Why Learn the Hard Way?

Converting Hindsight into Foresight

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Why Learn the Hard Way?

My message for you today is derived from a book we published with AWWA (June 2014),

sponsored by:

✧ Canadian Water Network
✧ Rural Alberta Development Fund (AWWOA)
✧ Walkerton Clean Water Centre
✧ National Collaborating Centre on Environmental Health
Ensuring Safe Drinking Water

Learning From Frontline Experience With Contamination

Steve E. Hrudey and Elizabeth J. Hrudey

AWWA Webinar on this

Wednesday, January 27

Do Not Learn the Hard Way?

- Most frontline personnel (operators, managers, regulators and public health personnel) will likely **not** experience major disaster first hand.
- Makes sense to make disaster experience available and “live” for the majority so they can avoid becoming involved in a disaster.
- Change your view of the world, e.g. new car example.
- Illustrate the enormous benefit of Drinking Water Safety Plans (DWSP), as a “**know your own system**” approach.
A Case Study Approach

Despite the rare occurrence of drinking water outbreaks in affluent countries, they continue to happen, so we need to teach prevention:

- Case studies can make learning more effective by adding reality to the learning experience
- Case studies can be adapted to local realities
- Front line personnel do not want to harm their neighbours
- They are likely to avoid, if they fully understand the consequences (e.g. Walkerton)
What We Communicate

We encourage the readers of our case studies to ask themselves:

- Could this have happened to your system?
- Would all of the failures which occurred have been detected by your system management?
- Would your system have responded appropriately to all of the signals if they were detected?
- These answers should be evident with a DWSP approach in place.
Failure is Commonly Blamed on Human Error

- The case studies presented in our book document many mistakes and human failings.
- Hindsight is usually 20:20 vision, but may miss the point.
- Trevor Kletz (1922-2013), a brilliant safety engineer noted: “Saying an accident is due to human failing is about as helpful as saying that a fall is due to gravity. It is true, but it does not lead to constructive action. Instead it merely tempts us to tell someone to be more careful....”
- To understand what went wrong you have to put yourself completely into the situation as it happened.
Dealing with operations in real time
## Serious Incidents Do Happen!

<table>
<thead>
<tr>
<th>Location</th>
<th>Year</th>
<th>Type</th>
<th>Health Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adliswil, Switzerland</td>
<td>2008</td>
<td>Mixed pathogens - sewage</td>
<td>180 cases</td>
</tr>
<tr>
<td>Alamosa, Colorado*</td>
<td>2008</td>
<td><em>Salmonella</em></td>
<td>1 death, 1300 cases</td>
</tr>
<tr>
<td>Anytown, North America</td>
<td>2011</td>
<td>Process failure following main break</td>
<td><em>Cryptosporidium</em> close call</td>
</tr>
<tr>
<td>Anytown, Australia</td>
<td>2011</td>
<td>Chlorination failure</td>
<td><em>E. coli</em> close call</td>
</tr>
<tr>
<td>Brisbane, Australia</td>
<td>2009</td>
<td>Fluoridation overdose</td>
<td>fluoride poisoning - close call</td>
</tr>
<tr>
<td>Burncrooks, Scotland</td>
<td>1997</td>
<td>Diesel fuel spill</td>
<td>water safe only for toilet flushing</td>
</tr>
<tr>
<td>Camelford, England*</td>
<td>1988</td>
<td>Aluminum overdose</td>
<td>acute and chronic effects</td>
</tr>
<tr>
<td>Milwaukee, Wisconsin</td>
<td>1993</td>
<td><em>Cryptosporidium</em></td>
<td>50 deaths, 400,000 cases</td>
</tr>
<tr>
<td>Nokia, Finland*</td>
<td>2007</td>
<td>Mixed pathogens - sewage</td>
<td>2 deaths, 8,450 cases</td>
</tr>
<tr>
<td>Northampton, England</td>
<td>2008</td>
<td><em>Cryptosporidium</em></td>
<td>422 cases</td>
</tr>
<tr>
<td>North Battleford, Sask.</td>
<td>2001</td>
<td><em>Cryptosporidium</em></td>
<td>&gt;6,000 cases</td>
</tr>
<tr>
<td>Östersund, Sweden*</td>
<td>2010</td>
<td><em>Cryptosporidium</em></td>
<td>27,000 cases</td>
</tr>
<tr>
<td>Stratford, Ontario</td>
<td>2005</td>
<td>Car wash detergent</td>
<td>quick action - illness avoided</td>
</tr>
<tr>
<td>Walkerton, Ontario</td>
<td>2000</td>
<td><em>E. coli</em> O157:H7</td>
<td>7 deaths, 2,300 cases</td>
</tr>
</tbody>
</table>
Camelford, July 1988
Camelford, July 1988

to the left???
Nokia, Finland 2007

Maatiala WW

Kallaanvuori Wastewater Treatment Plant

Complaints November 28
Complaints November 29-30
Kullonvuori Wastewater Treatment Plant

Nokia, Finland 2007
Kullonvuori Wastewater Treatment Plant

Valve connecting to drinking water main
Alamosa, Colorado, USA 2008
Östersund, Sweden 2010

Minnesgårdets Waterworks

Contaminated creek
Serious Incidents Still Happen

<table>
<thead>
<tr>
<th>Location</th>
<th>Year</th>
<th>Type</th>
<th>Health effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bergen, Norway</td>
<td>2004</td>
<td>Giardia</td>
<td>4,000 – 6,000 cases</td>
</tr>
<tr>
<td>Galway, Ireland</td>
<td>2007</td>
<td>Cryptosporidium</td>
<td>242 lab confirm</td>
</tr>
<tr>
<td>Podgorica, Montenegro</td>
<td>2008</td>
<td>gastroenteritis</td>
<td>1,700 cases</td>
</tr>
<tr>
<td>Köge, Denmark</td>
<td>2010</td>
<td>Campylobacter</td>
<td>&gt;400 cases</td>
</tr>
<tr>
<td>Saratoga Springs, UT, USA</td>
<td>2010</td>
<td>Campylobacter</td>
<td>&gt;300 cases</td>
</tr>
<tr>
<td>Skellefteå, Sweden</td>
<td>2011</td>
<td>Cryptosporidium</td>
<td>~20,000 cases</td>
</tr>
<tr>
<td>Baker City, OR, USA</td>
<td>2013</td>
<td>Cryptosporidium</td>
<td>&gt;2000 cases</td>
</tr>
</tbody>
</table>
10 Commandments for Safe Drinking Water

1. Never say never! Contamination can strike any system. The test for you will be how quickly you recognize trouble and deal with it effectively.

2. Do not underestimate the capacity of fecal (human or animal) waste to make water unsafe.

3. Learn from experience – do not just survive it. Learn from your mistakes and those around you.

4. Recognize when you do not understand what is happening, admit it and seek help to understand.

5. Do not overlook the obvious – if you would not eat there, do not make drinking water there.
10 Commandments for Safe Drinking Water

6. Treat water operations like defensive driving – expect mistakes by others.

7. Make sure you understand why you must do regulated things – if you only do things because you are told to, you are on your way to complacency.

8. Maintain healthy skepticism about the first explanations of what is wrong.

9. Do not let others (managers, politicians) pin blame on you – if you know that improvements are needed, document those needs in detail.

10. Take pride in the public health responsibility you carry and maintain!
Closing Thoughts

♦ More stringent water quality numbers alone do **NOT** assure safe drinking water (e.g. Walkerton)

♦ Vulnerability can exist for a long time before disaster (e.g. Walkerton, 22 years)

♦ A regulatory focus on monitoring for multiple chemicals must **not distract from the primary risks** - pathogens

♦ Regulation needs to focus on achieving operational and management competence at all levels

♦ Regulation needs to focus on good practice: **DWSPs**

♦ **What SHOULD you know about YOUR plant that COULD go wrong?**
A free excerpt of our book is available at:

www.awwa.org/esdw
Questions???

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