Reporting of Industrial / Commercial Wells
to the Twin Platte Natural Resources District

Facility Name:	Gerald Gentleman Station (GGS)
Owner:	Nebraska Public Power District
Location:	Section 19 T13N-R33W, Lincoln County
Reason:	Plant Well Field #1 Plant Well Field #2

Gerald Gentleman Station Plant Well Field #1

Plant wells included in the well field:
G-041198
G-043107
G-043108
G-071043
G-049632

Station Description: GGS is located near Sutherland, Nebraska on the south shore of Sutherland Reservoir. GGS consists of two, coal-fired power generating units that supply electricity to NPPD's electrical grid system. Units 1 and 2 generate 665,000 and 700,000 kilowatts, respectively. In addition to the ground water uses described herein, the plant has surface water appropriations from the North Platte River, South Platte River, Sutherland Reservoir, and Lake McConaughy for a once-through cooling system and for supplying plant needs. Approximately 220 employees are located at GGS.

Well Field #1 Uses: This well field supplies the ground water for the station's potable water and supplies all of the water necessary for system operations described below.

System Description: Wells G-041198, G-043108, and G-071043 provide water to a common system that supplies water for potable use and for plant operations. G-049632 is designed to provide water for fire suppression and for plant operations. Water from the well field that is not consumed can be discharged into evaporation ponds or returned to the cooling water system. G-043107 is currently not in use.

The wells included in this well field provide water for the following purposes:

- Boiler Make-Up Water – The boiler system consists of a closed loop in which high quality water is heated into steam to drive the generating unit turbines and then the steam is condensed back to water in the condenser to begin the process once again. Periodically additional water from the plant wells is treated and added to the boiler system to make up for system losses. The water is treated by reverse osmosis and a zeolite softening process before it is used as boiler make-up water.

- Bottom Ash Removal System –Water from the bottom ash cooling pond and/or the waste water recovery tanks is used to cool slag and ash in the bottom of the boilers. The sources of water for the bottom ash cooling pond are regeneration water from the reverse osmosis unit, washdown drainage, and reject water from the softening process. Excess water in the bottom ash cooling pond is discharged into the evaporation pond.

- Circulating Water System (Cooling Water) – This water is used for once-through cooling in the plant condensers. While the majority of the water in the circulating water system comes from surface water, some water from the reverse osmosis and softening processes can be returned into this system. Water used in this system is discharged into Sutherland Reservoir.

- Dust Control – G-049632 can be used for dust control on the plant site. The water used in dust control measures evaporates on site.

- Fire Protection System – Water from G-049632 is used as needed for fire suppression. Water from G-041198, G-043108, and G-071043 may also be used to maintain pressure in the fire suppression system.

- HVAC Cooling System – During the warmer months, chilled water for the main plant building is provided by four absorption type water units (chillers). In the cooling tower, heat in the circulating water is released to the atmosphere and the cooled water is recirculated to the chillers. Part of the water is discharged into the atmosphere from the tower.

- Potable System – The potable water system provides water to the main plant building, warehouses, and miscellaneous on-site buildings for use in service sinks, lavatories, toilets, showers, etc. The waste water from the facilities is treated and discharged into the Sewage Evaporation Pond.

- Service Water System – The service water system provides water which is used through-out the plant in various processes and systems that result in treated or untreated waste water streams. Those uses may include washdown, cleaning, flushing, etc. All of the wells in the well field provide service water to the plant. The service water which is not reused is discharged into the evaporation pond.

None of the wells in this well field are currently equipped with flow meters. The annual average use was estimated by plant technicians based on a typical operation year. Outage scope variability, forced outages, equipment malfunctions, and other variables will have a considerable effect on yearly water usage totals.

Estimated Average Annual Well Field Pump Volume – 873 acre-feet (See following page for computation details)

GGS Industrial Well Figures

A-C Diesel Fire Water Pump	**Quantity (Gallons)**
Weekly Test – 30 min @ 1000gpm	1,560,000
Quarterly Testing – 4 hours @ 1000 gpm	960,000
Yearly Fire Pump Test – 1,000gpm for 1 hour	60,000
Air Heater Hydro Wash – 5 days @ 1000gpm	7,200,000
	Total Usage ~ 9,780,000

Potable Water Well #1	
Weekly Test - 60mins@350 gpm	1,092,000
Quarterly Potable Water Bacteria Test – 30 mins @350 gpm	42,000
	Total Usage ~ 1,134,000

Potable Water Well #2 and #3 combined total	
Anion Regen – 25 per year, 40,000 gal per each	1,000,000
Cation Regen – 8 per year, 15,000 gal per each	120,000
Mixed Bed Regen – 8 per year, 15,000 gal per each	120,000
Polisher Recoat – 35 per year, 37,000 gal per each	1,295,000
Potable Water General Plant Use – 300gpm, 24/7	157,680,000
Potable Water Boiler Make up both units – 210 gpm, 24/7	110,376,000
Outage Boiler Fills – 3 outages per unit per year Unit 1 – 437,000 gal/per outage Unit 2 - 479,000 gal/per outage	2,750,500
	Total Usage ~ 273,341,500

Note – Total Usage for PW#2 and PW#3 is split evenly between the two due to GGS equipment swapping process.

Total Estimated Industrial Well Usage – 284,255,500 gallons per year

One acre-foot = 325851 gallons

Total Estimated Industrial Well Usage – 873 acre-feet

Figures contained here-in are a best guess estimate of typical yearly usage based upon limited measuring equipment and several assumptions utilized for developing figures. Outage scope variability, forced outages, equipment malfunctions, etc. will have a considerable effect on yearly water usage totals.

Gerald Gentleman Station Plant Well Field #2

Plant wells included in the well field:

G-128029	G-128034	G-128039	G-128044	G-128049	G-128054	G-128059	G-128064
G-128030	G-128035	G-128040	G-128045	G-128050	G-128055	G-128060	G-128065
G-128031	G-128036	G-128041	G-128046	G-128051	G-128056	G-128061	G-128066
G-128032	G-128037	G-128042	G-128047	G-128052	G-128057	G-128062	
G-128033	G-128038	G-128043	G-128048	G-128053	G-128058	G-128063	

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Well Field #2 Uses: Plant Well Field #2 has two functions. They are to 1) sustain water levels in Sutherland Reservoir and 2) help GGS comply with discharge water temperature regulations.

System Description: Water from the well field is pumped into the cooling water system. The cooling water system includes the surface water canals upstream and downstream of the plant and the cooling pond. Water used in the cooling water system is discharged into Sutherland Reservoir.

27 of the wells in the well field were utilized in 2014. The flow meter data for those 27 wells have been compiled into monthly pumping volumes. Wellfield pumping volumes also includes start up and shutdown pumping and testing.

Total Well Field Pump Volumes:

Year	Volume (acre-feet)
2005	4,211
2006	3,443
2007	8,194
2008	426
2009	3,241
2010	1,127
2011	13
2012	47
2013	116
2014	817

2014 Monthly Pump Volumes:

Month	Volume (acre-feet)
Jan	
Feb	
Mar	
Apr	
May	6
Jun	562
Jul	179
Aug	2
Sep	68
Oct	
Nov	
Dec	