ATTACHMENT 13

INSTRUMENT CALIBRATION

Attachment 13
Instrument Calibration

The attached table lists each instrument by its tag number, the parameter that it monitors, the type of instrument it is, the manufacturer, model number, and the minimum required frequency of calibration. In all cases, the minimum frequency of calibration will be at least that recommended by the manufacturer.

Each instrument will be calibrated according to the procedures recommended by the manufacturer. These written procedures will be maintained on-site. Each calibration will be documented on log sheets. Each log sheet will clearly identify the instrument being calibrated, the date of calibration and the signature of the person performing the calibration. It will include the settings/readings prior to any adjustments, any adjustments made to the instrument, and any other information recommended to be checked by the manufacturer for that particular instrument. Any unusual findings discovered as part of the calibration will also be noted on the calibration logs. If any problems need to be corrected or any repairs made to the instrument, a work order will be generated.

A separate maintenance file will be maintained for each instrument/monitor. The file shall contain all work, maintenance, calibration, testing, and inspection data as required for each instrument.

As part of the calibration of the tank level instruments, a check of the interlocks will also be performed. To perform the interlock checks, a signal representative of the level transmitter's output will be generated into the system. After the alarm threshold has been crossed, the interlocks should activate. If the proper response is not observed, work orders will be generated to correct all problems.

A check of the accuracy of the tank levels will also be performed as part of the calibration by comparing a manual measurement of the tank (stick the tank) to that indicated by the level instrument. These values will also be noted on the calibration logs.

The calibration of the high-high level switches on the tanks is actually a verification of their operability. With the automatic inlet valve to the tank manually isolated and opened, the level switch will be manually activated to prove mechanical operability of the level switch. If the proper response is not observed, work orders will be generated to correct all problems.

INSTRUMENT CALIBRATION SCHEDULE

TAG #	SYSTEM PARAMETER MEASURED	MONITOR TYPE	MANUFACTURER	MODEL NUMBER	REQUIRED CALIBRATION FREQUENCY
AT2104A	1st stage inlet pH	pH analyzer	Johnson Yokogawa or Quantum	EXAPH 402, EXAXT 450 or Q45P or PH4506	quarterly
AT2104B	1st stage inlet pH	pH analyzer	Johnson Yokogawa or Quantum	EXAPH 402, EXAXT 450 or Q45P or PH4506	quarterly
AT2129A	2nd stage rundown pH	pH analyzer	Johnson Yokogawa or Quantum	EXAPH 402 or Q45P or PH4506	quarterly
AT2129B	2nd stage rundown pH	pH analyzer	Johnson Yokogawa or Quantum	EXAPH 402, EXAXT 450 or Q45P or PH4506	quarterly
AT2130A	2nd stage inlet pH	pH analyzer	Johnson Yokogawa or Quantum	EXPHA 402, EXAXT 450 or Q45P or PH4506	quarterly
AT2130B	2nd stage inlet pH	pH analyzer	Johnson Yokogawa or Quantum	EXAPH 402, EXAXT 450 or Q45P or PH4506	quarterly
AT2199A	stack CO -- CEM A (low)	nondispersive infrared photometry	Servomex	4900	daily (see Attachment 15)
AT2199B	stack CO – CEM A (high)	nondispersive infrared photometry	Servomex	4900	daily (see Attachment 15)
AT2199C	stack CO – CEM B	nondispersive infrared photometry	Servomex	4900	daily (see Attachment 15)
AT2200A	stack O_2 -- CEM A	paramagnetic	Servomex	4900	daily (see Attachment 15)
AT2200B	stack O_2 -- CEM B	paramagnetic	Servomex	4900	daily (see Attachment 15)
AT1010A	ABC O_2 -- unit A	zirconia oxygen analyzer	Johnson-Yokogawa	ZA-8	monthly
AT1010B	ABC O_2 -- unit B	zirconia oxygen analyzer	Johnson-Yokogawa	ZA-8	monthly
AT2020A	baghouse broken bag	optical particle counter	BHA	CPM-700 or 750	annual
AT2020B	baghouse broken bag	optical particle counter	BHA	CPM-700 or 750	annual
AIT4016	bulk solids vent LEL	sample draw infrared	Scott Instruments or Buckeye	4600IR or BFT-44	monthly
AIT4017	shredder vent LEL	sample draw infrared	Scott Instruments or Buckeye	4600IR or BFT-44	monthly
AIT4018A	kiln comb. air LEL	sample draw infrared	Scott Instruments or Buckeye	4600IR or BFT-44	monthly
AIT4018B	kiln comb. air LEL	sample draw infrared	Scott Instruments or Buckeye	4600IR or BFT-44	monthly
AIT4018C	north ABC comb. air LEL	sample draw infrared	Scott Instruments or Buckeye	4600IR or BFT-44	monthly
AIT4018D	south ABC comb. air LEL	sample draw infrared	Scott Instruments or Buckeye	4600IR or BFT-44	monthly
AIT4089	Roberoller vent LEL	sample draw infrared	Scott Instruments or Buckeye	4600IR or BFT-44	monthly
AIT1020	A damper LEL	diffusion	Gastech or Buckeye	61-101 or BFT-44	monthly
AIT4051	T-403 vent LEL	sample draw infrared	Scott Instruments or Buckeye	4600IR or BFT-44	monthly
AIT4023	sludge T-406 vent LEL	sample draw infrared	Scott Instruments or Buckeye	4600IR or BFT-44	monthly
AT1122	cylinder station LEL	diffusion	Gastech or Buckeye	61-101 or BFT-44	monthly

TAG #	SYSTEM PARAMETER MEASURED	MONITOR TYPE	MANUFACTURER	MODEL NUMBER	REQUIRED CALIBRATION FREQUENCY
AT3013	drum direct burn glove box LEL	diffusion	Gastech or Buckeye	61-101 or BFT-44	monthly
AIT4019	sludge pit O_2	diffusion	Sensor Electronics or Buckeye	SEC 3000 or BFT-44	monthly
AIT4052	sludge pit LEL	diffusion	Gastech or Buckeye	61-101 or BFT-44	monthly
AIT4012A	repack LEL	sample draw infrared	Scott Instruments or Buckeye	4600IR or BFT-44	monthly
AIT4012B	repack room O_2	sample draw	Scott Instruments or Buckeye	4600 or BFT-44	monthly
AIT4012C	repack room HCN	sample draw	Scott Instruments or Buckeye	4600 or BFT-44	monthly
AIT4012D	repack room H_2S	sample draw	Scott Instruments or Buckeye	4600 or BFT-44	monthly
AIT4013A	decant room LEL	sample draw infrared	Scott Instruments or Buckeye	4600IR or BFT-44	monthly
AIT4013B	decant room O_2	sample draw	Scott Instruments or Buckeye	4600 or BFT-44	monthly
AIT4013C	decant room HCN	sample draw	Scott Instruments or Buckeye	4600 or BFT-44	monthly
AIT4013D	decant room H_2S	sample draw	Scott Instruments or Buckeye	4600 or BFT-44	monthly
AIT3387	corrosive waste HCN	sample draw	Scott/Bacharach or Buckeye	4600 or BFT-44	monthly
AIT3386	corrosive waste H_2S	sample draw	Scott/Bacharach or Buckeye	4600 or BFT-44	monthly
AIT3385	corrosive waste O_2	sample draw	Scott/Bacharach or Buckeye	4600 or BFT-44	monthly
AIT3384	corrosive waste LEL	sample draw infrared	Scott/Bacharach or Buckeye	4600IR or BFT-44	monthly
AIT3044B	hydrocarbon vent O_2	sample draw	Servomex	Servotough Oxy (1900)	semi-annual
AIT4073A	E-7 LEL	diffusion	Gastech or Buckeye	61-101 or BFT-44	monthly
AIT4073B	E-7 LEL	diffusion	Gastech or Buckeye	61-101 or BFT-44	monthly
FT2066A	Carbon Injection Train 1 Air Flow Rate	Orifice Plate / dP Cell	Viatran	IDP10	annual
FT2066B	Carbon Injection Train 3 Air Flow Rate	Orifice Plate / dP Cell	Viatran	IDP10	annual
WT2037A	Carbon Injection Train 1 Carbon Feed Rate	load cells	Thermo Ramsey	Micro-Tech 2000	quarterly
WT2037B	Carbon Injection Train 3 Carbon Feed Rate	load cells	Thermo Ramsey	Micro-Tech 2000	quarterly
FT1121	kiln blend flow rate	coriolis mass flow meter	Endress Hauser	ProMass 83	monthly
FT1131	kiln fuel oil flow rate	coriolis mass flow meter	Endress Hauser	ProMass 83	monthly
FT1151	kiln aqueous flow rate	coriolis mass flow meter	Micro Motion	DS1005128SU	monthly
FT1184	ABC north blend flow rate	coriolis mass flow meter	Endress Hauser	ProMass 83	monthly
FT1194	ABC north fuel oil flow rate	coriolis mass flow meter	Endress Hauser	ProMass 83	monthly
FT1221	ABC south blend flow rate	coriolis mass flow meter	Endress Hauser	ProMass 83	monthly

TAG #	SYSTEM PARAMETER MEASURED	MONITOR TYPE	MANUFACTURER	MODEL NUMBER	REQUIRED CALIBRATION FREQUENCY
FT1231	ABC south fuel oil flow rate	coriolis mass flow meter	Endress Hauser	ProMass 83	monthly
FT1253	ABC north aqueous flow rate	coriolis mass flow meter	Endress Hauser	ProMass 83	monthly
FT1263	ABC south aqueous flow rate	coriolis mass flow meter	Endress Hauser	ProMass 83	monthly
FT3018	drum direct burn flow rate	coriolis mass flow meter	Endress Hauser	ProMass 83	monthly
FT4042	sludge flow rate	coriolis mass flow meter	Endress Hauser	Pro Mass 63 I or 83	monthly
FT3366	corrosive waste flow rate	coriolis mass flow meter	Endress Hauser	ProMass 83	monthly
WT1035	flop gates weigh cells	load links	Mettler Toledo	JAGXTREME or AJB541M	quarterly
WT1102A	cylinder weight	load cells	Rice Lake	HP33-1K	monthly
WT1102B	lecture bottle weight	load cells	Rice Lake	BM1818-300	monthly
N/A	E-1 drum scales	load cells	Avery Weigh-Tronix	1310	annual
N/A	E-5 drum scales	load cells	Avery Weigh-Tronix	1310	annual
N/A	main truck scales	load cells	Avery Weigh-Tronix	1310	annual
N/A	E-2 drum scales	load cell	Rice Lake Weighing System	IQ-355-2A	annual
N/A	E-4 drum scales	load cell	Rice Lake Weighing System	IQ-355-2A	annual
FT1171	direct burn flow rate	coriolis mass flow meter	Endress Hauser	Pro Mass 83	monthly
FT2081A	saturator flow rate	magnetic flow converter	Yokogawa or Endress Hauser	AM11 Mag Flow Converter or Promag 50P	quarterly
FT2081B	saturator flow rate	magnetic flow converter	Yokogawa or Endress Hauser	AM11 Mag Flow Converter or Promag 50P	quarterly
FT2092A	1st stage flow rate	magnetic flow converter	Yokogawa or Endress Hauser	AM11 Mag Flow Converter or Promag 50P	quarterly
FT2092B	1st stage flow rate	magnetic flow converter	Yokogawa or Endress Hauser	AM11 Mag Flow Converter or Promag 50P	quarterly
FT2095A	2nd stage flow rate	magnetic flow converter	Yokogawa or Endress Hauser	AE14 Mag Flow Converter or Promag 50P	quarterly
FT2095B	2nd stage flow rate	magnetic flow converter	Yokogawa or Endress Hauser	AE14 Mag Flow Converter or Promag 50P	quarterly
FT2195	stack flow rate	annubar (Δp converted to flow rate)	Rosemount	3051	annual
FIT1143	kiln primary air flow rate	annubar (Δp converted to flow rate)	Rosemount	3051	annual
FIT1192	north ABC primary air flow rate	annubar (Δp converted to flow rate)	Rosemount	3051	annual
FIT1247	south ABC primary air flow rate	annubar (Δp converted to flow rate)	Rosemount	3051	annual
FIT1015	secondary air flow rate	annubar (Δp converted to flow rate)	Rosemount	3051	annual
FS4097	bulk solids vent flow	flow switch	Fluid Components International or K-TEK	FLT93S-1A1A106C1A00000 or TX/A1/S6/0750	annual
FT2201A	CEM sample flow rate	turbine flowmeter	Omega	FMA 1700/1800 series	annual
FT2201B	CEM sample flow rate	turbine flowmeter	Omega	FMA 1700/1800 series	annual

TAG #	SYSTEM PARAMETER MEASURED	MONITOR TYPE	MANUFACTURER	MODEL NUMBER	REQUIRED CALIBRATION FREQUENCY
LT3108	tank T301 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3118	tank T302 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3128	tank T303 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3138	tank T304 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3148	tank T305 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3158	tank T306 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3168	tank T307 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3178	tank T308 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3188	tank T309 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3198	tank T310 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3208	tank T311 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3218	tank T312 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3278	tank T321 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3288	tank T322 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3258	tank T323 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT3268	tank T324 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT4023	tank T406 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LT4030	tank T401 level	microwave level transmitter or radar gauge	CannonBear, Saabrosemount or Varec	1001/1220, RTG40 or 7200 Series	quarterly
LS3112	tank T301 high level	float switch	Madison	M4300	quarterly
LS3122	tank T302 high level	float switch	Madison	M4300	quarterly
LS3132	tank T303 high level	float switch	Madison	M4300	quarterly
LS3142	tank T304 high level	float switch	Madison	M4300	quarterly
LS3152	tank T305 high level	float switch	Madison	M4300	quarterly
LS3162	tank T306 high level	float switch	Madison	M4300	quarterly
LS3172	tank T307 high level	float switch	Madison	M4300	quarterly
LS3182	tank T308 high level	float switch	Madison	M4300	quarterly
LS3192	tank T309 high level	float switch	Madison	M4300	quarterly
LS3202	tank T310 high level	float switch	Madison	M4300	quarterly
LS3212	tank T311 high level	float switch	Madison	M4300	quarterly

TAG #	SYSTEM PARAMETER MEASURED	MONITOR TYPE	MANUFACTURER	MODEL NUMBER	REQUIRED CALIBRATION FREQUENCY
LS3222	tank T312 high level	float switch	Madison	M4300	quarterly
LS3282	tank T321 high level	float switch	Madison	M4300	quarterly
LS3292	tank T322 high level	float switch	Madison	M4300	quarterly
LS3262	tank T323 high level	float switch	Madison	M4300	quarterly
LS3272	tank T324 high level	float switch	Madison	M4300	quarterly
LS4031	tank T401 high level	level switch	Delta Mode 1	104-A-0-N78-1-14"-2" RF flg	quarterly
LS4008	tank T406 high level	float switch	Conery	2900 Series	quarterly
PIT1006A	combustion pressure	pressure transmitter	Rosemount	1151DP3	annual
PIT1006B	combustion pressure	pressure transmitter	Rosemount	1151DP3	annual
PIT1006C	combustion pressure	pressure transmitter	Rosemount	1151DP3	annual
PIT2020A	baghouse inlet pressure	pressure transmitter	Rosemount	1151DP3	annual
PIT2020B	baghouse outlet pressure	pressure transmitter	Rosemount	1151DP3	annual
PT2044	spray dryer top nozzle pressure	pressure transmitter	Rosemount	114G1200	annual
PT2045	spray dryer bottom nozzle pressure	pressure transmitter	Rosemount	114G1200	annual
PIT2093A	scrubber inlet pressure	pressure transmitter	Rosemount	1151DP3	annual
PIT2093B	scrubber outlet pressure	pressure transmitter	Rosemount	1151DP3	annual
PIT2093C	scrubber middle pressure	pressure transmitter	Rosemount	1151DP3	annual
PT1018	kiln combustion air pressure	pressure transmitter	Rosemount	1151DP3	annual
PSL1119A	kiln blend pressure switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PDSL1124	kiln atomizing air / blend Δp switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PSL1119B	north ABC blend pressure switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PSL1156	kiln aqueous atomizing air switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PSL1157	kiln aqueous pressure switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PDSL1187	north ABC atomizing air / blend Δp switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PSL1196	south ABC blend pressure switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PDSL1224	south ABC atomizing air / blend Δp switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual

TAG #	SYSTEM PARAMETER MEASURED	MONITOR TYPE	MANUFACTURER	MODEL NUMBER	REQUIRED CALIBRATION FREQUENCY
PSL1162	direct burn atomizing air pressure switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PSL1165B	north ABC aqueous pressure switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PSL1256	north ABC aqueous atomizing air switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PSL1165C	south ABC aqueous pressure switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PSL1266	south ABC aqueous atomizing air switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PSL1107	cylinder eductor N_2 pressure	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PSL1206	glove box eductor N_2 pressure	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
PSL3382	south ABC corrosive atomizing air switch	pressure switch	SOR Static O'Ring Control Devices or REO Temp or Ashcroft	44V1 or 4NX or LDDN4GGB25 or 4LG or 6NN	annual
ST1003	kiln speed	speed	Electro Sensor or Conveyor Components	SA420 or CMS-1G	annual
TT1005A	kiln temperature	infrared pyrometer	E^2 Technology Corp.	Pulsar III M7000SR	annual
TT1005B	kiln temperature	infrared pyrometer	E^2 Technology Corp.	Pulsar III M7000SR	annual
TT1005C*	kiln temperature	infrared pyrometer	E^2 Technology Corp.	Pulsar III M7000SR	annual
TT1009A	ABC temperature	temp transmitter/ type K thermocouple	Accutech	AI-2000 W/XP-HDC2-L	annual
TT1009B	ABC temperature	temp transmitter/Type K thermocouple	Accutech	AI-2000 W/XP-HDC2-L	annual
TT1009C	ABC temperature	temp transmitter/Type K thermocouple	Accutech	AI-2000 W/XP-HDC2-L	annual
TT2001A	spray dryer temp	temp transmitter/Type J thermocouple	Accutech	AI-2000 W/XP-HDC2-L	annual
TT2001B	spray dryer temp	temp transmitter/Type J thermocouple	Accutech	AI-2000 W/XP-HDC2-L	annual
TT2001C	spray dryer temp	temp transmitter/Type J thermocouple	Accutech	AI-2000 W/XP-HDC2-L	annual
TT2082A	saturator temp	temp transmitter/Type J thermocouple	Accutech	AI-2000 W/XP-HDC2-L	annual
TT2082B	saturator temp	temp transmitter/Type J thermocouple	Accutech	AI-2000 W/XP-HDC2-L	annual
TT2082C	saturator temp	temp transmitter/Type J thermocouple	Accutech	AI-2000 W/XP-HDC2-L	annual
TT2194	stack temperature	temp transmitter/Type J thermocouple	Accutech	AI-2000 W/XP-HDC2-L	annual

*Kiln pyrometer TT1005C is not currently being used to monitor kiln temperature and demonstrate compliance with permit limits. If the Permittee decides to place TT1005C into use, the pyrometer will be calibrated as required by this attachment.