



Critical Alarms

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Office of Drinking Water
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PUBLIC HEALTH
ALWAYS WORKING FOR A SAFER AND
HEALTHIER COMMUNITY



Office of Drinking Water's Mission

To protect the health
of the people of
Washington State
by ensuring safe
and reliable
drinking water.



Learning From Mistakes

Chlorine analyzer
left in calibrate
mode for 20
hours.

Alarm disabled
during
maintenance.

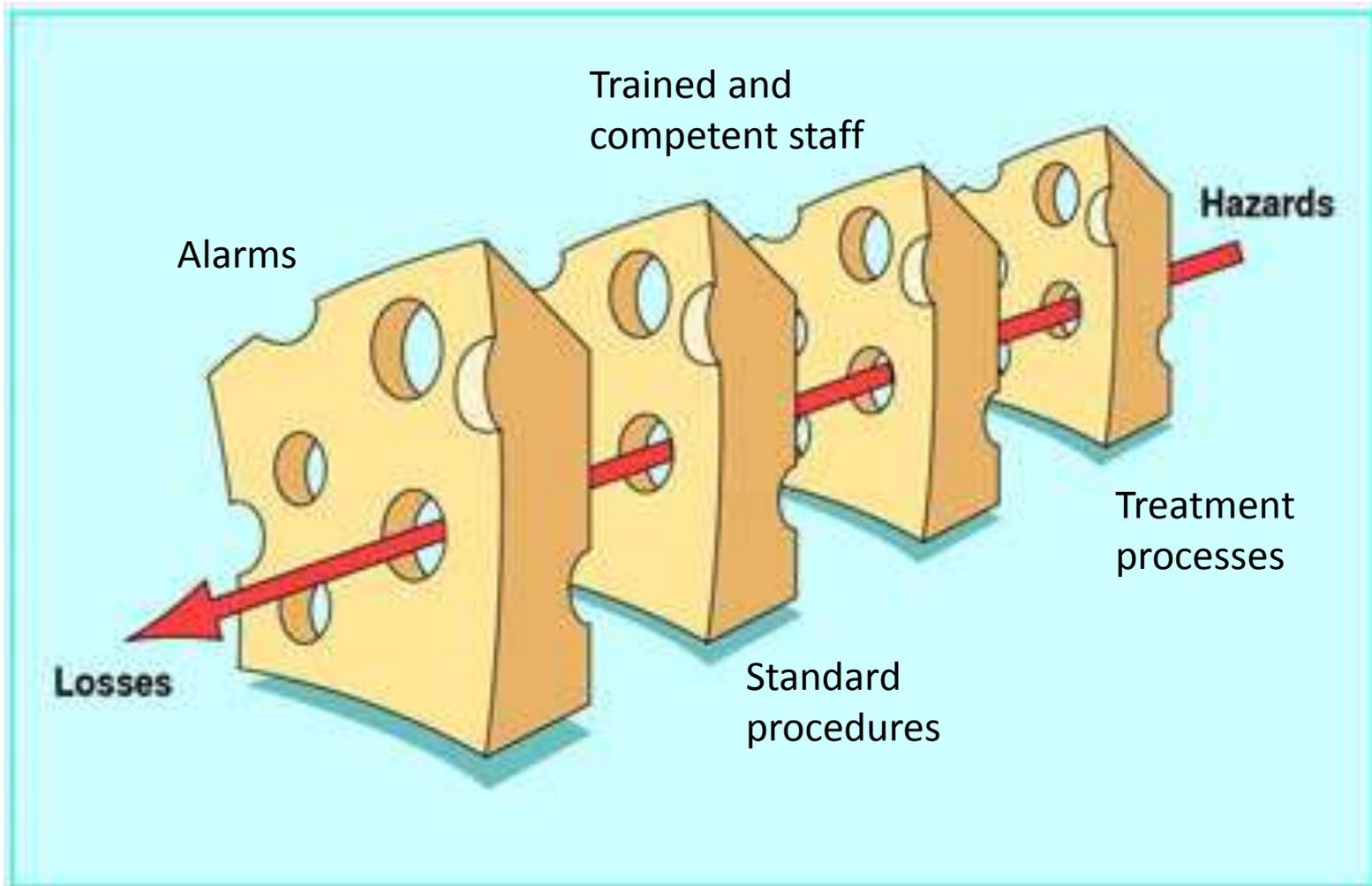
Alarm setpoints
too high: Not
enough time to
respond.

Tank drained by
water main leak,
no contact time,
no alarm.

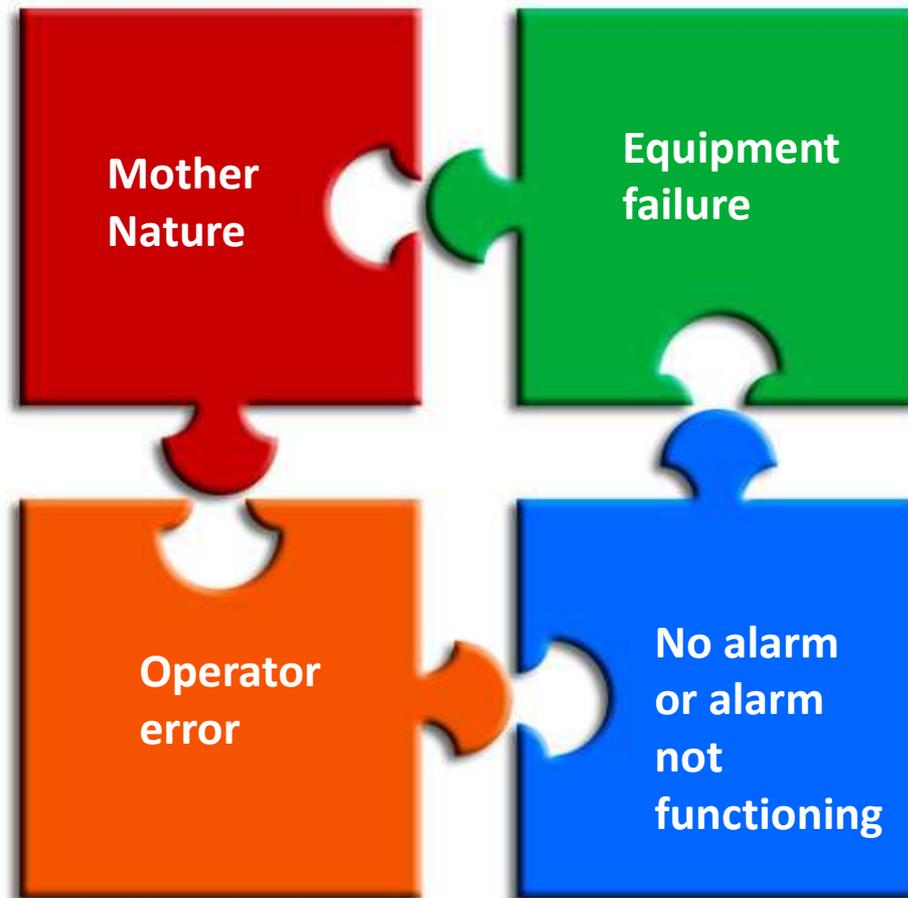
Alarm disabled
during
construction.

No water
flowing
through the
analyzer.

How Complex Systems Fail



Cascade Effect



Common Points of Failure

- No alarms on critical processes.
- Inappropriate setpoints.
- Alarms disabled during maintenance or repair.
- Alarms not functioning.
- Monitoring equipment off-line or not functioning.
- Monitoring equipment not calibrated with SCADA.

What are Critical Treatment Processes?

Failure poses an immediate risk to public health or safety.

- Coagulation
- Filtration
- Disinfection
- pH adjustment



What are Critical Alarms?

- Turbidity
- Chlorine residual
- pH
- Clearwell level
- Unique for each plant



Establishing Alarm Setpoints

- Specific to each plant.
- A margin of safety.
- Avoid a treatment technique violation.
- Maintain optimized performance.
- Detect a chemical overfeed.
- Plant unattended?

Typical Alarm Setpoints

		Purpose	Typical Setpoints
Turbidity	High	Alert the operator of a significant process change so corrective action can be taken.	0.10 NTU or slightly less
	High-high (shutdown)	Avoid a water quality violation.	Slightly less than 0.30 NTU.
Chlorine Residual	Low-low (shutdown)	Prevent inadequately disinfected water from entering the system.	Plant specific, 0.2-0.6 mg/L typical
	High-high (shutdown)	Avoid exceeding maximum residual disinfectant level (MRDL).	Below 4.0 mg/L
Clearwell Level	Low	Prevent inadequately disinfected water from entering the system.	Unique for each system
	High	Prevent damage from an overflow.	Unique for each system
pH	Low-low (shutdown)	Detect an overfeed when acid is used.	5.5 to 6.0
	High-high (shutdown)	Detect an overfeed when base is used.	9.0 to 9.5

How Often Should Alarms be Tested?

- Unattended plants: Monthly
- 24/7 staffing: Quarterly



When a Problem Occurs

- Act promptly to stabilize the situation.
- Consult with Department of Health ASAP—health advisory or other follow-up needed?
- After-incident review.
- Correct deficiencies.
- Document lessons learned.
- Share with others!

Toll Free 1-877-481-4901
After-Hours
Troubleshooting for
Drinking Water Emergencies

Call this number after-hours if a drinking water emergency:

- *Threatens the health of your customers.*
- *Threatens the integrity of your system.*
- *Can't wait until the next business day.*

Corrective Actions

- Standard operating procedures (SOPs).
- Training.
- Alarm setpoints.
- After system failure settings: System reverts to fail-safe default.
- After power outage settings: No auto-start.
- “Alarm disabled” alarm.
- “Instrument in calibrate mode” alarm.

Take Home

Make sure your plant has:

- Alarms on critical processes.
- Appropriate setpoints.
- Routine alarm testing.





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Resources

- Reliability for filtered systems (WAC 246-290-678)
- ANSI/AWWA standard G100-05: Water Treatment Operation and Management
- Recommended Standards for Water Works (2012), Policy Statement on Automated/Unattended Operation of Surface Water Treatment Plants