**SCADA\_PRC\_OVERFLOW**

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| **Version** | **Release Notes** |
| 1.0 | Initial Release |

**Description**: This is intended to be used in either of the following scenarios: the overflow flow rate through a pipe is calculated based on the level of the wet well, or when reporting on overflow events is required for regulatory purposes.

**Naming Conventions**: It is recommended that this UDT be named in the format of BXX\_OVF1\_TL1 if the reporting interface is used, or BXXOVF1FX1 if only the virtual flow calculation is used. The use of BXX\_OVF1\_FI1 or similar should be reserved for the virtual analog driver or a real overflow instrument. See the programming examples section for integrating data from this UDT with an analog AOI.

**UDT Members**

| **UDT Member** | **Datatype** | **Description** | **Usage** |
| --- | --- | --- | --- |
| ADDON | Virtual\_Overflow\_v1\_1 | Calculation of flow rate using Manning Formula | Use within Overflow Device AOI |
| REPORT | Overvlow\_Report\_v1 | Overflow Event Report AOI | Use within Overflow Device AOI |
| ST | SCADA\_SYS\_DATE\_1\_0 | Overflow Start Timestamp | Used with Reporting AOI |
| SP | SCADA\_SYS\_DATE\_1\_0 | Overflow End Timestamp | Used with Reporting AOI |
| AI\_BE | DINT | Total Overflow Events | Used with Reporting AOI |
| AI\_TM | DINT | Total Overflow Duration | Used with Reporting AOI |
| AI\_CV | REAL | Total Overflow | Used with Reporting AOI |
| AO\_TS | REAL | Overflow Event Start Setpoint | Used with Reporting AOI |
| AO\_PS | REAL | Overflow Event End Setpoint | Used with Reporting AOI |
| AI\_EM | REAL | Elevation of the 4 mA wet well level reading | Used with Virtual Overflow AOI |
| AI\_EU | REAL | Elevation of the 20 mA wet well level reading | Used with Virtual Overflow AOI |
| PB\_RS | BOOL | Report Reset Pushbutton | Used with Reporting AOI |
| DI\_SS | BOOL | Overflow Report Available | Used with Reporting AOI |
| DA\_SS | BOOL | Overflow Event Alarm | Used with Reporting AOI |

**AOI**

These AOIs should be deployed within the Overflow device routine. The parameters for the virtual overflow AOI are listed in the table below.

| **AOI Parameter** | **Requirement** | **Default Value** | **Description** | **Implementation Guideline** |
| --- | --- | --- | --- | --- |
| Virtual\_Overflow\_v1\_1 | Mandatory | *Tagname*.ADDON | Virtual Overflow AOI | N/A |
| WetWell\_Level\_Scan | Mandatory | N/A | Level Transmitter on Scan | Programmer is to use the .DI\_SC member of the level transmitter tag that will be used in the flow rate calculation here |
| Wet\_Well\_Level\_in\_Percent | Mandatory | N/A | Level in Percent | Programmer to use value from the level transmitter that will be used in the flow rate calculation |
| WetWell\_Level\_MinSpan | Mandatory | N/A | Wet Well level 4 mA value in metres | Programmer to use value from the level transmitter that will be used in the flow rate calculation |
| WetWell\_Level\_MaxSpan | Mandatory | N/A | Wet Well level 20 mA value in metres | Programmer to use value from the level transmitter that will be used in the flow rate calculation |
| WetWell\_Level\_Offset | Mandatory | N/A | Offset of wet well level transmitter in metres | This value should normally be the same as WetWell\_Level\_MinSpan. Otherwise the value here should be set so that the level reading in metres is measured from the same baseline as the overflow invert height |
| Overflow\_Invert\_Height | Mandatory | N/A | Height of the overflow pipe invert | Programmer to hard code to elevation of overflow pipe invert |
| Overflow\_Pipe\_Radius | Mandatory | N/A | Radius of the overflow pipe | Programmer to hard code to radius of overflow pipe |
| n\_Coefficient | Mandatory | N/A | Roughness of the overflow pipe | Programmer to hard code value provided by Halton Region |
| Bed\_Slope | Mandatory | N/A | Slope of the overflow pipe | Programmer to hard code value provided by Halton Region |
| Overflow\_Rate | Mandatory | BXXOVF1FI1.ADDON.Raw | Overflow Flow Rate in m3/s | It is recommended to feed this into an analog AOI for alarm evaluation. See Programming Examples. |

The parameters for the overflow report AOI are listed below.

| **AOI Parameter** | **Requirement** | **Default Value** | **Description** | **Implementation Guideline** |
| --- | --- | --- | --- | --- |
| Overflow\_Report\_v1 | Mandatory | *Tagname*.REPORT | Overflow Report AOI | N/A |
| Overflow\_Rate | Mandatory | Associate with appropriate overflow flow rate | Overflow Flow Rate | N/A |
| Division\_Factor | Optional | 1000 | Overflow Totalizer Division Factor | Set to an appropriate factor to yield a totalized volume in m3. Assumption is overflow rate is in L/s |
| Overflow\_Rate\_On\_Scan | Mandatory | Associate with an appropriate on scan tag for overflow flow rate | Overflow Flow Rate Device On Scan | If Overflow\_Rate is associated with an Analog AOI, then map the DI\_SC tag here. Otherwise hard code to 1 or use the DI\_SC tag from the wet well level transmitter if the flow rate is derived from the Virtual\_Overflow AOI |
| Event\_Start\_SP | Mandatory | *Tagname*.AO\_TS | Flow rate above which overflow event starts | N/A |
| Event\_End\_SP | Mandatory | *Tagname*.AO\_PS | Flow rate below which overflow event ends | N/A |
| Overflow\_Alarm | Mandatory | *Tagname*.DA\_SS | Overflow Event in Progress | N/A |
| Overflow\_Event | Mandatory | *Tagname*.DI\_SS | An Overflow Report is Available due to an Overflow Event | N/A |
| Overflow\_Start\_Date | Mandatory | *Tagname*.ST | Start Of First Overflow Event | N/A |
| Overflow\_End\_Date | Mandatory | *Tagname*.SP | End of Most Recent Overflow Event | N/A |
| Total\_Overflow\_Events | Mandatory | *Tagname*.AI\_BE | Total Number of Overflow Events in Current Report | N/A |
| Total\_Overflow\_Duration | Mandatory | *Tagname*.AI\_TM | Total Duration of Overflow between Start and End Timestamps | N/A |
| Overflow\_Total | Mandatory | *Tagname*.AI\_CV | Total Overflow in m3 | N/A |
| Report\_Reset | Mandatory | *Tagname*.PB\_RS | Reset Overflow Report | N/A |
| DateTime | Mandatory | SYS\_Calendar\_This | Current date and time for event timestamping | N/A |

**Typical AOI Operation Description**

The Overflow Report AOI implements the Manning Formula to calculate the rate of flow through a pipe based on how “full” of water the pipe is. The “fullness” of the pipe is estimated by comparing the level of the wet well to the elevation of the overflow pipe invert and the overall diameter of the pipe. There are four different scenarios under which the flow is calculated; the wet well level is below the invert height, the level is above the invert height but less than the pipe radius, the level is greater than the invert height plus pipe radius, and the level is above the invert height and pipe diameter. Once calculation scenario has been determined the relevant geometric parameters can be calculated for use in the Manning Formula, which yields a flow output in m3/s.

The Overflow report AOI monitors the overflow flow rate for overflow events and collects relevant data for the event. An Overflow Alarm is triggered when the overflow rate exceeds the start setpoint and remains active until the flow drops below the stop setpoint. While the overflow alarm is active the event counter is incremented by one and the duration and total flow is calculated.

On the first occurrence of an overflow alarm an overflow event is sealed in, indicating that overflow report data is available. The start time of the report is the occurrence of the first overflow event, and the end time is the time at which the most recent overflow alarm went to the out of alarm state. The end time, duration, and flow total will continue to be updated as additional overflow events occur until the report is manually reset from the HMI.

**Programming Examples**

Both AOIs should be deployed in an overflow device routine. The output from the virtual overflow AOI should be used as the raw input to an analog device AOI, where the flow can be scaled from m3/s to L/s for display on the HMI, and for triggering any associated alarms. The scaled CV output from this Analog AOI should then be fed into the overflow report AOI, as the overflow report requires a flow in L/s for the totalizer to totalize correctly in m3.

If a real flow instrument is installed on the overflow pipe the virtual flow meter can be disregarded, and the scaled CV from the analog device can be used directly in the overflow report.

**HMI Integration**

This AOI is intended for use with the “SPS Overflow Report v1\_0” pop-up.

A standard button exists on the “Symbols Library – Misc I” window on the InTouch baseload that holds the action script for mapping tags to the pop-up. Developers can perform a Substitute Tag option on this object to replace the placeholder tags with the correct device tagging. Programmers must manually configure the value of OVF1DI\_NM in the script for the name of the pump station for display on the report.