Submersible	Power Source	OH fm pole	Level Control:	Pressure
Number of Pumps:	2	Service:	OH	Control Manufacturer:	Multi-Trode MSMP
Pump Brand:	Flygt	Transformer Number:	2189,2190,2060	Redundant Level Control:	Yes
Serial Number:		Transformer Type:	Pole	Number / Type:	Probe
Pump Curve:	Yes	Transformer Size:	3@100 kVA	Flowmeter Type:	None
Wet Well Diameter	10 ft	Voltage:	460	Lapse Time Meter:	Yes
Wet Well Storage Depth:	11'/28' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:	776.0	Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	Yes	Main Amps:	400	Alarm Type:	Horn/Light
FM Material:	Other	Motor Control Location:	Panel	Control Sequence:	
FM Size:	8 (CI) in	Motor Controller	VFD		
FM Length	3038 ft	HP	105		
Discharge Elevation:	To Scarboro wet w	Motor Brand	Flygt		
Evidence of Overflow:	No	Motor Serial Number:		Other Station Equipment:	yard light
Fence:	Yes	Aux Power:	None		
		Generator Brand			
		Generator kW			

Remarks: LAT ACTUALLY 35-58-30; Pumps 3301.090-0940005, 1775 RPM, 125 FLA; 2 ARV piped to wet well; station designed for additional pump (160 hp) to pump past Scarboro through new force main to abandon Scarboro station in future; valve vault 8'x10'x7.75' deep,8" piping,2 ARV

City of Oak Ridge

Pump Station Inspection

Date:	12/02/10	Location:	Radisson Cove adjacent to Edgemoor Road	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-01-37
Name of Station:	Radisson Cove			Longitude:	NS: 84-10-25

ID: 19

Mechanical Station Condition: Good

Electrical Station Condition: Good

Type:	Submersible	Power Source	Pad mnt trans	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	Digital Control Cor
Pump Brand:	KSB	Transformer Number:	N/A	Redundant Level Control:	Yes
Serial Number:	5-M07-765659/4;5-	Transformer Type:	Pad	Number / Type:	4 floats
Pump Curve:	Yes	Transformer Size:	???	Flowmeter Type:	None
Wet Well Diameter	6 ft	Voltage:	240/120	Lapse Time Meter:	No
Wet Well Storage Depth:	5.5'/17.3' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	Yes	Main Amps:	300	Alarm Type:	
FM Material:		Motor Control Location:	Panel		
FM Size:	8 in	Motor Controller	Across the Line		
FM Length	1159 ft	HP	20		
Discharge Elevation:	891.45	Motor Brand	KSB		
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on 48%/off at 32% Lag on 54%/off 32% High alarm 66%/Low alarm 22%

Other Station Equipment: APC batt backup for controls;PumpPak FloatPak controller for floats

Remarks: Pump model KRTE80-251/164XG-270;;150-7-- gpm,118-85 ft head;1765 rpm,59 FLA;wet well is new to 86", tot dpth 207.5",142" to influent pipe;ret wall (locking block) on lower side of site;paved access with gate;valve vault 7'x7'x5' deep,4'x4' alum hatch,no pipe supports; APCO 400 AVV;no yard hydrant;drawdown P1-10.5 in 35 sec=317 GPM;P2 8" in 35 sec=241 GPM

City of Oak Ridge

Pump Station Inspection

Date:	12/10/10	Location:	100 Rivers Run Blvd behind landscaping and ent sign	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-01-28
Name of Station:	Rivers Run			Longitude:	NS: 84-10-50

ID: 20

Mechanical Station Condition: Good

Electrical Station Condition: Good

Type:	Submersible	Power Source	UG fm pad mt tran	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	Dig Cont P/N 1192
Pump Brand:	KSB	Transformer Number:	2213 277/480	Redundant Level Control:	Yes
Serial Number:	5-MO7-703 480/1	Transformer Type:	Pad	Number / Type:	5 floats
Pump Curve:	Yes	Transformer Size:	45 kVA	Flowmeter Type:	None
Wet Well Diameter	6 ft	Voltage:	460	Lapse Time Meter:	Yes
Wet Well Storage Depth:	3.3'/15.8' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	Yes	Main Amps:	200	Alarm Type:	Light
FM Material:		Motor Control Location:	Panel		
FM Size:	6 in	Motor Controller	Soft Start		
FM Length	7978 ft	HP	36		
Discharge Elevation:	793.59	Motor Brand	KSB		
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on 30%/off 18% Lag on 35%/off 18% High level 40%/ Low level 8%

Other Station Equipment: Yard hydrant; Pur-A-Fil scrubber-Ser no. I06-8020, Model DS-1005

Remarks: Pump 2 could not be pulled due to floats being tangled around it; Pumps are KRTE 100-316/294XG, 300 gpm at 130 ft,DKN 181.4-29 AC3,M No. 075203, 1770 rpm, FLA 48; Valve vault 6'x6'x63" deep precast w/ 21"x45" dbl hatch, ARV's disch to wet well, 4" piping w/ OL&W ck valves; wet well hatch is 51"x28" dbl; drawdown P1 4" in 30 sec=141 GPM, P2 7" in 30 sec=246 GPM(inflow higher due to infl pipe being submerged); total wet well dpth 189"/ infl pipe at 149"

City of Oak Ridge

Pump Station Inspection

Date:	11/17/10	Location:	120 Marywater Lane behind houses	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-02-48
Name of Station:	Riversway			Longitude:	NS: 84-12-17

ID: 14

Mechanical Station Condition: Excellent

Electrical Station Condition: Good

Type:	Submersible	Power Source	UG frm pad mt tra	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	CSI
Pump Brand:	Flygt 3127.180-475	Transformer Number:	931 & 935	Redundant Level Control:	No
Serial Number:	9420632;9420633	Transformer Type:	Pad	Number / Type:	
Pump Curve:	Yes	Transformer Size:	2-25 kvA	Flowmeter Type:	None
Wet Well Diameter	6 ft	Voltage:	240/120	Lapse Time Meter:	No
Wet Well Storage Depth:	5.0'/12.3' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:	797	Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	No	Main Amps:	80	Alarm Type:	Light
FM Material:	PVC	Motor Control Location:	Panel		
FM Size:	6/8 in	Motor Controller	Across the Line		
FM Length	1400'/800' ft	HP	10		
Discharge Elevation:	830	Motor Brand			
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	Yes	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on 3.8'/lag on 4.1' Pump off- 2.0'/hi level 4.5'/low level 0.7'

Other Station Equipment: yard hydrant (inoperable);valve on influent pipe to sta;seal leak & bearing temp sensors (flygt mini-control),lightning arrestor in panel,heater and thermostat in panel, motor loss of phase prot.,

Remarks: conc access drive; valve vault 4'X 8' X44-1/2" deep w/ double door al access hatch; wet well has 8' sq top; pump 1- 8" in 30 sec=281 GPM, pump 2- 7" in 30 sec=246 GPM; motors 25 FLA, 1735 rpm;wet well total depth 148"/ 88" to influent

City of Oak Ridge

Pump Station Inspection

Date:	12/02/10	Location:	117 Rock Bridge at front common prop line	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-00-57
Name of Station:	Rockbridge Greens			Longitude:	NS: 84-10-46

ID: 17

Mechanical Station Condition: Good

Electrical Station Condition: Good

Type:	Submersible	Power Source	UG fm trans	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	CSI
Pump Brand:	Flygt	Transformer Number:	1870	Redundant Level Control:	No
Serial Number:	9670191/9670192	Transformer Type:	Pad	Number / Type:	
Pump Curve:	Yes	Transformer Size:	300 kVA	Flowmeter Type:	None
Wet Well Diameter	5 ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	10'/19' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Circuit Breaker	Telemetry Type:	
Pressure Gauge Dischrg:	No	Main Amps:	100	Alarm Type:	Light
FM Material:	PVC	Motor Control Location:	Panel		
FM Size:	6 in	Motor Controller	Soft Start		
FM Length	1887 ft	HP	23		
Discharge Elevation:	975.0	Motor Brand	Flygt		
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on 5.7'/off 3.7' Lag on 8.2'/off 3.7' High alarm 9.2'

Other Station Equipment: Yard hydrant

Remarks: 8' and 9' to inv of infl pipes; total w welldpth 19';4'x9'x53" deep cast-in-place valve vault(pipes too close to wall to access check valves easily, drain pipe clogged with mulch),3-1/2' x 3-1/2' al hatch;station in landscape area,mulch over access lids (dangerous to be around openings due to mulch sloping toward openings);guide brackets on pumps snag on disch pipe flanges;Pump model 3152.181-6273;51 FLA;4-wire Y service;Drawdown 17" in 1 min=208 GPM for both pumps

City of Oak Ridge

Pump Station Inspection

Date:	12/02/10	Location:	51 Rolling Links-behind house adjacent to large pond	Date of Construction:		ID:	18
Inspector:	sb/sh			Latitude:	EW: 36-01-18		
Name of Station:	Rolling Links			Longitude:	NS: 84-10-19		

Mechanical Station Condition:	Good	Electrical Station Condition:	Fair

Type:	Submersible	Power Source	Pad mnt trans	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	Consolidated D-15
Pump Brand:	Flygt	Transformer Number:	2284/2276	Redundant Level Control:	No
Serial Number:	9670310/9670309	Transformer Type:	Pad	Number / Type:	
Pump Curve:	Yes	Transformer Size:	25 kVA	Flowmeter Type:	None
Wet Well Diameter	5 ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	6' ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Circuit Breaker	Telemetry Type:	None
Pressure Gauge Dischrg:	No	Main Amps:	100	Alarm Type:	Light
FM Material:	PVC	Motor Control Location:	Panel		
FM Size:	6 in	Motor Controller	Across the Line		
FM Length	770 ft	HP	10		
Discharge Elevation:	903.6	Motor Brand	Flygt		
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence:

Lead on 3.5'/off 2.0' Lag on
5'/off 3.5' Low al
1.25'/2.5' High AL 5.5'/off 4'

Other Station Equipment:

Yard hydrant

Remarks:

Flygt motors have MINI CAS II; Valve vault 4'x8'x56" deep cast-in-place,3-1/2' x 4' AL hatch' drain is 3" above floor; vault top 1' below surrounding ground (water stands over lid);pumps barely clear hatch on wet well;pump model 3127.180-6184;Gravel access drive to site;Drawdown 8" in 30 nsec=196 GPM for both pumps

City of Oak Ridge

Pump Station Inspection

Date:	11/17/10	Location:	Scarboro Rd	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-59-13
Name of Station:	Scarboro			Longitude:	NS: 84-13-31

ID: 15

Mechanical Station Condition: Replace

Electrical Station Condition: Poor

Type:	W-well/D-well	Power Source	OH to pole	Level Control:	Pressure
Number of Pumps:	2	Service:	OH	Control Manufacturer:	Cons Elec D152
Pump Brand:	Yeomans(Clow can)	Transformer Number:		Redundant Level Control:	Yes
Serial Number:	N4315/Unit 1&2	Transformer Type:	Pole	Number / Type:	1 hi level float
Pump Curve:	Yes	Transformer Size:	2 @ ???kvA	Flowmeter Type:	None
Wet Well Diameter	~8' ft	Voltage:	460	Lapse Time Meter:	No
Wet Well Storage Depth:	~8'/12' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	Phone
Pressure Gauge Dischrg:	No	Main Amps:	175	Alarm Type:	Telemetry
FM Material:	Other	Motor Control Location:	Panel		
FM Size:	8 (CI) in	Motor Controller	Across the Line		
FM Length	4299 ft	HP	50		
Discharge Elevation:	912.86	Motor Brand	Marathon		
Evidence of Overflow:	No	Motor Serial Number:	95714		
Fence:	Yes	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence:

Lead on 6.5'/off 3.5' lag on
8'/off 4' low levels
3'/2.5' high levels 8.5'/9.5'

Other Station Equipment: sump pump;dehumidifier;ex fan;

Remarks: fence damage (tree);steel can sta (10' dia x 9' hi inside w/3' dia tube 6'1" long) 15'2" total depth;pumps 650 gpm@185 ft TDH,9/86 date stamp, 263441 on plate also;wet well has F&C, foam in wet well; check valves&plug valves corroded;pump 1 8" in 27 sec=557 GPM, pump 2 9" in 30 sec=562 GPM;gravel access rd to site;seals leaking on both pumps;REPLACE

City of Oak Ridge

Pump Station Inspection

Date:	12/22/10	Location:	East Southwood at Shagbark Ln	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-58-19
Name of Station:	Southwood			Longitude:	NS: 84-20-21

ID: 30

Mechanical Station Condition: Fair

Electrical Station Condition: Poor

Type:	Submersible	Power Source	UG fm 2 pad moun	Level Control:	Probe
Number of Pumps:	2	Service:	UG	Control Manufacturer:	Flygt Multitrode M
Pump Brand:	Flygt	Transformer Number:	240/480V-#'s 623&	Redundant Level Control:	Yes
Serial Number:	9450351/9450352	Transformer Type:	Pad	Number / Type:	1 transducer
Pump Curve:		Transformer Size:	2@25 kVA	Flowmeter Type:	None
Wet Well Diameter	6 ft	Voltage:	460	Lapse Time Meter:	No
Wet Well Storage Depth:	5.3'/14.3' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:	768.67	Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	No	Main Amps:	60	Alarm Type:	Light
FM Material:	PVC	Motor Control Location:	Panel		
FM Size:	4 in	Motor Controller	Across the Line		
FM Length	2638 ft	HP	10		
Discharge Elevation:	791.99	Motor Brand	Flygt		
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on 70/ off 20% Lag on 90/ off 20%

Other Station Equipment: Yard hydrant

Remarks: valve vault 56"x70"x52" deep CMU, 4'x4' al dbl door hatch,no ARV, 4" piping;Pumps 3127.180-6322,FLS M21-12-4AL,10 hp,460/230,13/25 FLA,1735 RPM; grease buildup in wet well,galv guide rails need to be replaced, P2 very difficult to remove due to corrosion on rails, LAT ACTUALLY 35 58 19;lifting rings on wet well need to be removed (tripping hazard);ground wire disconnected from ground rod;fused disconn enclosure very corroded; wet well total depth 172";109" & 2 @ 86" to influent pipes; P1 4" in 30 sec (140 GPM),P2 2" in 30 sec (70 GPM)

City of Oak Ridge

Pump Station Inspection

Date:	12/22/10	Location:	720 S. Illinois Ave. in Summit Ridge Development	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-00-02
Name of Station:	Summit Ridge			Longitude:	NS: 84-14-22

ID: 29

Mechanical Station Condition: Excellent

Electrical Station Condition: Excellent

Type:	Submersible	Power Source	UG from pad moun	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	Dig Cont Corp P/N
Pump Brand:	KSB	Transformer Number:	1903	Redundant Level Control:	Yes
Serial Number:	871987M/872168	Transformer Type:	Pad	Number / Type:	5 floats
Pump Curve:	Yes	Transformer Size:	75 kVA	Flowmeter Type:	None
Wet Well Diameter	6 ft	Voltage:	460	Lapse Time Meter:	Yes
Wet Well Storage Depth:	6'/17' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	Yes	Main Amps:	40	Alarm Type:	Horn/Light
FM Material:		Motor Control Location:	Panel		
FM Size:	?? in	Motor Controller	Across the Line		
FM Length	?? ft	HP	10		
Discharge Elevation:	??	Motor Brand	KSB		
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	Yes	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on 38/ off 12% Lag on 44/ off 12% High/Low Al 62/ 2 %

Other Station Equipment: Yard hydrant;bypass pump connection

Remarks: Valve vault 6'x8'x4' deep w/4'x5' Al double door hatch, 4" piping, 1 APCO ARV (disch not piped),OL&W ck valves, bypass pump conn, press ga on red valve (gauge not readable);pumps KSB KRTF 100-25-/74 XG (215), DKN 1324-5.5, 10 hp, 460V, SF 1.1, 1745, FLA 14.5, LRA 82, PF 76%; Disch pipe flange interferes with pump removal/replacement;appears to be mud? On pumps;Wet well tot depth 204", 130" & 123" to infl pipes; P1 4" in 30 sec (140 GPM), P2 4" in 30 sec (140 GPM); XYPEX additive in wetwell and valve vault;conduit seals are failing in wet well-need to be replaced ASAP;street lighting electrical panel (service,disconn,meter) directly adjacent to station

City of Oak Ridge

Pump Station Inspection

Date:	12/10/10	Location:	Warehouse Road east of Dresden	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-02-06
Name of Station:	Warehouse Road			Longitude:	NS: 84-13-19

ID: 21

Mechanical Station Condition: Good

Electrical Station Condition: Good

Type:	Submersible	Power Source	Overhead fm Ware	Level Control:	Probe
Number of Pumps:	2	Service:	OH	Control Manufacturer:	Multiprobe MT2PC
Pump Brand:	Flygt	Transformer Number:	11526/11630/??	Redundant Level Control:	Yes
Serial Number:	9451282/9451283	Transformer Type:	Pole	Number / Type:	2 floats
Pump Curve:	Yes	Transformer Size:	25kVA/?/?	Flowmeter Type:	None
Wet Well Diameter	4' X 4' ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	2.6'/12.4' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	No	Main Amps:	60	Alarm Type:	Light
FM Material:	Other	Motor Control Location:	Panel		
FM Size:	4 (CI) in	Motor Controller	Across the Line		
FM Length	90 ft	HP	2.2		
Discharge Elevation:	828.86	Motor Brand	Flygt		
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	Yes	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on 50%/off 10% Lag on 60% /off 20% High level ??

Other Station Equipment: Yard hydrant

Remarks: Valve Vault 4'x4' X 54" deep w/3'x3' Al Hatch,4" piping,no ARV; Pumps 3085.181-6167, FLS M15-07-4AA,6.7 FLA, 1670 rpm; wet well 4'x4' inside, steps up to top, tot depth 149", 118 to influent; P1 4" in 30 sec=80 GPM, P2 4-1/2" in 30 sec =90 GPM;gravel drive; fence overgrown, tree inside fence interferes w/ access, guy wire interferes w/ boom truck operation;could not access disconnect (lock wouldn't open)

City of Oak Ridge

Pump Station Inspection

Date:	11/10/10	Location:	113 Eastburn Lane- behind old radio station	Date of Construction:		ID:	6
Inspector:	sb/sh			Latitude:	EW: 36-02-57		
Name of Station:	WATO			Longitude:	NS: 84-12-34		

Mechanical Station Condition:	Good	Electrical Station Condition:	Excellent

Type:	Submersible	Power Source	OH from street	Level Control:	Pressure
Number of Pumps:	2	Service:	OH	Control Manufacturer:	US Filter DI52
Pump Brand:	Flygt	Transformer Number:		Redundant Level Control:	Yes
Serial Number:	9881057,9881058	Transformer Type:	Pole	Number / Type:	4 floats
Pump Curve:	Yes	Transformer Size:		Flowmeter Type:	None
Wet Well Diameter	4'X4' ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	2.7'/14.2' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	
Pressure Gauge Dischrg:	Yes	Main Amps:	100	Alarm Type:	Horn/Light
FM Material:	Other	Motor Control Location:	Panel		
FM Size:	4 (CI) in	Motor Controller	Across the Line		
FM Length	574 ft	HP	3-1700 rpm		
Discharge Elevation:	853.54	Motor Brand			
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on 3'/ off 1-1/2' Lag on 3-1/2'/ off 2'

Other Station Equipment:

Remarks: drawdown 3-1/2" in 30nsec= 70 GPM (ea Pump), stat 13-1/2 psi, run 17 psi???; 6'X8' valve vault w/ double door alum hatch, 4" piping; wet well tot depth 170", 138" to inv of lowest infl;

City of Oak Ridge

Pump Station Inspection

Date:	12/15/10	Location:	1129 West Outer Drive, behind house, access off of Sugar Road	Date of Construction:		ID:	28
Inspector:	sb/sh			Latitude:	EW: 36-59-27		
Name of Station:	West Outer			Longitude:	NS: 84-20-42		

Mechanical Station Condition:	Fair	Electrical Station Condition:	Poor

Type:	Submersible	Power Source	Oh from West Oute	Level Control:	Pressure
Number of Pumps:	2	Service:	OH	Control Manufacturer:	Consol Electric D15
Pump Brand:	KSB	Transformer Number:	??	Redundant Level Control:	No
Serial Number:	881244/888553	Transformer Type:	Pole	Number / Type:	
Pump Curve:	Yes	Transformer Size:		Flowmeter Type:	None
Wet Well Diameter	5 ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	5.5'/10.5' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	Yes	Main Amps:	200	Alarm Type:	Light
FM Material:		Motor Control Location:	Panel		
FM Size:	3 in	Motor Controller	Across the Line		
FM Length	1093 ft	HP	23		
Discharge Elevation:	992.89?	Motor Brand	KSB		
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: lead on 3-1/2'/off 1-1/2' Lag on 5-1/2'/ off 1-3/4' High Al on 8-1/4'/ off 8' Low Al on 8-1/4'/ off 8'

Other Station Equipment: Yard hydrant

Remarks: Valve vault 6'x6'x54" deep,4" piping, 2 ARV (disch not piped),OL&W ck valves, vault located ~25' from wet well;new 2" SST disch pipes in wet well;grease reported to be a problem at station;pumps KRTS 40-250/172XG 205mm,DKN160 2-11,3500 rpm, FLA 58, .80 PF; wet well tot depth 126", 60 " to infl, P1 2" in 30 sec, P2 1.5" in 30 sec; Lat actually 35 59 27; electric meter read via telephone line

City of Oak Ridge

Pump Station Inspection

Date:	11/10/10	Location:	behind homes on Westview Lane-129 Westview Lane	Date of Construction:		ID:	7
Inspector:	sb/sh			Latitude:	EW: 36-58-41		
Name of Station:	Westview			Longitude:	NS: 84-21-56		

Mechanical Station Condition:	Replace	Electrical Station Condition:	Replace

Type:	Suction Lift	Power Source	Transform at site	Level Control:	Floats
Number of Pumps:	4-2 ea in series	Service:	UG	Control Manufacturer:	
Pump Brand:	Hydromatic	Transformer Number:	942 or b947	Redundant Level Control:	No
Serial Number:	P65127,28,29 &30	Transformer Type:	Pad	Number / Type:	
Pump Curve:	Yes	Transformer Size:	50kVa	Flowmeter Type:	None
Wet Well Diameter	7 ft	Voltage:	240/120	Lapse Time Meter:	Yes
Wet Well Storage Depth:	??/12.7' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:	979	Disconnect Type:		Telemetry Type:	None
Pressure Gauge Dischrg:	No	Main Amps:	150A per motor	Alarm Type:	Light
FM Material:	PVC	Motor Control Location:	Panel	Control Sequence:	2 floats only; alternator
FM Size:	6 in	Motor Controller	Across the Line		
FM Length	750 ft	HP	40		
Discharge Elevation:	1147	Motor Brand	US		
Evidence of Overflow:	No	Motor Serial Number:	V050059R027R-4G	Other Station Equipment:	portable heater
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Remarks: lat is 35-58-41 N;problem with rats;all 4 pumps repl in 2009;debris on top of wet well;corrosion on metals; pumps all identical model #40MPH 9-5/32" impellers;could not access infl pipes to meas down; drawdown 1 pump 9" in 30 sec=432 GPM, 1 pump 8-1/2" in 30 sec=408 GPM; wet well tot depth 152";site access along gravel road behind houses;disconnect is meter;4" piping

City of Oak Ridge

Pump Station Inspection

Date:	11/10/10	Location:	Whippoorwill Lane below road-104 Whippoorwill Lane	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-59-18
Name of Station:	Whippoorwill			Longitude:	NS: 84-20-40

ID: 9

Mechanical Station Condition: Good

Electrical Station Condition: Good

Type:	Submersible	Power Source	PMNT Trans	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	Dig Cont Corp
Pump Brand:	KSB	Transformer Number:	1897	Redundant Level Control:	Yes
Serial Number:	875502,875503	Transformer Type:	Pad	Number / Type:	5 floats
Pump Curve:	Yes	Transformer Size:	45 kVA	Flowmeter Type:	None
Wet Well Diameter	6'X7' ft	Voltage:	460	Lapse Time Meter:	Yes
Wet Well Storage Depth:	8.3'/15.3' total ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	Yes	Main Amps:	200	Alarm Type:	Horn/Light
FM Material:	PVC	Motor Control Location:	Panel		
FM Size:	6 in	Motor Controller	Across the Line		
FM Length	566 ft	HP	20-1750 rpm		
Discharge Elevation:	1089.61	Motor Brand	KSB		
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on 34%/ off 20% Lag on 21%/ off 48%

Other Station Equipment: Pur-A-Fill scrubber

Remarks: Pump model #KRT F 100-316/164XG; 300 gpm at 96' TDH;valve vault 6'X6'X6.25' deep w/ double door alum hatch; debris in wet well;gravity infl not visible (approx 7' down from top), gets flow from Williams Lane and Westview; drawdown 3.5" in 30 sec=183 GPM, 4" in 30 sec=209 GPM; wet well 184" total depth (6'X7' vault with 6' dia on top);lat actually 35 59 18

City of Oak Ridge

Pump Station Inspection

Date:	11/10/10	Location:	Williams Lane	Date of Construction:	
Inspector:	sb/sh			Latitude:	EW: 36-59-25
Name of Station:	Williams			Longitude:	NS: 84-20-56

ID: 8

Mechanical Station Condition: Good

Electrical Station Condition: Excellent

Type:	Submersible	Power Source	PMnt Trans	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	US Filter D152
Pump Brand:	KSB	Transformer Number:	1860	Redundant Level Control:	Yes
Serial Number:	5-M07-782 282/1&	Transformer Type:	Pad	Number / Type:	2 floats
Pump Curve:	Yes	Transformer Size:	75kVA	Flowmeter Type:	None
Wet Well Diameter	7 ft	Voltage:	460	Lapse Time Meter:	Yes
Wet Well Storage Depth:	~4 ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Fused	Telemetry Type:	None
Pressure Gauge Dischrg:	No	Main Amps:	200	Alarm Type:	Light
FM Material:		Motor Control Location:	Panel		
FM Size:	4 in	Motor Controller	Across the Line		
FM Length	1454 ft	HP	49		
Discharge Elevation:	1028.92	Motor Brand	KSB		
Evidence of Overflow:	No	Motor Serial Number:	029442&3 AA		
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

Control Sequence: Lead on at 3'/ off at1.75' Lag on at 3.5'/ off at 2.25'

Other Station Equipment: Yard hydrant

Remarks: Consolidated Electric control panel NEMA 4X SS, ser #58120A; Red Valve on discharge (press gauge inoperable); valve vault 6'X7'X4'-7" deep;pump has guide cables, not rails; 4" piping; pt where guide cables conn to concrete struct heavily corroded;drawdown ea pump pumps 4" in 30 sec=192 GPM; pump model #KRTF 100-400/414XG; 120 gpm @ 210 ft TDH; lat is actually 35 59 25

City of Oak Ridge

Pump Station Inspection

Date:	01/05/11	Location:	108 Pavillion Drive	Date of Construction:	under construction	ID:	33
Inspector:	sh			Latitude:	EW: 36-00-47		
Name of Station:	Wolf Creek			Longitude:	NS: 84-13-29		

Mechanical Station Condition:	Poor	Electrical Station Condition:	Good

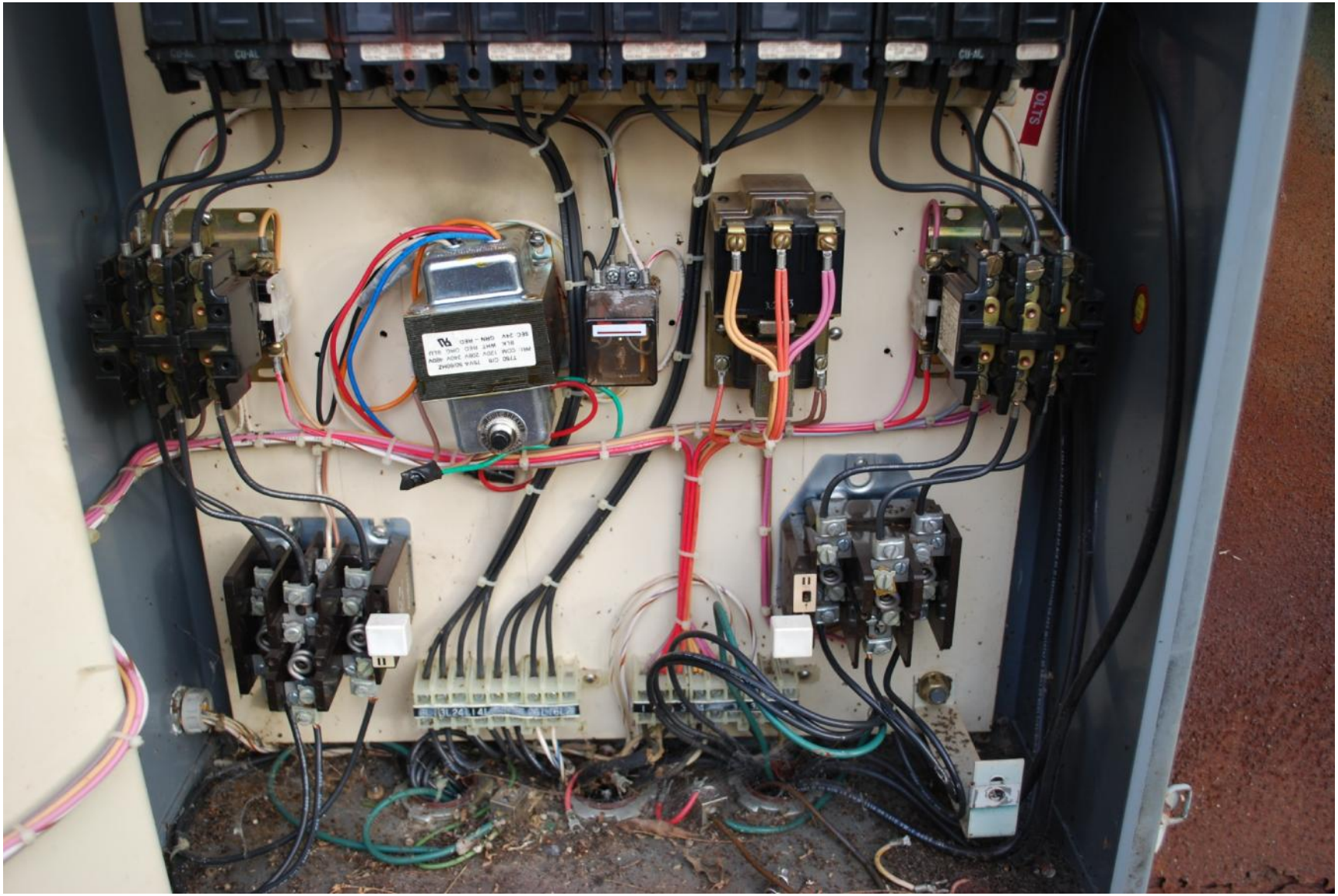
Type:	Submersible	Power Source	UG fm pad mnt tra	Level Control:	Pressure
Number of Pumps:	2	Service:	UG	Control Manufacturer:	Dig Control 11928-
Pump Brand:		Transformer Number:	4441	Redundant Level Control:	Yes
Serial Number:		Transformer Type:	Pad	Number / Type:	4 floats (PumpPak)
Pump Curve:		Transformer Size:	45kVA	Flowmeter Type:	None
Wet Well Diameter	8 ft	Voltage:	460	Lapse Time Meter:	Yes
Wet Well Storage Depth:	ft	Phase:	3	Telemetry Mfg:	
Invert Elevation:		Disconnect Type:	Circuit Breaker	Telemetry Type:	
Pressure Gauge Dischrg:	Yes	Main Amps:	100	Alarm Type:	Horn/Light
FM Material:		Motor Control Location:	Panel		
FM Size:	in	Motor Controller	Across the Line		
FM Length	ft	HP			
Discharge Elevation:		Motor Brand			
Evidence of Overflow:	No	Motor Serial Number:			
Fence:	No	Aux Power:	None		
		Generator Brand			
		Generator kW			

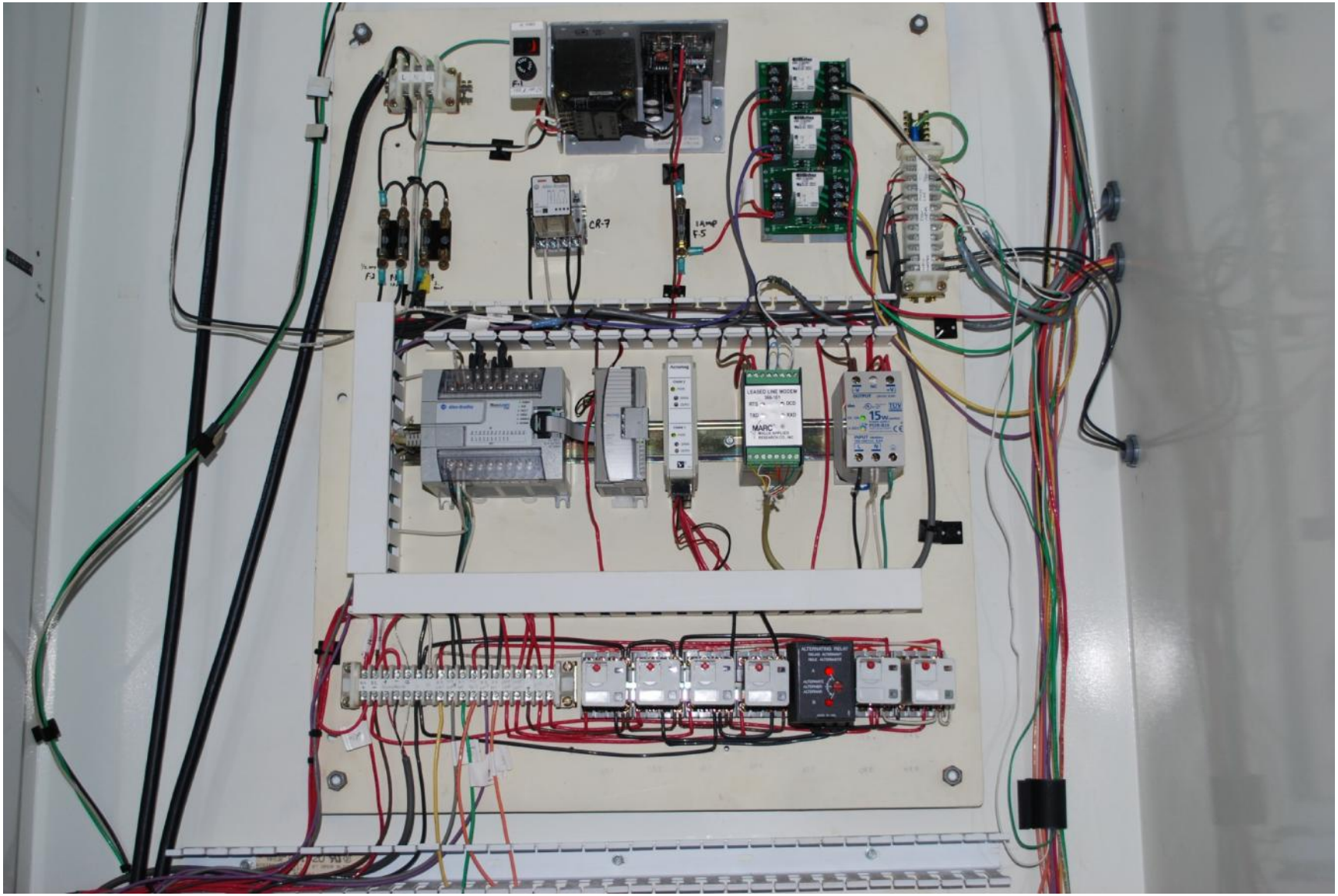
Control Sequence: Lead on/off @ 4'/2' Lag on/off @ 5'/2'

Other Station Equipment: Pur-A-Fil scrubber;yard hydrant

Remarks: No lock on wet well hatch;P2 check valve is inoperable, allows flow back into wet well; Single ARV piped back to wet well, pipe broken at valve due to no support for pipe; 4" piping in vault; debris in valve vault;COR HAS NOT ACCEPTED STATION AS OF DATE OF INSPECTION

PUMP STATION
ACCESS ROAD
NO
PARKING

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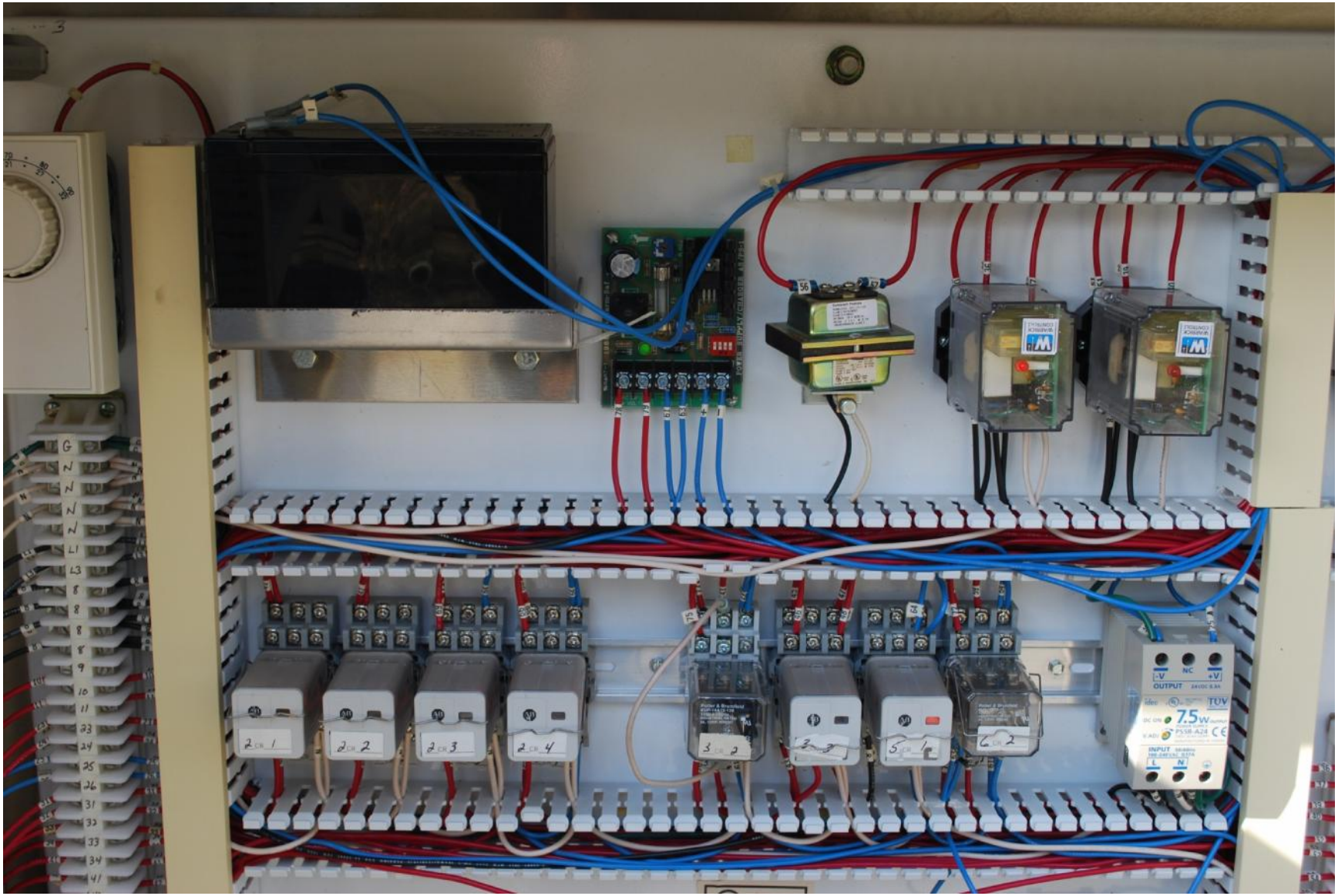

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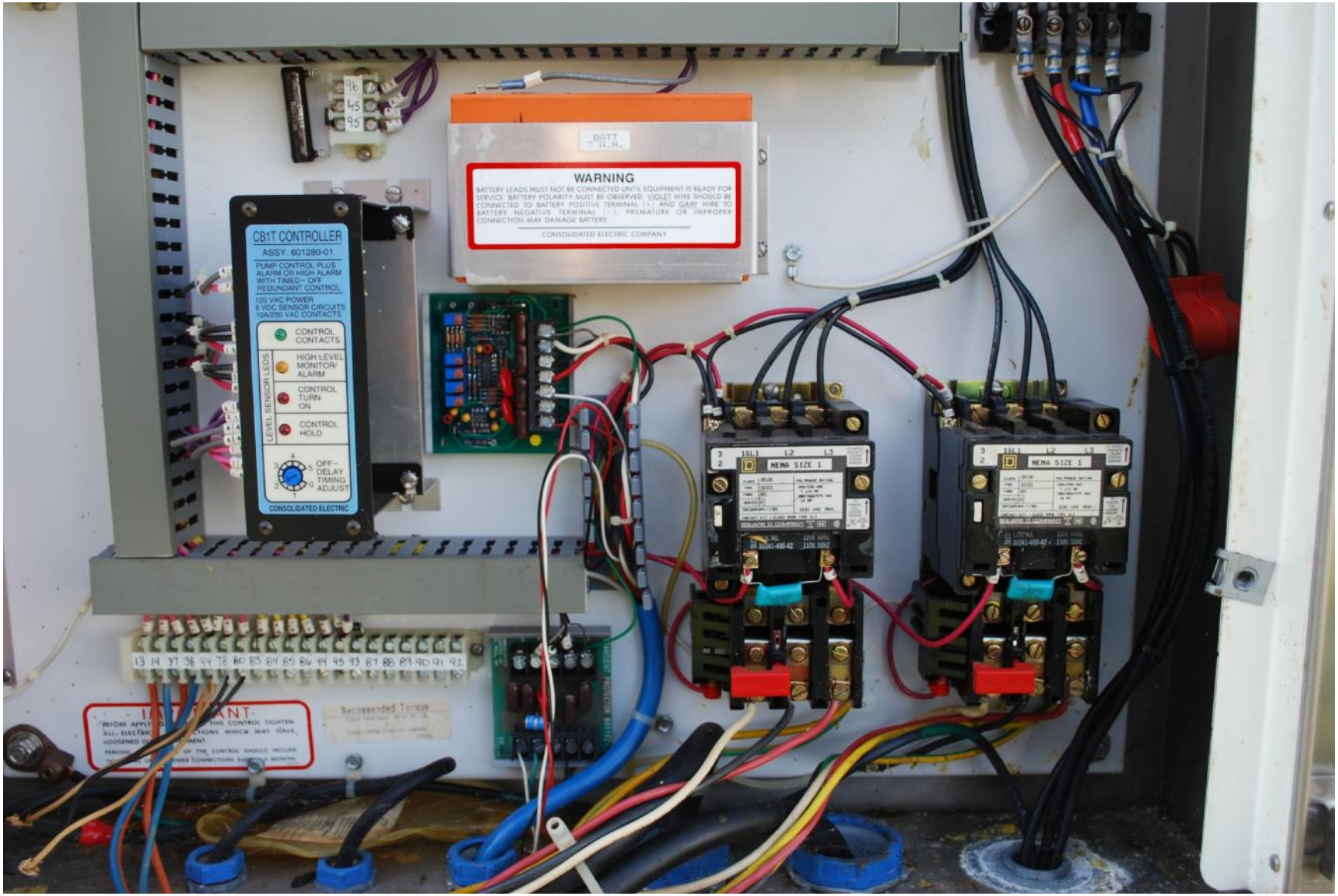
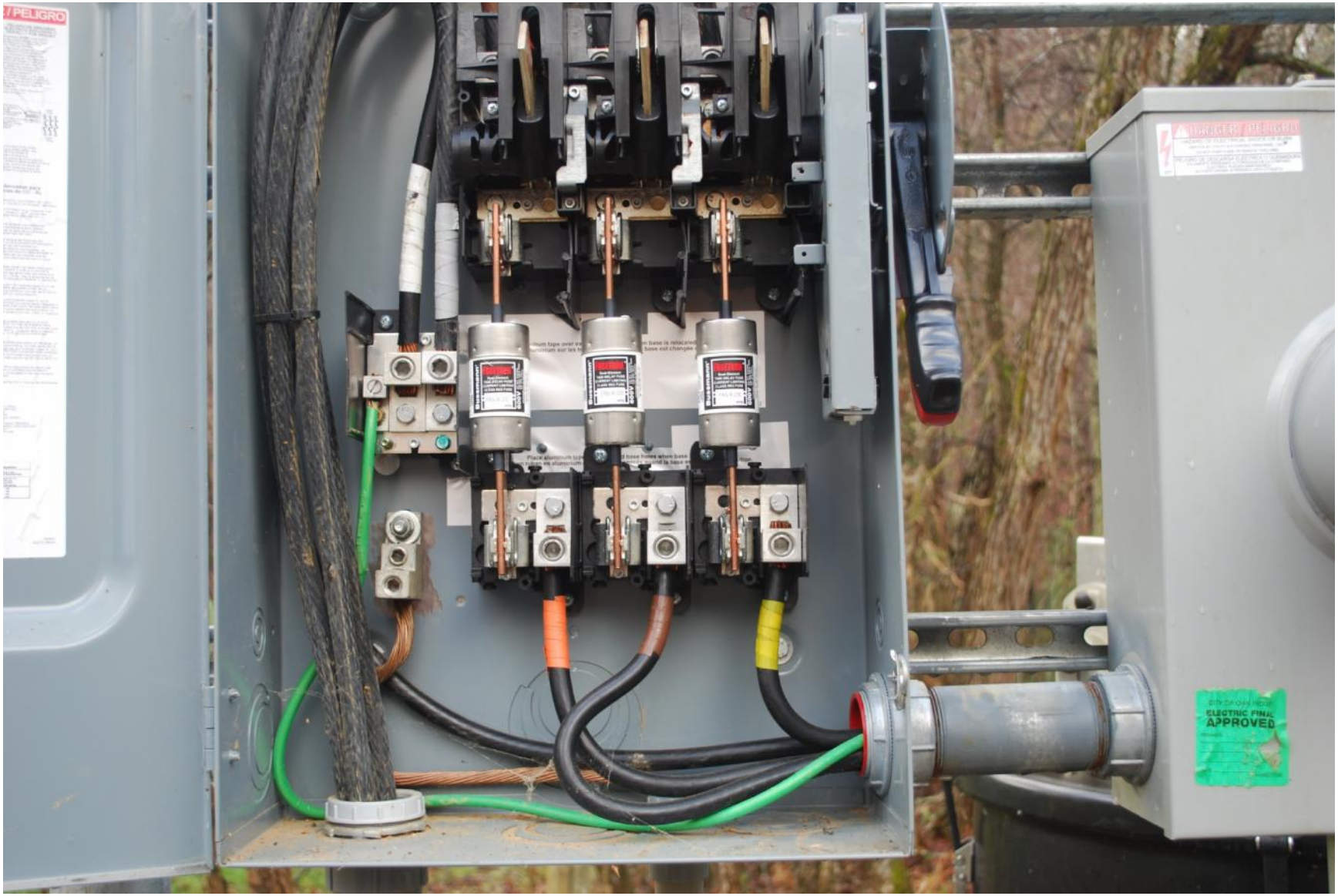

CB1T CONTROLLER
ASSY. 601280-01
PUMP CONTROL PLUS ALARM OR HIGH ALARM WITH TIMED-- OFF REDUNDANT CONTROL
120 VAC POWER
8 VDC SENSOR CIRCUITS
10A/250 VAC CONTACTS
CONTROL CONTACTS
HIGH LEVEL MONITOR/ ALARM
CONTROL TURN ON
CONTROL HOLD
LEVEL SENSOR LEDS
OFF-DELAY TIMING ADJUST
CONSOLIDATED ELECTRIC
WARNING
BATTERY LEADS MUST NOT BE CONNECTED UNTIL EQUIPMENT IS READY FOR SERVICE. BATTERY POLARITY MUST BE OBSERVED. VIOLET WIRE SHOULD BE CONNECTED TO BATTERY POSITIVE TERMINAL (+) AND GRAY WIRE TO BATTERY NEGATIVE TERMINAL (-). PREMATURE OR IMPROPER CONNECTION MAY DAMAGE BATTERY.
CONSOLIDATED ELECTRIC COMPANY
NEMA SIZE 1
NEMA SIZE 1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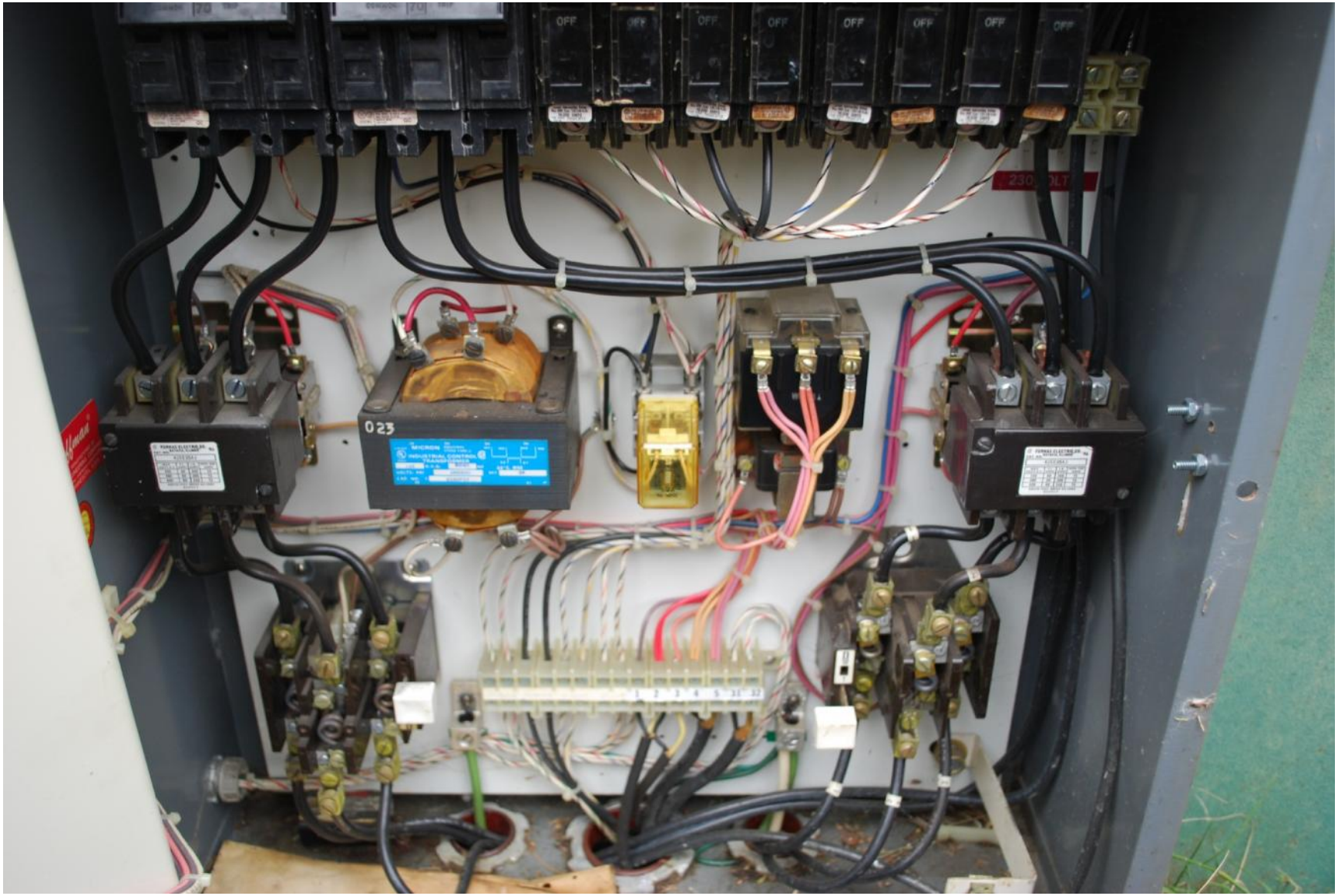
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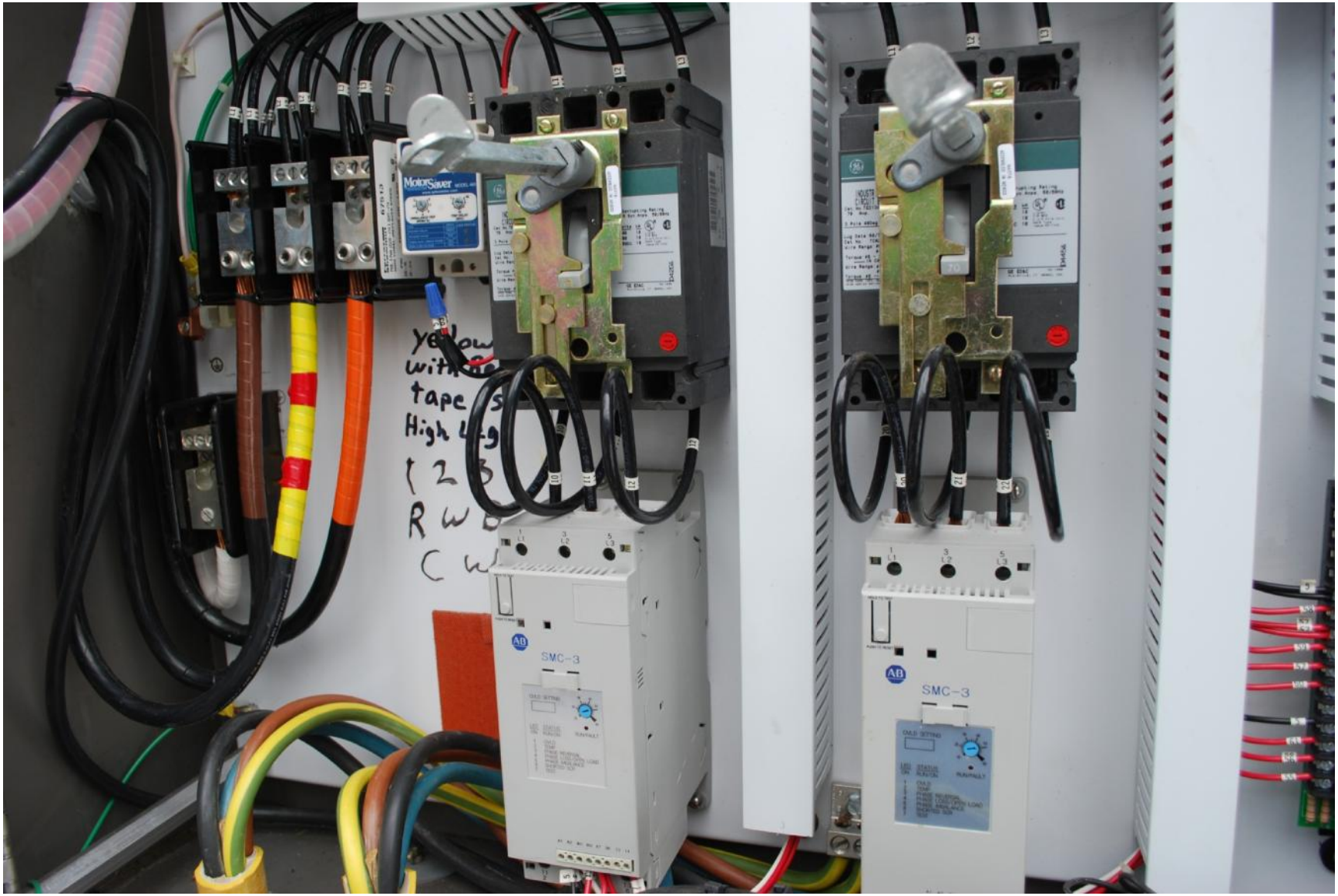
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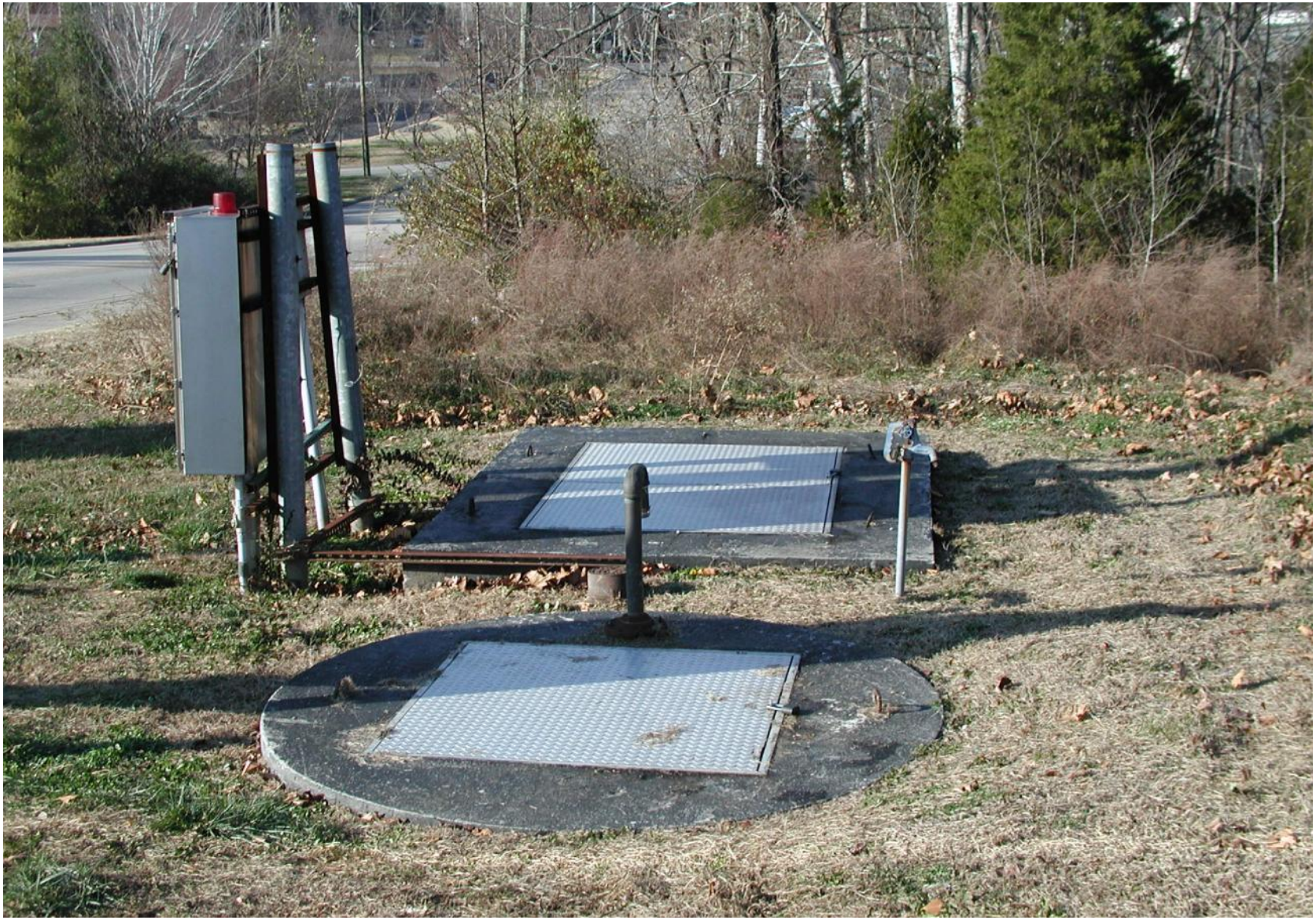

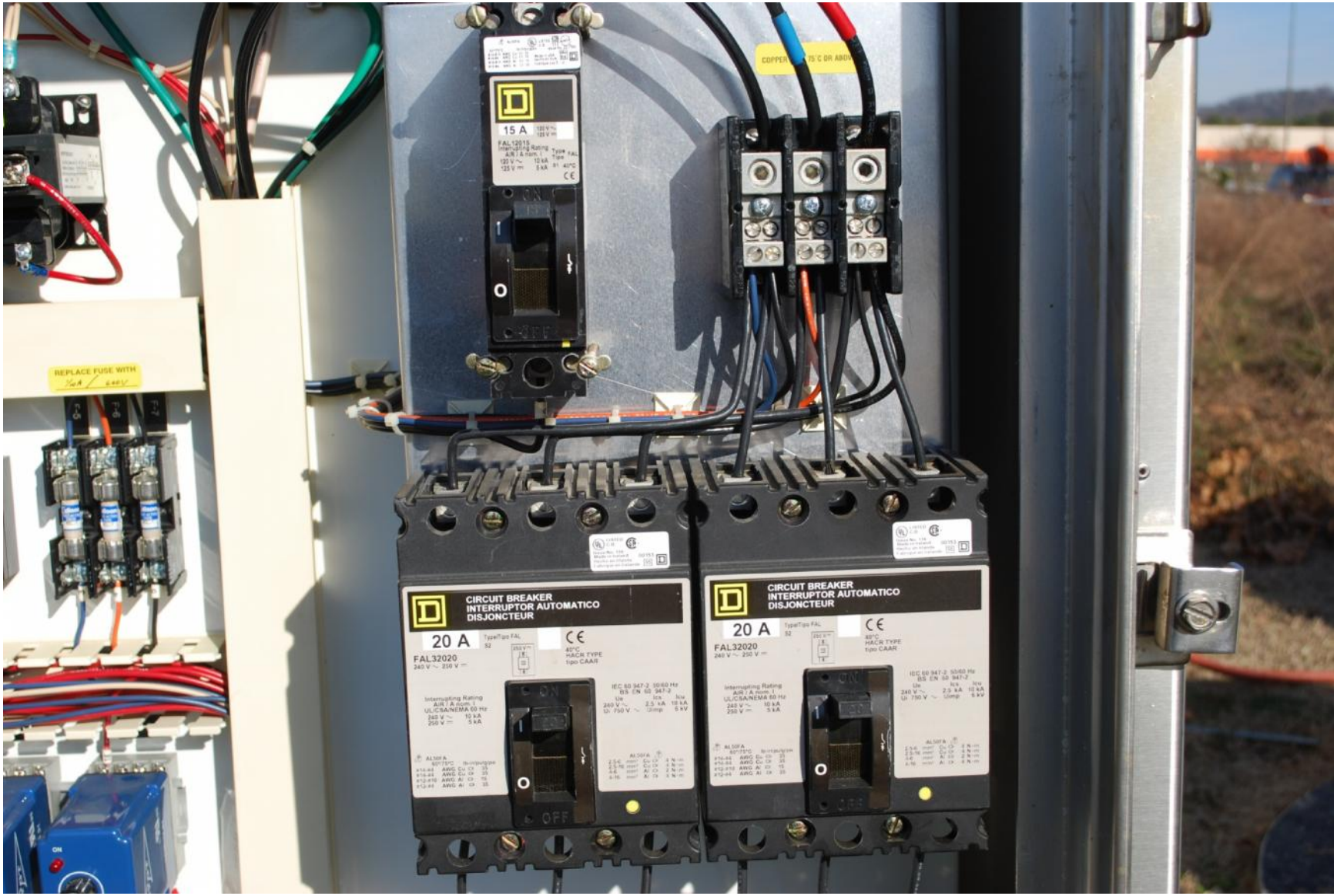
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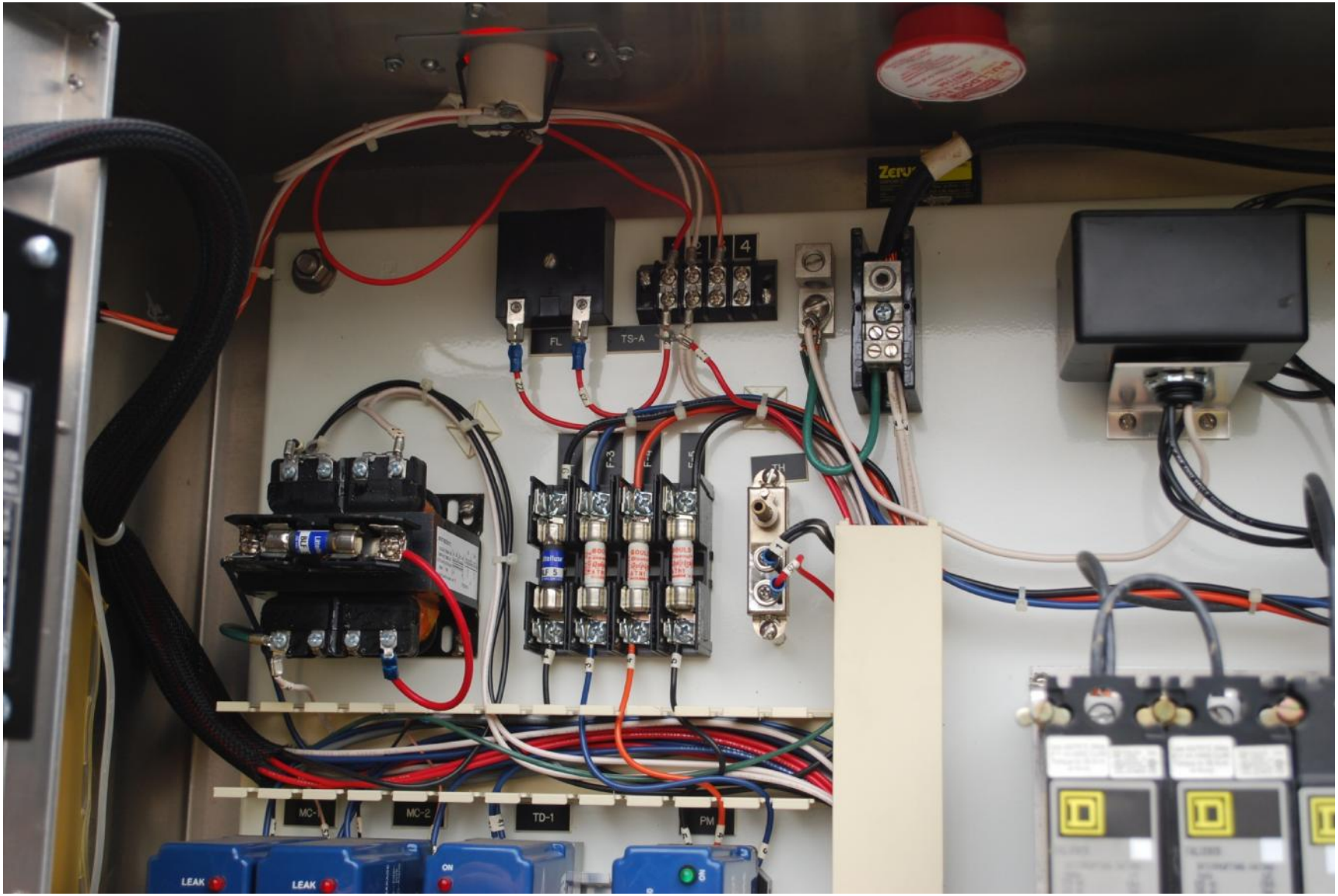
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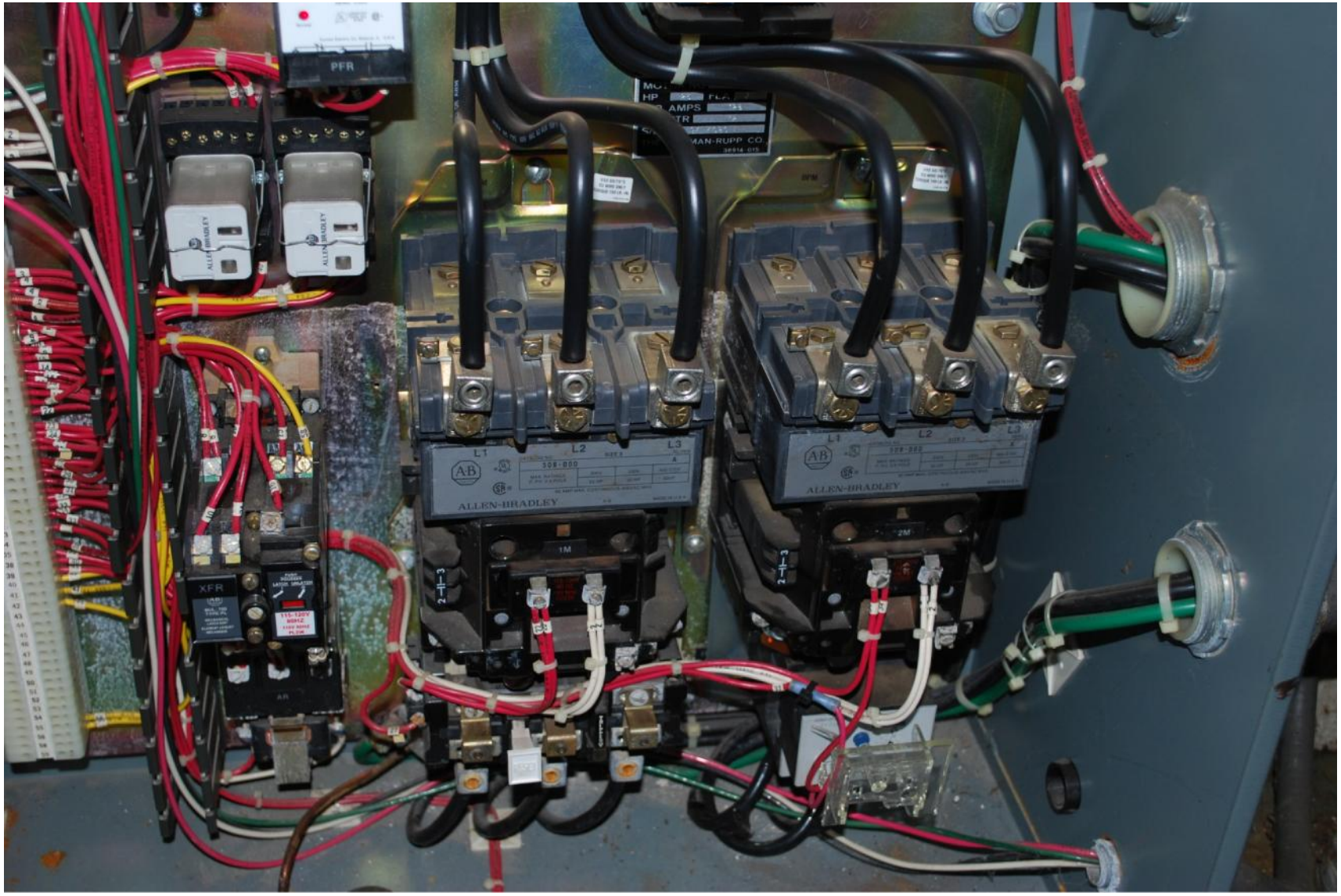
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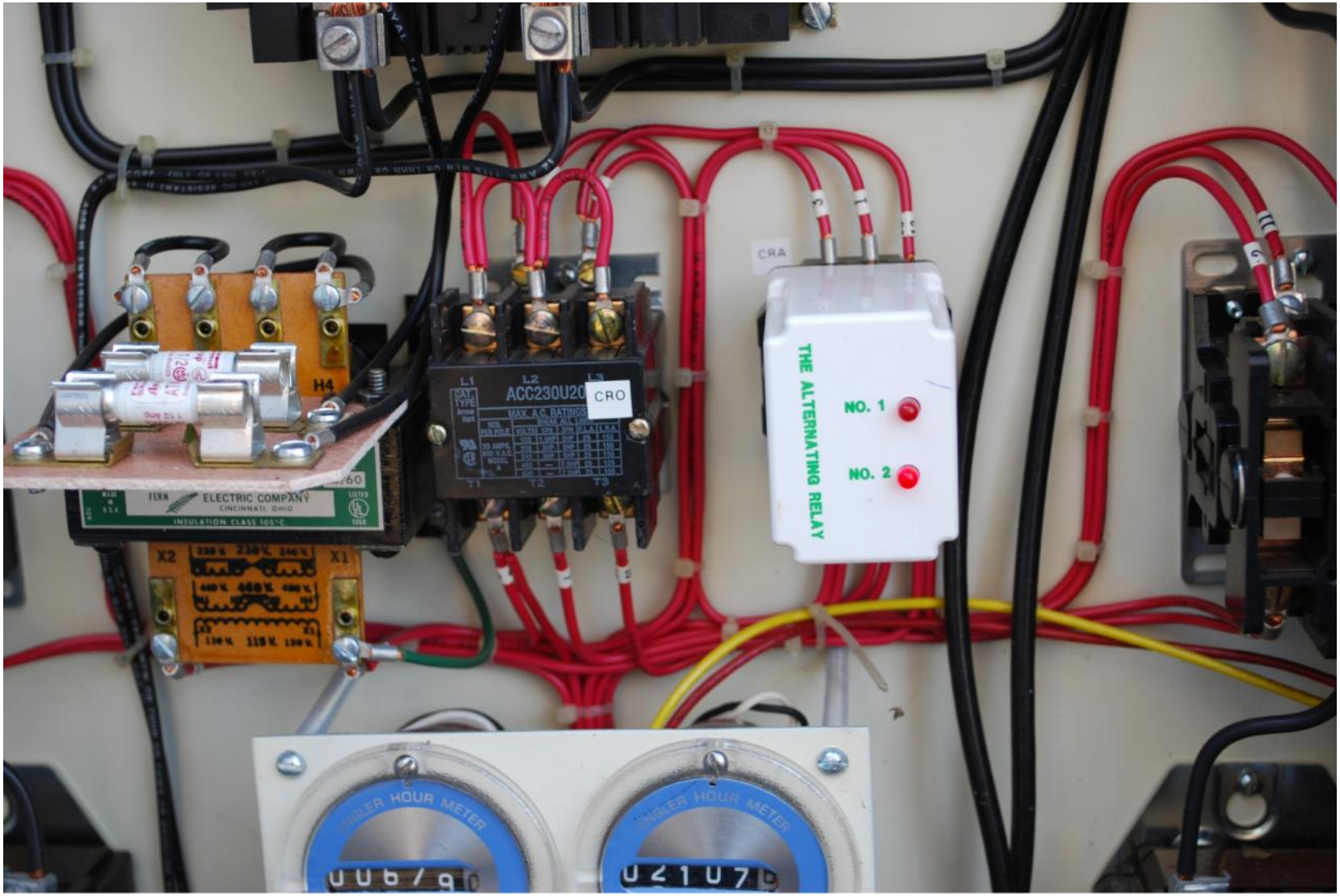
WARNING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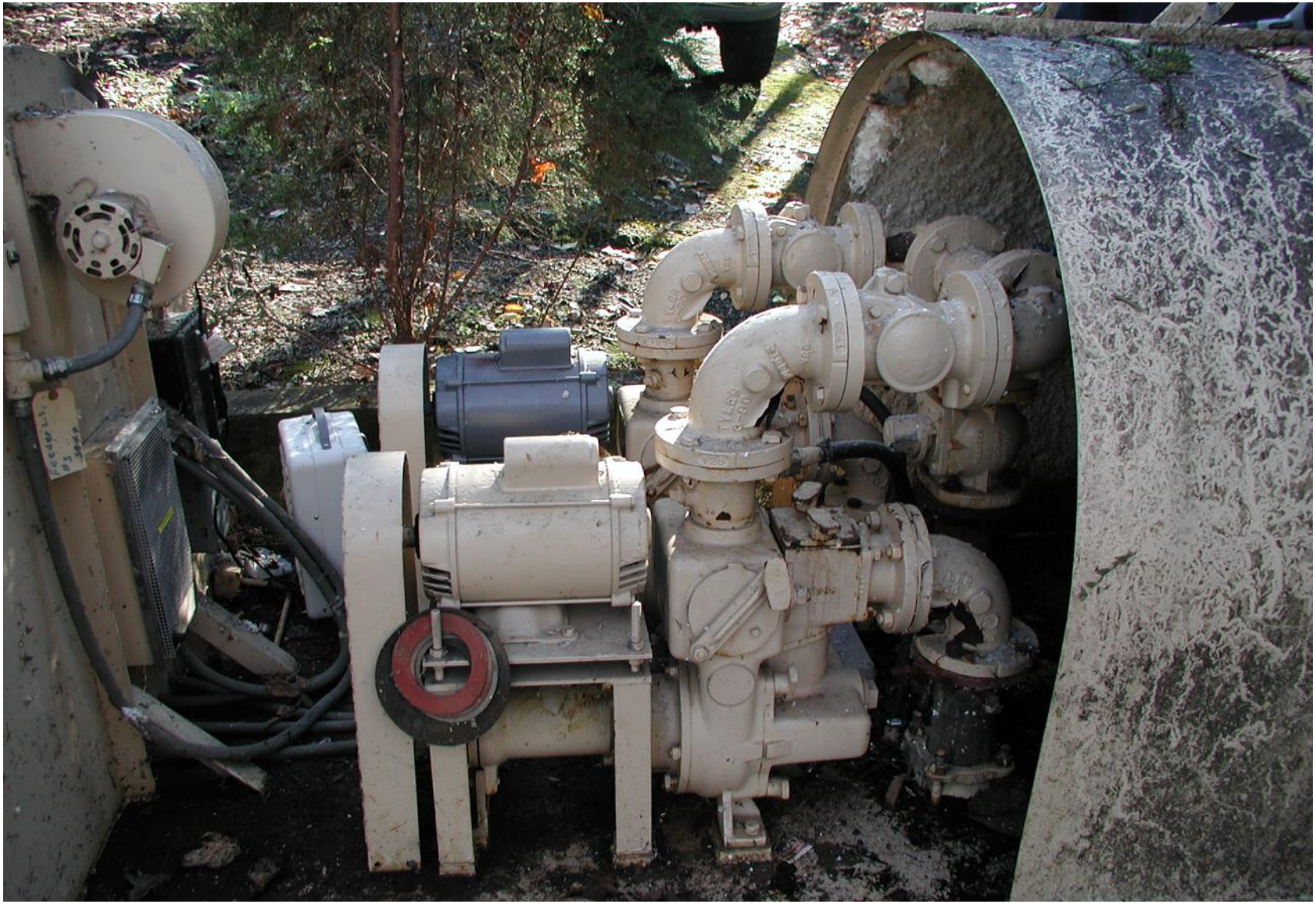
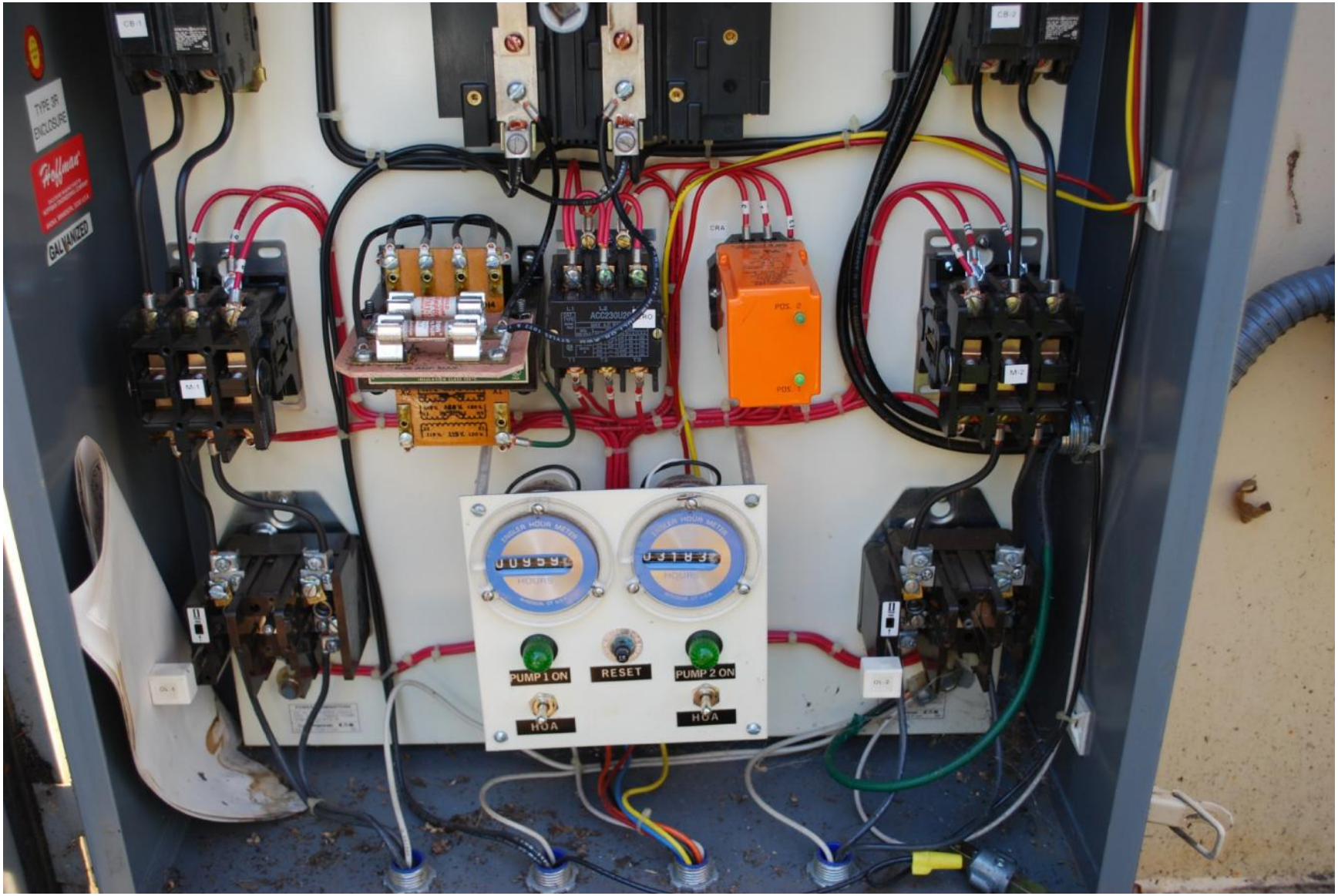
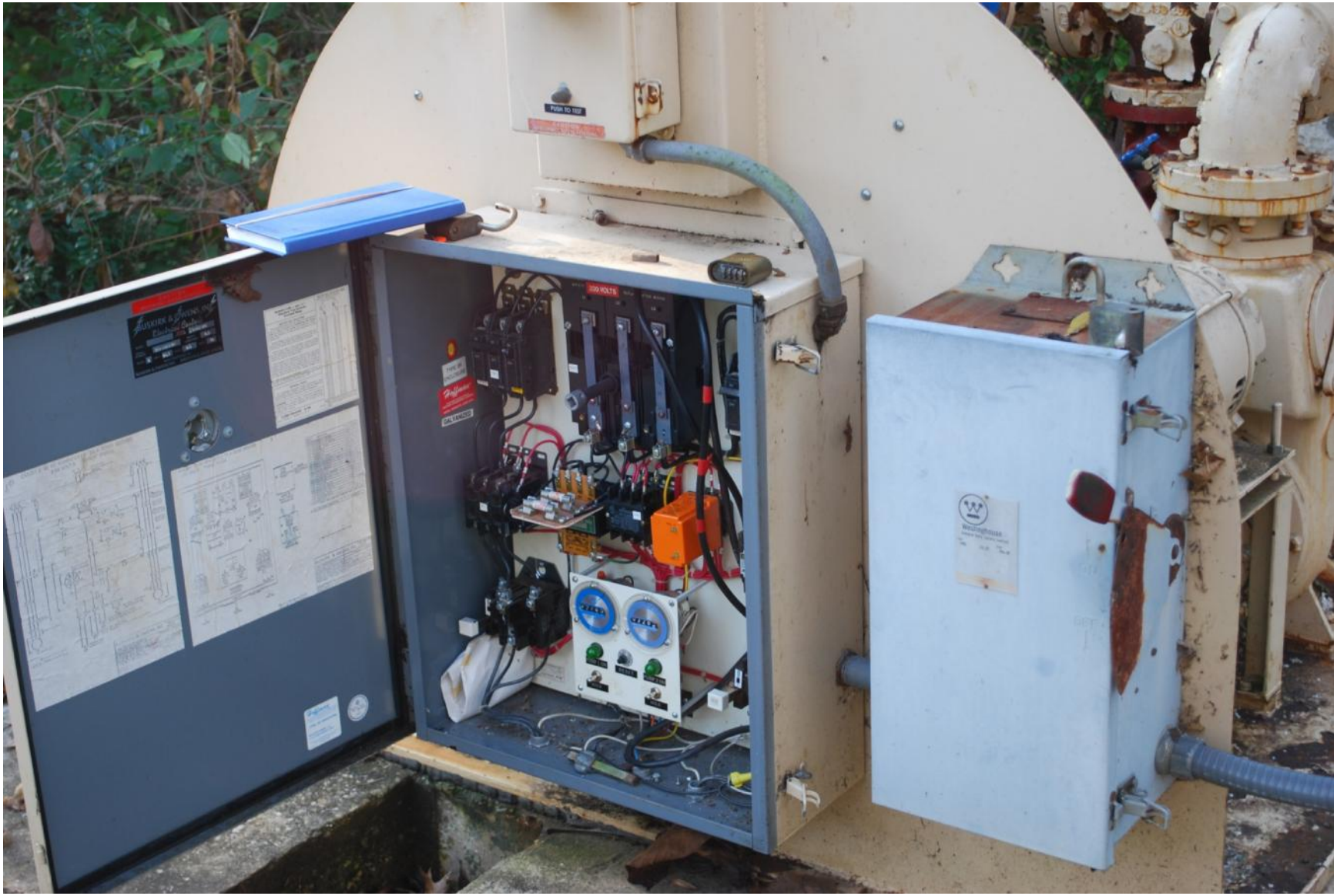
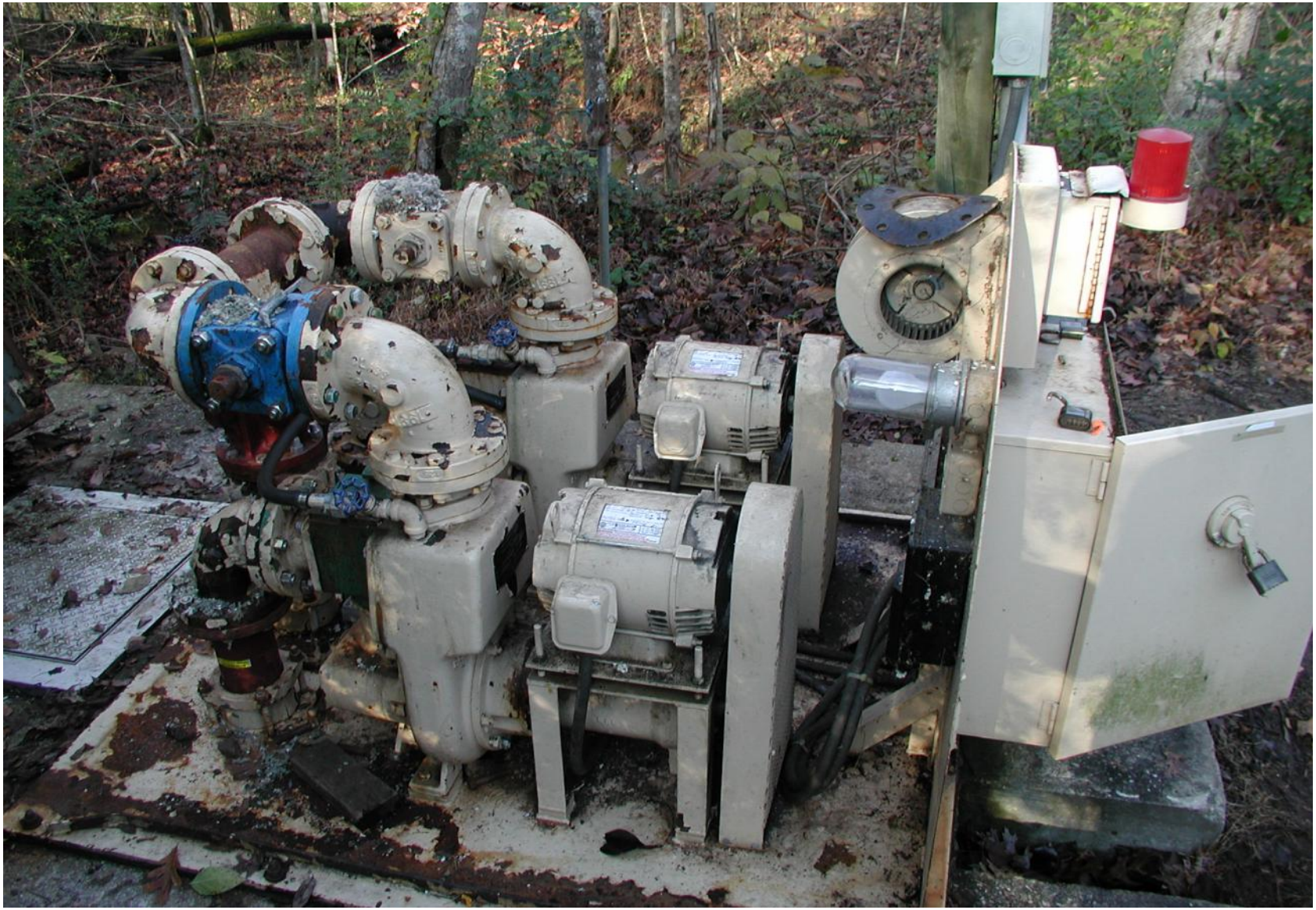
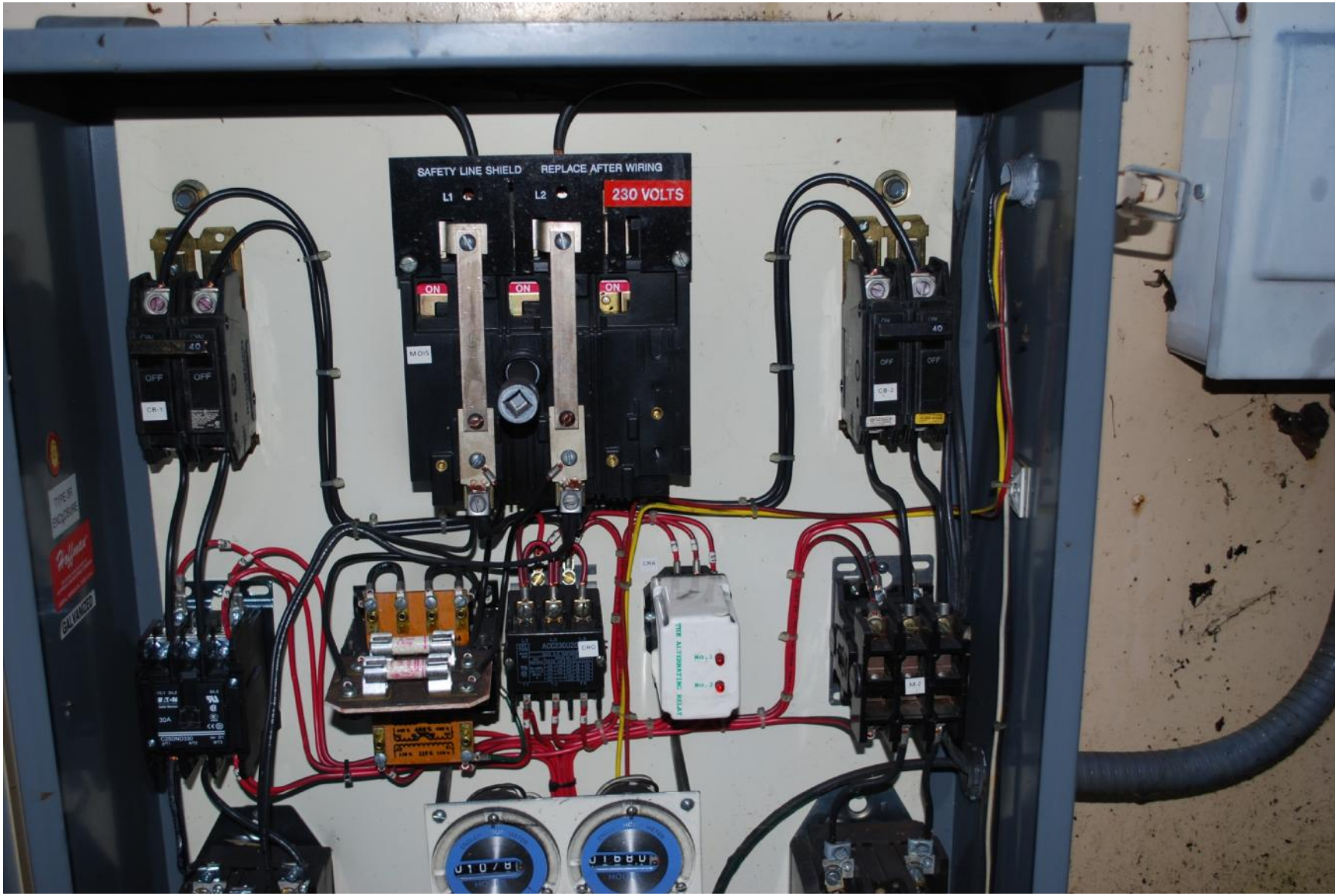


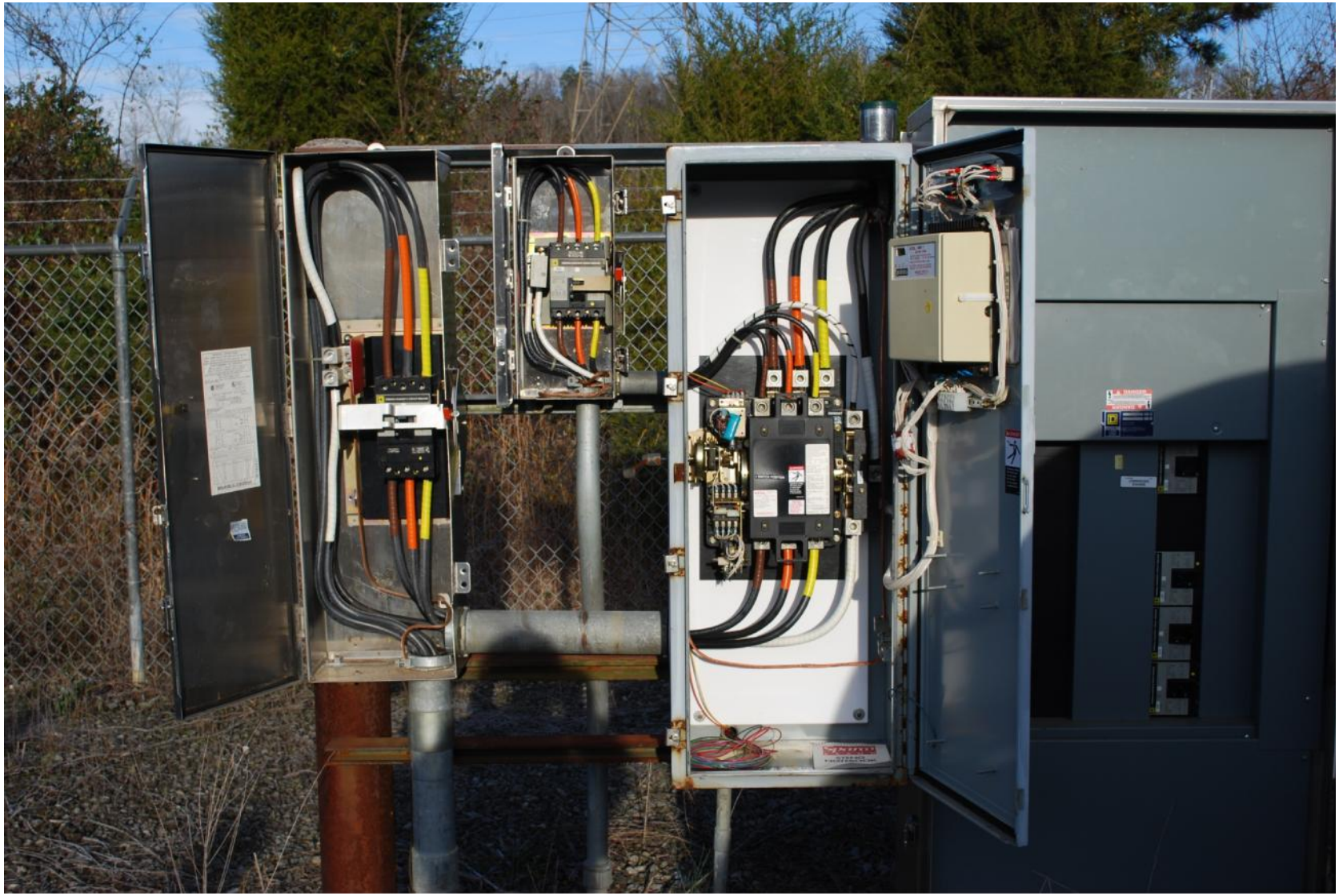
15 KVA
15 KVA

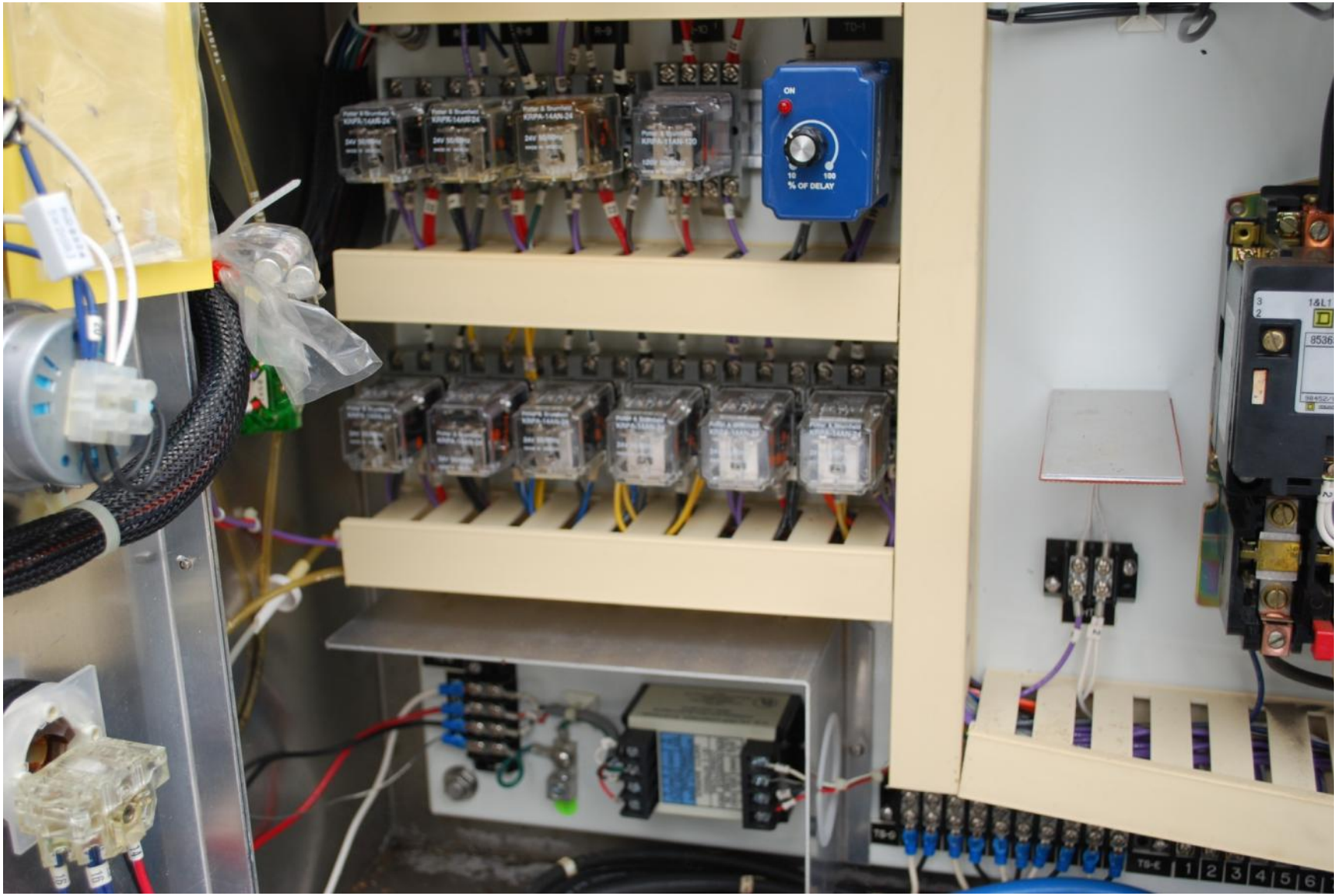

TYPE 3R ENCLOSURE
Hoffman
GALVANIZED
CB-1
CB-2
M-1
M-2
CRA
POS. 2
POS. 1
TRILER HOUR METER
HOURS
PUMP 1 ON
RESET
PUMP 2 ON
HOA
HOA

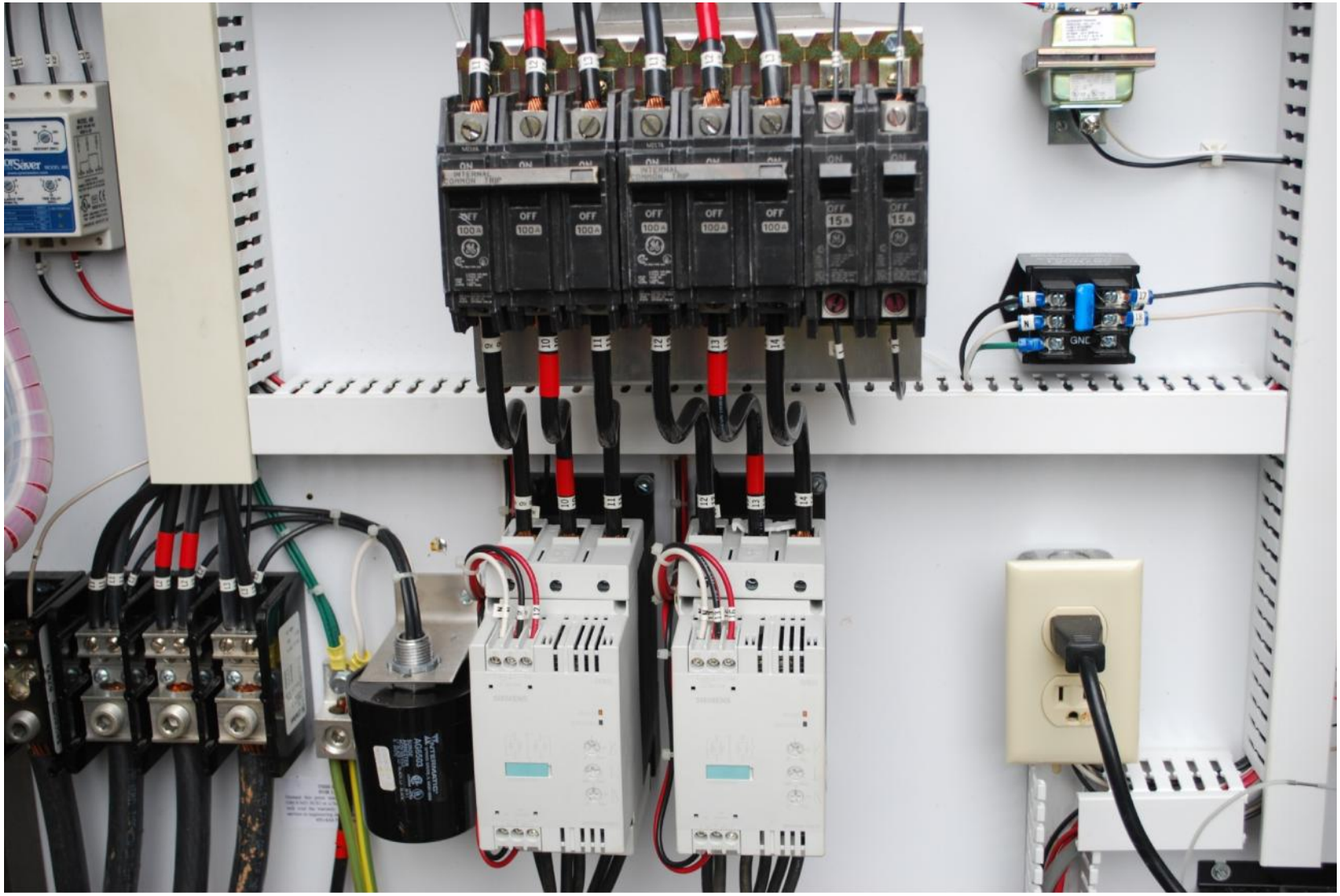

PUSH TO TEST
120 VOLTS

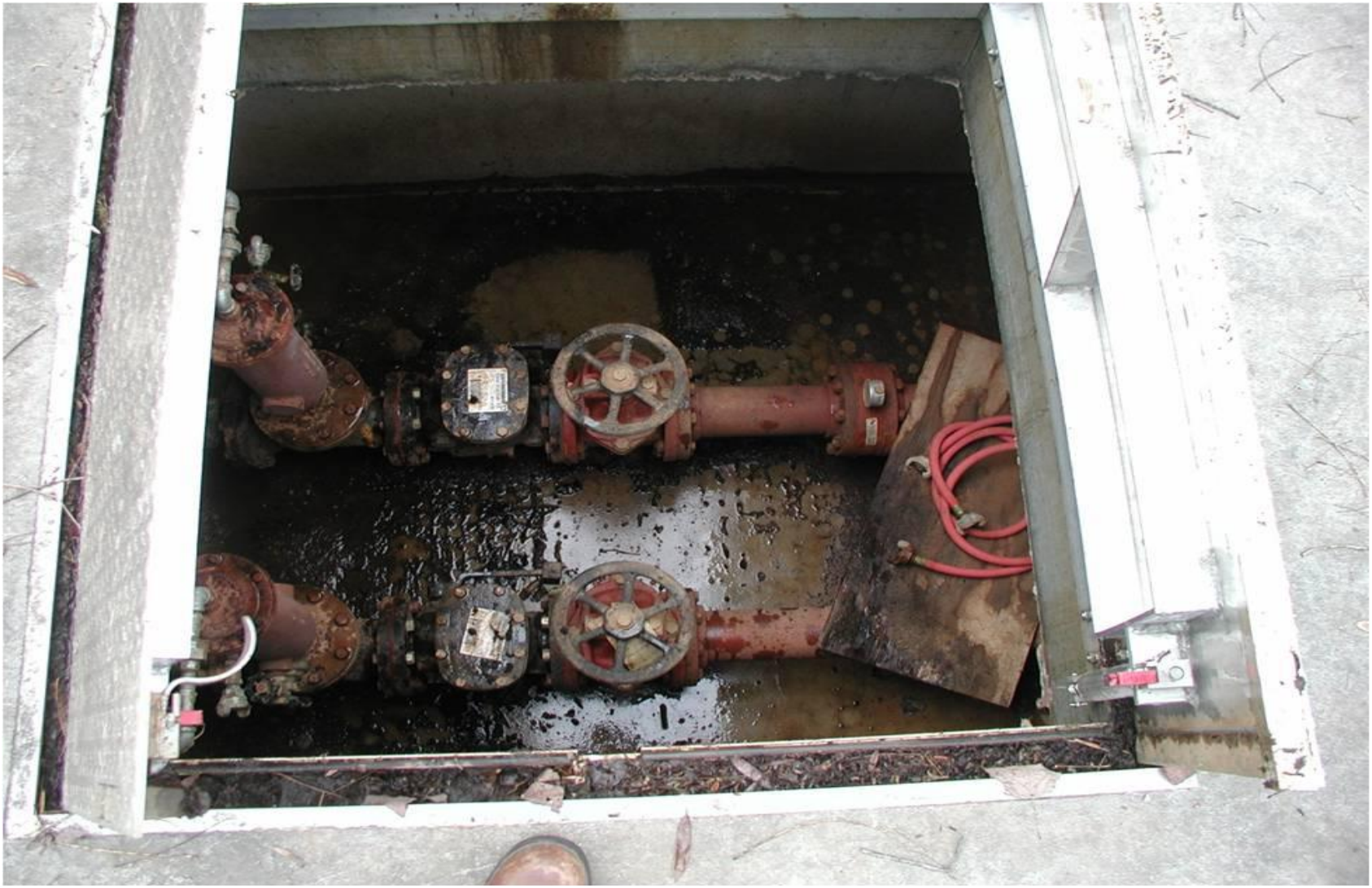



SAFETY LINE SHIELD
REPLACE AFTER WIRING
L1
L2
230 VOLTS
ON
ON
ON
OFF
OFF
OFF
OFF

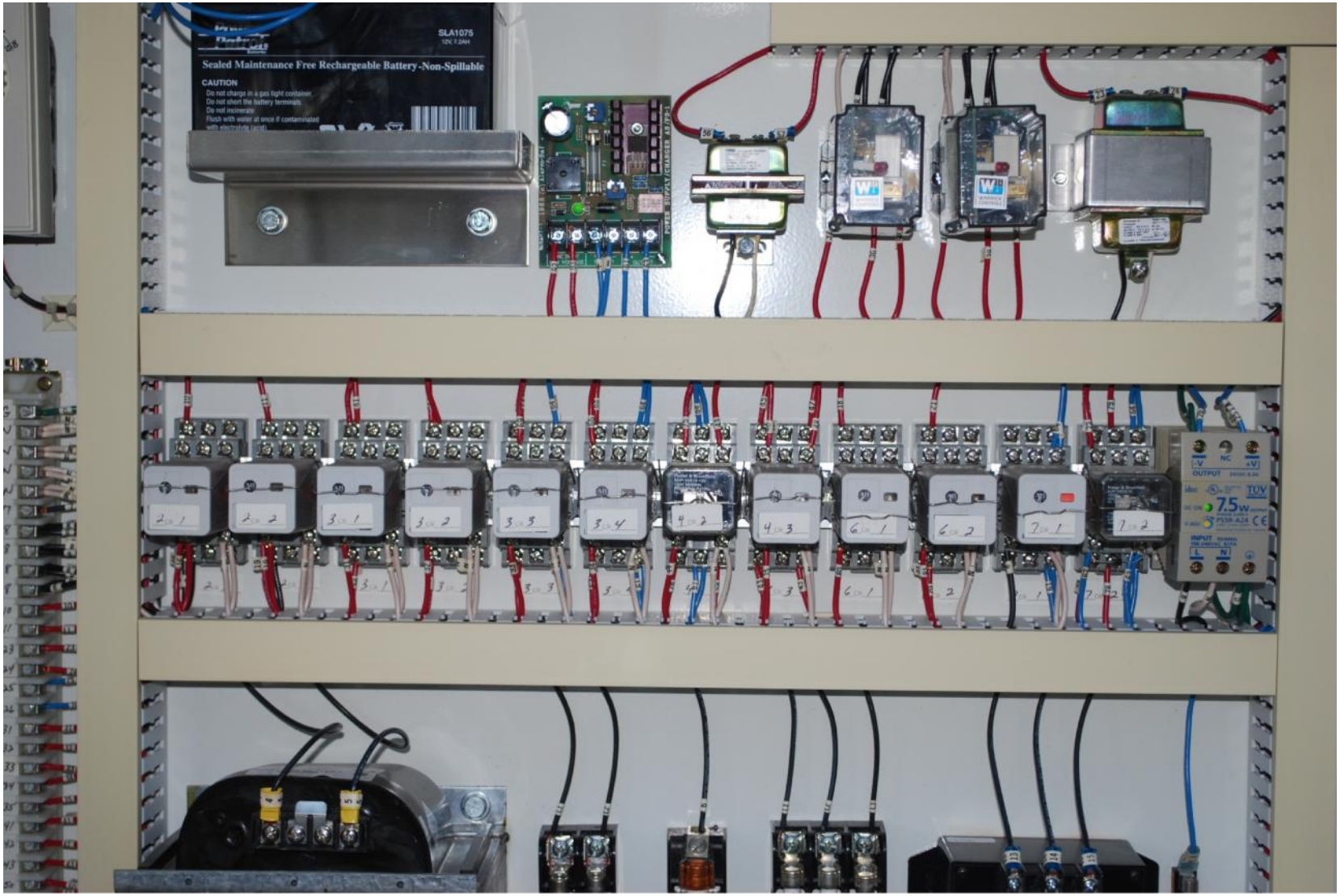


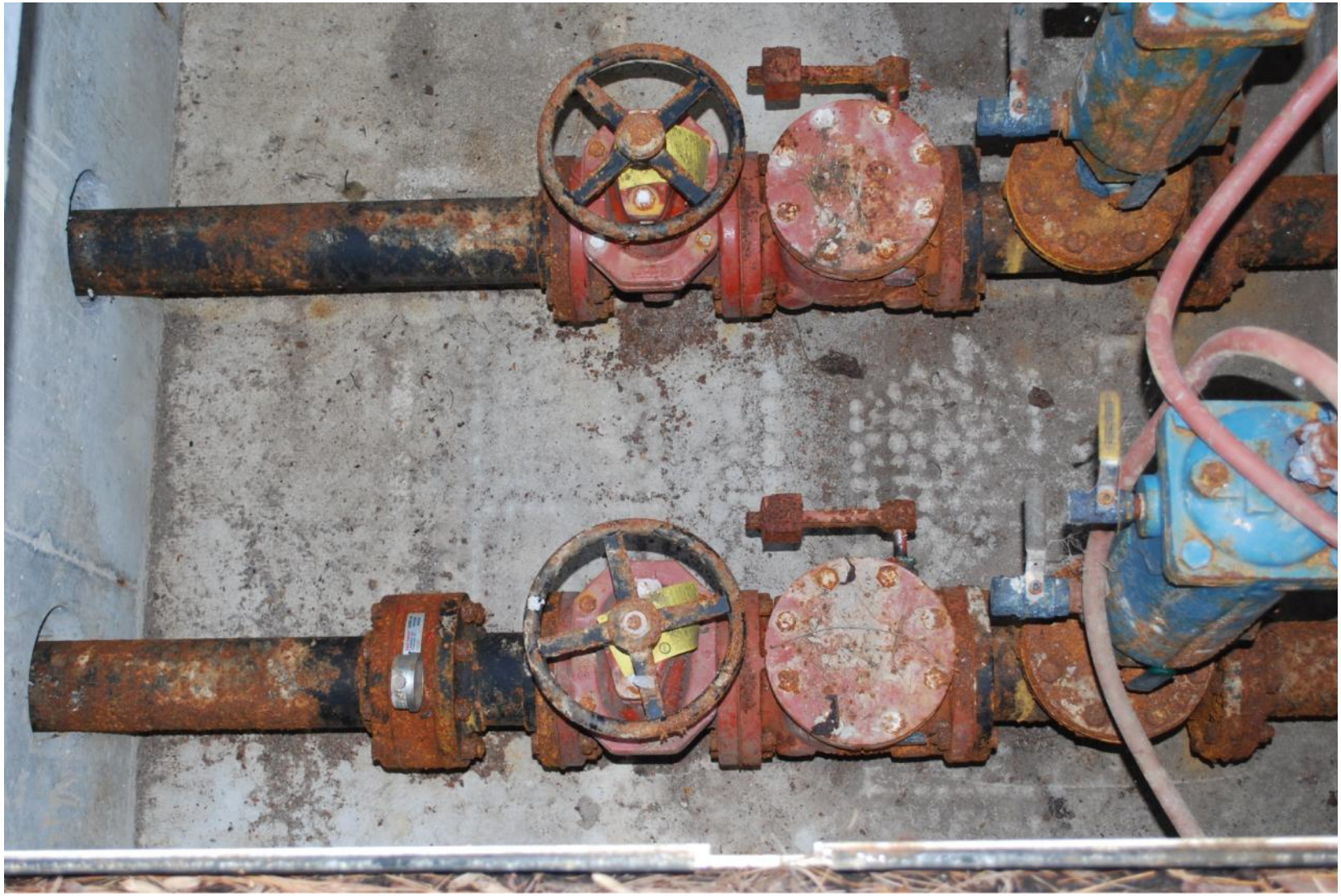

ON
10
100
% OF DELAY
1 2 3 4 5 6

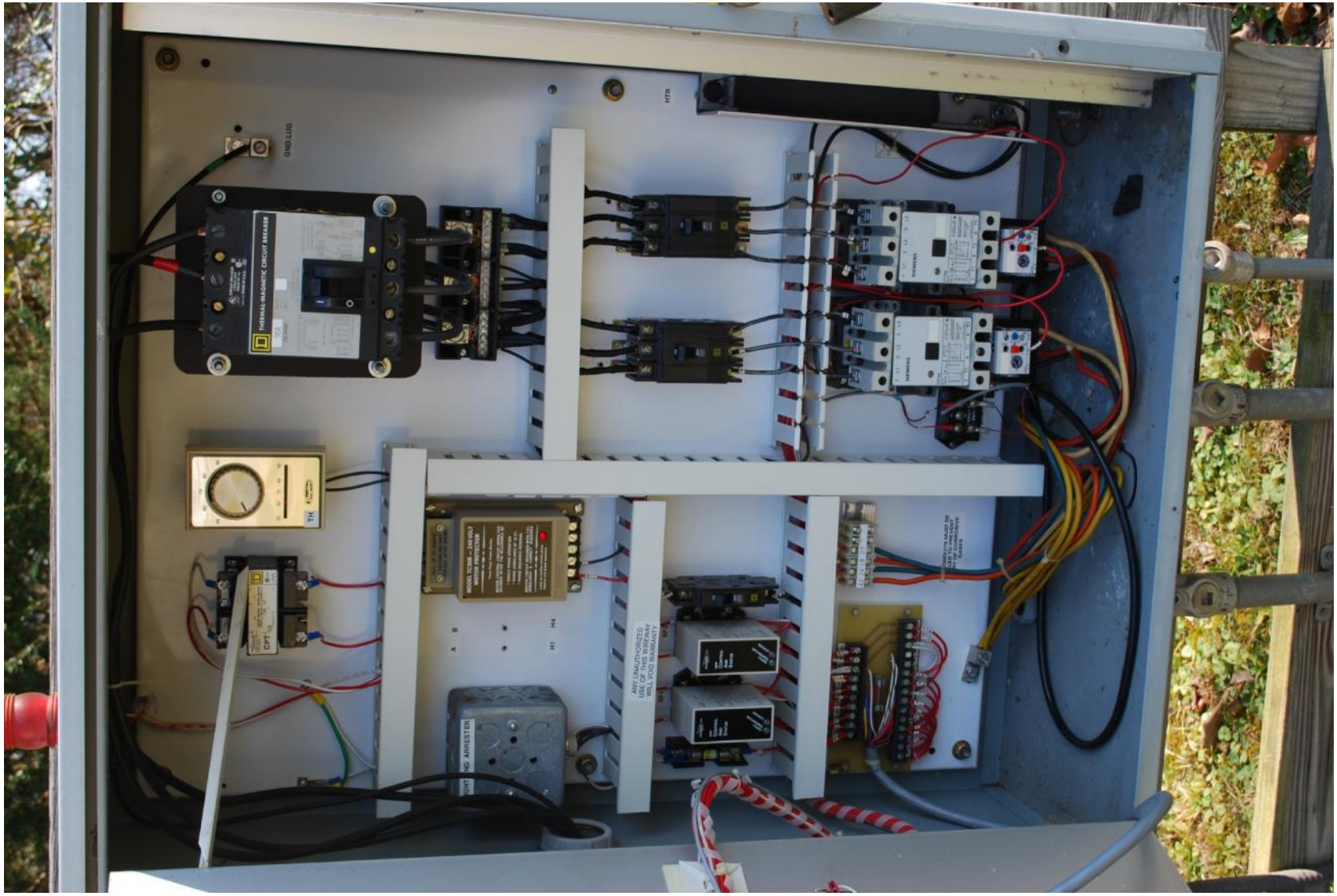

OFF
100A
OFF
15A
GND

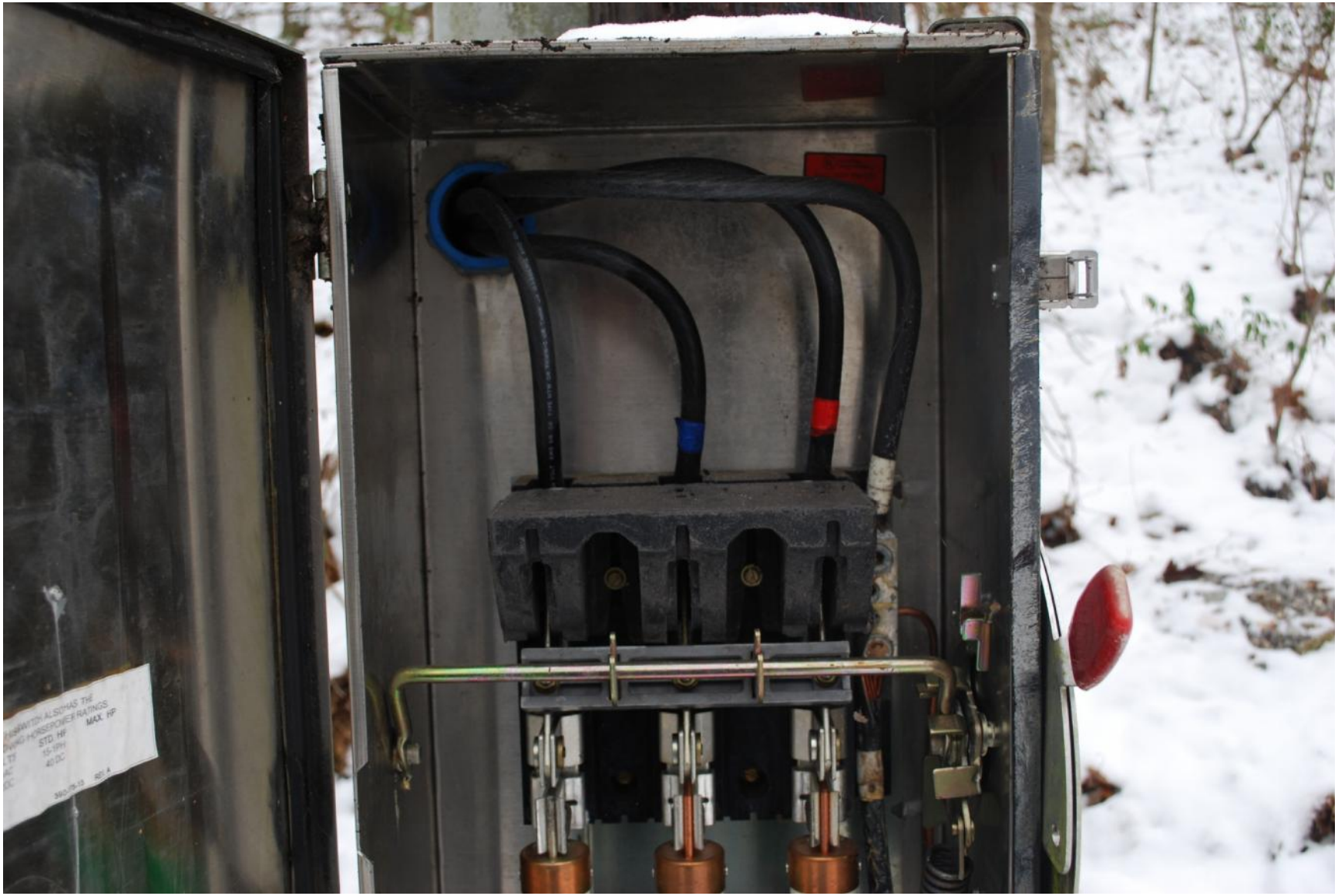


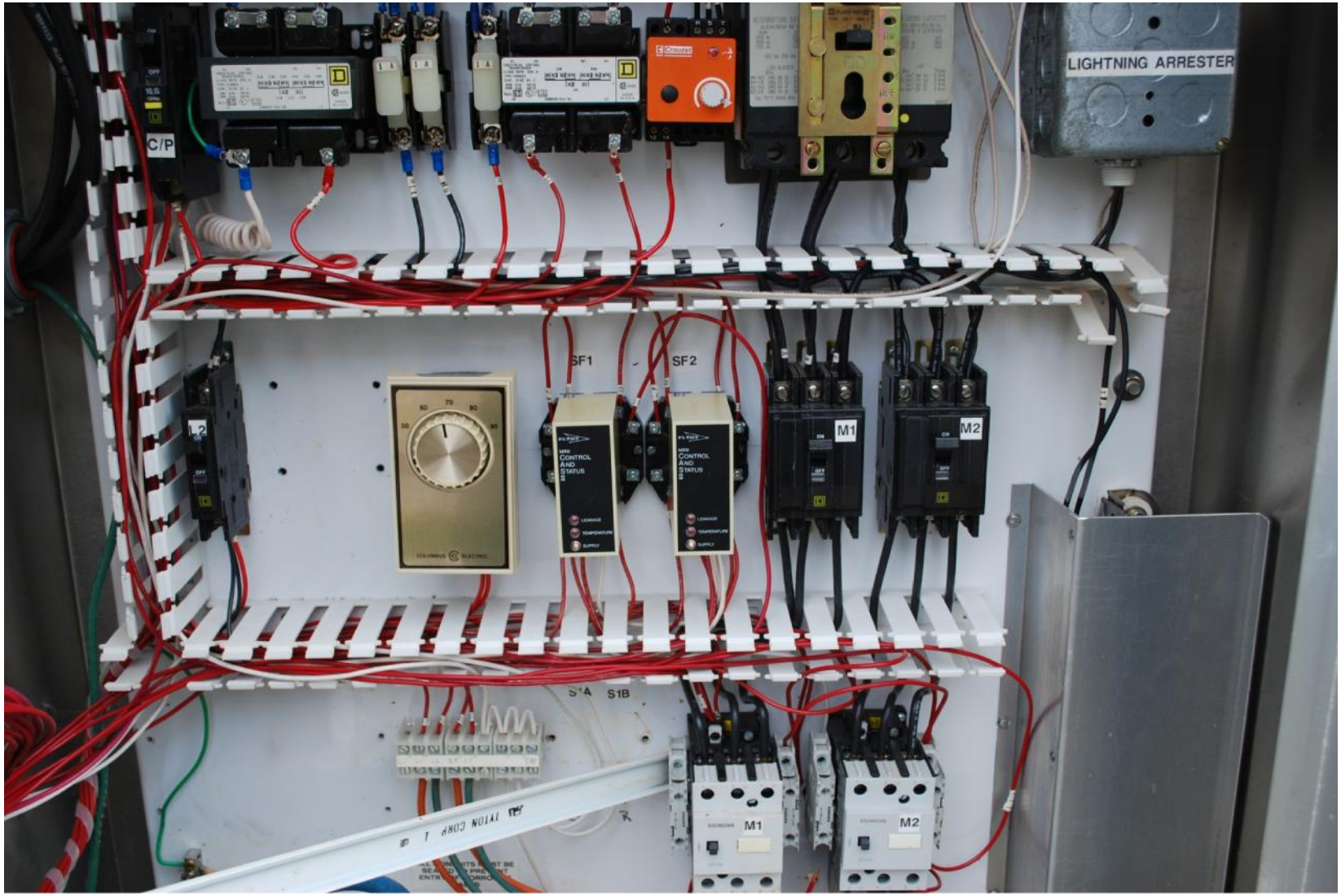
ON
OFF

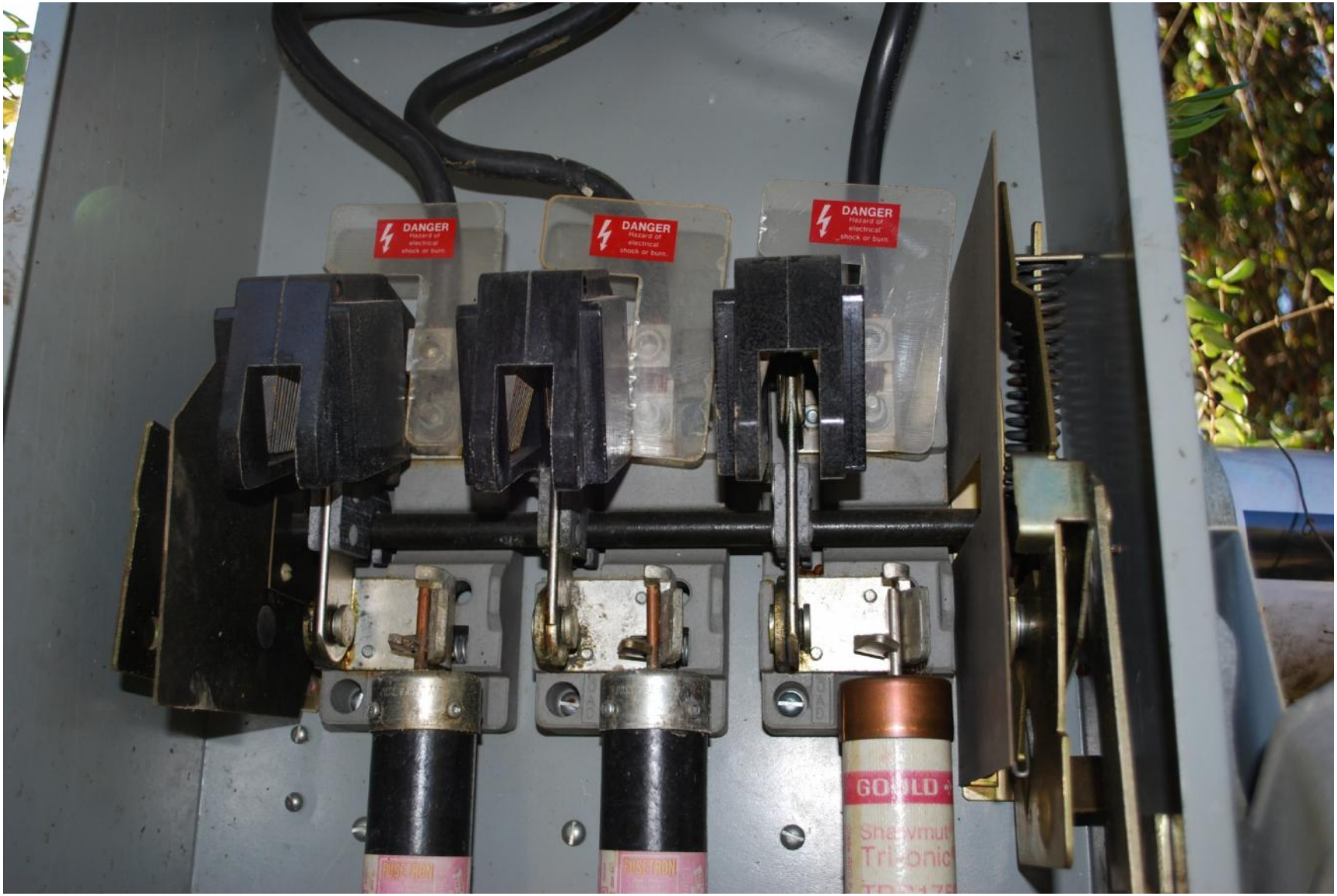

SLA1075
Sealed Maintenance Free Rechargeable Battery -Non-Spillable
CAUTION
7.5W



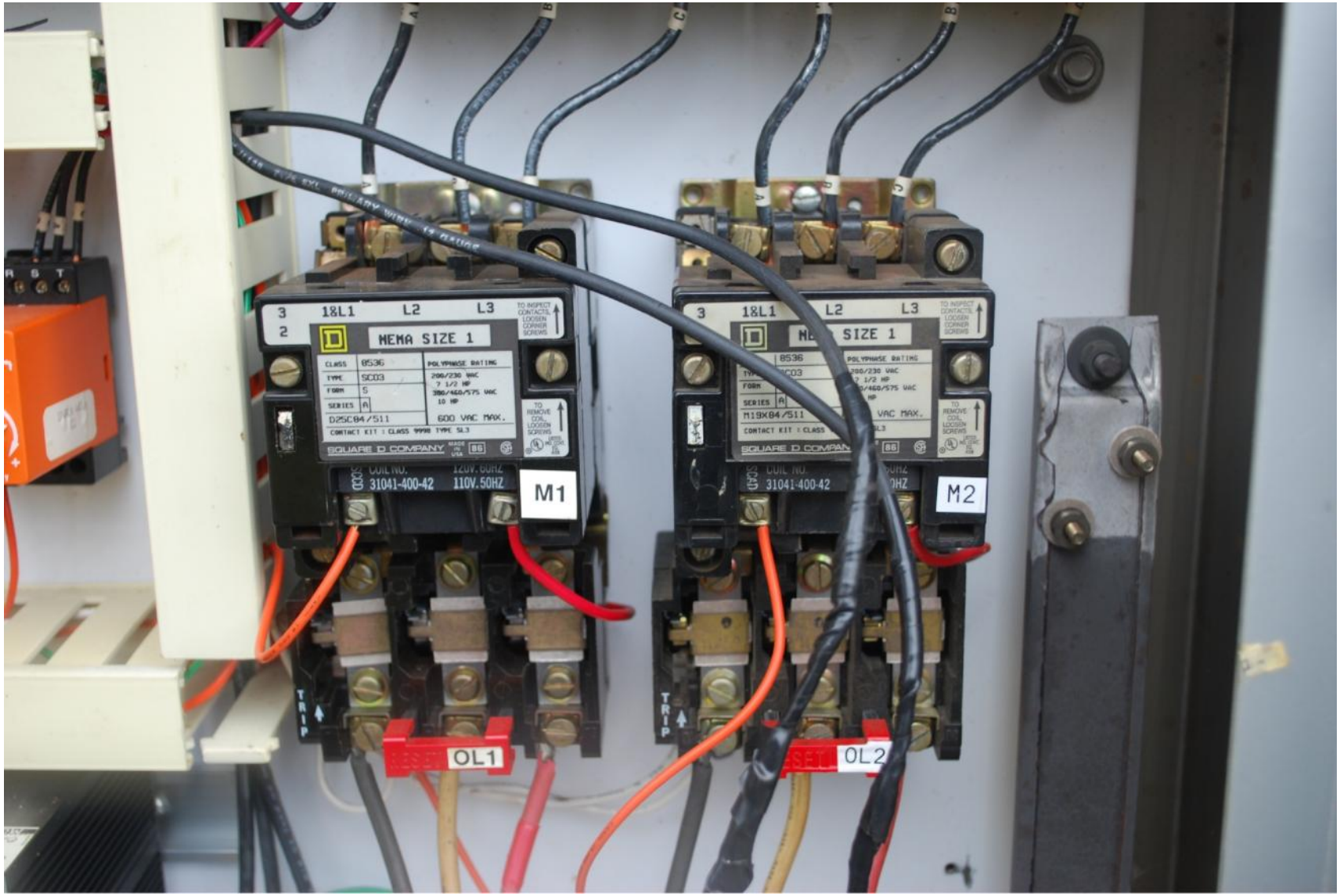

GND LUG
THERMAL MAGNETIC CIRCUIT BREAKER
MTR
SIEMENS
SIEMENS
TH
CPT
MODEL 1C300 — 240 VOLT
MOTOR PROTECTOR
A
H1
H4
ANY UNAUTHORIZED
USE OF THIS WIREWAY
WILL VOID WARRANTY
ARRESTER

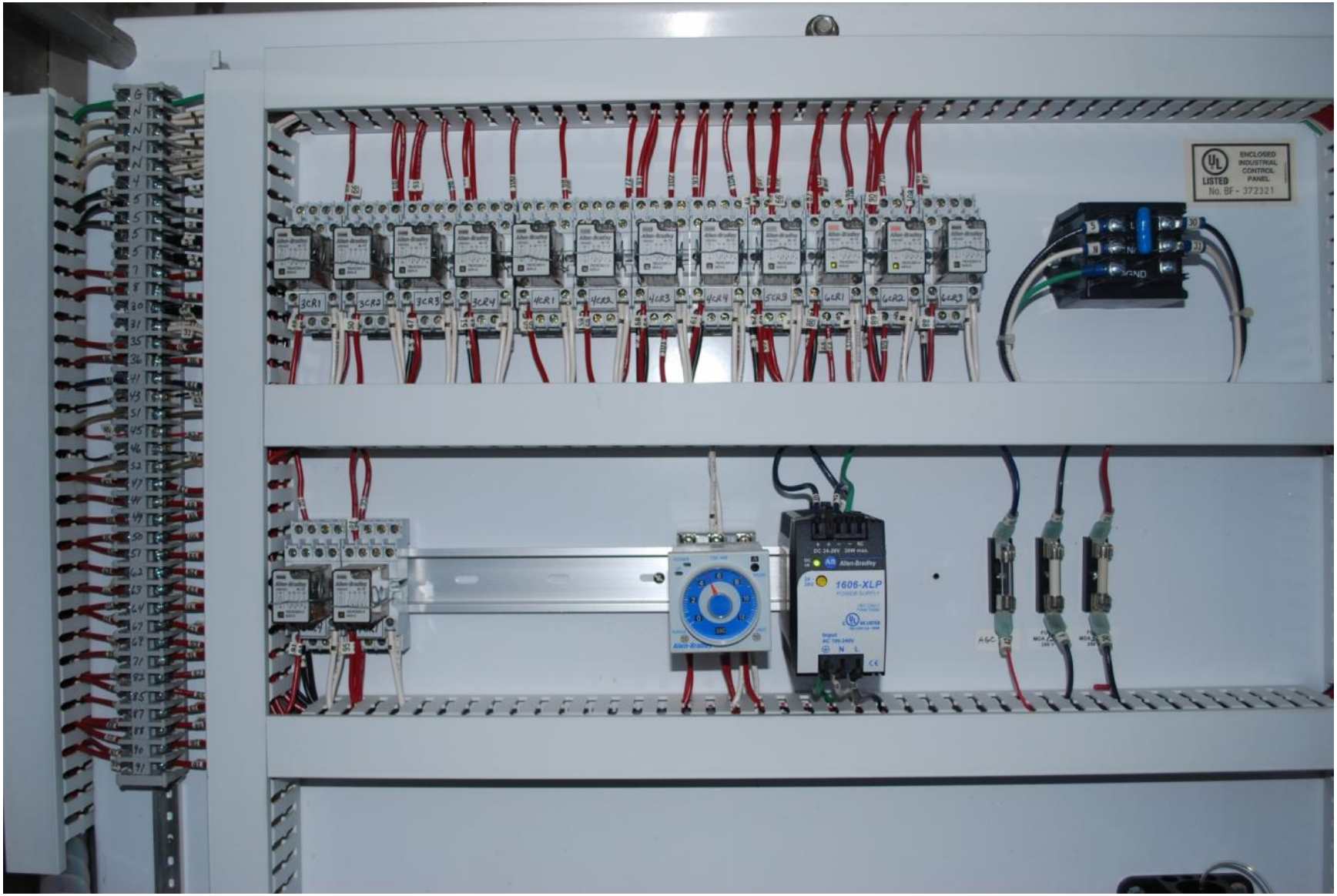

STD. HP
MAX. HP

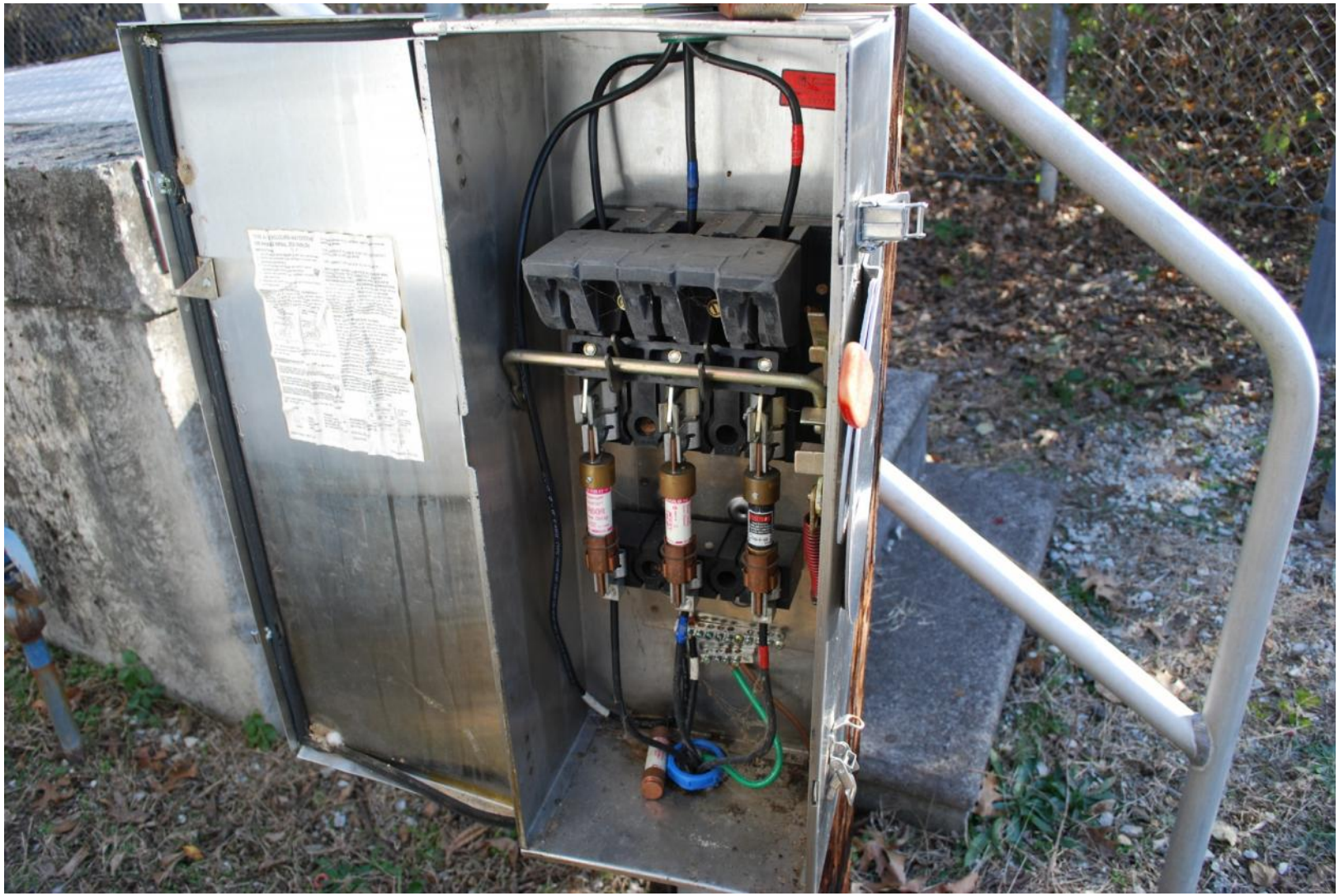

LIGHTNING ARRESTER
C/P
SF1
SF2
M1
M2
S1A
S1B
M1
M2


DANGER
Hazard of electrical shock or burn.
DANGER
Hazard of electrical shock or burn.
DANGER
Hazard of electrical shock or burn.
GOULD
Shawmut
Tri-onic
FUSETRON
FUSETRON

Phonetics, Inc.

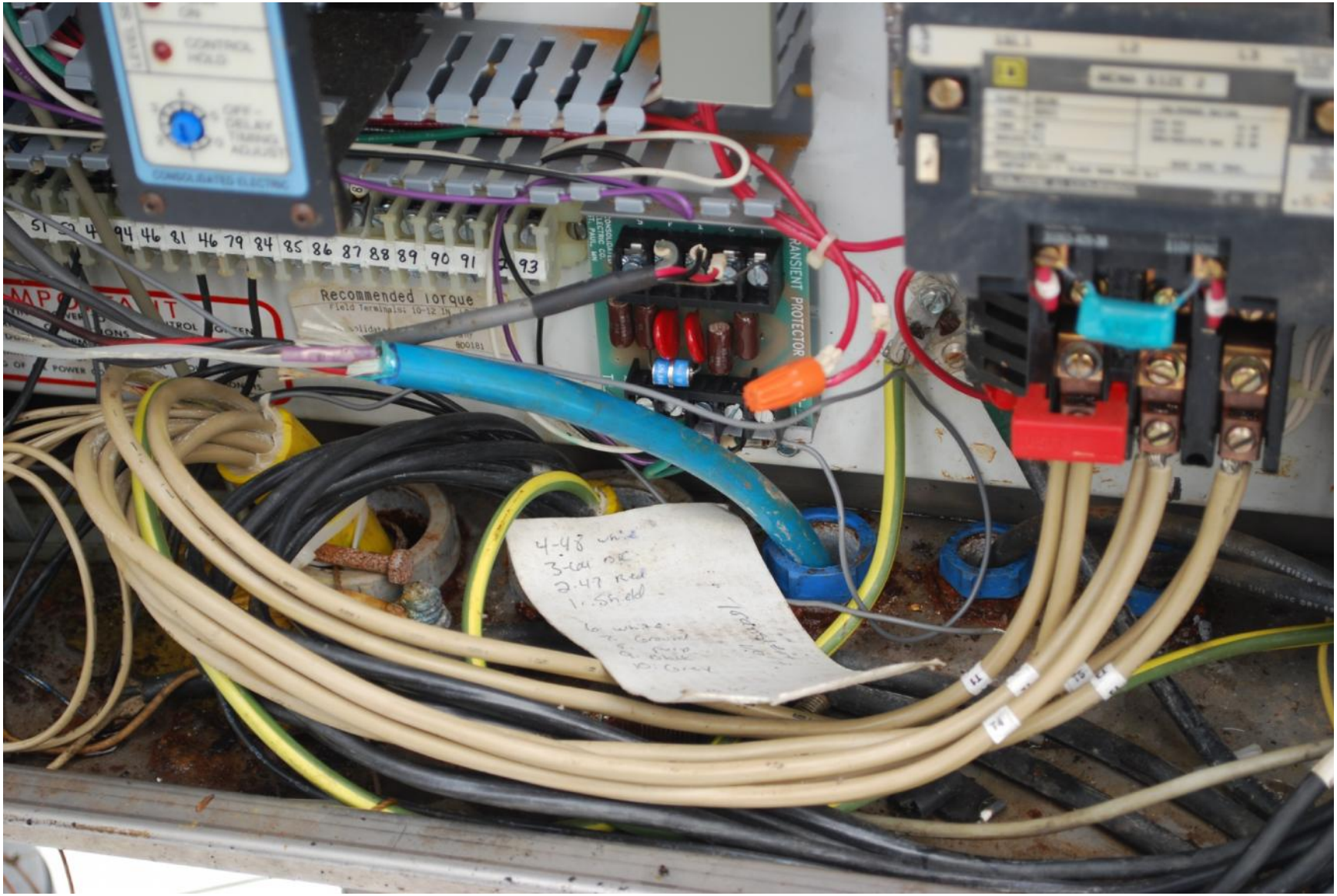

NEMA SIZE 1
SQUARE D COMPANY
31041-400-42
110V.50HZ
M1
M2
OL1
OL2
TRIP

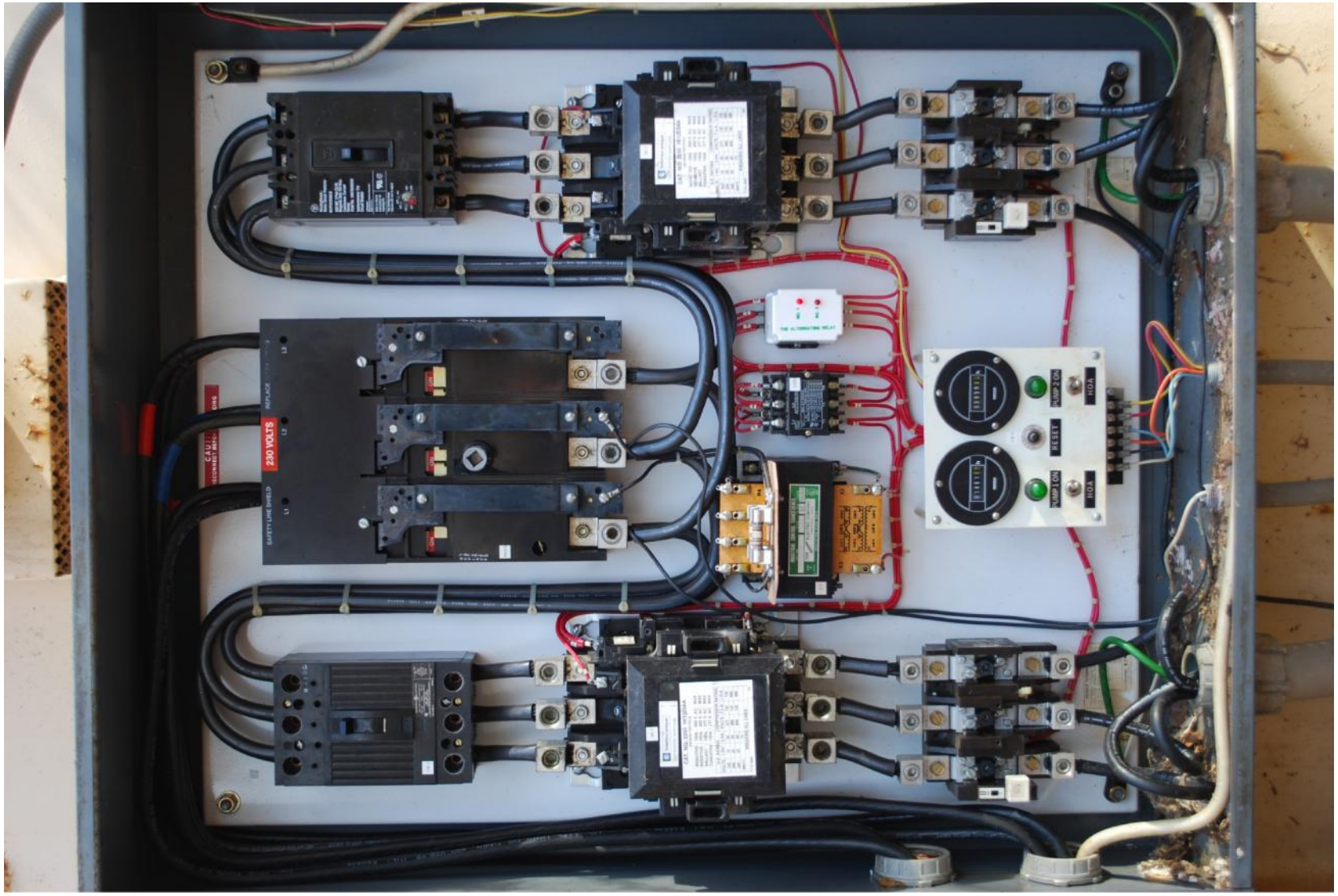

ENCLOSED INDUSTRIAL CONTROL PANEL
LISTED
No. BF - 372321
3CR1
3CR2
3CR3
3CR4
4CR1
4CR2
4CR3
4CR4
5CR3
6CR1
6CR2
6CR3
1606-XLP
Allen-Bradley

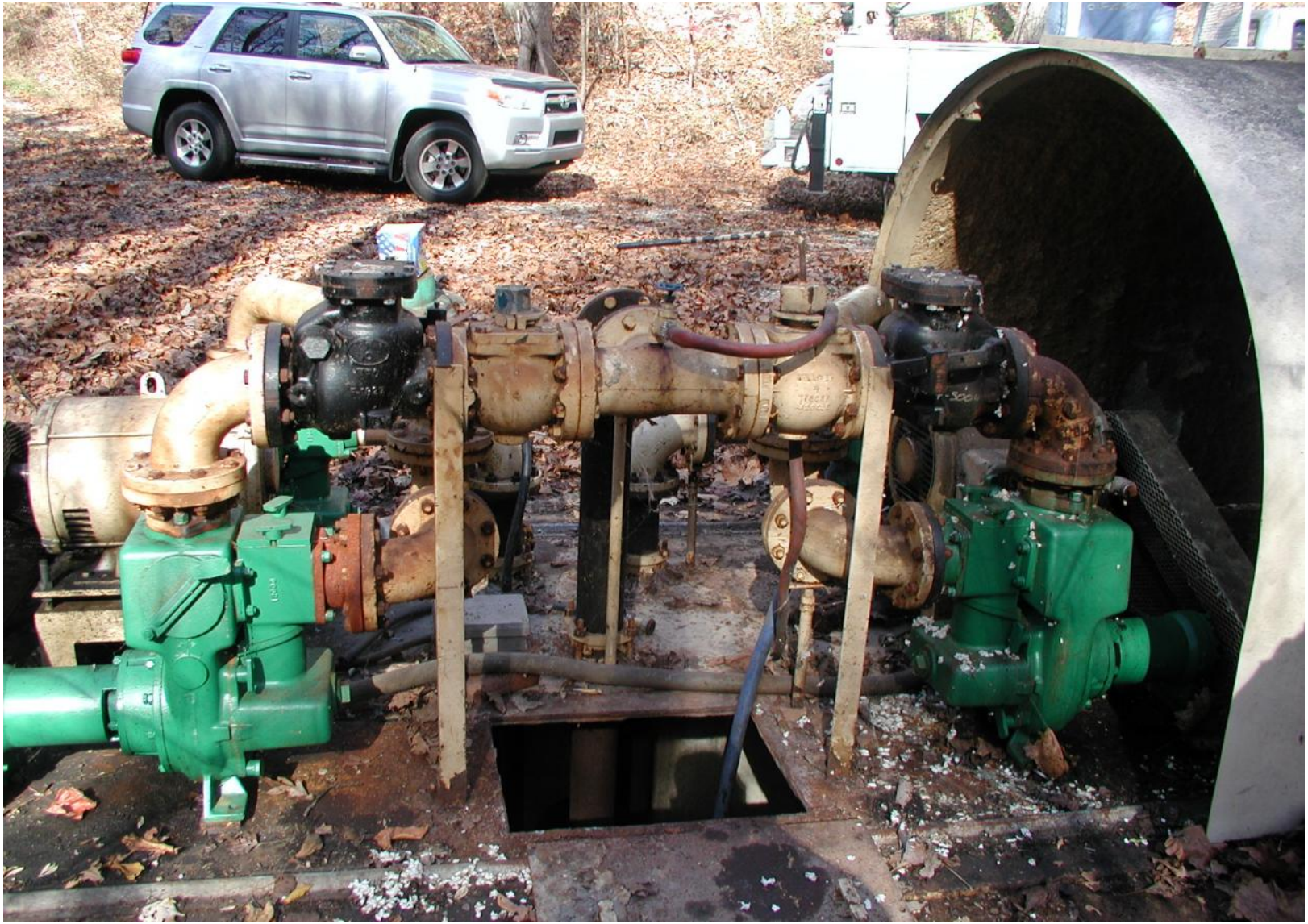


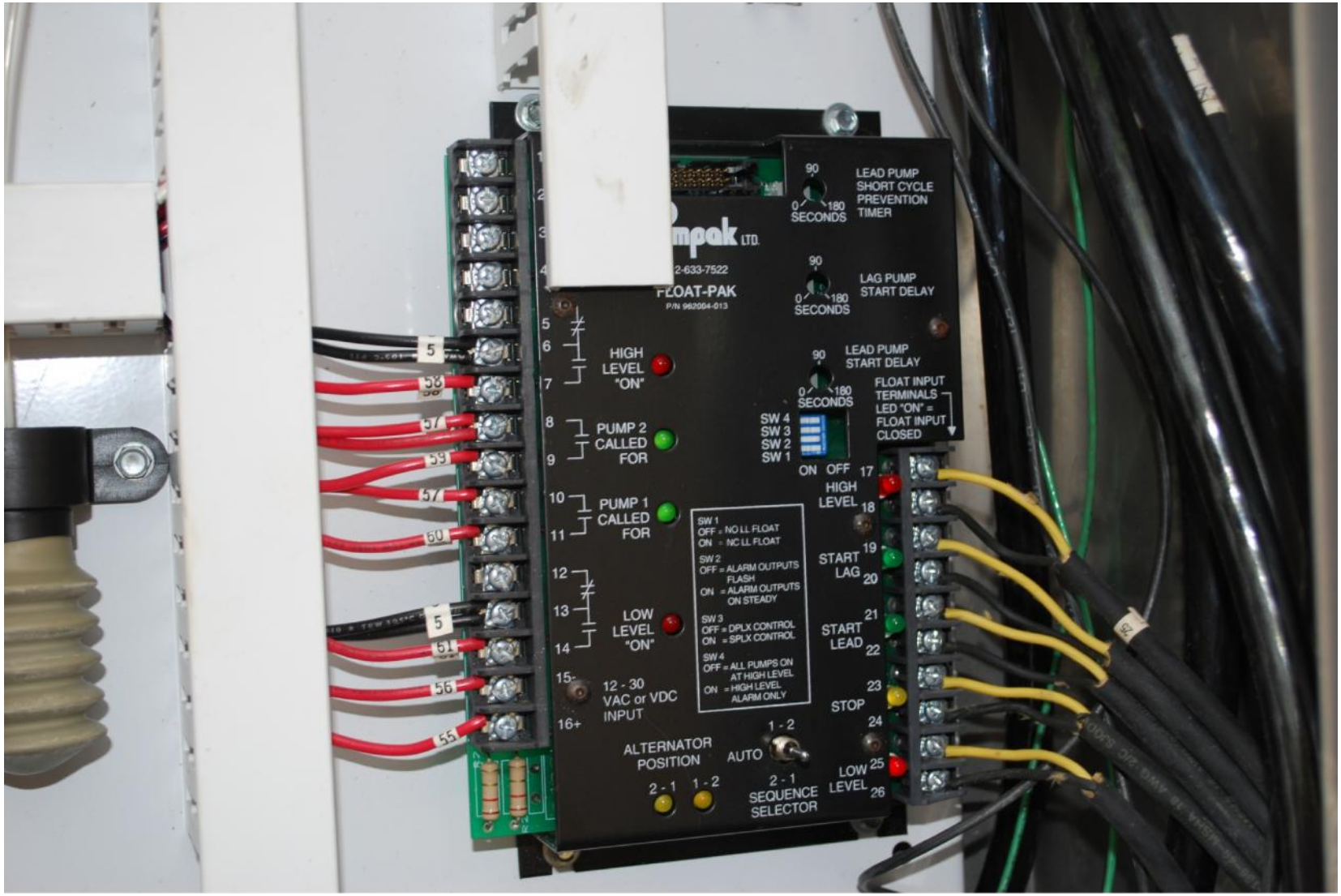
ON
OFF

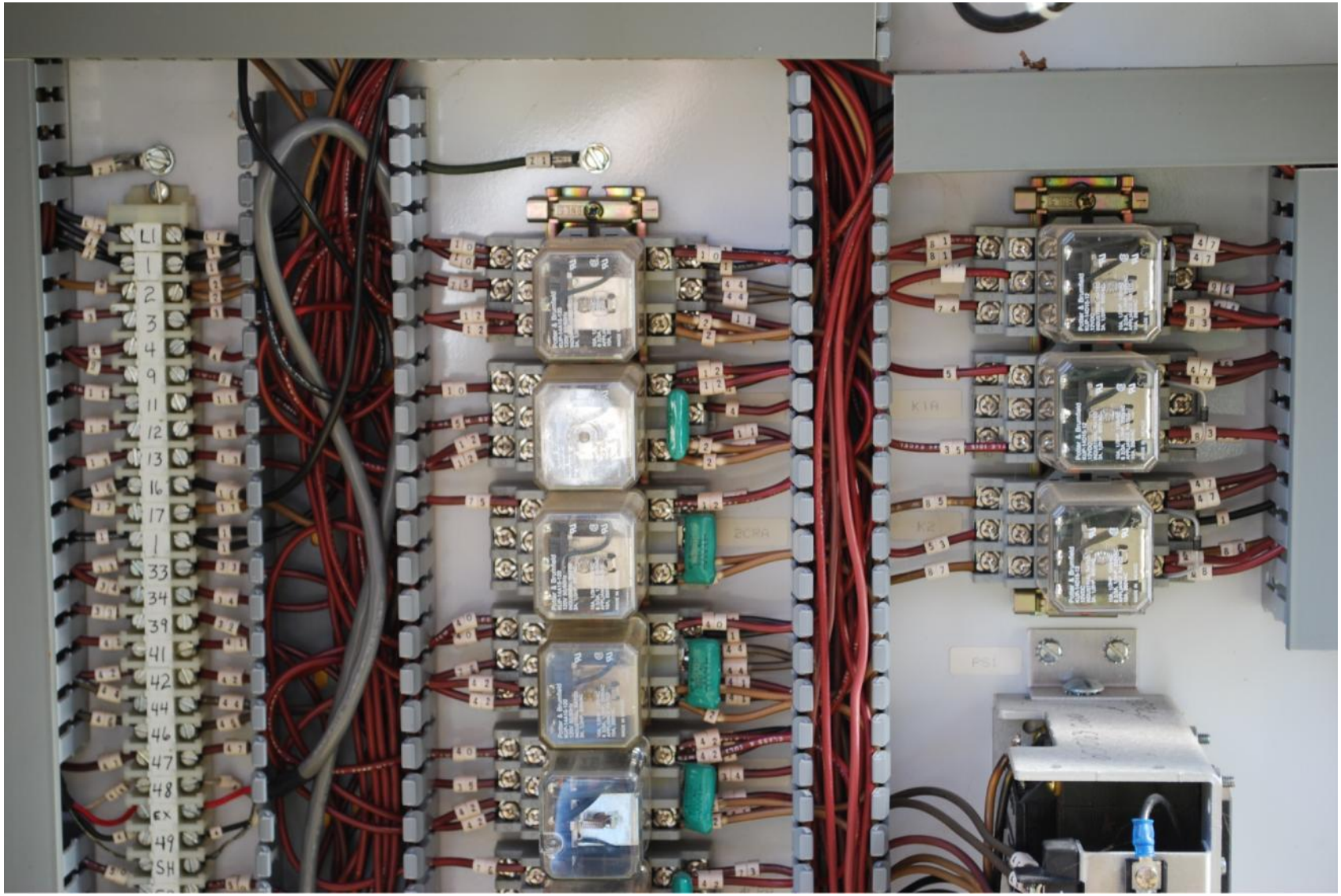
PTT
ALTERNATING RELAY
POS 1
Auto
POS 2

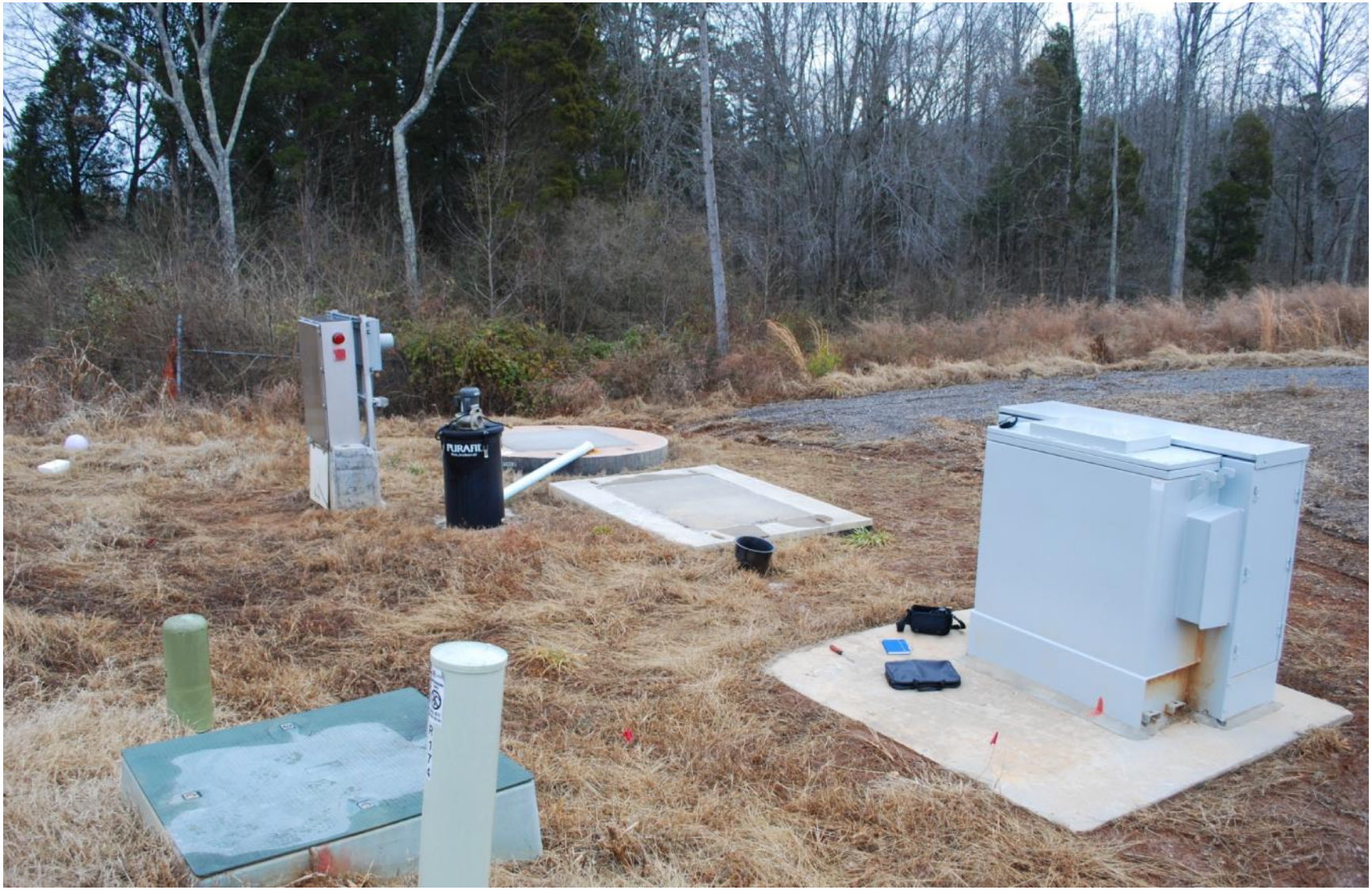

51 52 94 46 81 46 79 84 85 86 87 88 89 90 91 93
Recommended Torque
TRANSIENT PROTECTOR
4-48 white
3-44 OR
2-47 Red
1-Shield

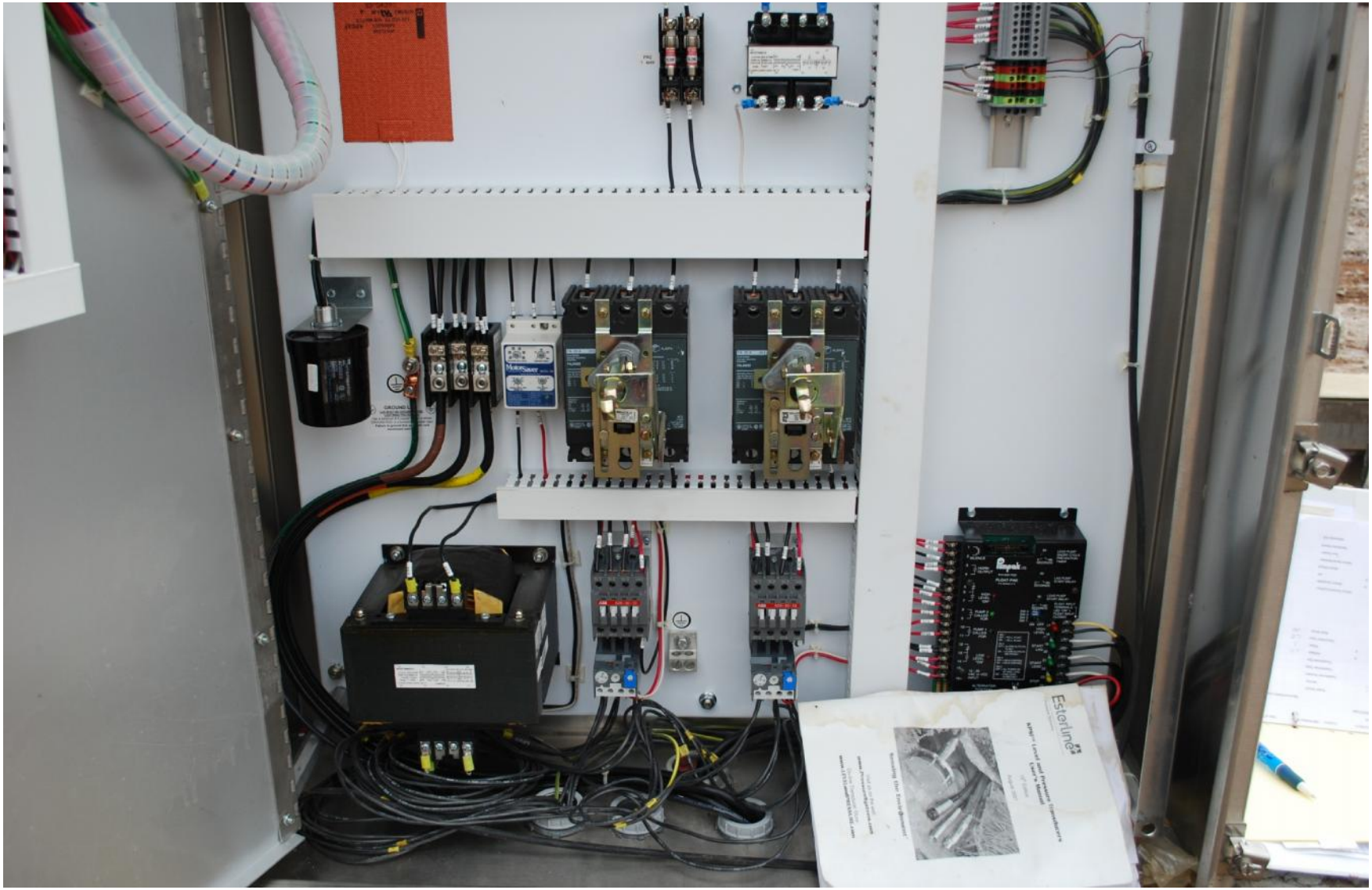

230 VOLTS
RESET

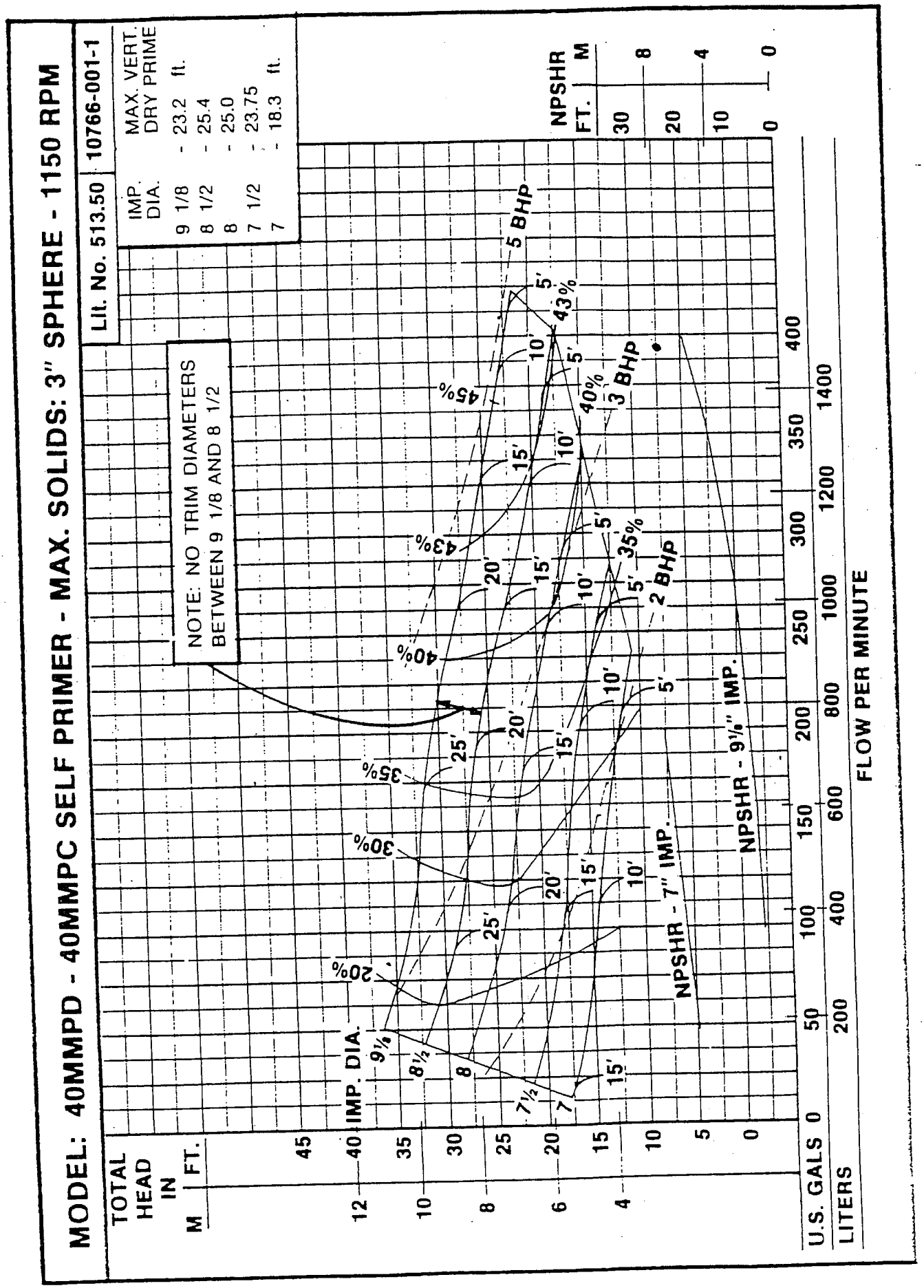



LEAD PUMP SHORT CYCLE PREVENTION TIMER
90
0
180
SECONDS
LAG PUMP START DELAY
LEAD PUMP START DELAY
FLOAT-PAK
P/N 962064-013
HIGH LEVEL "ON"
PUMP 2 CALLED FOR
PUMP 1 CALLED FOR
LOW LEVEL "ON"
12 - 30 VAC or VDC INPUT
SW 4
SW 3
SW 2
SW 1
ON OFF
FLOAT INPUT TERMINALS LED "ON" = FLOAT INPUT CLOSED
HIGH LEVEL
START LAG
START LEAD
STOP
LOW LEVEL
SW 1 OFF = NO LL FLOAT ON = NC LL FLOAT
SW 2 OFF = ALARM OUTPUTS FLASH ON = ALARM OUTPUTS ON STEADY
SW 3 OFF = DPLX CONTROL ON = SPLX CONTROL
SW 4 OFF = ALL PUMPS ON AT HIGH LEVEL ON = HIGH LEVEL ALARM ONLY
ALTERNATOR POSITION
2 - 1
1 - 2
AUTO
2 - 1 SEQUENCE SELECTOR

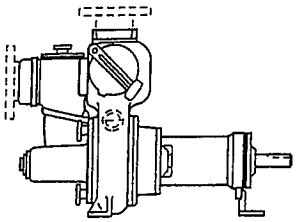

L1
1
2
3
4
9
11
12
13
16
17
1
33
34
39
41
42
44
46
47
48
EX
49
SH
K1A
K2
2CPA
PSI


PURAFIL


Esterline

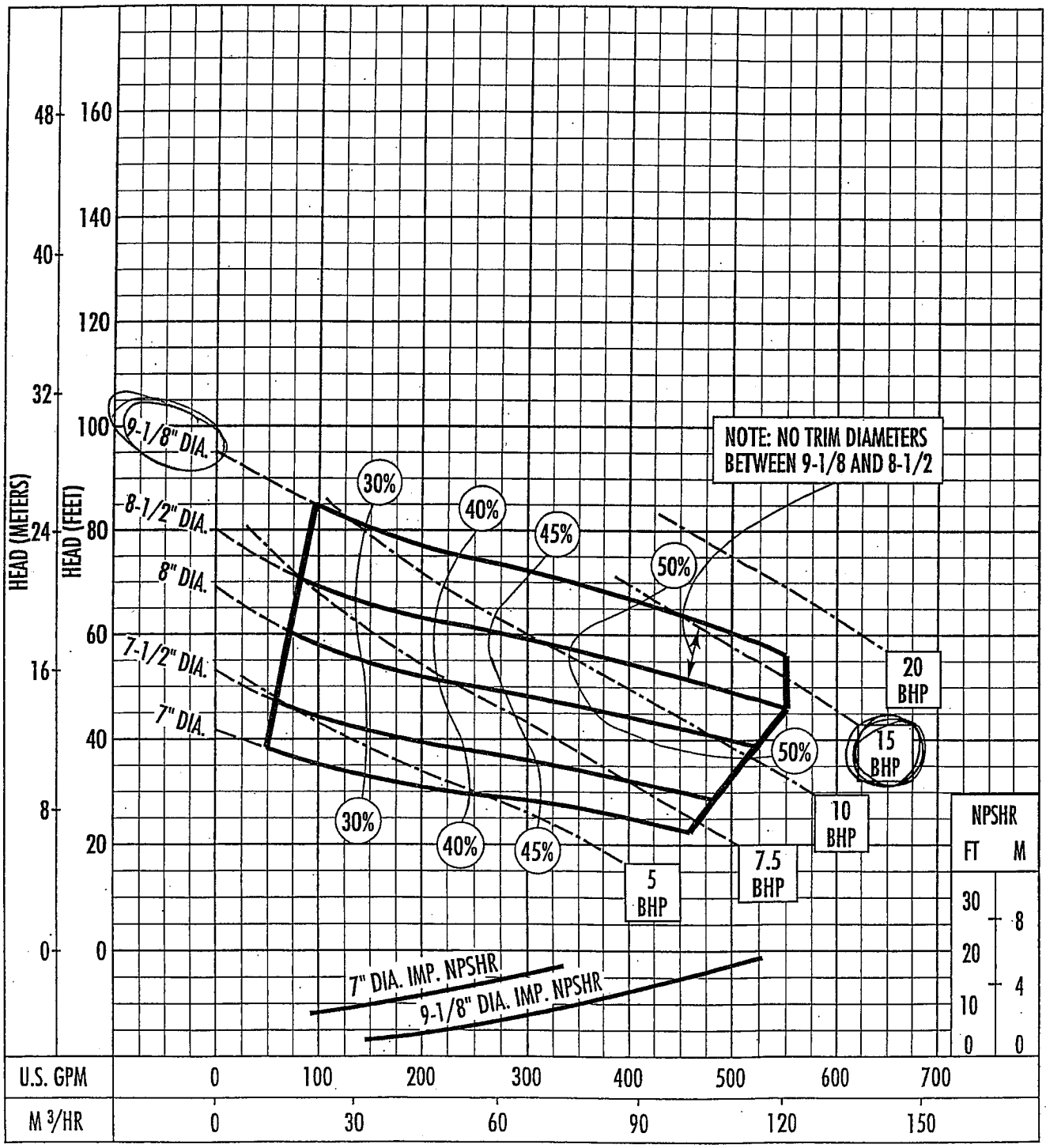

MODEL: 40MMPD - 40MMPC SELF PRIMER - MAX. SOLIDS: 3" SPHERE - 1150 RPM
Lit. No. 513.50
10766-001-1
IMP. DIA.
MAX. VERT. DRY PRIME
9 1/8 - 23.2 ft.
8 1/2 - 25.4
8 - 25.0
7 1/2 - 23.75
7 - 18.3 ft.
NOTE: NO TRIM DIAMETERS BETWEEN 9 1/8 AND 8 1/2
TOTAL HEAD IN M FT.
IMP. DIA.
NPSHR FT. M
NPSHR - 7" IMP.
NPSHR - 9 1/8" IMP.
5 BHP
3 BHP
2 BHP
U.S. GALS
LITERS
FLOW PER MINUTE

CASTLEWOOD PUMP ST.



Performance Curve — 40MMP

RPM: **1750** Discharge: **4"** Solids: **3"**



Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F. and 1280 feet site elevation.

Conditions of Service:

GPM: _____ TDH: _____

HYDROMATIC®

FLYGT

Performance Curve

Product	Type
NP3153.181	SH

Date	Project	Curve No	Issue
2007-11-19	CENTENNIAL BLUFF 300 GPM 140 FT	63-274-00-1078	5

	1/1-Load	3/4-Load	1/2-Load
Power Factor	0.91	0.87	0.79
Efficiency	91.0 %	91.5 %	91.5 %
Motor Data	---	---	---

Comments

Inlet/Outlet: -/ 4 inch

Imp. Throughlet: ---

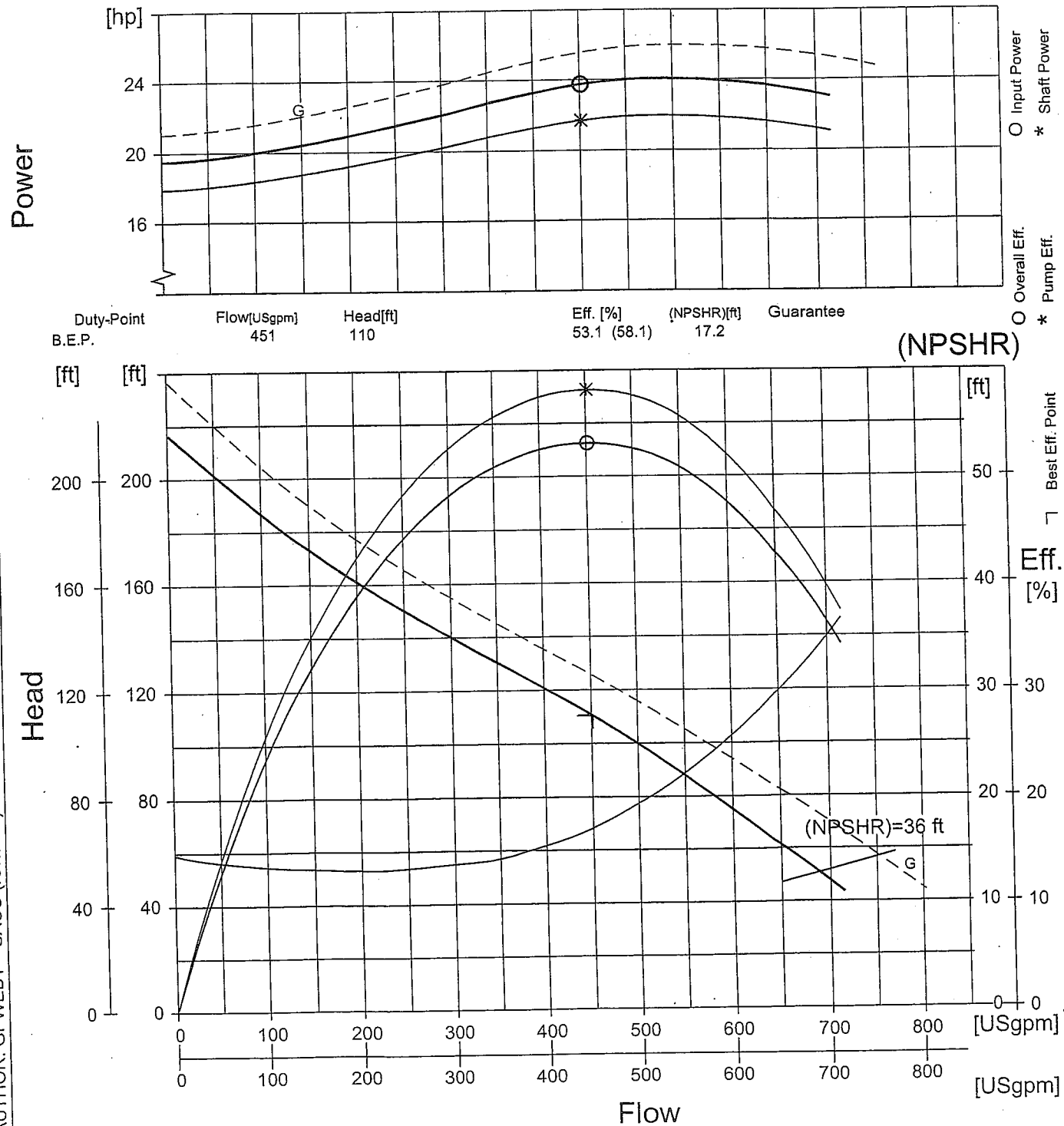
Rated Power ...	23	hp
Starting Current ...	415	A
Rated Current ...	52	A
Rated Speed ...	3510	rpm
Tot. Mom. of Inertia ...	0.032	kgm2
No. of Blades	2	

Impeller Diameter: 176 mm

Motor #	Stator	Rev
21-18-2BB	04Y//	10

Freq.	Phases	Voltage	Poles
60 Hz	3	230 V	2

Geartype	Ratio
---	---



Guarantee between limits (G) acc. to

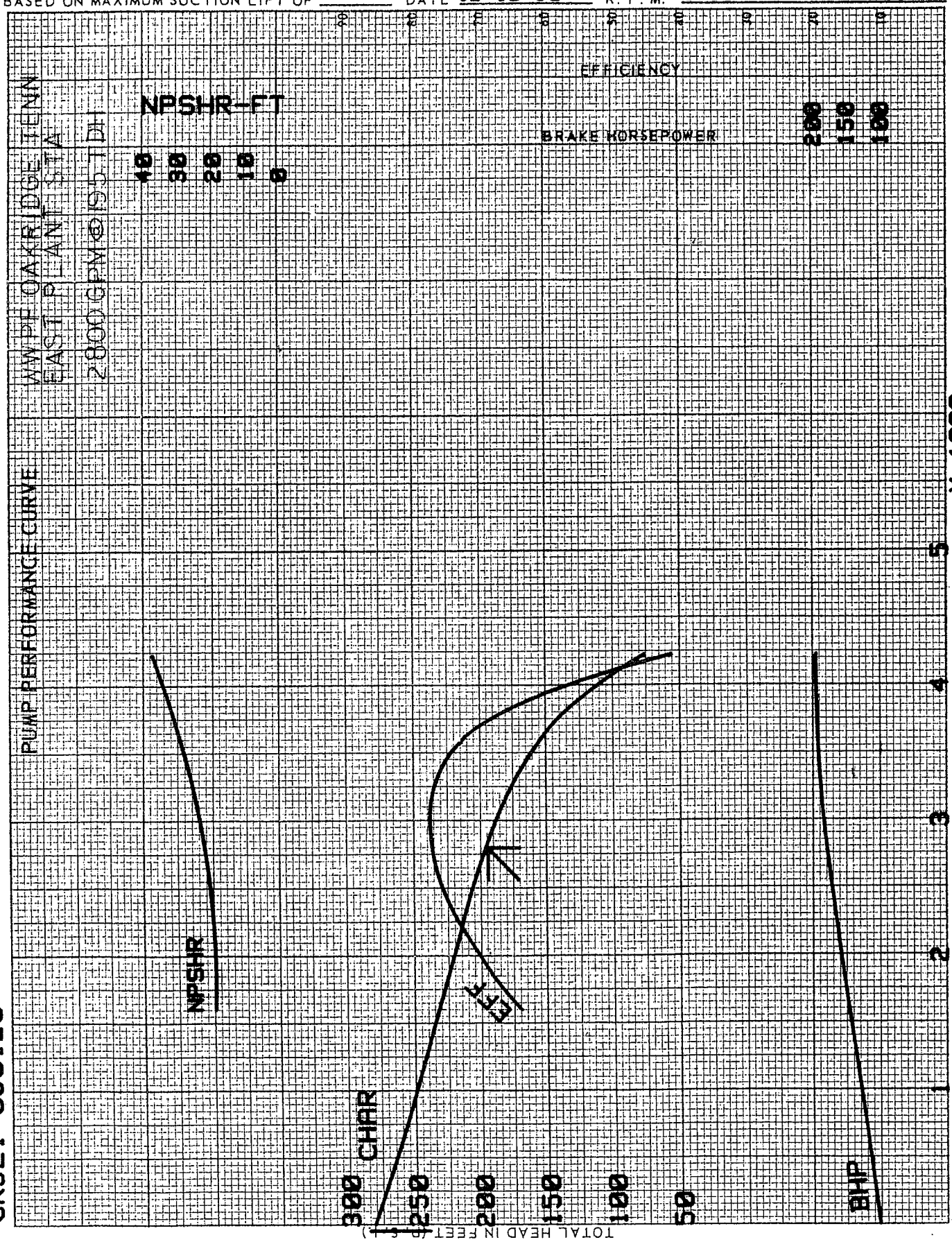
unix AUTHOR: GPWEB1 SACU (rev:7.49)

Colt Industries **Fairbanks Morse Pump Division**

THIS CHART IS BASED ON ACTUAL TEST PERFORMANCE OF A SIMILAR PUMP. ONLY THE INDICATED ↗ POINT IS GUARANTEED.
BASED ON MAXIMUM SUCTION LIFT OF _____

NO. STAGES ONE
REFERENCE TL-603343
PLOTTED BY JM
DATE 12-12-80

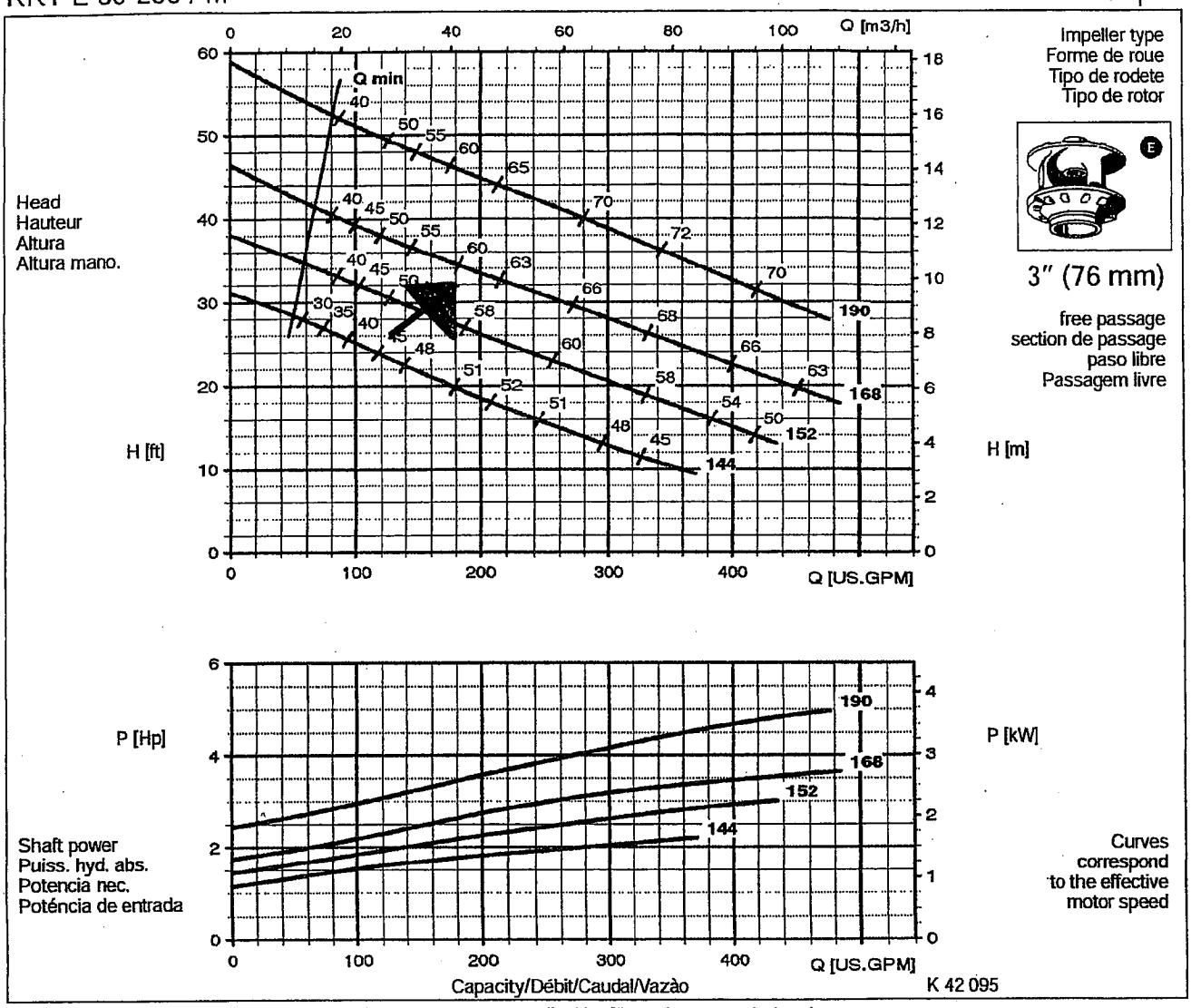
SIZE-FIGURE 6-B5416
IMPELLER T6E1G
IMP. DIA. 16.0"
R. P. M. 1785



CK3E1-060120

KC 1213

KRT E 80-200 / ... 1750 rpm



Suitable motor sizes/Définition taille moteur/Tamaños de motor aplicables/Tamanhos apropriados de motores

MOTOR RATING Material G Hp (kW)	MAX. LIQUID TEMP. °F (°C)	MOTOR CODE
1.75 (1.3)	104 (40)	1 4 U2G 1 4 X2G (FM)
2.4 (1.8)	104 (40)	2 4 UG 2 4 XG (FM)
	140 (60)	2 4 WG
3.4 (2.5)	104 (40)	2 4 UG 2 4 XG (FM)
	140 (60)	3 4 WG (FM)
5.0 (3.7)	104 (40)	3 4 UG 3 4 XG (FM)

(FM) = Explosionproof to Class I, Division 1, Groups C & D
(Explosionproof according to IEC 79 (EEx d II B) on request).

ITT Water & Wastewater

PERFORMANCE CURVE

PRODUCT	TYPE
NT3202.180	HT

DATE	PROJECT	CURVE NO	ISSUE
2010-11-02	EMORY VALLEY	63-465-00-4060	4

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.90	0.87	0.80
EFFICIENCY	92.5 %	93.0 %	93.0 %
MOTOR DATA	---	---	---

RATED POWER	70	hp
STARTING CURRENT ...	550	A
RATED CURRENT ...	79	A
RATED SPEED	1775	rpm
TOT.MOM.OF INERTIA ...	0.49	kgm2
NO. OF BLADES	2	

IMPELLER DIAMETER: 370 mm

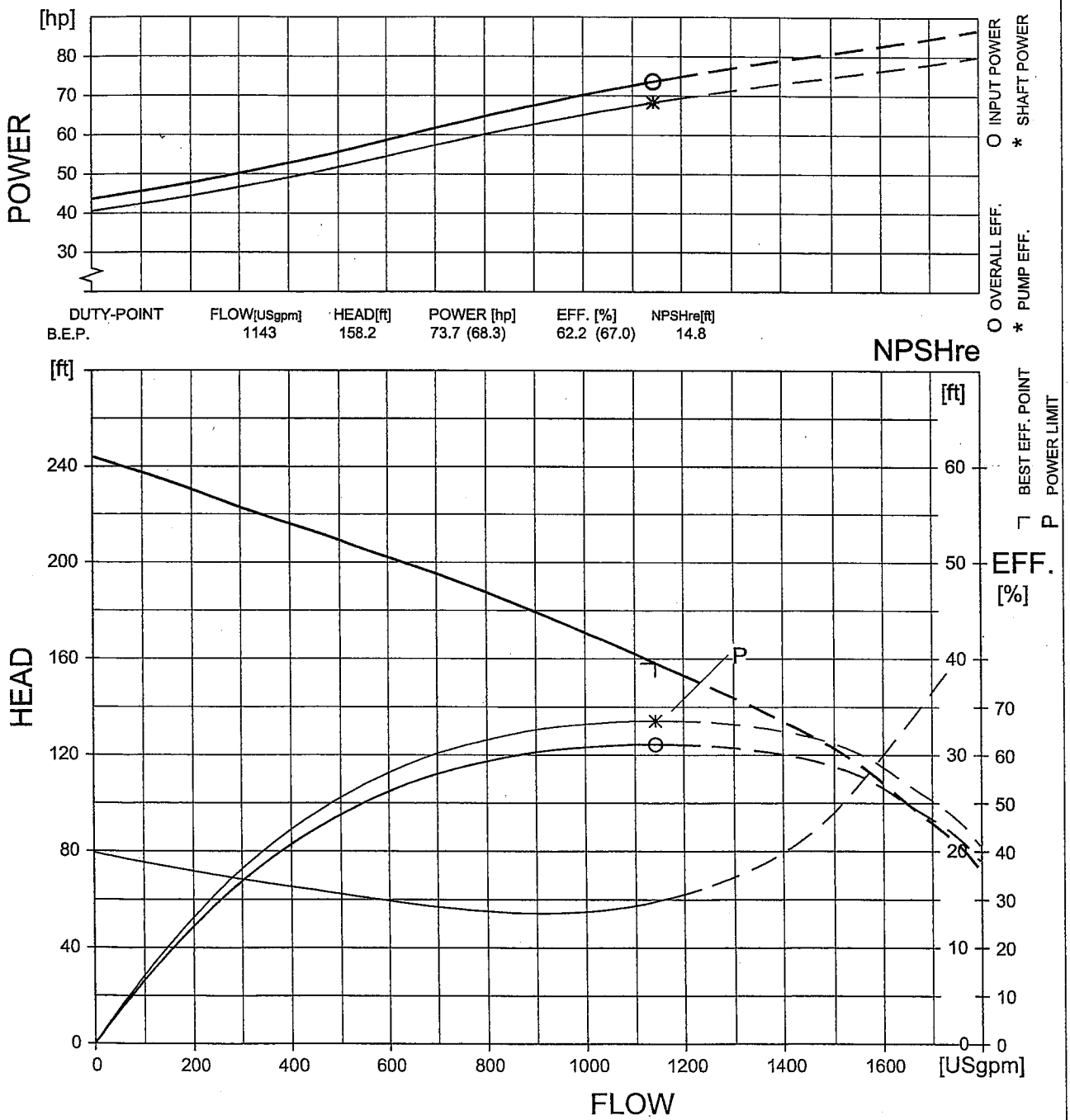
MOTOR #	STATOR	REV
30-29-4AA	01D	12

FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

GEARTYPE	RATIO
---	---

COMMENTS

INLET/OUTLET	IMP. THROUGHLET
8/ 4 inch	---



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
B.E.P.	1143	158.2	73.7 (68.3)	62.2 (67.0)	14.8

NPSHre = NPSH3% + min. operational margin

Performance with clear water and ambient temp 40 °C

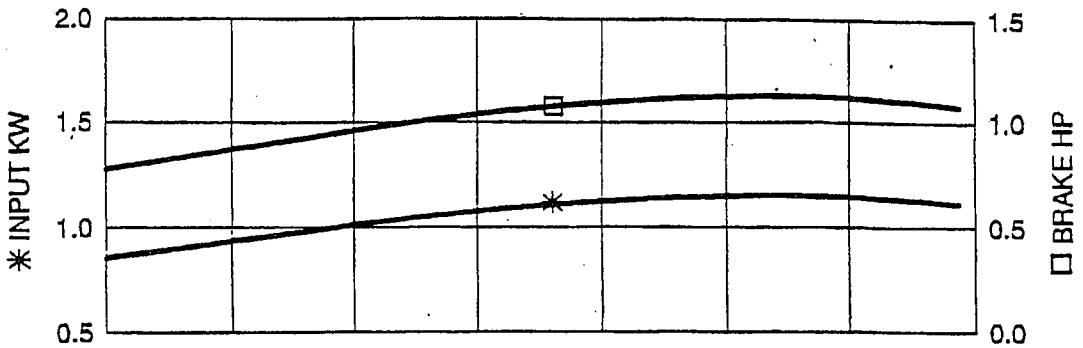
FLYGT

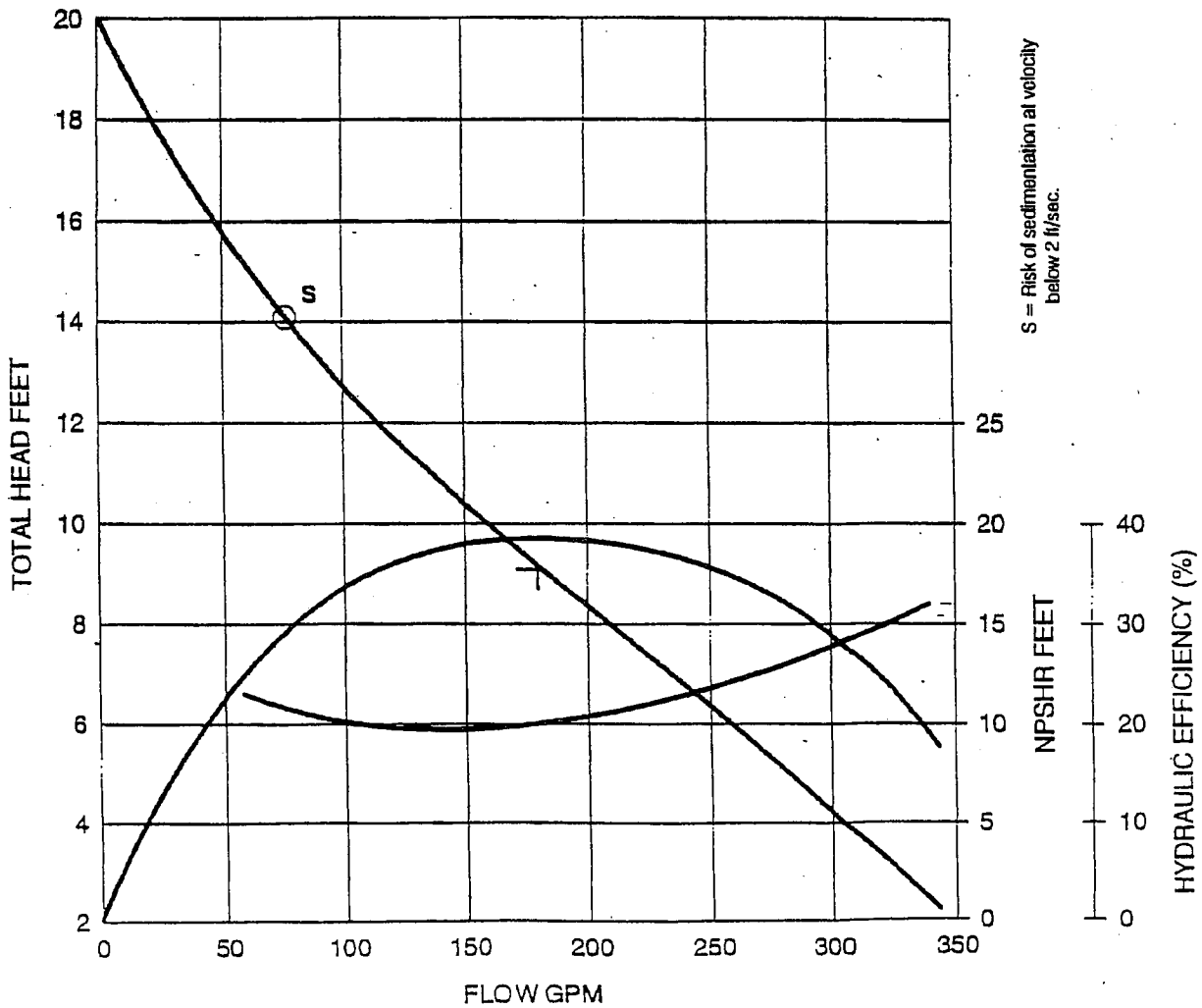
HI B Curve

FLYPS3.1.6.5 (20090313)

14. FAIRBANKS PUMP STATION

CONFIG.			SECTION	PAGE
CP/CS		**C-3085**	3	9
PHASE	VANES	**440 Impeller**	SUPERSEDES	ISSUED
3	1		6/94	2/96





03/20/98 FRI 11:19 FAX 615 377 1001 BRANNON&WHITTEMORE 003

PERFORMANCE CURVE

PRODUCT	CP3152.181	TYPE	HT
DATE	2009-03-16	PROJECT	Graceland Pump Station
CURVE NO	63-487-00-3855	ISSUE	2

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.84	0.79	0.69
EFFICIENCY	87.0 %	87.0 %	86.0 %
MOTOR DATA	---	---	---

RATED POWER	20	hp
STARTING CURRENT ...	142	A
RATED CURRENT ...	26	A
RATED SPEED	1750	rpm
TOT.MOM.OF INERTIA ...	---	
NO. OF BLADES	1	

IMPELLER DIAMETER: 265 mm

MOTOR #	STATOR	REV
25-15-4AA	12YSER	11

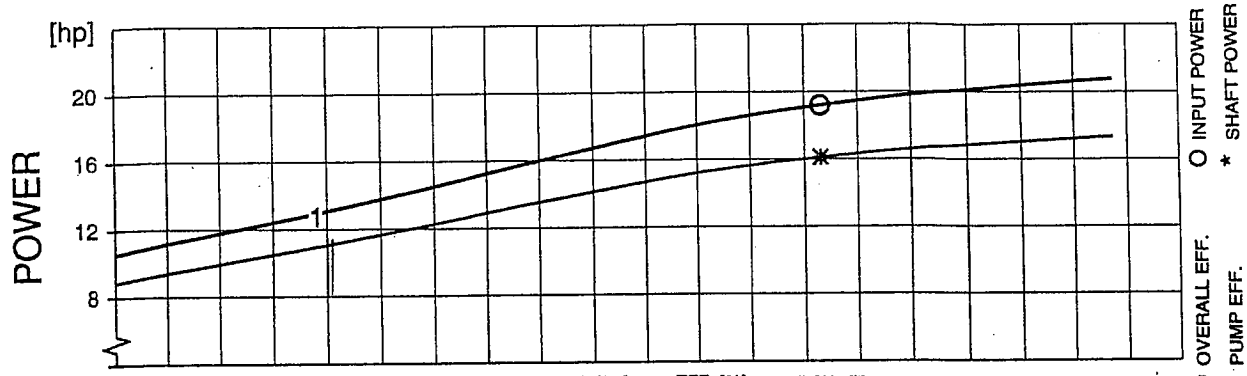
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

GEARTYPE	RATIO
---	---

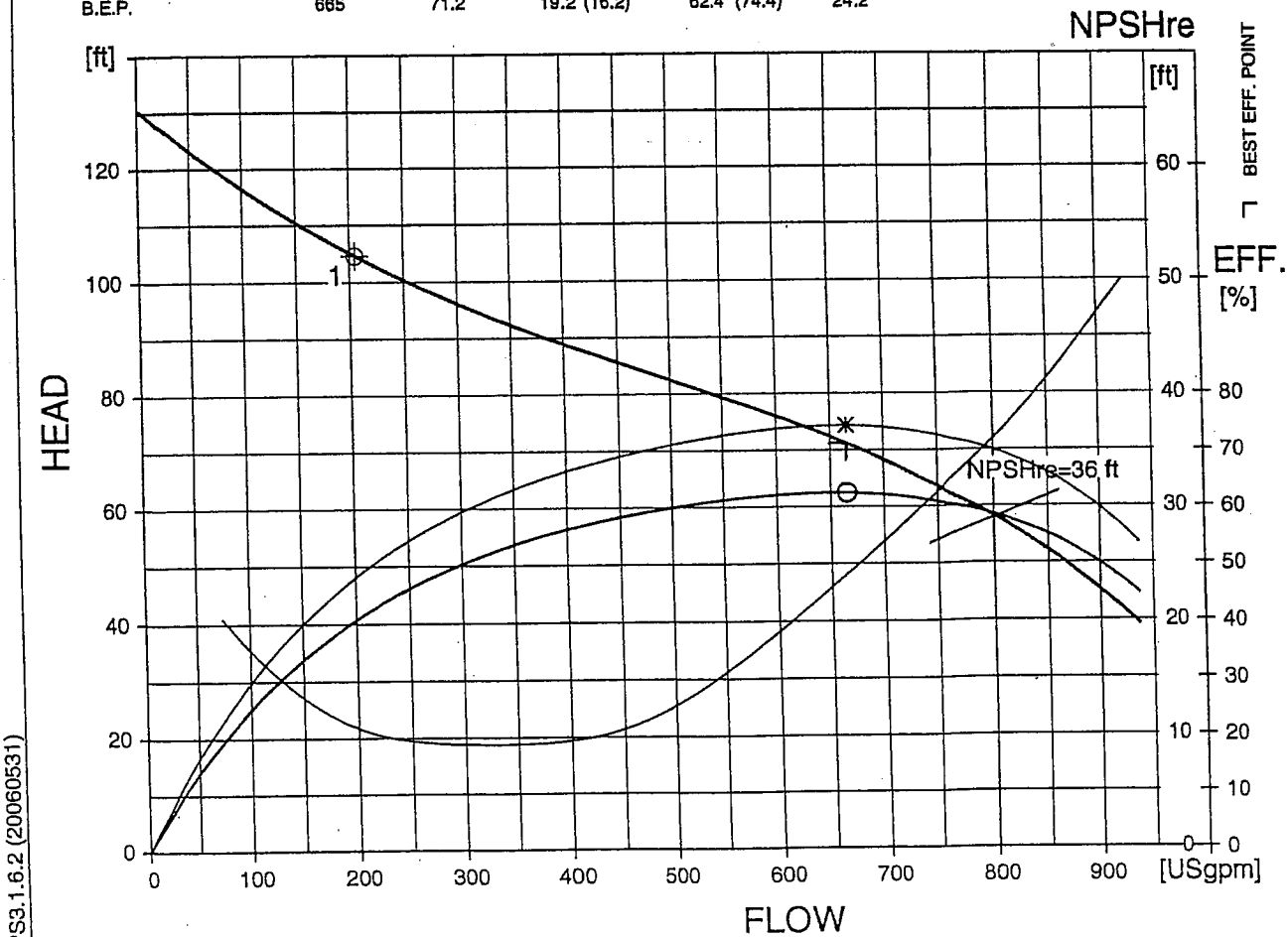
COMMENTS

INLET/OUTLET: -/ 4 inch

IMP. THROUGHLET: 3.0 inch



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
1	205	105	13.2 (11.2)	41.3 (48.7)	10.8
B.E.P.	665	71.2	19.2 (16.2)	62.4 (74.4)	24.2



FLYPS3.1.6.2 (20060531)

NPSHre = NPSH3% + min. operational margin

Performance with clear water and ambient temp 40 °C

HI B Curve

GRACELAND

FLYGT	PERFORMANCE CURVE	PRODUCT CP3152.181	TYPE HT
DATE 2011-07-27	PROJECT	CURVE NO 63-487-00-3855	ISSUE 2

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.84	0.79	0.69
EFFICIENCY	87.0 %	87.0 %	86.0 %
MOTOR DATA	---	---	---

RATED POWER	20	hp
STARTING CURRENT ...	142	A
RATED CURRENT ...	26	A
RATED SPEED	1750	rpm
TOT.MOM.OF INERTIA ...	---	
NO. OF BLADES	1	

IMPELLER DIAMETER: 265 mm

MOTOR #	STATOR	REV
25-15-4AA	12YSER	11

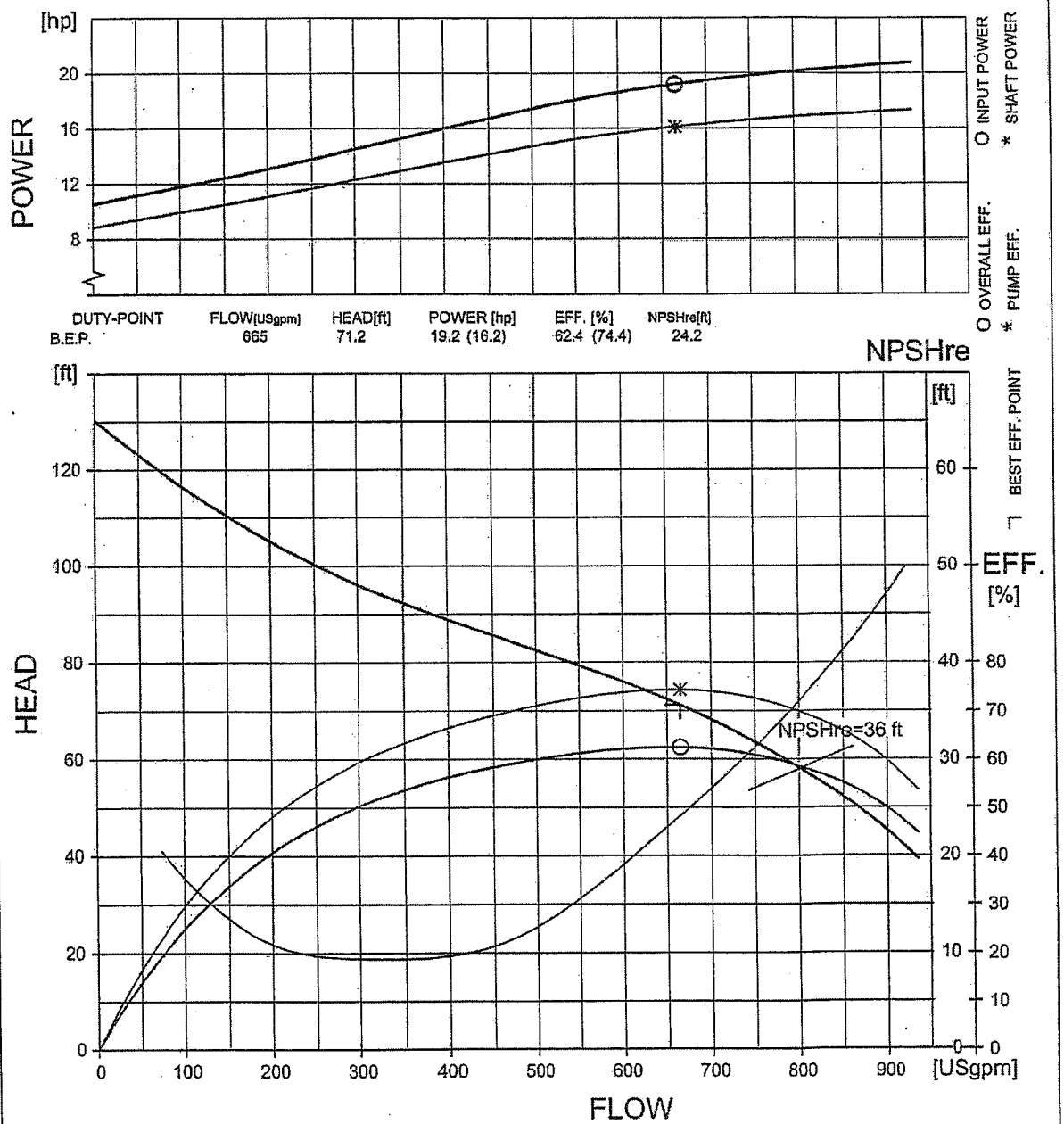
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

GEARTYPE	RATIO
---	---

COMMENTS

INLET/OUTLET: -/ 4 inch

IMP. THROUGHLET: 3.0 inch



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
B.E.P.	665	71.2	19.2 (16.2)	62.4 (74.4)	24.2

FLYPS3.1.5.8 (20060531)

NPSHre = NPSH3% + min. operational margin

Performance with clear water and ambient temp 40 °C

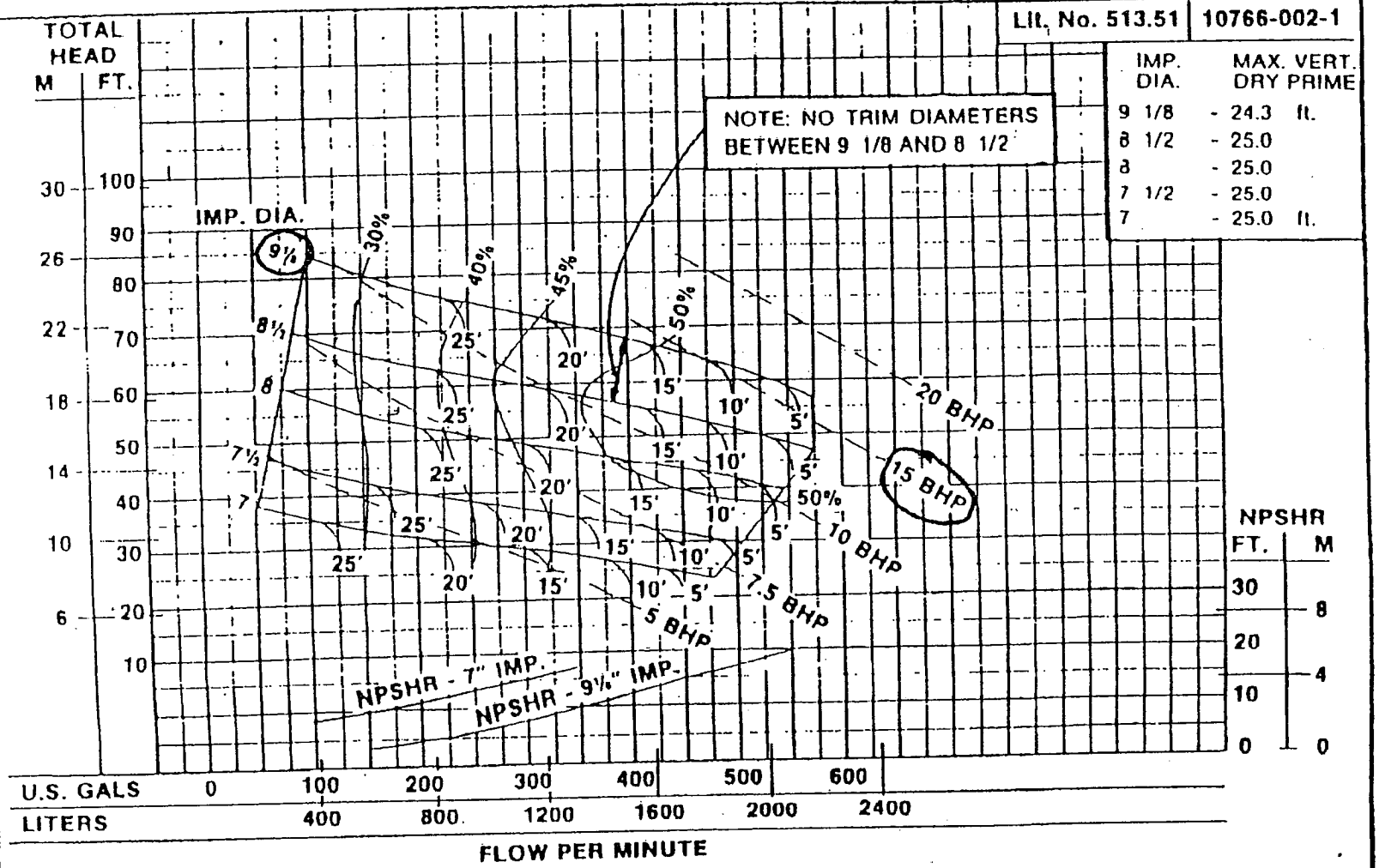
FLYGT HI B Curve

HYDR-O-MATIC PUMPS

SECTION 510
PERFORMANCE DATA

MODEL: 40MMPD - 40MMPC SELF PRIMER - MAX. SOLIDS: 3" SPHERE - 1750 RPM

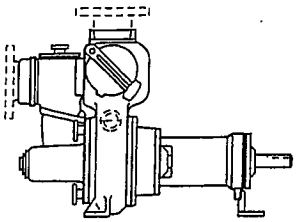
Lit. No. 513.51 | 10766-002-1



IMP. DIA.	MAX. VERT. DRY PRIME
9 1/8	- 24.3 ft.
8 1/2	- 25.0
8	- 25.0
7 1/2	- 25.0
7	- 25.0 ft.

MODEL: 40MMPV SELF PRIMER - MAX. SOLIDS: 3" SPHERE - VAR. RPM

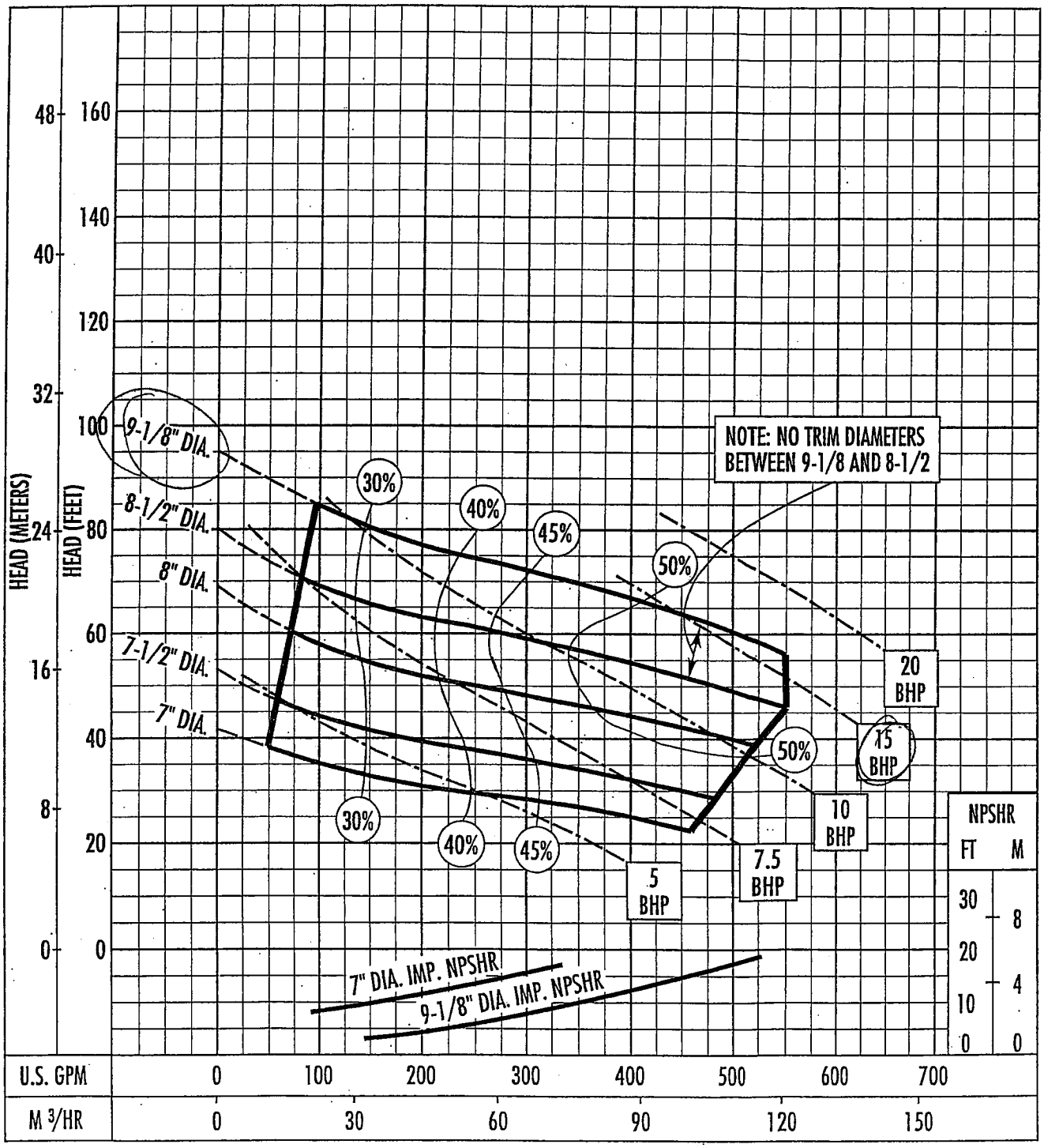
GREGGORY'S PUMP ST.



Performance Curve

40MMP

RPM: **1750** Discharge: **4"** Solids: **3"**



Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F. and 1280 feet site elevation.

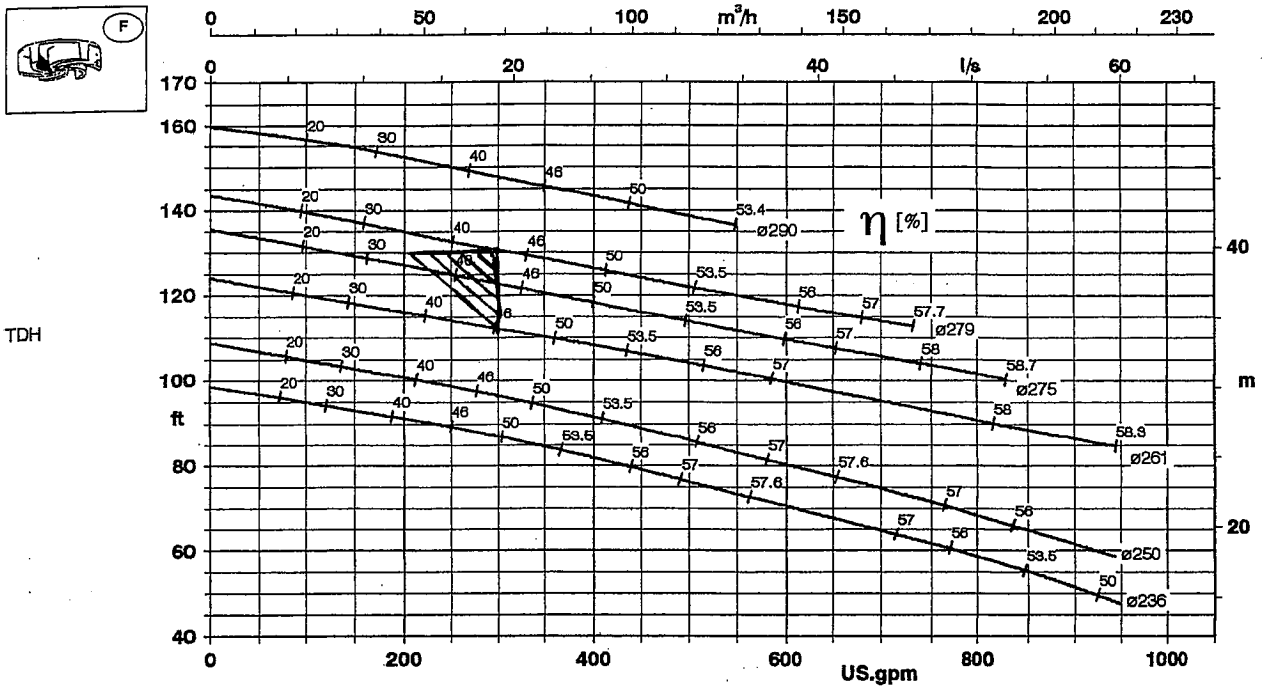
Conditions of Service:

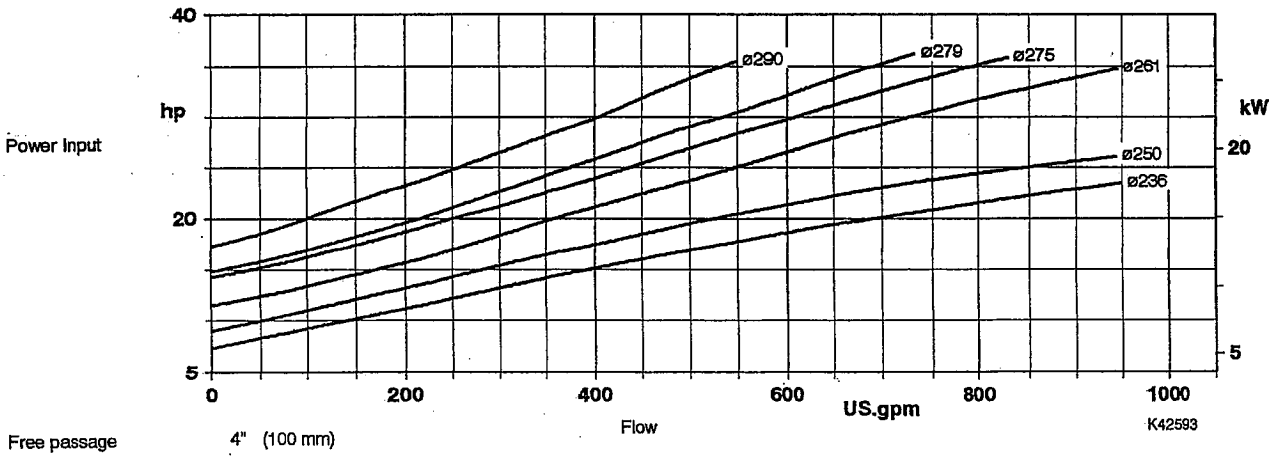
GPM: _____ TDH: _____

HYDROMATIC®

Gum Hollow - 300 GPM @ 133' TDH

KRT F 100-316 — 1750 rpm — 4 inch





Free passage 4" (100 mm)

MOTOR RATING Material G, G1, G2, GH, H		C1, C2		MAX. LIQUID TEMP.		MOTOR CODE
Hp	kW	Hp	kW	°F	°C	
15	11.2	15	11.2	104	40	114U
						114X *)
				140	60	164W
						164Z *)
20	14.9	20	14.9	104	40	164U
						164X *)
31	23.1	28	20.9	140	60	294W
						294Z *)
36	26.8	34	25.4	104	40	294U
						294X *)

*) FM/CSA = Explosionproof to Class I, Division 1, Groups C & D

Home Depot

FLYGT	PERFORMANCE CURVE	PRODUCT CP3085.183	TYPE LT
DATE 2011-07-27	PROJECT	CURVE NO 63-414-00-5301	ISSUE 1

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.83	0.77	0.66
EFFICIENCY	78.0 %	79.0 %	77.0 %
MOTOR DATA	---	---	---

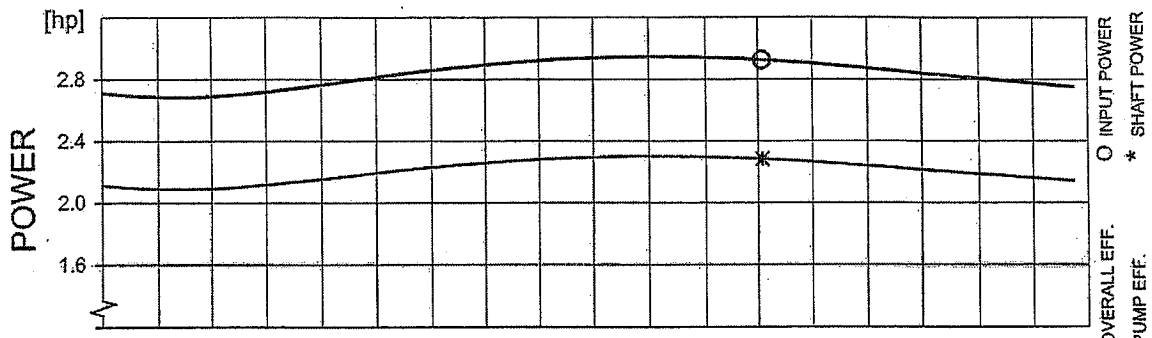
RATED POWER	3	hp
STARTING CURRENT ...	22	A
RATED CURRENT ...	4.3	A
RATED SPEED	1700	rpm
TOT.MOM.OF INERTIA ...	0.023	kgm2
NO. OF BLADES	1	

IMPELLER DIAMETER	183 mm
MOTOR #	15-10-4AL
STATOR	12YSER
REV	13
FREQ.	60 Hz
PHASES	3
VOLTAGE	460 V
POLES	4
GEARTYPE	---
RATIO	---

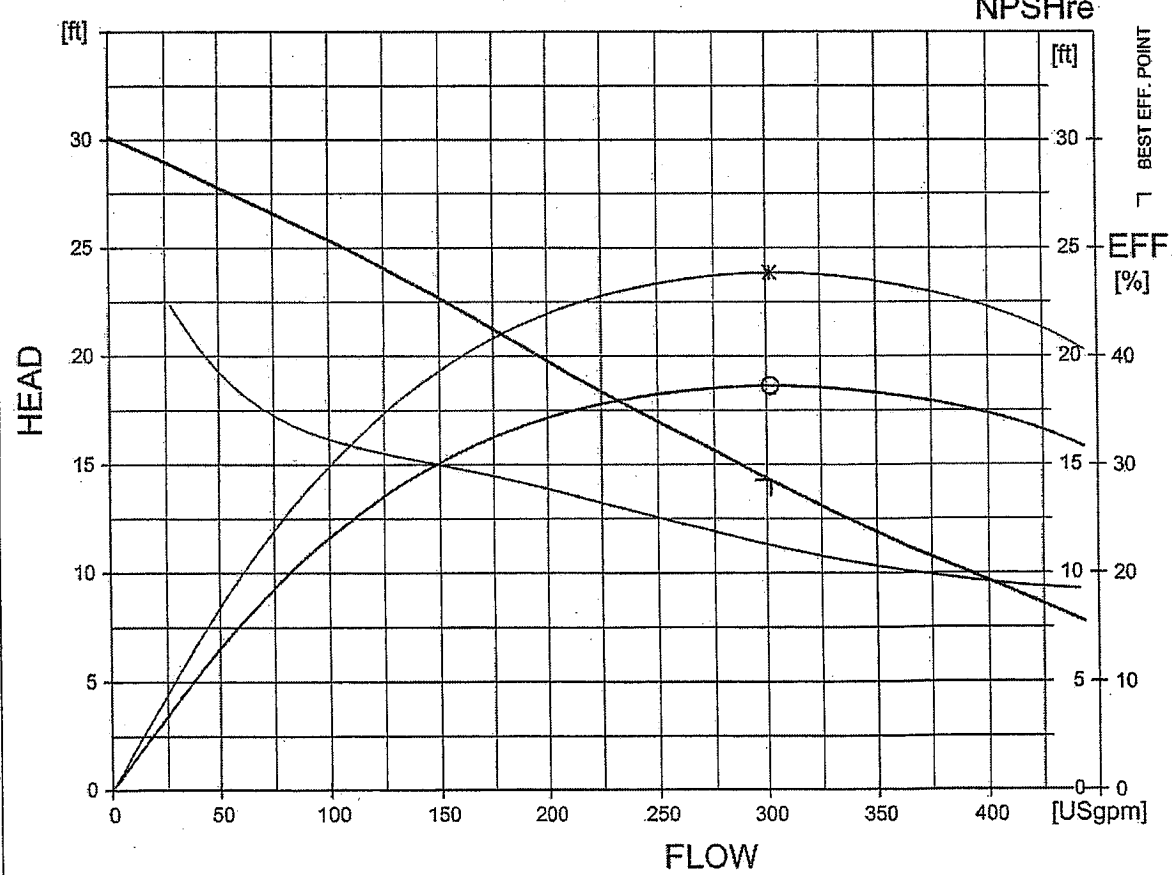
COMMENTS

INLET/OUTLET -/ 4 inch

IMP. THROUGHLET 3.1 inch



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
B.E.P.	302	14.3	2.93 (2.29)	37.3 (47.7)	11.3



FLYPS3.1.5.8 (20060531)

NPSHre = NPSH3% + min. operational margin

Performance with clear water and ambient temp 40 °C

FLYGT HI B Curve

MARINA

FLYGT	PERFORMANCE CURVE	PRODUCT CP3127.181	TYPE HT
DATE 2010-08-02	PROJECT FLYGT US Catalog	CURVE NO 63-483-00-3702	ISSUE 3

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.89	0.87	0.81
EFFICIENCY	83.5 %	85.0 %	84.5 %
MOTOR DATA	---	---	---

RATED POWER	10	hp
STARTING CURRENT ...	128	A
RATED CURRENT ...	25	A
RATED SPEED	1735	rpm
TOT.MOM.OF INERTIA ...	0.12	kgm2
NO. OF BLADES	1	

IMPELLER DIAMETER: 228 mm

MOTOR #	STATOR	REV
21-12-4AL	12Y//	11

FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	230 V	4

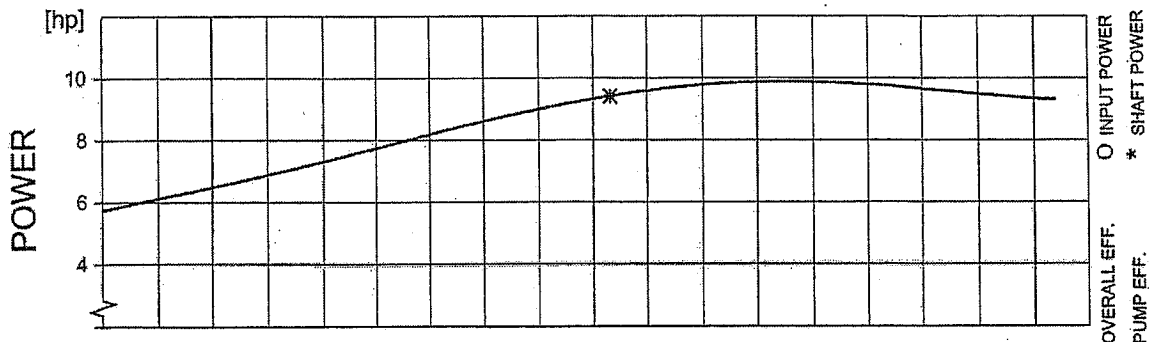
GEARTYPE	RATIO
---	---

COMMENTS

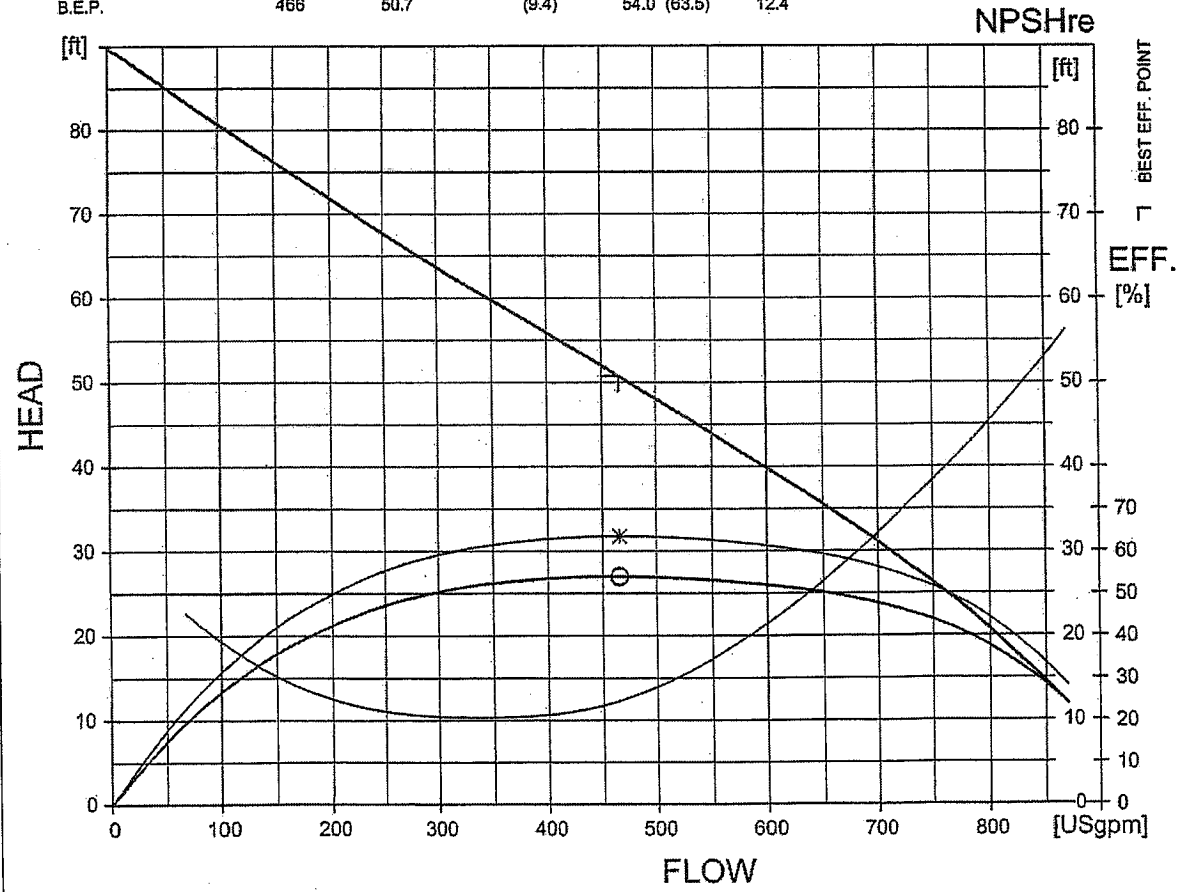
NEMA Code Letter: F

INLET/OUTLET: -/ 4 inch

IMP. THROUGHLET: 3.0 inch



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
B.E.P.	466	50.7	(9.4)	54.0 (63.5)	12.4



FLYPS 3.1.6.3 (20060531)

NPSHre = NPSH3% + min. operational margin

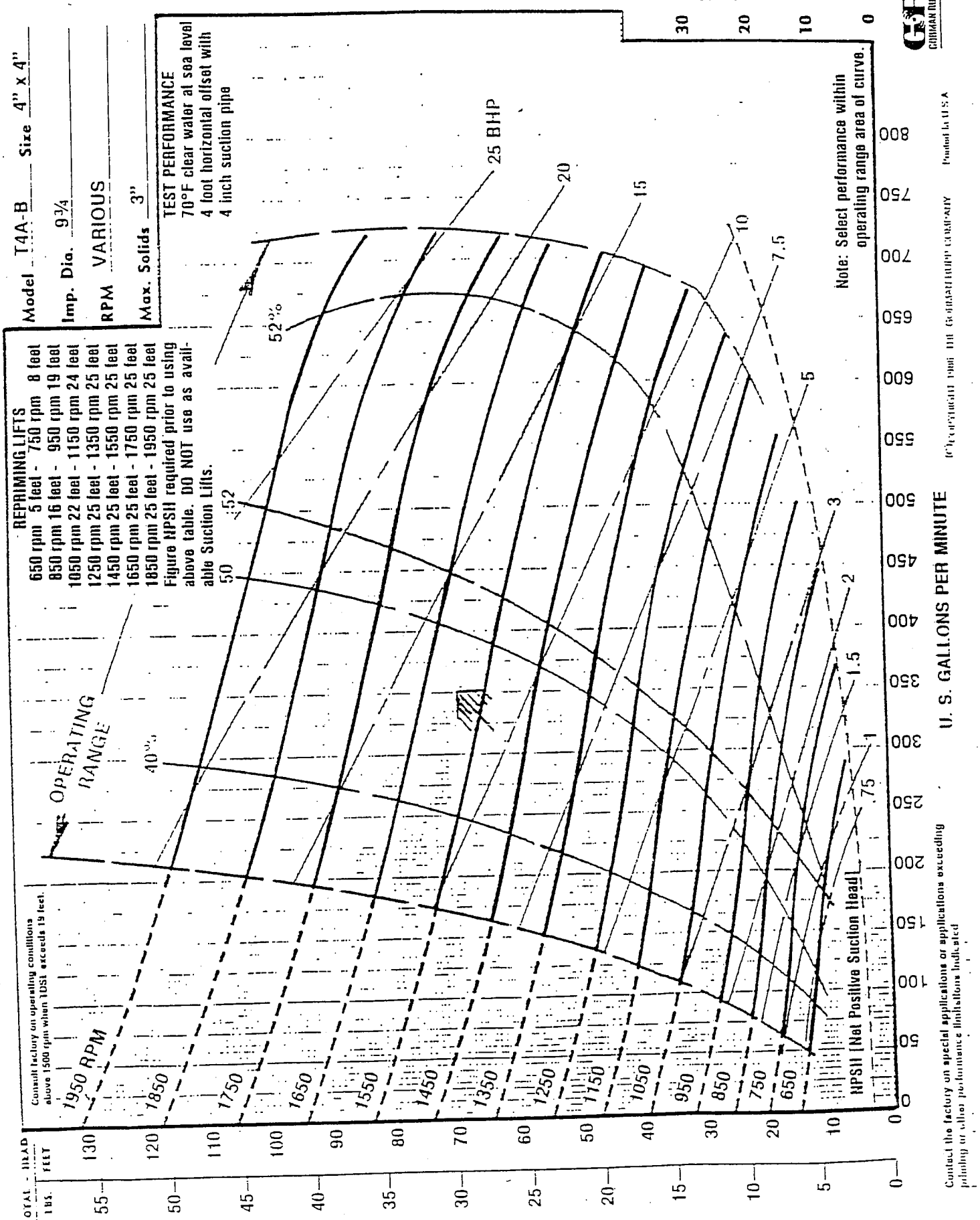
Performance with clear water and ambient temp 40 °C

FLYGT CURVE

8. OAK HILLS PUMP STATION

PERFORMANCE CHART NO. T4A-4 2-21-79

SECTION 55 PAGE 1154



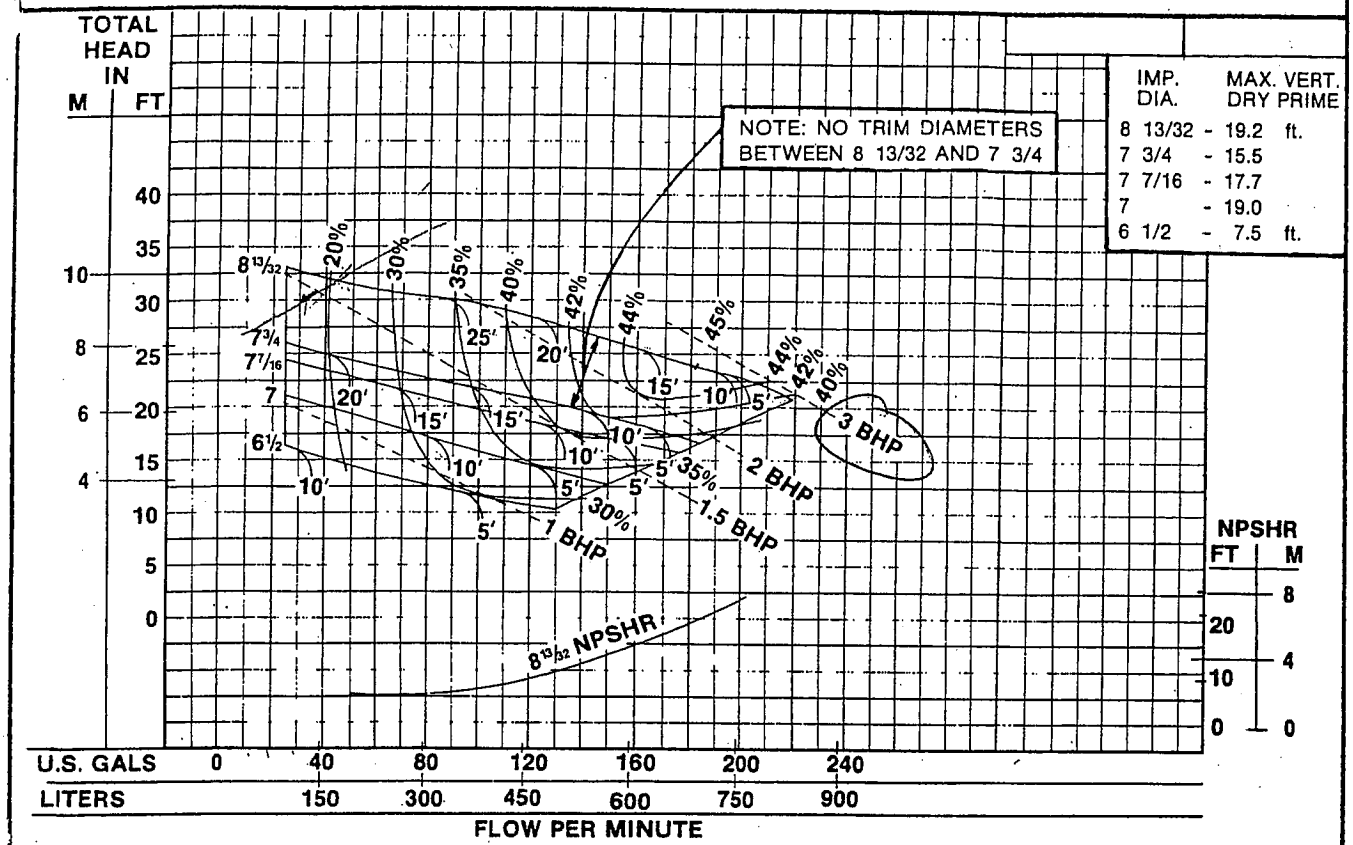
HYDROMATIC PUMPS

PALLISADES I

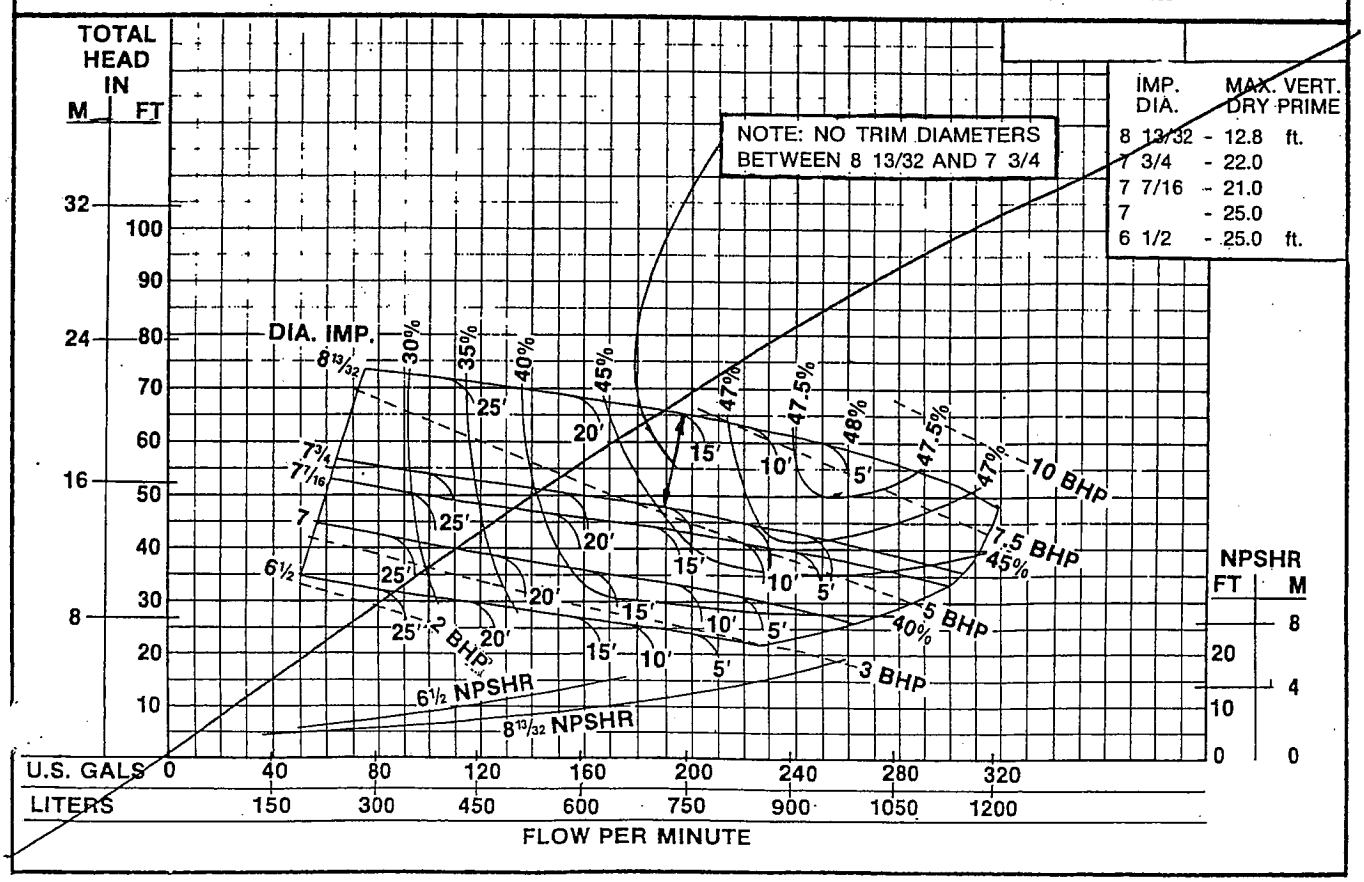
Bulletin MP - 202

PERFORMANCE DATA

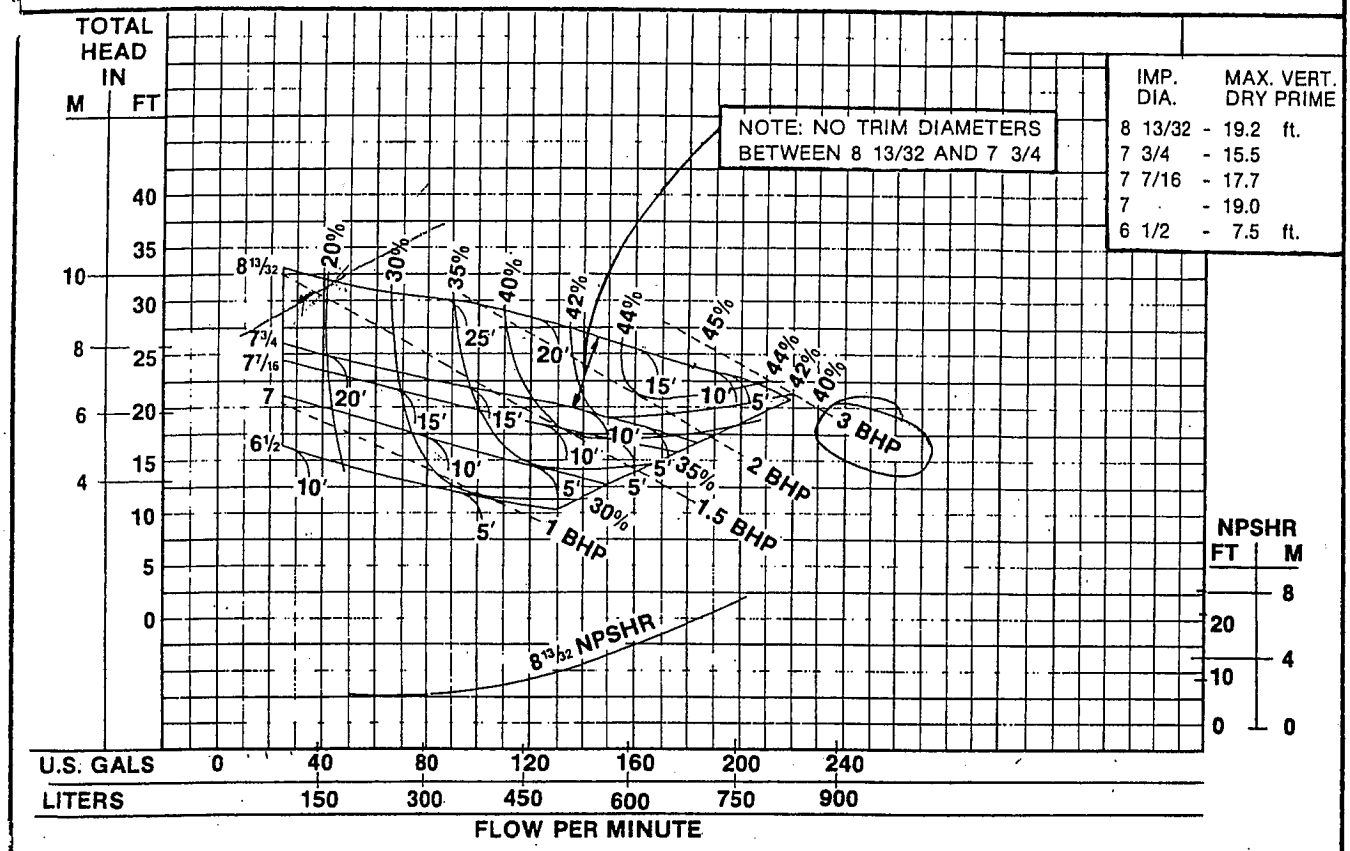
MODEL: 30MPSD SELF PRIMER - MAX. SOLIDS: 2½" SPHERE - 1150 RPM



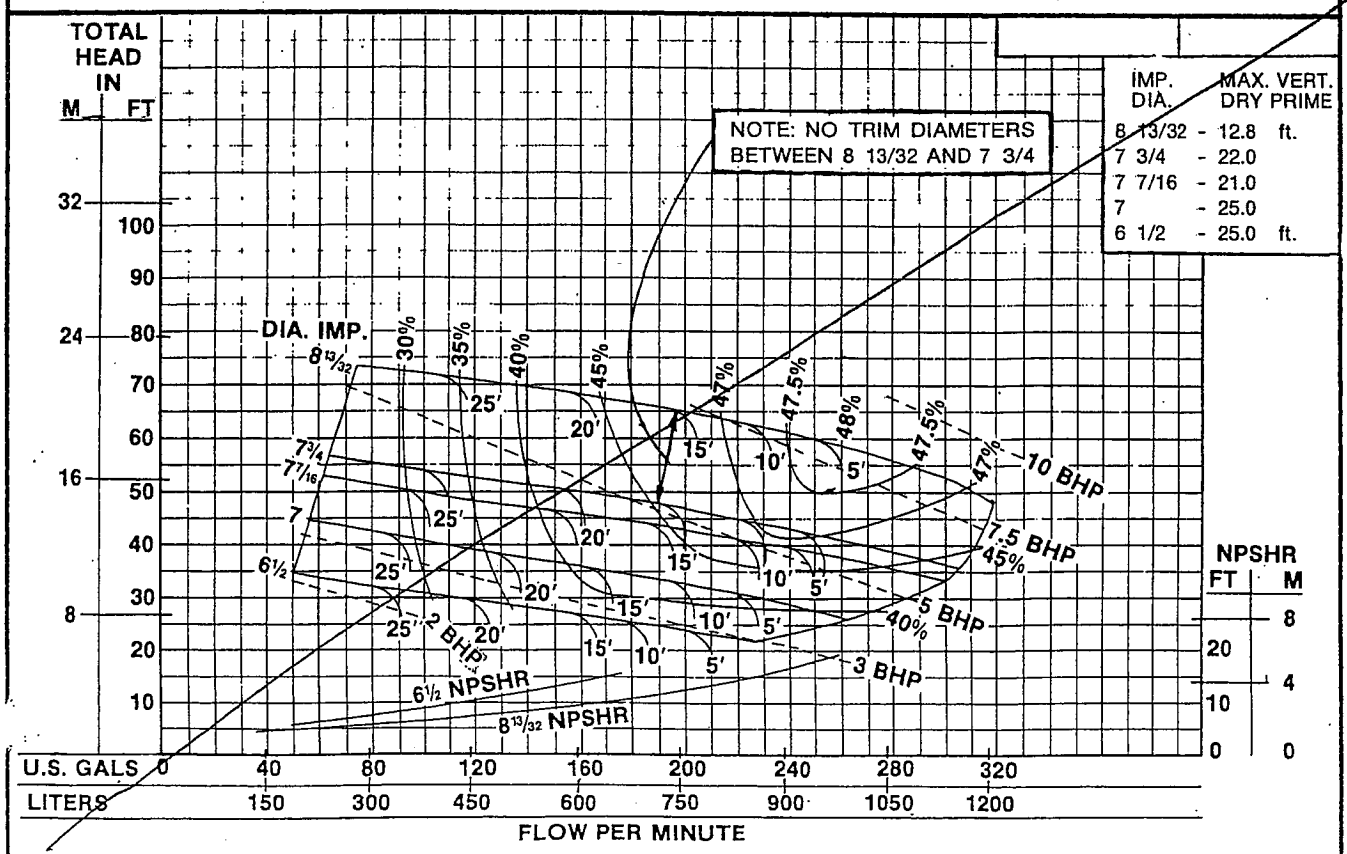
MODEL: 30MPSD SELF PRIMER - MAX. SOLIDS: 2½" SPHERE - 1750 RPM



MODEL: 30MPSD SELF PRIMER - MAX. SOLIDS: 2½" SPHERE - 1150 RPM



MODEL: 30MPSD SELF PRIMER - MAX. SOLIDS: 2½" SPHERE - 1750 RPM



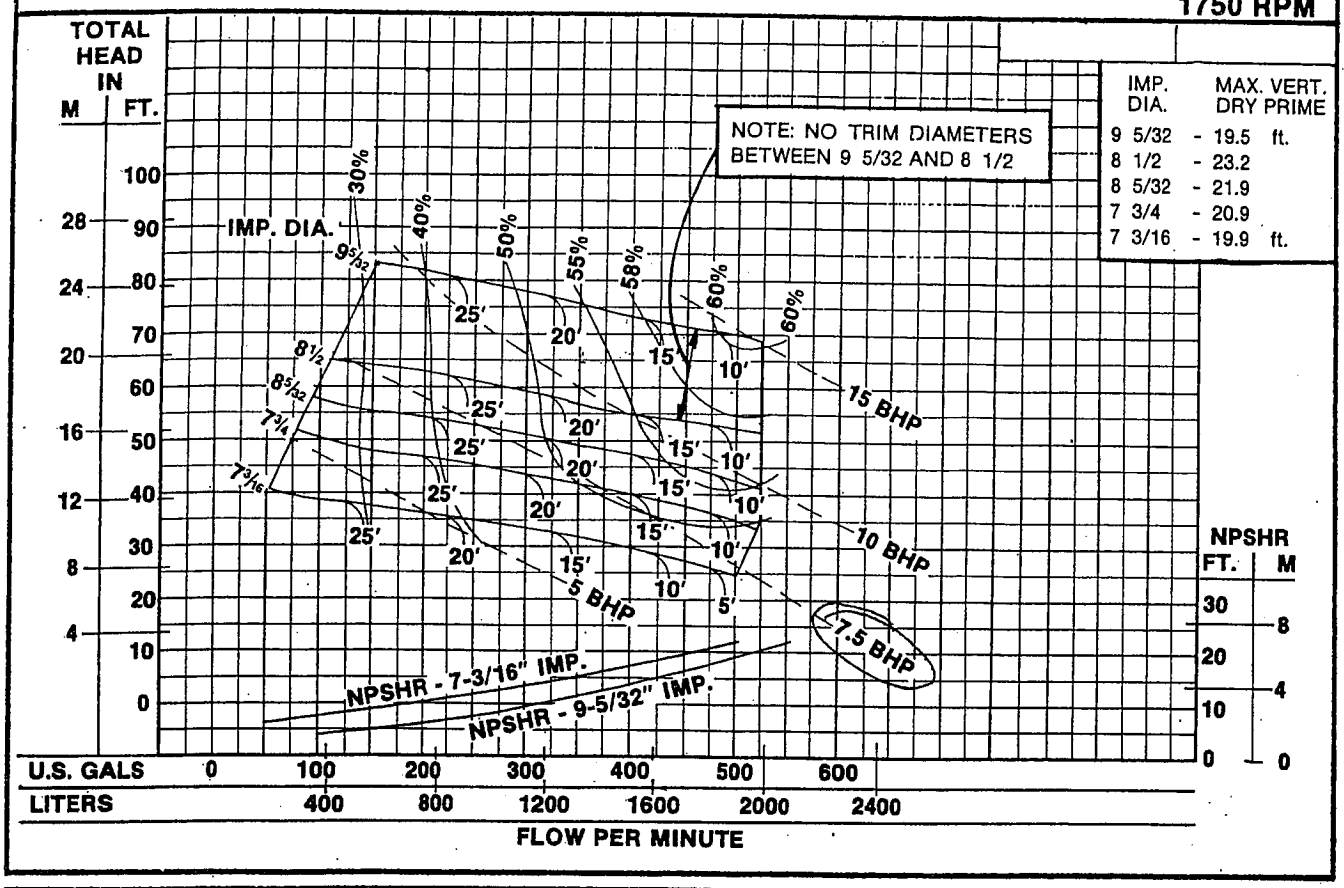
HYDROMATIC PUMPS

PALLISADES III

Bulletin MP - 206

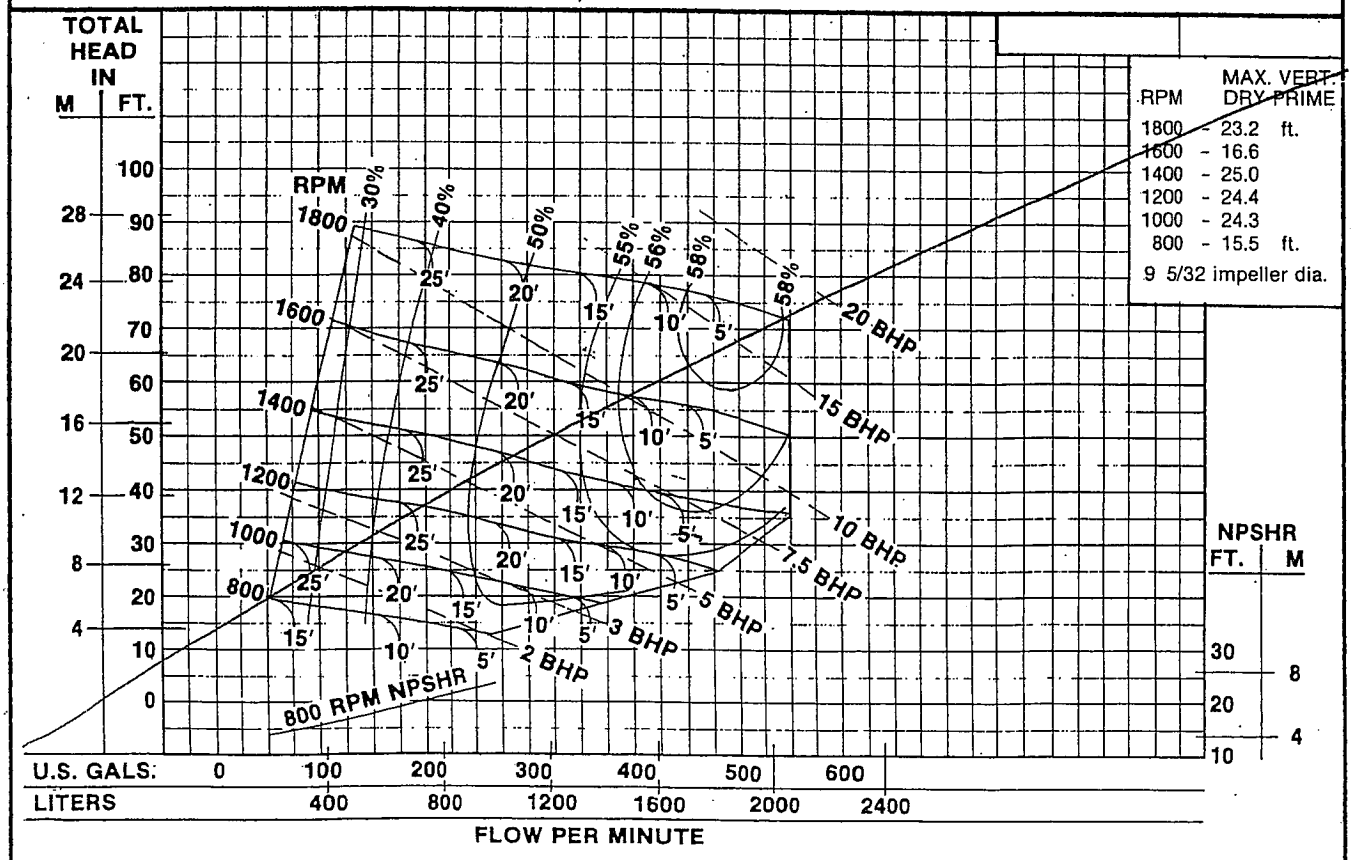
PERFORMANCE DATA

MODEL: 40MPD - 40MPC - 40MPSF SELF PRIMER - MAX. SOLIDS: 3" SPHERE - 1750 RPM



IMP. DIA.	MAX. VERT. DRY PRIME
9 5/32	- 19.5 ft.
8 1/2	- 23.2
8 5/32	- 21.9
7 3/4	- 20.9
7 3/16	- 19.9 ft.

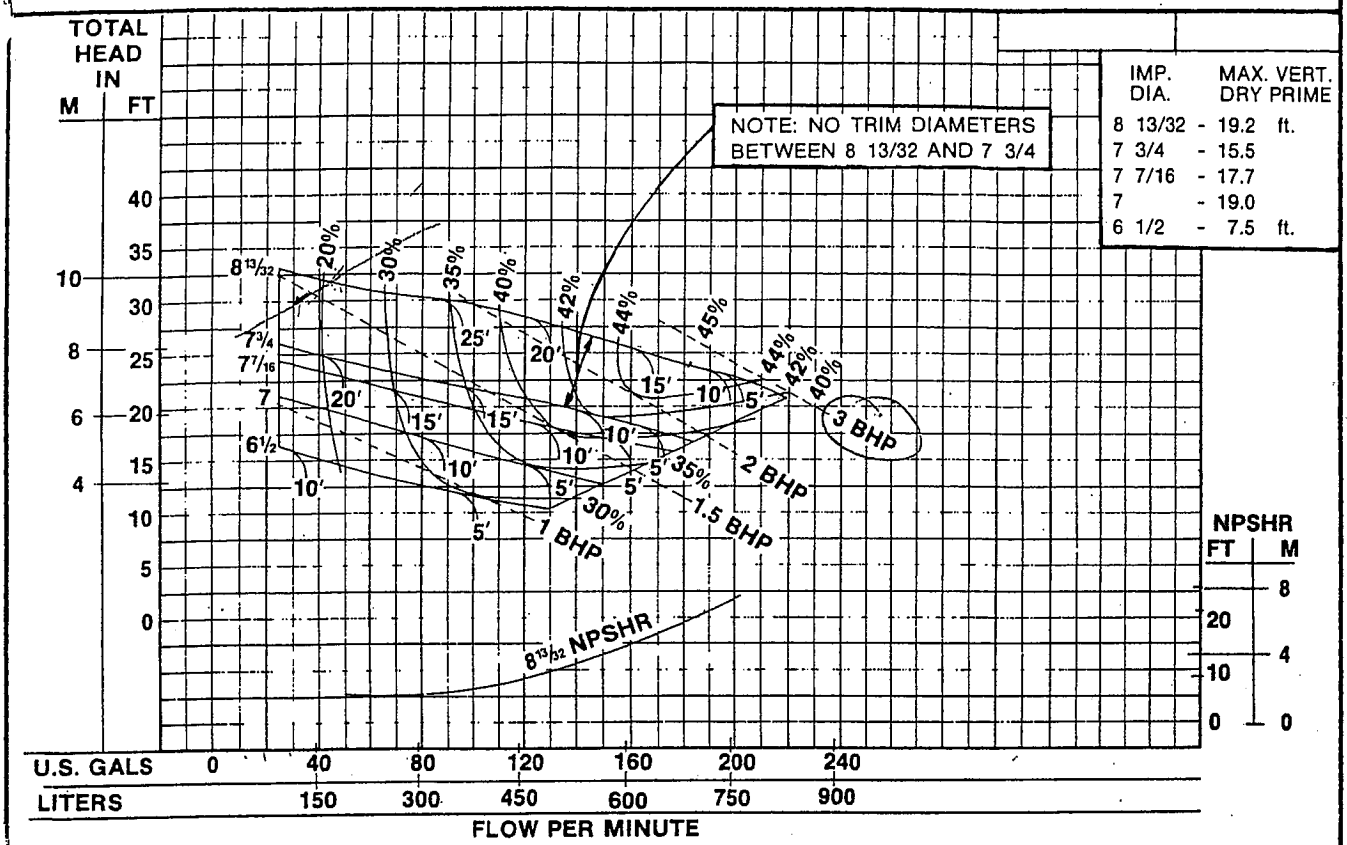
MODEL: 40MPV - 40MPSFV SELF PRIMER - MAX. SOLIDS: 3" SPHERE - VAR. RPM



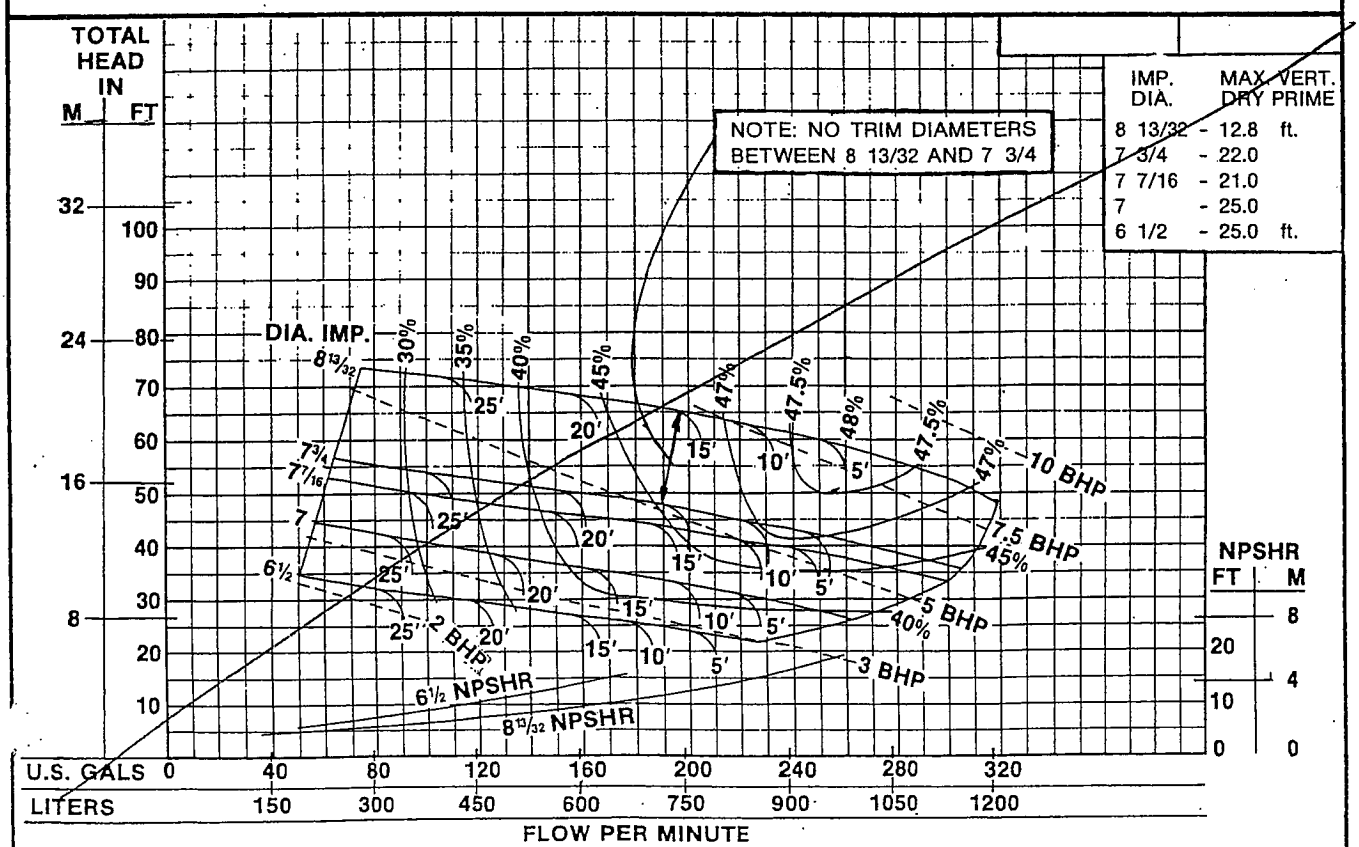
RPM	MAX. VERT. DRY PRIME
1800	- 23.2 ft.
1600	- 16.6
1400	- 25.0
1200	- 24.4
1000	- 24.3
800	- 15.5 ft.

9 5/32 impeller dia.

MODEL: 30MPSD SELF PRIMER - MAX. SOLIDS: 2½" SPHERE - 1150 RPM



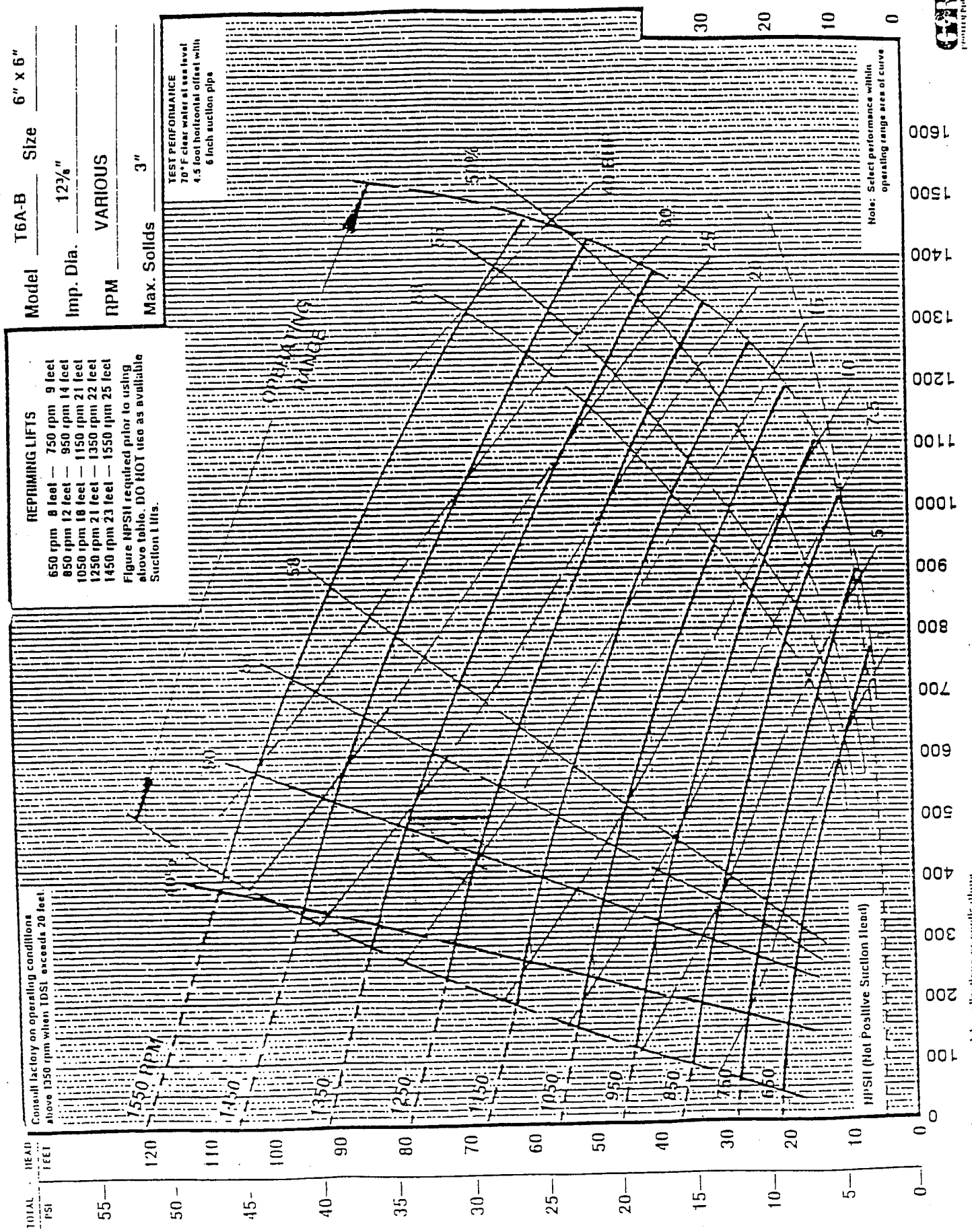
MODEL: 30MPSD SELF PRIMER - MAX. SOLIDS: 2½" SPHERE - 1750 RPM



29. PARK MEADE PUMP STATION

PERFORMANCE CHART NO. T6A-4 2-21-79

SECTION 55 PAGE 1254



PEACH ORCHARD

FLYGT	PERFORMANCE CURVE	PRODUCT CP3127.181	TYPE HT
DATE 2010-08-02	PROJECT FLYGT US Catalog	CURVE NO 63-481-00-3702	ISSUE 2

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.89	0.87	0.81
EFFICIENCY	83.5 %	85.0 %	84.5 %
MOTOR DATA	---	---	---

RATED POWER	10	hp
STARTING CURRENT ...	128	A
RATED CURRENT ...	25	A
RATED SPEED	1735	rpm
TOT.MOM.OF INERTIA ...	0.12	kgm2
NO. OF BLADES	1	

IMPELLER DIAMETER: 248 mm

MOTOR #	STATOR	REV
21-12-4AL	12Y//	11

FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	230 V	4

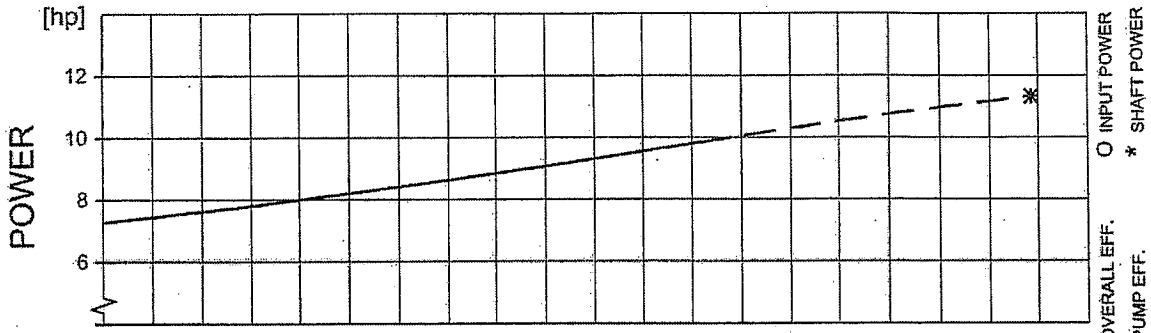
GEARTYPE	RATIO
---	---

COMMENTS

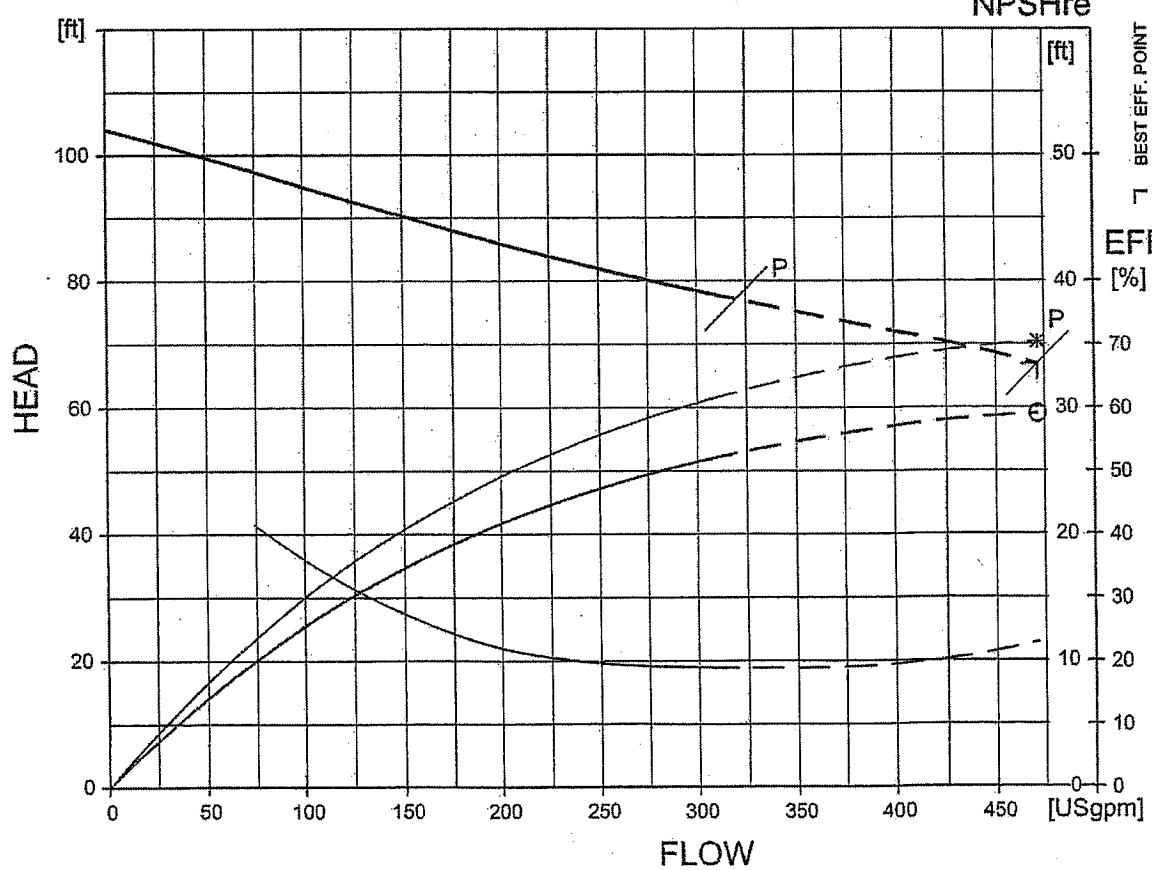
NEMA Code Letter: F

INLET/OUTLET: -/ 4 inch

IMP. THROUGHLET: 3.0 inch



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
B.E.P.	472	66.9	(11.4)	59.0 (70.4)	11.5



FLYPS 3.1.6.3 (20060531)

NPSHre = NPSH3% + min. operational margin

Performance with clear water and ambient temp 40 °C

FLYGT CURVE

PUMP HOUSE

FLYGT	PERFORMANCE CURVE	PRODUCT NP3301.180	TYPE HT
DATE 2010-08-02	PROJECT FLYGT US Catalog	CURVE NO 63-462-00-1150	ISSUE 2

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.84	0.81	0.72
EFFICIENCY	93.0 %	94.5 %	95.0 %
MOTOR DATA	---	---	---

RATED POWER	105	hp
STARTING CURRENT ...	560	A
RATED CURRENT ...	125	A
RATED SPEED	1775	rpm
TOT.MOM.OF INERTIA ...	0.89	kgm2
NO. OF BLADES	2	

IMPELLER DIAMETER: 390 mm

MOTOR #	STATOR	REV
35-29-4AA	1 D	12

FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

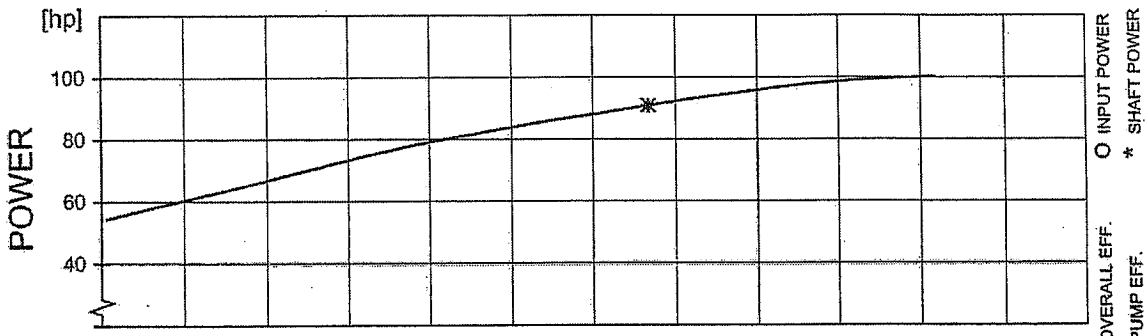
GEARTYPE	RATIO
---	---

COMMENTS

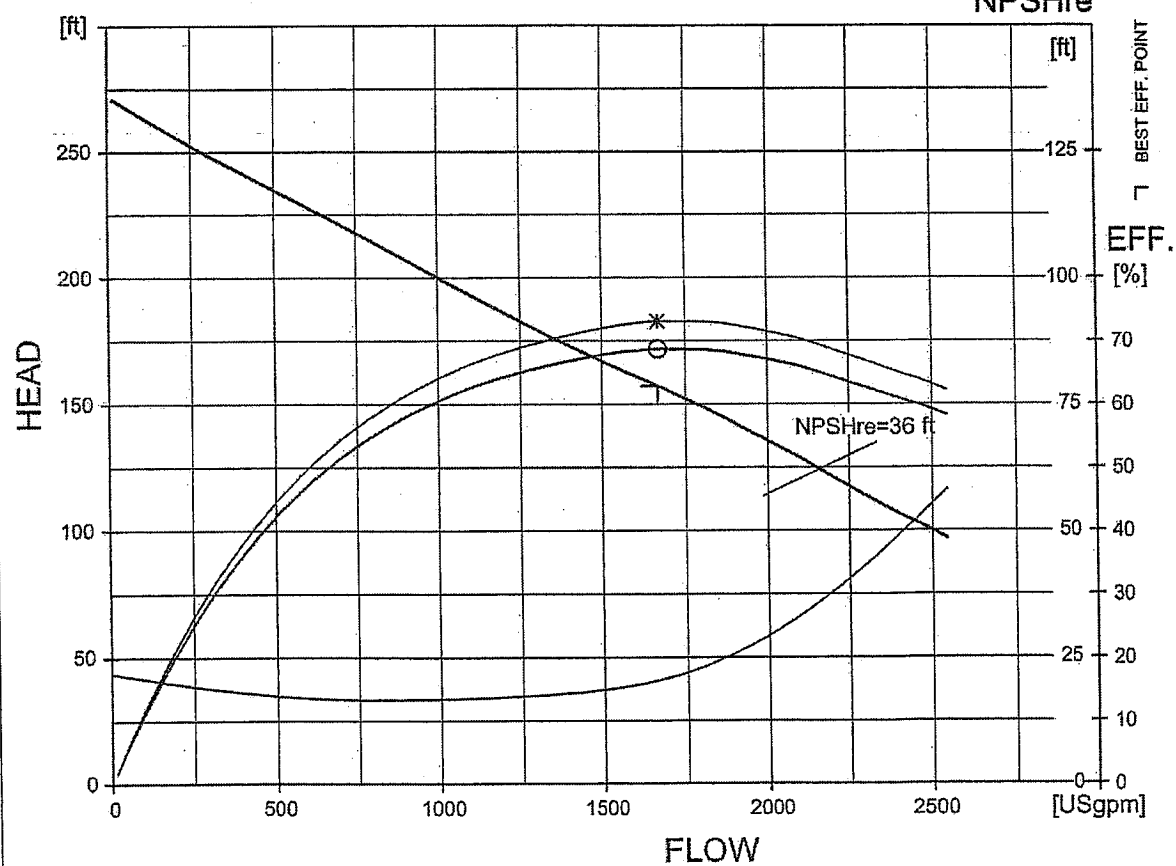
NEMA Code Letter: D

INLET/OUTLET: -/ 6 inch

IMP. THROUGHLET: ---



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
B.E.P.	1670	157	(91)	68.7 (73.0)	20.6



FLYPS 3.1.6.3 (20060531)

NPSHre = NPSH3% + min. operational margin

Performance with clear water and ambient temp 40 °C

FLYGT CURVE

FLYGT	PERFORMANCE CURVE	PRODUCT	TYPE
		NP3301.180	HT

DATE	PROJECT	CURVE NO	ISSUE
2009-03-16	Pumphouse Road	63-462-00-1150	1

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.84	0.81	0.72
EFFICIENCY	93.0 %	94.5 %	95.0 %
MOTOR DATA	---	---	---

RATED POWER	105	hp
STARTING CURRENT ...	560	A
RATED CURRENT ...	125	A
RATED SPEED	1775	rpm
TOT.MOM.OF INERTIA ...	0.89	kgm2
NO. OF BLADES	2	

IMPELLER DIAMETER: 390 mm

MOTOR #	STATOR	REV
35-29-4AA	01D	12

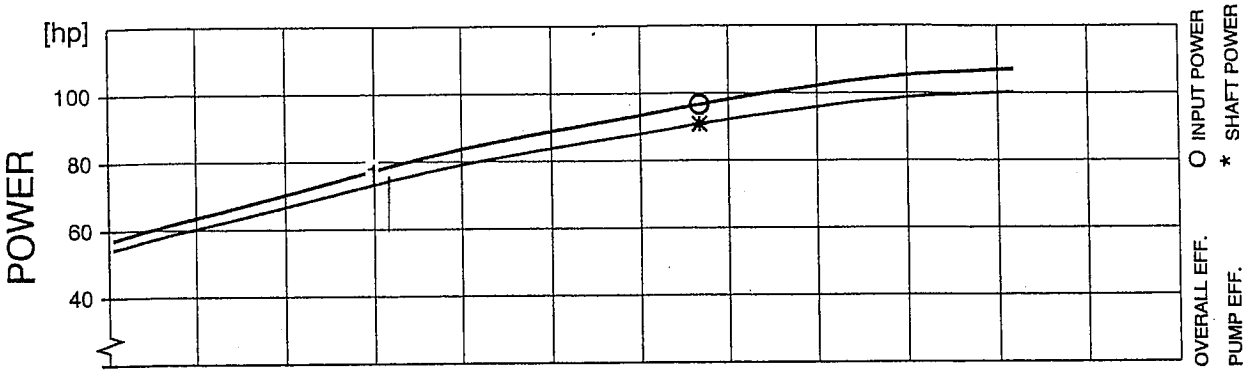
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

GEARTYPE	RATIO
---	---

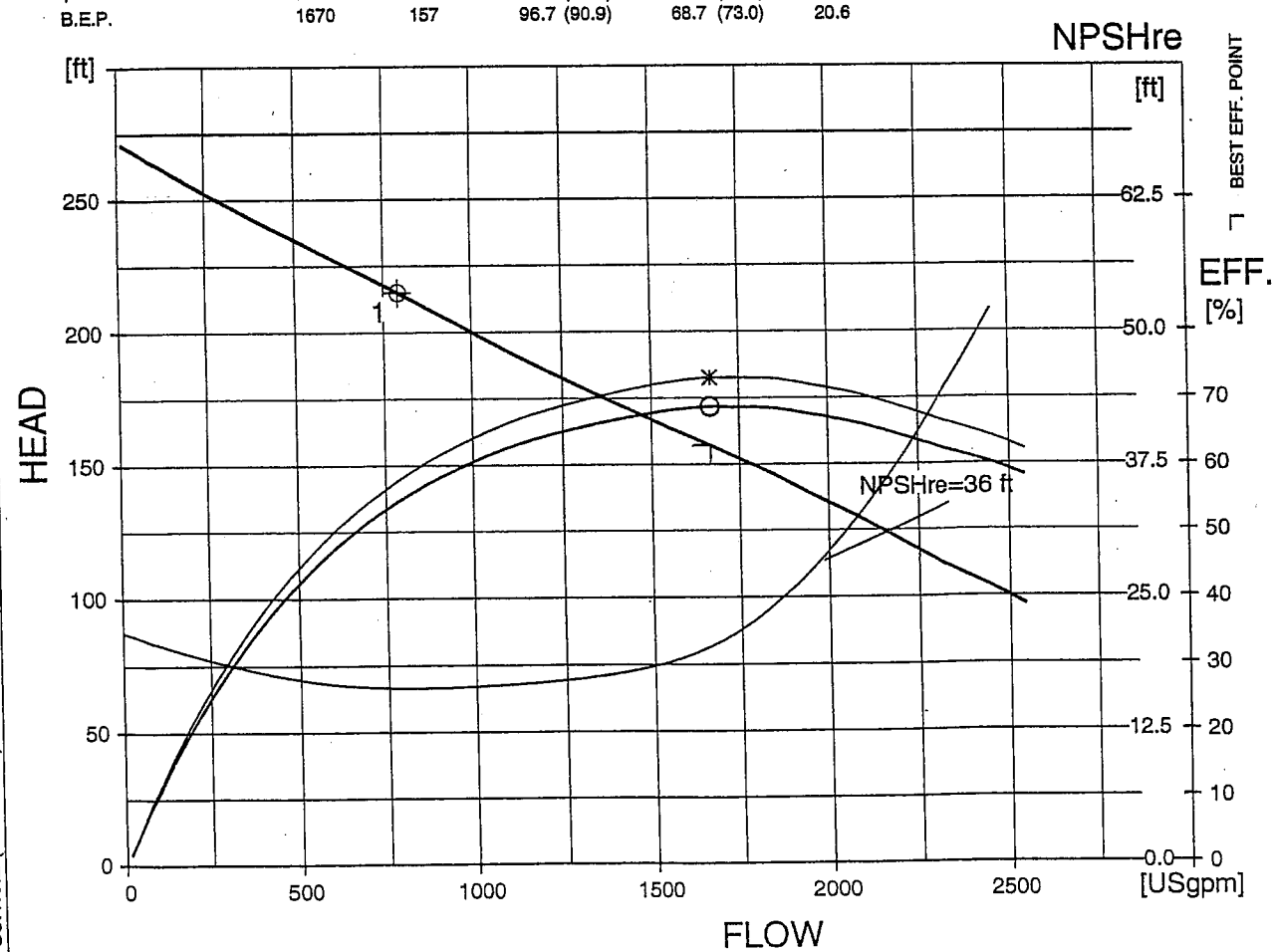
COMMENTS

INLET/OUTLET: -/ 6 inch

IMP. THROUGHLET: ---



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
1	792	215	78.7 (74.4)	54.8 (57.9)	16.6
B.E.P.	1670	157	96.7 (90.9)	68.7 (73.0)	20.6



FLYPS3.1.6.2 (20060531)

NPSHre = NPSH3% + min. operational margin

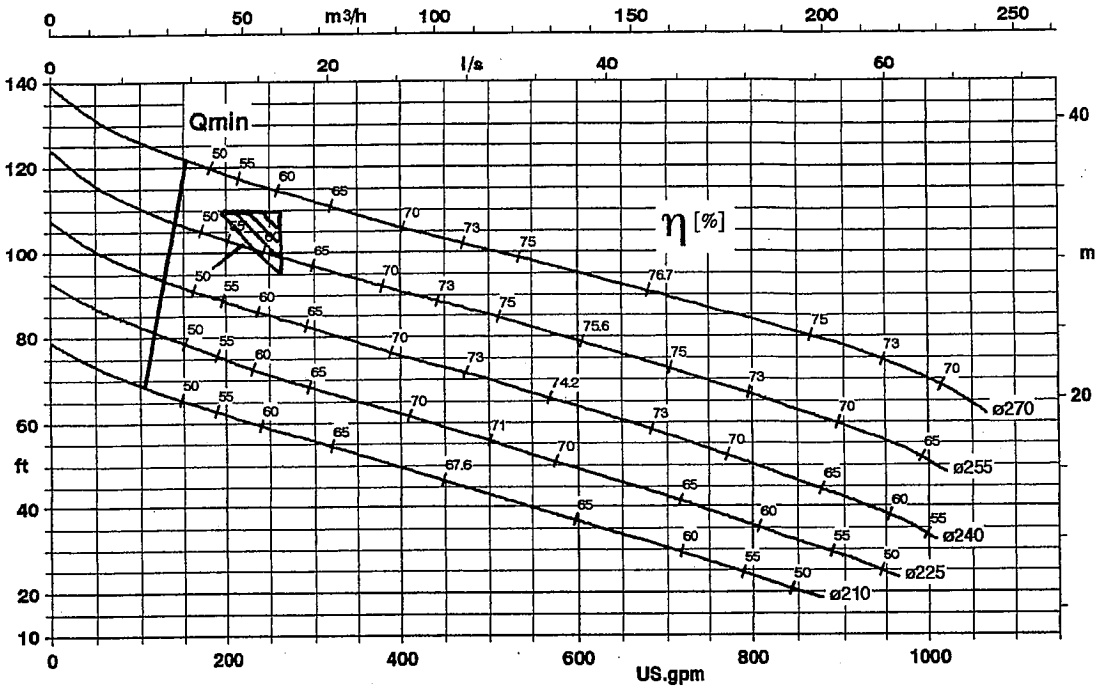
Performance with clear water and ambient temp 40 °C

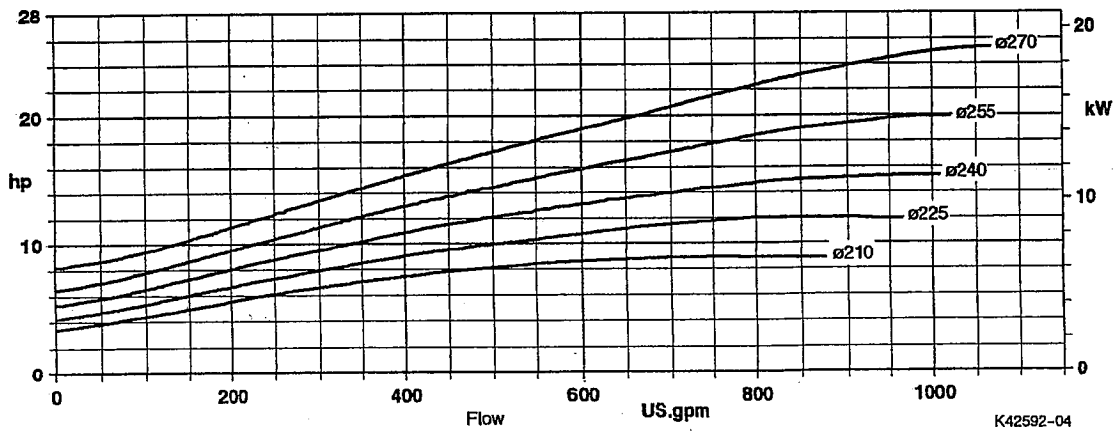
FLYGT HI B Curve

KRT E 80-251

1750 rpm

3 inch





Free passage 3" (76 mm)

MOTOR RATING Material G		MAX. LIQUID TEMP.		MOTOR CODE
Hp	kW	°F	°C	
10	7.5	104	40	74UK IE3
				74XK IE3*)
				74U
				74X *)
		140	60	114W
				114Z *)
15	11.2	104	40	114U
				114X *)
		140	60	164W
				164Z *)

→

MOTOR RATING Material G		MAX. LIQUID TEMP.		MOTOR CODE
Hp	kW	°F	°C	
20	14.9	104	40	164U
				164X *)
		140	60	214W
				214Z *)
25	18.6	104	40	194U
				194X *)
30	22.3	104	40	214U
				214X *)

*) FM/CSA = Explosionproof to Class I, Division 1, Groups C & D

HYDR-O-MATIC PUMPS

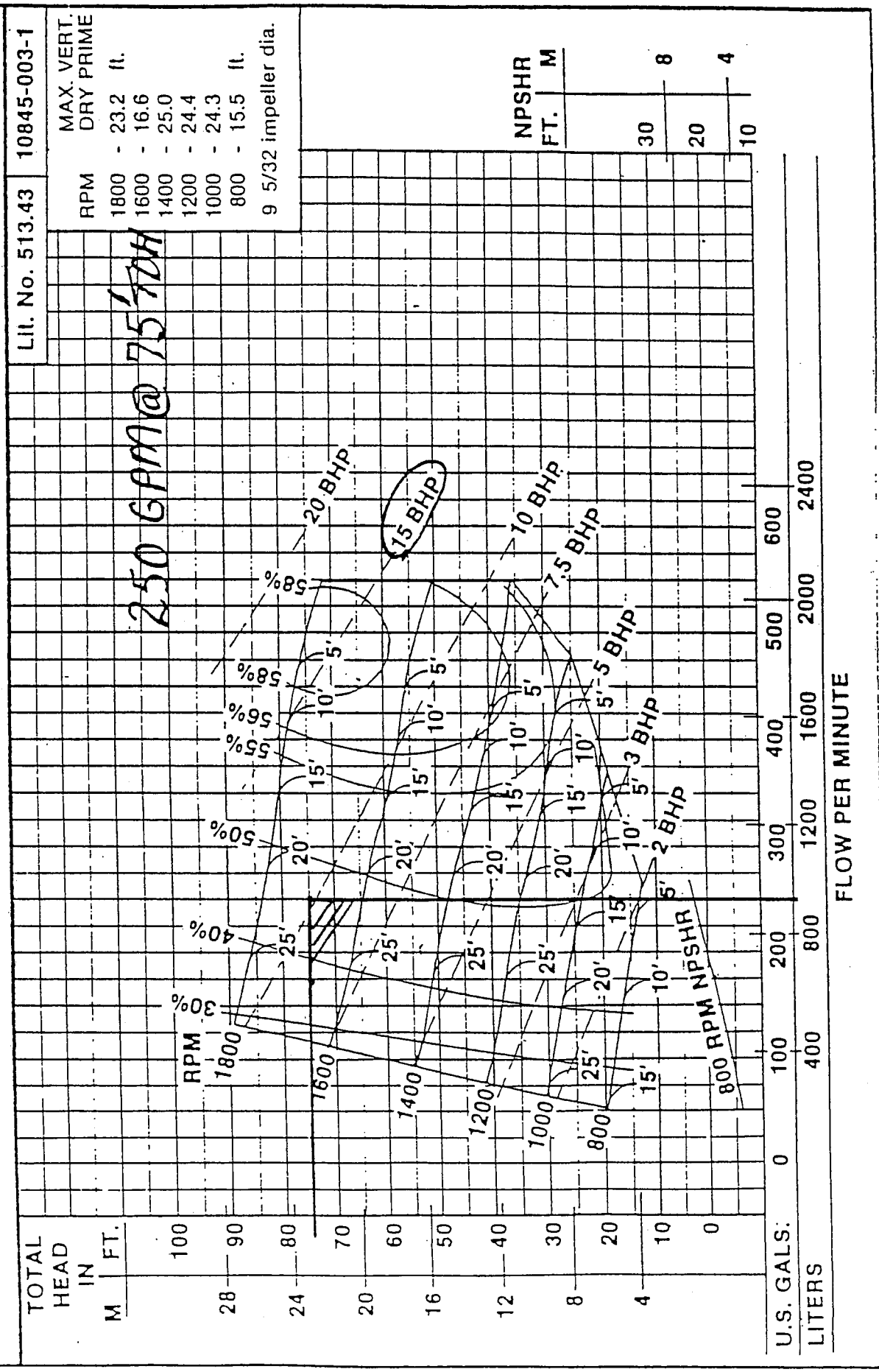
SECTION 510
PERFORMANCE DATA

MODEL: 40MPV - 40MPSFV SELF PRIMER - MAX. SOLIDS: 3" SPHERE - VAR. RPM

Lit. No. 513.43 | 10845-003-1

RPM	MAX. VERT. DRY PRIME
1800	23.2 ft.
1600	16.6
1400	25.0
1200	24.4
1000	24.3
800	15.5 ft.

9 5/32 impeller dia.



SPC-103

ITT Water & Wastewater

PERFORMANCE CURVE

PRODUCT	TYPE
CP3127.181	HT

DATE	PROJECT	CURVE NO	ISSUE
2010-11-11	<unnamed> RIVERSWAY	63-483-00-3702	3

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.89	0.87	0.81
EFFICIENCY	83.5 %	85.0 %	84.5 %
MOTOR DATA	---	---	---

RATED POWER	10	hp
STARTING CURRENT ...	64	A
RATED CURRENT ...	13	A
RATED SPEED	1735	rpm
TOT.MOM.OF INERTIA ...	0.12	kgm2
NO. OF BLADES	1	

IMPELLER DIAMETER: 228 mm

MOTOR #	STATOR	REV
21-12-4AL	12YSER	11

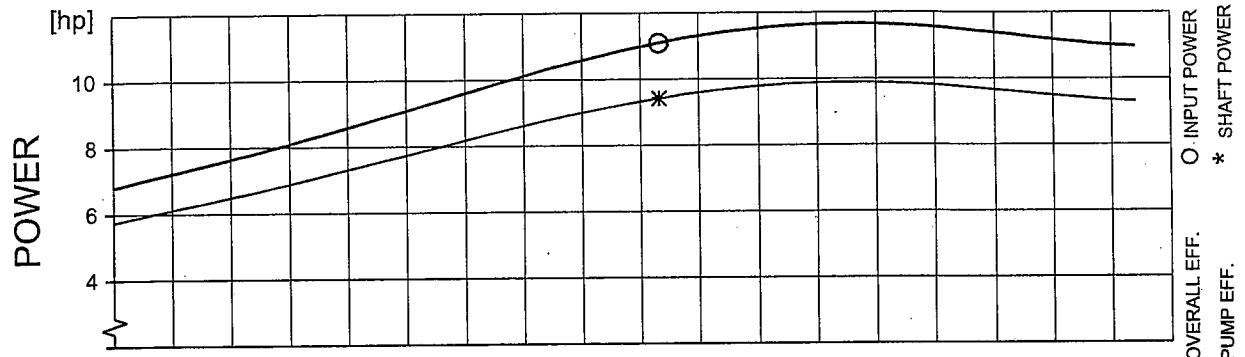
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

GEARTYPE	RATIO
---	---

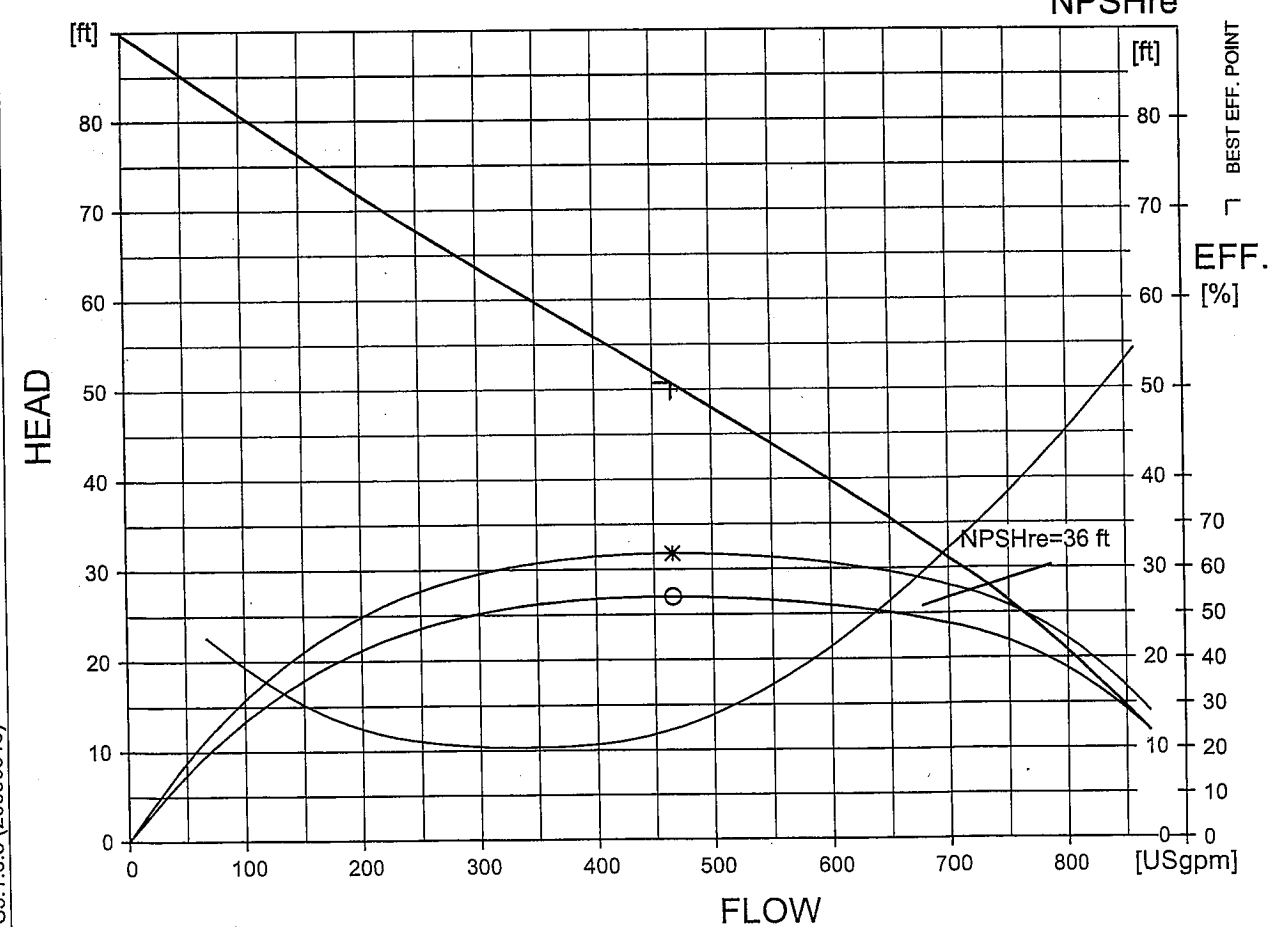
COMMENTS

INLET/OUTLET: -/ 4 inch

IMP. THROUGHLET: 2.9 inch



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
B.E.P.	466.2	50.7	11.1 (9.4)	54.0 (63.5)	12.4



FLYPS3.1.6.5 (20090313)

NPSHre = NPSH3% + min. operational margin

Performance with clear water and ambient temp 40 °C

FLYGT

HI B Curve

ROCKBRIDGE GREEN

FLYGT	PERFORMANCE CURVE	PRODUCT CP3152.181	TYPE HT
DATE 2011-07-27	PROJECT	CURVE NO 63-452-00-5360	ISSUE 2

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.84	0.79	0.69
EFFICIENCY	87.0 %	87.0 %	86.0 %
MOTOR DATA	---	---	---

RATED POWER	20	hp
STARTING CURRENT ...	142	A
RATED CURRENT ...	26	A
RATED SPEED	1750	rpm
TOT.MOM.OF INERTIA ...	0.23	kgm2
NO. OF BLADES	1	

IMPELLER DIAMETER: 280 mm

MOTOR #	STATOR	REV
25-15-4AA	12YSER	11

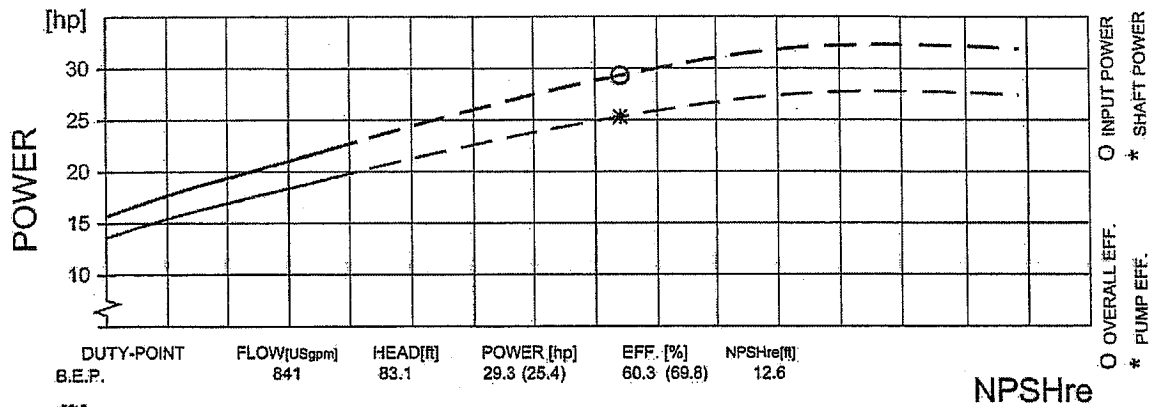
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

GEARTYPE	RATIO
---	---

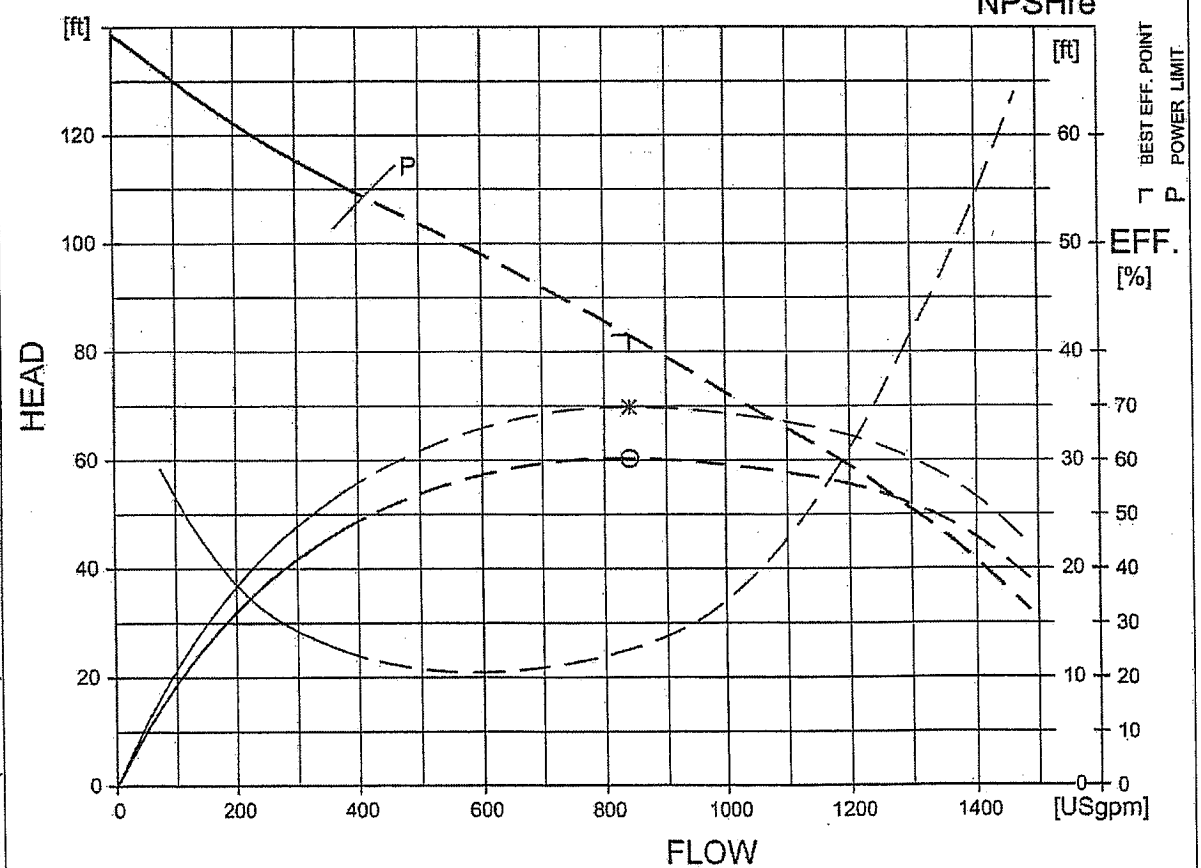
COMMENTS

INLET/OUTLET: -/ 4 inch

IMP. THROUGHLET: 3.0 inch



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
B.E.P.	841	83.1	29.3 (25.4)	60.3 (69.8)	12.6



NPSHre = NPSH3% + min. operational margin

Performance with clear water and ambient temp 40 °C

FLYGT HI B Curve

FLYPS3.1.5.8 (20060531)

ROLLING LINKS

FLYGT	PERFORMANCE CURVE	PRODUCT CP3127.181	TYPE HT
DATE 2010-08-02	PROJECT FLYGT US Catalog	CURVE NO 63-484-00-3702	ISSUE 2

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.89	0.87	0.81
EFFICIENCY	83.5 %	85.0 %	84.5 %
MOTOR DATA	---	---	---

RATED POWER	10	hp
STARTING CURRENT ...	128	A
RATED CURRENT ...	25	A
RATED SPEED	1735	rpm
TOT.MOM.OF INERTIA ...	0.11	kgm2
NO. OF BLADES	1	

IMPELLER DIAMETER: 217 mm

MOTOR #	STATOR	REV
21-12-4AL	12Y//	11

FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	230 V	4

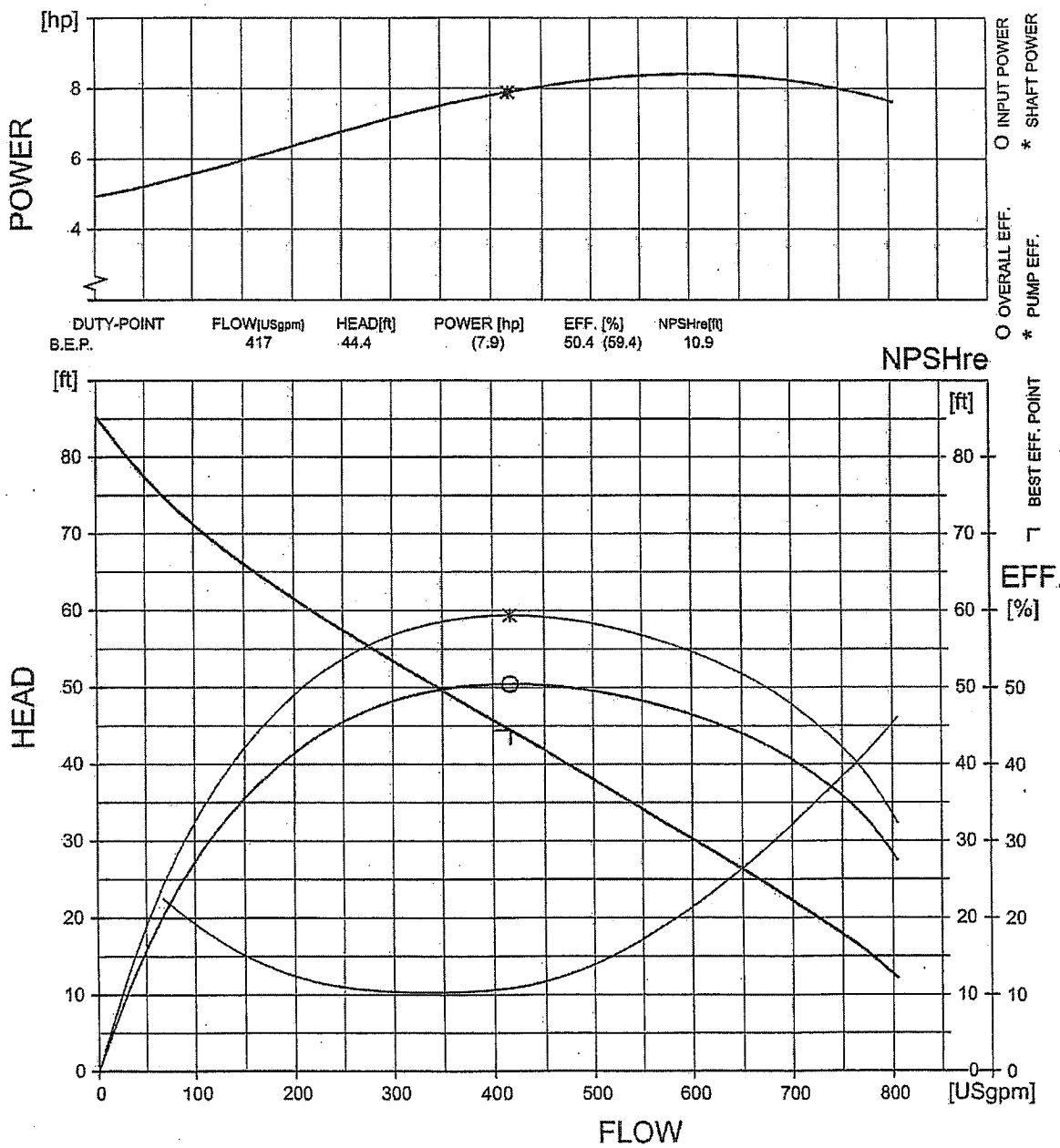
GEARTYPE	RATIO
---	---

COMMENTS

NEMA Code Letter: F

INLET/OUTLET: -/ 4 inch

IMP. THROUGHLET: 3.0 inch



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
B.E.P.	417	44.4	(7.9)	50.4 (59.4)	10.9

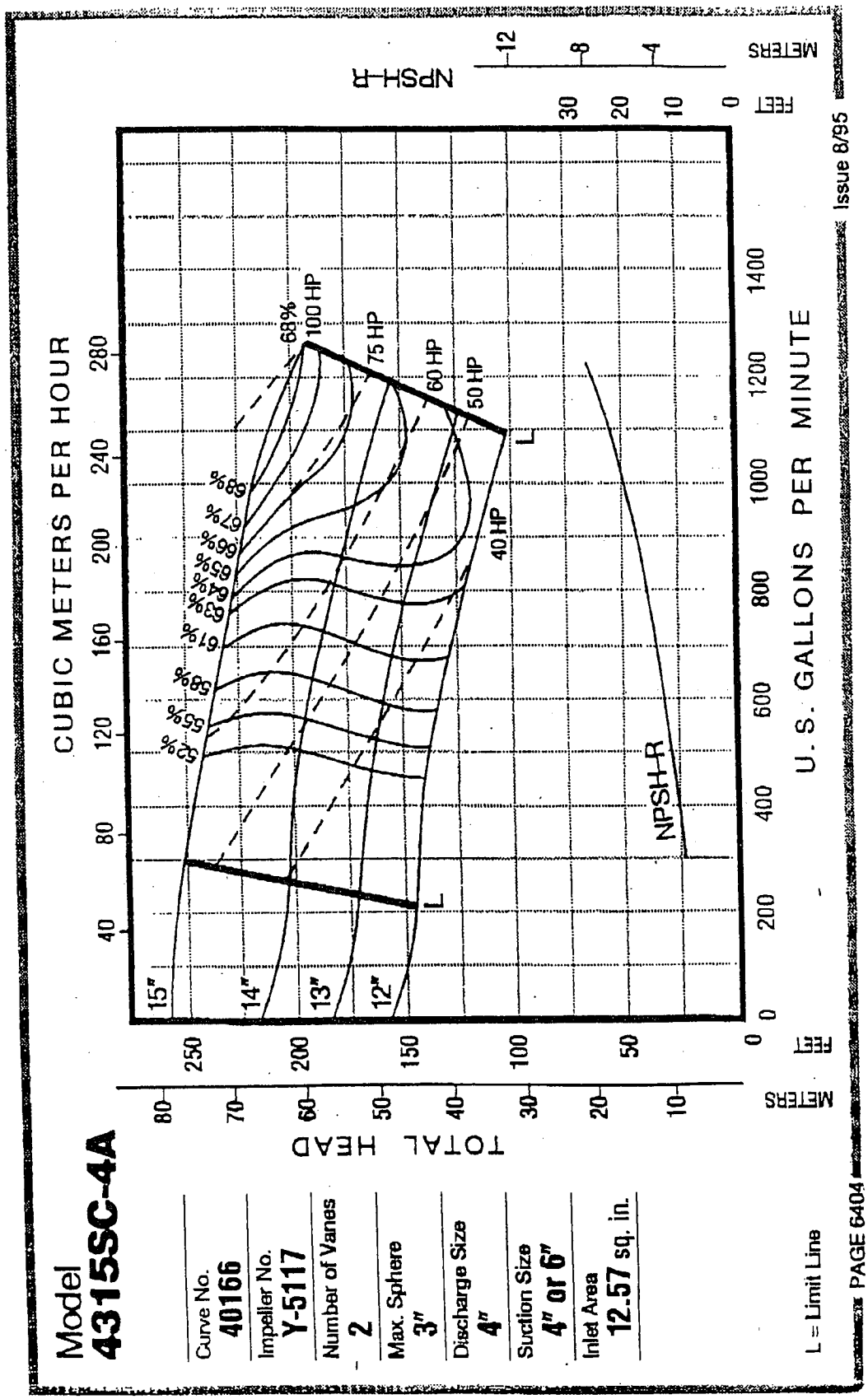
FLYPS 3.1.6.3 (20060531)

NPSHre = NPSH3% + min. operational margin

Performance with clear water and ambient temp 40 °C

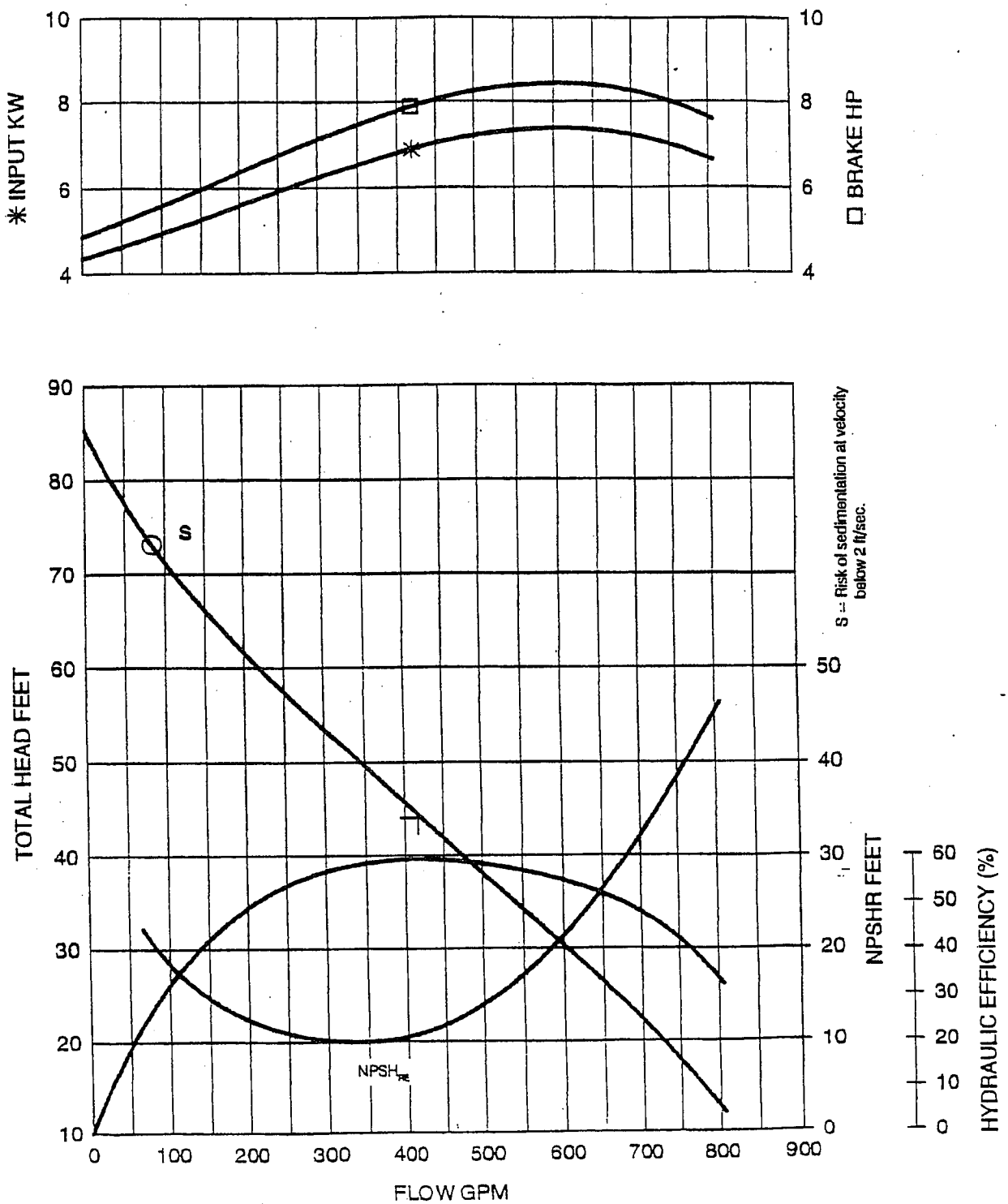
FLYGT CURVE

15. SCARBORO ROAD PUMP STATION

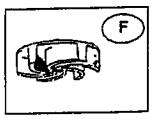


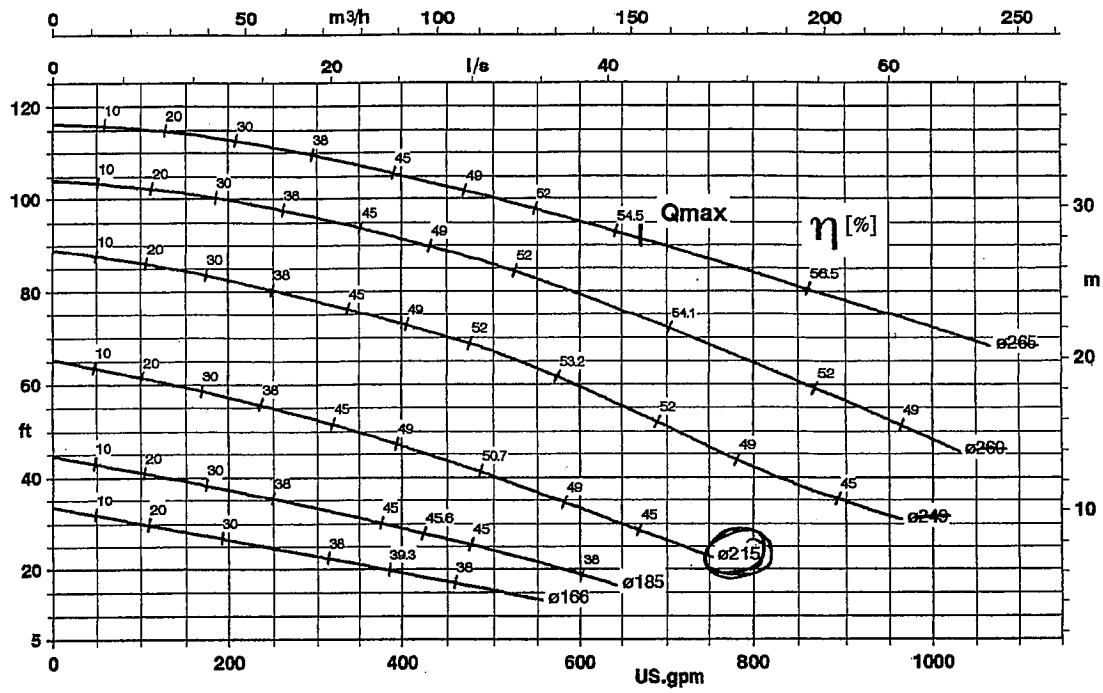
20. SOUTHWOOD PUMP STATION

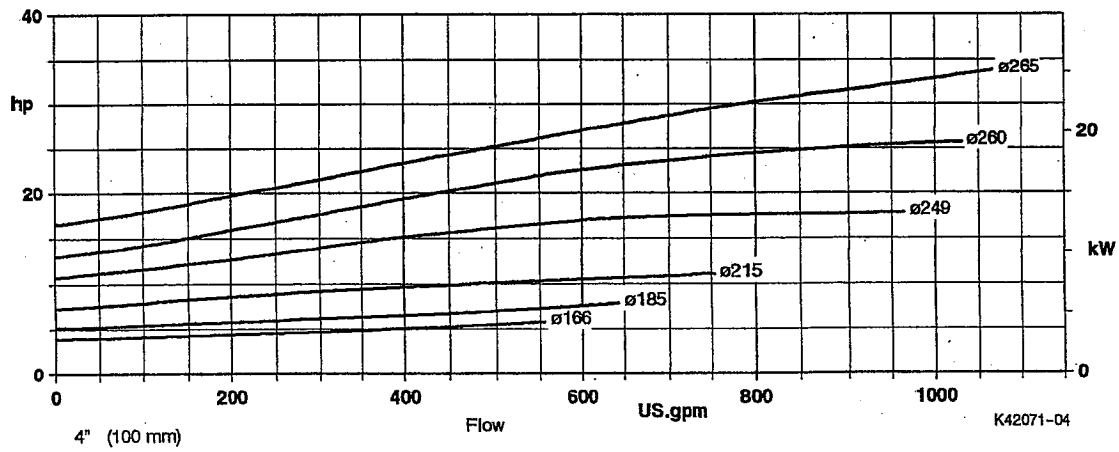
PAGE	SECTION		CONFIG.	
28	3	**C-3127**	CP/CS	
ISSUED	SUPERSEDES	**484 Impeller**	VANES	PHASE
2/96	6/94		1	3



KRT F 100-250 — 1750 rpm — 4 inch







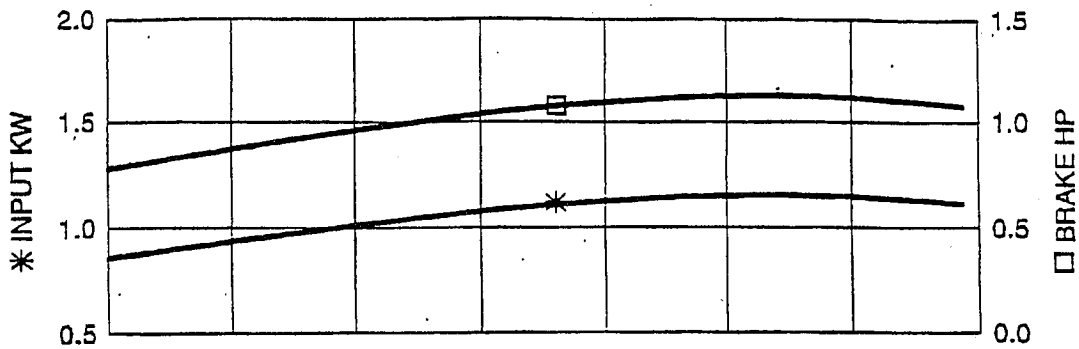
Free passage 4" (100 mm)

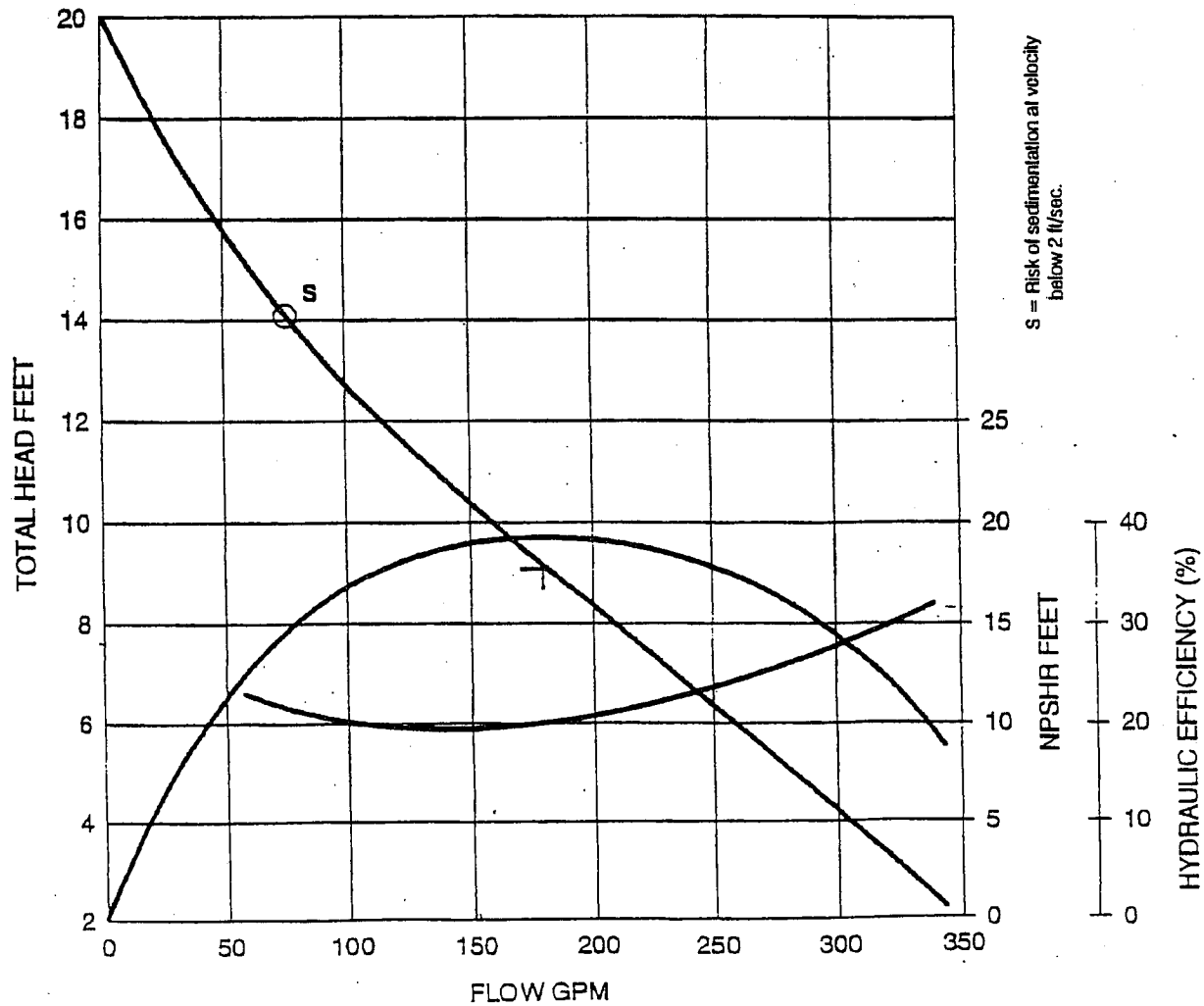
MOTOR RATING Material G, G1, G2, GH, H Hp	kW	C1, C2 Hp	kW	MAX. LIQUID TEMP. °F	°C	MOTOR CODE
7.5	5.6	-	-	104	40	54UK IE3
						54XK IE3 *)
		7.5	5.6			54U
						54X *)
				140	60	74W
						74Z *)
10	7.5	-	-	104	40	74UK IE3
						74XK IE3 *)
		10	7.5			74U
						74X *)
				140	60	114W
						114Z *)

MOTOR RATING Material G, G1, G2, GH, H Hp	kW	C1, C2 Hp	kW	MAX. LIQUID TEMP. °F	°C	MOTOR CODE
15	11.2	15	11.2	104	40	114U
						114X *)
				140	60	164W
						164Z *)
20	14.9	20	14.9	104	40	164U
						164X *)
				140	60	214W
						214Z *)
25	18.6	-	-	104	40	194U
						194X *)
30	22.3	25	18.6	104	40	214U
						214X *)

*) FM/CSA = Explosionproof to Class I, Division 1, Groups C & D

CONFIG.			SECTION	PAGE
CP/CS		**C-3085**	3	9
PHASE	VANES	**440 Impeller**	SUPERSEDES	ISSUED
3	1		6/94	2/96





PERFORMANCE CURVE

PRODUCT	CP3085.183
TYPE	MT
DATE	2011-11-29
PROJECT	WATO
CURVE NO	63-434-00-5303
ISSUE	2

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.83	0.77	0.66
EFFICIENCY	78.0 %	79.0 %	77.0 %
MOTOR DATA	---	---	---

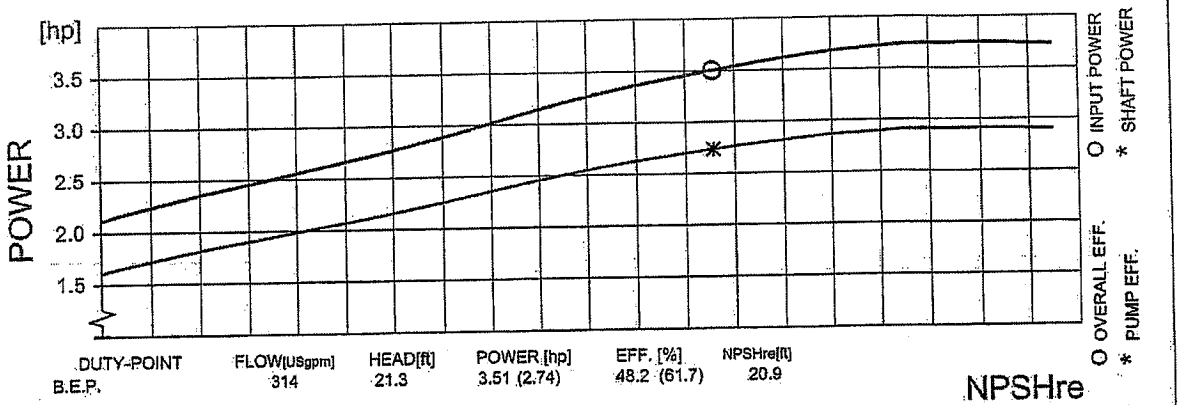
RATED POWER	3	hp
STARTING CURRENT ...	22	A
RATED CURRENT ...	4.3	A
RATED SPEED	1700	rpm
TOT.MOM.OF INERTIA ...	0.034	kgm2
NO. OF BLADES	1	

IMPELLER DIAMETER	160 mm
MOTOR #	15-10-4AL
STATOR	12YSER
REV	13
FREQ.	60 Hz
PHASES	3
VOLTAGE	460 V
POLES	4
GEARTYPE	---
RATIO	---

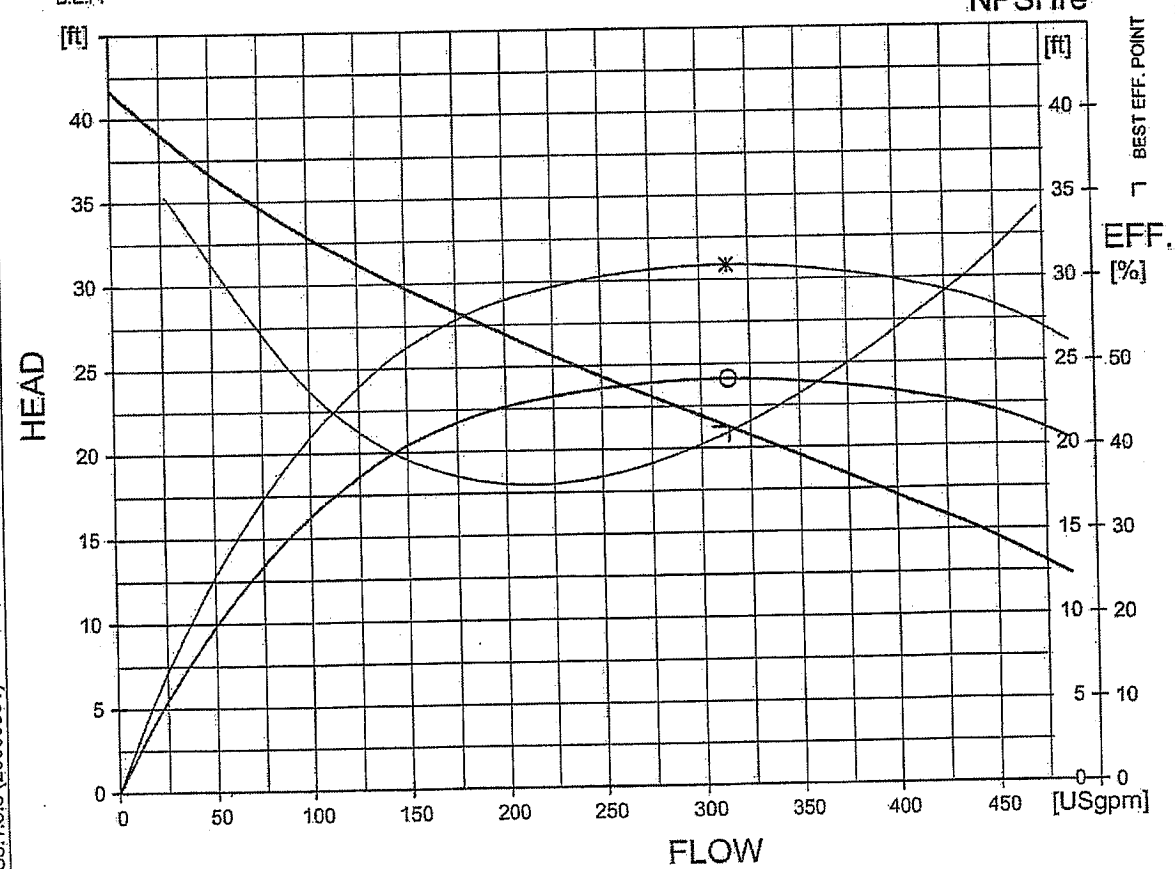
COMMENTS

INLET/OUTLET - / 3.0 inch

IMP. THROUGHLET 3.0 inch



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
B.E.P.	314	21.3	3.51 (2.74)	48.2 (61.7)	20.9



NPSHre = NPSH3% + min. operational margin

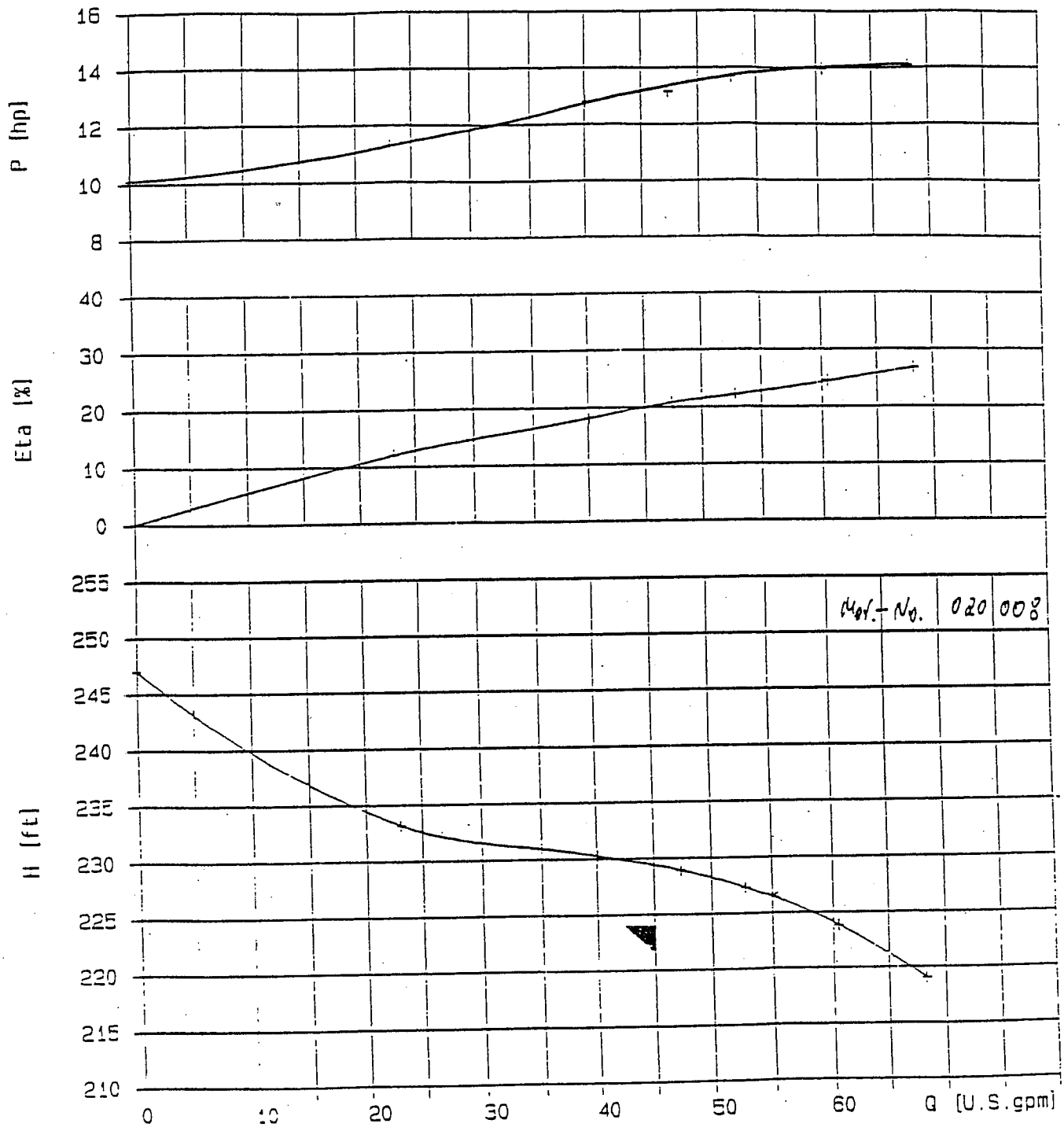
Performance with clear water and ambient temp 40 °C

HI B Curve

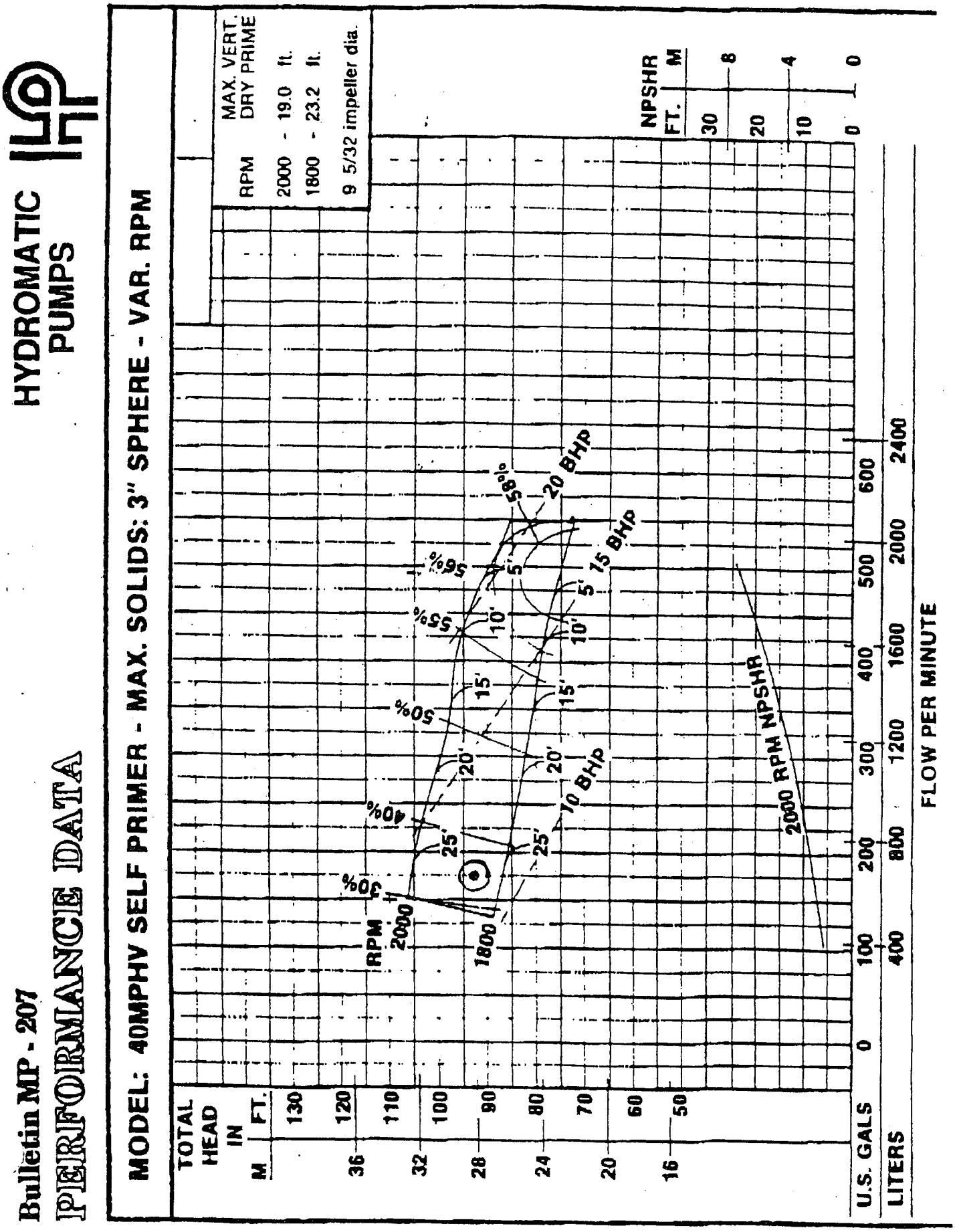
FLYPS3.1.5.8 (20060531)

1. WEST OUTER PUMP STATION

Rho = 998.200 [kg/m3]

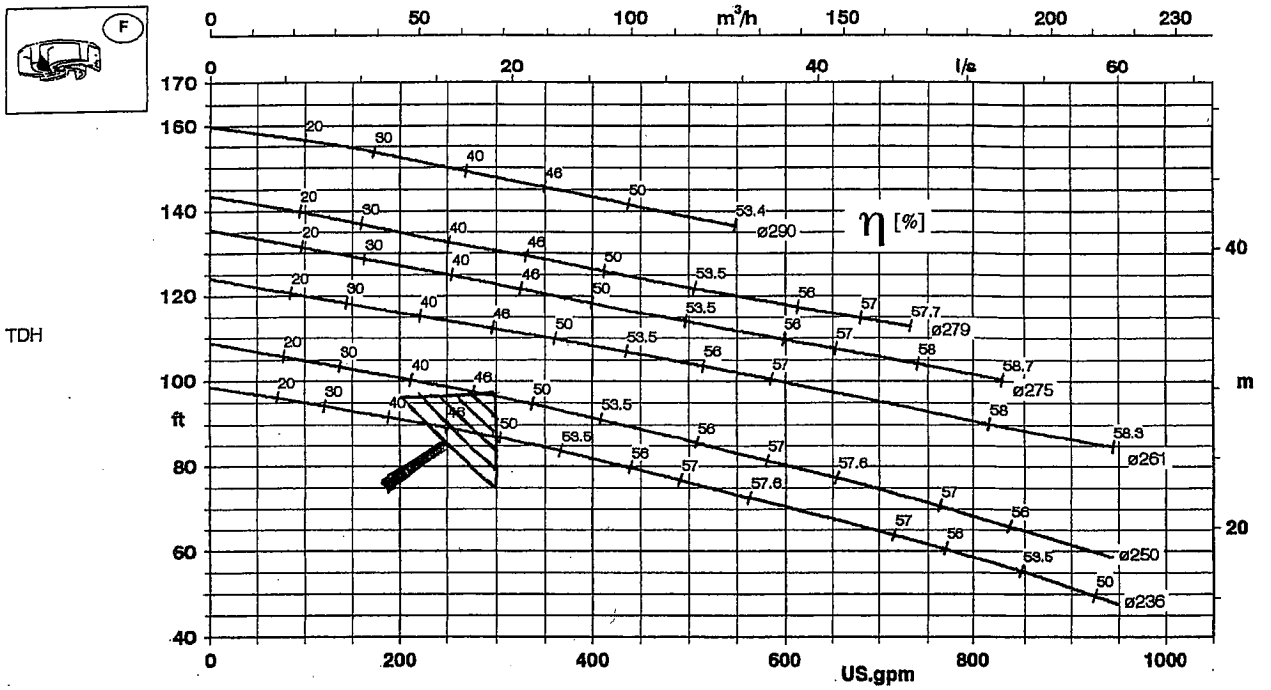


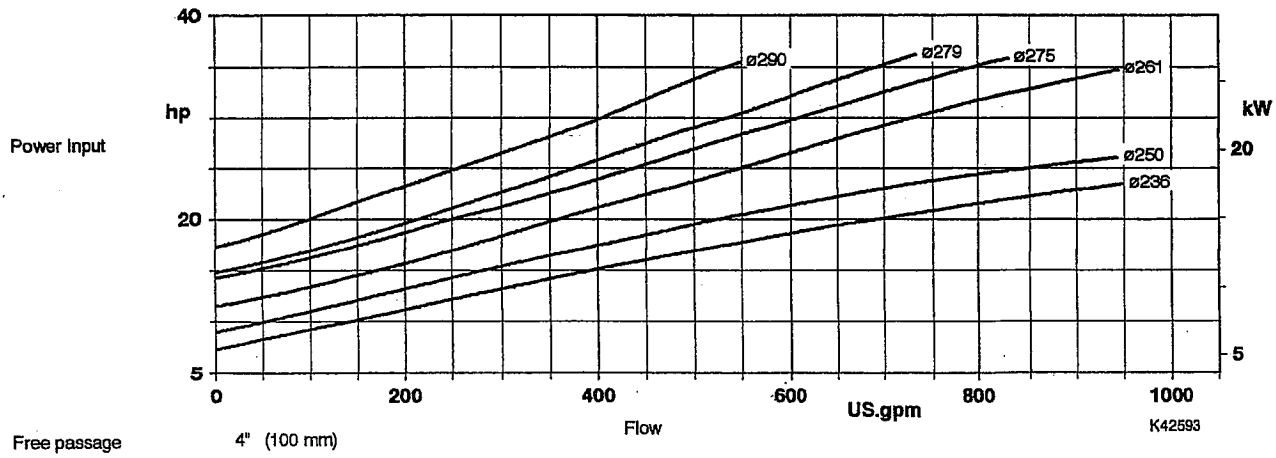
IMP.MACH.NO.	DIFFUSOR/CASING	ORDER-NO. :
IMP.PATT.NO.	MACH.DRWG.NO. :	CODE : Kennlinie m.PropeLR
IMP.CODE	PATTERN NO. :	TYPE : KRTS 40-250/122X1G
IMP.MAX.DIA.		n [1/min] : 3549..3559
IMP.TRIMMED 231.4[illegible]	KSB Halle 30.11.1994	SERIAL NO. : 5-M07-757383/--
FORM (IN/OUT)		
KSB-INSPECTOR [illegible]	0 - CURVE	CURVE NO. : 5-M07-757383/--


Bulletin MP - 207
PERFORMANCE DATA
HYDROMATIC PUMPS
MODEL: 40MPHV SELF PRIMER - MAX. SOLIDS: 3" SPHERE - VAR. RPM
RPM
MAX. VERT. DRY PRIME
2000 - 19.0 ft.
1800 - 23.2 ft.
9 5/32 impeller dia.
TOTAL HEAD IN M FT.
NPSHR FT. M
30%
40%
50%
55%
56%
58%
20 BHp
15 BHp
10 BHp
2000 RPM NPSHR
U.S. GALS
LITERS
FLOW PER MINUTE

Whippoor Will - 300 GPM @ 96' TDH

KRT F 100-316 — 1750 rpm — 4 inch





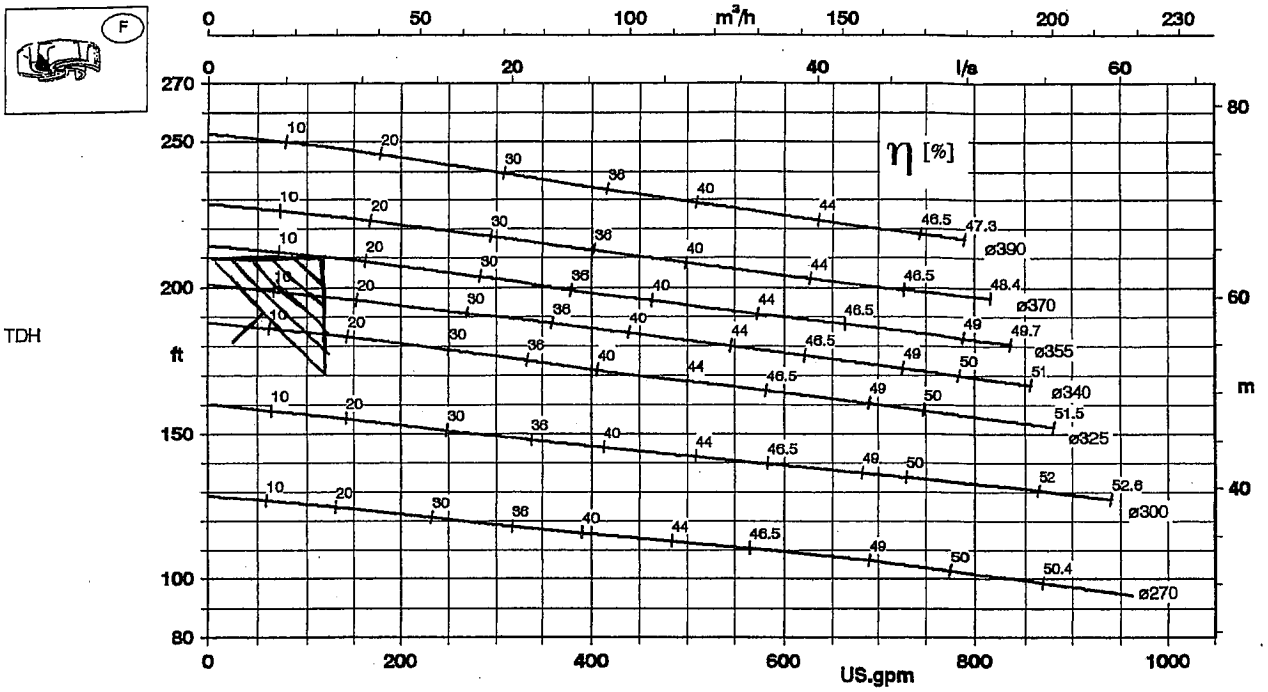
Free passage 4" (100 mm)

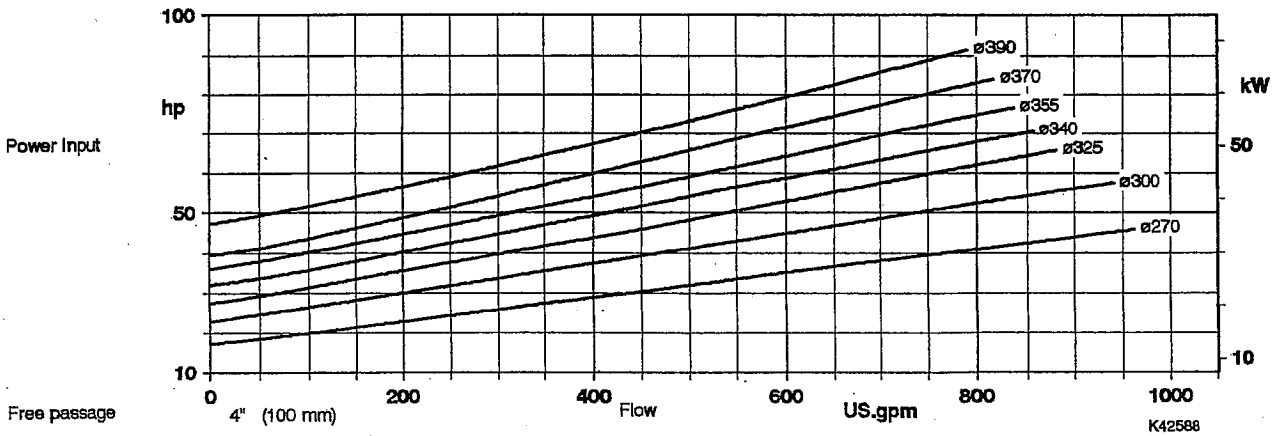
MOTOR RATING Material G, G1, G2, GH, H		C1, C2		MAX. LIQUID TEMP.		MOTOR CODE
Hp	kW	Hp	kW	°F	°C	
15	11.2	15	11.2	104	40	114U
						114X *)
				140	60	164W
						164Z *)
20	14.9	20	14.9	104	40	164U
						164X *)
31	23.1	28	20.9	140	60	294W
						294Z *)
36	26.8	34	25.4	104	40	294U
						294X *)

*) FM/CSA = Explosionproof to Class I, Division 1, Groups C & D

Williams Lane - 120GPM @ 210' TDH

KRT F 100-401 — 1750 rpm — 4 inch





MOTOR RATING Material G, G1, G2, GH, H Hp	kW	C1, C2 Hp	kW	MAX. LIQUID TEMP. °F	°C	MOTOR CODE
28	20.9	–	–	104	40	234U 234X *)
31	23.1	–	–	140	60	294W 294Z *)
36	26.8	–	–	104	40	294U 294X *)
45	33.6	37	27.6	140	60	354W 354X *)
50	37	45	34	104	40	354U 354X *)
				140	60	504W 504Z *)
65	48.5	56	41.8	104	40	504U 504X *)
				140	60	654W 654Z *)

MOTOR RATING Material G, G1, G2, GH, H Hp	kW	C1, C2 Hp	kW	MAX. LIQUID TEMP. °F	°C	MOTOR CODE
83	61.9	74	55.2	104	40	654U 654X *)
100	74.6	75	56	140	60	804WN 804ZN *)
107	79.8	90	67	104	40	804UN 804XN *)
121	90.2	95	71	140	60	954WN 954ZN *)
127	94.7	100	75	104	40	954UN 954XN *)
–	–	115	86	140	60	1104WN 1104ZN *)

*) FM/CSA = Explosionproof to Class I, Division 1, Groups C & D

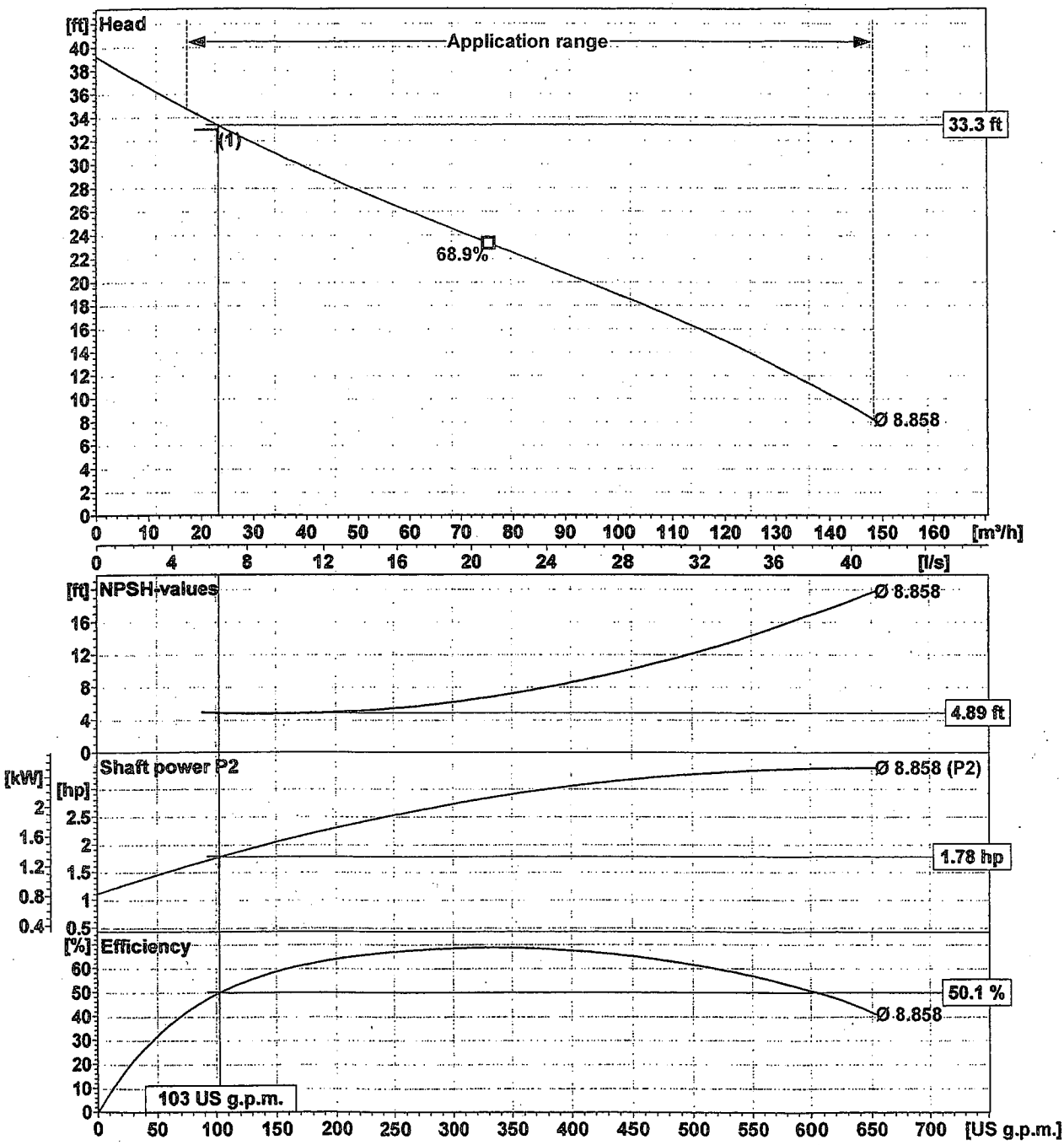
Project	**Wolf Creek Subdivision**
Project ID	**Oak Ridge, TN**
Pos.no	
Created by	**Water and Waste Equipment INC.**

KSB

2007-11-12

Performance curve

Pump type **KRT E 80-251/46XG-S**



Impeller type		Single vane impeller	Closed	Curve number	K42883/1
Free passage		3"	Density of fluid 62.32 lb/ft³	Frequency	60 Hz
Impeller size	(225)	8⁷/₈"	Viscosity 1.082E-05 ft²/s	Speed	1160 1/min

KSB Inc., Richmond, VA. / KSB Pumps Inc., Mississauga, Ontario / KSB AG, Halle (Saale), Germany