

**APPENDIX II**

**CONTINUOUS MONITORING SYSTEM  
PERFORMANCE EVALUATION TEST PLAN (CMS PETP)**

<b>MOMENTIVE™</b>	<b>Waterford Maintenance Work Instruction</b>				
	<b>Instrument Transmitter Inspection, Verification, and Calibration Appendix B</b>				<b>WMWI 304B</b>
	<b>Version</b>	<b>1.2</b>	<b>Valid from</b>	<b>10/23/2014</b>	<b>Page 1 of 29</b>

## **Instrument Transmitter Inspection, Verification, and Calibration Appendix B**

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## Document Approval

Document approval shall be in accordance with Waterford Maintenance Standard Operating Procedure for Document Creation and Control, WMSOP 1.

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## Revision Log

Revisions to the Waterford Maintenance Instrument Inspection, Verification, and Calibration Work Instruction shall be described in the table below.

<b>Description of Change</b>	<b>Who requested change?</b>	<b>Revision with change</b>
Initial standardized version.	Jim Beamish	1.0
Updated for switch from Vignette to SharePoint.	Jim McKeon	1.1
Updated for MOC 2014-963410-0004. Addition of river water pressure transmitters to RKI and FB.	Jim McKeon	1.2

## Purpose

The purpose of this work instruction appendix is to provide instrument specific information for the Waste Treatment Plant for completion of instrument transmitter inspection, verification, and calibration. This information in this appendix is only for the Rotary Kiln Incinerator (RKI) and Fixed Box Incinerator (FB). Any instrument specific information for other Waste Treatment Plant instruments can be found in Appendix C.

## Notes

This appendix includes weekly/monthly (periodic) and annual (comprehensive) requirements for Rotary Kiln Incinerator (RKI) and Fixed Box Incinerator (FB) instruments.

A comprehensive inspection, verification, and calibration must be completed if any of those instruments is physically removed from the process for bench testing, vendor calibration, during maintenance work, for short term storage during periods when an incineration system is not in use, etc.

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## RKI Waste Feed Mass Flow Meters

### Devices

Equipment Number	Instrument Tag	Description
WA900603	FT-963168	Main Burner Fuel Oil/NPS flow rate
WA900604	FT-963206	Lance Fuel Oil/NPS flow rate
WA900628	FT-963800	APS flow rate
WA900605	FT-963163	Siloxane/Miscellaneous flow rate
WA900606	FT-963164	Acetyl Chloride flow rate
WA900601	FT-963161	T-61 Slurry flow rate
WA900602	FT-963162	T-62 Slurry flow rate
WA900600	FT-963165	Silanes flow rate

Accuracy requirement is 1.0% for all mass flow meters except FT-963165

Accuracy requirement is 2.0% for FT-963165

Monthly calibration requirements

- Zero check

Yearly calibration requirements

- Removal and internal inspection
- Vendor calibration or three point verification vs. a certified meter
- Zero check
- Three point verification using simulator at transmitter

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## RKI SCC Temperatures

Devices

Equipment Number	Instrument Tag	Description
WA900622	TT-963125	Upper secondary combustion chamber
WA900623	TT-963126	Lower secondary combustion chamber

Accuracy requirement is 0.50%

Monthly calibration requirements

- Verify current process reading
- Five point verification using simulator at transmitter

Yearly calibration requirements

- Replace thermocouple
- Verify current process reading
- Five point verification using simulator at transmitter

## RKI Stack Flow Rate

Devices

Equipment Number	Instrument Tag	Description
WA900629	FT-963211	Stack flow rate

Accuracy requirement is 1.0%

Monthly calibration requirements

- Clear annubar
- Five point verification

Yearly calibration requirements

- Vendor RATA calibration, Accuracy is per regulatory standard

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## **RKI Stack Flow Temperature**

Devices

Equipment Number	Instrument Tag	Description
WA963211	TT-963211	Stack flow temperature

Accuracy requirement is 0.50%

Monthly calibration requirements

- Verify current process reading
- Five point verification using simulator at transmitter

Yearly calibration requirements

- Vendor RATA calibration, Accuracy is per regulatory standard

## **RKI Quench Exit Temperature**

Devices

Equipment Number	Instrument Tag	Description
WA900620	TT-963136	Quench exit temperature

Accuracy requirement is 0.50%

Monthly calibration requirements

- Verify current process reading
- Five point verification using simulator at transmitter

Yearly calibration requirements

- Five point verification

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## RKI Counter Current Scrubber Flow Rate

Devices

Equipment Number	Instrument Tag	Description
WA900624	FT-963190	Counter current scrubber flow rate

Accuracy requirement is 1.0%

Monthly calibration requirements

- Five point verification

Yearly calibration requirements

- Remove and inspect orifice
- Five point verification

## RKI Counter Current Scrubber Differential Pressure

Devices

Equipment Number	Instrument Tag	Description
WA900772	PDT-963250	Counter current scrubber differential pressure

Accuracy requirement is 1.0%

Monthly calibration requirements

- Three point verification

Yearly calibration requirements

- Remove and inspect
- Three point verification

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## RKI IWS Voltage

### Devices

Equipment Number	Instrument Tag	Description
WA900667	EI-963254	IWS 1A voltage
WA900669	EI-963255	IWS 1B voltage
WA900281	EI-963256	IWS 1C voltage
WA900668	EI-963251	IWS 2A voltage
WA900670	EI-963252	IWS 2B voltage
WA900280	EI-963253	IWS 2C voltage

Accuracy requirement is 1.0%

Monthly calibration requirements

- Zero check

Yearly calibration requirements

- Five point verification using simulator at voltage divider

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## RKI IWS Current

### Devices

Equipment Number	Instrument Tag	Description
WA963254	II-963254	IWS 1A current
WA963255	II-963255	IWS 1B current
WA963256	II-963256	IWS 1C current
WA963251	II-963251	IWS 2A current
WA963252	II-963252	IWS 2B current
WA963253	II-963253	IWS 2C current

Accuracy requirement is 1.0%

Monthly calibration requirements

- Zero check

Yearly calibration requirements

- Five point verification using simulator at voltage divider

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## RKI IWS Total Make-Up Flow

### Devices

Equipment Number	Instrument Tag	Description
WA900607	FT-963191	IWS 1A make-up water flow
WA900608	FT-963193	IWS 1B make-up water flow
WA900829	FT-963225	IWS 1C make-up water flow
WA900609	FT-963195	IWS 2A make-up water flow
WA900610	FT-963691	IWS 2B make-up water flow
WA900828	FT-963215	IWS 2C make-up water flow

Accuracy requirement is 1.0%

Monthly calibration requirements

- Five point verification

Yearly calibration requirements

- Remove and inspect orifice plate
- Five point verification

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## **RKI IWS Crossflow Scrubber Flow**

Devices

Equipment Number	Instrument Tag	Description
WA907701	FT-960005	IWS 1A crossflow scrubber water flow
WA907702	FT-960006	IWS 1B crossflow scrubber water flow
WA907703	FT-960007	IWS 1C crossflow scrubber water flow
WA907704	FT-960008	IWS 2A crossflow scrubber water flow
WA907705	FT-960009	IWS 2B crossflow scrubber water flow
WA907706	FT-960010	IWS 2C crossflow scrubber water flow

Accuracy requirement is 1.0%

Monthly calibration requirements

- Zero check

Yearly calibration requirements

- Remove, inspect, and clean
- Zero check
- Three point verification using simulator at transmitter

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## **RKI IWS Crossflow Scrubber pH**

### Devices

Equipment Number	Instrument Tag	Description
WA901162	AIT-960001	IWS 1A crossflow scrubber pH
WA901164	AIT-960002	IWS 1B crossflow scrubber pH
WA901163	AIT-960003	IWS 2A crossflow scrubber pH
WA901165	AIT-960004	IWS 2B crossflow scrubber pH

Accuracy requirement is 0.1 pH units

#### Weekly calibration requirements

- 2 point verification at 7.0 and 10.0

#### Yearly calibration requirements

- 2 point verification at 7.0 and 10.0
- Check at 4.0

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## RKI Instrument Air Pressure

### Devices

Equipment Number	Instrument Tag	Description
WA900255	PT-963318	Instrument air header pressure
WA962109	PT-963811	Atomization air header pressure

Accuracy requirement is 1.0%

Monthly calibration requirements

- Five point verification

Yearly calibration requirements

- Five point verification

## RKI SCC Pressure

### Devices

Equipment Number	Instrument Tag	Description
WA900618	PT-963394	Secondary combustion chamber pressure

Accuracy requirement is 1.0%

Monthly calibration requirements

- Three point verification

Yearly calibration requirements

- Three point verification

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## RKI Steam Atomization Pressure

### Devices

Equipment Number	Instrument Tag	Description
WA900256	PT-963377	Steam atomization header pressure

Accuracy requirement is 1.0%

### Monthly calibration requirements

- Five point verification

### Yearly calibration requirements

- Remove and inspect
- Five point verification

## RKI Quench Tower Flow Rate

### Devices

Equipment Number	Instrument Tag	Description
WA900616	FT-963210	Quench tower flow rate

Accuracy requirement is 1.0%

### Monthly calibration requirements

- **DO NOT STOP WATER FLOW** or equipment damage will result
- Verify current process flow

### Yearly calibration requirements

- Remove, inspect, and clean
- Zero check
- Three point verification using simulator at transmitter

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## **RKI Counter Current Scrubber River Water Pressure**

Devices

Equipment Number	Instrument Tag	Description
WA963909	PT-963909	Counter current scrubber river water

Accuracy requirement is 1.0%

Yearly calibration requirements

- Remove and inspect
- Five point verification

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## FB Waste Feed Mass Flow Meters

### Devices

Equipment Number	Instrument Tag	Description
WA901465	FT-907116	Fuel Oil/NPS flow rate
WA900363	FT-907124	APS flow rate
WA901485	FT-907151	Silane/Siloxane flow rate
WA900673	FT-907126	Acetyl Chloride/Miscellaneous flow rate
WA900636	FT-907131	Slurry flow rate
WA907132	FT-907132	Slurry flow rate (backup)

Accuracy requirement is 1.0% for all mass flow meters except FT-907126, FT-907131, and FT-907132

Accuracy requirement is 2.0% for FT-907126, FT-907131, and FT-907132

### Monthly calibration requirements

- Zero check
- Note:
  - If the Fixed Box incinerator is not in operation, the monthly checks are not required. However, all instruments in this section must be checked at least once every three months regardless of whether the incinerator is in operation.
  - The fuel oil/NPS meter must be checked every month regardless of whether the incinerator is in operation.

### Yearly calibration requirements

- Removal and internal inspection
- Vendor calibration or three point verification vs. a certified meter
- Zero check
- Three point verification using simulator at transmitter

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## FB Steam Atomization Pressure

### Devices

Equipment Number	Instrument Tag	Description
WA901461	PT-907081	Steam atomization pressure

Accuracy requirement is 1.0%

### Monthly calibration requirements

- Five point verification
- Note:
  - If the Fixed Box incinerator is not in operation, the monthly checks are not required. However, all instruments in this section must be checked at least once every three months regardless of whether the incinerator is in operation.

### Yearly calibration requirements

- Remove and inspect
- Five point verification

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## FB Instrument Air Pressure

### Devices

Equipment Number	Instrument Tag	Description
WA901460	PT-907080	Instrument air header pressure
WA907143	PT-907143	Instrument air atomization header pressure

Accuracy requirement is 1.0%

### Monthly calibration requirements

- Five point verification
- Note:
  - If the Fixed Box incinerator is not in operation, the monthly checks are not required. However, all instruments in this section must be checked at least once every three months regardless of whether the incinerator is in operation.

### Yearly calibration requirements

- Five point verification

## FB Combustion Chamber Pressure

### Devices

Equipment Number	Instrument Tag	Description
WA900643	PT-907077	Combustion chamber pressure

Accuracy requirement is 1.0%

### Monthly calibration requirements

- Three point verification

### Yearly calibration requirements

- Three point verification

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## FB Combustion Chamber Temperatures

### Devices

Equipment Number	Instrument Tag	Description
WA900647	TT-907066	Combustion chamber temperature
WA901456	TT-907067	Combustion chamber temperature (backup)

Accuracy requirement is 0.50%

#### Monthly calibration requirements

- Verify current process reading
- Five point verification using simulator at transmitter

#### Yearly calibration requirements

- Replace thermocouple
- Verify current process reading
- Five point verification using simulator at transmitter

## FB Stack Flow Rate

### Devices

Equipment Number	Instrument Tag	Description
WA900671	FT-907315	Stack flow rate #1
WA900672	FT-907015	Stack flow rate #2

Accuracy requirement is 1.0%

#### Monthly calibration requirements

- Five point verification

#### Yearly calibration requirements

- Vendor RATA calibration, Accuracy is per regulatory standard

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## FB Stack Flow Temperature

### Devices

Equipment Number	Instrument Tag	Description
WA943315	TT-907315	Stack flow temperature #1
WA943015	TT-907015	Stack flow temperature #2

Accuracy requirement is 0.50%

#### Monthly calibration requirements

- Verify current process reading
- Five point verification using simulator at transmitter

#### Yearly calibration requirements

- Vendor RATA calibration, Accuracy is per regulatory standard

## FB Quench Exit Temperature

### Devices

Equipment Number	Instrument Tag	Description
WA900650	TT-907065	Quench exit temperature

Accuracy requirement is 0.50%

#### Monthly calibration requirements

- Verify current process reading
- Five point verification using simulator at transmitter

#### Yearly calibration requirements

- Replace thermocouple
- Verify current process reading
- Five point verification using simulator at transmitter

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## FB Quench Tower Flow Rate

Devices

Equipment Number	Instrument Tag	Description
WA901415	FT-907013	Quench tower flow rate

Accuracy requirement is 1.0%

Monthly calibration requirements

- **DO NOT STOP WATER FLOW** or equipment damage will result
- Verify current process flow
- Note:
  - If the Fixed Box incinerator is not in operation, the monthly checks are not required. However, all instruments in this section must be checked at least once every three months regardless of whether the incinerator is in operation.

Yearly calibration requirements

- Remove, inspect, and clean
- Zero check
- Three point verification using simulator at transmitter

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## **FB Counter Current Scrubber Flow Rate**

### Devices

Equipment Number	Instrument Tag	Description
WA901414	FT-907312	Counter current scrubber #1 flow rate
WA901413	FT-907012	Counter current scrubber #2 flow rate

Accuracy requirement is 1.0%

### Monthly calibration requirements

- Zero check
- Note:
  - If the Fixed Box incinerator is not in operation, the monthly checks are not required. However, all instruments in this section must be checked at least once every three months regardless of whether the incinerator is in operation.

### Yearly calibration requirements

- Remove, inspect, and clean
- Zero check

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## **FB Counter Current Scrubber Differential Pressure**

### Devices

Equipment Number	Instrument Tag	Description
WA900274	PDT-907335	Counter current scrubber #1 differential pressure
WA900644	PDT-907035	Counter current scrubber #2 differential pressure

Accuracy requirement is 1.0%

### Monthly calibration requirements

- Three point verification
- Note:
  - If the Fixed Box incinerator is not in operation, the monthly checks are not required. However, all instruments in this section must be checked at least once every three months regardless of whether the incinerator is in operation.

### Yearly calibration requirements

- Remove and inspect
- Three point verification

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## FB IWS pH

### Devices

Equipment Number	Instrument Tag	Description
WA907047	AT-907305	IWS 1-1 pH
WA907048	AT-907306	IWS 1-2 pH
WA907049	AT-907307	IWS 2-1 pH
WA907050	AT-907308	IWS 2-2 pH

Accuracy requirement is 0.1 pH units

### Weekly calibration requirements

- 2 point verification at 7.0 and 10.0
- Note:
  - If the Fixed Box incinerator is not in operation, the monthly checks are not required. However, all instruments in this section must be checked at least once every three months regardless of whether the incinerator is in operation.

### Yearly calibration requirements

- 2 point verification at 7.0 and 10.0
- Check at 4.0

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## FB IWS Voltage

### Devices

Equipment Number	Instrument Tag	Description
WA901442	EI-907341	IWS 1-1 voltage
WA901444	EI-907351	IWS 1-1 voltage
WA901446	EI-907041	IWS 2-1 voltage
WA901448	EI-907051	IWS 2-2 voltage

Accuracy requirement is 1.0%

### Monthly calibration requirements

- Zero check
- Note:
  - If the Fixed Box incinerator is not in operation, the monthly checks are not required. However, all instruments in this section must be checked at least once every three months regardless of whether the incinerator is in operation.

### Yearly calibration requirements

- Five point verification using simulator at voltage divider

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## FB IWS Current

### Devices

Equipment Number	Instrument Tag	Description
WA905240	II-907340	IWS 1-1 current
WA907450	II-907350	IWS 1-2 current
WA907240	II-907040	IWS 2-1 current
WA907150	II-907050	IWS 2-2 current

Accuracy requirement is 1.0%

### Monthly calibration requirements

- Zero check
- Note:
  - If the Fixed Box incinerator is not in operation, the monthly checks are not required. However, all instruments in this section must be checked at least once every three months regardless of whether the incinerator is in operation.

### Yearly calibration requirements

- Five point verification using simulator at voltage divider

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	<b>Version</b>	<b>1.2</b>	<b>Valid from</b>	<b>10/23/2014</b>

## FB Crossflow Scrubber Flow

### Devices

Equipment Number	Instrument Tag	Description
WA907051	FT-907301	Crossflow scrubber 1-1 water flow
WA907052	FT-907302	Crossflow scrubber 1-2 water flow
WA907053	FT-907001	Crossflow scrubber 2-1 water flow
WA907054	FT-907002	Crossflow scrubber 2-2 water flow

Accuracy requirement is 1.0%

### Monthly calibration requirements

- Zero check
- Note:
  - If the Fixed Box incinerator is not in operation, the monthly checks are not required. However, all instruments in this section must be checked at least once every three months regardless of whether the incinerator is in operation.

### Yearly calibration requirements

- Remove, inspect, and clean
- Zero check
- Three point verification using simulator at transmitter

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## FB IWS Plate Flow

### Devices

Equipment Number	Instrument Tag	Description
WA900641	FT-907310	IWS 1-1 plate water flow
WA901412	FT-907311	IWS 1-2 plate water flow
WA901410	FT-907010	IWS 2-1 plate water flow
WA901411	FT-907011	IWS 2-2 plate water flow

Accuracy requirement is 1.0%

### Monthly calibration requirements

- Zero check
- Note:
  - If the Fixed Box incinerator is not in operation, the monthly checks are not required. However, all instruments in this section must be checked at least once every three months regardless of whether the incinerator is in operation.

### Yearly calibration requirements

- Remove, inspect, and clean
- Zero check
- Three point verification using simulator at transmitter

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## **FB Counter Current Scrubber River Water Pressure**

### Devices

Equipment Number	Instrument Tag	Description
WA907396	PT-907387	Counter current scrubber #1 river water
WA907087	PT-907087	Counter current scrubber #2 river water

Accuracy requirement is 1.0%

Yearly calibration requirements

- Remove and inspect
- Five point verification

**INSTRUMENT CALIBRATION FORM**

Instrument Transmitter Inspection, Verification, and Calibration Form					<b>WMWI 304F1</b>
<b>MOMENTIVE™</b>	Version	1.0	Valid from	9/20/2012	Page 1 of 1

Work Order Number:	SAP Equipment Number:
Instrument Number:	Service:
Transmitter Manufacturer:	Transmitter Model:
Calibrated Span:	Maximum Span:
Sensor Manufacturer:	Sensor Model:

Visual Inspection: Acceptable <input type="checkbox"/> Unacceptable <input type="checkbox"/>
Current Process Reading (include units): _____ As expected <input type="checkbox"/> Unacceptable <input type="checkbox"/>
Notes:

Span (include units): _____	Calibrated Span <input type="checkbox"/>	Maximum Span <input type="checkbox"/>
Accuracy Requirement: _____ %	Tolerance (include units): +/- _____	
Number of Test Points: 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>		

Input Test Equipment Number: _____				Transmitter Test Equipment Number: _____					
Input		Transmitter As Found		Transmitter As Left		Display As Found		Display As Left	
Value	Units	Value	Units	Value	Units	Value	Units	Value	Units

Test Equipment Type/Description	Test Equipment SAP Number	Test Equipment Calibration Due Date

Notes:

Performed By	Name / Signature:	Date:
Team Leader Approval	Name / Signature:	Date:

## **RKI INSTRUMENTATION LIST**