Ms. Karen A. Cahill
Environmental Engineer, Division of Environmental Remediation
New York State Department of Environmental Conservation
Region 7
5786 Widewaters Parkway
Syracuse, NY 13214-1867

Arcadis of New York, Inc.
One Lincoln Center

Syracuse
New York 13202
Phone: 315 446 9120
Fax: 315 449 0017
www.arcadis.com

Date: May 15, 2023
Our Ref: 30173485
Subject: **System Operation – Modification Request #2**
Former Bristol-Myers Squibb North Campus Restoration Area
Building 55 Thermal In-Situ Sustainable Remediation
Village of East Syracuse, Town of DeWitt, Onondaga County
Site ID No. C734138

Dear Ms. Cahill,

On behalf of Bristol-Myers Squibb Company (BMS), Arcadis of New York, Inc. (Arcadis) has prepared this request to modify the existing Thermal In-situ Sustainable Remediation^{SM} (TISR^{SM}) remedial system located within the former Building 55 area of concern at the former BMS Syracuse North Campus located at 3551 Burnet Avenue, East Syracuse, New York (**Figure 1**). The modifications are required to allow the TISR^{SM} system to operate more efficiently and to increase the number of operating Borehole Heat Exchanger (BHE) locations online.

BACKGROUND

Arcadis has been operating the TISR^{SM} system since March 28, 2022. Since activation, the TISR^{SM} system has experience several operational upsets that warrant system modifications. The TISR^{SM} system has experienced periodic downtime attributed to elevated steam supply pressures and condensate generation. Elevated pressures in the steam supply line have damaged the steam control valve and has led to the generation of condensate when the system is not calling for steam. As the volume of water increases in the condensate return line, pressures build and cause periodic hammering, stalling, and opening of the pressure relief valve. Water then drains from the return line and activates the high-liquid level alarm in the building sump.

In November 2022, Arcadis completed modifications to the TISR^{SM} system to address detections of propylene glycol in groundwater samples collected during routine monitoring. The modifications completed were detailed in a TISR^{SM} modification request dated October 11, 2022, and included replacement of the propylene glycol heat transfer fluid with distilled water, repairing leaking tubing within well vaults, and installing an internal BHE within each of the eight BHE/EW locations. Following the repairs, the TISR^{SM} system was turned back on. However, several of the BHE locations failed to hold pressure upon startup and were left offline. From November 2022 until present, the number of operating BHE locations has decreased from 19 to 10 of the 30 total BHE locations and approximately 230 gallons of distilled water has leaked to the subsurface.

The following table identifies which wells have been turned off since restarting the TISR[SM] system in November 2022 to present.

BHE ID	DATE TAKEN OFFLINE
BHE-5, BHE-8, BHE/EW-15, BHE-16, BHE/EW-17, BHE-10, BHE-20, BHE-21, BHE-22, BHE-25, and BHE-27	11/22/2023
BHE-2, BHE/EW-4, BHE-13, BHE-24, BHE/EW-26, and BHE/EW-28	2/16/2023
BHE-3, BHE/EW-7, and BHE-18	2/24/2023

The TISR[SM] system currently operates on BHE-1, BHE/EW-6, BHE-9, BHE-10, BHE-11, BHE-12, BHE-14, BHE-23, BHE-29, and BHE/EW-30. The operating BHE locations are illustrated on **Figure 2**.

Arcadis proposes to complete additional modifications to limit downtime attributed to condensate generation, reduce the amount of distilled water being lost to the subsurface, and increase the number of BHE locations operating. The following paragraphs provide details pertaining to the proposed modifications.

PEOPOSED TISR[SM] MODIFICATIONS

Steam Equipment Upgrades

The TISR[SM] system was designed based on a maximum steam inlet pressure of 110 psi. This pressure was used to determine the appropriate heat exchanger rating, capacity, and pressure relief for the system. Based on the expected steam pressure, the pressure relief valve for the heat exchanger was installed with a set point of 120 psi. When the steam pressure exceeds the specified value, the pressure relief valve opens, and excess steam pressure is relieved. The TISR[SM] system steam pressure has been observed as high as 125 psi and the pressure relief valve has been activated multiple times. The elevated steam pressures have damaged the seat of the steam control valve for the heat exchanger, “cutting” a grove in the seat and allowing steam to bypass the valve in the closed position. This results in the formation of water in the steam/condensate return line and leading to the occasional “pipe hammer” and/or “stalling”. Arcadis worked with F.W. Webb to redesign the steam components to properly regulate steam pressure, control steam flow through the heat exchanger, and improve condensate handling. The major components of the steam system upgrade include installation of the following equipment.

- Drain Separator
- Wye Strainer
- Pressure Reducing Valve
- Heat Exchanger Control Valve
- Condensate Trap
- Condensate Handling Pump
- Pressure Relief Valve

Drain Separator, Wye Strainer, and Pressure Reducing Valve

To regulate the steam supply pressure, Arcadis will install equipment upstream of the heat exchanger. A drain separator and wye strainer will be installed to remove excess moisture and debris in the steam supply feeding the system. The pressure reducing valve will reduce the incoming steam pressure to approximately 75 psi. The reduced pressure will still meet the demand for the heat exchanger, reduce equipment wear, and minimize the likelihood that spikes in steam supply pressure will result in activation of the pressure relief valve.

Heat Exchanger Control Valve, Condensate Trap, and Condensate Pump

Arcadis will install a new heat exchanger control valve that has a higher resistance to wear caused by steam "cutting" and will provide better control of discharge temperatures from the heat exchanger. A new condensate trap will be installed on the heat exchanger outlet based on actual demand of the heat exchanger. The size of the previous trap made it possible for steam to occasionally enter the condensate discharge pipe, resulting in "pipe hammer". Arcadis will also install a condensate pump to manage condensate for the system and minimize the potential for "stalling". The condensate pump will be capable of lifting the condensate approximately 30 feet to the pipe rack so the condensate can return to the steam plant.

A new process flow diagram including the new condensate handling equipment is included as **Figure 3**.

Stainless Steel Tubing Replacement

On April 20, 2023, Arcadis completed pressure testing activities on the 10 BHE and 3 BHE/EW locations currently operating. Pressure testing included applying approximately 50 psi to the BHE coil, supply line and return line at each BHE location for 15 minutes or longer. Pressure testing results demonstrated that several of the BHE locations have developed leaks either at the system manifold, within the well vaults or along the conveyance piping. There does not appear to be a simple identifier or a common similarity between the failed locations. Based on this and historical observations, Arcadis believes that all the stainless steel tubing will eventually be subject to failure.

Arcadis proposes to replace the stainless steel tubing with Everhot, Inc. cross-linked polyethylene (PEX) tubing or similar. The PEX tubing will include an oxygen barrier for use with cast iron components (circulation pump, pressure regulating valves, etc.) and be ¾-inch in diameter. For each BHE/EW location, the PEX tubing will be installed within the 2-inch diameter, Schedule 40 PVC conduits previous installed during system installation activities. For BHE only locations that do not have spare Schedule 40 PVC conduits installed to them, the PEX tubing will be installed within shallow trenches. Because PEX has a maximum operating temperature of 200°F at 80 psi, the temperature control valve on the shell and tube heat exchanger will be reduced from 210°F to approximately 190°F to ensure that the heat transfer solution doesn't exceed the maximum operating temperature.

Pressure testing results indicated that 2 of the 13 BHE coils (BHE-3 and BHE-10) could not hold pressure. Prior to replacing the compromised BHE coils installed at BHE-only locations, Arcadis will pressure test the remaining 12 BHE locations to determine the final number of BHE coils that need to be replaced. The in-well BHE installed in each BHE/EW location passed pressure testing. Therefore, each BHE location will mirror the in-well BHE coil setup currently installed in each of the BHE/EW locations. Arcadis will remove the well anulus, pull the existing BHE, and install a 4-inch carbon steel riser with 4-inch diameter stainless steel, continuous wire wrap well screen. The in-well BHE will be fabricated in accordance with the BHE/EW locations and plumbed to the PEX tubing.

Arcadis will continue to monitor the TISR[SM] system following modifications and make operational adjustments to ensure sufficient heat transfer is being achieved to reach target temperatures. Modified well head connection details are illustrated on **Figure 4**. Manufacturer literature for the PEX is included in **Attachment B.**

Utilization of Potable Water as Heat Transfer Solution

In lieu of distilled water as the heat transfer solution, Arcadis proposes to use tap water supplied by the City of Syracuse. The City's tap water will have the same heating capacity as the distilled water but will be more readily available for filling the water makeup tank.

Langelier Saturation Index (LSI) Determination

To evaluate the potential for scaling in the newly installed PEX and in-well BHE coils, Arcadis calculated a Langelier Saturation Index (LSI) which predicts the degree of scaling potential of water at various temperatures. Arcadis collected a water sample of the City's tap water from the Arcadis warehouse located at 4 Dwight Park Drive, Syracuse, New York and sent the sample to Aries Chemical Inc. of Beaver Falls, New York for chemical analyses of pH, conductivity, total alkalinity, and calcium hardness. The analytical results were then used to calculate an LSI value. The following table identifies the LSI scale.

Langelier Saturation Index (LSI)	Scaling/Corrosion Tendency of Water
+3.0	Extremely Scale Forming
+2.0	Strongly Scale Forming
+1.0	Scale Forming
+0.5 to -0.5	Uncertainty Zone
-1.0	Corrosive
-2.0	Strongly Corrosive
-3.0	Extremely Corrosive

The calculated LSI value for the City's tap water is approximately 1.07. This indicates that scaling is probable but not at an excessive rate. To ensure that scaling doesn't plug the PEX/stainless steel tubing, Arcadis will monitor operating pressures and complete routine maintenance as needed.

Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS) Evaluation

NYSDEC granted approval to use distilled water so long as the Perfluorooctanoic acid (PFOA) or perfluorooctane sulfonic acid (PFOS) concentrations were below 10 nanograms per liter (ng/L). Arcadis reviewed analytical results provided in the City of Syracuse Water Department Consumer Confidence Report from 2021 (Report). PFOA and PFOS analytical results are provided on Page 16 of the Report and reported average PFOA and PFOS concentrations of 1.0 ng/L and 1.8 ng/L, respectively. Reported concentration were below the regulatory limit of 10 ng/L.

A copy of the Report indicating PFOA and PFAS concentrations below criteria in tap water, as well as a Langelier Saturation Index analysis conducted on the tap water, is included in **Attachment C**.

Ms. Karen Cahill, P.E
NYSDEC
May 15, 2023

Following review of the provided information, Arcadis can implement the proposed modifications immediately upon NYSDEC approval to proceed.

If you have any questions regarding this System Operation – Modification Request or require additional information, please do not hesitate to contact me.

Sincerely,
Arcadis of New York, Inc.

Kevin Jay, P.E.
Program Remedial Engineer

Email: kevin.jay@arcadis.com
Direct Line: 724.934.9523

CC. Gary Priscott, NYSDEC
Scarlett McLaughlin, NYSDOH
Sara Bogardus, NYSDOH
Richard Mator, BMS
William McCune, Arcadis
Ron Arcuri, Geosyntec

Enclosures:

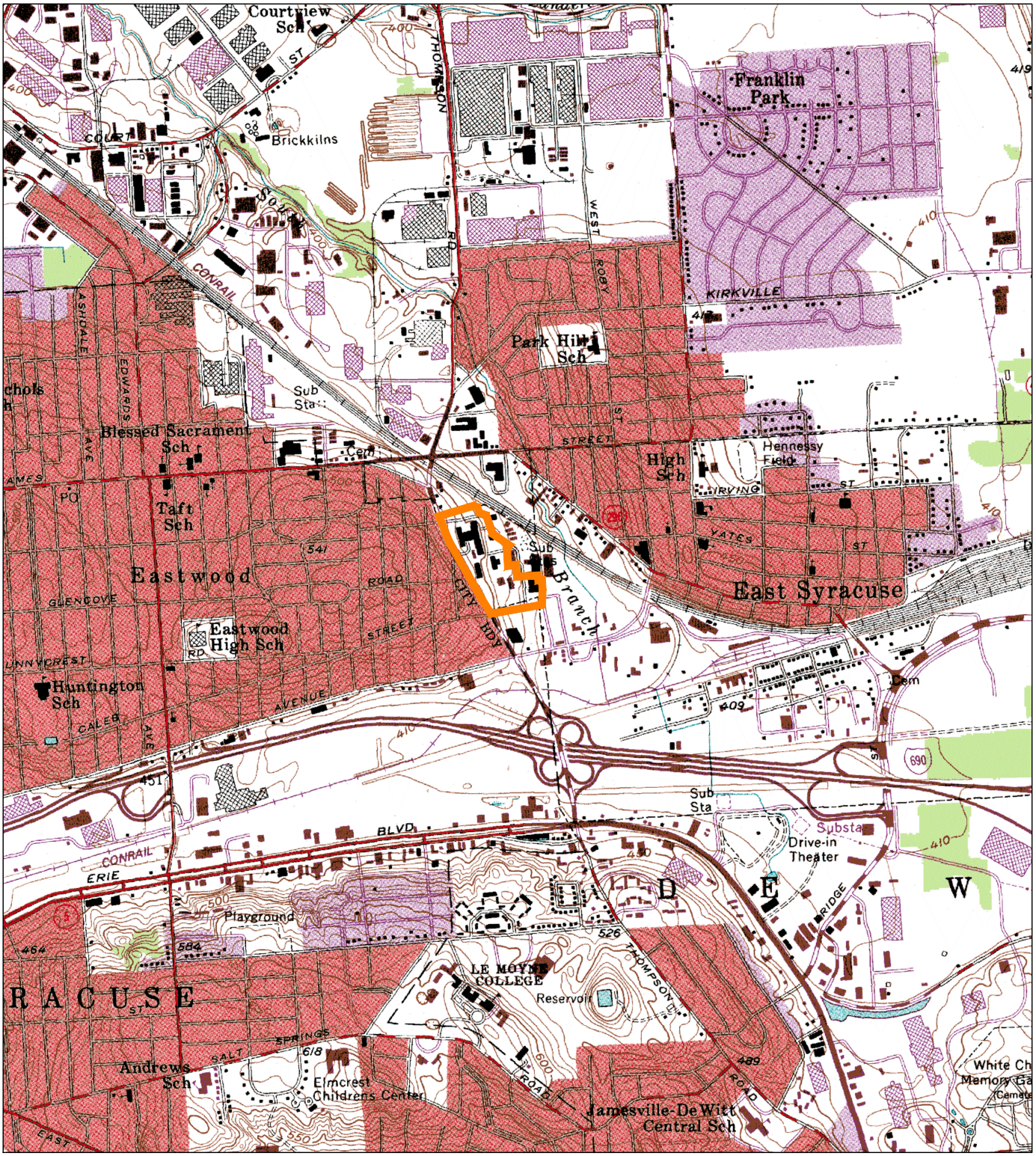
Figures

Figure 1	Site Vicinity Map
Figure 2	Borehole Heat Exchanger, Thermocouple Monitoring Point, and Trenching/Piping Layout
Figure 3	Process Flow Diagram
Figure 4	Borehole Heat Exchanger Well Connection Details

Attachments

Attachment A	Steam Component Specifications
Attachment B	Everhot Inc. PEX Specifications
Attachment C	City of Syracuse Data/LSI Determination

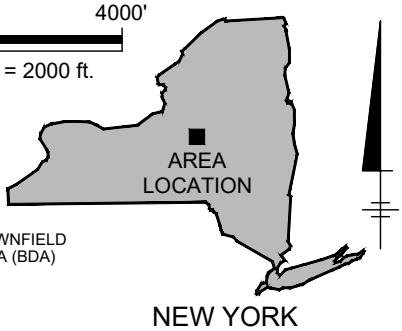
Figures



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., SYRACUSE EAST, NEW YORK, 1957, PHOTOREVISED 1978.

0 2000' 4000'

Approximate Scale: 1 in. = 2000 ft.



LEGEND:

APPROXIMATE BROWNFIELD DEVELOPMENT AREA (BDA) BOUNDARY

SITE #C734138: FORMER BMS SYRACUSE
NORTH CAMPUS RESTORATION AREA
EAST SYRACUSE, NY

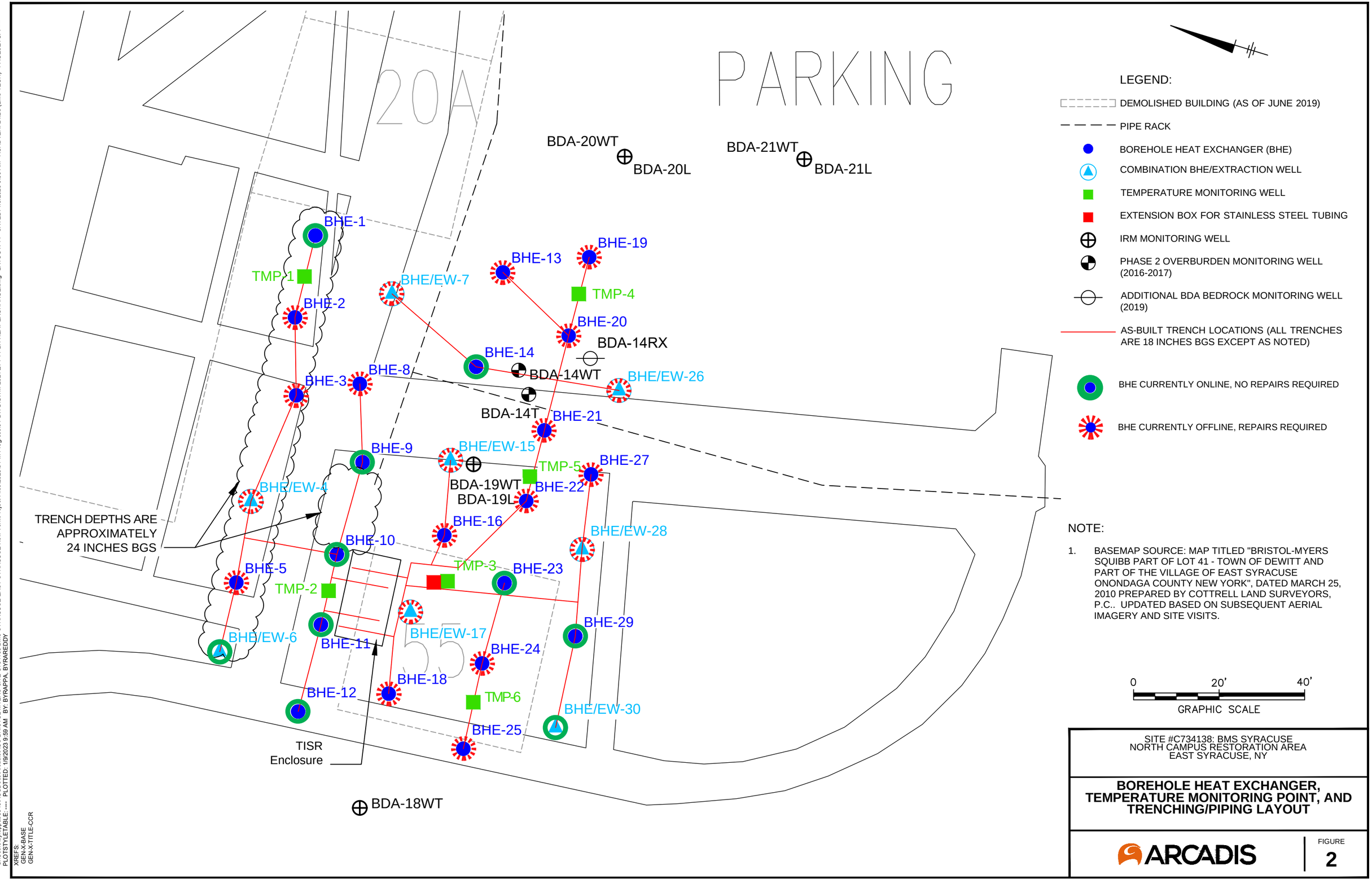
SITE VICINITY MAP

ARCADIS

FIGURE 1

IMAGES:
NY_Syracuse East.tif

C:\Users\lposenauer\ACCDocs\Arcadis\AUS-BRISTOL MYERS-SITE C734138 BMS SYRACUSE-EAST SYRACUSE New York\Project Files\2023\01-In Progress\01-DWG\GEN-F01-USGS SLM.dwg LAYOUT: 1 SAVED: 5/3/2023 11:12 AM ACADVER: 24.2S (LMS TECH) PAGESETUP: C-PA-PDF
PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 5/3/2023 12:00 PM BY: POSENAUER, LISA



NOTE:

1. BASEMAP SOURCE: MAP TITLED "BRISTOL-MYERS SQUIBB PART OF LOT 41 - TOWN OF DEWITT AND PART OF THE VILLAGE OF EAST SYRACUSE ONONDAGA COUNTY NEW YORK", DATED MARCH 25, 2010 PREPARED BY COTTRELL LAND SURVEYORS, P.C.. UPDATED BASED ON SUBSEQUENT AERIAL IMAGERY AND SITE VISITS.

0 20' 40'

GRAPHIC SCALE

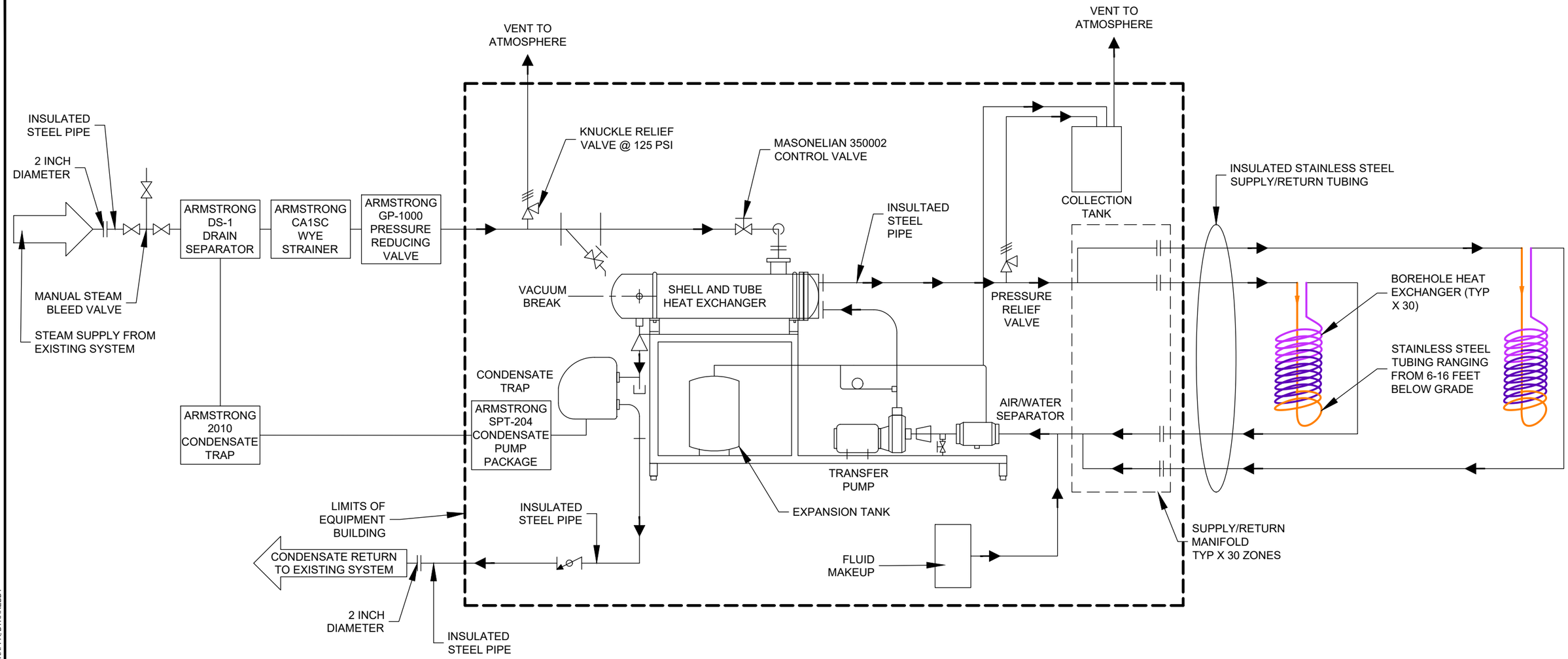
SITE #C734138: BMS SYRACUSE
NORTH CAMPUS RESTORATION AREA
EAST SYRACUSE, NY

BOREHOLE HEAT EXCHANGER, TEMPERATURE MONITORING POINT, AND TRENCHING/PIPING LAYOUT

ARCADIS

FIGURE 2

C:\Users\byrappab8346\ACCDocs\Arcadis\AUS-BRISTOL MYERS-SITE C734138 BMS SYRACUSE-EAST SYRACUSE New York\Project Files\2023\01-In Progress\01-DWG\GWM-2021Q1-F11-BH HEAT EXCHANGE.dwg LAYOUT: 11 SAVED: 1/9/2023 9:59 AM ACADVER: 24.2S (LMS TECH) PAGESETUP: ---
PLOTSTYLETABLE: ---- PLOTTED: 1/9/2023 9:59 AM BY: BYRAPPA, BYRAREDDY
XREFS:
GEN-X-BASE
GEN-X-TITLE-CCR



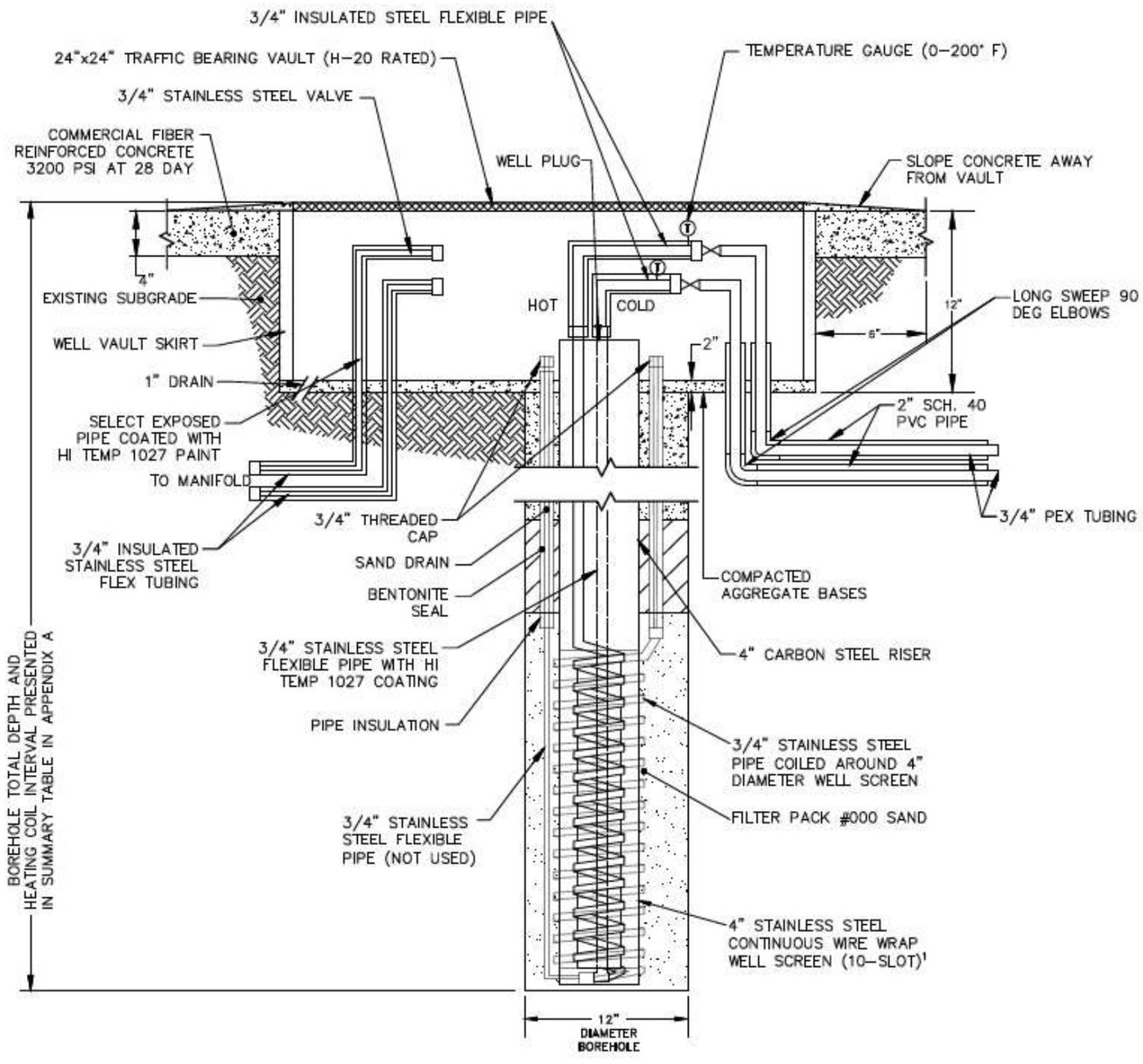
NOT TO SCALE

SITE #C734138: FORMER BMS SYRACUSE
NORTH CAMPUS RESTORATION AREA
EAST SYRACUSE, NY

PROCESS FLOW DIAGRAM

ARCADIS

FIGURE
3



PROPOSED IN-WELL BOREHOLE HEAT EXCHANGER

NOT TO SCALE

ACRONYMS:
HDPE = HIGH DENSITY POLYETHYLENE.
PSI = POUNDS PER SQUARE INCH.
PVC = POLYVINYL CHLORIDE.

SITE #C734138: FORMER BMS SYRACUSE
NORTH CAMPUS RESTORATION AREA
EAST SYRACUSE, NY

BOREHOLE HEAT EXCHANGER WELL CONNECTION DETAILS

ARCADIS

FIGURE
4

Attachment A

Steam Components Specifications

Item	Description Net Price Total	QTY
1	SPEC "B" 1" CS 150# ARMSTRONG PYTHON WITH BELIMO 120VAC ELECTRIC ACTUATOR WITH BATTERY BACKUP. Industrial Special *MSVVALVE/ASSY #valve Assy Consisting Of EST SHIPPING 6 WEEKS ARO	1
2	Armstrong ARMD25913 Separator Di 300# Npt 1" Ds-1 EST SHIPPING 1 TO 2 WEEKS ARO	1
3	Armstrong ARMB2311C-1 Univ Conn 1/2" Ss 2blt Thd EST SHIPPING 1 TO 2 WEEKS ARO	1
4	Armstrong *ARMC5324-1 #stm Trp Inv Bkt 2blt Flg 2010 #38 Orif 200ps EST SHIPPING 1 TO 2 WEEKS ARO	1
5	Armstrong ARMC4424-2 Y Strnr 1" Thd Ci Ca1sc 250psig EST SHIPPING 1 TO 2 WEEKS ARO	1
6	Armstrong *ARMD24354 #1" Gp1000 Npt Prv 7-125 EST SHIPPING 1 TO 2 WEEKS ARO	1
7	Armstrong ARMB2311C-1 Univ Conn 1/2" Ss 2blt Thd EST SHIPPING 1 TO 2 WEEKS ARO	1
8	Armstrong ARMC5324-4 Stm Trp Invt Bckt Ss 2-blt 2011 125psi EST SHIPPING 1 TO 2 WEEKS ARO	1
9	Armstrong *ARMSC-576849 #spt204lbrpi 6 1 X 1 Npt 0fh Open Sys Ss EST SHIPPING 10 TO 12 WEEKS ARO	1
10	Kunkle *KUN6010DCM01ALM0125 #rlf Vlv Brz Npt 1/2x3/4" 125psi 833pph EST SHIPPING 1 TO 2 WEEKS ARO	1

Specification

Category: Control Valves
Type: Two Way Globe Valve
Model: 1500 Series

Prepared for:	Arcadis	Location:	
		DATE:	Jan 05, 2023
Project:	BMS	Quantity:	1
		Contact:	Jeremy Wyckoff
SERVICE APPLICATION:	Flow Control	Valve ID:	

				Unit	Max	Nor	Min
Service Condition	1	**Media**		STEAM			
	2	Flow W		lb/h [kg/h]	700.2 [318]	700.2 [318]	700.2 [318]
	3	Inlet Pressure P1		psi [bar]	75 [5.2]	75 [5.2]	75 [5.2]
	4	Outlet Pressure P2		psi [bar]	8 [0.6]	6 [0.4]	4 [0.3]
	5	Pressure Drop Ratio Factor Xt			0.7991	0.7991	0.7991
	6	Pressure Recovery Factor Fl					
	7	Compressibility Factor Z			0.65	0.64	0.63
	8	Delta P		psi [bar]	67 [4.6]	69 [4.8]	71 [4.9]
	9	Shutoff Against		psi [bar]	75 [5.2]	75 [5.2]	75 [5.2]
	10	Inlet Temperature T1		F [C]	321 [161]	321 [161]	321 [161]
	11	Sp. Gravity (SG)					
	12	Vapour Pressure (VP)		psi [bara]			
	13	Critical Pressure (Dpmax)		psi [bar]	64 [4.4]	64 [4.4]	64 [4.4]
	14	Valve Outlet Area (Ao)		in² [mm²]	0.864 [557]	0.864 [557]	0.864 [557]
	15	M2 Pipe			0.3	0.3	0.3
	16	Vo Valve		ft/min [m/s]	11255.2 [57.2]	11255.2 [57.2]	11255.2 [57.2]
	17	V2 Pipe		ft/min [m/s]	9566.9 [48.6]	9566.9 [48.6]	9566.9 [48.6]
	18	C2 Pipe		ft/min [m/s]	92913.2 [472]	92913.2 [472]	92913.2 [472]
	19	Calculated Cv			4.61	4.61	4.61
	20	Valve Cv			9	9	9
	21	Percentage Valve Opening			50.23	50.23	50.23
	22	Flow Characteristics			Choked FLow	Choked Flow	Choked Flow
	23	Predicted Noise Level		dBA	90	91	91
	24	Final Noise Level		dBA			
	25	Max. Shut Off Dp		psi [bar]	200 [13.8]	200 [13.8]	200 [13.8]
Body & Trim	26	**Python Series**					
	27	Model No.		CV1500			
	28	Body Form		Two Way Globe Valve			
	29	Size Body / Size Trim		1" (DN25) / 3/4"			
	30	End Connections / Rating		1 150RF			
	31	**Body Material**		ASTM A216 WCB			
	32	Certification					
	33	Trim Form		Parabolic Unbalanced			
	34	Trim Material	Plug/Disc/Ball | Facing				
			Seat Ring | Facing	17-4 PH H900			
			Spindle | Large Spindle	SS 431			
			Cage / Seat Retainer				
			Seal Ring				
	35	Flow Direction		Under the Plug			
	36	Seat Leakage (FCI 70.2)		Class IV			
	37	Bonnet Type		Standard			
	38	Gland Packing		Graphoil			
Actuator	39	**Actuator Type | Action**		Electric / Direct			
	40	Valve Action Air Or Power To		Open			
	41	Fail Safe Condition		Close			
	42	Control Signal Range		4-20 mA			
	43	Spring Range					
	44	Supply		24 VDC / 24 VAC			
	45	**Actuator Model**		Belimo-SVK			
	46	Valve Travel		0.8 in [20 mm]			
	47	Supply Connection 1/4" NPT					
	48	Hand Wheel		No			

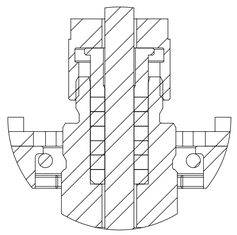
Positioner	49	**Model No.**	
	50	Positioner Type	
	51	Make	
	52	Action	
	53	By Pass. / No. of Guages	
	54	Input Signal	
	55	Output Signal	
	56	Supply Pressure	
	57	Pnu. Conn.	
	58	Cable Entry	
	59	Enclosure	
	60	Communication	
	61	Certification	
I/P Convertor	62	**Model No.**	
	63	Make	
	64	Input Signal	
	65	Output Signal	
	66	Pnu. Conn.	
	67	Cable Entry	
	68	Supply	
	69	Hsg. Material	
	70	Enclosure	
	71	Certification	
Air Set	72	**Model No.**	
	73	Quantity	
	74	Make	
	75	Pnu. Conn.	
	76	Gauge	
	77	Body Moc	
	78	Filter Size	
Solenoid Valve	79	**Model No.**	
	80	Make	
	81	Type	
	82	Pnu. Connection	
	83	Cable Entry & Enclosure	
	84	Body Moc.	
	85	Voltage	
	86	Ins. Class	
	87	Man Override	
	88	Certification	
Limit Switch	89	**Model No.**	
	90	Quantity	
	91	Make	
	92	Type	
	93	Contacts	
	94	Current Rating	
	95	Housing Moc.	
	96	Enclosure	
	97	Mounting Position	

Remarks:

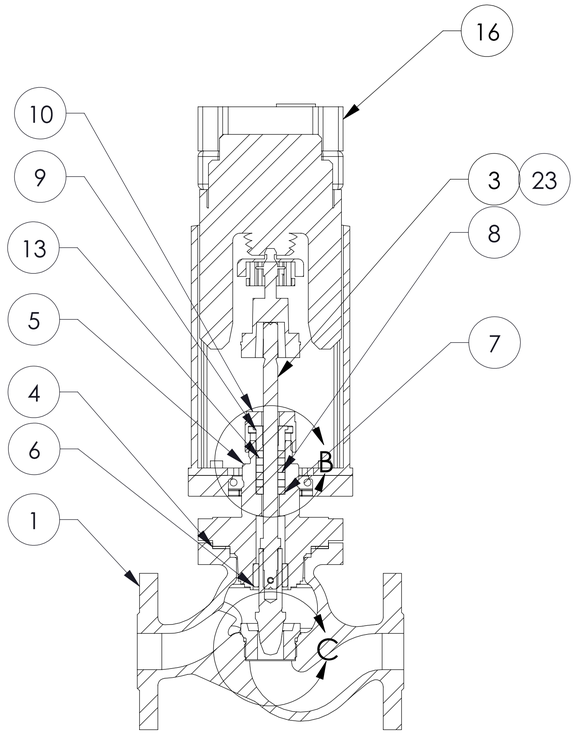
Note: Sizing calculations as per ANSI/ISA S75.01

POS	ITEM	MATERIAL
1	VALVE BODY	ASTM A216 Gr.WCB
2	SEAT	ASTM A564 TYP630 H900
3	SPINDLE	ANSI SS 431
4	GASKET	GRAFOIL
5	BONNET	ASTM A216 Gr.WCB
6	GUIDE BUSH	T420 S.S
7	BOTTOM RING	T420 S.S
8	GLAND PACKING SET	GRAPHOIL
9	GLAND FOLLOWER	T420 S.S
10	GLAND NUT	T316L S.S
11	BONNET SCREWS	ASTM A193 Gr.B7
12	BONNET NUT	ASTM A194 Gr.2H
13	PACKING	GPH REINF+INCONEL WIRE
14	SLOTTED NUT	ASTM A216 Gr.WCB
15	COUPLING	ASTM A351 CF8M
16	ACTUATOR	N/A
17	POSITIONER	N/A
18	PIPING	BRAIDED STAINLESS STEEL
19	AIR REGULATOR	N/A
20	NAMEPLATE	N/A
21	SOLENOID VALVE	N/A
22	GLAND SPRING	N/A
23	PLUG	ASTM A564 TYP630 H900
25	SLEEVE PARABOLIC	N/A

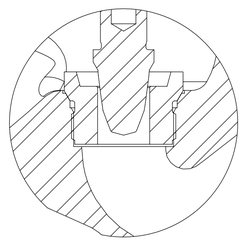
MODEL	CV1500
BODY SIZE	1
CONNECTION	150RF
TRIM SIZE	3/4
TRIM TYPE	PARABOLIC UNBALANCE
TRIM CHARACT	LINEAR
Cv VALUES	9
BONNET TYPE	STD
SEAT LEAKAGE	Class IV
ACTUATOR TYPE	ELECTRIC
ACTUATOR ACTION	N/A
POSITIONER	N/A



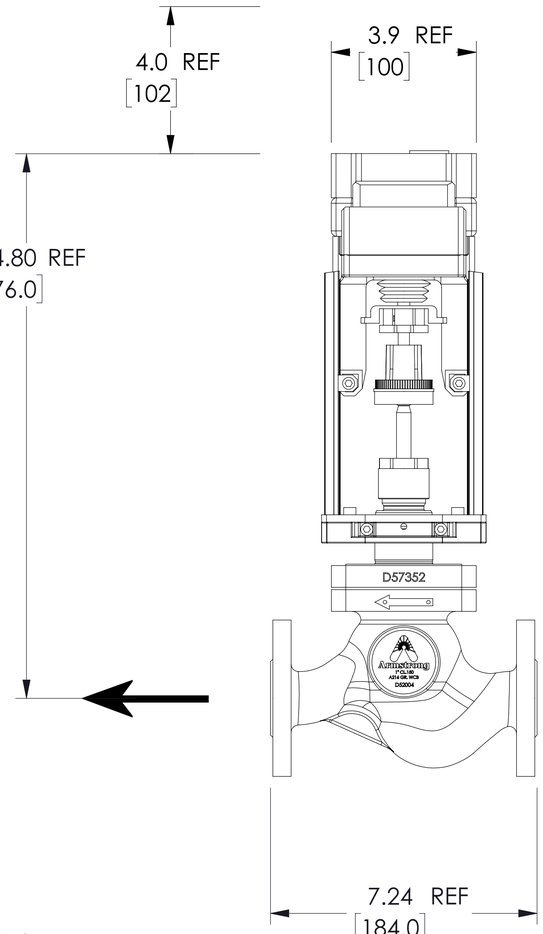
DETAIL B

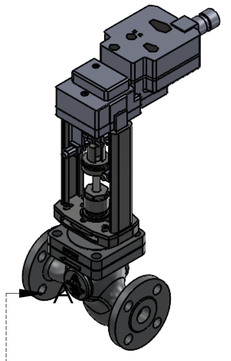


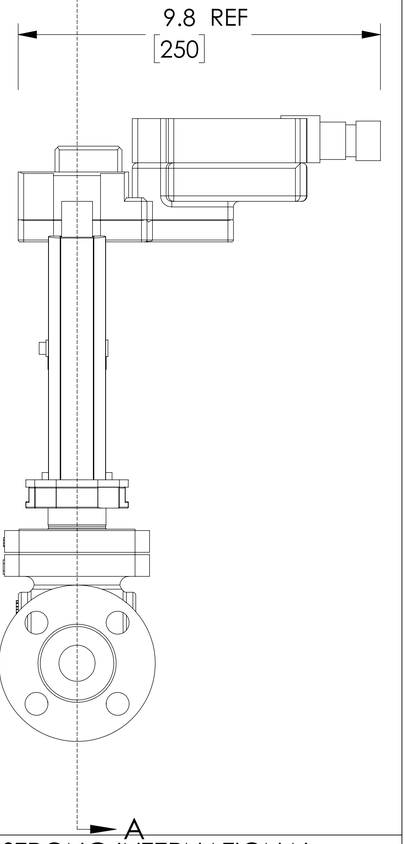
SECTION A-A
SCALE 1 : 2



DETAIL C







NOTES:

1.PS = 285 PSI AT 100°F [19.6 BAR AT 38°C]
2.MAX SHUTOFF PRESSURE = 200 PSI [13.8 BAR]
3.NOTE N/A
4.NOTE N/A
5.NOTE N/A

DO NOT SCALE DRAWING
TOLERANCES UNLESS OTHERWISE SPECIFIED
DIMENSIONING ENGLISH [mm]
FRACTIONAL ± 1/64
ANGULAR: ± 2

DECIMAL	IN.	MM
.XXXX	± .0005	-----
.XXX	± .005	.010
.XX	± .015	.10
.X	----------	.3

	NAME	DATE
DRAWN	CFG	1/5/2023
RELEASED	SALES	

CV1500BEL 1 150RF ASTM216 3/4 TR GFL
4-20 MA 24V 2-10 FAIL CLOSE 17-4PH PU LIN

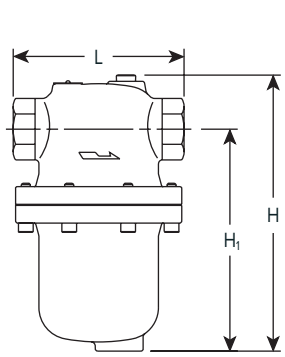
MATERIAL
SHEET 1 OF 1
CWF42759
REV A
DWG. C-589221

Armstrong® DS Series Drain Separators

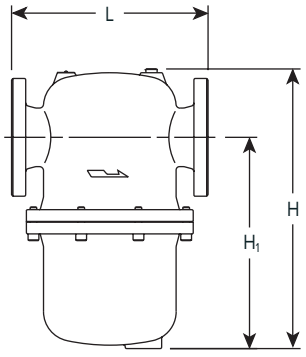
Condensate in steam and air piping reduce thermal efficiency, cause water hammer, corrode equipment such as valves and pipes, and cause other problems.

Armstrong drain separators separate condensate efficiently by using the centrifugal force of steam or air created by introducing it into a specifically shaped path. Because of the simple structure of the drain separators, pressure loss is minimized, enabling clean, dry steam or air to be fed to equipment.

With correct sizing and proper drainage, the separators are designed to eliminate 98% of all entrained liquids and particles that are 10 microns and larger in size.



DS-1 / DS-3 / DS-4



DS-2 / DS-3 / DS-4

Features

- A cyclone structure maximizes liquid separation efficiency
- Pressure loss is extremely low
- No moving parts means no breakdowns

Operating Principle

When steam or air flow enters the drain separator, centrifugal force is generated in the fluid because of the device's internal structural design. The fluid drains along the wall because of the difference in specific gravity with steam or air, eventually striking the baffle. The baffle guides the fluid to the drain outlet and to the trap, which drains it. As a result, both small dirt particles and condensate are separated and removed from the system through the bottom drain.

For fully certified drawings refer to:

DS-1 / DS-2	**CDY1102**
DS-3	**CD2126**
DS-4	**CD2127**

DS Series Specifications

Model	Application	Maximum Pressure psig (barg)	Maximum Temp. °F (°C)	Materials	
				Body	Nozzle
DS-1	Steam Air	NPT 300 (20)	430 (221)	Ductile Iron ASTM A536	Cast Iron ASTM A48
DS-2		150 lb. Flanged 185 (13)			
		300 lb. Flanged 300 (20)			
DS-3 DS-4		NPT 300 (20)	650 (343)	SS304 (DS-3) Carbon Steel (DS-4)	
		150 lb. Flanged 150 (10)	450 (232)		
		300 lb. Flanged 500 (34)	650 (343)		

DS Series Dimension and Weights

Model	Size		Face-to-Face "L"						H		H[1]		Drain		Weight					
			NPT		150#		300#								NPT		150#		300#	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	lb	kg	lb	kg
DS-1	1/2	15	5-15/16	150	—	—	—	—	9-9/16	243	7-5/8	193	3/4	20	16	7.3	—	—	—	—
	3/4	20	5-15/16	150	—	—	—	—	9-9/16	243	7-5/8	193	3/4	20	16	7.3	—	—	—	—
	1	25	5-15/16	150	—	—	—	—	9-9/16	243	7-5/8	193	3/4	20	16	7.3	—	—	—	—
	1-1/4	32	7-1/2	190	—	—	—	—	11-1/8	243	8-3/8	213	1	25	28	12.7	—	—	—	—
	1-1/2	40	7-1/2	190	—	—	—	—	11-1/8	243	8-3/8	213	1	25	28	12.7	—	—	—	—
	2	50	8-5/8	219	—	—	—	—	13-15/32	243	10-1/4	260	1	25	45	20.5	—	—	—	—
DS-2	2-1/2	65	—	—	11-1/2	292	11-15/16	303	16-15/32	418	12-3/8	314	1	25	—	—	45	20.5	77	35
	3	80	—	—	13-1/2	343	14-1/64	356	19	484	14-1/2	361	1-1/4	32	—	—	77	35	99	45
	4	100	—	—	15-13/16	402	16-7/16	418	23-3/8	594	17-1/2	445	1-1/4	32	—	—	99	45	143	65
DS-3 DS-4	1/2	15	5-1/2	140	9	229	9	229	16	356	9	229	1	25	28	12.7	30	13.6	32	14.5
	3/4	20	5-1/2	140	9	229	9	229	16	356	9	229	1	25	28	12.7	30	13.6	32	14.5
	1	25	6-3/8	162	10-1/2	267	10-1/2	267	16	356	10-1/2	267	1	25	30	13.6	33	15	35	15.9
	1-1/4	32	6-3/8	162	10-1/2	267	10-1/2	267	16	356	10-1/2	267	1	25	32	14.5	35	15.9	37	16.8
	1-1/2	40	7-5/8	194	11-1/2	292	11-1/2	292	19	483	12-1/2	318	1	25	46	20.9	50	22.7	56	25.4
	2	50	7-7/8	200	11-1/2	292	11-1/2	292	19	483	12-1/2	318	1	25	51	23.1	55	24.9	59	26.8
	2-1/2	65	—	—	16	406	16	406	22	559	15	381	1	25	—	—	100	45.4	110	49.9
	3	80	—	—	18	457	18	457	26	660	18	457	1	25	—	—	140	63.5	150	68
	4	100	—	—	20	508	20	508	31	787	22	559	1-1/2	40	—	—	195	88.4	220	99.8
	6	150	—	—	24	610	24	610	41	1 041	30	762	1-1/2	40	—	—	350	159	380	172
	8	200	—	—	28	711	28	711	50	1 270	37	940	2	50	—	—	475	215	610	278
	10	250	—	—	34	864	34	864	70	1 778	55	1 397	2	50	—	—	780	354	1 180	535
	12	300	—	—	38	965	38	965	75	1 905	58	1 473	2-1/2	65	—	—	940	426	1 510	685

DS Series Drain Separators

Capacities for Steam Service

DS-1/DS-2 Series Steam Capacities (lb/hr)									
Size	**5 psig**	**10 psig**	**25 psig**	**50 psig**	**100 psig**	**150 psig**	**200 psig**	**250 psig**	**300 psig**
1/2”	34	43	69	113	200	287	374	461	548
3/4”	60	75	121	198	351	503	656	809	962
1”	98	122	197	320	568	816	1 063	1 311	1 559
1-1/4”	169	212	340	555	983	1 412	1 840	2 269	2 698
1-1/2”	230	288	463	755	1 338	1 922	2 505	3 088	3 672
2”	379	475	763	1 244	2 206	3 167	4 129	5 090	6 052
2-1/2”	541	678	1 089	1 775	3 147	4 519	5 891	7 263	8 635
3”	835	1 046	1 682	2 741	4 860	6 978	9 096	11 215	13 333
4”	1 437	1 802	2 896	4 720	8 368	12 016	15 664	19 312	22 960

DS-1/DS-2 Series Steam Capacities (kg/hr)									
Size	**0.34 barg**	**0.69 barg**	**1.7 barg**	**3.4 barg**	**6.9 barg**	**10.3 barg**	**13.8 barg**	**17.2 barg**	**20.7 barg**
1/2”	16	20	31	51	91	130	170	209	249
3/4”	27	34	55	90	159	228	298	367	436
1”	44	55	89	145	258	370	482	595	707
1-1/4”	77	96	154	252	446	640	835	1 029	1 224
1-1/2”	104	131	210	342	607	872	1 136	1 401	1 665
2”	172	215	346	564	1 001	1 437	1 873	2 309	2 745
2-1/2”	245	307	494	805	1 428	2 050	2 672	3 294	3 917
3”	379	475	763	1 243	2 204	3 165	4 126	5 087	6 048
4”	652	817	1 314	2 141	3 796	5 450	7 105	8 760	10 414

DS-3/DS-4 Series Steam Capacities (lb/hr)									
Size	**5 psig**	**10 psig**	**25 psig**	**50 psig**	**100 psig**	**150 psig**	**200 psig**	**250 psig**	**300 psig**
1"	190	225	295	390	550	675	780	860	1 000
1-1/4"	320	345	460	620	860	1 050	1 125	1 140	1 160
1-1/2"	460	500	680	880	1 225	1 550	1 800	2 000	2 250
2"	790	910	1 050	1 550	2 200	2 700	3 150	3 700	4 000
2-1/2"	1 075	1 120	1 585	2 400	3 400	4 300	5 000	5 375	6 400
3"	1 950	2 300	2 950	3 750	5 250	6 600	7 600	9 000	10 000
4"	3 250	3 800	4 975	6 100	9 000	11 100	13 000	11 500	11 650
5"	4 975	5 850	7 650	9 250	11 400	11 700	12 000	23 000	25 000
6"	7 700	8 990	10 100	10 450	21 500	26 500	31 000	36 000	39 000
8"	10 750	11 450	12 000	23 750	34 000	43 000	51 000	58 000	66 000
10"	20 000	22 500	29 500	37 000	54 500	68 000	78 000	90 000	100 000
12"	29 500	34 000	44 000	54 000	81 000	100 000	105 000	112 000	114 000

DS-3/DS-4 Series Steam Capacities (kg/hr)									
Size	**0.34 barg**	**0.69 barg**	**1.7 barg**	**3.4 barg**	**6.9 barg**	**10.3 barg**	**13.8 barg**	**17.2 barg**	**20.7 barg**
1"	86	102	134	177	249	306	354	390	454
1-1/4"	145	156	209	281	390	476	510	517	526
1-1/2"	209	227	308	399	556	703	816	907	1 021
2"	358	413	476	703	998	1 225	1 429	1 678	1 814
2-1/2"	488	508	719	1 089	1 542	1 950	2 268	2 438	2 903
3"	885	1 043	1 338	1 701	2 381	2 994	3 447	4 082	4 536
4"	1 474	1 724	2 257	2 767	4 082	5 035	5 897	5 216	5 284
5"	2 257	2 654	3 470	4 196	5 171	5 307	5 443	10 433	11 340
6"	3 943	4 078	4 581	4 740	9 752	12 020	14 061	16 329	17 690
8"	4 876	5 194	5 443	10 773	15 422	19 504	23 133	26 308	29 937
10"	9 072	10 206	13 381	16 783	24 721	30 844	35 380	40 823	45 359
12"	13 381	15 422	19 958	24 494	36 741	45 359	47 627	50 802	51 710

Armstrong® Armstrong Universal Stainless Steel Connector

IS-2 Stainless Steel Connector with Integral Strainer Provides:

- A full line stainless steel strainer in the connector eliminates leak points and reduces installation time
- A strainer that is not discarded when the trap is replaced
- Easy strainer screen replacement
- Optional blowdown valve
- Accommodates Armstrong's inverted bucket, disc, thermostatic, thermostatic wafer, bimetallic, and float and thermostatic traps. Any manufacturer's 2-bolt steam trap can also be applied to Armstrong's S-2 connector.

Maximum Operating Conditions

Maximum allowable pressure:
650 psig @ 600°F (45 bar @ 315°C)

Connector Styles

- IS-2 connector with integral strainer
- IS-2 connector with integral strainer with blowdown valve

Connection Sizes

- 1/2", 3/4", 1"

Connection Types

Screwed NPT and BSPT
Socketweld
Flanged (consult factory)

Materials

Connector Body:	All stainless steel—304
Strainer:	20 x 20 Mesh 304 stainless steel

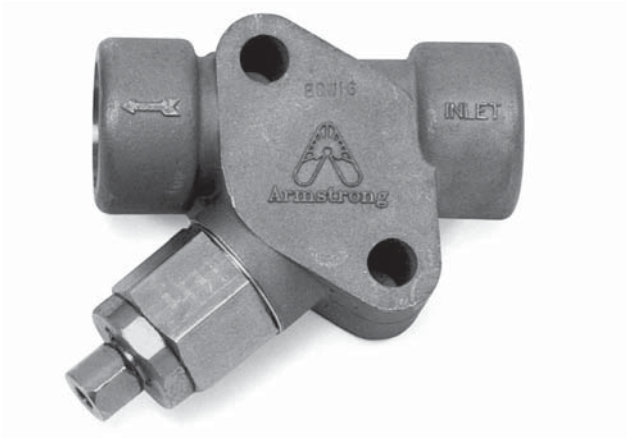
Weight

2 lbs (0.91 kg)

How to Order IS-2 Connector with Integral Strainer

Specify:

- Connection style
- Connection size
- Connection type
- Inlet flow direction
  - Left to Right
  - Right to Left



Standard 360° Stainless Steel Connector Provides:

- A compact, lightweight assembly
- Standardization, reducing inventory
- A compact design, simplifying piping
- Accommodates Armstrong's inverted bucket, disc, thermostatic, thermostatic wafer and bimetallic steam traps. Any manufacturer's 2-bolt steam trap can also be applied to Armstrong's standard connector.

Maximum Operating Conditions

Maximum allowable pressure:
650 psig @ 600°F (45 bar @ 315°C)

Connector Styles

- Standard 360°

Connection Sizes

- 1/2", 3/4"

Connection Types

Screwed NPT and BSPT
Socketweld
Flanged (consult factory)

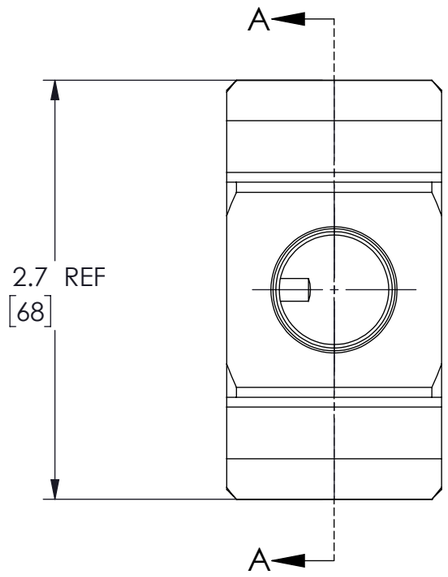
Weight

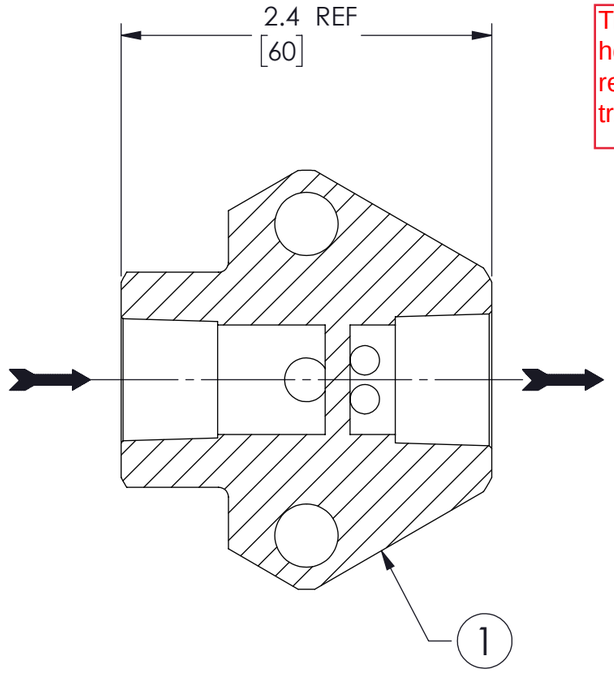
1-1/2 lbs (0.70 kg)

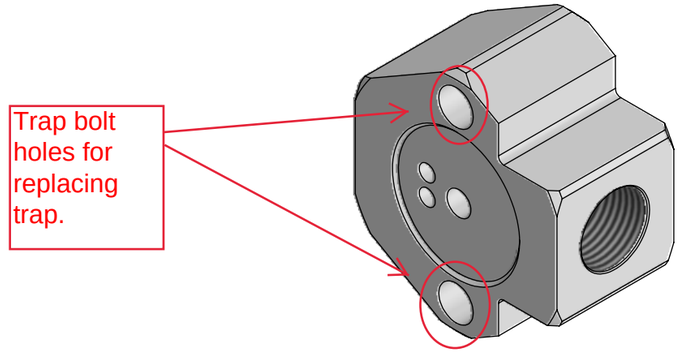
How to Order Standard 360° Stainless Steel Connector

Specify:

- Connection size
- Connection type







SECTION A-A

DESIGN CONDITIONS	
PMA	N/A

CONNECTIONS	
INLET	1/2 NPT
OUTLET	1/2 NPT

NOTES:

1. N/A
2. N/A
3. N/A
4. N/A
5. N/A
6. N/A

ITEM	DESCRIPTION	MATERIAL
1	BODY	ASTM A-479, TYP 304
2	N/A	N/A
3	N/A	N/A

DO NOT SCALE DRAWING
TOLERANCES UNLESS OTHERWISE SPECIFIED
DIMENSIONING ENGLISH [mm]
FRACTIONAL ± 1/64
ANGULAR: ± 2

		IN.	MM
DECIMAL	.XXXX ±	.0005	-----
	.XXX ±	.005	.010
	.XX ±	.015	.10
	.X	----------	.3

	NAME	DATE
DRAWN	CFG	5/20/2022
RELEASED		

PROJECT

ARMSTRONG INTERNATIONAL

CONN STD 1/2 NPT

CONFIG # (C-547456)

MATERIAL

SHEET 1 OF 1

REV A

DWG B2311C-1

2000 Series Inverted Bucket Steam Trap

All Stainless Steel With 360° Connector/IS-2/TVS-4000

For Pressures to 650 psig (45 bar)...Capacities to 1,300 lb/hr (590 kg/hr)

Description

With the 2000 Series' 360° universal connector, you can install inverted bucket efficiency and long service life in any piping configuration with little or no repiping. You get the reliability of the inverted bucket operating principle, plus all the benefits of all-stainless steel construction:

- A sealed, tamperproof package
- A compact, lightweight trap
- The ability to withstand freeze-ups without damage
- Exceptional corrosion resistance
- A three-year guarantee against defective materials, defective workmanship.

2000 Series steam traps combine savings in three important areas: energy, installation and replacement. The 360° universal connector provides quick, easy in-line replacement along with all the proven advantages of inverted bucket operation.

Also available with optional IS-2 integral strainer connector.

Maximum Operating Conditions

Maximum allowable pressure (vessel design):

Model 2010, 2011:	400 psig @ 800°F (28 bar @ 427°C)
Model 2022:	650 psig @ 600°F (45 bar @ 315°C)
	627 psig @ 700°F (43 bar @ 371°C)
	600 psig @ 800°F (41 bar @ 427°C)

Maximum operating pressure:

Model 2010:	200 psig (14 bar)
Model 2011:	400 psig (28 bar)
Model 2022:	650 psig (45 bar)

Connections

Screwed NPT and BSPT
Socketweld
Flanged (consult factory)

Materials

Body:	ASTM-A 240 Grade 304L
Internals:	All stainless steel—304
Valve and seat:	Hardened chrome steel—17-4PH or Titanium
Connector body (std & IS-2):	Stainless steel—304
Flange	ASTM A105 Zinc plated

Options

- Insu-Pak™ insulation for Models 2010/2011
- Stainless steel pop drain for Models 2011/2022
- Probe connection for Models 2011/2022
- Strainer blowdown valve for IS-2 connector
- Wiggle wire

360° Connector Styles

- Standard connector
- IS-2 connector with integral strainer
- IS-2 connector with integral strainer with blowdown valve

Specification

Inverted bucket steam trap, type ... in all stainless steel, freeze resistant, with 360° universal connector, having continuous air venting at steam temperature, free-floating stainless steel mechanism, and orifice at the top of the trap.

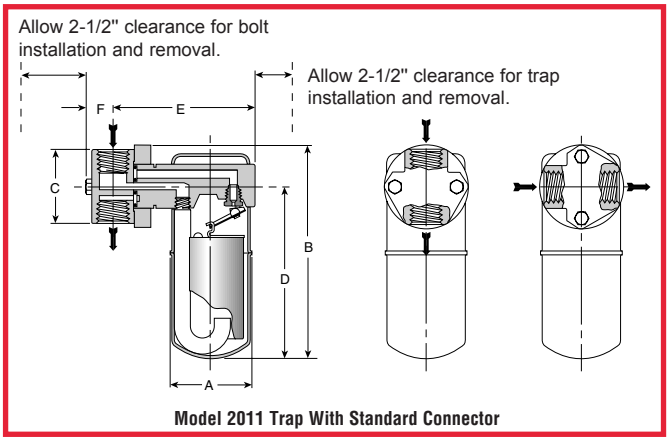
How to Order

Specify:

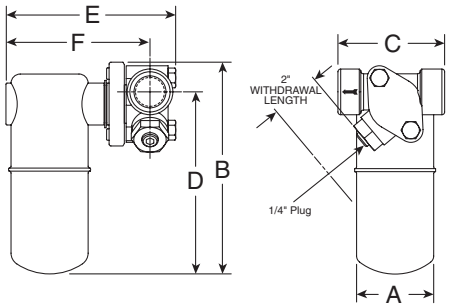
- Model number
- Size and type of pipe connection
- Type of 360° connector (with or without strainer)
- Maximum working pressure that will be encountered or orifice size
- Any options required

For a fully detailed certified drawing, refer to:

2000 Series with Standard Connector	**CD #1003**
2000 Series with IS-2 Conncector	**CD #1113**



Model 2011 Trap With Standard Connector



Series 2010-2022 With IS-2 Connector

2000 Series Traps With Standard Connector

Model No.	2010		2011		2022	
	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4	15, 20	1/2, 3/4	15, 20
"A" (Diameter)	2-11/16	68	2-11/16	68	3-7/8	98
"B" (Height)	6	152	6-15/16	176	8-11/16	221
"C" (Face to Face)	2-3/8	60	2-3/8	60	2-3/8	60
"D" (Bottom to ℄)	4-19/32	117	5-9/16	141	7-3/8	187
"E" (℄ to Outside)	4-9/16	115	4-9/16	115	5-3/4	146
"F" (℄ to Bolt)	1	25	1	25	1	25
Weight lb (kg)	4-1/4 (1.9)		4-1/2 (2.0)		7 (3)	

2000 Series Traps With IS-2 Integral Strainer Connector

Model No.	2010				2011				2022			
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1	25	1/2, 3/4	15, 20	1	25	1/2, 3/4	15, 20	1	25
"A" (Diameter)	2-11/16	68	2-11/16	68	2-11/16	68	2-11/16	68	3-7/8	98	3-7/8	98
"B" (Height)*	6	152	6	152	6-15/16	176	6-15/16	176	8-11/16	221	8-11/16	221
"C" (Face to Face)	3-1/2	89	4	102	3-1/2	89	4	102	3-1/2	89	4	102
"D" (Bottom to ℄)*	5	127	5	127	6	152	6	152	7-3/4	197	7-3/4	197
"E" (Outside to Bolt)	5-1/2	140	5-11/16	144	5-1/2	140	5-11/16	144	6-11/16	170	6-7/8	175
"F" (℄ to Outside)	4-5/8	117	4-13/16	122	4-5/8	117	4-13/16	122	5-13/16	148	6	152
Weight lb (kg)	4-3/4 (2.2)		5-1/4 (2.4)		5 (2.3)		5-1/2 (2.5)		7 (3)			

*Add 1/2" (15 mm) to "B" and "D" dimensions when optional probe connection is required.

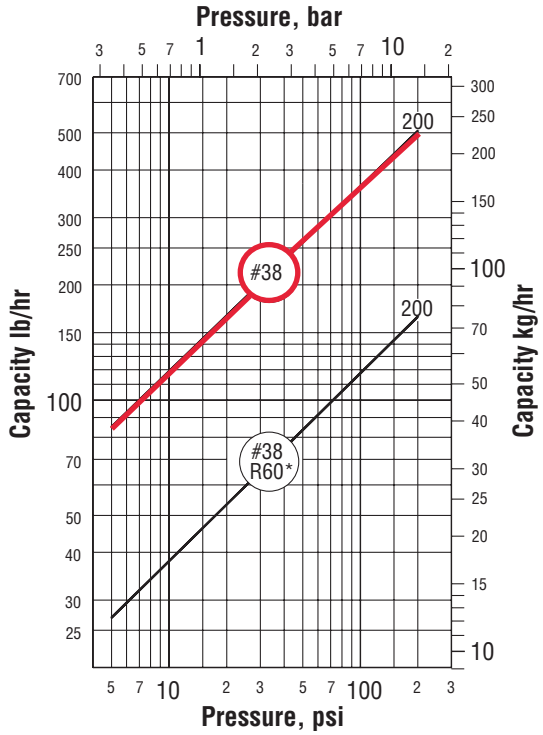
Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

2000 Series Inverted Bucket Steam Trap

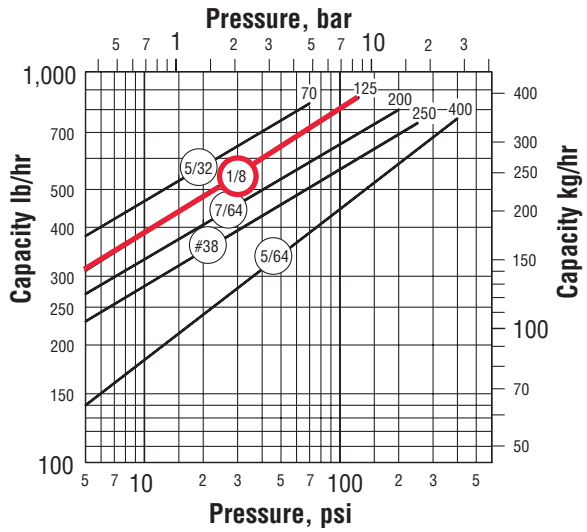
All Stainless Steel With 360° Connector/IS-2/TVS-4000

For Pressures to 650 psig (45 bar)...Capacities to 1,300 lb/hr (590 kg/hr)

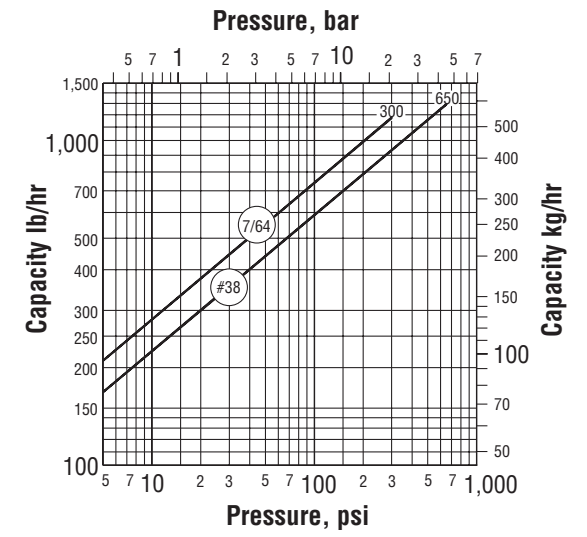
Model 2010 Capacity



Model 2011 Capacity



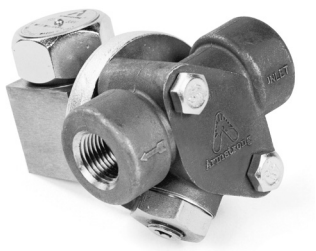
Model 2022 Capacity



*NOTE: Because the orifice is located at the top, inverted bucket steam traps handle dirt and scale better than other types of traps. However, in applications where extremely dirty conditions exist, care should be exercised in the use of all types of restricted-orifice, reduced-capacity traps.

Connectors

Besides the inverted bucket traps, the standard connector, IS-2 connector, and TVS-4000 connector with integral strainer can also be used on thermostatic, thermostatic wafer and disc traps.



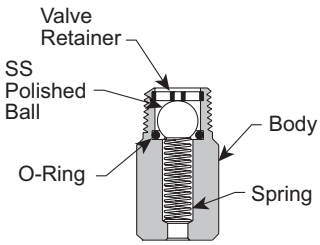
CD-3300 Disc Trap
With IS-2 Integral Strainer Connector

Options

Pop Drain for Freeze Protection
In general, a properly selected and installed Armstrong trap will not freeze as long as steam is coming to the trap. If the steam supply is shut off, a pop drain should be used to automatically drain the trap. Stainless steel pop drain available for Models 2011 and 2022.

Maximum Operating Conditions

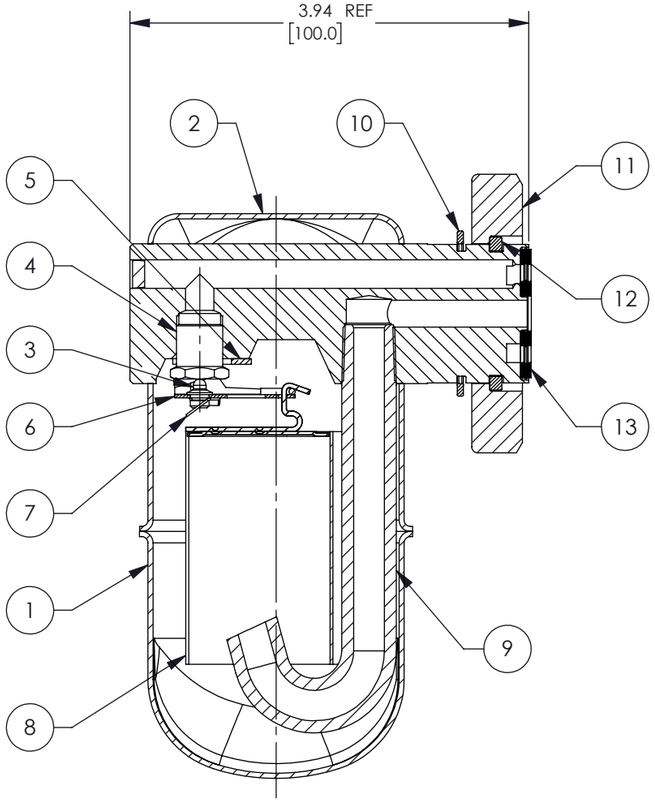
Pressure:	600 psig (41 bar)
Temperature:	350°F (177°C)



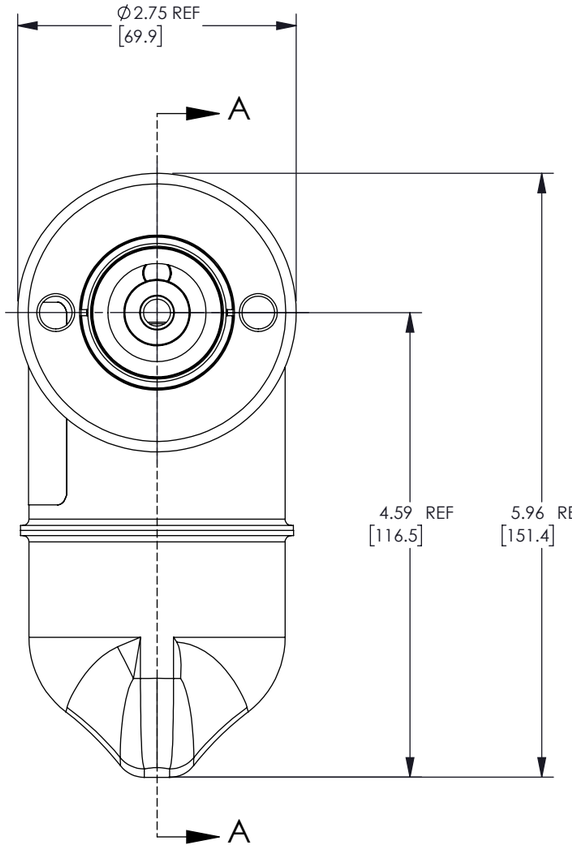
Insu-Pak
Now you can insulate the in-line traps in your plant without complicating regular trap maintenance. Insu-Pak, a simple reusable insulation package, cuts the time and cost of in-field installation because it goes on in a snap. And it comes off just as easily. The Insu-Pak can prevent trap freeze-up when used with a properly designed condensate manifold. Designed for use with Model 2010 and Model 2011 traps.

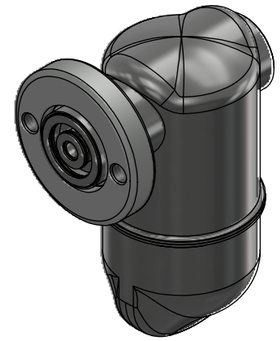
Probe connections are available for trap monitoring for Models 2011 and 2022.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.



SECTION A-A





ITEM	DESCRIPTION	MATERIAL	QTY
1	BODY	ASTM A240 TYP 304L	1
2	CAP	ASTM A240 TYP 304L	1
3	VALVE	ASTM A564 TYP 630 COND H900	1
4	SEAT	ASTM A564 TYP 630 COND H900	1
5	GUIDE PLATE ASSEMBLY	ASTM A240 TYP 304L	1
6	LEVER ASSEMBLY	CARPENTER 20 CB-3	1
7	RETAINER	ASTM A240 TYP 302	1
8	BUCKET	ASTM A240 TYP 304	1
9	INLET TUBE	ASTM A312 GR. TYP304L	1
10	RETAINING RING EXTERNAL	CARBBON STEEL	1
11	FLANGE	ASTM A105N ZINC PLTD	1
12	FLANGE RETAINING RING	ASTM A276 TYP 304	2
13	CONNECTOR GASKETS	SS 304 + FLEXITE SUPER	1
14	N/A	N/A	N/A
15	N/A	N/A	N/A

DESIGN CONDITIONS			
PMA	400 PSI AT 800 F [27.5 BAR AT 427 C]		
PMO	200 PSI [13.7 BAR]		
CUSTOMER	Arcadis of NY		
CONSULTANT	FW Webb PCD		
TAG NUMBER			
END USER:	Bristol-Myers Squibb	QTY:	1
P.O.NUMBER:		DWG REV:	

VENDOR DOCUMENT REVIEW

- ☐ WORK MAY PROCEED
- ☐ REVISE & RESUBMIT. WORK MAY PROCEED. SUBJECT TO INCORPORATION OF COMMENTS
- ☐ REVISE & RESUBMIT. WORK SHALL NOT PROCEED.
- ☐ FOR INFORMATION

ENGINEER'S SIGN. : DATE :

NOTES:
1. WELD PROCEDURES AND WELDER TO BE QUALIFIED TO ASME BPVC SEC IX
2. NOTE N/A
3. NOTE N/A
4. NOTE N/A
5. NOTE N/A
6. NOTE N/A
7. BUCKET VENT SIZE = #46

DO NOT SCALE DRAWING

TOLERANCES UNLESS OTHERWISE SPECIFIED

DIMENSIONING ENGLISH [mm]

FRACTIONAL ± 1/64
ANGULAR: ± 2

		IN.	MM
DECIMAL	.XXXX ±	.0005	-----
	.XXX ±	.005	.010
	.XX ±	.015	.10
	.X	----------	.3

Armstrong®

	NAME	DATE
DRAWN	CFG	10/20/2022
RELEASED		

ARMSTRONG INTERNATIONAL

2010 #38

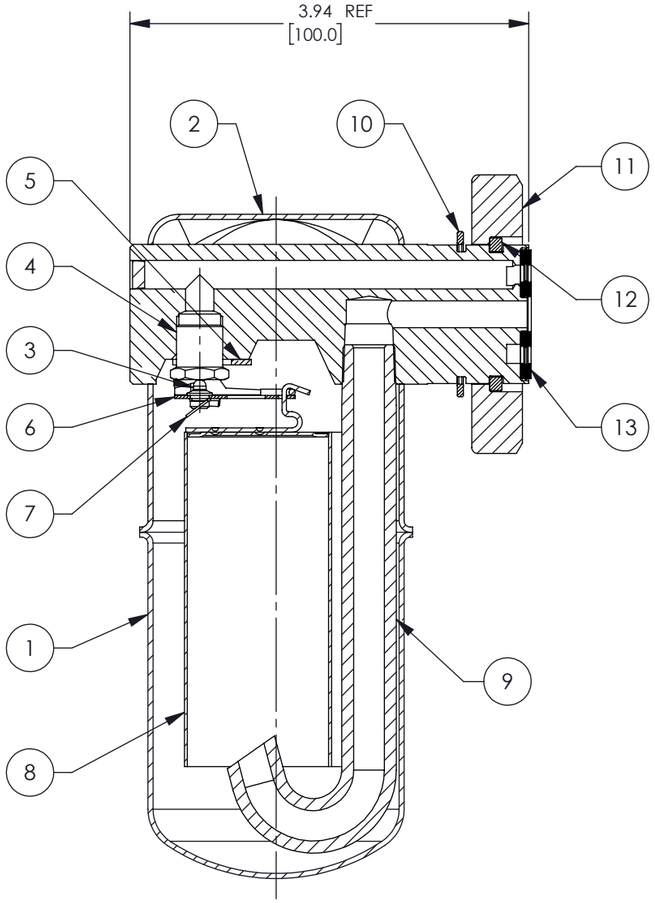
CONFIG # (C-576921)

MATERIAL REFER TABLE

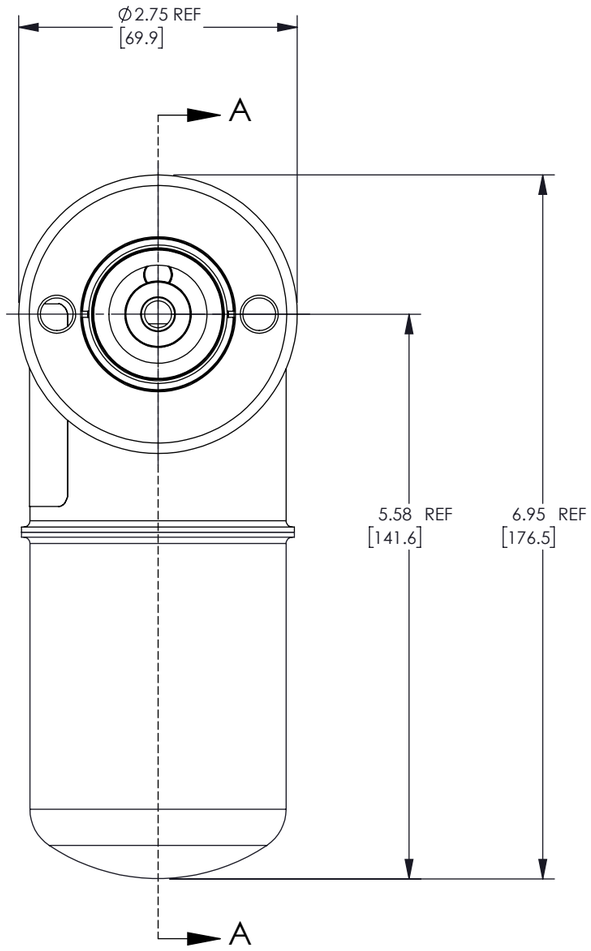
SHEET 1 OF 1

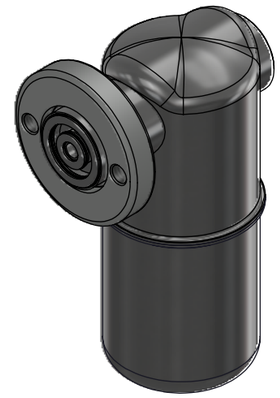
REV

DWG DXXXXXX



SECTION A-A





ITEM	DESCRIPTION	MATERIAL	QTY
1	BODY	ASTM A240 TYP 304L	1
2	CAP	ASTM A240 TYP 304L	1
3	VALVE	ASTM A564 TYP 630 COND H900	1
4	SEAT	ASTM A564 TYP 630 COND H900	1
5	GUIDE PLATE ASSEMBLY	ASTM A240 TYP 304L	1
6	LEVER ASSEMBLY	CARPENTER 20 CB-3	1
7	RETAINER	ASTM A240 TYP 302	1
8	BUCKET	ASTM A240 TYP 304	1
9	INLET TUBE	ASTM A312 GR. TYP304L	1
10	RETAINING RING EXTERNAL	CARBBON STEEL	1
11	FLANGE	ASTM A105N ZINC PLTD	1
12	FLANGE RETAINING RING	ASTM A276 TYP 304	2
13	CONNECTOR GASKETS	SS 304 + FLEXITE SUPER	1
14	N/A	N/A	N/A
15	N/A	N/A	N/A

DESIGN CONDITIONS			
PMA	400 PSI AT 800 F [27.5 BAR AT 427 C]		
PMO	125 PSI [8.6 BAR]		
CUSTOMER	Arcadis of NY		
CONSULTANT	FW Webb PCD		
TAG NUMBER			
END USER:	Bristol-Myers Squibb	QTY:	1
P.O.NUMBER:		DWG REV:	

VENDOR DOCUMENT REVIEW

- ☐ WORK MAY PROCEED
- ☐ REVISE & RESUBMIT. WORK MAY PROCEED. SUBJECT TO INCORPORATION OF COMMENTS
- ☐ REVISE & RESUBMIT. WORK SHALL NOT PROCEED.
- ☐ FOR INFORMATION

ENGINEER'S SIGN. : DATE :

NOTES:
1. WELD PROCEDURES AND WELDER TO BE QUALIFIED TO ASME BPVC SEC IX
2. NOTE N/A
3. NOTE N/A
4. NOTE N/A
5. NOTE N/A
6. NOTE N/A
7. BUCKET VENT SIZE = #46

DO NOT SCALE DRAWING
TOLERANCES UNLESS OTHERWISE SPECIFIED
DIMENSIONING ENGLISH [mm]
FRACTIONAL ± 1/64
ANGULAR: ± 2

		IN.	MM
DECIMAL	.XXXX ±	.0005	-----
	.XXX ±	.005	.010
	.XX ±	.015	.10
	.X	----------	.3

Armstrong®

	NAME	DATE
DRAWN	CFG	10/21/2022
RELEASED		

ARMSTRONG INTERNATIONAL

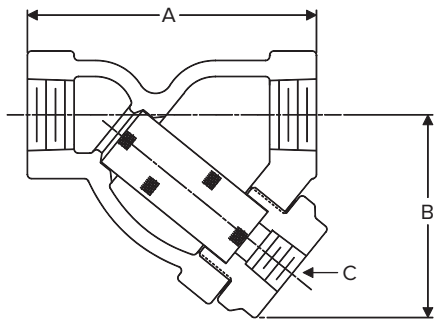
2011 1/8

CONFIG # (C-577149)

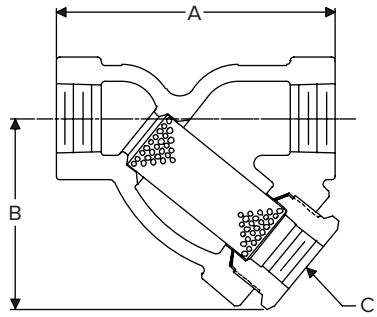
MATERIAL REFER TABLE | SHEET 1 OF 1

REV | DWG DXXXXXX

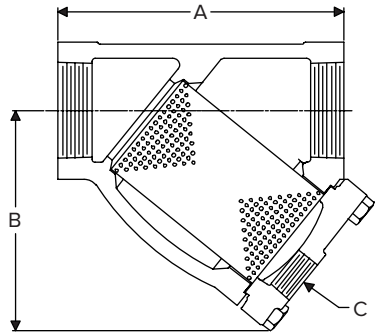
Cast Iron
250 lb Screwed 1/2" - 3"



CA1SC 1/2", 3/4", 1", 1-1/2", 2"



CA1SC 1-1/4"

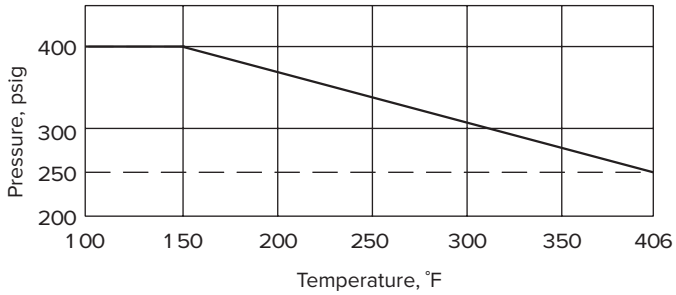


A1SC 2-1/2", 3"

For a fully detailed certified drawing, refer to:

CA1SC 1/2", 3/4", 1", 1-1/4", 1-1/2", 2"	**CD #1111**
A1SC 2-1/2", 3"	**CD #1043**

Pressure/Temperature Rating



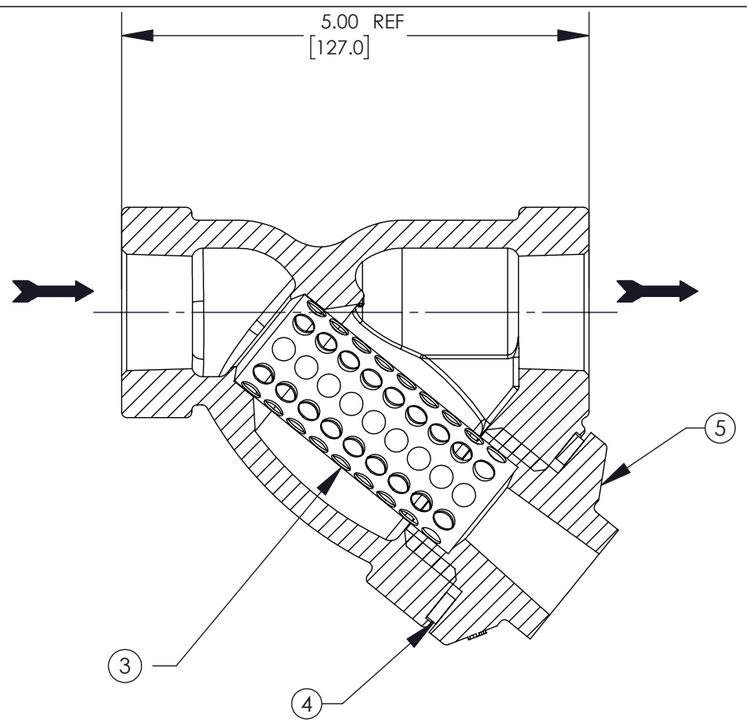
Materials: 250 lb Screwed 1/2" - 3" (15 - 80 mm)

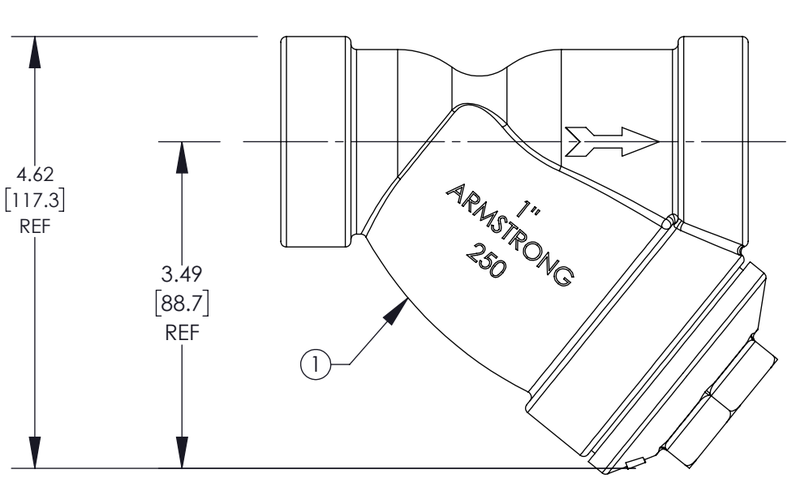
Connections Size		Body	Standard Screen	Screen Retainer	Gasket	Bolting
in	mm					
1/2, 3/4	15, 20	ASTM A48 Class 30 Cast Iron	304 SS .045" perforated†	ASTM A48 Class 30 Cast Iron	Spiral Wound	N/A
1, 1-1/2, 2	25, 40, 50					
1-1/4	32				Soft Steel	
2-1/2, 3	65, 80		304 SS .045" perforated†		Non-asbestos	Cap Screws ASTM A193 Gr. B7

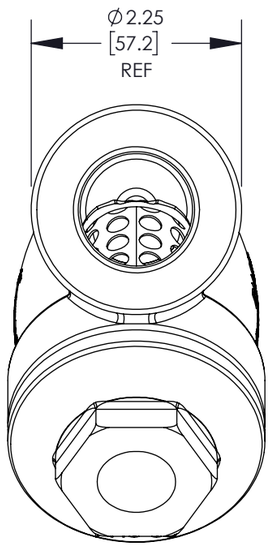
†NOTE: Other screen materials available. See page 435.

Physical Data: 250 lb Screwed 1/2" - 3" (15 - 80 mm)

Size		Ordering Code, Standard Screen	Weight		Dimensions						Maximum Pressure				Screen Retainer Type	Connections
					A		B		C		Saturated Steam		150°F (66°C) non-shock			
in	mm		lb	kg	in	mm	in	mm	in	mm	psig	barg	psig	barg		
1/2	15	CA1SC	3	1.4	4-1/4	108	3	76	3/8	9.5	250	17	400	28	Threaded	ANSI B1.20.1 Screwed
3/4	20								1/2	15						
1	25		4-1/2	2	5	127	3-3/4	95								
1-1/4	32		7	3	5-1/2	140	3-7/8	98								
1-1/2	40		10	4.5	6-5/16	160	4-7/16	113								
2	50		15	6.8	7-1/2	191	5-7/16	138								
2-1/2	65	A1SC	24-1/2	11	8-1/2	216	6-7/16	164	3/4	20					Bolted	
3	80		45-1/2	21	10-1/2	267	8	203	1-1/4	32						







ITEM	DESCRIPTION	MATERIAL	QTY
1	BODY	ASTM A48 CLASS 30	1
2	N/A	N/A	1
3	PERFORATED SCREEN .045 PERF	304 STAINLESS STEEL	1
4	GASKET	304 SPIRAL WOUND GRAPHITE	1
5	RETAINER	ASTM A48 CLASS 30	1
6	N/A	N/A	1
7	N/A	N/A	4

CONNECTIONS	
INLET	1 NPT
OUTLET	1 NPT
DRAIN	1/2 NPT

DESIGN CONDITIONS	
PMA	250 PSI AT 100 F [17.2 BAR AT 38 C]
CUSTOMER	
CONSULTANT	
TAG NUMBER	
END USER:	QTY:
P.O. NUMBER:	DWG REV:

VENDOR DOCUMENT REVIEW

☐ WORK MAY PROCEED

☐ REVISE & RESUBMIT. WORK MAY PROCEED. SUBJECT TO INCORPORATION OF COMMENTS

☐ REVISE & RESUBMIT. WORK SHALL NOT PROCEED.

☐ FOR INFORMATION

ENGINEER'S SIGN. : DATE :

NOTES:

1. NOTE N/A
2. NOTE N/A
3. PAINT USING ARMSTRONG STANDARD PAINT PER MANUFACTURING INSTRUCTIONS.
4. NOTE N/A

DO NOT SCALE DRAWING

TOLERANCES UNLESS OTHERWISE SPECIFIED

DIMENSIONING ENGLISH [mm]

FRACTIONAL ± 1/64
ANGULAR: ± 2

		IN.	MM
DECIMAL	.XXXX ±	.0005	-----
	.XXX ±	.005	.010
	.XX ±	.015	.10
	.X	----------	.3

Armstrong®

	NAME	DATE
DRAWN	CFG	10/20/2022
RELEASED		

STRAINER Y 1 NPT CI A48 .045 PERF SS T304 1/2 NPT BD

CONFIG # (C-576867)

MATERIAL

SHEET 1 OF 1

REV

DWG C-576867

For Steam, Air and Non-Corrosive Gas

The GP-1000 Series valves are pilot-controlled for accurate regulation of pressure under wide-ranging flow. Internal pilot design eliminates external components and piping.

Internally piloted GP Series valves are capable of larger capacity and greater accuracy than direct acting valves.

Completely supported by piping, lightweight GP Series valves install easily with NPT or flanged connections. A stainless steel diaphragm, hardened stainless steel working parts and integral removable strainer team up to provide high performance over a long, trouble-free service life. Valves are equipped with a single seated main valve, piston valve rings for longer life and an external adjusting screw with locking nut. All working parts are renewable in-line. ANSI Class IV Shutoff.

For a fully detailed certified drawing, refer to list below.

GP-1000 NPT	**CD #2104**
GP-1000 Flanged	**CD #2105**
GP-1000 SS/AS	**CDY #1081**

GP-1000

Model Number	Pressure: Inlet psig (barg)	Pressure: Reduced psig (barg)	Spring Color	Application	Maximum Temp. °F (°C)	Minimum Diff. psig (barg)	Body	Main Valve/ Valve Seat	Pilot Valve/Seat	Piston/Cylinder	Diaphragm
NPT GP-1000	15 - 250 (1 - 17)	7 - 125 (.48 - 8.6)	Black	Steam	450 (232)	7 (.48)	Ductile Iron ASTM A536	Stainless Steel AISI 420	Stainless Steel AISI 403/420	Stainless Steel AISI 420/Stainless Steel AISI 403	Stainless Steel AISI 301
		125 - 200 (8.6 - 13.8)	Green								
150 ANSI GP-1000	15 - 150 (1 - 10)	7 - 125 (.48 - 8.6)	Black							Bronze/Bronze ASTM C36000	
NPT GP-1000A	15 - 150 (1 - 10)	7 - 125 (.48 - 8.6)		Air & Gas	175 (80)			Stainless Steel AISI 420/Brass w/NBR			
150 ANSI GP-1000A	15 - 150 (1 - 10)	7 - 125 (.48 - 8.6)									
GP-1000SS* GP-1000AS*	15 - 150 (1 - 10)	7 - 125 (.48 - 8.6)		Steam	450 (232)		Stainless Steel AISI 304	Stainless Steel AISI 420	Stainless Steel AISI 403/420	Stainless Steel AISI 420/Stainless Steel AISI 403	

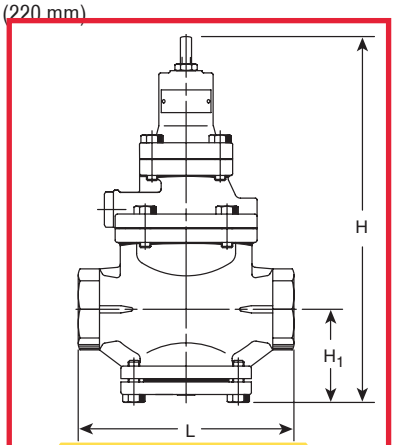
NOTES: Sizes 2" (50 mm) and below are NPT connections. Sizes 2" (50 mm) and larger are flanged connections.
Turndown ratio for GP-1000 20:1.
*GP-1000SS/GP-1000AS are available in 1/2" - 2" only and are flanged with NPT companion flanges.

GP-1000, GP-1000A, GP-1000SS, GP-1000AS Dimensions and Weights

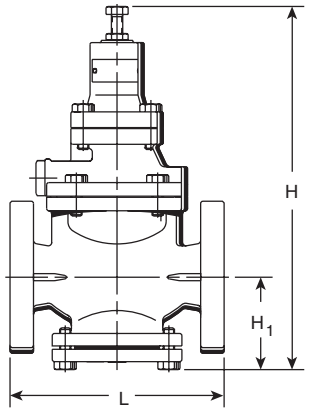
Symbol	Connection Size																	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	1/2	15	3/4	20	1	25	1-1/4	32	1-1/2	40	2*	50	2-1/2	65	3	80	4	100
L	5-7/8	150	6-1/8	155	6-5/16	160	7-1/2	190	7-1/2	190	8-11/16	220	9-5/8	245	11-3/8	290	13	330
H	11-1/4	285	11-1/4	285	11-7/8	300	12-3/4	323	12-3/4	323	13-5/8	347	14	357	15-7/8	404	17-3/4	450
H_1	2-1/2	64	2-1/2	64	2-5/8	67	3-1/4	82	3-1/4	82	3-11/16	93	4	100	4-13/16	122	5-9/16	144
Wt, lb (kg)	15-1/2 (7)		15-1/2 (7)		19 (8.5)		25-1/2 (12)		27-1/2 (12.5)		40 (18)		66 (30)		77 (35)		116 (53)	
C_V	1		2.3		4		6.5		9		16		25		36		64	

NOTES: GP-1000 is 1/2"-2" (20-50 mm) NPT, 2"- 4" (50-100 mm) ANSI 150 lb flanged.
* "L" Dimension for 2" 150# flange is 8-11/16" (220 mm)

GP-1000



GP-1000 NPT 1/2" - 2"



GP-1000 150 FL 2" - 4"

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

Capacities for Steam, Air and Non-Corrosive Gas

GP-1000 Capacities—Steam

Inlet psig	Outlet psig	lb/hr Connection Size in 1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
C_V Factor		1	2.3	4	6.5	9	16	25	36	64
15	8	40	93	161	261	362	644	1,005	1,448	2,574
	5	47	107	187	303	420	747	1,167	1,680	2,987
20	13	44	101	176	285	395	702	1,097	1,580	2,809
	5	60	138	240	390	540	960	1,500	2,160	3,839
30	23	50	116	202	328	454	807	1,261	1,816	3,228
	5 - 7	76	176	306	497	688	1,223	1,911	2,752	4,892
40	33	56	129	225	365	506	900	1,406	2,024	3,598
	25	79	182	316	514	711	1,264	1,976	2,845	5,057
	5 - 12	94	215	374	608	842	1,497	2,338	3,367	5,986
50	42	65	151	262	425	589	1,047	1,636	2,356	4,188
	30	98	226	393	638	884	1,572	2,456	3,536	6,287
	5 - 17	111	254	443	719	996	1,770	2,766	3,983	7,081
75	63	94	216	376	612	847	1,506	2,353	3,388	6,024
	45	141	323	562	914	1,265	2,249	3,515	5,061	8,998
	5 - 30	153	353	614	997	1,380	2,454	3,835	5,522	9,817
100	85	119	274	476	774	1,072	1,905	2,977	4,287	7,622
	70	162	374	650	1,056	1,462	2,599	4,061	5,847	10,395
	5 - 42	196	451	785	1,275	1,765	3,138	4,903	7,061	12,553
125	106	148	340	591	960	1,329	2,363	3,693	5,318	9,454
	100	167	385	670	1,089	1,507	2,680	4,187	6,029	10,718
	75	225	517	900	1,462	2,024	3,598	5,623	8,097	14,394
	7 - 55	239	549	956	1,553	2,150	3,822	5,972	8,600	15,289
150	125	183	421	733	1,191	1,649	2,931	4,580	6,595	11,724
	100	248	571	993	1,613	2,234	3,971	6,205	8,936	15,885
	80	283	651	1,132	1,839	2,547	4,528	7,074	10,187	18,111
	8 - 67	282	648	1,127	1,831	2,535	4,506	7,041	10,139	18,025
175	148	205	471	819	1,331	1,844	3,277	—	—	—
	125	270	620	1,078	1,752	2,426	4,312	—	—	—
	100	317	730	1,269	2,062	2,856	5,077	—	—	—
	9 - 80	324	746	1,298	2,109	2,919	5,190	—	—	—
200	170	230	529	919	1,494	2,069	3,678	—	—	—
	150	289	665	1,157	1,880	2,603	4,628	—	—	—
	125	342	787	1,369	2,225	3,081	5,478	—	—	—
	10 - 92	367	844	1,469	2,386	3,304	5,874	—	—	—
225	191	258	594	1,034	1,680	2,326	4,135	—	—	—
	175	308	708	1,231	2,000	2,769	4,923	—	—	—
	150	366	841	1,463	2,377	3,292	5,852	—	—	—
	12 - 105	410	943	1,640	2,664	3,689	6,558	—	—	—
250	200	325	748	1,301	2,113	2,926	5,202	—	—	—
	175	388	892	1,551	2,520	3,489	6,203	—	—	—
	150	435	1,001	1,741	2,829	3,916	6,963	—	—	—
	13 - 117	453	1,041	1,811	2,942	4,074	7,242	—	—	—

NOTE: For air capacities scfm, multiply steam capacities lb/hr by 0.36.

Armstrong Steam-A-ware™
Pressure/Temp. Controls

Application

Application	Single Stage Steam PRV	Revision Level	
By	Michael Reed	Company Name	PCD FW Webb
Valve ID Number		Comments	
Maximum Flow Rate	701lb/hr	Minimum Flow Rate	701___lb/hr
Maximum Inlet Pressure	115psig	Minimum Inlet Pressure	115___psig
Desired Outlet Pressure	75psig	Desired Noise Level	85dBa
Safety Relief Set Pressure	85psig	Superheated Steam Temp. (Total)	347F
Saturated Steam Temp.	347 F	Required Valve Cv	3.56
Reduction Ratio	0.31	Estimated Noise Level	58 dBa

Product Information

Valve Type	Internally Piloted PRV
Model Number	GP-1000 (NPT)
Connection Size	1"
Connection Type	NPT
Max. Valve Cv	4.00
Max Capacity of Valve	787 lbs/hr
Service	Steam
Inlet Pressure	15 - 150 psig
Reduced Pressure	5 - 125 psig
Min. Diff. Press.	7 psig
Maximum Temp.	450F
Material	Cast Iron
Weight	19 lbs
Capacity % (Req'd Cv/Actual Cv)	89%
Recommended Inlet Size	1 in
Inlet Velocity	6,645 ft/min
Recommended Delivery Pipe Size	1 in
Delivery Pipe Velocity	9,377 ft/min
Max. Capacity of valve for safety relief sizing	787 lbs/hr

Specification

Internally piloted, piston operated pressure reducing valve, incorporating two valves. A pilot and main valve in one unit. In cast iron, with field adjustable screw to achieve desired set pressure, operating with a flat diaphragm and stainless steel valves and seats. Piston and cylinder shall be made of bronze. It is self-contained and does not require an external sensing line.

Contact Local Sales Office: http://www.armstronginternational.com/replocator

Armstrong International, Inc.
221 Armstrong Blvd., P.O. Box 408, Three Rivers, Michigan 49093 - USA Phone: (269) 279-3600 Fax: (269) 273-8656

Product or Model Information

Item Number:	SC-576849
Basic Item Description:	SPT204LBRPI 6 1 X 1 NPT 0FH OPEN SYS SSCV SCH80 ADD OPTIONS ADD PIPING

Detailed Item Description:

Open Loop (Vented) System
Industrial Package - Carbon Steel Pump Inlet Isolation Valve, 3000# Forged Steel Fittings
Schedule 80 Piping
Simplex Package - 1 Pump
PT-204 Non-Code Cast Iron Pump(s) - 1" NPT Inlet x 1” NPT Outlet
4 Gallon ASME Code Carbon Steel Receiver (6" DIA X 36" LG) - 150 PSIG Max Vessel Pressure
1-1/2" NPT Receiver Inlet
2" NPT Receiver Vent
0" Fill Head
Stainless Steel Inlet and Outlet Check Valve(s)
Bronze Gauge Glass on Each Pump
Bronze Gauge Glass on Receiver
Pressure Gauge and Cycle Counter Assembly on Each Pump
Vent Manifold
Motive Drip Trap Station
Overflow Piping
Pump Drain(s)
Receiver Drain
Discharge Isolation Valve After Each Pump
Standard Armstrong Factory Paint (Black)

Complete product information

Product Features and Benefits:

- Economical non-electric operation. Uses inexpensive steam, air, or inert gas as a motive source (air and inert gas for use with open loop packages only).
- Low-maintenance operation. No leaking seals, impeller or motor problems means lower maintenance. No NPSH issues.
- Space-saving size. Low-profile body fits in tight spaces while allowing minimal fill head.
- Lower installation costs. Single trade required for installation and maintenance.

Configuration Number: C-576849

Document Created: 2022-10-20 09:09:08

Armstrong® PT-200 Series Low Profile Cast Iron Pump Trap

3-Year No Fail Warranty
3-Year No Fail
Pump Trap Mechanism

The Armstrong PT-200 Series Low Profile Pump Trap is a low maintenance, non-electric solution to move condensate or other liquids from low points, low pressures or vacuum spaces to an area of higher elevation or pressure. Condensate can be returned well above the 200°F (93°C) limit of conventional electric condensate pumps without the headaches of leaking seals or cavitation problems.

Features

- Economical non-electric operation. Uses inexpensive steam, air or inert gas.
- Low-maintenance operation. No leaking seals, impeller or motor problems means lower maintenance. No NPSH issues.
- Space-saving size. Low-profile body fits in tight spaces while allowing minimal fill head.
- Lower installation costs. Single trade required for installation and maintenance.
- Peace of mind. Standard unit is intrinsically safe.
- Cast iron durability. Rugged construction material means long service life.
- Corrosion resistance. Internals are all stainless steel for corrosion resistance and long life.
- Heavy-duty springs. Springs are made from long-lasting Inconel X-750.
- Efficiency. A closed loop means no motive or flash steam is lost. All valuable Btu's are captured and returned to the system.
- Safety. The pump can be used in flooded pits without fear of electrocution or circuit breaker defaults.
- Externally removable/replaceable seats. Seats can be replaced or cleaned without removing the mechanism assembly.

Options

Use of external check valves required for operation of pumping trap.

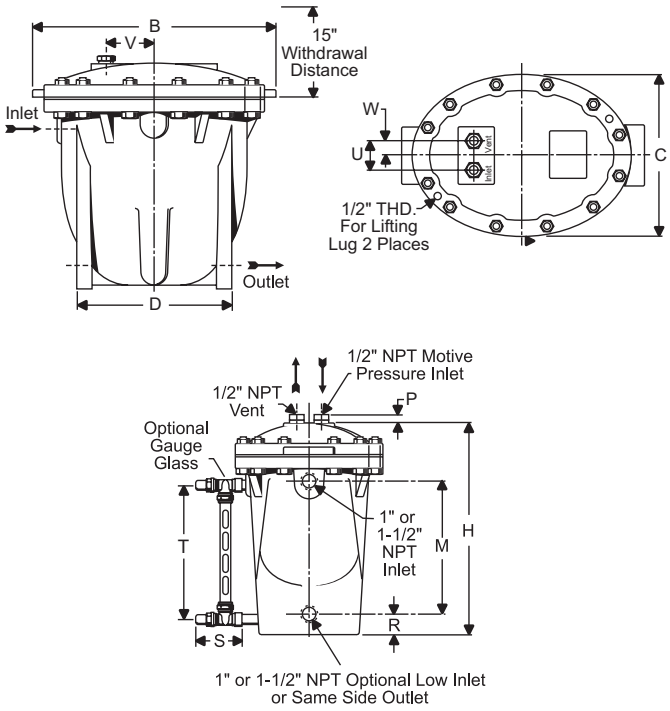
- Inlet Swing Check Valve
  - NPT Bronze ASTM B 62
  - Teflon® Disc
  - Class 150 (Minimum)
- Outlet
  - Stainless Steel Check Valve
  - Class 150 (Minimum)
- In-line Check Valves
  - Stainless Steel Non-Slam Check Valves
- Bronze Gauge Glass Assembly
- Steel Gauge Glass Assembly
- Removable Insulation Jacket
- Digital Cycle Counter

For a fully detailed certified drawing, refer to CDF #1000.

PT-200 Pumping Trap Materials	
Name of Part	**Series PT-200**
Body and Cap	Cast iron ASTM A48 Cl. 30
Cap Gasket	Graphoil
Bolts	SA-449 Steel
Nuts	Alloy steel ASTM A194 Gr. 2H
Inlet Valve Assembly	Stainless steel
Vent Valve Assembly	Stainless steel
Valve Assembly Washers	Zinc plated steel
Plug	Steel
Mechanism Assembly	Stainless steel
Springs	Inconel X-750

PT-200 Pumping Trap Connection Sizes				
Model	**Cast Iron**			
	PT-204		**PT-206**	
	in	**mm**	**in**	**mm**
Inlet Connection	1	25	1-1/2	40
Outlet Connection	1	25	1-1/2	40
Optional Low Inlet or Same Side Outlet Connection	1	25	1-1/2	40
Motive Pressure Connection	1/2	15	1/2	15
Vent Connection	1/2	15	1/2	15
Gauge Glass Connection	1/2	15	1/2	15

PT-200 Series Low Profile Cast Iron Pump Trap



PT-200 Pumping Trap Physical Data	PT-204 PT-206	
	in	mm
"B"	20-7/16	519
"C"	13-1/2	342
"D"	12-15/16	328
"H"	19	482
"M"	11-35/64	293
"P"	23/32	18
"R"	2-1/32	51
"S"	4-3/8	111
"T"	12	305
"U"	2-1/4	57
"V"	4-1/8	104
"W"	1-1/8	28
Weight lb (kg)	210 (96)	
Number of Body/Cap Bolts	12	
Check Valve Conn. in (mm)	1 (25)	1-1/2 (40)
Bronze Check Valves lb (kg)	4 (2)	9 (4)
Stainless Steel Check Valves lb (kg)	4 (2)	9 (4)

Maximum Allowable Pressure (Vessel Design) 150 psig @ 450°F (10 bar @ 232°C)
Maximum Operating Pressure 125 psig (9 bar)

PT-200 Capacity Conversion Factors for Other Fill Heads											
Fill Head		in	mm	in	mm	in	mm	in	mm	in	mm
		0	0	6	152	12	305	24	610	36	914
Model	PT-204	0.7		1		1.1		1.3		1.4	
	PT-206	0.7		1		1.1		1.3		1.4	

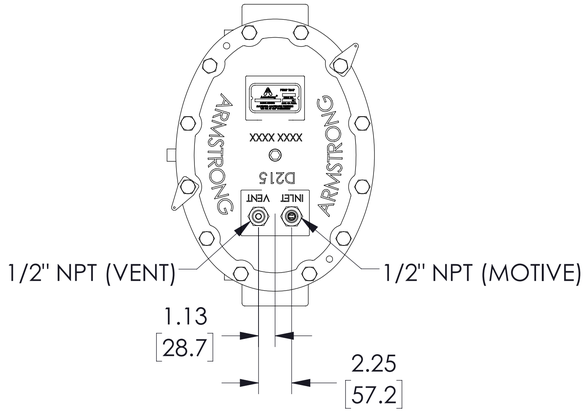
NOTE: Fill head is measured from drain point to top of cap. See figures on page 234.

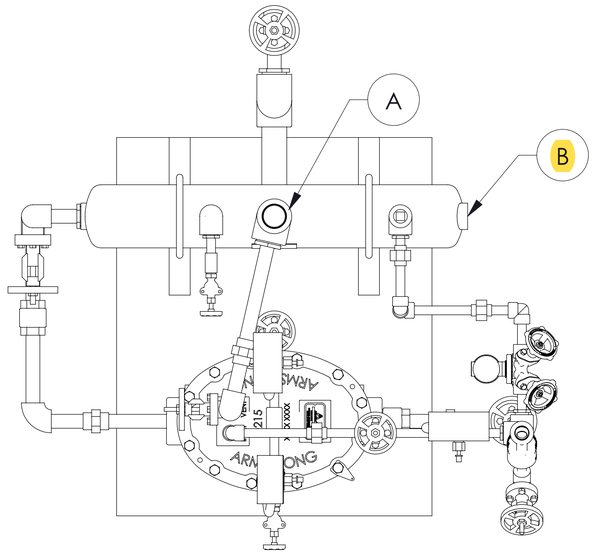
PT-200 Pumping Trap Capacities

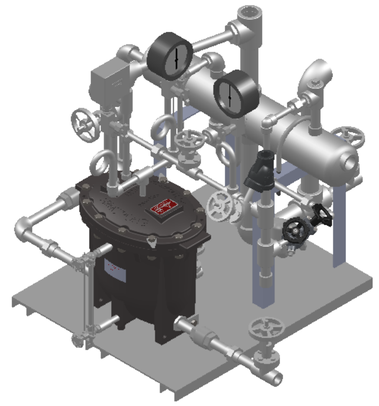
Motive Pressure		Total Lift or Back Pressure		PT-204 (6" Fill Head) 1" x 1"				PT-206 (6" Fill Head) 1-1/2" x 1-1/2"			
				Steam Motive		Air Motive		Steam Motive		Air Motive	
psig	bar	psig	bar	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15	1.0	5	0.34	1,800	816	2,100	953	2,700	1,225	3,000	1,361
25	1.7			2,025	919	2,300	1,043	3,200	1,451	3,500	1,588
50	3.5			2,100	953	2,500	1,134	3,400	1,542	3,600	1,633
75	5			2,200	998	2,700	1,225	3,500	1,588	3,700	1,678
100	7			2,300	1,043	*	*	3,600	1,633	*	*
125	8.5			2,400	1,089	*	*	3,700	1,678	*	*
25	1.7	15	1	1,500	680	2,000	907	2,400	1,088	2,700	1,225
50	3.5			2,000	907	2,250	1,021	3,200	1,451	3,400	1,542
75	5			2,100	953	2,500	1,134	3,300	1,497	3,500	1,588
100	7			2,110	957	*	*	3,350	1,520	*	*
125	8.5			2,125	964	*	*	3,400	1,542	*	*
35	2.5	25	1.5	1,500	680	1,700	771	2,100	953	2,300	1,043
50	3.5			1,700	771	2,000	907	2,400	1,089	2,600	1,179
75	5			1,900	862	2,300	1,043	2,700	1,225	2,900	1,315
100	7			2,000	907	*	*	2,800	1,270	*	*
125	8.5			2,100	953	*	*	2,900	1,315	*	*
50	3.5	40	2.75	1,400	635	1,700	771	1,500	680	2,000	907
60	4			1,500	680	2,000	907	2,000	907	2,300	1,043
75	5			1,700	771	2,200	998	2,300	1,043	2,500	1,134
100	7			1,800	816	*	*	2,400	1,089	*	*
125	8.5			1,920	871	*	*	2,500	1,134	*	*
70	4.5	60	4	1,100	499	2,000	907	1,150	522	2,000	907
75	5			1,300	590	2,300	1,043	1,325	601	2,300	1,043
100	7			1,600	726	*	*	1,900	862	*	*
125	8.5			1,720	780	*	*	2,000	907	*	*

NOTES: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump cap. See figures on page 234. Although motive pressures are shown at high pressure differentials (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 10 - 15 psig (0.65 - 1.0 bar) above discharge (outlet) pressure. This ensures longevity of economical (bronze) check valves and reduces both venting time and temperature differential (on steam). If a higher differential is used, stainless steel check valves are recommended.
*Consult factory.

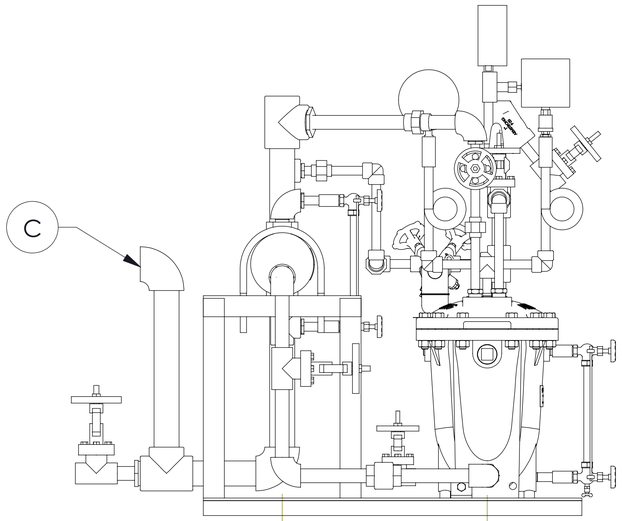
PUMP TRAP CAP
TOP VIEW

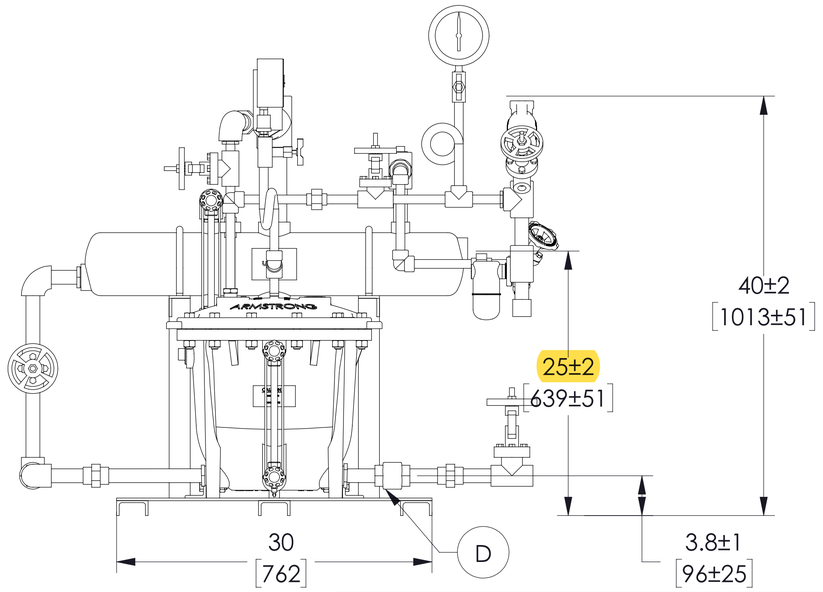






ITEM	MATERIAL
PUMP BODY	CAST IRON
RECEIVER	CARBON STEEL
INLET VALVE	FORGED STEEL
INLET CHECK VALVE	STAINLESS STEEL
OUTLET CHECK VALVE	STAINLESS STEEL
PIPE	ASTM A106 SCH80
FITTINGS	FORGED STEEL





PUMP TRAP MODEL	PT204
RECEIVER SIZE	6 X 36
GAUGE GLASS - PUMP	BRONZE
GAUGE GLASS - RECEIVER	BRONZE
PRESSURE GAUGE - PUMP	INCLUDED
CYCLE COUNTER - PUMP	NOT INCLUDED
INSULATION JACKET - PUMP	NOT INCLUDED
INSULATION JACKET - RECEIVER	NOT INCLUDED
MOTIVE DRIP TRAP STATION	INCLUDED
DISCHARGE ISOLATION VALVE	INCLUDED
VENT MANIFOLD	INCLUDED
OVERFLOW PIPING	INCLUDED
DRAIN - PUMP	INCLUDED
DRAIN - RECEIVER	INCLUDED

Arcadis - BMS
Arcadis - BMS

ITEM	SIZE	TYPE
A	2" NPT	VENT
B	1-1/2" NPT	INLET
C	2" NPT	DRAIN/OVERFLOW
D	1" NPT	OUTLET

APPROVAL

BY:_____ DATE:_____

- ☐ APPROVED, PROCEED WITH FABRICATION
- ☐ APPROVED AS NOTED, PROCEED WITH FABRICATION IN ACCORDANCE WITH COMMENTS
- ☐ DISAPPROVED, DO NOT FABRICATE

DO NOT SCALE DRAWING
TOLERANCES UNLESS OTHERWISE SPECIFIED
DIMENSIONING ENGLISH [mm]

FRACTIONAL ± 1/64
ANGULAR: ± 2

		IN.	MM
DECIMAL	.XXXX ±	.0005	-----
	.XXX ±	.005	.010
	.XX ±	.015	.10
	.X	----------	.3

Armstrong®

	NAME	DATE
DRAWN	CFG	06/04/2014
RELEASED		

SPT204LBRPI 6 1 X 1 NPT 0FH OPEN SYS SSCV
SCH80 ADD OPTIONS ADD PIPING

MATERIAL
CWF35843
REV A
SHEET 1 OF 1
DWG. SC-576849

Attachment B

Everhot Inc. PEX Specifications

EVERHOT INC.
Everhot, Inc.
tel: 800-832-0460 | fax: 800-659-9250
sales@everhotinc.com | www.everhotinc.com

Technical Specifications
PEX Tubing with Oxygen Barrier

Sizes: 3/8", 1/2", 5/8", 3/4" and 1".

PRESSURE RATINGS

Operating Pressure	Maximum working temperature
80 psi	200°F
100 psi	180°F
160 psi	73°F

DIMENSIONAL DATA

Tubing Size	OD	Wall thickness	ID	Volume gal/100'	Weight lbs/100'
3/8"	0.500±0.03	0.070±0.01	0.350	0.50	4.50
1/2"	0.625±0.04	0.070±0.01	0.475	0.92	5.80
5/8"	0.750±0.04	0.083±0.01	0.574	1.34	8.38
3/4"	0.875±0.04	0.097±0.01	0.677	1.83	11.00
1"	1.125±0.05	0.125±0.01	0.863	3.03	16.94

MINIMUM BENDING RADIUS

Minimum bending radius Rmin of Everhot PEX tubing is 8 times the outside diameter (OD):
Rmin = 8 x OD

PEX Size	OD	Rmin
3/8"	1/2"	4"
1/2"	5/8"	5"
5/8"	3/4"	6"
3/4"	7/8"	7"
1"	1-1/8"	9"

PRESSURE DROP TABLE (psi per 100ft)

Flow rate (GPM)	3/8"	1/2"	5/8"	3/4"	1"
0.5	2.50	0.51	0.21	0.05	0.02
1.0	7.50	1.70	0.71	0.34	0.10
2.0	26.1	5.30	2.12	1.02	0.35
3.0	54.1	11.0	4.36	2.10	0.63
4.0		18.4	7.36	3.53	1.06
5.0		27.4	11.0	5.26	1.58
6.0		38.1	15.3	7.30	2.19
7.0			20.1	9.63	2.89
8.0			25.6	12.3	3.68
9.0			31.7	15.1	4.55
10.0				18.3	5.50
11.0				21.7	6.52
12.0				25.4	7.63
13.0					8.81
14.0					10.1
15.0					11.4
16.0					12.8
17.0					14.3
18.0					15.8
19.0					17.5

MARKINGS

All Everhot PEX tubing is marked with nominal (CTS) and OD sizes, applicable ASTM standards, third party certifications (NSF-rfh), temperature and pressure ratings, material designation code, manufacturing date / time / codes and footage on every 5ft of tubing.

APPLICATIONS

· Radiant heating systems.
· Snow and ice melting systems.
· Baseboard and radiator heating.
· Other hydronic heating applications

SPECIFICATIONS

Everhot PEX tubing with oxygen barrier is manufactured from HDPE using a silane method of cross-linking. Oxygen Diffusion Barrier (EVOH) is per DIN 4726 standard (less then 0.1 grams/cu.m/day). Tubing complies with ANSI/NSF standard 14 for plumbing system components, NSF certified for radiant floor heating applications (NSF-rfh) and UPC listed by IAPMO.

STANDARDS

ASTM F876: Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
ASTM F877: Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hotand Cold-Water Distribution Systems.
CSA B137.5: Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications.
SDR9 Standard Dimension Ratio.

DESCRIPTION

Everhot Oxygen Barrier type PEX tubing is designed for use in closed-loop applications, including radiant heating and hydronic heating systems, which contain ferrous (cast iron) components, such as circulator pumps, radiators, boiler heating elements and others.

STORAGE

Everhot PEX Tubing shall be stored away from sunlight and shall not be exposed to direct sunlight for more than 5 days. Failure to comply will void the warranty.

WARRANTY

25 year limited warranty. For details, see complete document.

Kunkle Model 6010DCM01ALM0125

KUNKLE SERIES 6000 SAFETY VALVES

SAFETY AND RELIEF PRODUCTS

Bronze safety valves to ASME section I and VIII, steam, 'V' and 'UV'; section VIII, air/gas, 'UV' National Board certified including models to ASME section IV, steam 'HV'. PED certified for non-hazardous gas

MODEL 6010

FEATURES

- O-ring seats available for exceptional leak-free performance, reduced maintenance cost, multiple cycles with tight shutoff and improved seating integrity.
- Heavy duty casting.
- Wide hex on valve nozzle provides clearance for easy installation.
- Seats lapped to optical flatness.
- Dual control rings offer easy adjustability for precise opening with minimum pre-open or simmer and exact blowdown control.
- Pivot between disc and spring corrects misalignment and compensates for spring side thrust.
- Grooved piston type disc reduces sliding area and friction.
- Heavy duty lift lever assembly.
- Each valve tested and inspected for pressure setting and leakage.

GENERAL APPLICATION

These valves are suitable for use on steam boilers and generators, reciprocating or rotary, portable or stationary air/gas compressors, intercoolers and aftercoolers. Also for pressure vessels containing steam, air or non-hazardous gas and on pressure reducing stations.

TECHNICAL DATA

Connections:	Threaded NPT
Temperature Range[1]:	-60° to 425°F (-51° to 219°C)
Pressure Range[1]:	3 to 300 psig (0.2 to 20.7 barg)
Code:	ASME I, IV, VIII and PED

V HV UV

NOTE

1. See page 2 for more temperature and pressure range information.

MODELS OVERVIEW

Model 6010:	Side outlet. Full nozzle design with bronze/brass trim. Available with O-ring seats.
Model 6021:	As model 6010 with Teflon® (PFA) disc insert (use on steam only).
Model 6030:	As model 6010 except stainless steel (SS) trim (nozzle and disc). Available with O-ring seats.
Model 6182:	Top outlet. Full nozzle design with bronze/brass trim. O-ring seat available.
Model 6121:	As model 6182 with Teflon® (PFA) disc insert (use on steam only).
Model 6130:	As model 6182 except SS trim (nozzle and disc). Available with O-ring seats.
Model 6186:	Top outlet. Full nozzle design with bronze/brass trim. 150 psig (10.3 barg) maximum set pressure. Replaces Model 86 (original equipment only). For air service only.
Model 6283:	Over-sized side outlet. Full nozzle design bronze/brass trim.
Model 6221:	As model 6283 with Teflon® (PFA) disc insert (use on steam only).
Model 6230:	As model 6283 except SS trim (nozzle and disc).
Model 6933:	As model 6010 except certified for ASME code Section IV. Low pressure steam heating boilers set at 15 psig (1.0 barg) only.
Model 6934:	As model 6021 except certified for ASME code Section IV. Low pressure steam heating boilers set at 15 psig (1.0 barg) only.
Model 6935:	As model 6030 except certified for ASME code Section IV. Low pressure steam heating boilers set at 15 psig (1.0 barg) only.

NOTE

1. Resilient seats determine temperature range (see Specifications section).
2. Viton® and Teflon® are registered trademarks of E.I. du Pont de Nemours and Company.

PRESSURE AND TEMPERATURE LIMITS[1]

Models 6010, 6021, 6182, 6121, 6283, 6221

Steam Service:	3 to 250 psig (0.2 to 17.2 barg) -60° to 406°F (-51° to 208°C)
Air/Gas Service:	3 to 300 psig (0.2 to 20.7 barg) -60° to 406°F (-51° to 208°C)

Models 6030, 6130, 6230

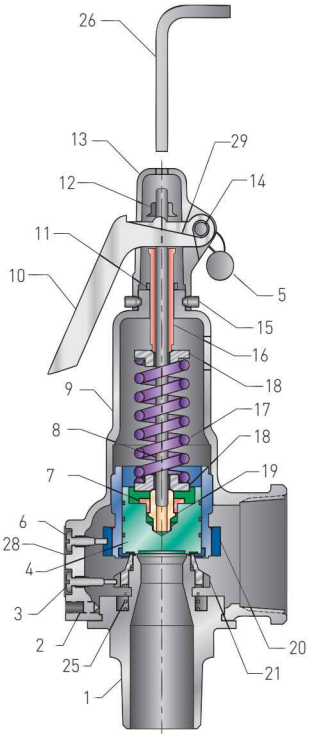
Steam and air/gas Service: 3 to 300 psig (0.2 to 20.7 barg) -60° to 425°F (-51° to 218°C)

SPECIFICATIONS

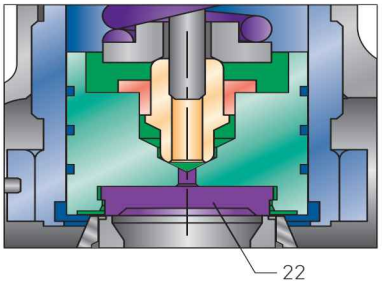
SERVICE RECOMMENDATIONS FOR SERIES 6000 RESILIENT SEAT/SEAL MATERIALS

Seat/Seal Materials	Service Recommendation
Viton® A (FKM) (-15 to 406°F [-26 to 208°C])	Air and Gas
Ethylene propylene (-60 to 425°F [-51 to 218°C])	Steam
Teflon® (PFA) (-60 to 406°F [-51 to 208°C])	Steam

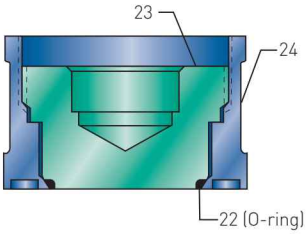
Parts and Materials



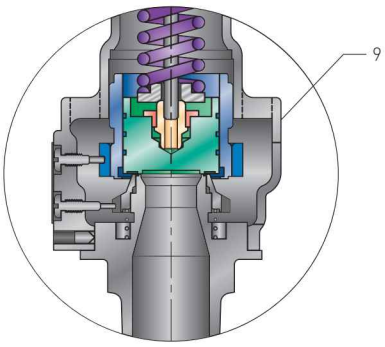
MODELS 6010, 6030, 6283, 6230, 6933, 6935



MODELS 6021, 6121, 6221, 6934
Teflon® (PFA) seat configuration



MODELS 6010, 6030, 6182,
6130, 6186, 6283, 6230
Optional soft seat



MODELS 6182, 6121, 6130, 6186
Top outlet configuration

PARTS AND MATERIALS

No.	Part name	Materials
1	Nozzle	BRS B283-C48500 or BRZ SB62[3]
2	Body set screw	STL A108 Black oxide
3	Warn ring set screw	SS 18-8
4	Disc	BRS B21 C48500[4]
5	Wire and seal	SS wire and lead seal
6	Guide set screw	SS 18-8
7	Retainer nut[2]	BRS B16
8	Stem	SS A582-303 for D orifice SS A582-416 for E thru J orifice
9	Body	BRZ B584-C84400
10	Lever	STL A109 or JIS SPCC equivalent/ZN plated yellow
11	Compression screw locknut	BRS B16
12	Lift nut	STL A108-1018/ZN plated
13	Cap	Aluminum, anodized
14	Lever pin	STL A108-12L14
15	Cap set screw[10]	STL A108 Black oxide
16	Compression screw	BRS B16
17	Spring	ASTM A-313 TY 631
18	Spring step	BRS B16
19	Stem end[12]	BRS B16
20	Guide	BRS B283-C37700
21	Warn ring[7]	BRS B283-C37700
22	Seat	Note 1
23	Seat retainer[8]	BRS B16[5]
24	Soft seat disc[8]	BRS B21 C48500[5]
25	Warn ring spring[6]	SS A313-302/316
26	Gag screw[9]	STL A108-1018/ZN plated
27[11]	Pop rivet	Aluminum
28	Nameplate	Aluminum
29[6]	Vibration dampener spring	PH BRZ B159-C51000

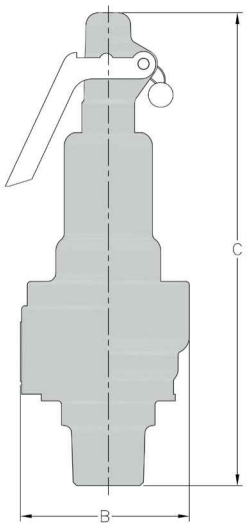
NOTES

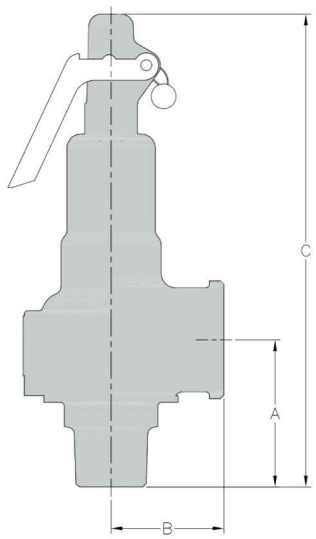
1. Models 6021, 6121, 6221 and 6934 Teflon® (PFA), optional O-ring seat available for all others (except Models 6933 and 6935 - metal seat only).
2. Section IV only.
3. Models 6030, 6130, 6230 and 6935 are SS SA351-CF8.
4. Models 6030, 6130, 6230 and 6935 are SS SA479-304.
5. Models 6030, 6130 and 6230 are SS SA479-304.
6. Variation 02 (vibration dampening) only.
7. Soft seat 'D', 'E' and 'F' orifice require special warn ring (notch on O.D. of fins).
8. Applies only to soft seat options.
9. Applies only to gag options. Remove when valve is in service. Failure to remove gag screw may cause serious damage to equipment, personal injury and death.
10. Rotated 90° for clarity.
11. Not shown on assembly.
12. Soft seat 'D' orifice requires special stem end (no hex).

SPECIFICATIONS

		Connections ANSI Standard				Valve Dimensions, inch (mm)						Approximate Weight	
		Inlet		Outlet									
Model Number[1]	Orifice	inch	(mm)	inch	(mm)	A		B		C		lb	(kg)
60**DC#	D	½	(12.7)	¾	(19.0)	2⅛	(54)	1⅝	(41)	6½	(165)	1½	(0.7)
60**DD#[2]	D	¾	(19.0)	¾	(19.0)	2⅛	(54)	1⅝	(41)	6½	(165)	1¾	(0.8)
61**DC#	D	½	(12.7)	-	-	-	-	2⅜	(60)	6½	(165)	1¼	(0.6)
60**ED#	E	¾	(19.0)	1	(25.4)	2⅜	(60)	1¾	(44)	7½	(191)	2½	(1.1)
60**EE#[2]	E	1	(25.4)	1	(25.4)	2½[4]	(64)	1¾	(44)	7⅝[5]	(194)	2¾	(1.2)
61**ED#	E	¾	(19.0)	-	-	-	-	2⅞	(73)	7½	(191)	2¼	(1.0)
62**ED#	E	¾	(19.0)	1¼	(31.75)	2⅞	(73)	1¾	(44)	7½	(191)	2¾	(1.2)
60**FE#	F	1	(25.4)	1¼	(31.8)	2⅝	(67)	2	(51)	8½	(216)	3½	(1.6)
60**FF#[2]	F	1¼	(31.8)	1¼	(31.8)	2⅞	(73)	2	(51)	8¾	(222)	3¾	(1.7)
61**FE#	F	1	(25.4)	-	-	-	-	3⅛	(79)	8½	(222)	3¼	(1.5)
62**FE#	F	1	(25.4)	1½	(38.0)	2⅞	(73)	2	(51)	8½	(222)	3¾	(1.7)
60**GF#	G	1¼	(31.8)	1½	(38.0)	3⅛	(79)	2⅜	(60)	9⅝	(244)	5½	(2.5)
60**GG#[2]	G	1½	(38.0)	1½	(38.0)	3⅜	(86)	2⅜	(60)	9⅞	(251)	5¾	(2.6)
61**GF#	G	1¼	(31.8)	-	-	-	-	3¾	(95)	9⅝	(244)	5	(2.3)
62**GF#	G	1¼	(31.8)	2	(51.0)	3⅜	(86)	2¼	(57)	9⅝	(244)	5¾	(2.6)
60**HG#	H	1½	(38.0)	2	(51.0)	3⅝	(92)	2¾	(70)	10⅝	(270)	7¾	(3.5)
60**HH#[2]	H	2	(51.0)	2	(51.0)	4⅛	(105)	2¾	(70)	11⅛	(283)	8	(3.6)
61**HG#	H	1½	(38.0)	-	-	-	-	4⅜	(111)	10⅝	(270)	7¼	(3.3)
62**HG#	H	1½	(38.0)	2½	(64.0)	3⅞	(98)	3	(76)	10⅝	(270)	8	(3.6)
60**JH#	J	2	(51.0)	2½	(64.0)	4¼	(108)	3⅜	(86)	14⅛	(359)	15½	(7.0)
60**JJ#[2]	J	2½	(64.0)	2½	(64.0)	4½	(114)	3⅜	(86)	14¼	(362)	15¾	(7.2)
61**JH#	J	2	(51.0)	-	-	-	-	5	(127)	14⅛	(359)	15	(6.8)
62**JH#	J	2	(51.0)	3	(76.0)	4⅝	(117)	3⅜	(86)	14⅛	(359)	15½	(7.0)

Dimensions are for reference only.





NOTES

1. Replace asterisks with desired model number. Replace # with desired seat material.
2. Model 6030 and 6935 available only ½ x ¾" (12.7 x 19 mm), ¾ x 1" (19 x 25.4 mm), 1 x 1¼" (25.4 x 31.8 mm), 1¼ x 1½" (31.8 x 38 mm), 1½ x 2" (38 x 51 mm) and 2 x 2 ½" (51 x 64 mm).
3. Models 6933, 6934 and 6935 have same dimensions as model 6010.
4. 2¼" for BSP (57).
5. 7⅜" for BSP (192.5).

Capacities

NON-CODE[1] AND ASME SECTION VIII STEAM (lb/h) Flow Coefficient = 0.878

	Orifice Area, in²					
Set Pressure (psig)	**D (0.121)**	**E (0.216)**	**F (0.336)**	**G (0.554)**	**H (0.863)**	**J (1.414)**
3	87	155	242	398	621	1017
4	100	178	277	457	711	1166
6	121	215	335	552	860	1409
8	137	245	382	629	980	1606
10	152	271	422	695	1083	1775
15	179	319	497	819	1276	2091
20	206	368	573	944	1471	2410
25	234	417	649	1070	1666	2730
30	261	466	725	1195	1861	3050
35	291	520	808	1333	2076	3401
40	321	573	892	1470	2291	3753
45	351	627	975	1608	2505	4105
50	381	681	1059	1746	2720	4456
55	411	734	1143	1884	2934	4808
60	442	788	1226	2022	3149	5160
65	472	842	1310	2159	3364	5511
70	502	896	1393	2297	3578	5863
75	532	949	1477	2435	3793	6215
80	562	1003	1560	2573	4008	6566
85	592	1057	1644	2710	4222	6918
90	622	1110	1727	2848	4437	7270
95	652	1164	1811	2986	4651	7621
100	682	1218	1895	3124	4866	7973
105	712	1272	1978	3262	5081	8325
110	742	1325	2062	3399	5295	8676
115	773	1379	2145	3537	5510	9028
120	803	1433	2229	3675	5725	9380
125	833	1487	2312	3813	5939	9731
130	863	1540	2396	3950	6154	10083
135	893	1594	2479	4088	6368	10434
140	923	1648	2563	4226	6583	10786
145	953	1701	2647	4364	6798	11138
150	983	1755	2730	4502	7012	11489
160	1043	1863	2897	4777	7442	12193
170	1104	1970	3064	5053	7871	12896
180	1164	2077	3232	5328	8300	13599
190	1224	2185	3399	5604	8729	14303
200	1284	2292	3566	5879	9159	15006
210	1344	2400	3733	6155	9588	15709
220	1404	2507	3900	6430	10017	16413
230	1465	2615	4067	6706	10446	17116
240	1525	2722	4234	6981	10876	17819
250	1585	2829	4401	7257	11305	18523
260	1645	2937	4569	7533	11734	19226
270	1705	3044	4736	7808	12163	19929
280	1766	3152	4903	8084	12592	20632
290	1826	3259	5070	8359	13022	21336
300	1886	3367	5237	8635	13451	22039

NOTE

1. No code stamp or 'NB' on nameplate below 15 psig set.

ASME section I and VIII, steam, ASME section VIII, air/gas National Board Certified. Models 6933, 6934, 6935 ASME section IV, National Board Certified

SELECTION GUIDE

Example:	6010	H	G	M	01	A	A	M	0015

Model

6010	**6130**	**6230**
6021	**6186**	**6933**
6030	**6283**	**6934**
6182	**6221**	**6935**
6121		

Orifice

D	**G**
E	**H**
F	**J**

Inlet size

C	½" (12.7)	**G**	1½" (38.1)
D	¾" (19.0)	**H**	2" (50.8)
E	1" (25.4)	**J**	2½" (63.5)
F	1¼" (31.8)		

Seat material

M	Metal
E	EPR
V	Viton® (FKM)
T	Teflon® (PFA) (models 6021, 6121, 6221, 6934 only)

Variation (01 to 99)

01	Plain lever
02	Plain lever with vibration dampener
03	Plain lever with gag
61	Plain lever with BSP threads
62	Plain lever with vibration dampener and BSP threads
63	Plain lever with gag and BSP threads

Design revision

Indicates non-interchangeable revision
Current design is at revision 'A'

Valve service

A	Steam ASME section I
K	Air/gas ASME section VIII
L	Steam ASME section VIII
G	Steam ASME section IV (models 6933, 6934, 6935 only)
P	Steam, non-code
N	Air, non-code

Spring material

M	SS

Set pressure

0015 15 psig (1.0 barg) only for models 6933, 6934, 6935

Attachment C

City of Syracuse Data/LSI Determination

CITY OF SYRACUSE
DEPARTMENT OF WATER

Consumer Confidence Report
2021 Newsletter

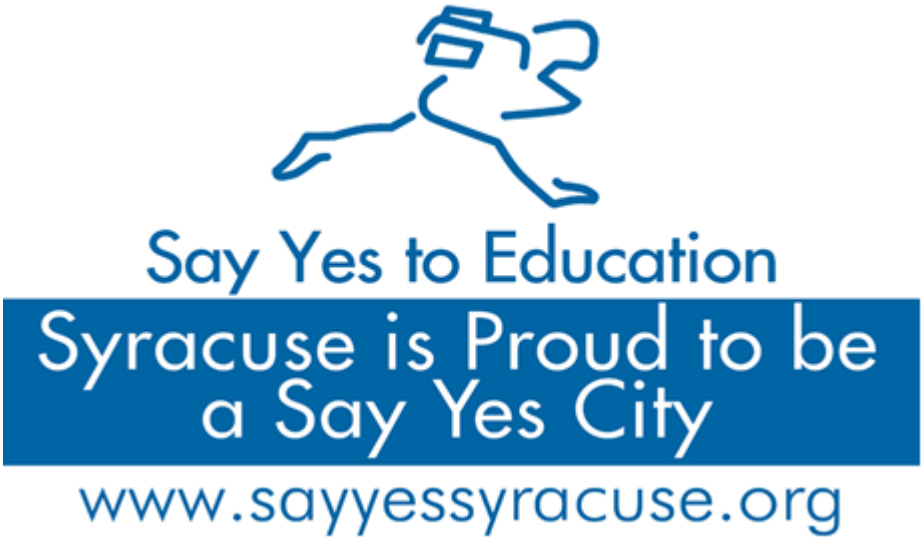
Ben Walsh, Mayor

Joseph Awald, P.E.
Commissioner of Water

Annual Drinking Water Quality Report for 2021

(Public Water Supply ID#3304334)

Published Date: May 27, 2022



The City of Syracuse website:

http://www.syrgov.net

We are also on Twitter:
Twitter@syracuse1848

You can also find us on Facebook:
Fb.com/Syracuse1848

SYRACUSE WATER NEWSLETTER

The Syracuse Water Newsletter is a publication of the City of Syracuse Department of Water. This publication contains valuable information about your water system and about the water that the Syracuse Water Department supplies. Information on the FEMA National Flood Insurance Program is also included.

If you would like other information about the City of Syracuse or have a question about City services in general, feel free to phone City Line, 315-448-CITY (2489). You will also find useful information about the City of Syracuse on the worldwide web by logging onto **http://www.syrgov.net**

Ben Walsh, Mayor
City of Syracuse

Table of Contents

Table index

Figure index

1. INTRODUCTION

The Annual Drinking Water Quality Report allows the Syracuse Water Department to provide customers and users of the City of Syracuse water system with useful information about the water system, the quality of the water and about important issues affecting your water supply. This report is prepared pursuant to regulations and guidelines of both the United States Environmental Protection Agency (USEPA) and the NYS Department of Health (NYSDOH).

The City of Syracuse Water Department (SWD) provides retail water service to the entire City of Syracuse. Through wholesale and other service agreements, the SWD also supplies water to portions of the towns of Dewitt, Onondaga, Geddes, Camillus, Salina, and the villages of Skaneateles, and Jordan and Elbridge. If you have any questions about the source of your water, check with the water purveyor that sends your water bill and ask for information concerning the source of water that you receive at your home or business.

It should be noted that all drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (1-800-426-4791) or the Onondaga County Health Department (OCHD) at 315-435-6600.

Some people may be more vulnerable to disease-causing microorganisms or pathogens in drinking water than the general population. Immuno-compromised persons, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice from their health care providers. EPA/Center for Disease Control guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

In general, the sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife;
- Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming;
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses;
- Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems; and

- Radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, EPA and the NYSDOH prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health.

In this report we describe your water system and what the Syracuse Water Department is doing to meet federal and state water quality regulations and provide the best quality water we possibly can for you, our customers. If you have any comments about this report, or questions about your water system, please do not hesitate to contact the Syracuse Water Department at 315-448-8340. You may send e mail to the City of Syracuse through the City's web site, http://www.syrgov.net or mail us through the U.S. Postal Service at 101 North Beech Street, Syracuse New York 13210.

2. SYRACUSE WATER SUPPLY AND SYSTEM USE

For 125 years, the primary water supply for the City of Syracuse has been Skaneateles Lake, a "Finger Lake" located approximately 20 miles southwest of the City. Syracuse has utilized this lake for its water supply since 1894. Skaneateles Lake is approximately 15 miles long and one mile wide with a maximum depth of 300 feet. Skaneateles Lake has a relatively small watershed of 59 square miles and a water surface area of 13.6 square miles. In 2021, an average of 56.50 million gallons per day (MGD) was released at the outlet of Skaneateles Lake to control lake level and maintain Skaneateles Creek flow at or above the minimum required flow.

Skaneateles Lake has exceptionally high water quality. This makes it possible to utilize the lake's water without filtration. Skaneateles Lake is one of the few large system surface water supplies in the country that is approved as an unfiltered water supply. The high quality of this water is due to: the shape and size characteristics of the lake and watershed, the fact that sewage discharges (including from sewage treatment plants) are not allowed into surface waters in the Skaneateles Lake watershed, the efforts of the City of Syracuse's watershed protection program, and to the stewardship of residents and landowners of the watershed.

In the 1970's the Onondaga County agency, known as the Metropolitan Water Board (MWB), constructed a water line between Lake Ontario and Syracuse. As a result, the City is able to supplement its Skaneateles Lake water supply with Lake Ontario water when necessary. The City normally relies upon Lake Ontario water during times when drought conditions limit the available supply from Skaneateles, during emergencies, or during periods of high consumption. Since the MWB system is connected to the City's system on the north side of the City, this area may receive water from Lake Ontario from time to time.

The Syracuse water system is made up of over 500 miles of pipelines to deliver water from Skaneateles Lake to the City and to distribute the water throughout the City. The water supply system consists of water storage in Woodland and Westcott Reservoirs on the west side of the City. Water is also stored in two standpipes and in the three tanks that comprise Morningside Reservoir.

2.1 Water Use

During 2021, the total amount of water entering the City of Syracuse water system was 13,619.83 million gallons (37.315 MGD). 14,859.59 million gallons (40.60 MGD) of water was withdrawn from Skaneateles Lake and 12.045 million gallons (0.033 MGD) came from Lake Ontario (Metropolitan

Water Board). Water customers were billed for 5,249.16 million gallons (14.381 MGD) leaving 8,370.665 million gallons (22.933 MGD) for firefighting purposes, street sweeping, construction, water main flushing, water discharge, water main repairs, and transmission/distribution system leaks.

2.2 COST OF WATER

The City of Syracuse continues to have some of the lowest water rates in New York State. Under current water rates the basic price of water is $3.09 per 100 cubic feet. Non-City customers pay a higher rate of $4.64 per 100 cubic feet. Customers using less than 1,300 cubic feet per quarter will be billed a minimum charge of $40.15 per quarter per unit for water. The sewer rate is $0.94 per 100 cubic feet for sewer use. Sewer bills are based upon actual consumption. The water rate schedule is based on a declining block system.

All water bills are based on consumption, so it is important that your water meter be read. In the past, meter readers had to enter the property for a read, currently ~98% of the city's water meters have been upgraded to the radio read system. It is mandatory to be converted to this system. If you have not been upgraded please contact us for an appointment 315-448-8357.

Please note the meter is the property of the City of Syracuse, and may only be removed by meter room personnel

3. WATER TREATMENT

Skaneateles Lake water is a very high-quality water source requiring minimal treatment. The following treatment is conducted by the Syracuse water Department:

- Chlorine is applied to the water for disinfection.
- Hydro-fluorosilicic acid is added to the water in order to maintain a fluoride level (target level of 0.7 mg/L) in the water for the purpose of reducing tooth decay.
- Copper sulfate is used to control the growth of algae in Woodland Reservoir. These treatments prevent algae growth which can cause foul tastes and odors between the months of May and October. Copper sulfate treatments occur on an as-needed basis. In 2021 Woodland Reservoir was not treated with copper sulfate.
- Orthophosphate is added to the water to minimize the dissolving of lead from lead service pipes and other plumbing fixtures. This topic is further described in the section "Lead Corrosion Control".

All Lake Ontario water used by the City has been filtered, chlorinated and fluoridated at Onondaga County's Metropolitan Water Board Plant in Oswego, New York.

3.1 INFORMATION ON FLUORIDE ADDITION

Our system is one of the many drinking water systems in New York State that provides drinking water with a controlled, low level of fluoride for consumer dental health protection. Fluoride is added to your water by the City of Syracuse before it is delivered to the customer. According to the United States Centers for Disease Control (USCDC), fluoride is very effective in preventing cavities when present in drinking water at a target level of 0.7mg/L (parts per million). To ensure that the fluoride supplement in your water provides optimal dental protection, the New York State Department of Health (NYSDOH) requires that the City of Syracuse monitor fluoride levels on a

daily basis. During 2021 monitoring showed that fluoride levels in your water were within the 0.7mg/L – 1.2mg/L range 68.0% of the time. None of the monitoring results showed fluoride at levels that approach the 2.2 mg/L MCL for fluoride.

4. SKANEATELES LAKE FILTRATION WAIVER

The City of Syracuse applied for and received a filtration waiver in June 2004. Unlike the waivers granted before it, this filtration avoidance extension has no expiration date. Our filtration waiver will remain in effect indefinitely as long as the City maintains its excellent watershed protection programs and the lake water continues to be of high quality.

5. NEW YORK STATE SOURCE WATER ASSESSMENT PROGRAM

The NYSDOH evaluated the City of Syracuse water supply's susceptibility to contamination under the Source Water Assessment Program (SWAP), and their findings are summarized in the paragraphs below. It is important to stress that these assessments are created using available information and only estimate the potential for source water contamination. Elevated susceptibility ratings do not mean that source water contamination has or will occur for the City of Syracuse. The City of Syracuse provides treatment and regular monitoring to ensure the water delivered to consumers meets all applicable standards.

This assessment found a moderate susceptibility to contamination for the Skaneateles Lake source of drinking water. The amount of pasture in the assessment area results in a high potential for protozoan contamination. No permitted discharges are found in the assessment area. There is no likely contamination threat associated with other discrete contamination sources, even though some facilities were found in low densities.

The Lake Ontario Source (water purchased from the Metropolitan Water Board): The Great Lakes watershed is exceptionally large and too big for a detailed evaluation in the Source Water Assessment Program. General drinking water concerns for public water supplies that use these sources include: storm generated turbidity, wastewater discharges, toxic sediments, shipping-related spills, and problems associated with exotic species (e.g. intakes clogged by zebra mussels and taste and odor problems). The summary below is based on the analysis of the contaminant inventory compiled for the drainage area deemed most likely to impact drinking water quality at this public water supply intake.

This assessment found a moderate susceptibility to contamination for this source of drinking water. The amount of agricultural lands in the assessment area results in elevated potential for pesticides contamination. Non-sanitary wastes may increase contamination potential. There is also noteworthy contamination susceptibility associated with other discrete contamination sources and those facility types include: mines.

6. WATERSHED RULES AND REGULATIONS

The NYSDOH Watershed Rules and Regulations apply to the use of Skaneateles Lake and control activities in the watershed that might affect the water quality. The Watershed Rules and Regulations are comprehensive and provide stringent requirements for repairing failed septic tanks and for protecting Skaneateles Lake from erosion and sediment-laden runoff from

construction sites. The City employs watershed inspectors to monitor activities and report violations of the rules. City inspectors check septic systems and also remove and dispose of dead animals that might pollute watercourses. The City works closely with village, town, and state officials to minimize or eliminate the potential for water pollution within the watershed.

Watershed protection and pollution prevention is not a new concept relative to the City's utilization of Skaneateles Lake. Watershed rules and regulations were first adopted in 1909. Since then the City has participated in septic system design and approvals and helped install sewers in the village of Skaneateles. The City's long history with Skaneateles Lake has been marked with a legacy of sound water quality stewardship.

What is a watershed? It's the area of land that drains water into the lake via creeks, brooks, and drainage ways. It can be compared to the shape of an irregular bowl. For Skaneateles Lake, this area totals about 59 square miles. It is largely made up of agricultural and open land, but has smaller areas of residential and commercial development. One key reason why Skaneateles Lake has high quality water is that the ratio of the amount of land that drains to the lake (59 square miles) to the surface area of the lake (13.6 square miles) is relatively small compared to other lakes.

6.1 Skaneateles Lake Watershed Agricultural Program (SLWAP)

The SLWAP provides environmental protection plans for qualifying farms in the watershed. Once the plans are prepared, financial assistance is provided so that farmers/landowners can install improvements intended to protect the lake by keeping runoff water from storms and snow melt clean.

6.2 Land Protection Program

In an effort to preserve and protect environmentally sensitive land that may have otherwise become a source of pollution, the City purchased conservation easements on 858 acres in the Skaneateles Lake watershed. Sellers agreed to limit activities that may be detrimental to water quality. A component of this program involves educating property owners about environmental stewardship. The purchase program is now complete, but restrictions on the land are perpetual, and properties are monitored on a schedule to make sure that owners are maintaining the proper stewardship of their land.

7. LEAD IN YOUR DRINKING WATER

The Syracuse Water Department treats the water with orthophosphate in order to provide and maintain a sufficient phosphate residual in the water, creating a protective coating on the interior surfaces of plumbing fixtures and lead water service pipe. The treatment was designated by the NYSDOH and OCHD after the City conducted studies designed to determine a successful method to reduce the amount of lead that dissolves from lead pipes or plumbing fixtures containing lead. Under federal law, we are required to have a program in-place to minimize lead in your drinking water. Source water treatment is not necessary with Skaneateles Lake water since lead is not in the source water.

The City was required by federal law to reduce the amount of lead in its drinking water by replacing 7% of existing lead water services in the public right-of-way each year until two consecutive 6-month water quality sampling events resulted in the 90th percentile at a concentration below the USEPA action level of 15 ppb. The December 2006 and the June 2007 sampling events satisfied the requirements. This treatment may not completely eliminate, but has

reduced the amount of lead that dissolves. The Water Department is confident that with continued treatment the levels of lead will stay below the USEPA action level of 15 ug/L. 2020 lead and copper sample results are provided on page 18.

Another source of lead in the drinking water can be from the residential service connection piping. If this line is made of lead, it can contribute high concentrations of lead to the household drinking water. Remember, not every home has a lead contamination problem. Most people have low levels of lead in their drinking water. But because you cannot see, taste or smell lead, testing the water is the only way to know if there is a problem.

If you have any questions about how we are carrying out the requirements of the lead regulation, or want more information about what you can do, please call us at 315-448-8347. Information on Lead in your drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline 1-800-426-4791 or at http://www.epa.gov/safewater/lead.

7.1 Why is lead corrosion such a concern

Infants and young children are typically more vulnerable to lead in drinking water than the general population. Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.

7.1.1 RESIDENTIAL LEAD SERVICE REPLACEMENT PROGRAM

If you need assistance in identifying whether you have a lead service, you may call the Water Department at 315-448-8347

If you want to replace your lead service pipe, the following options are available to you:

1. Contract with your own licensed plumber who will obtain the necessary permits and perform the work;

2. For residential properties, utilize the City Water Department's Residential Lead Service Replacement Program whereby we will hire a plumber for you with the cost of the work being assessed to you on your property tax bill in a lump sum, or over a ten year period at seven percent (7%) interest per year.

Option 1 allows you to negotiate on your own with various licensed plumbers. You may be able to get a lower price for the work, and the time frame to have the work completed may be less.

Option 2 allows you to spread the payments over a ten-year period on your City Tax bill, however this may cost more than if you negotiated the work on your own. Please remember that your $50 Application Fee cannot be refunded should you choose not to enter into the contract.

If you have any questions about the program or need an application, please contact the City of Syracuse Department of Water at 315-448-8347.

8. WATER QUALITY MONITORING

The Water Department conducts numerous tests of the water in order to monitor its quality and to verify compliance with state and federal requirements. The monitoring program includes seven primary components described below. The Syracuse Water Department tests Skaneateles Lake

water as well as water in the distribution system, which might be a combination of Skaneateles Lake water and water from Lake Ontario. The Onondaga County Metropolitan Water Board is responsible for testing the Lake Ontario supply, since they operate that supply and sell water on a wholesale basis to the City of Syracuse.

8.1 Phytoplankton

Skaneateles Lake and the City's Reservoir water samples are collected and microscopically examined for phytoplankton (algae) between May and October. High algal populations are controlled in the Reservoir by diffused aeration; ultrasonic algae control devices and the application of copper sulfate when necessary. Though not considered a contaminant, these organisms can impact the taste, odor, and aesthetic quality of the drinking water.

8.2 Skaneateles Lake Harmful Algae Bloom

Algae blooms observed by Skaneateles Lake Watershed Protection staff were exceptionally small, localized and limited to near-shore areas in 2021. Monitoring, identifying, sampling and reporting algae blooms involved a collaborative effort between the NYSDEC Finger Lakes HAB Volunteer Surveillance, NYSDEC Finger Lakes Water Hub, the Skaneateles Lake Association (SLA) Shoreline HABs Program, CSLAP and the City of Syracuse Water Department. The SLA Shoreline HABs Program comprising of select volunteers continued to monitor 25 zones around the perimeter of Skaneateles Lake in 2021. Suspicious algal blooms were reported to the NYSDEC Division of Water HABsInfo@dec.ny.gov. Syracuse Water Department personnel collected several surface water skim samples in late summer/early fall, following reports of suspicious blooms. Algal forms were identified and cell counts performed on one-liter centrifuged samples under light microscopy to determine dominant forms and the composition of bloom densities.

As a result of the numerous volunteers and professional staff monitoring Skaneateles Lake and the heightened awareness of lakefront property owners and watercraft operators, the Lake was intensely monitored and lake conditions assessed in a timely manner. The frequent monitoring and the lake-wide surveillance program were effective in the early detection of HABs in 2021.

8.3 NYSDOH Action Plan

In coordination with the NYSDOH, an Action Plan was developed in 2018 to ensure the City's drinking water remained of high quality and microcystin was not detected in treated water above 0.3 µg/L. The Action Plan included short-term and long-term measures.

8.3.1 Short Term Actions

Short-term actions provide for an aggressive monitoring program. Microcystin sampling at the City's drinking water intakes was initiated on July 6, 2021 and extended through October 25, 2021. Raw water from both of the City's Intakes was sampled weekly. If microcystin is detected, repeat samples are collected for both raw and treated water at that Intake until results are below detectable levels of microcystin for three consecutive days. Microcystin samples were collected and transported to a certified lab on 22 occasions for analysis in 2021. Raw water samples were reported to have microcystin levels above the limit of quantitation (LOQ) of 0.3 µg/L on five occasions on Intake No. 1 and four occasions for Intake No. 2. Microcystin levels were not detected above the LOQ for treated water.

Short term actions also addressed the City's response to finished water microcystin levels above the 0.3 µg/L. in regards to public messaging and agency coordination. These measures included identifying specific agencies and contact information involved in decision making and communications and resources immediately available, such as alternate potable water.

Since increasing blue-green algae cell densities are generally associated with increasing cyanotoxin concentrations, the City has applied for an aquatic use pesticide through the NYSDEC in 2020 to mitigate the risk of allowing microcystin producing algae to grow unmanaged. A State Pollution Discharge Elimination System (SPDES) Permit application was submitted to the Division of Water – Bureau of Water Permits for applying an algaecide within the north basin of Skaneateles Lake.

8.3.2 Long Term Actions

Long-term actions currently under evaluation include extending the City's shallow water intake and developing and/or enhancing interconnections between neighboring public water systems, and continued and advanced source water protection activities. Source water protection activities are also part of the HAB Action Plan that the New York State Department of Environmental Conservation (NYSDEC) is developing in concert with steering committees. Having additional in-lake short time actions established to manage HABs especially though the funding, design and implementation process necessary for long-term action items is a critical component to ensure optimal water quality.

8.4 Bacteria

Each Skaneateles Lake intake is monitored for total and fecal coliform bacteria five times per week, totaling 1,094 samples for the year. Fifty one locations in the water distribution system were tested weekly for coliform bacteria; an average of 223 bacteriological samples were collected per month, or 2,671 samples were collected during the year. Eight routine distribution system samples tested positive for total coliform in 2021. No samples tested positive for E.coli.

Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, bacteria may be present. E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, and people with severely compromised immune systems.

8.5 Turbidity

Incoming Skaneateles Lake water is continually monitored at the water treatment plant in Skaneateles for turbidity (measurement of water quality for clarity). Turbidity is caused by particles in the water and is measured in Nephelometric Turbidity Units (NTU). Skaneateles Lake turbidity is generally the result of the re-suspension of bottom sediments as a result of wind driven wave action or from the introduction of suspended sediment as a result of snow melt and storm water runoff.

Turbidity is regulated for the Skaneateles Lake supply by two standards. One is a treatment technique requirement, which is violated if any turbidity measurement exceeds 5 NTU. The second, more critical, threshold is a turbidity regulatory limit, or Maximum Contaminant Level (MCL) violation, which occurs when two consecutive daily entry point analyses exceed 5 NTU.

One treatment technique violations (TTV) was recorded and reported to the Onondaga County Health Department in 2021. On November 12, the turbidity levels entering the City of Syracuse's intake exceeded the maximum allowable standard of 5 NTU due to high winds. Turbidity levels reached 10.73 NTU on Intake #1. The Intake was re-opened on November 14. There was no Turbidity Events in 2021.

The second TTV occurred on December 23 on Intake #2. Strong winds resulted in a turbidity recording of 41.38 NTU. The Intake was re-opened on December 25.

There was one Turbidity Event in 2020. This occurred for Intake #1 over November 15 and 16. The high turbidity reading for the two-day event was 23.37 NTU. Intake #2 was closed on November 15 and re-opening was initiated on November 18. Intake #1 was impacted from a combination of sustained high winds over several days and a low lake level. The Turbidity Event was reported to the Onondaga County Health Department.

Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites, which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches. Please pay special attention to the additional statements in this document regarding Cryptosporidium.

The NYSDOH sets drinking water standards and has determined that the presence of microbiological contaminants is a health concern at certain levels of exposure. If water is inadequately treated, microbiological contaminants in that water may cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. The NYSDOH has set enforceable requirements for treating drinking water to reduce the risk of these adverse health effects. Treatments, such as filtration and disinfection, remove or destroy microbiological contaminants.

8.6 Chlorine Residual

The Water Department adds chlorine to the water for disinfection. The amount of chlorine in the water is continuously monitored as the water leaves the City's Skaneateles Lake treatment plant and as it leaves Woodland and Westcott reservoirs. Also, each week, samples are checked at locations throughout the distribution system. NYS regulations require that free chlorine residual be maintained in the water.

8.7 Organic and Inorganic Chemicals

Skaneateles Lake Water is tested for the presence of 24 metals and non-metallic inorganic chemicals, 54 volatile organic compounds, 40 synthetic organic compounds (pesticides) and nine other organic chemicals known as disinfection byproducts. The latter are known as trihalomethanes and haloacetic acids (see section below for detail). The organic and inorganic chemicals and compounds tested for in 2021 are listed in the table of "Undetected Contaminants," which also follows. Trihalomethanes and haloacetic acids were detected (see table below). However, all detections were well below the regulated levels set by the USEPA and NYSDOH.

8.8 Other Skaneateles Lake water properties

Sodium 11.0 mg/L; pH average 7.82; pH range: 7.14-8.44 (EPA standard of 6.5-8.5); and total hardness 128 mg/L.

8.9 Radionuclides

Skaneateles Lake water was analyzed for 3 radionuclides (gross alpha particles, Radium 226 and Radium 228 in 2017. All results were below detectable levels. The next scheduled round of sampling for radionuclides is 2026.

8.10 Water Quality Summary

As stated above, Skaneateles Lake and the reservoir water was monitored for many inorganic and organic contaminants. See the tables on succeeding pages.

During 2021, Skaneateles Lake water was monitored for certain contaminants classified as Unregulated Contaminants, pesticides and herbicides. The lake and reservoirs were sampled for algae (phytoplankton). Though not considered a contaminant, these organisms can impact the aesthetic quality of the drinking water. Thus, treatment to control algae is done to keep the population in check. If you have any questions about the results of these analyses, please call 315-448-8366 or e-mail us at waterquality@syrgov.net.

8.11 Disinfection Byproducts

The water in the distribution system is checked quarterly for the presence of disinfection byproducts (DBPs). These organic chemical compounds are formed when chlorine combines with algae or other organic material occurring naturally on the water. High concentrations of DBPs in drinking water can pose a cancer risk. Test results indicate these compounds are present at levels significantly below the stringent EPA standard that went into effect in January 2002. The standards or MCLs are listed in the table on page 16.

8.12 Monitoring the Lake Ontario Supply

The Onondaga County Metropolitan Water Board monitors the quality of its Lake Ontario water. The monitoring of this source is similar to the monitoring that the City does for the Skaneateles Lake supply. The “Detected Contaminant” tables report contaminants detected by the Metropolitan Water Board in its tests of Lake Ontario water. The MWB also tests their treated water for the presence of volatile organic chemicals, inorganic elements and synthetic organic chemicals, including herbicides and pesticides, all of which have not been detected. For a complete summary of the testing performed by the MWB, contact their office at 315-652-8656.

8.13 Water Quality Monitoring Tables

The “Detected Contaminant” tables, which follow this section, report only on those contaminants that have been detected in the water at levels above mandated minimum detection limits, per federal and state regulations. Results are provided for Skaneateles and Lake Ontario water separately, where noted. Any table that reports “City of Syracuse, Distribution System” results refers to water sampled from the City of Syracuse water pipe network; the water sampled from the distribution system may be Skaneateles water or Lake Ontario water or a combination of the two. The distribution system sample results for the Lake Ontario water are representative of Lake Ontario water just prior to the point that the water enters the City of Syracuse distribution system on the north side of the City. The table of “Undetected Contaminants” is provided to report on tests undertaken by the City of Syracuse of Skaneateles water for contaminants that were not detected above EPA and NYS established detection levels.

8.14 Glossary of Terms Used in the Tables

AL: (Action Level) the concentration of a contaminant which, when exceeded, triggers treatment or other requirements that a water system must follow.

MCL: (Maximum Contaminant Level) the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MCLG: (Maximum Contaminant Level Goal) the level of a contaminant in drinking water below which there is no known health risk. MCLGs allow for a margin of safety.

Mg/L: (Milligrams per liter) Parts per million—a concentration equal to 1 milligram of a substance in one liter of water, equivalent to parts per million (ppm) in water measurement.

MRDL: (Maximum Residual Disinfectant Level) the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG: (Maximum Residual Disinfectant Level Goal) The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contamination.

N/A: (Not Applicable)

ND: (Not detected) Not detected above the regulated detection level

Ng/L (Nanograms per liter) Parts per trillion - a concentration equal to 1 nanogram of a substance in one liter of water, equivalent to parts per trillion (ppt) in water measurement.

NTU: (Nephelometric Turbidity Unit) A measurement of the turbidity, or cloudiness of the water. Turbidity in excess of 5 NTU is just noticeable to the average person.

PCi/L: (Picocuries per liter) A measure of the radioactivity in water.

TT: (Treatment Technique) A required process intended to reduce the level of a contaminant in drinking water.

Ug/L: (Micrograms per liter) Parts per billion, a concentration equal to 1 microgram of a substance in one liter of water, equivalent to parts per billion (ppb) in water measurement.

Table 1 Skaneateles Lake Microcystin Levels (ug/L) July 6 – October 25 2021

Date Sampled	7/6	7/12	7/19	7/26	8/2	8/9	8/16	8/23	8/30	9/7	9/13
Intake 1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.36
Intake 2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.46
Clear Well 1&2	---	---	---	---	---	---	---	---	---	---	---
Clear Well 3	---	---	---	---	---	---	---	---	---	---	---
Skaneateles UV Plant	---	---	---	---	---	---	---	---	---	---	---
Elbridge UV Plant	---	---	---	---	---	---	---	---	---	---	---
Westcott Incoming	---	---	---	---	---	---	---	---	---	---	---

Westcott Outgoing	---	---	---	---	---	---	---	---	---	---	---
Woodland Incoming	---	---	---	---	---	---	---	---	---	---	---
Woodland Outgoing	---	---	---	---	---	---	---	---	---	---	---
Skaneateles High School	---	---	---	---	---	---	---	---	---	---	---
Byrne Dairy	---	---	---	---	---	---	---	---	---	---	---
Elbridge North	---	---	---	---	---	---	---	---	---	---	---
Jordan Town Hall	---	---	---	---	---	---	---	---	---	---	---
Syracuse Burnet Ave	---	---	---	---	---	---	---	---	---	---	---

Table 2 Skaneateles Lake Microcystin Levels (ug/L) July 6 – October 25 2021

Date Sampled	9/17	9/20	9/23	9/27	10/4	10/6	10/8	10/11	10/13	10/18	10/25
Intake 1	0.39	0.31	0.47	ND	0.36	ND	ND	ND	ND	ND	0.36
Intake 2	0.79	0.61	0.49	ND	ND	ND	ND	ND	ND	ND	0.46
Clear Well 1&2	---	---	---	---	---	---	---	---	---	---	---
Clear Well 3	---	---	---	---	---	---	---	---	---	---	---
Skaneateles UV Plant	---	---	---	---	---	---	---	---	---	---	---
Elbridge UV Plant	---	---	---	---	---	---	---	---	---	---	---
Westcott Incoming	---	---	---	---	---	---	---	---	---	---	---
Westcott Outgoing	---	---	---	---	---	---	---	---	---	---	---
Woodland Incoming	---	---	---	---	---	---	---	---	---	---	---
Woodland Outgoing	---	---	---	---	---	---	---	---	---	---	---
Skaneateles High School	---	---	---	---	---	---	---	---	---	---	---
Byrne Dairy	---	---	---	---	---	---	---	---	---	---	---

Elbridge North	---	---	---	---	---	---	---	---	---	---	---
Jordan Town Hall	---	---	---	---	---	---	---	---	---	---	---
Syracuse Burnet Ave	---	---	---	---	---	---	---	---	---	---	---

Table 3 Detected Contaminants – 2021: General

Samples From	Contaminant	Unit	Regulatory Limit (MCL)	MCLG	Level Detected	Range	Sample Date	Violation
Skaneateles Lake	Barium (1)	Mg/L	2	2	0.022	N/A	May 12, 2021	No
	Chloride (2)	Mg/L	250	N/A	22.0	N/A	May 12, 2021	No
	Fluoride	Mg/L	2.2 (3)	N/A	0.72 (9)	0.11-1.21	Daily	No
	Chromium, Hexavalent	ug/L	N/A	N/A	0.031	N/A	November 2021	No
	Nitrate (4)	Mg/L	10	10	0.37	N/A	May 12, 2021	No
	Odor	Units	3	N/A	2.00	N/A	May 12, 2021	No
	Sodium (5)	Mg/L	N/A (6)	N/A	11.0	N/A	May 12, 2021	No
	Sulfate (7)	Mg/L	250	N/A	11.6	N/A	May 12, 2021	No
Lake Ontario	Aluminum (1)	Mg/L	N/A	N/A	0.09 (9)	0.05-0.14	March, September 2021	No
	Barium (1)	Mg/L	2	2	0.0197 (9)	0.0195-0.0199	March, September 2021	No
	Calcium	Mg/L	N/A	N/A	34.2 (9)	31.2-37.1	March, September 2021	No
	Color	Units	15	N/A	3.75	<5-5	March, September 2021	No
	Chloride (2)	Mg/L	250	N/A	28.5 (9)	26.6-30.4	March, September 2021	No
	Chromium, Hexavalent	Ug/L	N/A	N/A	0.07	N/A	November 2021	No

	Copper	Mg/L	AL=1.3	N/A	0.003	.0023-.0040	March, September 2021	No
	Fluoride (3)	Mg/L	2.2 (5)	4	0.70 (9)	0.62-0.76	Daily	No
	Magnesium (8)	Mg/L	N/A	N/A	9.1 (9)	8.6-9.5	March,September 2021	No
	Nickel	Mg/L	10	10	.00062	0.00059-	March, September 2021	No
	Nitrate (4)	Mg/L	10	10	0.27	0.15-0.38	March, September 2021	No
	Odor	Units	3	N/A	0.75	<1-1	March, September 2021	No
	Sodium (5)	Mg/L	N/A (6)	N/A	17.9 (9)	16.4-19.3	March, September 2021	No
	Sulfate (7)	Mg/L	250	N/A	24.4 (9)	23.7-25.0	March, September 2021	No
	Perfluorooctane sulfonate (10)	ng/L	10	N/A	1.8 (9)	<1.8-2.4	Monthly	No
	Perfluorooctanoic acid (10)	Ng/L	10	N/A	1.0 (9)	<1.8-1.9	Monthly	No

Notes:
1: Sources –Erosion of natural deposits
2: Sources – Natural deposits; road salt
3: The US EPA MCL is 4mg/L, but NYS has a stricter 2.2mg/L standard
4: Sources – Runoff from land applied fertilizer and septic tanks, sewage; erosion of natural deposits
5: Sources – Natural deposits; road salts; water softeners; animal waste
6: There is no MCL for sodium, but water with more than 20mg/L should not be used for drinking by people with severe sodium restriction diets; water with more than 270mg/L should not be used for drinking by people with moderate sodium restiction diets
7: Source – Naturally occuring
8: Naturally occuring
9: Average
10: Non-stick coatings, stain repellents and fire fightin foam

Table 4 Detected Contaminants – 2021: Distribution System Disinfection Byproducts

Samples From	Contaminant	Unit	Regulatory Limit (MCL)	MCLG	Level Detected (2)	Range	Sample Date	Violation
Syracuse (City)	Total Trihalomethanes TTHM (1)	Ug/L	80	N/A	34.63	16.70-58.00	2/17, 5/13, 8/25, 11/17	No
	Haloacetic Acids HAA5 (1)	Ug/L	60	N/A	20.88	12.40-32.10	2/17, 5/13, 8/25, 11/17	No
	Free Chlorine Residual (Distribution System)	Mg/L	4 (MRDL)	N/A (MRDLG)	0.72	0.00-2.17	Daily	No

	Free Chlorine Residual (Leaving Water Plant)	Mg/L	4 (MRDL)	N/A	1.26	0.48-2.67	Every 4 Hours	No

Notes:
1: Source – Byproduct of drinking water chloronation

Table 5 Detected Contaminants – 2021: Lead and Copper

Samples From	Contaminant	Unit	Regulatory Limit (AL)	MCLG	Level Detected (2)	Range	Sample Date	Violation
Syracuse (City)	Lead (1)	Ug/L	15	0	15.1 (3)	ND-49.6	September 2021	No
	Copper (2)	Ug/L	1300	1300	230 (3)	9.1-297	September 2021	No

Notes:
1: Source – Corrosion of lead service pipe, brass fittings, and household plumbing components
2: Source – Corrosion of household plumbing components
3. The result represents the 90% value, i.e., the concentration that is equal or greater than 90% of the sample results of the 50 samples checked. The action level for lead was exceeded at one of the 50 sites tested. The action level for copper was not exceeded at any of the test sites

Table 6 Detected Contaminants – 2021: Organic Chemicals (not including TTHM and HAA5)

Samples From	Contaminant		Regulatory Limit (MCL)	MCLG	Level Detected	Range	Sample Date	Violation
Syracuse (City)	None	---	---	---	---	---	---	---
MWB – Lake Ontario	Total Organic Carbon (1)	Mg/L	N/A	N/A	1.7 (2)	1.4-2.3	Monthly	No
	Dissolved Organic Carbon (1)	Mg/L	N/A	N/A	2.1 (2)	1.7-2.4	Monthly	No

Notes:
1: Naturally occuring
2: Average
3: Likely sources of contamination – non-stick coatings, stain repllants' and firefighting foam

Table 7 Detected Contaminants – 2021: Radioactive Contaminants

Samples From	Contaminant	Unit	Regulatory Limit (MCL)	MCLG	Level Detected	Sample Date	Violation
Skaneateles Lake	Gross Alpha Emitters (1)	pCi/L (7)	15	0	Undetected	5/10/2017	No
	Radium 226 (2)	pCi/L (7)	5 (5)	0	Undetected	5/10/2017	No
	Radium 228 (2)	pCi/L (7)	5 (5)	0	Undetected	5/10/2017	No
Lake Ontario	Gross Alpha Emitters (1)	pCi/L (7)	15	0	Undetected	February, May, August, December 2021	No
	Gross Beta Emitters (3)	pCi/L (7)	50 (6)	0	1.87		No
	Radium 226 (2)	pCi/L (7)	5 (5)	0	0.187		No
	Radium 228 (2)	pCi/L (7)	5 (5)	0	0.976		No
	Uranium Total (4)	Ug/L	30	N/A	0.385		No

Notes:
1: Source – Decay of natural deposits
2: Source – Decay of natural deposits
3: Source – Decay of natural deposits and man-made emissions
4: Source – Decay of natural deposits
5: 5pCi/L is the refulatory limit for combined Radium 226 and 228
6: The State considers 50 pCi/L to be the level of concern for beta particles
7: Picocuries per liter – measure of the radioactivity in water

Table 8 Detected Contaminants – 2021: Syracuse Distribution System Coliform

Samples From	Contaminant	Regulatory Limit (MCL)	Month	Samples Tested	MCLG	Positive Samples	% Positive	Violation
Syracuse Distribution System	Total Coliform Bacteria (1)	N/A	May	264	0	2	0.76%	No
			June	301	0	4	1.33%	No
			July	284	0	13	4.58%	No
			August	293	0	5	1.71%	No
			September	296	0	2	0.68%	No
			October	267	0	6	2.25%	No
			December	243	0	2	0.82%	No

Notes:
1: Source – Naturally present in the enviroment. Coliforms are used as an indicator that other, potentially harmful bacteria may be present. As shown above, Total Coliforms were detected in the routine monthly compliance samples collected at our system.Four additional recheck samples were collected for every Total Coliform positive sample. Since Total Coliforms were detected in <5% of all samples collected during the month, the system did not have a Total Colfiorm MCL violation. It should be noted that E. Coli is associated with human and animal fecal waste.

Table 9 Detected Contaminants – 2021: Source Water Turbidity (1)

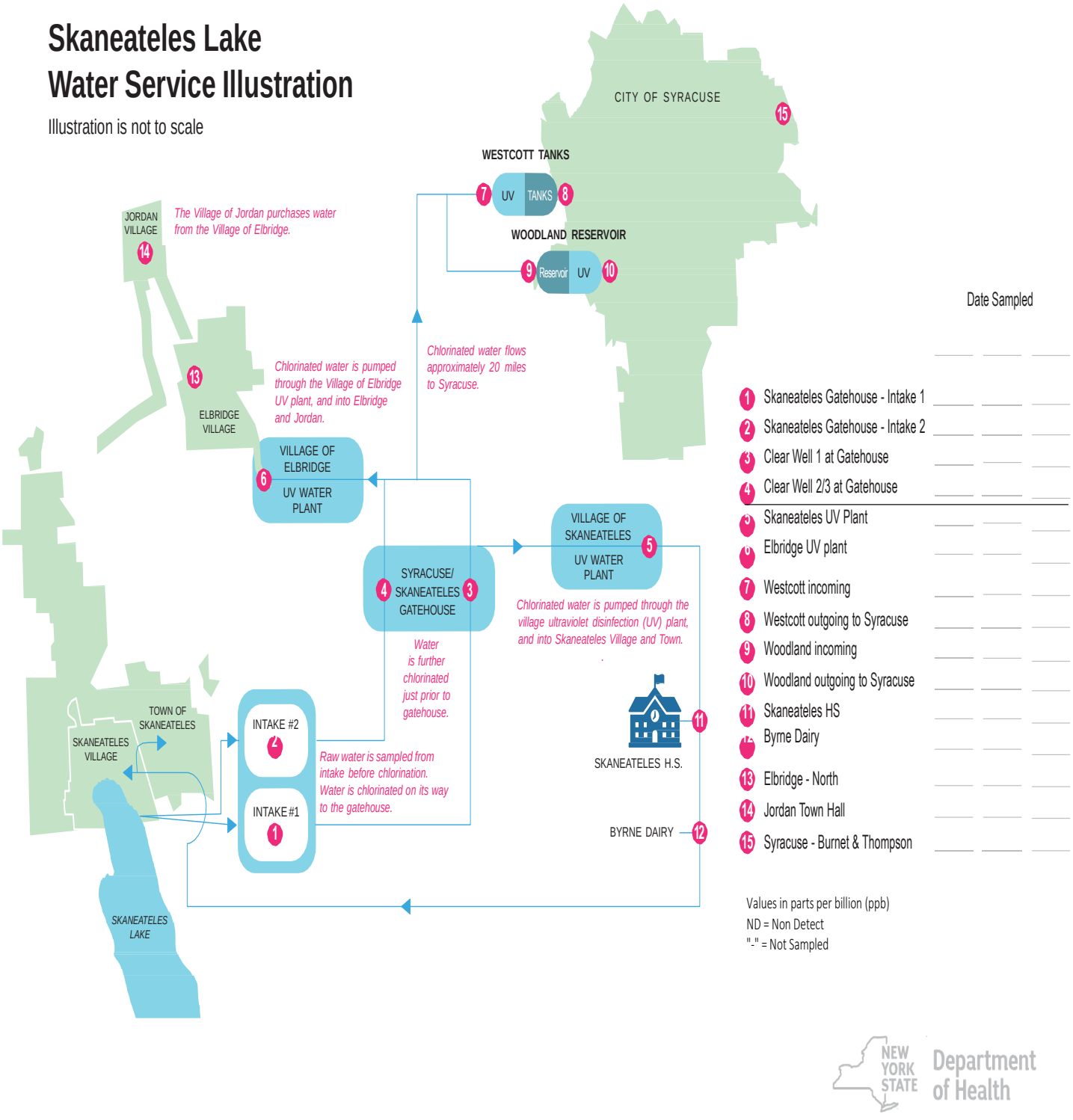
Turbidity Location	Unit Measurement	Regulatory Limit (TT)	MCLG	Level Detected	Sample Date	Violation
Skaneateles	NTU	TT <= 5NTU for filtration avoidance systems	No	10.73 NTU (2) (3)	11/15 11/16	Yes
Ontario (5)	NTU	TT <= 1.0 NTU	N/A	100% <= 1.0 NTU	Every 4 Hours	No
	NTU	TT= 95% of monthly samples <= 0.3 NTU	N/A	100% <= 0.3 NTU	Every 4 Hours	No

Notes:
1: Source – Re-suspension of bottom sediment or sediment in stream flow runoff from rainfall events. Turbidity is a measure of the cloudiness of water. In the case of unflitered Skaneateles Lake Water, turbidity is an indicator of water quality; high turbidity can interfere with disinfectants. In the case of Lake Ontario, turbidity is monitored as an indicator of the effectiveness of the filtration system.
2: For unfiltered Skaneateles Lake water, the treatment technique standard limits turbidity to 5 NTU or below. Thus, there were 2 violations during 2020.
3: MCL (2 day exceedance). There was one MCL in 2020.
4: Treatment Technique Violation (1 day exceedance). See narrative for explanation of turbidity occurences.
5: For the filtered Lake Ontario supply, the treatment technique must maintain turbidity <= 0.3 NTU in 95% of samples. The 100% represents the monthly percentage of samples below 0.3 NTU.

Table 10 Undetected Contaminants – 2020: Skaneateles Lake (1)

Undetected Contaminant Type	Contaminant Name				
Volatile Organic Chemicals	Benzene	2-Clorotoluene	Trans -1,2 Dichloroethene	Methylene Chloride	Trichloroethene
	Bromobenzene	4-Chlorotoluene	1,2-Dichloropropane	n- Propylbenzene	Trichlorofluoromethane
	Bromochloromethane	Dibromomethane	1,3-Dichloropropane	Styrene	1,2,3-Trichloropropane
	Bromomethane	1,2-Dichlorobenzene	2,2-Dichloropropane	1,1,1,2-Tetrachloroethane	1,2,4-Trimethylbenzene
	n-Butyibenzene	1,3-Dichlorobenzene	1,1-Dichloropropene	1,1,2,2-Tetrachloroethane	1,3,5-Trimethylbenzene
	sec- Butyibenzene	1,4-Dichlorobenzene	(cis) 1,3-Dichloropropene	Tetrachloroethene	Toluene
	tert- Butyibenzene	Dichlorodifluoromethane	(trans) 1,3-Dichloropropene	MTBE	m-Xylene
	Carbon Tetrachloride	1,1-Dichloroethane	Ethylbenzene	1,2,3-Trichlorobenzene	p-Xylene
	Chlorobenzene	1,2-Dichloroethane	Hexachlorobutadiene	1,2,4-Trichlorobenzene	o-Xylene
	Chloroethane	1,1-Dichloroethene	Isopropylbenzene	1,1,1-Trichloroethane	Vinyl Chloride
	Chloromethane	Cis- 1,2-Dichloroerthene	4- Isopropyltoluene	1,1,2-Trichloroethane	
Synthetic Chemicals (Including Pesticides and Herbicides)	1,2-Dibromo-3-chloropropane	Aldicarb Sulfoxide	Carbofuran	Heptachlor Epoxzide	Oxarnyl
	1,2-Dibromethane (EDB)	Aldrin	Dalapon	Hexachlorobenzene	PCB, Total
	2,4,5-TP Silvex	Atrazine	Dicamba	Hexachlorocyclopen-tadiene	Pentachlorophenol
	2,4-D	Benzo(a)pyrene	Dieldrin	Lindane	Pichloram
	3-Hydroxy Carbofuran	Bis (2-Ethylhexyl) phthalate	Dinoseb	Methornyl	Propachlor
	Alachlor	Bis (2-Ethylhexyl) adipate	Endrin	Methaxychlor	Simazine
	Aldicarb	Butachlor	Glyphosate	Metolachlor	Total Chlordane
	Aldicarb Sulfone	Carbaryl	Heptachlor	Metribuzin	Toxaphene
Inorganics	Antimony	Chromium	Mercury	Silver	
	Arsenic	Color	Nickel	Thallium	
	Beryllium	Iron	Nitrite	Zinc	
	Cadmium	Lead	Selenium		

Figure 1 Skaneateles Lake Water Service Illustration



8.15 Giardia and Cryptosporidium

The Water Department routinely monitors the water for the presence of two parasitic protozoans: Giardia and Cryptosporidium. These organisms, if ingested, can cause intestinal illness with flu-like symptoms.

Of these two protozoans, Cryptosporidium poses the most concern since, unlike Giardia, it is not controllable with chlorination at the normal doses utilized in water systems. With the exception of very few service connections to our transmission pipelines between Skaneateles and Syracuse, Giardia is routinely oxidized and rendered harmless with the chlorination contact time that the system is able to provide. The NYSDOH has required that water suppliers provide their customers the following notice:

"New York State law requires water suppliers to notify their customers about the risks of cryptosporidiosis and giardiasis. Cryptosporidiosis and giardiasis are intestinal illnesses caused by microscopic parasites. Cryptosporidiosis can be very serious for people with weak immune systems, such as chemotherapy, dialysis or transplant patients, and people with Crohn's disease or HIV infection. People with weakened immune systems should discuss with their health care providers the need to take extra precautions such as boiling water, using certified bottled water or a specially approved home filter. Individuals who think they may have cryptosporidiosis and giardiasis should contact their health care provider immediately."

An Ultraviolet (UV) Disinfection Facility was completed at Woodland Reservoir in April 2015. The facility, along with a smaller UV facility located at the Westcott Reservoir (completed in 2013), were constructed in order to comply with the USEPA's Long Term 2 Enhanced Surface Water Treatment Rule (LT2). UV disinfection uses UV light to inactivate pathogens such as Cryptosporidium by disrupting their DNA strands, making them non-viable and non-infectious. Two raw water samples (one from each intake) were sampled monthly. A total of 24 samples were collected and analyzed for Giardia and Cryptosporidium during 2020. No Giardia cysts or Cryptosporidium oocysts were detected.

Since 1986, there have been 1,253 samples analyzed for Giardia and 1,241 samples for Cryptosporidium. Confirmed Giardia cysts have been observed in ten samples. Of these, eight were samples collected from tributaries within the watershed, one was a sample collected from Raw Water Intake #2 and one was collected from the Water Shop in 2003 (Table No. 12). Cryptosporidium oocysts have been observed on nine occasions since 1988. Of these, three sample locations were tributaries and three were from Raw Water Intake samples.

OCWA collected a total of 8 Cryptosporidium and Giardia samples in 2021 from water originating from Lake Ontario. Quarterly samples were collected from the Raw Water and Finished Water. Cryptosporidium and Giardia were not detected in any of the samples from Lake Ontario.

9. WATER CONSERVATION

People in the northeastern part of the United States generally feel that they need not be too concerned about water conservation. There is usually plenty of rain and snow to replenish most surface and ground water supplies. Occasionally droughts do strike Central New York and the level of Skaneateles Lake falls to a point that the withdrawals need to be limited as part of the Water Department's lake level management plan. This happened during 1999 and to a lesser degree in 2001. In March of 2002, Skaneateles Lake was below average level, which prompted the City of Syracuse to issue an advisory that the management plan flow reduction might need to be exercised if the lake level did not improve. During 2004, an above average amount of precipitation fell on the watershed and lake level management was not a problem.

In 2020, the City was not required to reduce withdrawals since the Skaneateles Lake elevation was maintained above the monthly levels outlined in the Water Department's lake level management plan.

Water conservation should not be something that is ignored until a crisis is at hand. By exercising the following water-saving consumption practices all the time, you will be well prepared to deal with the occasional drought; and by not using any more clean water than is necessary, you will be saving money and doing your share toward global environmental protection. Remember: always be conscious of the water you are using; don't be wasteful, and look for ways to conserve.

The following are some common sense tips plus some water facts to help you become a conscientious water user. If you would like to obtain more information about water conservation, one good web site is www.epa.gov/watersense/. This site is a service of the USEPA.

9.1 Leakage and Estimated Water Bills

Customers with bills that are regularly based on estimated water usage may be in for a big surprise if there are plumbing leaks or extraordinary water use at their property.

Since water bills that have been based on estimated water consumption might not account for leakage, a customer will not be aware that their water consumption has increased when reviewing a water bill based on estimated consumption. Several billing cycles may go by before the Water Department is able to obtain a reading at any given property. In such cases, unknown leakage could be costing money without the owner even realizing it. When a water meter reading is finally obtained, the actual water use recorded by the meter will be charged to the customer even though estimated bills may have assumed a lower consumption. So, be aware and be a water-wise consumer by paying attention to water bills and don't let estimated consumption go for more than one quarter. By paying attention to your water bill and to your plumbing, you will be potentially saving water and a lot of money and grief. No one likes to get a water bill that is hundreds of dollars higher than expected.

The following tips might also help save you money:

Inside Water Use

- Repair all leaks in faucets, showerheads, toilets, hoses and other fixtures and appliances.
- Use faucet aerators and low flow showerheads.
- Put 10-12 drops of food coloring in your toilet tank. If the color appears in the bowl within an hour, your toilet tank is leaking.
- Use the sink garbage disposal sparingly.
- When using a dishwasher, wash only full loads and do not use extra cycles.

- Keep a container of cold water in the refrigerator instead of letting the cold water faucet run.
- Water plants with leftover drinking water.

Outside Water Use:

- Repair or replace leaky garden hose connections.
- Use a hose nozzle that can be shut off.
- Wash vehicles using a bucket of water and be sure the hose is off when not needed to rinse.
- Lawn watering in the summertime uses significant amounts of water.

Since grass goes dormant during dry periods, most lawns need very little watering. Lawns with a combination of rye, bluegrass, and a higher percentage of fescue are suited for sunny, dry places and have a good tolerance to droughts. Most lawns can go five (5) weeks without water. If lawn watering is permitted, lawns need to be watered only once a week and only long enough for the water to soak 3 or 4 inches below the ground surface. The best time to water lawns is the early morning, to minimize water loss due to evaporation. Don't allow water to run off onto pavements.

9.2 Opportunities for Public Participation

The Mayor of the City of Syracuse is the chief executive officer for the City. The Mayor appoints a Commissioner of Water who is the head of the City's Department of Water. The Mayor's office can be contacted at 315-448-8005. Requests for City services or information can be made to the City's help line at 315-448-CITY (2489).

The City of Syracuse Common Council is the legislative body of the City. All matters concerning the Water Department's budget, capital projects, water rates and fees, rules and regulations must be considered by the Common Council. The Common Council meets on a regular basis every other Monday at 1 p.m. except during July and August when it meets every three weeks. An informal "study session" is held at 12 p.m. on the Wednesday prior to a Monday meeting and at 12 p.m. on Monday prior to the formal 1 p.m. meeting. To check on meeting dates you may contact the City Clerk's office at 315-448-8216 or the Common Council office directly at 315-448-8466.

10. FLOOD HAZARDS IN SYRACUSE

The City of Syracuse has five streams that have flooded in recent years with associated property damage:

- Onondaga Creek
- Meadowbrook
- Harbor Brook
- Ley Creek
- Cold Brook

Onondaga Lake also reached flood levels in the 1970's and 1980's. To address these flooding risks, several flood reduction measures were implemented over the last several decades including:

- The Onondaga Dam on Onondaga Creek;
- The Grand Avenue/Velasko Road Detention Basin, which reduces flood risk up to the 25-year event for Harbor Brook; and
- The Meadowbrook Detention basin which reduces risk for the up to the 5-year event for Meadowbrook.

Even with these flood reduction measures, flood risks remain a real threat for people and property along these streams. In both August and October of 2021 water levels and flows reached their highest levels in more than 10 years on Onondaga Creek, flooding into Kirk Park and Lower Onondaga Park, as well as nearby backyards on Cheney Street.

Figure 2 – August 19, 2021- High flow and water levels on Onondaga Creek at Kirk Park. Water levels were at their highest in over 10 years.

10.1 Safety During Floods

Almost every year, Syracuse and Onondaga County experience flash flooding where stream levels rise rapidly due to intense rainfall events. Intense rainfall will also cause storm sewer back-ups and flash flooding onto local roads.

- Flash floods can come rapidly and unexpectedly. You may not have warning that a flash flood is approaching.
- Do not drive around a barricade. Barricades are there for your protection. Turn around and use a safe route.
- Do not attempt to drive through a flooded road or moving water. The depth of water is not always obvious. The road bed may be washed out under the water, and you could be trapped. Bridge underpasses have a higher risk for flash flooding.
- Six inches of water will reach the bottom of most passenger cars; this depth can cause loss of control or possible stalling.
- Many cars will start to float in as little as one foot of water - this can be extremely dangerous because as the wheels lose grip, you lose control.
- Two feet of flowing water can sweep away most vehicles — including large SUVs.
- Do not attempt to walk in flooded areas! Fast-moving water can sweep you off your feet, and underwater hazards cannot be seen! Floodwaters are also highly unsanitary. Please do not let children play in fast-moving water or flooded areas!

Figure 3 FEMA Flood Preperation Poster

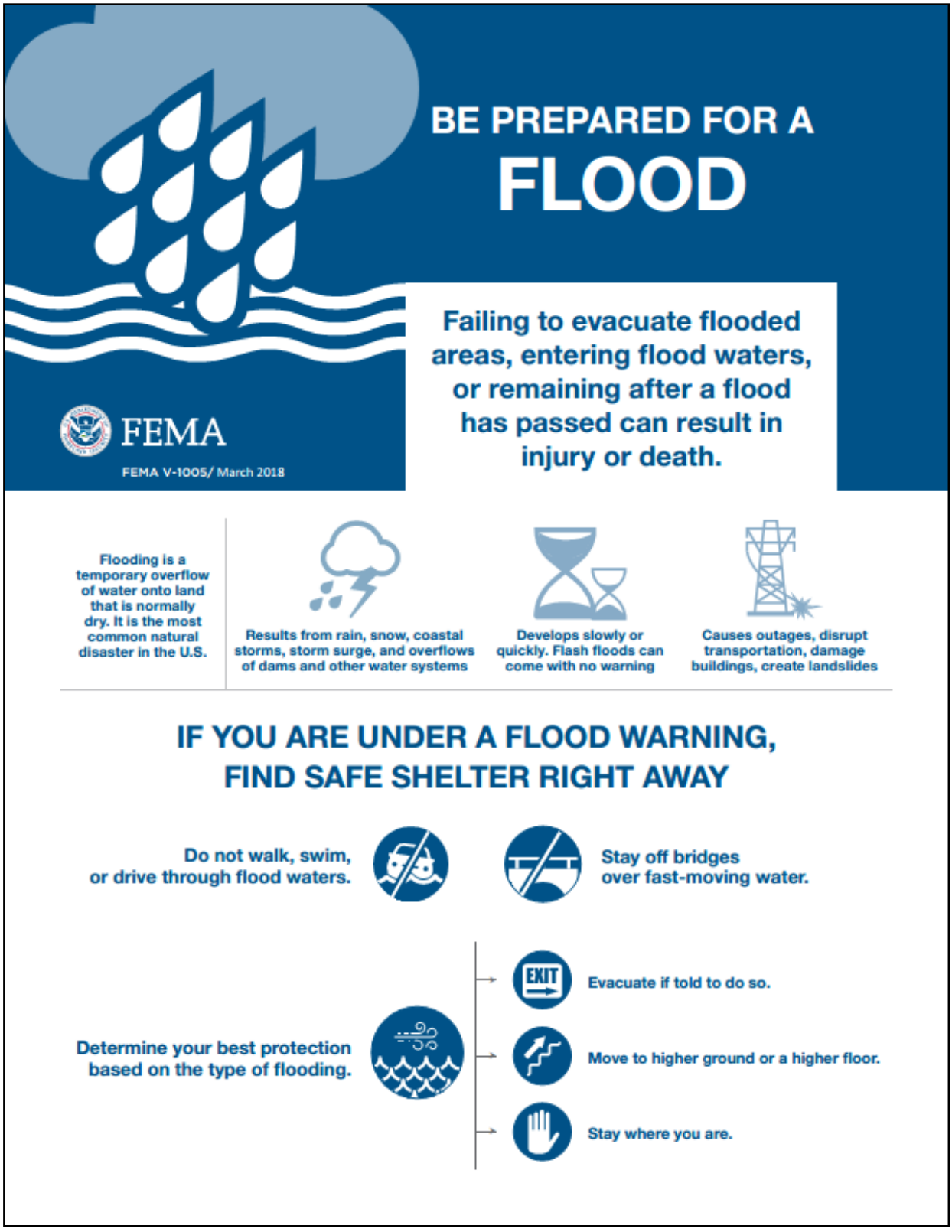


Figure 4 FEMA Flood Safety Tips

HOW TO STAY SAFE

WHEN A FLOOD THREATENS

Prepare NOW

Know your area's type of flood risk. Visit FEMA's Flood Map Service Center at https://msc.fema.gov/portal for information.

Sign up for your community's warning system. The Emergency Alert System (EAS) and National Oceanic and Atmospheric Administration (NOAA) Weather Radio also provide emergency alerts.

If flash flooding is a risk in your location, monitor potential signs such as heavy rain.

Learn and practice evacuation routes, shelter plans, and flash flood response.

Gather supplies in case you have to leave immediately or if services are cut off. Keep in mind each person's specific needs, including medication. Don't forget the needs of pets. Obtain extra batteries and charging devices for phones and other critical equipment.

Obtain flood insurance. Homeowner's policies do not cover flooding. Get flood coverage under the National Flood Insurance Program (NFIP).

Keep important documents in a waterproof container. Create password-protected digital copies.

Protect your property. Move valued items to higher levels. Declutter drains and gutters. Install check valves. Consider a sump pump with a battery.

Survive DURING

Depending on where you are, and the impact and the warning time of flooding, go to the safe location that you have identified.

If told to evacuate, do so immediately. Never drive around barricades. Local responders use them to safely direct traffic out of flooded areas.

Listen to EAS, NOAA Weather Radio, or local alerting systems for current emergency information and instructions.

Do not walk, swim, or drive through flood waters. Turn Around. Don't Drown.® Just six inches of fast-moving water can knock you down, and one foot of moving water can sweep your vehicle away.

Stay off of bridges over fast-moving water. Fast-moving water can wash bridges away without warning.

If your vehicle is trapped in rapidly moving water, stay inside. If water is rising inside the vehicle, seek refuge on the roof.

If trapped in a building, go to its highest level. Do not climb into a closed attic. You may become trapped by rising floodwater. Go on the roof only if necessary. Signal for help.

FEMA

Be Safe AFTER

Listen to authorities for information and instructions.

Avoid driving, except in emergencies.

Be aware that snakes and other animals may be in your house. Wear heavy gloves and boots during clean up.

Avoid wading in floodwater, which can contain dangerous debris and be contaminated. Underground or downed power lines can also electrically charge the water.

Use a generator or other gasoline-powered machinery ONLY outdoors and away from windows.

Be aware of the risk of electrocution. Do not touch electrical equipment if it is wet or if you are standing in water. If it is safe to do so, turn off the electricity to prevent electric shock.

Take an Active Role in Your Safety

Go to **ready.gov** and search for **flood**. Download the **FEMA app** to get more information about preparing for a **flood**. Find Emergency Safety Tips under Prepare.

10.2 Flood Risk Reduction

10.2.1 General Hazard Preparedness

In 2020, the City of Syracuse adopted the Onondaga County Multi-Jurisdictional Hazard Mitigation Plan (HMP), which identified mitigation strategies for all forms of hazards, including flooding, that affect the County, City, and other local municipalities. Adoption of this plan facilitates coordination with the New York State Emergency Management Office and FEMA, and provides opportunities for hazard mitigation funding from state and federal sources.

10.2.2 Onondaga Creek Flood Risk Reduction

As identified in the Onondaga County HMP, the City has initiated a hydraulic study to assess if large open space areas near Dorwin Avenue could provide enough flood storage to reduce Onondaga Creek flood levels downstream, particularly in the City's Southside and Downtown areas. This effort is targeted at shrinking the floodplain in populated areas, which would reduce risks to people and property, and also remove flood insurance requirements in some areas. This study is funded by a FEMA grant.

10.2.3 Protect the Floodplain! Keep Channels Clear of Debris

The potential for flooding is greatly alleviated when creeks are clear of obstructions. It is a violation of a city ordinance to dispose of any solid waste (trees, garbage, etc.) in any creek or channel throughout the city. The City's Public Works Department, Bureau of Sewers & Streams, assigns personnel to check the main creeks at least twice per year. In the event that branches or other miscellaneous debris accumulate in a creek, you may contact the City DPW to clear them out free of charge at 315-448-CITY (2489). For no-cost clearing in the Meadowbrook and Harbor Brook areas please call the County Department of Water Environment Protection at 315-435-2260.

10.2.4 Building in the Floodplain - Build Responsibly!

The City of Syracuse regulates new construction, site development and building renovation within the floodplain. In September 2016, the City adopted a new floodplain ordinance to reduce risk to new and substantially-improved structures in the floodplain, and to ensure that new floodplain development will not enlarge the floodplain or raise flood elevations, adversely affecting neighboring properties.

Strict regulations apply to projects within the Regulatory Floodway (higher risk area close to the waterway). Projects located within the Special Flood Hazard Zone (SFHA, or commonly known as the "100-Year Flood Zone") are also subject to protective regulations. Projects in the Floodway must demonstrate by engineering analysis that they will cause no increase in base flood elevations. All projects within the SFHA, whether inside or outside of the floodway, must also maintain pre-development flood storage. The City of Syracuse Department of Engineering and the Code Enforcement websites provide additional information regarding building within the regulated floodplain.

Residential and commercial structures in the SFHA shall have the lowest floor, including basement or cellar, elevated to at least two feet above the base flood elevation. Commercial, industrial, or other non-residential structures in the SFHA can be dry-floodproofed, so that the structure is watertight below the base flood elevation plus freeboard, with walls substantially impermeable to the passage of water. Wet-floodproofing applies only to parking, access areas, and non-basement storage areas.

10.2.5 Renovation within the Floodplain: Substantial Improvement Requirements

For existing structures within the SFHA, the National Flood Insurance Program (NFIP) requires that if the cost of reconstruction, rehabilitation, addition or other improvements to a building equals or exceeds 50% of the building's market value, then the building must meet the same construction requirements as would a new building in the floodplain.

10.2.6 What Can I Do to Help Protect My Property From Flooding?

Measures to protect a property from flood damage include retrofitting, elevating a building above flood levels, constructing small protective barriers, and waterproofing walls, grading a yard, correcting local drainage problems, and such emergency measures as moving furniture and sandbagging.

Please consult with the Department of Engineering (315-448-8200) or the Department of Neighborhood & Business Development, Division of Code Enforcement (315-448-8600) regarding any alteration or addition to your building or land if it is located in the special flood hazard zone. Most of these improvements will require a permit, including grading or filling of the site.

10.3 Flood Maps and Flood Insurance

10.3.1 New Flood Maps for Syracuse Issued in November 2016

In the early 2000's, the Federal Emergency Management Agency (FEMA) restudied the flood risks for Syracuse streams and provided revised flood maps to Syracuse for review. After several successful appeals by Syracuse to reduce the flood zones, FEMA finalized the maps in 2016, and the Syracuse Common Council adopted the new flood maps in September 2016. If the flood maps had not been adopted, Syracuse risked losing membership in the National Flood Insurance Program (NFIP) which would have eliminated federally subsidized flood insurance for residents, and also would have risked Syracuse's ability to receive federal funding for flood-related disasters.

10.3.2 Flood Insurance Rates

Before a property owner can receive a loan or other financial assistance from a federally-banked lender, there must be a check to see if the building is in the Special Flood Hazard Area (SFHA). If it is within the SFHA, flood insurance is required by the lending institution.

In October 2021, FEMA and the NFIP changed the methods for determining flood insurance rates. The new rating system is called Risk Rating 2.0: Equity in Action. Risk Rating 2.0 is FEMA's new, individualized approach to risk assessment. By using new data, new flooding models, and new technology, Risk Rating 2.0 can assess many factors for individual properties, including:

- Frequency of flooding
- Multiple flood types — river overflow, storm surge, coastal erosion, and heavy rainfall
- Proximity to flood sources
- Building characteristics, such as First Floor Height and the cost to rebuild

Why did the NFIP change its risk rating system? Prior to Risk Rating 2.0, the NFIP rating methodology primarily considered flood zones and elevations, and had not been updated in 50 years. This caused disparities that resulted in individuals paying more than their fair share in flood

insurance premiums. With Risk Rating 2.0, FEMA now utilizes the latest in technology that allows it to:

- Calculate rates that are equitable for all policyholders, based on the values of their buildings and individual properties' flood risks.
- Provide building owners and renters with more specific and accurate information on flood risk, which will help them make well-informed decisions on purchasing flood insurance and taking steps to mitigate flood risk. February 2022 1 FEMA Fact Sheet — Understanding Risk Rating 2.0: Equity in Action
- Improve community resilience and help disaster survivors recover faster after floods — America's number one natural disaster — which are projected to get worse across the country due to climate change
- Ensure rate increases and decreases accurately reflect individual flood risk. The rating is specific to the building (rather than a blanket rate based on a flood map).

FEMA estimates that under Risk Rating 2.0, flood insurance rates will slightly decrease for most, but not all, homeowners within Syracuse.

10.3.3 Flood Insurance Discount of 15%

The City of Syracuse participates in the NFIP Community Rating System (CRS). This system rewards Syracuse for actively promoting sound floodplain management and working to reduce flood risks. The City's CRS rating was recertified in 2021 and provides a flood insurance discount of 15 percent for City residents. Make sure your insurance agent is aware of the insurance discount.

Homeowners Insurance does not cover Flooding! If you are in a Floodplain, insure your Property with Flood Insurance!

Flood insurance is also available for contents, renters, and properties outside of the SFHA. Check with your insurance agent about the coverage that is best for you.

10.3.4 Flood Insurance Property Tax Exemption

In January 2019, the New York State legislature passed a new law drafted by Assemblywoman Pamela Hunter which authorized a special property tax exemption for households within the City of Syracuse required to purchase flood insurance. This exemption could result in up to approximately $750 in reduced City taxes. In order to qualify for the exemption, the property must be:

- Located within the Special Flood Hazard Area (100 Year floodplain) or within the Flood Hazard Boundary as designated by FEMA;
- A 1-3 family residential property;
- Insured through a federally-backed flood insurance policy for the current tax year;
- Have no delinquent City taxes; and
- Either be located in the City's Neighborhood Revitalization Strategy Area (NRSA) or, if located outside of the NRSA, be owner-occupied with a total household income of less than $62,985 per year.

For this credit, an applicant must apply every year to the City of Syracuse Assessment Department prior to January 1. Proof of required insurance is needed with the application. Application forms are available on the City website and at the City Assessment Office. (City Hall, First Floor Room 130, 233 E. Washington Street)

10.3.5 Is My House or Building in the Floodplain?

To determine if your property (residential or commercial) is within a regulated floodplain, the FEMA FIRMs can be viewed:

On-Line:

- Onondaga County Web GIS: http://www.fsihost.com/onondaga/
- FEMA Map Service Center website: http://msc.fema.gov/portal

Paper Flood Maps

- Syracuse Dept. of Engineering, Mapping Division, Room 401 City Hall; 8:00 A.M. to 4:00 P.M. weekdays (telephone 315-448-8211).
- Onondaga County Central Library Main Branch at the Galleries of Syracuse (447 S. Salina Street)

What if I think I am outside of the Special Flood Hazard Area but My Bank Requires Flood Insurance?

FEMA has established procedures to change the designation for properties incorrectly included in the SFHA. These processes are referred to as **the Letter of Map Amendment or LOMA and the Letter of Map Revision Based on Fill, or LOMR-F.** Through these processes, an individual who owns, rents, or leases property may submit certain mapping and survey information to FEMA and request that FEMA issue a document that officially removes a property and/or structure from the SFHA. The applicant will need to hire, **at their own expense**, a Licensed Land Surveyor or Registered Professional Engineer to prepare an **Elevation Certificate** for the property. Upon receiving a complete application forms package, FEMA will normally complete its review and issue its determination in 4 to 6 weeks.

10.4 Floodplain and Flood Insurance Resources

For flood preparedness guidelines, please see:

https://www.ready.gov/floods

For more information on flood insurance coverages and rates, please utilize FEMA's website:

https://www.floodsmart.gov

The NYSDEC-Floodplain Bureau website also has relevant floodplain-related information:

http://www.dec.ny.gov/lands/24267.html

10.5 Storm Water Management

10.5.1 Reducing The Impacts of Storm water Pollution

What is Storm water?

Stormwater is rain that falls on roofs, lawns, or paved areas like driveways and roads, and is carried away by a system of storm water pipes or culverts and ditches. As it flows over the land surface, stormwater picks up debris, chemicals, dirt and other pollutants. This untreated water is discharged into the water bodies we use for swimming, fishing and drinking water.

Ten Ways Homeowners Can Improve the Quality of Stormwater Runoff

1. Cover piles of soil, sand or mulch to stop them from being transported in storm water. Plant grass where soil is exposed.
2. Sweep your sidewalks and driveways rather than hosing them down.
3. Put leaves and grass clippings in the compost, on the garden as mulch, or mow back into the lawn to recycle nutrients
4. Divert roof water to lawns or gardens where it can safely soak in.
5. Keep pesticides, oil, leaves and other pollutants off streets and out of storm drains.
6. Keep cars tuned up and repair leaks.
7. Wash your vehicle on grass or over gravel. Use as little detergent as you can, consider biodegradable detergent, and pour any leftover soapy water onto the lawn.
8. Dispose of household hazardous waste according to the label directions. Reuse turpentine once the paint has settled.
9. Clean up pet waste and dispose of in an appropriate manner.
10. Have your septic system inspected by a professional every 3 to 5 years and have the septic system pumped as necessary (usually every 3 to 5 years).

Why Should You Care?

- Sediment clouds the water making it difficult for aquatic plants to grow.
- Sediment deposits fill in fish spawning beds and deep pools. Fish eggs are buried and food supplies are reduced.
- Excess nutrients cause algae blooms and deplete oxygen supplies.
- Bacteria and other pathogens discharged in swimming areas create health hazards.
- Debris washed into the water can choke, suffocate or disable aquatic life.
- Household hazardous wastes can poison aquatic life.
- Boating, swimming and other recreational activities are impaired due to sediment-filled navigation channels and decreased water clarity.
- Polluted storm water often affects drinking water sources – human health is at risk and water treatment costs rise.

10.5.2 Storm Water Pollutants of Concern

- **Coliform** – Pathogens or bacteria, possibly from illicit discharges or pet waste, that are responsible for periodic beach closings.

- **Floatables** – Street litter or debris that floats on or near the water surface and can be harmful or fatal to aquatic organisms.
- **Oil / Grease** – A pollutant that often enters the water via storm drains and road runoff, which damages animal's skins and can cause poisonings, blindness and liver damage.
- **Phosphorus** – An element that is easily transported via sediment into the water. Excess phosphorus causes algal blooms, decreases water clarity and reduces dissolved oxygen.
- **Settling Solids** – Soil or other particles that settle on the lake or stream bottom and destroy aquatic habitats, spawning areas and may contaminate bottom feeding organisms.
- **Suspended Solids** – Smaller soil particles transported via runoff and erosion that decrease water clarity and food supplies.

10.5.3 Illicit Discharge Detection and Elimination (IDDE) Program

Under a State Pollution Discharge Elimination System (SPDES) General Permit the City of Syracuse is required to develop a program to detect and eliminate illicit discharges to storm water sewer systems. Illicit discharges are defined as drainage into a storm water sewer that is not runoff from precipitation. This could be improperly connected sanitary sewers, or used motor oil or other contaminants deposited into catch basins.

To facilitate this program, the City has developed mapping of the storm water sewer systems within the City, including the outlets into the various streams passing through the City. The maps will be developed to also show storm water sewer lines, catch basins, and manholes plus the geographic limits of the individual sewer lines (known as "sewer sheds"). The completed maps will be used by investigators in the field to isolate sources of illicit discharges so that they can be eliminated by the responsible party from the storm water system.

If you would like to report an illicit discharge into a storm sewer or catch basin, please call City Line 315-448-CITY (2489) or go on-line to the City's website **www.syrgov.net** and click on the link to the SYRCITYLINE on the homepage to submit your request.

FOR MORE INFORMATION OR QUESTIONS CONTACT:

Syracuse Department of Engineering, Office of the City Engineer, 315-448-8200

CITY OF SYRACUSE
DEPARTMENT OF WATER
101 NORTH BEECH STREET
SYRACUSE, NY 13210

FOR MORE INFORMATION OR QUESTIONS:

Your family doctor or pediatrician can perform a blood test for lead and provide you with information about the health effects of lead.

SYRACUSE DEPARTMENT OF WATER

Emergencies:	315-448-8360	
Engineering, Maintenance, and Operations:	315-448-8340	Fax: 315-473-2608
Meter Reading & Water Billing:	315-448-8238	Fax: 315-448-8262
Water Quality & Treatment:	315-685-6486	Fax: 315-685-8160

Other important sources of information concerning water-related issues are as follows:

ONONDAGA COUNTY DEPARTMENT OF HEALTH 315-435-6600
ONONDAGA COUNTY LEAD POISON CONTROL 315-435-3271

US EPA's *SAFE DRINKING WATER HOTLINE* 1-800-426-4791
(This hotline is available to provide you with information on drinking water contaminants and health effects.)

If you have any questions or comments about the material contained in the Drinking Water Newsletter please contact the Commissioner's office in writing (101 N Beech St, Syracuse, NY 13210), by calling 473-2609, or e-mail at waterengineering@syrgov.net.


Syracuse
New York

Langelier Saturation Index

Prediction of Water Tendencies by using the LSI
Langelier Saturation

The Langelier index is a calcium carbonate saturation index that is very useful in determining the scaling or corrosive tendencies of water. It is based on the assumption that any given water with a scaling tendency will tend to deposit a corrosion-inhibiting film of calcium carbonate and hence will be less corrosive. By inference, water with a non-scaling tendency will tend to dissolve protective films and be more corrosive. This is not entirely accurate since other factors are involved in corrosion, as we have seen in the section on corrosion, but, although a relatively simple tool, it provides a valuable index in determining the tendency of water to directly influence scaling or corrosive actions.

As, for example, the actual pH of a recirculating water approaches or even exceeds the pH of saturation of calcium carbonate under certain specific conditions; the tendency is to form a scale of calcium carbonate. If the actual pH is well below the pH of saturation of calcium carbonate, the tendency is to dissolve minerals and therefore to be corrosive. The Langelier index of a recirculating water, therefore, is determined by comparing the actual pH with the saturation pH of calcium carbonate under the same specified conditions.

To determine the Langelier index, the actual pH of the water must be measured, and the pH of saturation of calcium carbonate is calculated from a measure of the total alkalinity, hardness, total dissolved solids, and temperature.

Langelier Index Tendency of Water

+3.0 Extremely scale forming
+2.0 Strongly scale forming
+1.0 Scale forming
+0.5 Uncertainty zone
-0.5 Uncertainty zone
-1.0 Corrosive
-2.0 Strongly corrosive
-3.0 Extremely corrosive

TPLSI1007 Langelier Index

■ PO Box 519 ■ Beaver Falls, NY 13305 ■ Tel: 315-346-1489 ■ Fax: 315-346-1658 ■
■ E-mail: aries@arieschem.com ■

CALCULATION OF LANGELIER SATURATION INDEX (LSI) AND RYZNAR STABILITY INDEX

The Langelier Saturation Index (LSI) or calcium carbonate saturation index of cooling water is of value in predicting the scaling or corrosive tendencies of water. The LSI index can be calculated for most cooling waters with reasonable accuracy by using of the data in tables 1 + 2. To compute the index it is necessary to know (1) the total alkalinity, (2) the calcium hardness, (3) the pH (see table 2 for pH projections) (4) the approximate concentration of total dissolved solids and (5) the maximum temperature of the water.

To determine the saturation index, obtain values of A, B, C and D from tables 1 + 2 and calculate the saturation pH_s as follows:

$$pH_s = (9.3 + A + B) - (C + D)$$

Then using the actual pH if the water, calculate the index:

Langelier Saturation Index (LSI) = $pH - pH_s$

If the LSI is zero, the water is in chemical balance. If the LSI is positive, scaling tendencies are indicated. If the LSI is negative, corrosive tendencies are indicated.

The Ryznar stability index is a modification if the Langelier saturation index:

Ryznar Stability index = $2\ pH_s - pH$

All values of the Ryznar stability index will be positive, and values above 6.5 indicate a corrosive tendency while values below 6.0 indicate a tendency to form scale.

PO Box 519 Beaver Falls, NY 13305 Tel: 315-346-1489 Fax: 315-346-1658
E-mail: aries@arieschem.com

Table 1
Langelier Saturation Index Calculation
Bristol-Myers Squibb Company
BMS Syracuse North Campus Restoration Area
East Syracuse, New York

DRAFT

ARCADIS

Calculated Langelier Saturation Index (LSI)	Units	Result	Index	Index Value
pH	SU	7.17		--
Temperature	°F	180	B	1.1
Calcium Hardness	mg/L as $CaCO_3$	188	C	1.9
Total Alkalinity	mg/L	300	D	2.5
Total Dissoved Solids[4]	mg/L	0.3	A	0.1
Calculations				
pHs = (9.3 + A + B) - (C + D)	6.10			
LSI = pH - pHs	1.07			

Notes:
1. Water sample was collected from the water spigot located at the Arcadis warehouse located at 4 Dwight Park Dr., Syracuse, NY 13209
2. General water chemisty analytical data provided by Aries Chemical, Inc. of Beaver Falls, NY 13305
3. Langelier Saturation Index formulas provided by Arier Chemical, Inc. of Beaver Falls, NY 13305
4. Total Dissolved Solids assumed to be 0.3 mg/l based on Lead and Copper levels reported in the City of Syracuse Department of Water, Consumer Confidence Report, 2021

SU = standard units
°F = degrees fahrenheit
mg/L as $CaCO_3$ = microgram per liter as Calcium Carbonate
mg/L = microgram per liter
-- = not applicable

ARIES CHEMICAL INC.

P.O. Box 519
BEAVER FALLS, NY 13305
Tel (315) 346-1489
Fax (315) 346-1658
aries@arieschem.com

LABORATORY WATER ANALYSIS

COMPANY:	ARCADIS
ADDRESS:	
COPY TO:	
DATE:	19-Jan-23

ANALYSIS	Test Method	unit	SAMPLE				
			Warehouse Spigot				
pH		std units		7.17			
pH (5 % by volume)							
TDS							
Conductivity		microsiemens/cm		300			
"P" Alkalinity							
Total Alkalinity				300			
Alkalinity	TMpAlk@5%0814						
Calcium Hardness		mg/L as CaCO3		188			
Chlorides							
Phosphate							
Sulfite							
Iron							
Molybdate							
Silica							
turbidity							
corrected conductivity							
Prepared by:							

ARIES CHEMICAL
Water Treatment Specialists

Table 1 – Data for calculation of saturation and stability indexes

Total Solids	A	Calcium Hardness	C	Total Alkalinity	D
p.p.m.		p.p.m.			
50 - 350	0.1	10	0.6	10	1.0
400 - 1100	0.2	12	0.7	12	1.1
		14	0.8	14	1.2
Temperature	**B**	18	0.9	18	1.3
°C °F		23	1	39	1.4
		28	1.1	28	1.5
0 32	2.6	35	1.2	36	1.6
2 36	2.5	44	1.3	45	1.7
7 44	2.4	56	1.4	56	1.8
10 50	2.3	70	1.5	70	1.9
14 58	2.2	88	1.6	88	2.0
18 64	2.1	111	1.7	111	2.1
22 72	2.0	132	1.8	140	2.2
28 82	1.9	175	1.9	177	2.3
32 90	1.8	230	2	230	2.4
38 100	1.7	280	2.1	280	2.5
44 112	1.6	350	2.2	360	2.6
51 124	1.5	440	2.3	450	2.7
57 134	1.4	560	2.4	560	2.8
64 148	1.3	700	2.5	700	2.9
72 162	1.2	870	2.6	880	3.0
82 180	1.1	1050	2.7		

TABLE 2: Expected recirculating water pH values (± pH_{actual}) at various cycles of concentration (COC), using makeup water sources of varying initial total alkalinity (TA).

Recirculating Water pH @ various COC	MU water with 25 ppm T. Alk	MU water with 50 ppm T. Alk	MU water with 100 ppm T. Alk	MU water with 200 ppm T. Alk	MU water with 400 ppm T. Alk
pH @ 2x	7.1	7.5	7.9	8.2	8.6
Ph @ 3x	7.4	7.8	8.2	8.6	9.0
Ph @ 4x	7.7	8.1	8.5	8.9	9.3
pH @ 5x	7.9	8.4	8.8	9.1	9.5
pH @ 6x	8.1	8.6	9.0	9.4	9.7
pH @ 7x	8.2	8.7	9.2	9.5	9.8
pH @ 8x	8.3	8.8	9.4	9.6	-
pH @ 9x	8.4	8.9	9.5	-	-
pH @ 10 x	8.5	9.0	-	-	-

PO Box 519 Beaver Falls, NY 13305 Tel: 315-346-1489 Fax: 315-346-1658
E-mail: aries@arieschem.com