Workforce Development in Metro Vancouver’s Systems Control Centre

Opportunities for Collaboration
West Coast Water Utility Workshop on Workforce Development

May 30 2008
Presentation Overview

• Metro Vancouver overview
• Systems Control Centre workforce challenges
• Workforce development strategies and actions
• Lessons learned and next steps
• Opportunities for collaboration
Water Supply and Treatment

17 municipal customers
Servicing 2.2 million people

Surface water supply
3 protected watersheds

Chlorination at Capilano and Seymour; filtration with UV under construction
Ozone/chlorination at Coquitlam; UV in design
8 rechlorination stations

Over 310 miles of large diameter transmission mains
22 reservoirs; 15 pump stations
Wastewater Collection and Treatment

18 municipal customers
Servicing 2.2 million people

33 pumping stations
275 miles of trunks and interceptor sewers

3 secondary treatment plants
2 primary treatment plants
Systems Control Centre

SCADA operation of water supply, transmission and treatment and wastewater collection systems

24/7 operations – led by Superintendent with one Senior Operator and seven Duty Operators

Range of ages, years of service, education and experience
Workforce Challenges

- Lost 3 out of 8 experienced control centre staff in calendar year 2005 (> 75 years combined experience)
- 2 more expected to leave by 2010
- Hired 3 junior replacement operators in 2006
- Currently 3 vacancies
Workforce Challenges

• Evolving water quality requirements
• Increasing focus on energy management
• New filtration plant on-line later this year
Seymour-Capilano Filtration Plant

Two large storage lakes combined into one small clearwell

Loss of more than 30 m of gravity head

More pumping required for more of the year
Workforce Challenges

• New SCADA system cut over May 2008
Workforce Challenges

• New decision support technologies (optimization project)
2005

- SPS Pilot
- SCADA Vendor Selection and Systems Development
- 3 Senior Control Room Staff Leave (75+ years experience)

2006

- SCADA Standards Development
- Optimization Technology Development

2007

- Systems Control Joins Water Treatment Operations
- USC Position Description Finalized
- Optimization Training Starts

2008

- SCADA Cut Over
- Optimization System at SCFP
- SCFP Construction
- Integrated Control Centre Design
- SCADA Programming
- Optimization Project

Organization Change

SCADA

SCFP

Optimization Technology Development
Strategies – Organizational Change

• New leadership position – Utility Systems Control Superintendent; in Operations Engineering group
• System Planning and Scheduling Team
System Planning & Scheduling Team

Water supply and treatment engineers

Water quality scientists

Field operations supervisors

Control system operators
Overall Objectives:
Achieve immediate stability
Take actions to prepare system for evening peak
Move configuration into mode of operation that will be sustainable through next week (anticipating prolonged warm spell) while facilitating 650 zone high demand strategy: model testing

Overall System Status:

Consumption Forecast:
Yesterday's average and maximum flows were:

<table>
<thead>
<tr>
<th>Average Flow (MGD)</th>
<th>Maximum Flow (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capilano = 129</td>
<td>Capilano = 158</td>
</tr>
<tr>
<td>Seymour = 103</td>
<td>Seymour = 126</td>
</tr>
<tr>
<td>Coquitlam = 144</td>
<td>Coquitlam = 165</td>
</tr>
<tr>
<td>Total = 378</td>
<td>Total = 447</td>
</tr>
</tbody>
</table>

Yesterday's weather was mainly sunny with maximum temperature of 24°C.[1]
Yesterday was a sprinkling day
Today's forecast is also mainly sunny with a maximum temperature of 28°C.[2]
Today is also a sprinkling day
Best estimate of today's flows is same as yesterday plus some factor

Water Supply Sources:
Objectives:
Use Capilano and Seymour sources according to DSS model targets to achieve

- October 1 lake level targets of Capilano = 545 ft and Seymour = 770 ft. Use Coquitlam as required
- Option to use additional Seymour water to meet high demand if needed

Status:
Yesterday's average flow targets from the DSS model[1] were:

<table>
<thead>
<tr>
<th>Actual Flow (MGD)</th>
<th>Target Flow (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capilano = 129</td>
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</tr>
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Comment: We are generally using more Capilano and less Seymour than the DSS targets.

Reasons:
We have some questions about the change in the targets compared to the previous week - we have not reconfigured to hit the new targets.
System is configured to bring Coquitlam water west through Burnaby to supplement the west side of the system because of broken fill valve at Kersland (WKRSZT-0171).

Facilities Out of Service:
Restricted filling of Kersland Reservoir - due to repair work on 36" inlet valve (WKRSZT-0171)
P100 at WW2 failed to start last night due to low discharge pressure which tripped it out. Returned to service 8:30 am
P400 at Central Park restored to service at 10:00 am
Fill valve at CP61, V287 inlet float valve is not responding to control. Prioritized; scheduled to be resolved by the weekend.
P400 at Cape Horn 1 out of service (electrical drive issue)
P300 at Burnaby Mountain out of service
Flow meter at 10th & Coquitlam out of service from 9:00 – 18:00
Numerous intermittent short term PIU failures (could be weather)

Notes:
How do we describe how we judge/predict adequate reservoir recovery?
Need pressure targets – maximums and minimums
Consider state of facilities, WQ issues, WT issues; before setting objectives, consider constraints first
Strategies – Job Redesign

New job description

More system analysis

Higher educational requirements

Future integration with treatment staff in mind

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Metro Vancouver

Position Description: UTILITY SYSTEMS CONTROLLER (G767) October 2007

Purpose: Executes daily/hourly Utility Systems Operating Plans and operates or directs others to operate the water supply, treatment, and waste water collection systems to maintain performance criteria. Monitors and controls the systems using the computerized supervisory control and data acquisition system (SCADA/CDACS), and applies other computer software and a high level of system understanding to optimize total system operations.

...

Requirements:
Grade 12 and graduation from a two year Water Technology education program or related discipline (i.e. Water Resources, Wastewater technology, environmental sciences, environmental or chemical technology).

At minimum, British Columbia EOCP Class II Water Distribution or Water Treatment Operator Certification. The highest EOCP Water Distribution/Water Treatment Certificate achieved shall be maintained in good standing and a copy of the Certificate shall be filed in the employee file in Human Resources as proof of eligibility.
Strategies – Recruitment

• Old Approach
  – Job ‘sells itself’
  – We’ll take anyone with some relevant experience
  – Standard posting materials with factual listing of position responsibilities
Strategies – Recruitment

• New Approach
  – National advertising
  – Metro Vancouver
    ‘Sustainable Region’
  – Focus on ‘Canada’s newest and largest filtration plant’
  – ‘Majestic mountains’
  – ‘State-of-the-Art’ equipment and technology
Strategies – Knowledge Retention

• Advanced technology tools for operations optimization
Optimization System Development Status

Optimization Model Status - April 2008

- Consumption Forecaster
- Quality Analyzer
- Supply Analyzer
- Utility Systems Operating Plan
- Maintenance Construction Scheduler
- Simulator
- Optimizer
- Optimization Monitor
Strategies – Knowledge Retention

• Advanced technology tools for operations optimization
• Documentation of ‘manual’ control strategies
• Multi-year automation program
• New SCADA HMI design with Advanced Process Graphics approach
Low contrast colours for normal conditions

High contrast colours for alarm conditions

Alarm prioritization and grouping

New display hierarchy
Strategies - Operator Training and Development

SCADA replacement training

Optimization Model training

Division-wide procedures and training system

Certification training

TRAINING AND DEVELOPMENT PLAN FOR LCOC CONTROL ROOM OPERATOR INCUMBENTS TO MEET THE REQUIREMENTS OF THE UTILITY SYSTEM CONTROLLER POSITION
October, 2007

PURPOSE:

This training and development plan has been created to provide the seven full-time regular Control Room Operator 1, 2 and 3 incumbents with the opportunity to supplement their existing education and experience in order to demonstrate competency equivalent to the requirements of the new Utility Systems Controller (USC) position.

TRAINING

As part of this plan, training will be offered in four areas:

- operator training for the new DeltaV SCADA system,
- user training for the new operations optimization computer models,
- training on operating procedures for specific facilities and equipment, and
- supplementary courses to address gaps in educational background and/or certification level achieved.
Lessons Learned and Next Steps

• It’s all about the people – it’s relatively easy to build tools, but much more difficult to change the way people think
• Training and development is the highest priority
• It takes time – we need to be planning now for what our future needs will be
Lessons Learned and Next Steps

• It takes perseverance
  – Keep trying to fill those vacancies
  – Keep working on knowledge capture and transfer tools
• It takes contributions from many different departments in our organization
• It may take ‘creative’ solutions
In training for his “next” career.......?
Opportunities for Collaboration

• Internally – with other utility departments and Human Resources to provide opportunities for cross training of staff and knowledge retention

• With local educational institutions to encourage and enhance operator training and development
Opportunities for Collaboration

• With other utilities on developing specialized training and certification requirements for SCADA operators
• Other?
Questions?