



Report to the Mayor on Water Quality Concerns

June 1, 2007

Background

This report responds to an e-mail (attached) sent by the Mayor to the Water Utility General Manager on May 8, 2007. In that correspondence, the Mayor requested the appointment of a team to address several specific questions regarding variance of chlorine levels at unit wells and other water quality concerns. The Mayor asked that the Team report back to him on these questions by June 1, 2007. The General Manager assembled a team made up of the following individuals:

David Denig-Chakroff, General Manager
Larry Nelson, City Engineer
George Meyer, Board of Water Commissioners
Greg Harrington, Board of Water Commissioners
Thomas Schlenker, Director of Public Health/Board of Water Commissioners
Joseph Grande, Water Quality Manager
Al Larson, Principal Engineer
Joel Guderyon, Operator II
Paul Nehm, Madison Metropolitan Sewerage District
Jack Geisenhoff, EMA, Inc.

Team Findings and Recommendations

Even before the Mayor requested the appointment of this Team, a staff team, including a SCADA consultant, had been assembled by the General Manager to develop a standard operating procedure (SOP) for addressing chlorine issues at wells, as well as additional recommendations for addressing these issues. The work of the staff team was completed and an SOP implemented by May 10, 2007. The work of the staff team provided the SOP, an event tree, and both short- and long-term recommendations that were reviewed by the Team requested by the Mayor.

The Team assembled at the request of the Mayor reviewed and discussed these documents. The Team had no recommendations for changes to the event tree (attached) or to the short- or long-term recommendations (attached) developed by the staff team. However, the General Manager should report to the Board and to the Mayor on at least a quarterly basis the status of accomplishment of the short- and long-term recommendations.

The Team made recommendations for modifications and additions to the SOP developed by the staff team. The Team's recommendations for changes with respect to actual limits and targets for chlorine levels were minor. The Team did, however, make recommendations for clarification and for adding explanatory language to the SOP. The staff team's SOP, as revised by the Team is attached, and addresses the first question in the Mayor's e-mail; i.e., "When should a variance such as this be considered a minor and relatively normal fluctuation in chlorine levels, and at what point is a threshold crossed where health concerns or system failures come into play." It also partially answers the Mayor's second question regarding notification and reporting requirements by identifying under what circumstances Operators should notify their supervisor of chlorine variances and also partially addresses the Mayor's request that "standard decision-making and reporting procedures should be developed, widely communicated, and carefully followed." The Mayor's questions are further addressed below.

Chlorine Variance Notification and Reporting

Any chlorine variance identified in the SOP as requiring a report to the Water Supply supervisor must be reported by the supervisor to the Water Quality Manager, the Principal Engineer and the General Manager of the utility.

For chlorine levels in water leaving a unit well below 0.1 mg/L or in excess of 4.0 mg/L, the Water Quality Manager will be responsible for providing a courtesy notice to the Wisconsin Department of Natural Resources (WDNR) system engineer. Such variances are not required to be reported the WDNR. For such variances, the General Manager will be responsible for notifying the Director of Public Health and a representative of the Mayor's Office. If the variance is detected in a timely manner and is handled in accordance with the SOP, no other reporting or notification is necessary, although the General Manager and/or Mayor's Office may decide to provide broader reporting based on specific circumstances.

If, however, chlorine levels below 0.1 mg/L or in excess of 4.0 mg/L are not detected in a timely manner and such under- or over-chlorinated water is pumped into the system in excess of four hours, then broader reporting and notification is required. Four hours is the time period for which a utility has to correct a problem of under-chlorination under federal rules for maintaining proper CT values (see explanation in the SOP). In such cases, a rapid response team assembled by the General Manager (see Standard Protocols for Responding to Significant Water Quality Events below) will develop a public statement or notice for wide distribution. The public statement or notice will be distributed (at least) to the utility's Water Quality Listserve, to the Board of Water Commissioners, to all water utility employees, and to reporters for the two major newspapers. If the Department of Public Health determines there is a public health concern associated with the incident, then in addition, a full press release would be issued or press briefing held, depending on the situation.

Standard Protocols for Responding to Water Quality Concerns from Customers

The Utility's Water Quality Manager has established and follows the following standard protocols for responding to customer water quality concerns:

Almost all water quality concerns expressed to the Water Utility are handled directly by the Water Quality Manager. Correspondence usually takes the form of phone calls to the Water Quality Hotline (266-4654) or e-mails through the Ask Us – Tell Us feature on our website or the Report-a-Problem feature on the City's website. E-mails sent to "Water" are copied to the General Manager, the Water Quality Manager and support staff, and the Water Quality Manager primarily handles the responses. In the case of a billing inquiry or homeowner impact due to Water Utility activities, e-mails are forwarded to the Customer Service Manager or Operations Manager, respectively, for follow-up action. On occasion, customer-staff interaction at a meter

change-out, interruption of service (e.g. main break), or other Water Utility routine operation results in a referral from the Water Utility staff to the Water Quality Manager.

For all water quality correspondence, customers are asked to identify themselves, their location, and provide a phone number for potential future correspondence. This information is entered into the Water Quality Correspondence database for tracking purposes. Customers are asked to identify their reason for calling. Typical responses include discolored water, chlorine odor, low water pressure, or inquiries about hardness, the well that serves their address, or water quality in general. Water Utility notification postcards or letters about future public meetings, planned work at wells (e.g. Well 29 pilot study), or flushing program updates often trigger phone calls (and e-mails). In addition, water quality inquiries routinely peak following newspaper articles discussing potential contaminant sources (e.g. landfills on the East Isthmus) or chlorine mishaps.

With most water quality correspondence, discussing the problem/concern with the customer is usually sufficient. Often the caller is reassured by details of our monitoring and testing program and what the results show. They are referred to the new website function which provides water quality data for wells serving a specific address and given additional information as requested. Customers are referred to the Environmental Testing Lab or the Drinking Water Testing Lab if they would like to have their water tested. Occasionally, water quality correspondence prompts additional investigation and a site visit/inspection. For a report of discolored water or chlorine taste/odor, for example, the Water Quality Manager would contact flushing crews or system operators to determine if a specific Utility activity may be affecting water quality. The Water Quality Manager uses his judgment and experience to decide whether a site visit will be scheduled. The nature of the concern, location of the problem, and frequency of occurrence weigh heavily in the decision of whether to schedule a visit or not.

Situations in which customers express concern about the safety of the water or a suspected health condition arising from drinking the water always prompt a site visit. In these cases, the customer is referred to the Public Health Department after which the Water Quality Manager consults with Public Health staff, usually the Environmental Epidemiologist, to assess the situation and future testing. Depending on the nature of the concern, water samples are tested for coliform bacteria or metals such as iron, manganese, lead, or copper. Additional water samples may be collected following the initial assessment and test results. Depending on the situation, the Water Quality Manager may contact members of the Utility's Technical Water Quality Peer Review Task Force or other sources of special expertise.

Standard Protocols for Responding to Significant Water Quality Events

A significant water quality event will trigger execution of the utility's Emergency Response Plan (ERP). In some cases, it will also trigger actions, monitoring, reporting and notification requirements of federal rules and state regulations. The ERP outlines the protocols for responding to such events. It identifies four levels of emergencies and the criteria for designating those levels (see Emergency Action Levels document attached), including water quality criteria. Level 3 and 4 emergencies require activation of the City Emergency Operations Center. It identifies a Utility Emergency Response Team and outlines the specific duties of each member of the team in the event of an emergency. It specifies who needs to be called in for each level of emergency to make decisions on how to respond and contains lists of contact numbers for those individuals. It describes, in detail, notification and reporting procedures in order to appropriately notify employees and their families, customers, media, local emergency responders, state and federal agencies, and regulatory agencies. It also contains checklists and flowcharts for responding to emergencies.

The utility's Emergency Response Plan is in process of being updated. As the result of a number of issues raised in the recent past since the ERP was last updated, including high and low chlorine situations, the need for a number of modifications to the ERP are apparent. For example, under the existing ERP, if water with non-detectable levels of chlorine were pumped into the distribution system in excess of four hours (a Level 2 emergency in the ERP), the ERP calls for a Utility emergency response team to respond. A broader, more diversified rapid response team is needed in such situations. For a low or high chlorine event (Event A, B or C in the SOP) that persists more than four hours, or for other similar water quality incidents, the General Manager of the water utility should notify a rapid response team immediately and assemble the team within 30 minutes after the situation is discovered to have exceeded four hours. The team should physically meet face-to-face at the Water Utility main office (or other appropriate location). The team should be made up of (at least) the following individuals to make decisions on actions and reporting that should be taken:

David Denig-Chakroff, General Manager
Joseph Grande, Water Quality Manager
Al Larson, Principal Engineer
Kathy Cryan, Water Supply Supervisor
Thomas Schlenker and/or John Hausbeck, Public Health
George Twigg and/or Janet Piraino, Mayor's Office

Depending on the specific situation, members of the Utility's Technical Water Quality Peer Review Task force, a representative of the Wisconsin Department of Natural Resources, or other relevant experts in the specific area of concern should be called in to join the rapid response team. This rapid response team concept should be implemented immediately and incorporated into the utility's updated Emergency Response Plan. The draft updated plan should receive wide review within the utility, by the Water Board, by the Mayor's office, by the Department of Public Health, and by the City Emergency Response Team.

Denig-Chakroff, David

From: Mayor
Sent: Tuesday, May 08, 2007 2:31 PM
To: Denig-Chakroff, David
Cc: Larson, Alan; Grande, Joseph; Schlenker, Thomas; Piraino, Janet; Twigg, George
Subject: FW: Well 11 - Chlorine report

Importance: High

Dear David,

Thank you for Al Larson's report on the chlorine variance at Well 11 that occurred on Sunday. As we discussed, I want to continue to be informed of these issues.

It is good to know that from Al Larson's description, it appears the issue was promptly noticed and responded to. This situation, however, raises an important set of questions:

- When should a variance such as this be considered a minor and relatively normal fluctuation in chlorine levels, and at what point is a threshold crossed where health concerns or system failures come into play?
- What notification and reporting requirements should be in place for incidents both above and below this threshold?

I would also like to see standard protocols put in place as to how the Utility responds to water quality concerns:

- Who should be at the table when decisions are made?
- Who determines the urgency of a water quality concern?

Then, standard decision-making and reporting procedures should be developed, widely communicated, and carefully followed.

Please put together a team to answer these questions. The team should include Water Utility staff; board members, including the public health director or his designee; EMA consultants; and outside water quality experts as deemed necessary.

The team's report should be submitted to me and the Board of Water Commissioners by June 1, 2007 for approval.

Please share this e-mail with the Board, the communications subcommittee, and others as you feel appropriate.

Thank you for your prompt attention to this important issue.

Dave

Mayor Dave Cieslewicz
210 Martin Luther King, Jr. Blvd., Room 403
Madison, WI 53703
608.266.4611
mayor@cityofmadison.com

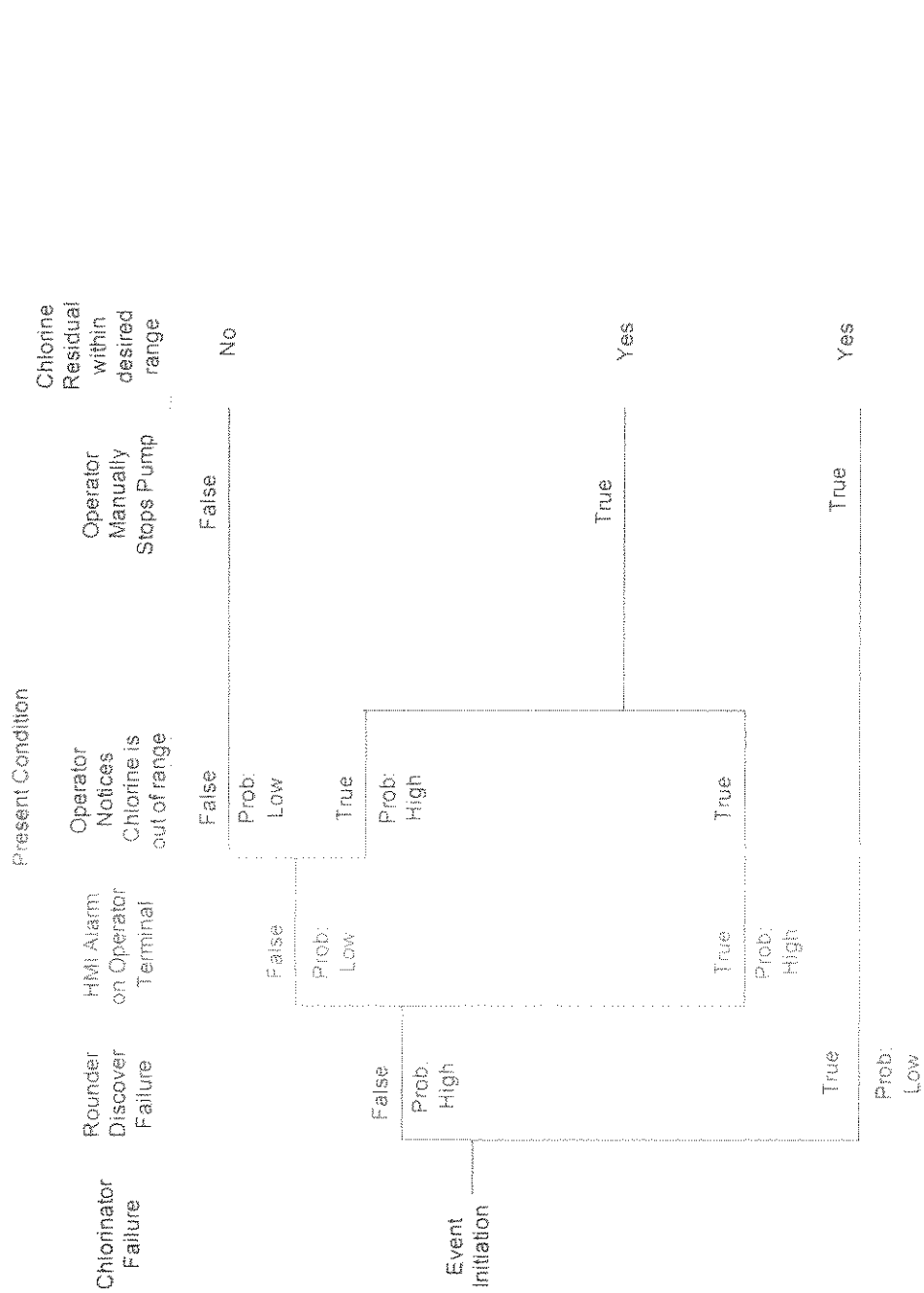
From: Grande, Joseph
Sent: Monday, May 07, 2007 3:18 PM
To: Piraino, Janet; Twigg, George
Cc: Denig-Chakroff, David; Larson, Alan
Subject: Well 11 - Chlorine report

Hi Janet and George

Attached is the chlorine report for Well 11 that we discussed earlier today. If you have any questions, please contact me by cell phone, 225-9135.

JOE

Event Tree Analysis
 Madison Water Utility
 Initiating Event: Chlorinator Failure
 Desired Outcome: Chlorine Residual remains within desired range
 May 10, 2007



Recommendations for Improved Performance of Maintaining Chlorine Residual Levels at Unit well Sites.

Short-term Recommendations:

1. Increase low chlorine residual alarms for Unit well sites to 0.16 mg/L within the SCADA HMI.
2. Provide refresher training and test rounders competency on proper portable chlorine residual analysis procedure and maintenance of the equipment.
3. Investigate use of existing RTUs to automatically stop booster pumps on high or low chlorine reading at the chlorine analyzers.
4. Train rounders on chlorine analyzer routine maintenance and calibration.
5. Fix bug in spreadsheet used to determine alarm for low chlorine use.

Long-term Recommendations:

1. As part of the new SCADA system, automatically stop booster pumps when chlorine levels are not within desire range.
2. Add a second chlorine residual analyzer at each unit well site closer to the feed point, either in the feed pipe to the reservoir, or within the reservoir itself.
3. Add chlorine gas flow meter or at least a signal indicating that chlorine is being fed or not. Use these signals for SCADA monitoring.
4. As part of the new SCADA system, replace the manual chlorinator feed with a motorized feed valve controlled via the SCADA system.

Draft Standard Operating Procedure—Chlorine Levels

Madison Water Utility: 06/01/2007

<p>Mandatory limits based on regulatory guidelines:</p>	<p>Maintain chlorine residual at all unit wells <u>at all times</u> to a site discharge level between 0.1 mg/L and 4.0 mg/L. These limits, in conjunction with the target and goal below, are designed to meet or exceed federal regulatory requirements for 4-log removal of viruses from drinking water and for maintaining a detectable level of chlorine throughout the distribution system at all times. (See Justification section below with citations for federal rules.)</p>
<p>Target and goal:</p>	<p>Maintain chlorine residual at all unit wells as close as possible to .25 mg/L (target level). The goal is to maintain chlorine levels within the range of .20 mg/L to .50 mg/L (target range).</p>

Event/Reporting	Actions Required For <u>Each</u> of the Events	Exceptions
<p><u>Low chlorine:</u></p> <p>A. The chlorine level leaving a unit well is less than 0.1 mg/L.—Report to supervisor within 15 min. of the event</p> <p>B. The chlorine level leaving a unit well is less than 0.2 mg/L for more than 1 hour.—Report to supervisor within 30 min. of the event.</p> <p><u>High chlorine:</u></p> <p>C. The chlorine level leaving a unit well is greater than 4.0 mg/L.—Report to supervisor within 15 min. of the event.</p>	<p><u>Low or high chlorine events A, B or C:</u></p> <ol style="list-style-type: none"> 1. Stop all booster pumps at that station within 15 min. after occurrence of the event. Carry out the actions in 2 below before re-starting pumps. 2. Verify in the field that the chlorine residual is out of acceptable limits by use of a portable analyzer. <ol style="list-style-type: none"> a. If the chlorine residual is not out of acceptable limits, repair the chlorine analyzer. b. If chlorine residual is verified out of acceptable limits (0.1-4.0 mg/L): <ol style="list-style-type: none"> i. Repair chlorine feed system. ii. Check the chlorine residual within the reservoir. If it is out of acceptable limits, dump the reservoir and completely refill with chlorinated water. iii. Using a hand held chlorine analyzer, sample the water in the reservoir to insure that the chlorine residual is within the target range. 	<p><u>Low or High chlorine:</u></p> <p>Maintain booster pump operation in the event of a fire within the service area of the station regardless of chlorine residual level. Proceed with Action 2, except dumping of reservoir.</p> <p><u>High chlorine:</u></p> <p>Conduct actions 1 and 2 (except dumping of reservoir) when chlorine residual exceeds 0.5 mg/L if multiple customer taste/odor complaints are received <u>and</u> if stopping the pump will not jeopardize water supply/pressure in the area.</p>

<p><u>Moderately High Chlorine:</u></p> <p>D. The chlorine level leaving a unit well is greater than 0.5 mg/L and less than 4.0 mg/L for more than 1 hour.— Report to supervisor within one hour of the event.</p>	<p><u>Moderately High Chlorine:</u></p> <ol style="list-style-type: none"> 1. Verify in the field that the chlorine residual is out of the target range by use of a portable analyzer. <ol style="list-style-type: none"> c. If the chlorine residual is not out of the target range, repair the chlorine analyzer. d. If the chlorine residual is verified out of the target range <ol style="list-style-type: none"> i. Repair chlorine feed system. ii. Using a hand held chlorine analyzer, sample the water in the reservoir multiple times over a sufficient period to ensure that the chlorine residual is decreasing. e. Closely monitor chlorine levels for 24 hours. 	<p><u>Moderately High Chlorine:</u></p> <p>If (1) this event occurs outside normal business hours, and (2) the moderately high chlorine level is stabilized (not increasing significantly), and (3) there are not multiple customer taste/odor complaints, then the reporting and action required may be delayed until the next business day. Note: <u>all three</u> criteria must be met for this exception to apply.</p>
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Justification

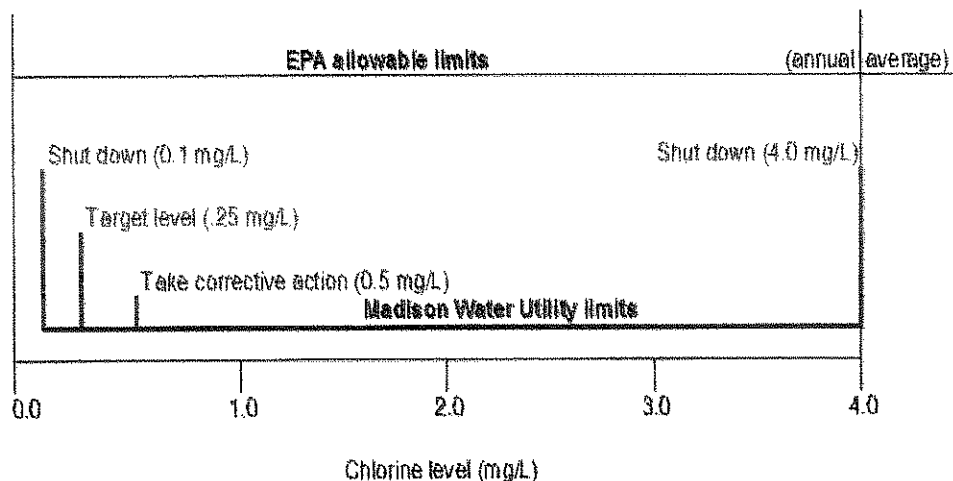
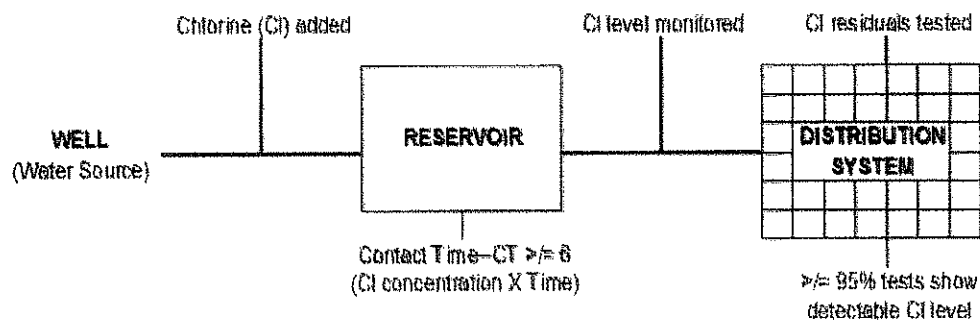
There are three standards that should be met for chlorination in the water system: (1) water entering the distribution system should have a **CT value** of at least 6.0 mg·min/L., (2) 95% or more of samples taken throughout the distribution system should show a **detectable level of chlorine residual**, and (3) the **average annual chlorine residual** at any point in the distribution system must not exceed 4.0 mg/L. As a groundwater system, the Utility is not required by federal or state regulation to chlorinate its water supply. If it does provide chlorination, however, it is mandated by federal regulation to comply with standard 3 above. The Utility is also required to ensure that no less than 95% of samples taken throughout the distribution system are negative for total coliform; however, since chlorine is added to the system, a better measure is that required for surface water systems, which is to ensure that no less than 95% of samples show detectable levels of chlorine (standard 2 above). While we are not yet required to achieve the CT values in standard 1 above, it is expected that we will be under such requirements when the federal Groundwater Rule is implemented in 2009. This Standard Operating Procedure is designed to meet all three criteria.

1. **CT value** is a measure of the amount of time chlorine is in contact with water before it enters the distribution system. The CT value is a function of both the chlorine level and the amount of time water is in contact with chlorine; i.e., chlorine residual (C) multiplied by contact time (T). Example: if water leaves a reservoir with 0.2 mg/L chlorine and the water is in the reservoir for 30 min., the CT value of water leaving the reservoir is $CT = 0.2 \text{ mg/L} \times 30 \text{ min} = 6.0 \text{ mg}\cdot\text{min/L}$. The smallest reservoirs in our system have a water residence time of 30 minutes. Consequently, maintaining a level at or above 0.2 mg/L will achieve a CT value of 6, which achieves 4-log removal of viruses. This standard does not currently apply to groundwater

systems. It is expected, however, that the standard will apply to our system in 2009. The requirement will provide that if the CT value goes below 6, the utility must regain a value of 6 within four hours. (Federal regulation: Groundwater Rule)

2. Experience shows that a **detectable level of chlorine residual** can be maintained at all points in the distribution system if we are feeding at least .15 mg/L chlorine at unit wells. Establishing a target level of 0.2 mg/L to meet CT requirements and a pump shutoff level of 0.1 mg/L will meet the requirement of achieving detectable levels of chlorine at all points in the distribution system at least 95% of the time and the requirement that at least 95% of samples be negative for total coliform. (Federal regulations: Surface Water Treatment Rule, Total Coliform Rule.)

3. Establishing a procedure to check chlorine instruments and equipment if they exceed 0.5 mg/L and shutting off pumps if levels exceed 4.0 mg/L will ensure that there is never an **average annual chlorine residual** in the system exceeding 4.0 mg/L. (Federal regulation: Stage 2 Disinfectants and Disinfection Byproducts Rule.)



2.3 Emergency Action Levels

Specific protective actions will be identified in the checklists for each emergency situation. Determination of protective actions depends on the Emergency Action Level (EAL) of the event, established on the level of severity of the event according to the criteria in Figure 2.4.

FIGURE 2.4
Emergency Action Levels for the City of Madison Water System

Emergency Action Levels	Emergency Response Organization Action	Example	Criteria
Level 1 Emergency	Notification of Utility	Water Main Break	Potential problem identified
	Notify Operator on Duty No Emergency Operating Center (EOC) activation Monitor situation		No customers impacted yet No impacts offsite
Level 2 Emergency	Notification of Utility Emergency Squad Leader, Operations Coordinator, Maintenance Supervisor	Intruder detected but did not reach a critical asset <i>MAIN Break w/ Property damage low-high Cl event</i>	Problem can be fixed in a few hours < \$10K - \$30K economic Loss < 8 hrs loss (potable) < 8 hrs loss (pressure) < 50 customers impacted
	No Utility EOC activation		
Level 3 Emergency	Notification of Utility Emergency Coordinator and Emergency Squad Leader	Intruder detected that reached critical asset	Major event with a significant impact affecting a large part of the water system and/or for a period of time too extensive for the Utility to manage alone.
	Utility EOC activation	Contamination in a single pressure zone of the distribution system	\$30K - \$100K economic loss 8-24 hrs loss (potable) 8-24 hrs loss (pressure) 50-100 customers impacted
Level 4 Emergency	Notification of Utility Emergency Coordinator and Squad Leader	Long-term Loss of power to large number of unit wells through a tornado	System-wide and regional impact (other utilities such as gas and electric are likely to be affected as well)
	Utility EOC activation	System-wide contamination	> \$100K economic loss > 48 hrs loss (potable) >12 hrs loss (pressure) >100 customers impacted
	City EOC activation	Confirmed intruders at multiple sites	

2.4 Emergency Protective Actions

The essence of a plan to handle emergencies is summarized in the acronym "NEAR": Notify, Evacuate, Assemble, and Report.

Denig-Chakroff, David

From: Greg Harrington [gwharrin@facstaff.wisc.edu]
Sent: Friday, June 01, 2007 10:59 AM
To: Denig-Chakroff, David
Cc: Nelson, Larry; georgemeyer@tds.net; Schlenker, Thomas; Grande, Joseph; Larson, Alan; Guderyon, Joel; Paul Nehm; Jack Geisenhoff; Cryan, Kathy; Piraino, Janet
Subject: Re: RE: chlorine

Dave is largely correct here. There may be a few customers within close proximity to the well that will see less than 0.1 mg/L for a short time period, and this will not cause any violations of any rules. In fact, the rules allow for a chlorine concentration that is not detected by the technology that the operators are using. As long as the bacteria count (as measured by heterotrophic plate count) is less than 500 per mL, then the water is assumed to have enough disinfectant in it. It is important to stress that the regulatory framework considers this to be adequate public health protection.

Just a reminder that the 0.1 mg/L value is not universally accepted as the number for "detectable" - my experience is that 0.05 mg/L to 0.2 mg/L is the range of opinion on this. I like the 0.1 mg/L value because it is consistent with my experience using the chlorine detectors that MWU uses, it is easier to make operational decisions on than bacteria counts are, and it gives us a value that provides the possibility of consistent information for the customers.

I agree that we need to decide whether or not we want to avoid concentrations less than 0.1 mg/L for these situations. I am technically comfortable with the SOP - I believe it provides adequate public health protection. However, if the SOP says that our goal is 0.1 mg/L at the tap, then the public will likely be confused and skeptical if we try to tell them that a short time period of less than 0.1 mg/L is nothing to worry about. Perhaps we could go with a 0.15 mg/L residual for this part of the SOP than the 0.1 mg/L residual we currently have. Alternatively, we could say that the goal is a "detectable" chlorine residual at the tap and then use the regulatory language as our fall back position. The latter is more flexible from an operations perspective but less well understood by the public. If you want me to vote on one choice, I would probably go with the 0.15 mg/L (but I could be swayed to the other position if everyone else wants to go the other way).

Greg

Greg Harrington
Associate Professor
Department of Civil and Environmental Engineering University of Wisconsin
3232 Engineering Hall
1415 Engineering Drive
Madison, Wisconsin 53706

----- Original Message -----

From: "Denig-Chakroff, David" <ddenig-chakroff@madisonwater.org>
Date: Friday, June 1, 2007 8:33 am
Subject: RE:
To: "Nelson, Larry" <LNelson@cityofmadison.com>, georgemeyer@tds.net, gwharrin@facstaff.wisc.edu, "Schlenker, Thomas" <TSchlenker@cityofmadison.com>, "Grande, Joseph" <JGrande@madisonwater.org>, "Larson, Alan" <ALarson@madisonwater.org>, "Guderyon, Joel" <JGuderyon@madisonwater.org>, Paul Nehm <pauln@madsewer.org>, Jack Geisenhoff <jgeisenhoff@ema-inc.com>
Cc: "Cryan, Kathy" <KCryan@cityofmadison.com>, "Piraino, Janet" <JPiraino@cityofmadison.com>

> I will put times on the reporting. With respect to the 0.1 mg/L
> leaving the station (Greg can correct me if I'm wrong) the way I
> understand it is if we are regularly running at a range of 0.2 to 0.5
> and and the level decreases to below 0.1 and the Operator shuts down
> the station within 15 minutes of that occurrence (at which time water

> from other wells with 0.2 - 0.5 is supplying the service area again)
> there is enough residual chlorine in the system that we will be
> maintaing detectable levels at all times at all points. We certainly
> would not violate the 95% rule. Even if the levels dropped to 0.0 at
> the station for longer periods of time (while certainly not
> desirable) we would not violate the 95% rule. This actually occurred
> in the case of the Well

> 29

> incident intermittently for weeks, and when we reported it to DNR,
> they confirmed there was no violation. Also, remember that 0.1 is a
> conservative estimate of "detectable level." Historically, we have
> always considered 0.05 to be a "detectable level."

>

>

>

> From: Nelson, Larry
> Sent: Friday, June 01, 2007 7:33 AM
> To: Denig-Chakroff, David; 'georgemeyer@tds.net';
> 'gwharrin@facstaff.wisc.edu'; Schlenker, Thomas; Grande, Joseph;
> Larson, Alan; Guderyon, Joel; 'Paul Nehm'; 'Jack Geisenhoff'
> Cc: Cryan, Kathy; Piraino, Janet
> Subject: RE:

>

>

> I don't understand the difference between "report to supervisor
> immediately" vs. "as soon as possible" vs. "as soon as convenient".
> That will appear to be vague or at the operator's discretion. Given
> the demands of the job, lets define the reporting in a more specific
> fashion, such as within the "quarter hour of notice of the event".

>

> Also, and one more time, if our goal is to provide "detectable
> chlorine residual at the point of use" and define "detectable" at 0.1
> mg/l, should the chlorine leaving the well/reservoir into the system
> be higher than 0.1?

>

>

>

> From: Denig-Chakroff, David
> Sent: Thursday, May 31, 2007 2:05 PM
> To: Nelson, Larry; georgemeyer@tds.net; gwharrin@facstaff.wisc.edu;
> Schlenker, Thomas; Grande, Joseph; Larson, Alan; Guderyon, Joel; 'Paul
> Nehm'; 'Jack Geisenhoff'
> Cc: Cryan, Kathy; Piraino, Janet
> Subject:

>

>

> Attached is the final draft report to the Mayor from our Team, along
> with attachments, including the revised Chlorine Levels SOP. Please
> review these and get any final comments back to me by first thing
> tomorrow morning. My deadline for submitting the report to the Mayor
> is tomorrow. Thanks. And, thanks for all the assistance you have
> provided for this.

>

> Dave

>