

Annual Steam Startup at Cornell University

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*IDEA CampusEnergy2018
Baltimore, MD
March 5, 2018*

Agenda

- Overview of Cornell District Steam System
- Steam Startup Awareness
- Review of Cornell's Annual 3-day Steam Shutdown
- Single Steam Pipe Startup
- Steam Startup Safety
- Steam Pipe Startup Video
- Questions

Cornell District Steam System

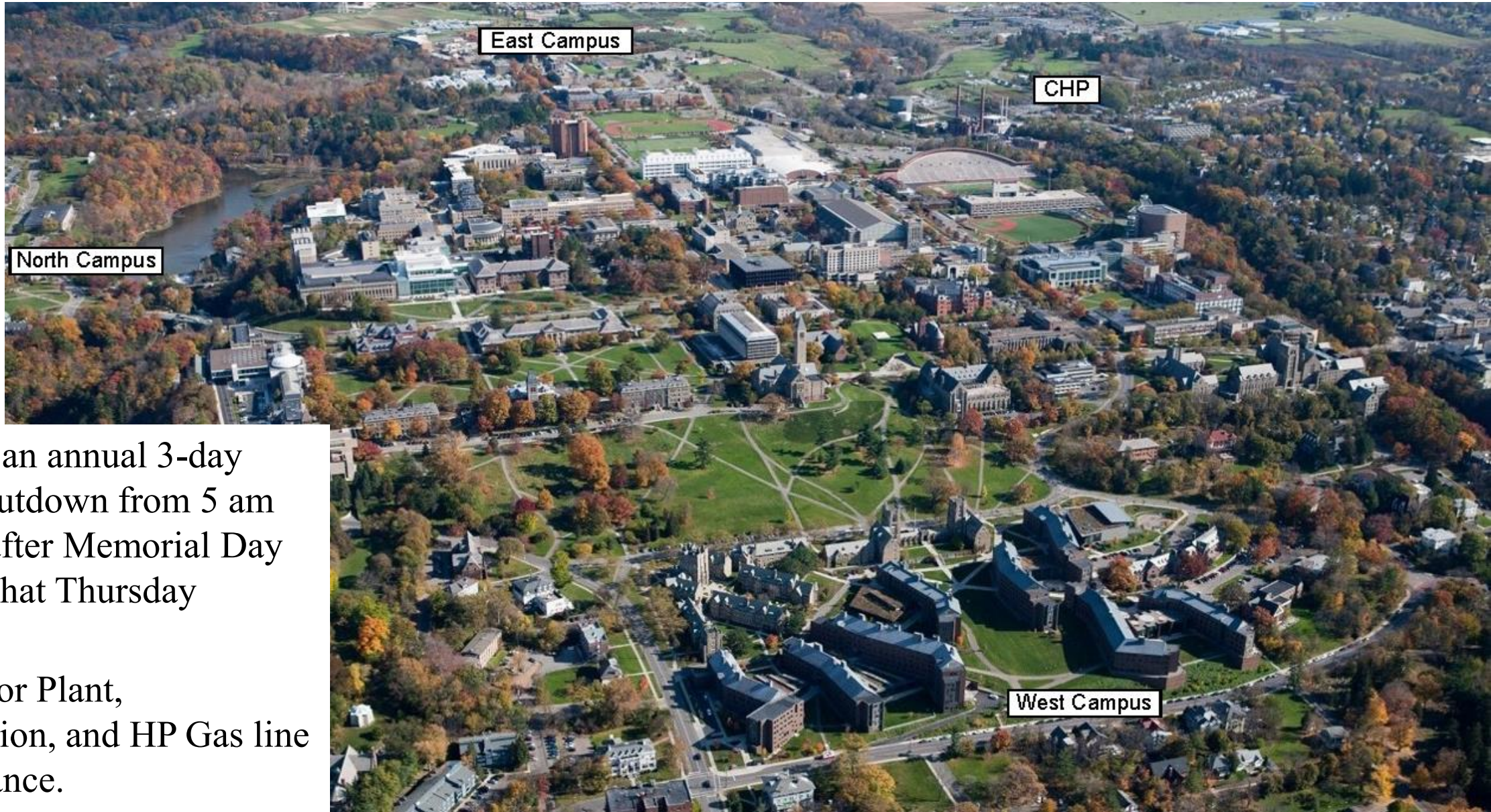
- Cornell Ithaca Campus
 - 21,000 Students + 11,000 Staff & Faculty
 - 2 Square Miles
 - 15.83M GSF
- Steam System
 - Peak Load of ~ 380 K#/hr
 - 9 Miles of Main & 3 Miles of Laterals w/ ~ 175 vaults
 - 40 psi Summer and 80 psi Winter



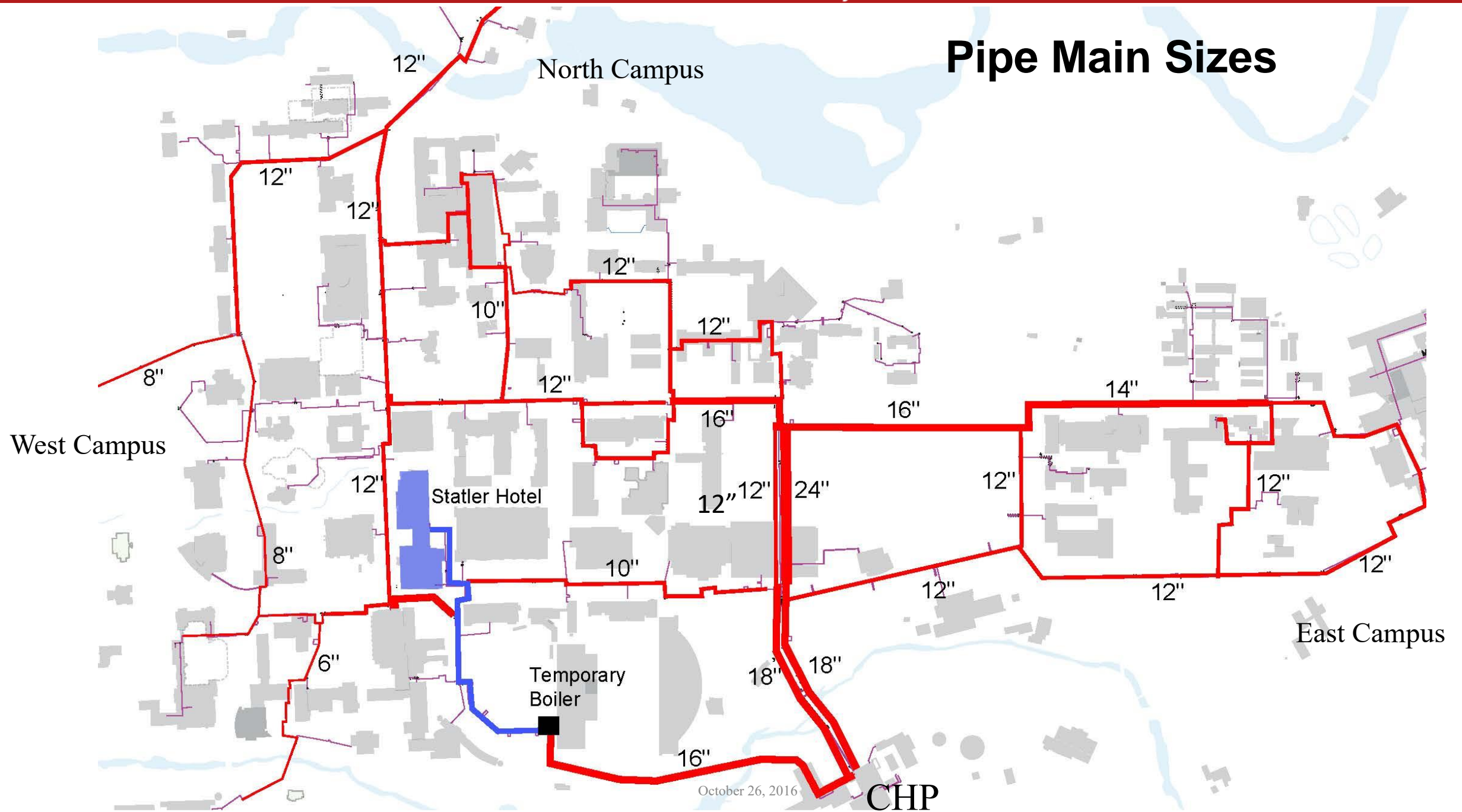
Steam Pipe Startup Awareness

- Points to Remember
 - Go Slow
 - Identify potential issues ahead of time
 - Where could condensate puddle?
 - Verify there isn't any water on the other side of the valves
 - Verify drains are not plugged
 - Install temporary traps if necessary
 - Energize the line downhill if possible
 - Make sure to continually remove all air and water w/ trained personnel
- Campus Wide – Hot vs Cold System
 - Many pipe sizes
 - Differing insulation types
 - Differing slopes
 - Many drip points
- Section of pipe
 - One or two pipe sizes
 - Similar insulation
 - One slope
 - Few drip points

Annual 3-Day Steam Shutdown

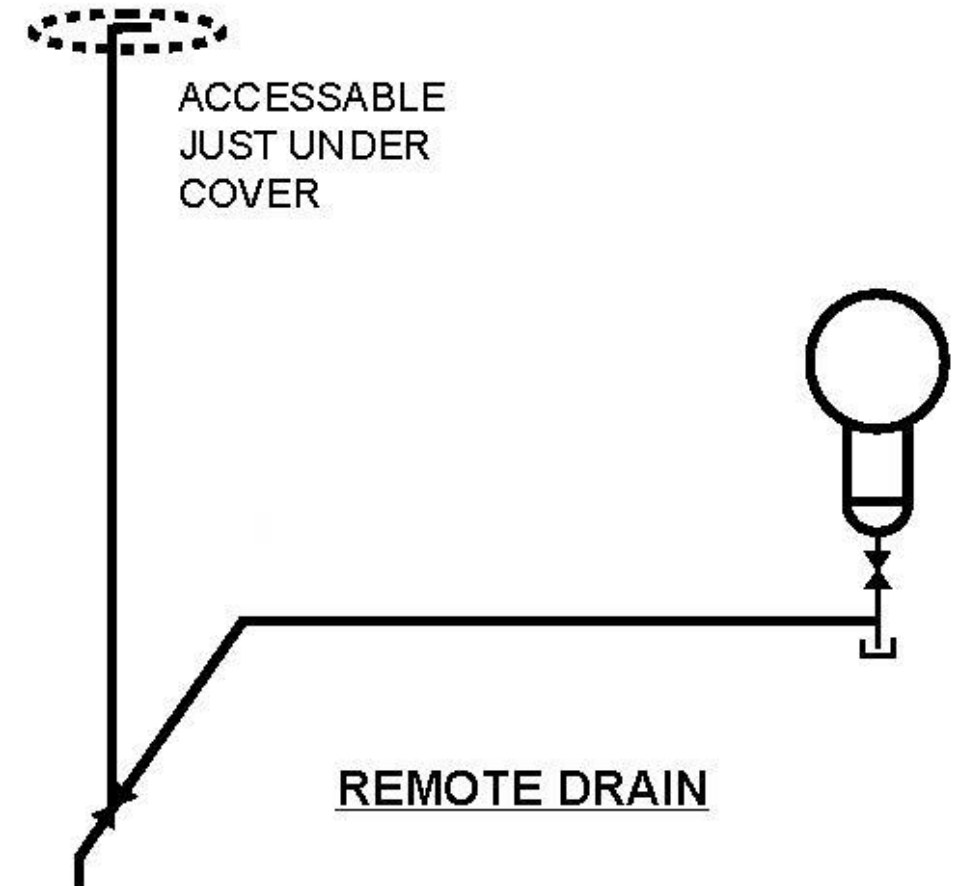


- Conduct an annual 3-day steam shutdown from 5 am the day after Memorial Day to 5 pm that Thursday evening.
- Allows for Plant, Distribution, and HP Gas line maintenance.

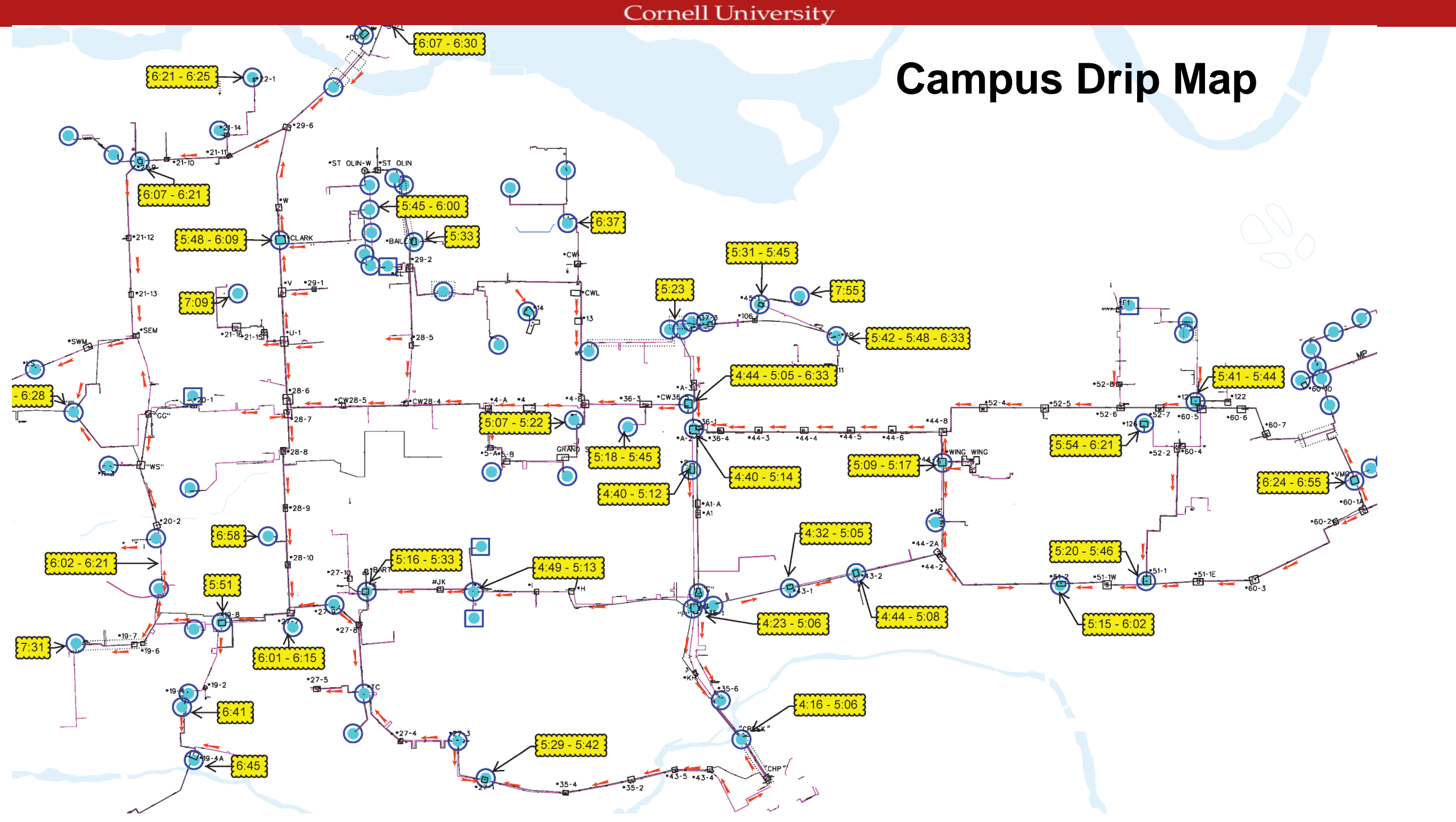


Preparation for the System Startup

- Central Heating Plant / Management
 - Verify plant work is complete
 - Verify building projects are complete
 - Verify communications for start times with CHP
- Pipe Shop
 - Install temporary steam boiler for the Statler Hotel
 - Crews go to ALL vaults to clean and drain drip legs
 - Usually not the Steam Crew due to shutdown work load
 - Visit all drip points and open and clean all drip legs
 - Open all remote drip drains
 - Startup Personnel List w/ assignments, phone number & radio number
 - Coordinate 60 tradespersons to work overtime
 - Prepared all safety barricades, radios, tripods
 - Pre-Startup meeting & dinner



Campus Drip Map



Steam Startup Work Tasks

- Pipe Shop steam crew (4) at first 2 drip points (Creek and MH-F) until traps working
- Distribution Mgmnt follows the steam and directs the CHP when to increase steam flow
- Steam Crew circulates and verify traps are cycling at drip stations and closes the drain.
- Once initial water is out of the system the CHP takes control of the steam output
- Once traps are all working and extra personnel have left, the steam crew disconnects the temporary boiler.
- At end, the Steam Crew makes a lap around Campus to visually look for issues/steam plumes.

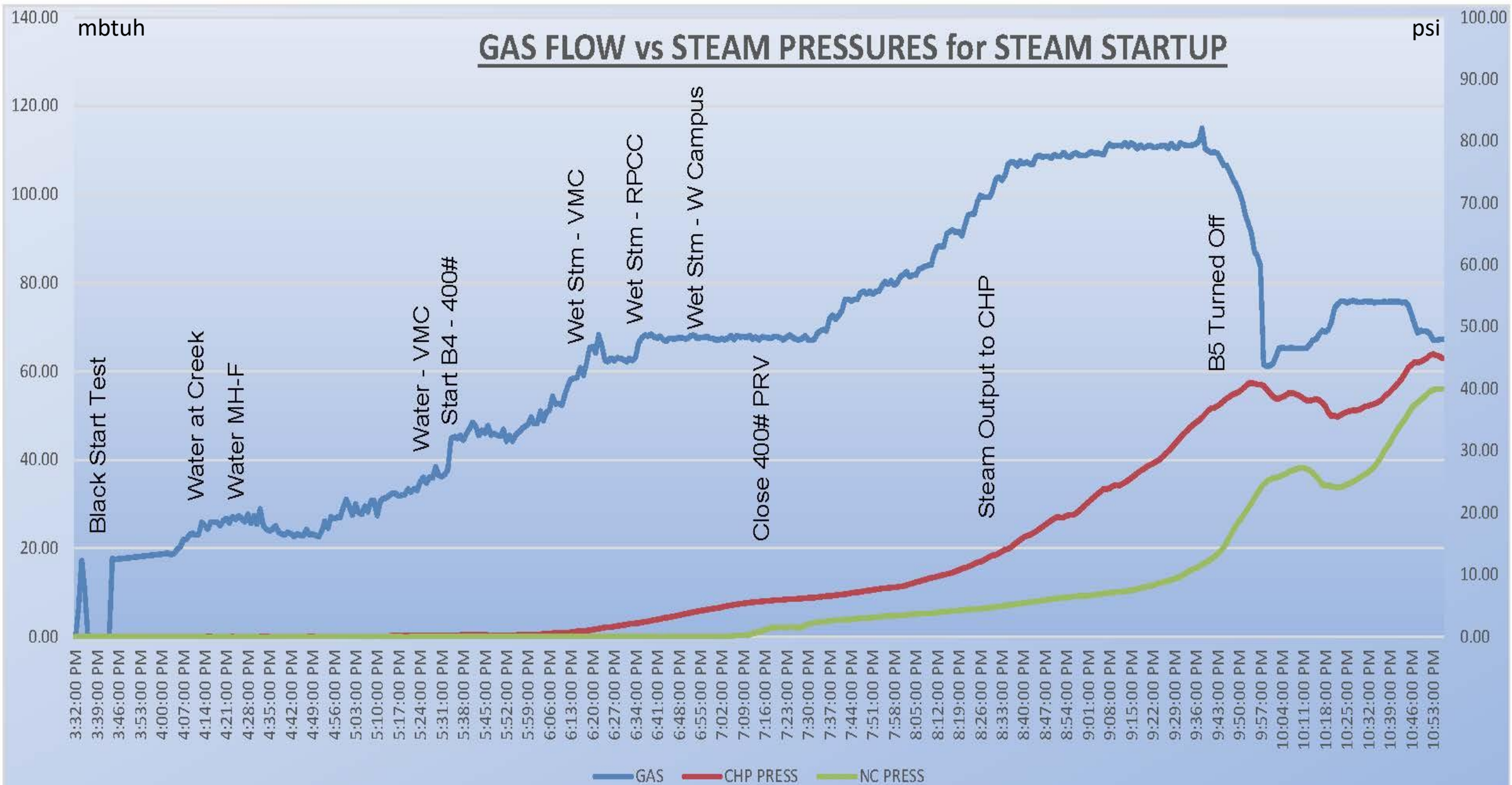
Startup Personnel List

2017 Steam Start-Up

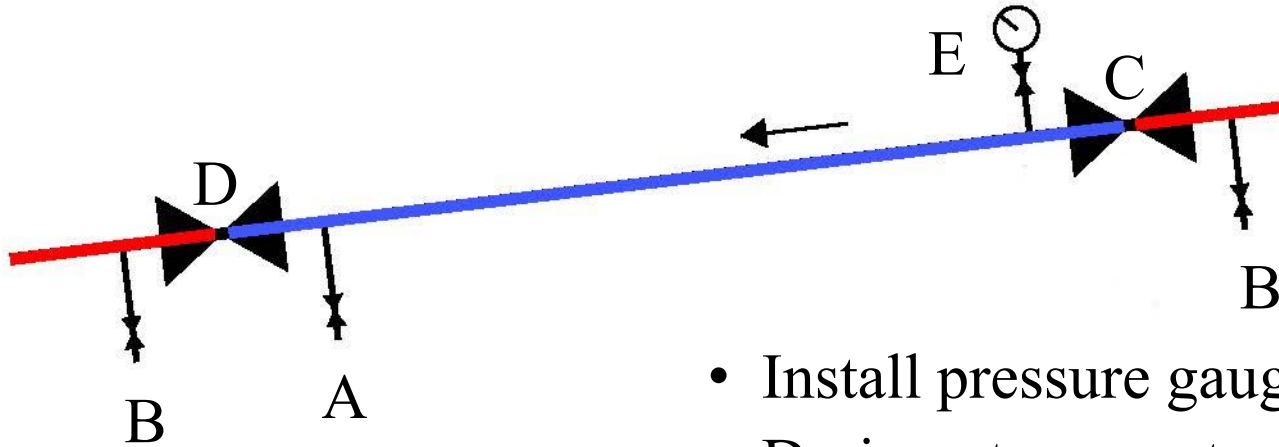
Drip List

6/1/2017

#	Building or Manhole Identifier	Drip Location	Remote Drip	What To Do	Name	Cell #	Radio#	Time Condensate Started to Flow	Time Steam Started to Flow	Issues & Special Notes	Tripod	Barricade	Road Location	Keys / Card Access	# of staff needed for start up
1	Creek Dide MH	366 Side of Creek	Yes	Drain & close -- by pass open	Porter, Chas		3	Water-4:18		Remember to shut down bypass		1			1
2	MH 35-6	Across creek	No	Drain & leave partially open	Porter, Chas		3	Cond-4:24							
3	MH F	Campus rd across - Bartels	No	Drain & staff @ startup	Porter, Chas		3								
4	MH 35-1	next to Mh F	Yes	Drain & staff @ startup	Porter, Chas		3					1			
5	MH G	Sidewalk Field house	Yes	Drain & staff @ startup	Porter, Chas		3					1			
6	MH 27-1	Hoy Rd / Parking Garage	Yes	Drain & leave open	Porter, Chas		3	Cond 4:38				1			
7	MH A-2	Lot near Bradfield	Yes	Drain & staff @ startup	Bergen, Jeremy		17	Cond 4:38	WS 6:15						1
8	MH-2	middle of Alumni field	Yes	Drain & leave open, staff@ startup	Bergen, Jeremy		17					1			
9	MH 43-1	in front of Wrestling Fac.	Yes	Drain & leave open, staff@ startup	Conley, Dan		2	WC-4:55 Cond-4:49	6:34			1			1
10	MH 43-2	Wilson Lab vault	Yes	Drain & leave open, staff@ startup	Conley, Dan		2	WC-5:06	6:35			1			
11	MH 36-5	Tower Rd. near Bradfield	Yes	Drain & leave open, staff@ startup	Thomas, Rob		9	WC Cond 4:54	D.S. 7:33	TS-8:40 Signage & Safety Cones		1	Yes		1
12	LSTB (Weill Hall)	Base MR	No	Drain & staff @ startup	Eastman, Paul		10		W- 6:16					Yes	1
13	MH 51-2	Campus rd. south of Surge III	Yes	Drain & leave open, staff@ startup	Strong, Ray		11	C-5:32	W- 6:38	TS 8:36		2			1
14	MH K	sw corner of Barton Hall	Yes	Drain & leave open, staff@ startup	Lelik, Bill		12	C-5:56	6:32			2			1
15	MH AF	W. Wing dr./ Riley Robb	Yes	Drain & leave open, staff@ startup	Hotchkiss, Brian		40	Cond-5:20	6:40			1			1
16	Corson Hall	mr. In Corson start up trap	No	Drain & staff @ startup	Humphrey, John		15		6:02/16:49					Yes	1
17	Biotech	Base MR	No	Drain & staff @ startup	Humphrey, John		15	HC-5:50	6:08	TC 7:29				Yes	
18	Comstock Hall	mr. in Comstock	Yes	Drain & staff @ startup	Fossaceca, Mark		16		W-Steam- 5:59			1			1
19	Plant Sci, Warren	MR & Tunnel	No	Drain & staff @ startup	Carr, Dan		6	HC-5:18-18 HC-5:21	5:38					Yes	1
20	Plant Sci, West Tunnel MH	West of Plant Science in Sidewalk	Yes	Drain & leave open, staff@ startup	Kelly, John		18	HC-5:24	6:04						1
21	MH 36-7	Ag Quad West of Minns Garden	Yes	Drain & leave open, staff@ startup	Kelly, John		18	WC-5:08	5:42			1			
22	MH VMC	S.W. end of VMC L.D.drive	Yes	Drain & leave open, staff@ startup	Moon, Mike		13		7:31			1			1
23	VMC	in diesel gen. rm & air way	No	Drain & staff @ startup	Moon, Mike		13	C-6:03	WS-6:15					Yes	



Single Steam Pipe Startup



- Install pressure gauge (E) if possible
- Drain out any water at (A) and leave fully open
- At (B) drain verify there is no water on both sides of hot valve. Best to install temporary trap at this location
- Crack valve (C) and slowly let by steam to warm up main
- At (A) listen for air, then water. If water is more than drain can handle partially close valve (C)
- Once steam is present at (A) slowly start closing the valve to reduce the steam loss but still allowing water to drain
- Continue to slowly open (C)
- Once pressure has stabilized open downstream valve (S)

Steam Startup Safety

- Campus notification & feedback
- Startup Mgr. notifies the buildings and CU Police
- Pre-Startup meeting/dinner to review safety issues and to thank everyone for the overtime.
- Sheet of assignments
- Customer Service/radios/cell phones – Personnel report to CS with times which Startup Mgr. monitors.
- Last year's times listed on a map for Startup Mgr. and all personnel.
- Crew size – 60 people w/ only 6 or 7 with steam experience
- External drip accessible from above ground
- Only Pipe Crew enters the vaults
- Same people at same locations every year if possible
- Pipe Crew floats where needed
- Clear identification of Roles and Responsibilities

Steam Startup Video



- Note this is a mockup of a vault dripleg/trap assembly.
- An actual trap would be 100% welded past up to and including the trap root valve and the drain valve.
- All piping would be carbon steel.
- Trap is a thermal dynamic type with integral strainer and blowdown. .
- In the vault, the trap can only be heard, not seen working.
- The check valve would normally be just before the condensate main root valve.



Questions?

