

A Risk Assessment/Risk Management Approach to Safe Recreational Bathing Water.

Gordon Yasvinski, Microbiologist
Water Quality and Health Bureau
Health Canada



Guidelines for Canadian Recreational Water Quality

- Current version - 2nd Edition (1992)
- 3rd Edition:
 - Anticipated 2006-07
 - Developed by FPT Working Group on Recreational Water Quality
- GCRWQ
 - Guidance
 - Factors which can affect the health and safety of recreational water users.
 - Conducting Environmental Health Assessment
 - Establishing Monitoring Program
 - Criteria
 - Recommended Indicators and Maximum Limits for Safe Recreational Waters



Cette présentation a été effectuée le 15 novembre 2005, au cours de la journée « Les eaux de baignade : cessons de nager en eaux troubles » dans le cadre des Journées annuelles de santé publique (JASP) 2005. L'ensemble des présentations est disponible sur le site Web des JASP, à l'adresse <http://www.inspq.qc.ca/jasp/archives/>.

Guidelines for Canadian Recreational Water Quality

Maximum Limits: GCRWQ 2nd Edition, 1992.

- Fresh Water:

- E. coli* 200 cfu/100mL
Resample at 400 cfu/100mL



- Marine Water:

- Enterococci 35 cfu/100mL
Resample at 70 cfu/100mL



- Appealing to responsible authorities – Plug neatly into monitoring programs.
- Management Documentation - Too often only Guideline values communicated.
- Gives impression that compliance is most relevant aspect of program

Limitations of Indicator Concept for Water Quality

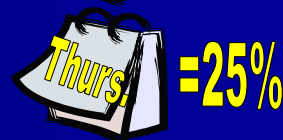
- Response is retroactive.
 - Some individuals will already be exposed.
 - Conditions may have returned to normal by the time beach is posted.
- Significant variation observed in indicator densities (temporally and spatially).
- Indicator Organisms do not adequately index viral and protozoan pathogens.

Effectiveness of Monitoring Programs

- Leecaster and Weisberg, 2001

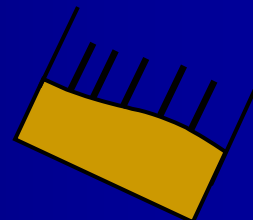
Number of Exceedances Detected:

- 5 days/week 80%
- 1 day/week 25%
- 1 day/month 5%



- Whitman and Nevers, 2004.

- # samples required for 70% accuracy in catching exceedances
- Intensive (single location) samples 6
- Extensive (across transects) samples 24



Effectiveness of Monitoring Programs

- Weekly sampling
 - Many water quality exceedances can be missed.
- Daily sampling
 - More exceedances caught, but will not prevent exposure.
- Single sample
 - May not be representative of true water quality.
- Few jurisdictions have the resources to account for this variability when sampling.
- Compliance with Maximum Limits not solely sufficient in managing risk.
- Importance of a more balanced approach to risk management increasingly being realized.

Recent WHO Publications

- Represent over a decade of collaboration from international recreational water experts.
 - 'The Annapolis Protocol' – 1999
 - Guidelines for Safe Recreational Water Environments - 2003
- Advocate 'Harmonized' approach to risk management.
- Combines Sanitary Inspection and Microbiological Assessment.
- Focus shifted from traditional retrospective numerical compliance to include real-time management and preventive public health protection.

Risk Assessment/ Risk Management Approach

- Effective Risk Management Strategy - Key Elements: (Hrudey 2001)
 - Real-time control if possible.
 - Use of Multiple Barriers.
 - Preventive rather than reactive strategies.
 - Risks prioritized.
 - Invest resources proportional to risk posed.
- Process-type Model:
 - Risk Assessment to identify all risk inputs.
 - Identify priority points for control.
 - Identify and apply control measures/barriers.
 - Validate system.
- Similar to Multiple Barrier Approach Advocated for provision of Safe Drinking Water.

Reemphasis on Sanitary Surveys

- Surveys often neglected.
- Impact from different pollution sources not always known (esp. diffuse sources).
- Environmental Health and Safety Surveys used to identify:
 - Pollution sources.
 - Scenarios contributing to risk.
 - Safety hazards.
- Helps identify priority points for control as well as barriers that can be applied.



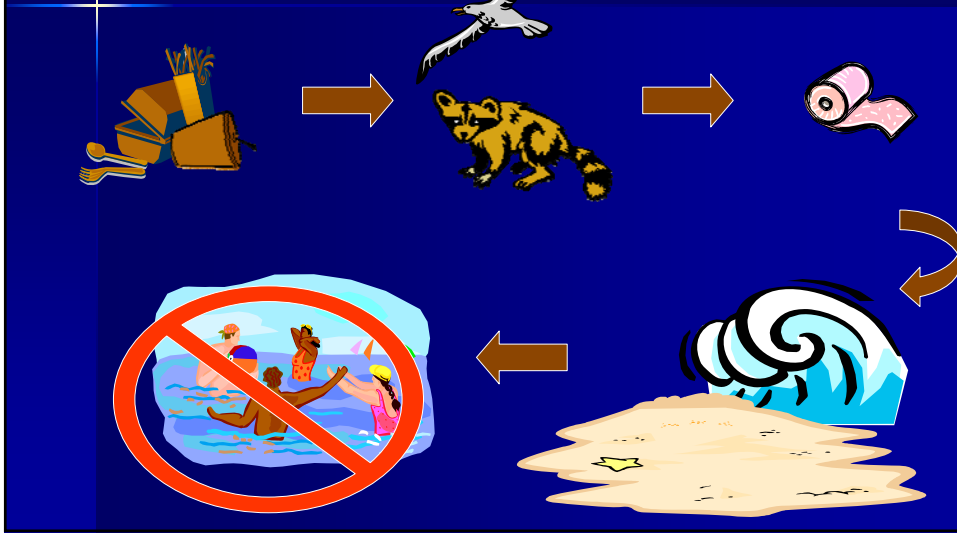
Environmental Health and Safety Survey – Steps

- Pre-survey Preparations:
 - Review of historical data.
 - Examine maps of watershed and beach area.
- On-Site Visit:
 - Identify hazards first hand.
 - Use of EHSS checklist.
- Assessment Report:
 - Summarize hazards and risks.
 - Identify possible corrective actions.
 - Recommend an appropriate monitoring program.

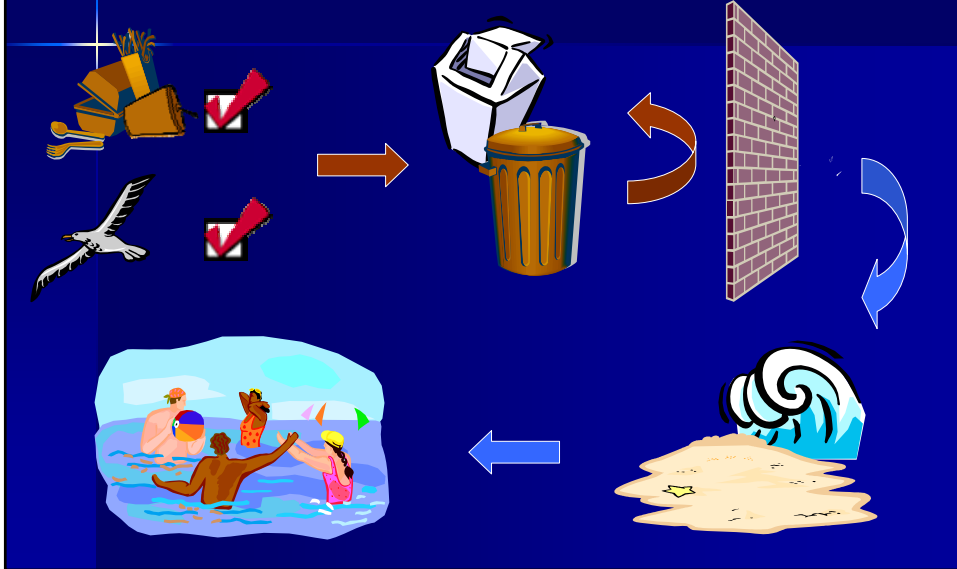




Steps to Risk Assessment / Risk Management: Example



Steps to Risk Assessment / Risk Management: Example



Other Examples of Barriers That can be Implemented

- Preemptive advisories following significant rainfall.
- Improved beach cleanup/grooming procedures.
- Wildlife deterrents (gull nets, fencing)
- Can also be improved public communication (posters, brochures)
 - Clean up after pets.
 - Do not feed animals or birds.
 - Limit contact for diaper-aged children.
 - Proper disposal of household wastes.
 - Proper maintenance of septic systems.

**Unsafe for Swimming
Due to Heavy
Rainfall**



Other Examples of Barriers That can be Implemented

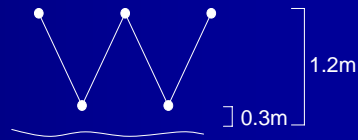
- Use of Predictive Models
 - Use easily collected water quality and weather information to predict water quality.
 - Can achieve accuracy similar to using yesterday's microbiological results, but decisions made the same day.
- Multiple Barrier Approach - Bottom Line:
 - Operators and Authorities need to be aware of both large and small scale interventions available.
 - Once you have fully characterized your bathing area using an Environmental Health and Safety Survey – you now have a framework upon which to base operational activity.



Adjunct to Risk Management - Beach Grading System

- Environnement-Plage Program: Quebec Ministère du Développement durable, de l'Environnement et des Parcs.
 - Public can make informed decisions on relative water quality.
 - Public awareness creates incentive to make quality improvements
 - Also used to validate that quality improvements are working.
- New Guideline document to incorporate best information from provincial approaches to monitoring.
- Working Group on Recreational Water Quality exploring use of National grading system based on Quebec's model.

Fecal Colliforms	Grade
0-20	A
21-100	B
100-200	C
>200	D



Multiple Barrier Approach

- Advantages:
 - Flexibility
 - Program can be tailored to individual beaches.
 - Actions can be as large or small as resources permit.
 - Multiple Barriers – More effective Risk Management
 - Multiple barriers more effective than single barrier.
 - Proactive, not reactive strategy.

Multiple Barrier Approach

- Advantages (continued):
 - Improved Cost Effectiveness
 - Small-scale actions can have better cost-benefit returns.
 - Can lead to reduced monitoring requirements.
 - Microbiological results used to confirm system operating properly.
 - Pre-emptively identify sources before jumping in to costly source tracking studies.
- Limitations:
 - Some problems chronic, cannot be easily resolved without large-scale actions.
 - Requires more effective coordination among stakeholders.

Guidelines for Canadian Recreational Water Quality, 3rd Edition.

- Objectives:
 1. Emphasize advantages of a more balanced approach to Risk Management.
 2. Communicate how Environmental Health and Safety Surveys can be used as part of a preventive Risk Management Strategy.
- * Intent is not to be prescriptive – Not all operators will be able to make use of the recommendations.
- * Scope of topic is broad - Guidance intended as a starting point for those individuals who have interest and/or resources to seek out additional information.