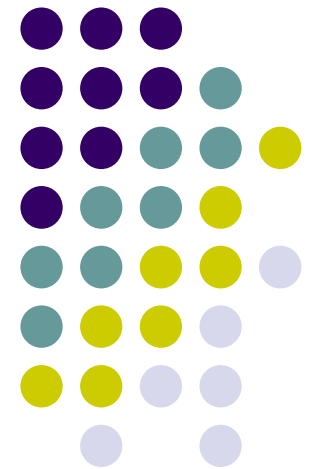


Standardizing the Water Main Disinfection Process



Why?



From the Forward to AWWA Standard C651 for
Disinfecting Water Mains:

*“It must be remembered that the final
water quality test is not the primary
means for certifying the sanitary
condition of a main.....”*

Why? (part 2)



We needed to achieve consistency between the methods used by our contractors and our own crews.

Steps for Standardizing Water Main Disinfection at Portland Water Bureau



- Assess & Upgrade Equipment
- Write SOP
- Create Field Aids
- Institute Record-Keeping
- Train Maintenance & Construction, Operations and Inspection Workers

Steps for Standardizing Water Main Disinfection at Portland Water Bureau



- **Assess & Upgrade Equipment**
 - Chlorine Dosing Device
 - High Range Chlorine Test Kit
- Write SOP
- Create Field Aids
- Institute Record-Keeping
- Train Maintenance & Construction, Operations and Inspection Workers



Chlorine Dosing Device

- Continuous feed method described in the C651 Standard
- Dosatron® flow driven proportional mixing device.
 - Mechanics wanted a better device
 - Problems with priming the suction line
 - Problems maintaining the correct dose.

Alternate Devices Evaluated



- Pumping devices vs. water powered
- Trailer mounted vs. suitcase vs. non-integrated devices.

And the winner is
Dosatron, again



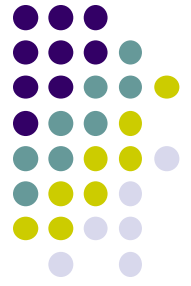
Replaced Old Dosatron Units with New Units



We add:

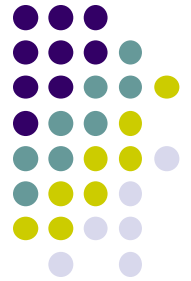
- Protective support cage
- Piping
- Flow meter

Test Kits for High Chlorine Concentrations



- Ordered 5 different test kits from various manufacturers
- Tried them out within Water Quality group
- Wrote a field instruction sheet for each one
- Assembled a group of employees to try them out on samples of chlorine spiked water
- Voted!

And the winner is.....



Steps for Standardizing Water Main Disinfection at Portland Water Bureau



- Assess & Upgrade Equipment
- **Write SOP**
- Create Field Aids
- Institute Record-Keeping
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SOP contents



- Scope
- Rules that govern water main disinfection
- General flow chart of the process
- Detailed information on each step of process
- Contact information
- Revision History

Steps for Standardizing Water Main Disinfection at Portland Water Bureau

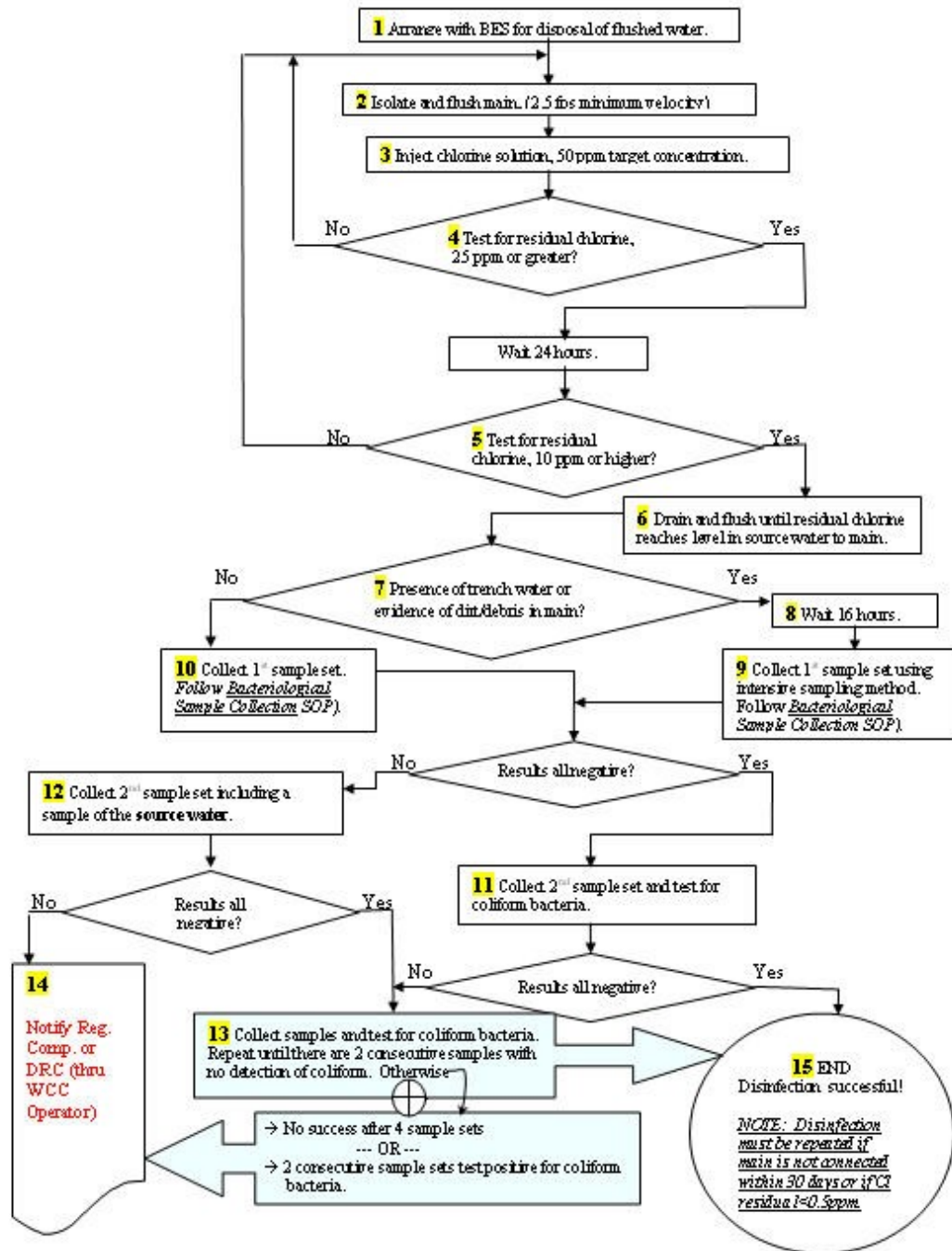


- Assess & Upgrade Equipment
- Write SOP
- **Create Field Aids**
- Institute Record-Keeping
- Train Maintenance, Construction and Inspection Workers

Field Aids

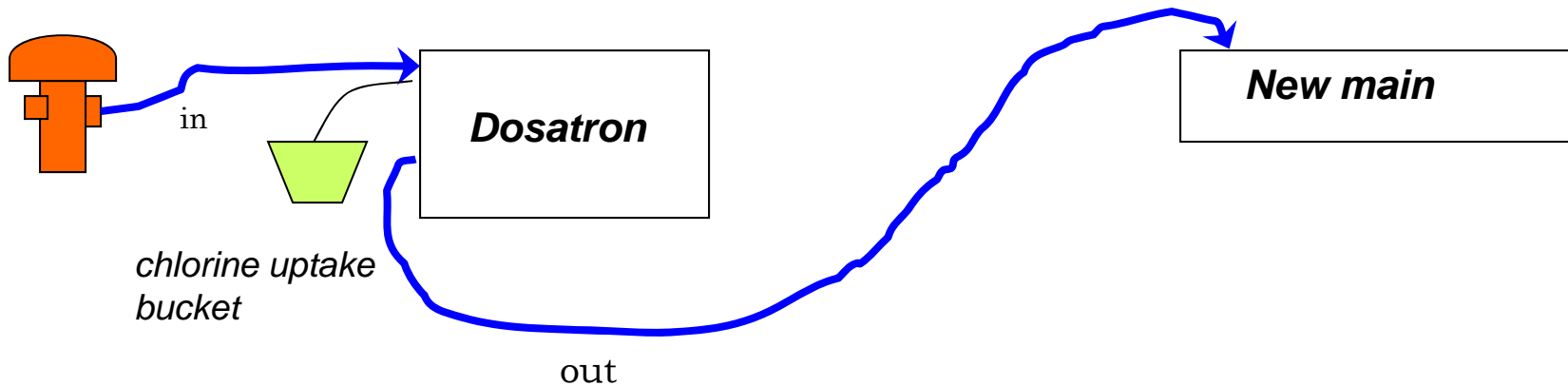


- Excel Spreadsheet to calculate volume of 12% hypochlorite needed for the job.
- Work flow chart
- Dosatron set-up instructions
- High range chlorine tester – short instruction sheet

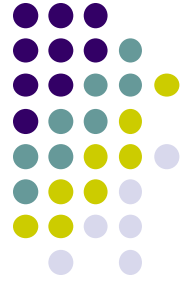


CHLORINATION MACHINE INSTRUCTIONS

1. The first thing you need to do is attach the pressure valve and flow meter to the inlet side of the machine.



2. The machine should be preset to 1:500 on the adjusting screws on the bottom of the Dosatron mixers.
3. Next you need to hook up your potable hoses from the hydrant to the inlet and from the outlet to your main.
4.



Steps for Standardizing Water Main Disinfection at Portland Water Bureau



- Assess & Upgrade Equipment
- Write SOP
- Create Field Aids
- **Institute Record-Keeping**
- Train Maintenance, Construction and Inspection Workers

Water Main Disinfection Record, 2-sided form



- **Side 1**

- Measured chlorine concentration in superchlorinated disinfectant charged to main
- Time that charge was complete (Beginning of 24 hour hold time)
- Measured chlorine concentration after 24 hours
- End of hold time
- Chlorine residuals – system water and water at end of flush

- **Side 2** – coliform sample data (chlorine residual and location for each sample)

Review of Water Main Disinfection Records



- Check for
 - Beginning chlorine residual is 25-50 mg/L
 - Ending chlorine residual is greater than 10 mg/L
 - Disinfectant hold time is at least 24 hours
 - Water flushed from main has similar chlorine residual as system water used for flushing

Because disinfection record-keeping was a new step -



- One-month grace period after training.
- After that coliform samples for water main disinfections were rejected if brought in without a record. (First samples only).
- Records have indicated consistent chlorine dosing and (mostly) successful disinfections.

Steps for Standardizing Water Main Disinfection at Portland Water Bureau



- Assess & Upgrade Equipment
- Write SOP
- Create Field Aids
- Institute Record-Keeping
- Train Maintenance, Construction, Operations and Inspection Workers

Training, (and more training)



- Training included
 - PPT presentation
 - Handouts
 - Coliform sampling demonstration
 - Quiz!!!!
- Obtained OSEAC accreditation to provide ceu's for training.
- Repeated yearly for entire Maintenance & Construction Group, less often for Engineering Inspectors.

Training also included....



- Laboratory Coordination procedures
- Review of BMP's for main breaks or reduced pressure events.
- Lots of photos and diagrams

Jug of 12.5% NaOCl [Concentrated Bleach!]



Note ratio control adjustment on the Dosatron®.

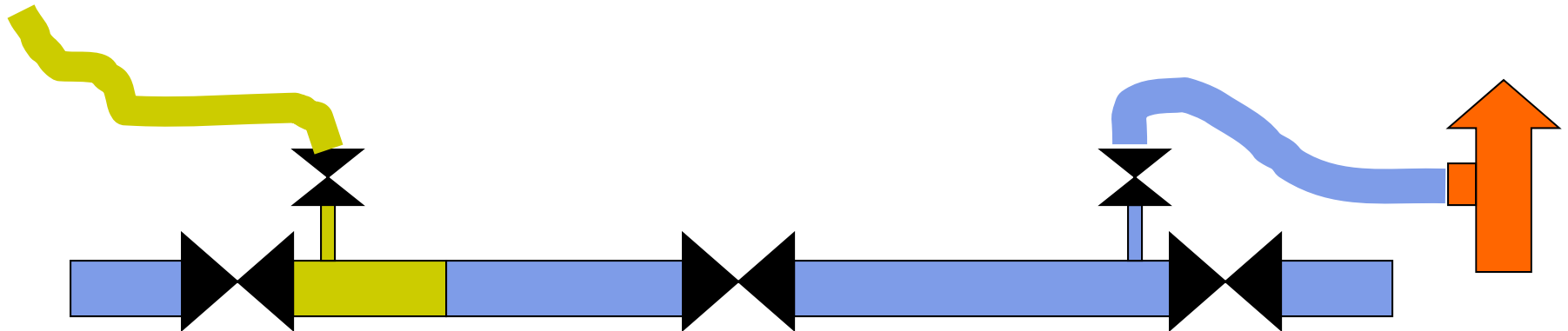


New Main Disinfection – Step 6



6 Drain and flush until residual chlorine reaches same level as water supply to main.

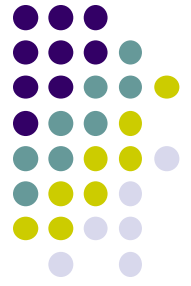
to sewer



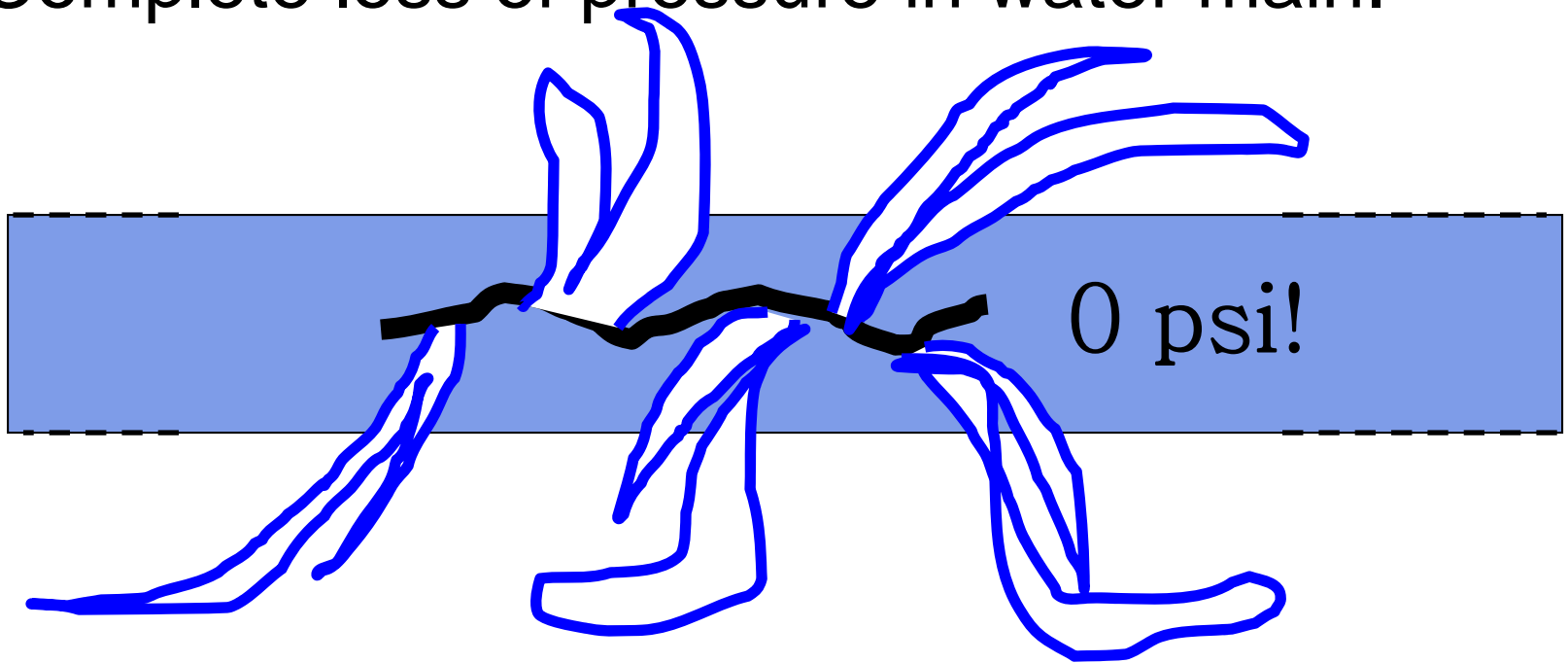
Oops! Minimize contact with concentrated chlorine (and do not wear your favorite pants)!



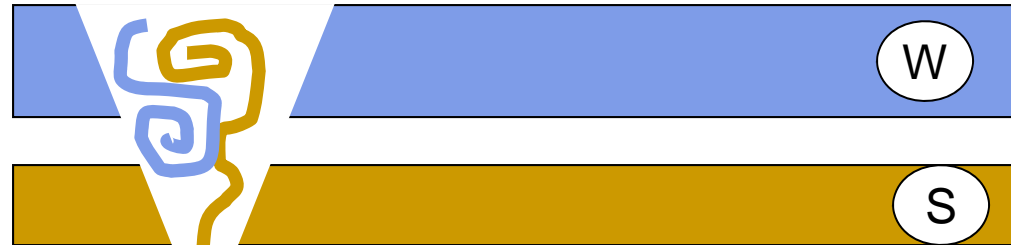
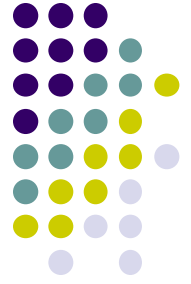
What constitutes an “Obvious Risk of Contamination?”



Complete loss of pressure in water main.



OR...

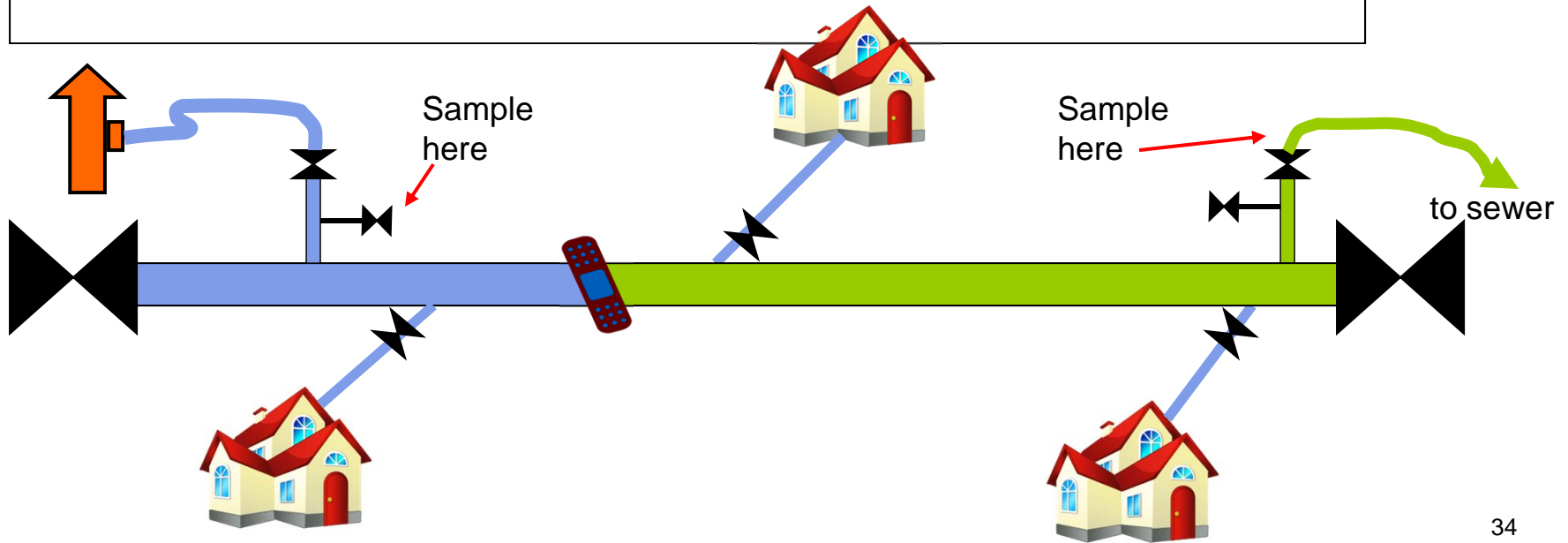


- simultaneous damage to adjacent water & sewer lines.

Fast Track Disinfection – Step 5



5 Flush the repaired main section at 2.5 feet per second minimum until chlorine residual matches that of source water.



Collect the correct amount of sample – 100 milliliters minimum



- Do not rinse out the bact. sample bottle. It contains a pre-measured chlorine neutralizer.
- Collect at least 100 mL of sample. Fill bottle to ABOVE the 100 mL mark and BELOW the bottle cap.



WARNING: Do not deliver a “hot sample” (more than 8 ppm chlorine concentration) to the lab for bacteriological testing. Doing so will cause an immediate and explosive release of chlorine gas!!



Changes to Water Main Disinfection SOP in last 5 Years



- Added a note to contact Water Quality Group if system water was less than 0.5 mg/L total chlorine in project area.
- Removed instruction to collect a coliform sample from system whenever a project sample shows presence of coliform bacteria since these must be counted as TCR compliance samples.

Questions???

