

SPREADSHEET VERIFICATION AND RELEASE FORM

1. SVF 1805 Rev. 1

1a. No. Pages: 1

2. Spreadsheet Owner, Organization, MSIN, & Phone No.: Rick Nelson, WFD Site Prep, B1-55, 372.9706

3. Spreadsheet File Name and Version No.: Elect. Pwr needs for WFD & SST Retrieval_SFV1805 Rev. 1.XLSM

4. Function and Purpose of Spreadsheet: Calculate electrical power needs for future WFD and SST Retrieval Activities

5. Spreadsheet Category: Critical Spreadsheet Non-Critical Spreadsheet

5a. Spreadsheet Use: Multiple-Use Spreadsheet Single-Use Spreadsheet

6. Associated Document(s): RPP-5228, Rev 1 6a. Attachments: None

7. Scope of Verification: Input Data Formulas Changes Only Macros/Add-ins Other

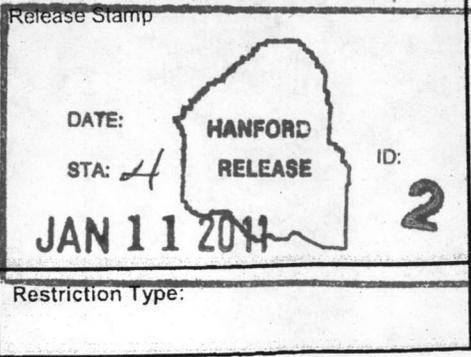
8. Scope Description/Test Plan: N/A

9. Verification Checklist:	Yes	No	NA
a. Unique formulas in spreadsheet have been checked that they correctly perform their intended function.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Non-unique formulas have been reviewed to confirm that they have been correctly copied.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Values are correctly labeled with units.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Formulas were checked for dimensional consistency.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Spreadsheet contains <u>no hidden pages or formulas</u> /data on hidden ranges/pages have been verified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Links to external workbooks have been verified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g. Input data used in the spreadsheet are appropriate and have been checked against their original source.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Spreadsheet has been reviewed for common errors. See TFC-ENG-DESIGN-C-32, Attachment C for guidance.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Assumptions in the spreadsheet are reasonable and supportable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Macros contained in the spreadsheet have been verified for correct operation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
k. Add-in software is commercially available software, suitable for its intended purpose, and is a production version of the software (e.g. not be a "beta" or test version).	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
l. Spreadsheet contains a documentation sheet with spreadsheet purpose, methodology, assumptions, and reference to current SVF No.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. A change log is included for multiple-use or revised single-use spreadsheets and all changes in the log have been verified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n. If the spreadsheet is a critical spreadsheet, a published spreadsheet description document has been produced that provides a description of the spreadsheet purpose, assumptions, methodology.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
o. All errors identified during verification have been corrected and the spreadsheet is suitable for its intended purpose.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: Completion of blocks 7, 8, and 9 constitutes the test plan and documentation of test results for single use non-critical spreadsheets.

10. **Comments:** (Explanation for any items marked "No" must be provided)

EXCEL rounding rules causes some numbers to round up by 1. This has no significant affect on the overall calculation.

11. Approvals/Clearance:	Printed Name:	Signature:	Date:	Release Stamp 
Spreadsheet Owner:	Rick Nelson	<i>[Signature]</i>	12/13/10	
Spreadsheet Verifier:	Elise Uytioco	<i>[Signature]</i>	12/16/10	
Owner's Manager:	Doug Larsen	<i>[Signature]</i>	12/17/10	
LCCB Approval (if required):				
Clearance Review:	N. A. Fouad L FOX	<i>[Signature]</i>	1-11-11	
Cleared for Public Release?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Restricted Use?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Restriction Type:

When completed, submit the original hard copy signed SVF form together with a protected electronic copy of the spreadsheet (in *.xls or *.xl format) to the Document Control Service Center for records retention and release. See Form Instructions for how to transmit spreadsheet electronic file.

Electrical Power Needs Projection for WFD & SST Retrieval

Spreadsheet Owner/Developer: Rick E. Nelson, Ivan Lee (URS, Washington Division)

Objective/Purpose: Reasonable worst case bounding calculation of future WFD & SST retrieval electrical power needs to support the update of RPP-5228, Rev. 1.

Overview: Electrical loads for each DST farm are estimated by reviewing the electrical one-line diagrams for the existing connected load and adding the projected WFD load per RPP-40149, Rev. 1, Table 6-1. Simultaneous operation of these loads are estimated based on the premise that the primary tank ventilation system will be designed to remove heat commensurate with simultaneous mixing of two (2) HLW sludge tanks during transfer. Process needs to support these operations are also factored in. SST retrieval loads are based on C-farm retrieval electrical power demands (modified sluicing) from RPP-CALC-32223, Rev. 1, Section 6.0 and the constraints on simultaneous SST retrievals identified in RPP-RPT-40734, Rev. 0, Table A-1, Assumption #B3.2.3.3.

Macros/add-ins: None.

Key Assumptions: See next worksheet.

Input data: Tank farm electrical drawings, as referenced on farm-specific "Existing Loads" worksheets, are used to calculate the existing connected load. Existing loads are shown in green highlight on the WFD Loads worksheets. RPP-40149, Rev. 1, describes the WFD design baseline which includes 300-HP mixer pumps to mobilize the waste in DSTs and 60-HP transfer pumps for the transfer of DST wastes. The pump vendor, Curtiss-Wright EMD, has provided a preliminary design package for the mixer pumps. This design package includes the power requirements for the mixer pump, which has been increased to 400-HP (See Key Assumptions on the next worksheet). New loads shown in yellow highlight on the WFD loads worksheets pertaining to mixer pumps and transfer pumps on the farm WFD loads reflect these pump sizes; numbers of pumps for each of the DSTs are taken from RPP-40149, Rev. 1, Table 6-1. WFD Diluent and Flush System heater sizing shown on these worksheets are taken from Preliminary Electrical Calculation for AW Tank Farm Infrastructure Upgrades, RPP-CALC-44876 Rev. B. RPP-CALC-32223, Rev. 1, Section 6.0 provides the C-farm retrieval electrical loads (C-farm spreadsheet) that form the basis for estimating SST Retrieval loads for modified sluicing.

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Organization of Workbook: Each DST farm's WFD Load calculation sheet is supported by an existing loads spreadsheet constructed from the electrical one-line drawings for each DST farm. SST retrieval load calculations are grouped by farms with similar retrieval schemes per the RPP System Plan, ORP-11242, Rev. 5.

SVF Number	SVF-1805
Version	1
Description of Change	Change in size of motors for Submersible Mixer Pumps and Transfer Pumps based on preliminary design information for WFD In-Tank Upgrades Project. Affected worksheets are: Key Assumptions, References, Constants, WFD Loads (ALL), Existing Loads (DST only).
Originator	Rick E. Nelson
Change Date	12/8/2010
Verifier	Elise Uytioco
Verification Date	12/13/2010

No.	Assumption	Comments	Applicability
1	Waste sampling is not an appreciable electrical load & will "fit" within the 125%*Existing loads allocation.	Waste sampling mechanism is yet to be determined	All DST farms
2	DST VTP for WFD is sized to be twice the existing AN-farm VTP.	The existing AN-farm VTP is sized for operation of two (2) mixer pumps in a HLW sludge tank during transfer. Operational considerations lead to the need for simultaneous mixing of two (2) HLW sludge tanks during transfer (total of four (4) mixer pumps and a transfer pump); therefore, the AN-farm VTP fan-size, heater size, etc. was simply doubled as an estimate for needed electrical power for the VTP sized for the recently identified WFD operational scenario.	All DST farms
3	Redundant VTP train is not counted on demand load.	One VTP train running at any one time.	All DST farms
4	Future WFD project(s) as defined in RPP-5228 will be connected to a new transformer.	AY/AZ-farm loads will be fed from a new 3000 kVA transformer installed during infrastructure upgrades.	AY/AZ farms
5	Heater usage limited to one 500 kW heater during peak WFD operations that do not require hot water (e.g., during mixing & transfer of waste from a sludge tank; mixing a sludge tank for sample). WFD operations requiring hot water include pre-heat of transfer lines & post transfer flush.	One 500 kW heater may be needed for hot water to tanker truck loadout. Hot water to tanker truck loadout currently run off of one 500 kW heater--typical for hot water needs in other tank farms (e.g., SST farms)	SY-farm
6	Bus tie-breaker on SWG-E-001 is open allowing power feed from both sides of double ended substation.	Maximum capacity configuration is needed. If tie-breaker closed, must place administrative controls on load operation.	SY-farm
7	Heater usage limited to one 500 kW heater during WFD Operations. A second heater will be available for use as a spare but will not be operationed simultaneously.	One 500 kW heater is sufficient for temperature requirements.	All DST farms except SY-farm
8	Mixer Pump Calculations: Pump motor efficiency is 0.81; Brake HP = 290 HP Calculated Electric HP = $290 / 0.81 = 358$ HP An appropriate 400 HP (electric) was selected for calculating required loads due to the fact that 358 HP is not a standard size. NEC Article 430-250: using PF of 0.8, 400 HP motor at 460 V = 477 Amps * 1.25 = 596.25	Appropriately conservative assumptions.	All worksheets
9	Transfer Pump Calculations: Pump motor efficiency is 0.49; Brake HP = 60HP Calculated Electric HP = $60 / 0.49 = 122$ HP An appropriate 150 HP (electric) was selected for calculating required loads due to the fact that 122 HP is not a standard size. NEC Article 430-250: using PF of 0.8, 150 HP motor at 460 V = 180 Amps * 1.25 = 225	Appropriately conservative assumptions.	All worksheets
10	Amperes = Watts / (1.732 * Volts * Power Factor) for three phase electric circuit; OR Watts = Amperes * 1.732 * Volts	Standard electrical calculation	All worksheets

References		
Document No.	Document Title	Comments
ORP-11242, Rev. 5	<i>River Protection Project System Plan</i>	
RPP-5228, Rev. 0	<i>Assessment of the Electrical Power Requirements for Continued Safe Storage and Waste Feed Delivery Phase One</i>	
RPP-7069, Rev. 0	<i>Project W-521 Waste Feed Delivery System Advanced Conceptual Design Report, Volumes 1 & 2</i>	
RPP-8183, Rev. 1	<i>241-AW Tank Farm Electrical Distribution Study</i>	
RPP-8185, Rev. 0	<i>241-SY Tank Farm Electrical Distribution System Study</i>	
RPP-40149, Rev. 1	<i>Integrated Waste Feed Delivery Plan</i>	
RPP-CALC-32223, Rev. 1	<i>POR114-EDS-SUS-001 Electrical Load Analysis</i>	Tank C-104 Waste Retrieval Detailed Design
RPP-PLAN-40145, Rev. 0	<i>Single-shell Tank Waste Retrieval Plan</i>	
RPP-RPT-40734, Rev. 0-B	<i>Hanford Tank Waste Operations Simulator Model Data Package for the River Protection Project System Plan Rev. 4 Case</i>	
RPP-RPT-42527, Rev. 0	<i>Methods for Determining Agitator Mixing Requirements for Mixing & Sampling Facility to feed WTP</i>	
RPP-CALC-44876, Rev. B	<i>Preliminary Electrical Calculations for AW Tank Farm Infrastructure Upgrades</i>	
WRPS Subcontract #42626	<i>Curtiss-Wright EMD, 30% Design Report for Submersible Mixer Pump</i>	Available in PassPort

	Amps	Voltage	Overall Power Factor	Watts	KW	VA	KVA
Mixer Pump	596.25	460	0.8	380035	380	475044	475
Transfer Pump	225	460	0.8	143410	143	179262	179
Heaters	N/A	N/A	1	N/A	N/A		
Existing Loads	N/A	N/A	1	N/A	N/A		

Reasonable worst case simultaneous activities for each process step shown in red		AN-farm Electrical Loads (kVA)																				Connected (kVA)				
		500	232	950	950	950	950	950	950	475	179	179	179	179	179	179	179	179	179	179	179	179	563	9801		
No.	Major Process Step Description	HTR-01†	AN VTP	AN-101 MPs	AN-102 MPs	AN-103 MPs	AN-104 MPs	AN-105 MPs	AN-106 MPs	AN-107 MP	AN-107 TP	AN-101 DP	AN-102 DP	AN-103 DP	AN-104 DP	AN-105 DP	AN-106 DP	AN-101 SP	AN-102 SP	AN-103 SP	AN-104 SP	AN-105 SP	AN-106 SP	Other Exist. Loads*	Comments	Peak Demand (kVA)
1	Mix sludge tank (e.g., AN-104) for sample		116			950	950																	563	Coincident with transfer from AN-103.	2758
2	Pre-heat transfer line, just prior to transfer from sludge tank (e.g., AN-104). Mixers running to mobilize/suspend sludge during pre-heat.	500	116			950	950																	563	Coincident w/mixing in other sludge tank for sample or chemical adjustment	3258
3	Mix sludge tank (e.g., AN-104) prior to transfer for solids mobilization & suspension.	500	116			950	950																	563	Worst case loading is inverse of step 2.	3258
4	Transfer waste from a sludge tank (e.g., AN-104)		116			950	950																	563	Coincident with mixing for sample in AN-103.	2758
5	Post transfer flush (e.g., AN-104)	500	116			950																		563	Mixer pumps mobilizing sludge during hot water flush operation.	2308
6	Decant liquid from a sludge tank (e.g., AN-103)		116			950							179											563	Coincident w/ mixer pumps mobilizing sludge for sample.	1988
7	De-gas Group A tank, AN-106 (Worst case: need hot water and mixer pump)	500	116					950									179							563	Coincident w/ evaporator operation. Would not plan to challenge vent system w/ mixer pump operation in other tanks during de-gas.	2308
8	Adjust tank chemistry (i.e., dump NaOH, NaNO ₂ , or NaNO ₃); mix tank contents (e.g., AN-104)		116			950	950																	563	Coincident w/ mixer pumps mobilizing sludge for sample.	2758

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HTR = Heater
VTP = Ventilation Tank Primary
TP = Transfer Pump
MP = Mixer Pump
SP = Sludge Pump
DP = Decant Pump

 = Existing Loads
 = Existing Loads changed due to WFD needs
 = New Loads

† Worst case assumption is that oil-fired boiler installed by W-211 will not be used in favor of AW-farm sized electric heaters.

* Other Existing Loads consists of 100% of current existing loads (see attached existing loads sheet) to allow room for additional "hotel" loads.

** Number calculated for RPP-5228, Table 2.2 from Max Peak Demand. Other Existing Loads replaced by meter data in RPP-5228 (not included here). VTP/2 included to account for increased vent load for WFD over that accounted for in meter data.

AN FARM LOADS FROM H-14 DRAWINGS -- 12/07/2010

Stand-Alone Loads								
Equip Number	Description	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
AN271-VT-AC-100	Air Cond Unit		16	20	H-14-030001 SH1	29	No exact load could be found so 80% of the breaker rating was used instead	
AN241-EDS-XFMR-129		15 kVA	9.6	12	H-14-030001 SH26	2	No exact load could be found so 80% of the transformer rating was used instead	
AN271-VT-HTR-101	Heater		16	16	H-14-030001 SH2	17	No exact load could be found so 80% of the breaker rating was used instead	
AN241-VTA-EF-003	A Train Annulus Exhaust Fan	10 HP	7.46	9.325	H-14-030001 SH3	8		
AN241-VTA-EF-004	B Train Annulus Exhaust Fan	13 HP	9.7	12.125	H-14-030001 SH3	8		
AN241-VTA-HTR-003	A Train Annulus Exhaust Htr	9 kW	9	9	H-14-030001 SH3	8		
AN241-VTA-HTR-004	B Train Annulus Exhaust Htr	12 kW	12	12	H-14-030001 SH3	8		
AZ156-VT-HVAC-101	HVAC Unit		26.6	33.25	H-14-030007 SH1	17	No exact load could be found so 80% of the breaker rating was used instead	
AZ241-VTA-HTR-101	101-AZ- Heater		6	6	H-14-030007 SH1	17		
AZ241-VTA-HTR-102	102-AZ-Heater		6	6	H-14-030007 SH1	17		
AZ241-VTA-EF-101	Exhaust Fan	30 HP	22.38	27.975	H-14-030007 SH1	17		
AZ156-VT-HVAC-001	HVAC #1		10.6	13.25	H-14-030007 SH32	4	No exact load could be found so 80% of the breaker rating was used instead	
AZ156-VT-HVAC-002	HVAC #2		10.6	13.25	H-14-030007 SH32	4	No exact load could be found so 80% of the breaker rating was used instead	
Subtotal			161.94	190.175				
Totals From Distribution Panels								
Equip Number	Location	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
AN271-EDS-DP-101	241-AN-271		11.35	14.2	H-14-030001 SH7	10		
AN274-EDS-DP-109	241-AN-274		99.33	124.2	H-14-030001 SH15	4		
AN241-EDS-DP-103	Power Distr Station		120	150.0	H-14-030001 SH9	7	Include 79.8kW welding receptacle load; only 2 receptacles can be used at any on time, deduct 53kW	
AN241-EDS-DP-128	241-AN-271		7.51	9.4	H-14-030001 SH24	2		
AN271-EDS-DP-126	241-AN-271		2.75	3.4	H-14-030001 SH25	1		
AN241-EDS-DP-107	AN241-EDS-MCC-002		12	15.0	H-14-030001 SH13	4		
AN241-EDS-DP-111	241-AN-102/by riser 016		2.04	2.6	H-14-030001 SH21	3		
AN241-EDS-DP-112	241-AN-104/by riser 016		7.7	9.6	H-14-030001 SH22	4		
AZ156-EDS-DP-101	241-AZ-156		5.02	6.3	H-14-030007 SH7	6	Includes 2.52kW RCPT load	
AZ101-EDS-DP-102	241-AZ-101		0.93	1.2	H-14-030007 SH8	6		
AZ101-EDS-DP-103	241-AZ-101		0.72	0.9	H-14-030007 SH9	3		
AZ241-EDS-DP-130	Annulus Vent Elec Rack		1.25	1.6	H-14-030007 SH38	1		
AZ241-EDS-DP-105	Annulus Vent Elec Rack		8.35	10.4	H-14-030007 SH11	7		
AN156-EDS-DP-124	241-AZ-156		7.23	9.0	H-14-030007 SH36	2		
AZ156-EDS-DP-122	241-AZ-156		12.08	15.1	H-14-030007 SH35	4		
Subtotal			298.26	372.8				
Grand Total			460.2	563.0				
Items not included								
Equip Number	Description	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
	Primary Exhaust Sys Train A		46.4	58	H-14-030101 SH1	2	20HP motor + 24kW heater + 8 kVA xfmr load	
	Primary Exhaust Sys Train B		46.4	58	H-14-030101 SH3	3	20HP motor + 24kW heater + 8 kVA xfmr load	
AN03A-WT-P-007	SN Pump Tank 103	20 HP	14.92	20	H-14-030001 SH2	16	Will be replaced w/ WFD transfer pump	
AN05A-WT-P-013	SN Pump Tank 105	20 HP	14.92	20	H-14-030001 SH2	16	Will be replaced w/ WFD transfer pump	
AN06A-WT-P-022	Supernatant Pump	40 HP	29.84	40	H-14-030001 SH2	16	Will be replaced w/ WFD transfer pump	
AN06A-WT-P-016	SN Pump Tank 106	25 HP	18.65	25	H-14-030001 SH2	16	Will be replaced w/ WFD transfer pump	
AN241-EDS-DP-121	Caustic Area Panel				H-14-030007 SH33	4	No load information	
	Receptacles				H-14-030001 SH2	16	No load information	

 = Loads not included due to new WFD loads added (see comments).

Reasonable worst case simultaneous activities for each process step shown in red		AW-farm Electrical Loads (kVA)																			Connected (kVA)	
		500	232	950	475	950	950	950	475	179	179	30	179	179	179	179	179	179	179	251	6723	
No.	Major Process Step Description	RW-HTR-01	VTP	AW-101 MPs	AW-102 MP†	AW-103 MPs	AW-104 MPs	AW-105 MPs	AW-106 MP	AW-101 TP	AW-102 TP†	Evap Feed Pmp‡	AW-103 DP	AW-103 SP	AW-104 DP	AW-104 SP	AW-105 DP	AW-105 SP	AW-106 TP	Other Exist. Loads*	Comments	Peak Demand (kVA)
1	Mix sludge tank (e.g., AW-103) for sample		116			950		950				30						179		251	Coincident with sludge transfer from other sludge tank (e.g., AW-105); evaporator feed.	2477
2	Pre-heat transfer line, just prior to transfer from sludge tank (e.g., AW-103). Mixers running to mobilize/suspend sludge during pre-heat.	500	116			950		950				30		179						251	Coincident w/mixing in other sludge tank for sample or chemical adjustment + evaporator feed.	2977
3	Mix sludge tank (e.g., AW-103) prior to transfer for solids mobilization & suspension.	500	116			950		950				30		179						251	Worst case loading is inverse of step 2.	2977
4	Transfer waste from a sludge tank (e.g., AW-103)		116			950		950				30		179						251	Coincident with mixing for sample in AW-105.	2477
5	Post transfer flush (e.g., AW-103)	500	116					950				30		179						251	Mixer pumps mobilizing sludge for sample during hot water flush & evaporator operation.	2026
6	Decant liquid from a sludge tank (e.g., AW-104)	500	116			950								179	179					251	Coincident w/ pre-heating a transfer line, just prior to a transfer out of a sludge tank (e.g., AW-103); evaporator feed not on due to decant to AW-102.	2176
7	De-gas Group A tank, AW-101 (Worst case: need hot water and mixer pump)	500	116	950						179		30								251	Coincident w/ evaporator operation. Would not challenge vent system w/ mixer pump operation in other tanks during de-gas.	2026
8	Adjust tank chemistry (i.e., dump NaOH, NaNO ₂ , or NaNO ₃); mix tank contents (e.g., AW-103)	500	116			950		950				30						179		251	Coincident w/ pre-heating a transfer line, just prior to a transfer out of a sludge tank (e.g., AW-105); evaporator feed.	2977

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HTR = Heater
VTP = Ventilation Tank Primary
TP = Transfer Pump
MP = Mixer Pump
SP = Sludge Pump
DP = Decant Pump

 = Existing Loads
 = Existing Loads changed due to WFD needs
 = New Loads

† These WFD pumps are to be installed at the end of the WFD mission; therefore, excluded from connected load calculation.
‡ AW-102 evap. feed pump migrated to 241-AW EDS as part of WFD upgrades.
* Other Existing Loads consists of 100% of current existing loads (see attached existing loads sheet) to allow room for additional "hotel" loads.
** Number calculated for RPP-5228, Table 2.2 from Max Peak Demand. Other Existing Loads replaced by meter data in RPP-5228 (not included here). VTP/2 included to account for increased vent load for WFD over that accounted for in meter data.

AW FARM LOADS FROM H-14 DRAWINGS -- 12/07/2010

Stand-Alone Loads								
Equip Number	Description	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
AW271-VT-HVAC-100	241-AW-271 HVAC Unit	20KVA	16	20	H-14-030002 SH1	22	No exact load could be found so 80% of the breaker rating was used instead	
AW241-VTA-EF-003	A Train Annulus Exhaust Fan	10HP	7.46	9.325	H-14-030002 SH3	12		
AW241-VTA-EF-004	B Train Annulus Exhaust Fan	10HP	7.46	9.325	H-14-030002 SH3	12		
AW241-VTA-HTR-003	A Train Ann Exhaust Heater	9kW	9	9	H-14-030002 SH3	12		
AW241-VTA-HTR-004	B Train Ann Exhaust Heater	9kW	9	9	H-14-030002 SH3	12		
Subtotal			48.92	56.65				
Totals From Distribution Panels								
Equip Number	Location	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
AW271-EDS-DP-102A	241-AW-271		18.28	22.9	H-14-030002 SH6	9	AW-101 camera loads subtracted out	
AWA-EDS-DP-107A	NW Corner AW Valve Pit A	59078	59.08	73.9	H-14-030002 SH8	7	Includes 26.4 kW of receptacles and 10550 W actual on DP-107A	
AW273-EDS-DP-108A	241-AW-273		61.598	77.0	H-14-030002 SH10	4	SA compressor loads subtracted out	
AW241-EDS-DP-201A	AW241-EDS-MCC-002		8.51	10.6	H-14-030002 SH 13	8	Heat trace loads are not available and are neglected	
AW241-EDS-DP-110	241-AW outside MO-818		8.01	10.0	H-14-030002 SH 20	2		
Subtotal			155.478	194.3				
Grand Total			204.398	251.0				
Items not included								
Equip Number	Description	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
AW06A-WT-P-017	SN Pump	30HP	22.4	28	H-14-030002 SH2	13	Will be replaced w/ WFD transfer pump	
AW05A-WT-P-014	SN Pump	30HP	22.4	28	H-14-030002 SH2	13	Will be replaced w/ WFD transfer pump	
AW241-VTP-EF-002	B Train Primary Exhaust Fan	3HP	2.24	2.8	H-14-030002 SH3	12	Old VTP fan; no longer in-use	
AW241-VTP-EF-001	A Train Primary Exhaust Fan	3HP	2.24	2.8	H-14-030002 SH3	12	Old VTP fan; no longer in-use	
AW241-VTA-HTR-001	A Train Primary Exhaust Heater	10kW	10	10	H-14-030002 SH3	12	Old VTP HEPA heater; no longer in-use	
AW241-VTA-HTR-002	B Train Primary Exhaust Heater	10kW	10	10	H-14-030002 SH3	12	Old VTP HEPA heater; no longer in-use	
AW241-EDS-DP-130	Near HVAC Skid		104.36	130.5	RPP-8183 App. B Page 92	1	Will use twice this load to size the VTP load for WFD (4 mixer pumps similt).	
NA	Welding Recpt.	Unknown			H-14-030002 SH 3	12	No value found for this load	
NA	Auxiliary ICE Bldg Loads	Unknown			NA		ICE HVAC, computer station power, lights, etc...	

 = Loads not included in sum; see comment

Reasonable worst case simultaneous activities for each process step shown in red		AY/AZ-farm Electrical Loads (kVA)																Connected (kVA)	
		500	232	950	950	950	950	179	179	179	179	179	179	179	179	179	202	83	6252
No.	Major Process Step Description	HTR-01	AY/AZ VTP‡	AZ-101 MPs	AZ-102 MPs	AY-101 MPs	AY-102 MPs	AZ-101 DP	AZ-102 DP	AY-101 DP	AY-102 DP	AZ-101 SP	AZ-102 SP	AY-101 SP	AY-102 SP	Other Exist. Loads* (AY)	Other Exist. Loads* (AZ)	Comments	Peak Demand (kVA)
1	Mix sludge tank (e.g., AZ-102) for sample		116	950	950							179				202	83	Coincident with transfer from AZ-101. (Note: Alternatively, could transfer out of AY-10X).	2481
2	Pre-heat transfer line, just prior to transfer from sludge tank (e.g., AZ-102). Mixers running to mobilize/suspend sludge during pre-heat.	500	116	950	950								179			202	83	Coincident w/mixing in other sludge tank for sample or chemical adjustment (Note: Alternatively, could be mixing in AY-10X).	2981
3	Mix sludge tank (e.g., AZ-102) prior to transfer for solids mobilization & suspension.	500	116	950	950								179			202	83	Worst case loading is inverse of step 2.	2981
4	Transfer waste from a sludge tank (e.g., AZ-102)		116	950	950								179			202	83	Coincident with mixing for sample in AZ-101 (Note: Alternatively, could mix for sample in AY-10X).	2481
5	Post transfer flush (e.g., AZ-102)	500	116	950									179			202	83	Mixer pumps mobilizing sludge during hot water flush operation.	2031
6	Decant liquid from a sludge tank (e.g., AZ-101)		116		950			179					179			202	83	Coincident w/ mixer pumps mobilizing sludge for sample in other AY/AZ tank.	1710
7	De-gas Group A tank, (N/A) (Worst case: need hot water and mixer pump)		116													202	83		401
8	Adjust tank chemistry (i.e., dump NaOH, NaNO ₂ , or NaNO ₃); mix tank contents (e.g., AZ-102).		116	950	950							179				202	83	Coincident w/ mixer pumps mobilizing sludge for sample in other AY/AZ tank.	2481

2637 **

HTR = Heater
VTP = Ventilation Tank Primary
TP = Transfer Pump
MP = Mixer Pump
SP = Sludge Pump
DP = Decant Pump

 = Existing Loads
 = Existing Loads changed due to WFD needs
 = New Loads

‡ Assume AY/AZ VTP load is the same as AN-farm VTP load. This will be refined as AY/AZ VTP upgrade project matures.
* Other Existing Loads consists of 100% of current existing loads (see attached existing loads sheet) to allow room for additional "hotel" loads.
** Number calculated for RPP-5228, Table 2.2 from Max Peak Demand. Other Existing Loads replaced by meter data in RPP-5228 (not included here). VTP/2 included to account for increased vent load for WFD over that accounted for in meter data.

AY FARM LOADS FROM H-14 DRAWINGS -- 12/07/2010

Stand-Alone Loads								
Equip Number	Description	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
	Flood Light Pole #1	3 kW	3	3	H-14-030006 SH1	16		
	Flood Light Pole #2	3 kW	3	3	H-14-030006 SH1	16		
AY101-VTA-EF-001	Annulus Exh Fan	15 HP	20	25	H-14-030006 SH1	16		
AY101-VTA-HTR-003	Annulus Exh Htr	40 kW	40	40	H-14-030006 SH1	16		
AY102-VTA-EF-002	Annulus Exh Fan	15 HP	20	25	H-14-030006 SH1	16		
AY102-VTA-HTR-004	Annulus Exh Htr	40 kW	40	40	H-14-030006 SH1	16		
Subtotal			126	136				
Totals From Distribution Panels								
Equip Number	Location	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
AY241-EDS-DP-105	241-AY		14.66	18.3	H-14-030006 SH7	4		
AY801A-EDS-DP-101	241-AY-801A		23.64	29.6	H-14-030006 SH3	8		
AY101-EDS-DP-110	AY101 Annulus Vent Elec Rack		2.05	2.6	H-14-030006 SH9	1		
AY102-EDS-DP-111	AY102 Annulus Vent Elec Rack		1.25	1.6	H-14-030006 SH10	1		
AY241-EDS-DP-104	241-AY Near 241-AY-801A		11.55	14.4	H-14-030006 SH6	6	See ECN 726713 R0 (SHMS loads to be removed)	
Subtotal			53.15	66.4				
Grand Total			179.15	202.4				
Items not included								
Equip Number	Description	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
AY241-CATH-RCPT-101	Cathodic Protection Rectifier				H-14-030006 SH1	16	No load information	
AY241-CATH-RCPT-102	Cathodic Protection Rectifier				H-14-030006 SH1	16	No load information	
AY241-CATH-RCPT-103	Cathodic Protection Rectifier				H-14-030006 SH1	16	No load information	
AY801A-EDS-RCPT-121	Spare Annulus Pump				H-14-030006 SH1	16	Spare annulus pump	
AY801A-EDS-RCPT-201	RCPT				H-14-030006 SH1	16	No load information	
AY801A-EDS-RCPT-202	RCPT				H-14-030006 SH1	16	No load information	
AY801A-EDS-RCPT-203	RCPT				H-14-030006 SH1	16	No load information	
	Some TRLR and SHOP loads				H-2-824696 SH2	0	No load information	

AZ FARM LOADS FROM H-14 DRAWINGS -- 12/07/2010

Stand-Alone Loads								
Equip Number	Description	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
AZ151-WT-P-006	Catch Tank Pump	7.5 HP	10.9	13.625	H-14-030007 SH2	19		
Subtotal			10.9	13.625				
Totals From Distribution Panels								
Equip Number	Location	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
AZ801A-EDS-DP-104	241-AZ-801A		29.63	37.0	H-14-030007 SH10	11		
AZ801A-EDS-DP-123	241-AZ-801A		13.98	17.5	H-14-030007 SH30	7		
AZ801A-EDS-DP-129	241-AZ-801A		1.61	2.0	H-14-030007 SH37	1		
AZ241-EDS-DP-106	241-AZ-801A		10.2	12.8	H-14-030007 SH12	9		
Subtotal			55.42	69.3				
Grand Total			66.32	82.9				
Items not included								
Equip Number	Description	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
AZ801A-EDS-RCPT-101	Control Trailer RCPT				H-14-030007 SH1	19	No load information	
AZ801A-EDS-RCPT-102	Spare Pump RCPT				H-14-030007 SH1	19	No load information	
AZ801A-EDS-RCPT-120	Spare Transfer Pump				H-14-030007 SH2	19	Spare transfer pump	
AZ801A-EDS-RCPT-121	Spare Annulus Pump				H-14-030007 SH2	19	Spare annulus pump	
AZ241-EDS-BKR-138	Impact Wrench Station				H-14-030007 SH2	19		
AZ02A-EDS-RCPT-106	60A Welding RCPT				H-14-030007 SH2	19		

Reasonable worst case simultaneous activities for each process step shown in red		SY-farm Electrical Loads (kVA)													Connected (kVA)	
		500	500	325	232	475	950	950	179	179	179	179	179	286	5114	
No.	Major Process Step Description	HTR-01A	HTR-01B	Diluent HTR	SY VTP	SY-101 Mixer Pump†	SY-102 Mixer Pumps	SY-103 Mixer Pumps	SY-101 Transfer Pump	SY-102 Sludge Pump	SY-102 Decant Pump	SY-103 Sludge Pump	SY-103 Decant Pump	Other Exist. Loads*	Comments	Peak Demand (kVA)
1	Mix sludge tank (e.g., SY-102) for tank sample	500			116		950	950				179		286	Coincident with transfer from SY-103; hot water loadout to tanker truck.	2981
2	Pre-heat transfer line, just prior to transfer from sludge tank (e.g., SY-102).	500	500	325	116		950			179				286	Mixer pumps mobilizing sludge during pre-heat operation.	2856
3	Mix sludge tank (e.g., SY-102) prior to transfer for solids mobilization & suspension.	500	500	325	116		950			179				286	Worst case loading is inverse of step 2.	2856
4	Transfer waste from a sludge tank (e.g., SY-102)	500			116		950	950		179				286	Coincident with mixing for sample in SY-103; hot water loadout to tanker truck (inverse of step 1).	2981
5	Post transfer flush	500	500	325	116			950		179				286	Mixer pumps mobilizing sludge during hot water flush operation.	2856
6	Decant liquid from a sludge tank (e.g., SY-102)	500			116			950			179			286	Coincident w/ mixer pumps mobilizing sludge for sample; hot water loadout to tanker truck.	2031
7	Transfer waste from saltcake tank (e.g., SY-101)	500			116	475	950		179					286	Coincident w/ mixer pumps mobilizing sludge for sample; hot water loadout to tanker truck.	2506
8	Adjust tank chemistry (i.e., dump NaOH, NaNO ₂ , or NaNO ₃); mix tank contents (e.g., SY-102)	500			116		950	950						286	Coincident w/ mixer pumps mobilizing sludge for sample; hot water loadout to tanker truck.	2802

2512 **

HTR = Heater
VTP = Ventilation Tank Primary
TP = Transfer Pump
MP = Mixer Pump
SP = Sludge Pump
DP = Decant Pump

 = Existing Loads
 = Existing Loads changed due to WFD needs
 = New Loads

† Shown as a new load because mixer pump, SY01A-WST-P-001, is disconnected & tagged Out of Service.

* Other Existing Loads consists of 100% of current existing loads (see attached existing loads sheet) to allow room for additional "hotel" loads.

** Number calculated for RPP-5228, Table 2.2 from Max Peak Demand. Other Existing Loads replaced by meter data in RPP-5228 (not included here). VTP/2 included to account for increased vent load for WFD over that accounted for in meter data.

SY FARM LOADS FROM H-14 DRAWINGS -- 12/07/2010

Stand-Alone Loads								
Equip Number	Description	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
SY271-SA-CMP-001	Air Compressor	5 HP	4.8	6	H-14-030031 SH1	15		
SY241-VTA-EF-003	VTA Exhaust Fan	2 HP	2.7	3.375	H-14-030031 SH2	8		
Lights (#2,3,4)	Inside fence farm floodlights	15 kVA	9.6	12	H-14-030031 SH1	15	No exact load could be found so 80% of the transformer rating was used instead	
SY101-VTP-ENCL-101	Flow Instr. Encl.	4.8 kW	4.8	4.8	H-14-030031 SH4	4	Load estimated by assuming nearest fuse/breaker is sized to 125% of max current through line. Current was then multiplied by line voltage to get power	
SY101-WST-ENCL-102	TK101 Instr. Encl.	2.4 kW	2.4	2.4	H-14-030031 SH4	4	Load estimated by assuming nearest fuse/breaker is sized to 125% of max current through line. Current was then multiplied by line voltage to get power	
SY101-WST-ENCL-101	VDTT Encl.	2.4 kW	2.4	2.4	H-14-030031 SH4	4	Load estimated by assuming nearest fuse/breaker is sized to 125% of max current through line. Current was then multiplied by line voltage to get power	
Subtotal			26.7	30.975				
Totals From Distribution Panels								
Equip Number	Location	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
SY271-EDS-DP-100	241-SY-271		47	58.8	H-14-030031 SH7	13		
SY271-EDS-DP-105	241-SY		4.89	6.1	H-14-030031 SH12	8		
SY271-EDS-DP-106	SY241-SY B-TRAIN EXH.		7.5	9.4	H-14-030031 SH13	5	DP-106 shows aux loads for old VTP B-Train system. To account for possible increase in capacity of upgraded VTP system, the existing DP-106 load was increased by 25%	
SY271-EDS-DP-107	SY296-VTA-ENCL-900		1.45	1.8	H-14-030031 SH14	2		
SY271-EDS-DP-108	241-SY-271		31.3	39.1	H-14-030031 SH15	4		
SY271-EDS-DP-111	241-SY		58.3	72.9	H-14-030031 SH18	2		
SY271-EDS-DP-117	241-SY		20.76	26.0	H-14-030031 SH24	4		
DP-E-001	252-S		32.584	40.7	H-2-824456	3	Subtracted-out welding receptacles - electrically isolated per H-2-824456, Sht 3.	kVA estimated as kVA = kW/0.8, where 0.8 = p.f.
Subtotal			203.784	254.7				
Grand Total			230.484	285.7				
Items not included								
Equip Number	Description	Nominal Load	Load (kW)	Load (kVA)	Reference	Rev	Comments	Conversion Comments
SY02A-WT-P-002	SY-102 Supernatant Pump	25 HP	22.6	28.25	H-14-030031 SH1	15	Will be replaced by WFD load.	Based on 25 HP to kVA motor conversion per RPP-8185, Section 7.2.2
SY241-SHM-PNL-005	TK 101 SHM PNL	5.76 kW	5.76	7.2	H-14-030031 SH4	4	Current D&D project removing; plan for load being disconnected	
SY01A-SHM-PNL-005	TK 101 SHM PNL	5.76 kW	5.76	7.2	H-14-030031 SH4	4	Current D&D project removing; plan for load being disconnected	
SY101-WST-ENCL-103	TK101 mixer pump instr. Encl.	2.88 kW	2.88	3.6	H-14-030031 SH4	4	Load not in-use. Expect to be disconnected during WFD	Load estimated by assuming nearest fuse/breaker is sized to 125% of max current through line. Current was then multiplied by line voltage to get power
SY271-EDS-DP-112	241-SY-274		12.3	15.4	H-14-030031 SH19	7	Current D&D project removing; plan for load being disconnected (GMS-1)	
SY271-EDS-DP-113	241-SY-275		23.6	29.5	H-14-030031 SH20	5	Current D&D project removing; plan for load being disconnected (GMS-2)	
SY272-EDS-RCPT-104	Welding Recpt.	Unknown			H-14-030031 SH3	11	No value found for this load	
DP-E-002	Outside of 242-S Building	Unknown			H-2-46424 SH2	10	Current plans	
NA	Auxiliary ICE Bldg Loads	Unknown			NA		ICE HVAC, computer station power, lights, etc...	

■ = Loads not included in sum, see comments

Load	Conn Load (A)	Equip. Ref. No.	Calc'd kVA
Control Trailer	83.2	POR103-WT-TRLR-001	69
Raw Water Skid	78.6	POR132-RW-RWDD-001	65
Farm Lighting	133		111
Trailer	31.3	POR137-WT-TRLR-001	26
HPU (Sluice pump)	135	POR136-WT-HPU-001	112
Portable Exhauster	25	POR03	21
HPU (Sluicer)	36	POR170-WT-HPU-001	30
Mini Power Zone	14	POR124-WT-DP-002	12
Misc. Loads?	5	CR244-EDS-DP-101	4
Change Trailer MO-522	31		26
Misc. Loads	60	241C-EDS-MCC-001	50
HPU (Sluicer)	32	POR171-WT-HPU-001	27
Water Skid	32	POR172-WT-RWDD-001	27
Dist. Panel Loads	31	C241-EDS-DP-114	26
Mini Power Zone	15	POR125-WT-DP-002	12
HPU (Sluice pump)	135	POR173-WT-HPU-001	112
Portable Exhauster ?	50	POR213-Skid	42
Totals	927.1		771

Existing T, TX & TY loads currently split among transformers shown on H-2-2126, Sh 8, Rev. 46.

SST Retrieval Loads				
	Load (kVA)	No. of Loads in Simultaneous Operation†	Load Sum (kVA)	Comments
Sluice Pump	112	3	337	Worst case C-farm sluice pump
Sluicer	30	3	90	Worst case C-farm sluicer
Water Skid	65	3	196	Worst case C-farm water skid
Portable SST Exhauster	42	3	125	Worst case C-farm portable exhauster
Control Trailer	69	3	208	C-farm Control Trailer load
Farm Lighting	111	0	0	Run off existing farm transformers
Change Trailer	26	3	77	One for each farm. Assume not on existing farm transformer
MPZs & Misc Loads	104	3	312	Sum of C-farm MPZs & other misc. loads
Total	<u>559</u>		<u>1344</u>	

† RPP-PLAN-40145 allows for 3 simultaneous SST retrievals

WRF Loads				
	Load (kVA)	No. of Loads in Simultaneous Operation	Load Sum (kVA)	Comments
Lighting	111	1	111	Estimate same as C-farm lights; DST lighting estimates are substantially lower
Control Room	57	1	57	AZ-156 Building connected load
Other/Misc. Loads	277	1	277	Average of existing loads from each DST farm
Mixer pump	100	1	100	Assume 100 hP paddle mixer (adequate for 500 kgal tank per RPP-RPT-42527, Rev. 0)
Transfer pump	60	1	60	Assume 60 hP WFD pump adequate for xfers out of WRF
Supernatant Recirc Pump	60	3	180	Same as C-farm supernatant recirc pump
VTP	58	1	58	Same as AN-farm W-314 skid (conservative)
VTA	24	1	24	Same as AN-farm Annulus B-train (conservative)
Total	<u>747</u>		<u>868</u>	

Assume Same for B, BX & BY. Note existing loads currently split among transformers shown on H-2-2126, Sh 2, Rev. 96.

Existing S & SX loads currently split among transformers shown on H-2-2126, Sh 10, Rev. 50.

SST Retrieval Loads				
	Load (kVA)	No. of Loads in Simultaneous Operation†	Load Sum (kVA)	Comments
Sluice Pump	112	2	224	Worst case C-farm sluice pump
Sluicer	30	2	60	Worst case C-farm sluicer
Water Skid	65	2	131	Worst case C-farm water skid
Portable SST Exhauster	42	2	83	Worst case C-farm portable exhauster
Control Trailer	69	2	138	C-farm Control Trailer load
Farm Lighting	111	0	0	Run off existing farm transformers
Change Trailer	26	2	52	One for each farm. Assume not on existing farm transformer
MPZs & Misc Loads	104	2	208	Sum of C-farm MPZs & other misc. loads
Total	<u>559</u>		<u>896</u>	

† 2 simultaneous SST retrievals will occupy 2 of 3 available DST receivers.

Assume Same for A, AX. Note existing loads currently supplied from transformer shown on H-2-2126, Sh 7, Rev. 20.

Based on limited DST receivers available in West Area, assume 1 retrieval is taking place in U-farm => Demand is 559 kVA