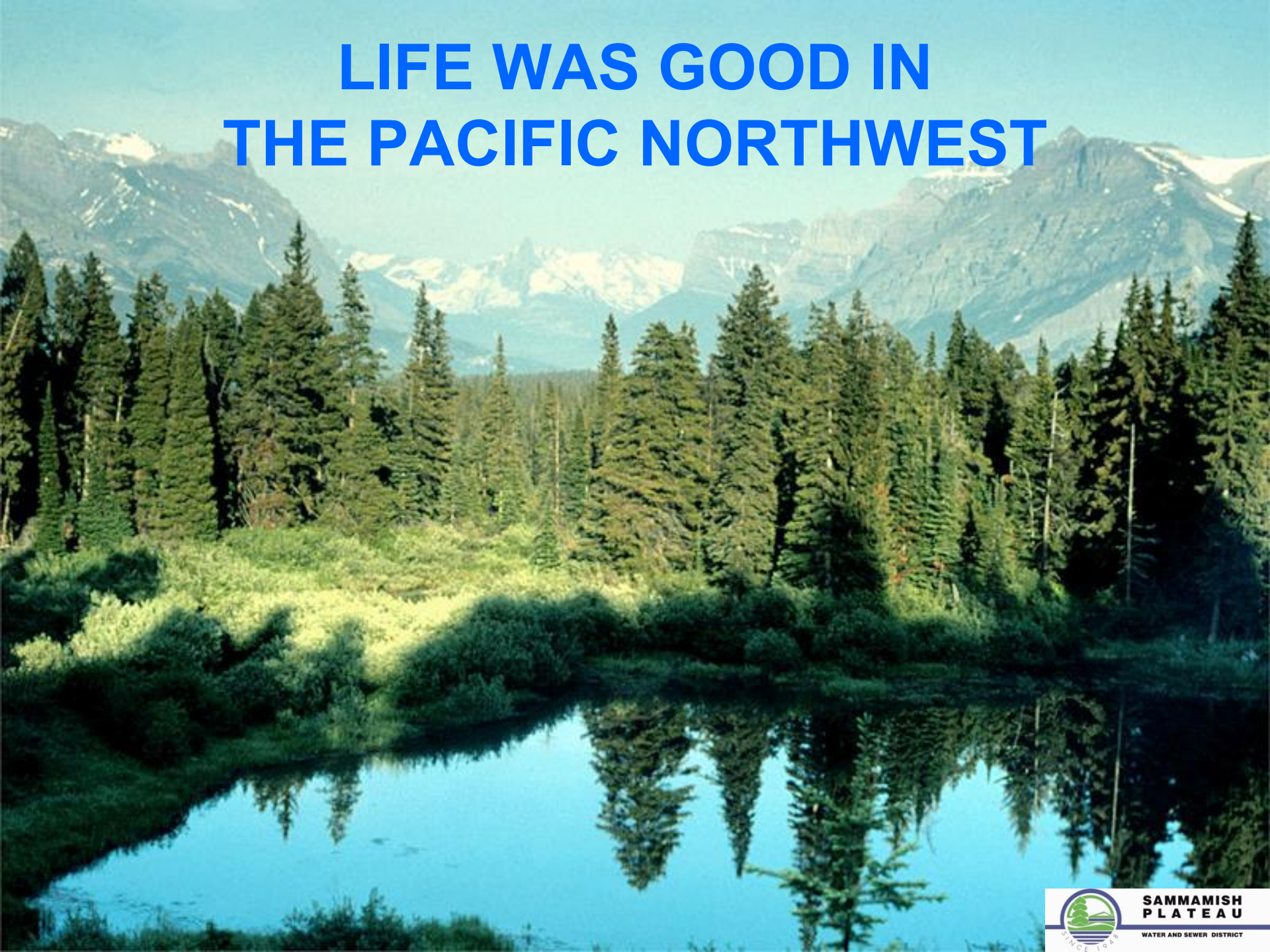
PNWS – AWWA SPRING CONFERENCE
BOISE, IDAHO – MAY 3, 2011

"SECURITY AND EMERGENCY RESPONSE PREPAREDNESS WITH FEWER RESOURCES "

Prepared by: Scott Jonas
Presented by: Len Cornwell
Sammamish Plateau Water and Sewer District
Sammamish, WA

SAMMAMISH PLATEAU
WATER AND SEWER DISTRICT

LIFE WAS GOOD IN THE PACIFIC NORTHWEST



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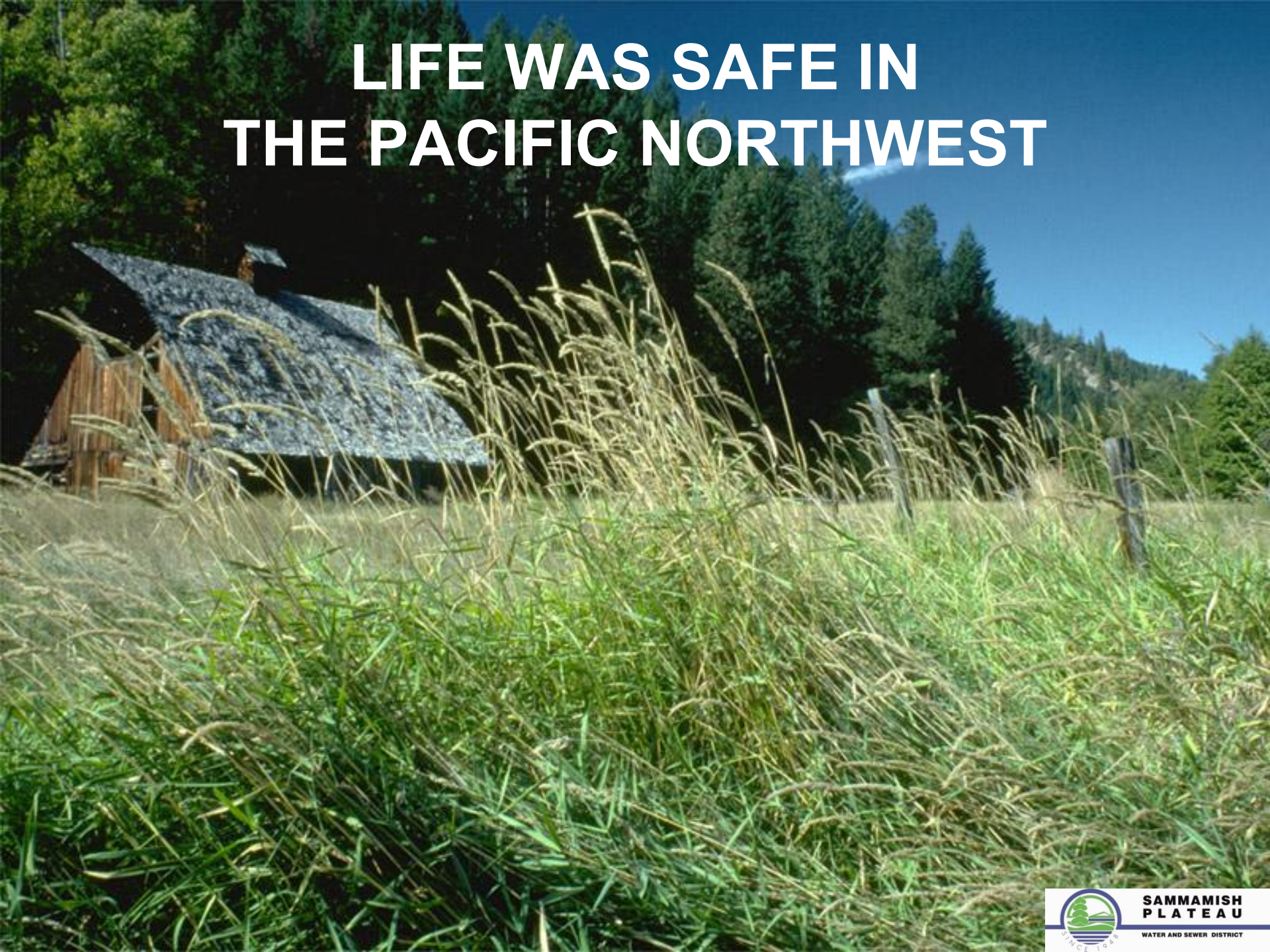
WATER AND SEWER DISTRICT

LIFE WAS SAFE IN THE PACIFIC NORTHWEST



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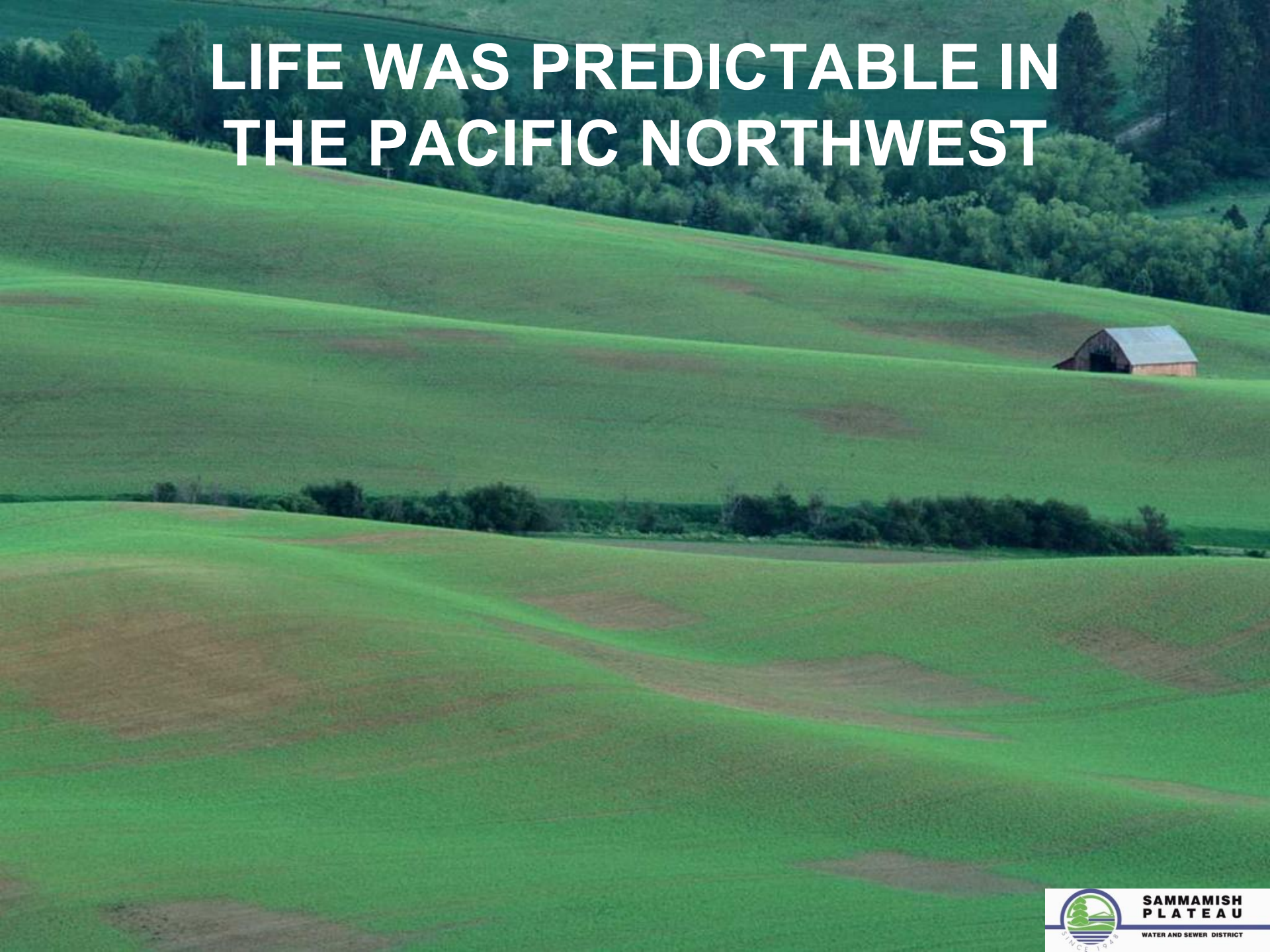
LIFE WAS PREDICTABLE IN THE PACIFIC NORTHWEST



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WATER AND SEWER DISTRICT

EVERYTHING CHANGED
THAT DAY
LIFE WOULD NEVER
BE THE SAME
SAMMAMISH
PLATEAU
WATER AND SEWER DISTRICT

AFTER 9/11

- 9/11 terrorist attacks on the World Trade Center and the Pentagon
- "*Public Health Security and Bioterrorism Preparedness and Response Act of 2002*" *(PL 107-188)*
  - Signed by George W. Bush

AFTER 9/11

- *"Public Health Security and Bioterrorism Preparedness and Response Act of 2002" (PL 107-188)*
  - A community water system that serves a population of greater than 3,300 people must review the **vulnerability** of its system **to a terrorist attack** or **other intentional acts** intended to substantially disrupt the ability of the system to provide a safe and reliable supply of drinking water.

AFTER 9/11

- *"Public Health Security and Bioterrorism Preparedness and Response Act of 2002" (PL 107-188)*
  - Deadlines for Vulnerability Assessment
    - March 31, 2003 • December 31, 2003 • June 30, 2004
    - Depended on utility size
    - Larger utilities first

RAM This and RAM That

- **R**isk **A**ssessment **M**ethodology for **W**ater – **RAM-W**™ (2000 - 2003)
  - AWWA Research Foundation, Sandia National Laboratories, EPA
    - Focus: Risks from malevolent threats
- **R**isk **A**nalysis and **M**anagement for **C**ritical **A**sset **P**rotection – **RAMCAP**
  - Led by A.S.M.E. & 100 industry leaders
  - *RAMCAP Framework* (2005)
    - Limited to various types and intensities of terrorist attacks
  - *RAMCAP Framework, Version 2.0*© (2006)
    - *All hazards – natural and man-made*

WHAT WE DID AFTER 9/11?

- Sammamish Plateau -

- Attempted our own **V**ulnerability **A**ssessment (VA) [January – June 2003]
  - Lack of skill in cyber attacks, hacking methods and cyber security in general
  - Staff resources needed to carry out the assessment while continuing their regular duties was severely limiting progress
- Engaged consultant to guide completion of the VA using RAM-W

WHAT WE DID AFTER 9/11?

- Sammamish Plateau -

- Created a standing Security Task Force
- Joined Water iSAC
- Instituted access control
  - Badge policy
  - Develop/document policies/procedures for issuing keys
    - Multi-layer keying
- Document network/cyber policy/procedures

WHAT WE DID AFTER 9/11

- Bellevue -

- Complete Overview Of Water System, Oct 2002
- Performed Own Vulnerability Assessment Internally
- External V.A. to reinforce what had already been discovered
- Incorporated security with “Emergency Response Plan”
- Developed “Safe Mode” and other programs for water system security

WHAT WE DID AFTER 9/11

- Bellevue -

- Created a security standby group
- Created a water security standby manual
- Created a utility infrastructure security team that meets regularly and whose members consisted of operators, engineering technicians, managers, supervisors, operators, water quality technicians, police and fire.

WHAT WE DID AFTER 9/11
- Both -

- Incorporated security into everything we do
- Picked the “Low Hanging Fruit” first
- **Then** we started on the more challenging repone$

“WHAT, ME WORRY?”, you say?

- “We‟re a small system in an out-of-way area. What‟s to worry about?”
- Ask Springfield, Oregon

SHAKING THE TREES FOR LOW-HANGING FRUIT

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WATER AND SEWER DISTRICT

"LOW-HANGING FRUIT" WHAT IS IT?

- A course of action that can be undertaken quickly and easily **as part of a wider range** of changes or solutions to a problem: *first pick the low-hanging fruit* ⇨

"LOW-HANGING FRUIT" Post 9/11

- These are measures that would logically be handled by our O&M staff as part of our business
- Does not require a great amount of coordination by departments outside of O&M
- Can be implemented in a short period of time
- Can be paid for with existing budget
- Gave us a lot of "Bang For The Buck" ⇨

“REALLY LOW-HANGING FRUIT”

- Can you say, “Fruit On the Ground!”?
- Some Examples > > > ⇨

FRUIT ON THE GROUND

- Re-key critical sites

- Add signs

FRUIT ON THE GROUND

- Repair existing fences
- Fix existing alarms and add easy ones
- Add telemetry room security
- Notification procedures for private companies-citizens
- Staff training - example
  - Crewmembers not leaving access keys unattended in unlocked trucks ⇨

LOW-HANGING FRUIT

ADD A NEW LOCK SYSTEM

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WATER AND SEWER DISTRICT

LOW-HANGING FRUIT

ADD NEW FENCES AND GATES

Before

After

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LOW-HANGING FRUIT

IDENTIFY AND SECURE YOUR CRITICAL AREAS

Before

After

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LOW-HANGING FRUIT

ADD NEW INTRUSION ALARMS AND CAMERAS

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LOW-HANGING FRUIT

ADD MORE CAMERA'S AND VIDEO EQUIPMENT

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LOW-HANGING FRUIT

MODIFY RESERVOIR VENTS

Before

After

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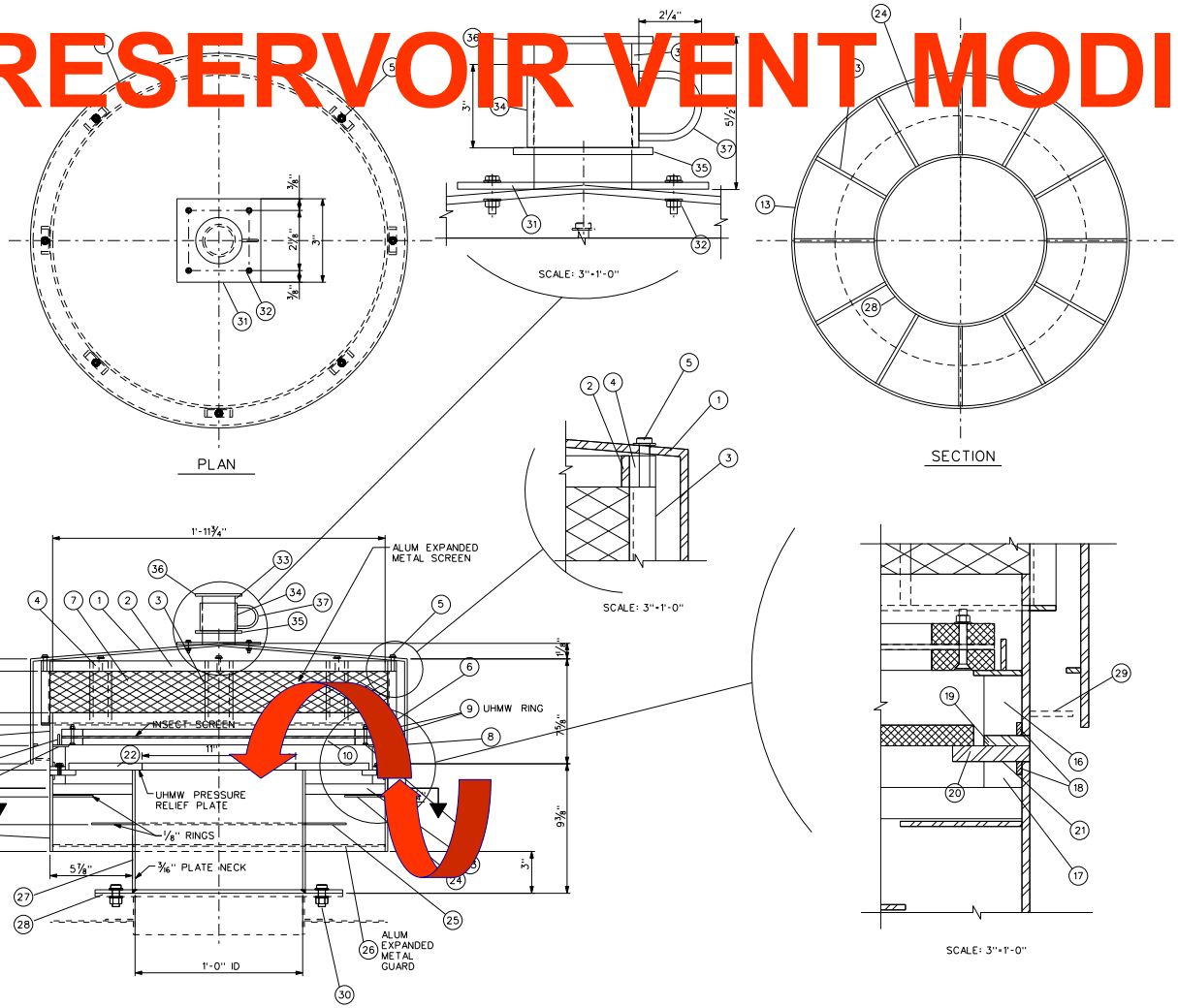
WATER AND SEWER DISTRICT

RESERVOIR VENT MODIFICATION



PART LISTS

PART NO.	DESCRIPTION	QUANTITY
1	3/16" THICK ALUMINUM PLATE CIRCLE TOP	1
2	VERT CYLINDER - PL 3/16 X 3/4 X 1'-11¾" OD	1
3	C2 X ⅛ X ⅝ X 4½"	8
4	PL ¾ X ⅝ X 2"	8
5	¼"-20 X 1½" LONG SS LOW HEAD HEX SOC CAP SCREW W/WASHER @ 45° SPACING	8
6	HORIZ RING - PL⅛X 2'-0⅛" ID X 2'-1⅜" OD	1
7	EXPANDED METAL SCREEN ALUM FLATTENED - ALLOY 5005 H34 AMICO ¾" .125 OR EQUAL 2'-0⅞" OD	1
8	HORIZ RING - PL⅛ X 2'-1⅞" ID X 2'-2⅝" OD	1
9	HORIZ UHMW RING - PL½" X 1'-7½" ID X 1'-10½" OD	2
10	FIBERGLASS INSECT SCREEN PHIFERGLASS POOL, PATIO & PORCH INSECT SCREENING 18 X 14 MESH OR EQUAL 1'-10½" OD	1
11	¼"-20 X 1" LONG SS COUNTERSUNK HEX SOC BOLTS W/NUT & WASHER @ 30° SPACING	12
12	VERT CYLINDER - PL3/16 X 3/8 X 1'-11¾" ID	1
13	VERT CYLINDER - PL3/16 X 5½ X 1'-11¾" ID	1
14	VERT CYLINDER - PL⅛ X¾ X 1'-10¾" ID	1
15	HORIZ RING - PL⅛X 1'-9½" ID X 1'-11¾" OD	1
16	PL⅛X 1 X 1½" @ 30° SPACING	12
17	PL⅛X⅝X 1" @ 30° SPACING	12
18	VERT CYLINDER - PL⅛X⅜X 1'-11¾" OD	2
19	HORIZ RING - PL¼" X 1'-10" ID X 2'-0⅛" OD	1
20	HORIZ RING - PL⅜" X 1'-8½" ID X 2'-0⅛" OD	1
21	¼"-20 X ⅝" LONG SS BOLT W/WASHER @ 30° SPACING	12
22	HORIZ UHMW RING - PL½ X 11" ID X 1'-9½" OD	1
23	PL3/16X¾X 5¾" @ 30° SPACING	12
24	HORIZ RING - PL⅛ X 1'-6" ID X 1'-11¾" OD	1
25	HORIZ RING - PL⅛X 1'-0⅜" ID X 1'-6½" OD	1
26	EXPANDED METAL GUARD - HORIZ RING - 1'-0⅜" ID X 1'-11⅞" OD	1
27	VERT CYLINDER - PL3/16X 8⅝" X 1'-0" ID	1
28	FLANGE RING - PL¼X 1'-0⅜" ID X 1'-5¾" OD	1
29	EXPANDED METAL SCREEN - ALUM FLATTENED - ALLOY 5005 H34 AMICO ¾" .125 OR EQUAL - HORIZ RING - 2'-0⅛" ID X 2'-2¼" OD	1
30	½"-20 X 1¼" LONG SS LOW HEAD HEX SOC CAP SCREW W/NUT & WASHERS @ 45° SPACING	8
31	PL ¼ X 9 X 9" W/3.5" DIA HOLE	1
32	¼"-20 X 1¼" LONG SS LOW HEAD HEX SOC CAP SCREW W/NUT & WASHERS	4
33	ALUM PIPE 3 STD X 2.621 X 5¼" LONG	1
34	ALUM PIPE 3.5 STD X 3.151 X 3" LONG	1
35	PL ¼" X 5" OD W/3.5" DIA HOLE	1
36	PL ¼" X 5" OD	1
37	¾" DIA BAR	1

NOTE:

1. USE ALUMINUM 6061 FOR CONSTRUCTION OF VENT.

REV	DATE	BY	DESCRIPTION

SCALE: AS SHOWN

WARNING: 0 ½ 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED J SCHULZ
DRAWN J SCHULZ
CHECKED H DUNHAM

SUBMITTED BY
PROJECT MANAGER'S NAME | LICENSE NO. | DATE
COMPANY OFFICER'S NAME | LICENSE NO. | DATE

MWH

City of Bellevue
UTILITIES
RESERVOIR VENT REPLACEMENT PROJECT

MECHANICAL
12" DIAMETER VENT DETAILS

SHEET M-9

Job No: 000000 File: G:\City of Bellevue\Reservoir Vent Replacement\Drawings\Design\RVR09.dgn User: sgpatric Plot Date: 04/16/2004

Security and Emergency Preparedness With Fewer Resources

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LOW-HANGING FRUIT

- Modify procedures for contractor/others access to critical sites
- Designated fire hydrant use
- Outreach programs for citizens located around critical facilities
  - Increase coordination with private companies - citizens
- Staff training

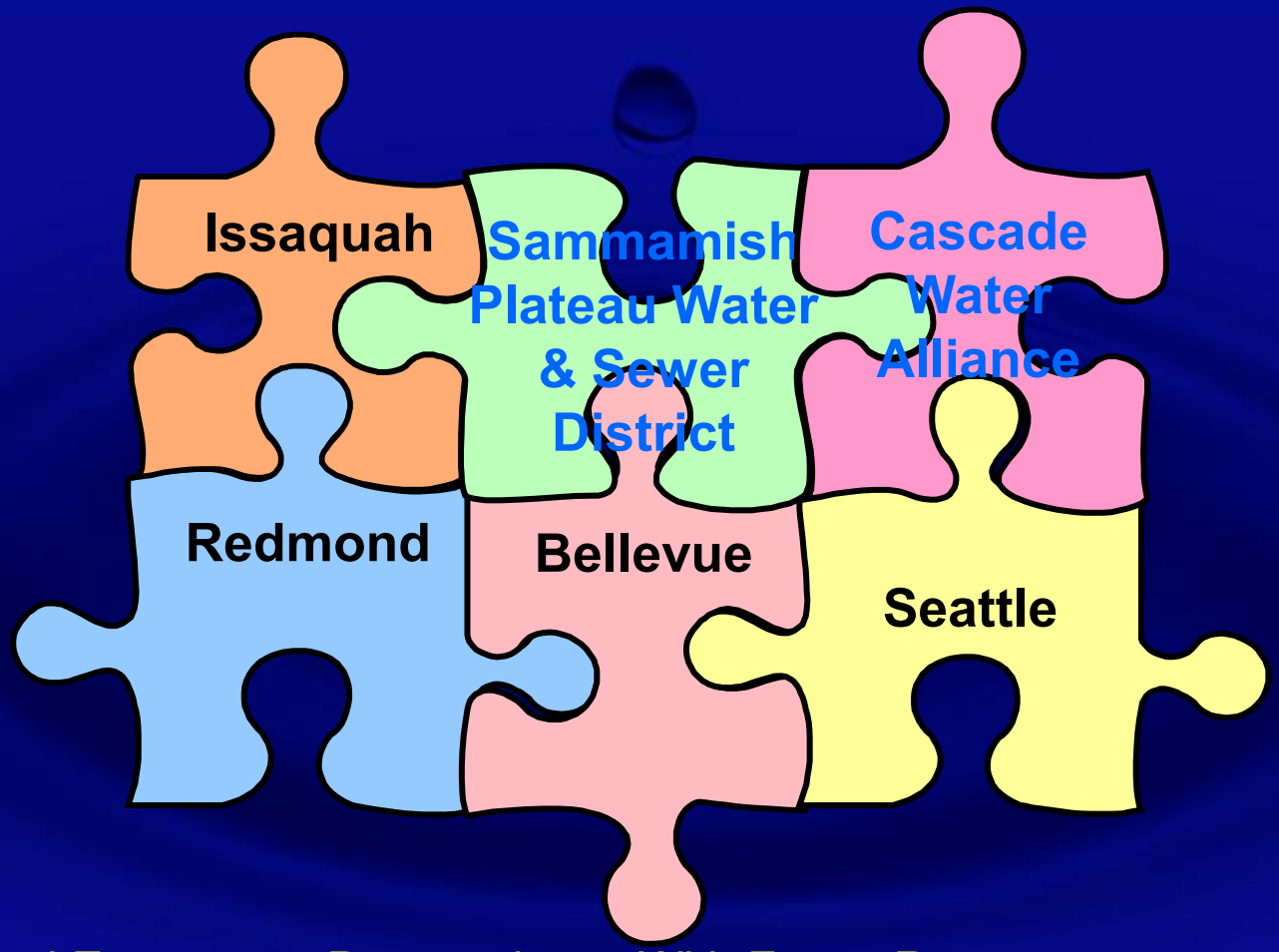
LOW-HANGING FRUIT

INCREASE COORDINATION WITH LOCAL FIRST RESPONDERS

SAMMAMISH PLATEAU
WATER AND SEWER DISTRICT

LOW-HANGING FRUIT

INCREASE COORDINATION WITH LOCAL AFFECTED UTILITIES

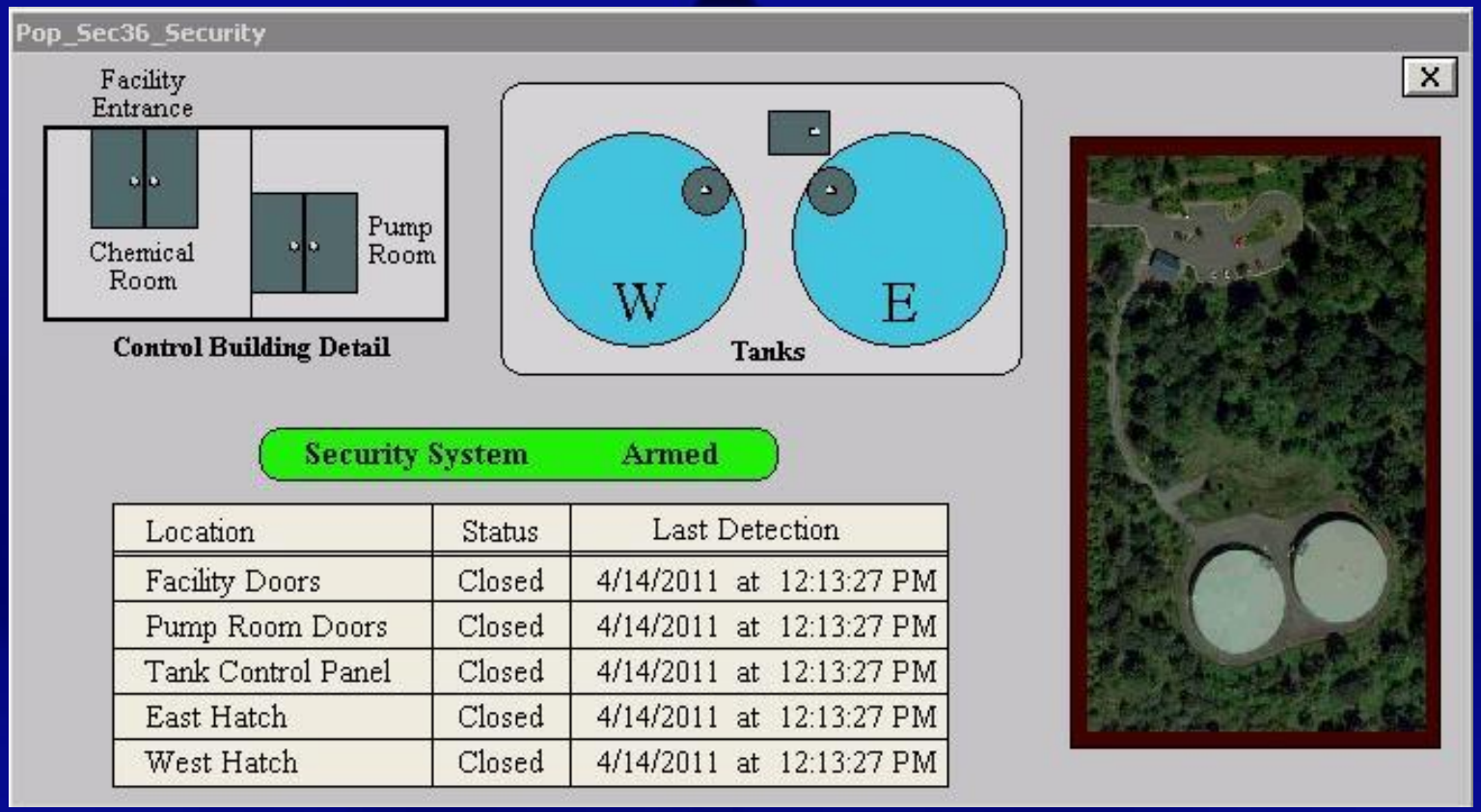


Security and Emergency Preparedness With Fewer Resources

SAMMAMISH PLATEAU
WATER AND SEWER DISTRICT

MORE LOW-HANGING FRUIT

- Remote site perimeter alarms



Location	Status	Last Detection
Facility Doors	Closed	4/14/2011 at 12:13:27 PM
Pump Room Doors	Closed	4/14/2011 at 12:13:27 PM
Tank Control Panel	Closed	4/14/2011 at 12:13:27 PM
East Hatch	Closed	4/14/2011 at 12:13:27 PM
West Hatch	Closed	4/14/2011 at 12:13:27 PM

MORE LOW-HANGING FRUIT

- Table Top exercises
- Add real-time monitoring
- **Incorporate water security with your emergency response plan**
- Safe Mode Operation ⇨

SAFE MODE?

Security and Emergency Preparedness With Fewer Resources

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WATER AND SEWER DISTRICT

WHAT IS A SAFE MODE

- The ability to place any critical water facility into a mode that will not allow water to be used until a determination has been made that the water is safe.
- If there is a question that a facility has been compromised you do not want your operators hesitating to isolate that facility
- Design your system to isolate any component without significant disruption to the entire system

SAFE MODE
HOW IS IT DONE

- Remotely by an operator using the SCADA system
- Locally using the on site PLC to place the facility in “Safe Mode”
- By an operator physically isolating the facility

SAFE MODE IN PRACTICE

- Reservoirs:
  - Altitude valve closing
  - Creating a situation where the zone pressure is higher than the reservoir head
  - Physical isolation

SAFE MODE IN PRACTICE

- Pump Stations:
  - Shutting off pumps
  - Creating a situation where the pump station is not needed
  - Physical isolation

SAFE MODE IN PRACTICE

- Source (Purveyor/Well) Stations:
  - Closing the inlet control valve/turn off well
  - Creating a condition which forces the inlet valve closed
  - Physical Isolation

RESERVOIR / INLET/PUMP STATION/ SAFE MODE ISOLATION VALVES

- Remote valve isolation
- All Isolation Valves are tagged and numbered
- All buried isolation valve are marked
- All operators carry “Safe Mode “ procedures books

SCADA

- **S**ystem **C**ontrol **A**nd **D**ata **A**cquisition
- Local control by PLC when loss of communication with the master
- Remote access by laptop to isolate critical sites
- 911 (on-call) pager tied directly to all alarm tags
- Monitoring of water quality information

BENEFITS OF A STAND ALONE S.C.A.D.A. SYSTEM

- Communication lost – station remains operational
- Stations continue to operate during natural and other disasters
- Reduces demand on operators during an event
- Big savings – reduced site visits
- Security :: Makes it practical
- Modify control parameters locally without modifying headquarters

ABILITY TO ADD NUMERIOUS ALARM SENSORS AND ARRANGE THEM IN SEQUENCE

SECURITY and EMERGENCY PREPAREDNESS

- Security Preparedness (Causes)
  - Identify sources, Resist & Harden
- Emergency Preparedness (Effects)
  - Mitigate, Respond & Recover
  - Resilience

SECURITY and EMERGENCY PREPAREDNESS

- Making the connection
  - Vulnerability Assessment (RAMCAP Plus^{SM}) identifies critical assets
  - Criticality assessed for **all** hazards
  - Identification guides hazard mitigation strategy and investments

10-years Later

- Update to *RAMCAP Framework, Version 2.0*© (2006)
  - RAMCAP Plus℠ – most current stage of continuing development of Risk Analysis and Management for Critical Asset Protection (RAMCAP℠)
    - ASME Innovative Technologies Institute (ASME-ITI) – Sector specific applications

10-years Later
RAMCAP Plus^{SM}

- Revisions & Additions
  - Likelihood, vulnerability and consequence of natural hazards
  - Increased attention to immediate dependencies posed by supply chains and proximity

10-years Later
RAMCAP Plus^{SM}

- Revisions & Additions, cont.
  - Explicit recognition of the role of resilience (the ability to withstand or rapidly restore function to critical assets after an attack or natural event), measured in duration and severity of denial and economic impact on the community ⇨

10-years Later
RAMCAP Plus^{SM}

- Revisions & Additions, cont.
  - Dual-perspective economic impacts, estimating the impacts to both the owners of the infrastructures and the community they serve
  - Benefit-cost analysis at both owner and community levels

RAMCAP Plus℠

- Key design criterion
  - Encourage widespread application
    - Appropriate for self-assessment by on-site staff in relatively short period of time
      - Typically 3-4 work days using 3-6 people, after assembly of necessary documents

RAMCAP Plus^{SM}

- Seven analytical steps
  1. Asset Characterization
  2. Threat Characterization
  3. Consequence Analysis
  4. Vulnerability Analysis
  5. Threat Assessment
  6. Risk/Resilience Assessment
  7. Risk/Resilience Management ⇨

RAMCAP Plus^{SM}
1 - Asset Characterization

- What assets do I have and which are critical? ⇨

RAMCAP Plus^{SM}
2 - Threat Characterization

- What threats and hazards should I consider? ⇨

RAMCAP Plus℠
3 - Consequence Analysis

- What happens to my assets if a threat or hazard happens?
- How much money lost, how many lives, how many injuries? ⇨

RAMCAP Plus^{SM}
4 - Vulnerability Analysis

- Where are my vulnerabilities that would allow a threat or hazard to cause these consequences? ⇨

RAMCAP Plus℠
5 - Threat Assessment

- What is the likelihood that a terrorist, natural hazard or dependency/locational hazard will strike my facility? ⇨

RAMCAP Plus℠
6 - Risk/Resilience Assessment

- What is my total risk & resilience?
  - **RISK** = Consequence x Vulnerability x Threat
  - **Resilience** = Service Outage x Vulnerability x Threat ⇨

RAMCAP Plus℠
7 - Risk/Resilience Management

- What options do I have to reduce risks and increase resilience?
- How much will each option produce in reduced risks and increased resilience?
- How much will it cost?
- What is the benefit/cost ratio of my options? ⇨

RESOURCES

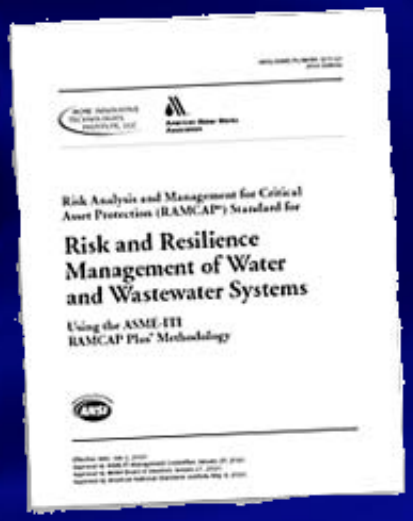
- RAMCAP Plus^{SM}
  - *All-Hazards Risk ands Resilience*

    (Prioritizing Critical Infrastructure Using the RAMCAP Plus^{SM} Approach)
  - $90 from AWWA ⇨

RESOURCES

- RAMCAP Plus^{SM}
  - *Risk and Resilience Management of Water and Wastewater Systems*

    (Using the ASME-ITI RAMCAP Plus^{SM}® Methodology)
  - $72 from AWWA ⇨


Risk Analysis and Management for Critical Asset Protection (RAMCAP®) Standard for

Risk and Resilience Management of Water and Wastewater Systems

Using the ASME-ITI RAMCAP Plus® Methodology

THE THREAT REMAINS

- al-Qa„ida in the Arabian Peninsula‟s (AQAP‟s) *Inspire* magazine
  - March 2011 public posting of the fifth issue – AQAP advises Western-based extremists to conduct **independent operations** in the West rather than risk possible compromise by working as part of a group. Specifically, AQAP recommends **striking more vulnerable soft targets** ⇨

10-years Later
THE THREAT REMAINS

- Are you a vulnerable, soft target?
- Are you in their sights?
- Pick the fruit wherever you can!

THAT'S ALL FOLKS!

A husband was in big trouble when he forgot his wedding anniversary.

His wife told him: "Tomorrow there better be something in the driveway for me that goes zero to 200 in 2 seconds flat."

The next morning the wife found a small package in the driveway. She opened it and found a brand new bathroom scale.

Funeral arrangements for the husband have been set for Saturday. 😐

THAT REALLY IS ALL, FOLKS!