ALBERTA UTILITY OPERATOR NEWSLETTER

WINTER 1999 - NUMBER ONE

FEATURE FACILITY:

Taber Water Treatment Plant – Dissolved Air Flotation Plant Addition

By Ian P.D. Wright, P.Eng., Associated Engineering Alberta Ltd.

INTRODUCTION

The Town of Taber is a community of nearly 7000 people located 50 kilometres east of Lethbridge. The Town's raw water source is agricultural irrigation water. As the irrigation system is shut off for approximately 7 months of the year, water must be stored to supply the Town over that period. To achieve this, the Town has two local raw water cells and a pumped supply from an irrigation storage lake some 16 km from the Town. In the irrigation season the Town can draw water by gravity directly from an irrigation canal or by pumping from the local raw water cells. The dry climate and industrial demands result in a relatively high peak day water consumption of some 2600 L per capita. In winter the demands drop to less than 750 L per capita per day.

The quality of the raw water is reasonably good. Turbidity ranges from approximately 0.5 NTU to 15 NTU. However, the pH ranges from 7.8 to 8.8 and total organic carbon (TOC) exceeds 6 mg/L at times.

PREVIOUS PLANT

The treatment process prior to the dissolved air flotation (DAF) addition consisted of settling out some of the denser suspended material in the local raw water storage cells, addition of polyaluminum chloride as a coagulant, pre-chlorination, filtration through conventional constant rate dual media filters, post chlorination and fluoridation. However, regularly there were periods in early spring and late fall when the treated water turbidity exceeded 1 NTU. This did not meet Alberta Environmental Protection Standards. The previous process is shown in Figure 1.

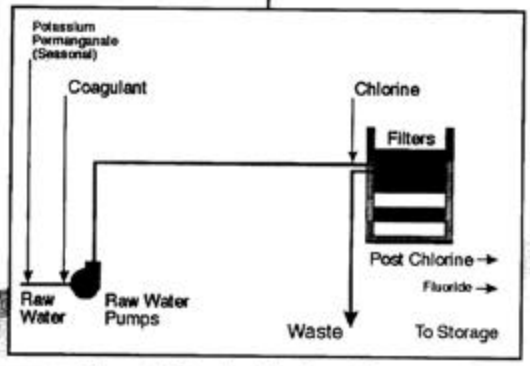


Figure 1: Previous Treatment Process

Most of the problem events were caused by turbidity that was high in organic material. Injecting coagulant upstream of the raw water pumps and

then filtering the water was highly inefficient. At times coagulant dosages as high as 60 mg/L were required for raw water with turbidity less than 5 NTU. These high dosages quickly blinded off the filters resulting in periods when the filters needed four backwashes per day each.

This backwash frequency would overload the backwash waste handling system. The backwash frequency was also reducing the effective production capacity of the plant such that it was having difficulty meeting customer demands during these periods. It was apparent that some change to the plant was necessary.

INVESTIGATION

A number of alternative processes were considered. However, none of the conventional treatment processes were well suited to the treatment requirements of Taber's raw water.

Associated Engineering had been assisting the City of Calgary with a comprehensive investigation into treatment options for the Glenmore Water Treatment Plant. DAF had been extensively pilot tested and had been found to perform well in treating Elbow River water which has many similar characteristics to Taber's raw water. It was decided to try DAF on Taber's raw water and on-site pilot testing took place in 1996. The process produced excellent results on all three sources of raw water.

PLANT DESIGN

The Town decided to proceed with the DAF addition and work started on the design. The basic concept for the process is shown in Figure 2.

The existing plant had not been designed for the addition of DAF. The site was quite constrained except to the south east of the existing plant. The design constraints for the DAF addition were compounded by the existing filter water surface being approximately 4 metres above grade. It was not desirable to pump the DAF effluent to the filters so the DAF cells had to be set high enough to feed water to the filters by gravity. Therefore, the DAF cells were elevated as shown in Figure 3.

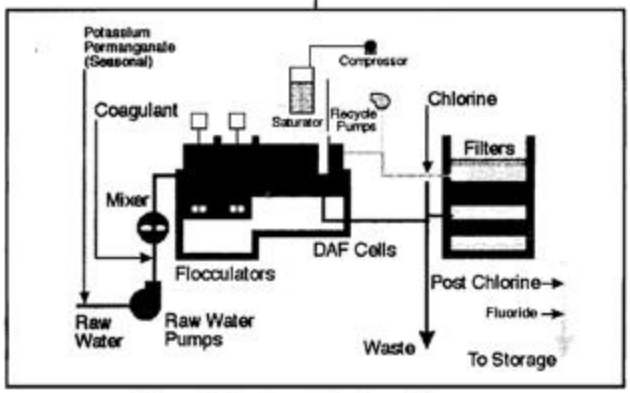


Figure 2: Proposed Treatment Process

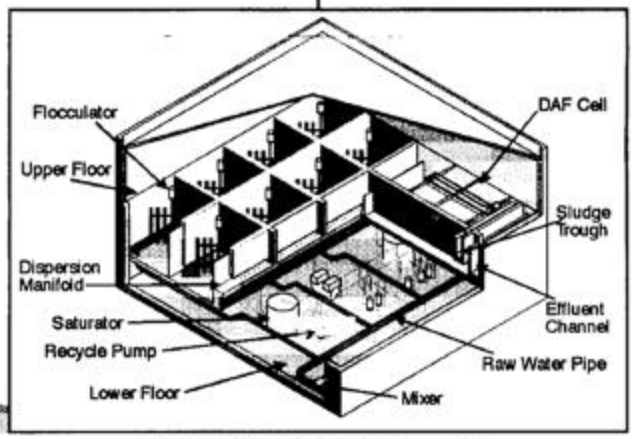


Figure 3: DAF Building Cut-away View

To minimize the cost impact of this, the area opened up below the DAF cells was used to locate the DAF recycle system. There were some hydraulic constraints with the recycle system using this approach but these were dealt with. Housing the recycle system underneath the DAF cells also made more efficient use of the site.

PROCESS CONTROL

Besides being physically integrated with the existing plant, the DAF system had to be integrated with the way the plant was operated. Previously, the plant operated on a simple start-stop mode based on the water level in the clearwell. The plant has four filters each rated at 7 ML/d. The operator could select any number of filters to be in operation.

As DAF is a process that can be started and stopped quite quickly the design team decided to match the DAF trains to the filters. Thus a DAF train is run for each filter. When a filter is dropped for backwash, another filter is started if one is available. If there are no filters available then a DAF train is shut down rather than trying to ramp down all the operating DAF units to match the reduced flow. This is faster and requires no additional loop control.

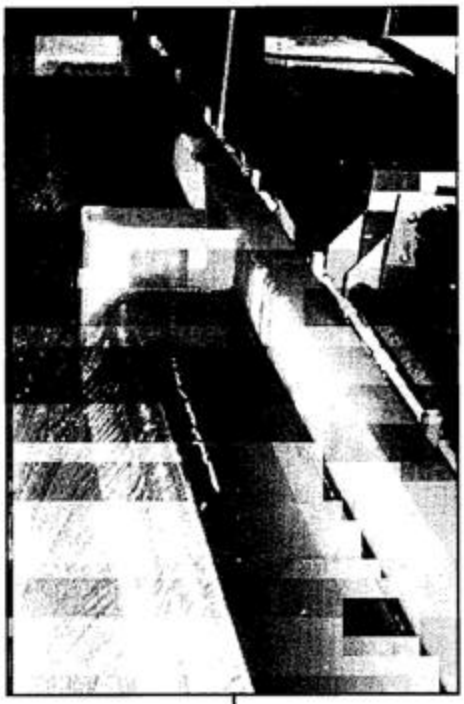
To further improve water quality, the plant flow is now varied in proportion to the clearwell level. This was done so that the flow changes resulting from changes in plant demand can be made gradually. However, when demands on the plant are very low it is shut down automatically and re-started when the clearwell water level falls sufficiently.

When a DAF train is shut down, it goes through a clearing cycle to prevent sludge deposition on the DAF cell floor. On start-up, it goes through another cycle which reestablishes the process.

The style of recycle system provided cannot use variable speed pumps. Therefore, multiple constant speed pumps are used to meet the recycle manifold flow requirements. The PLC control system adjusts the recycle rate to match flow changes from a minimum plant flow of 2.3 ML/d up to the full 28 ML/d plant capacity.

Individual flow meters and control valves are provided for each DAF train, ensuring the desired flow range can be controlled. The flow is totalized and the value is used to proportion the chemical feeds which consist of:

- potassium permanganate added to the raw water when required for taste and odour control.
- coagulant added at the flash mixer located upstream of the DAF.
- filter aid and coagulant added downstream of the DAF.
- primary chlorination point was located downstream of the DAF.



The primary chlorination point is located downstream of the DAF as the residence time contribution for CT through the DAF trains is relatively small and some of the TOC is removed by the DAF process. This helps to reduce THM formation. The post chlorination point remains downstream of the filters.

RESIDUALS MANAGEMENT

The plant had always discharged waste water to the sewer system. DAF is ideal for this arrangement as it produces a small steady stream of waste sludge that is already thickened. This conserves water and reduces the impact of the waste stream on the sewer system. So little water is wasted that a small amount of carrier water has to be added as the sewer receiving the sludge has no contribution other than from the plant. A spray-bar wash down system was therefore provided over the sludge trough that provides the carrier water to convey the sludge while also helping to de-aerate it.

PLANT PERFORMANCE

The project was tendered for construction in spring of 1997. The construction cost was approximately $2.9 million which was within budget. The initial start-up was in June of 1998 and the system was placed into automatic mode in July 1998.

The process works very well. Acceptable water was produced and processed for consumption within four hours of the initial startup. The treated water turbidity off the filters is well within standards, normally about 0.1 NTU.

Compared to the previous process, approximately 50% of the coagulant is now required. Besides reducing chemical costs this has also reduced the amount of waste sludge produced.

Initially, the DAF was operated to produce an effluent turbidity of less than 0.8 NTU. As familiarity was gained with the process it was realized that besides greatly reducing the turbidity, the turbidity in the effluent was now modified so that it was far easier to remove it on the filters. Therefore, the DAF effluent turbidity has been relaxed to approximately 1.0 NTU with no apparent ill effect on the filter effluent quality. This has further reduced the amount of coagulant required.

As expected, filter runs are far longer than previously experienced. The amount of water used for backwashing has been reduced by approximately 75%. There is some potential to reduce this further as there has been some damage to the filter media resulting from the previous excessive coagulant use and consequent backwashing. When this damage is corrected, filter runs are expected to be extended.

As some TOC is removed by the DAF process, the chlorine demands have also decreased.

An algae bloom occurred in late August. More coagulant was required but the DAF system handled the bloom with ease. Some odour was experienced in the plant but the treated water remained palatable.

The automatic train startup and shutdown works well. The process establishes itself within 20 minutes.

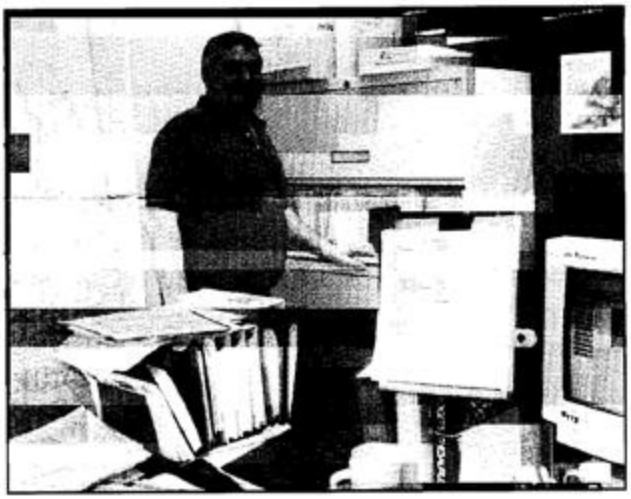
The sludge disposal system with the spray bar carrier water system exceeded expectations. Sludge is rapidly disposed of and the sludge trough stays completely clear.

SUMMARY

In summary, the DAF addition was a very successful project. It has met or exceeded expectations in every area, including water quality, cost, chemical use, waste disposal and operation.

As evidence of its success, at least three other DAF plants or additions that will treat agricultural irrigation water are presently under development in the region.

PERSONAL PROFILE
DAVID DOWHANIUK
Municipal Approvals Technologist
Northern East Slopes Region



DAVES "TRANSITIONAL OFFICE"

David is the new regional approvals technologist for the Northern East Slopes Region (west of Edmonton). As part of the new Environmental Service Team, David will be based out of what was the NAIT Westerra building, just south of the Town of Stony Plain. David works for the new Regional Director, Mr. Bill Macdonald.

David grew up in Alberta, close to Namao, just north of Edmonton. He attended school in Edmonton and graduated from the Materials Testing Technology at Northern Alberta Institute of Technology. David started his career with Alberta Environment in 1971 with the Water Quality Control Branch, Pollution Control Division. Yes, from the pictures, you can see that time has been kind to him. David's activities included sampling surface water industry and municipalities. In 1987 he became an investigator, working on spills, complaints and environmental incidents. Since 1997 David has worked with the Municipal Branch doing inspections and approvals of water, wastewater and solid waste facilities. In August of 1998, when regionalization was completed he moved into his current position.

Dave and Celina Duong, Industrial Approvals Engineer

One of the "highlights" for David was attending the 1998 AWWOA Operators Seminar. He has been a member of the Association for the last two years and feels that it is a great organization. David wants everyone to know that he intends to meet all of the operators in his region and hopes to get to know them.

On a personal note, David is an "avid internet groupie" who truly believes that it has broadened his horizons. In his spare time he coaches in and outdoor soccer and is still involved with the family farm north of Edmonton. David and his bride Sandy have three sons and they now live in Edmonton.

David hopes that the operators in his region will bear with them as they go through their "transition" time but assures that he will be working to give top notch "community level service".

Editors Note: David's new phone and fax numbers effective February 1, 1999 are:
Phone: (780) 963-6131
Fax: (780) 963-4651

A NOTE FROM THE AWWOA CHAIRMAN TERRY CHAPMAN

WHAT HAS THE AWWOA DONE FOR YOU LATELY

A big THANK-YOU! Must go out to Andy Bebbington and Gerald Samuel for the time and effort involved in spearheading the development of a study guide (map) for Levels III and IV Wastewater Treatment Certification. Many meetings took place with people from SAIT to develop a map, which will assist Operators with studying for higher levels of Wastewater Treatment Certification.

Maps will be developed for Water Treatment, Water Distribution and Wastewater Collection in the near future.

The map process will direct an operator to where to find the printed information on various subjects required to obtain the higher levels of Certification. The reference texts for the maps are based on Water Environment Federation and University of Sacramento literature.

Your Alberta Water and Wastewater Operators Association initially financed the first stage to develop these maps and the Western Canada Water and Wastewater Association has now come on board financially as well.

A Happy and Prosperous 1999 to All.

OPERATOR CERTIFICATION EXAMS

The deadline for receipt of applications for May certification exams is April 10, 1999. Operator Certification Exams will be offered at the following locations (assuming at least 5 per location)

May 25	Edmonton and St. Paul
May 26	Red Deer and Peace River
May 27	Grande Prairie and Lethbridge
May 28	Calgary and Fort McMurray

Contact Kathy Abramowski for details at 780-427-7713 or email Kathy.Abramowski@gov.ab.ca

24th ANNUAL ALBERTA OPERATORS SEMINAR

The 1999 Alberta Operators Seminar will be held March 9 –12, 1999, at the Banff Park Lodge. As well as the technical sessions and the 90 product and service displays there will be a Chemical Injection Pump Set-up and Calibration pre-seminar workshop on Tuesday, March 9th and an AWWA Teleconference (Operations and Maintenance: Tools and Technologies to Protect Water Quality in the Distribution System) on Thursday, March 11th.

For registration information call (780) 427-7713.

INSTRUCTORS WANTED!!!

The Alberta Water and Wastewater Operators Association has initiated a program to enhance the Training Workshops sponsored by the Association. In order to do this; the AWWOA needs people who are willing to instruct various technical sessions relevant to water and wastewater operations.

Interested people are asked to prepare a proposal and submit it to the AWWOA at the following address:

P.O. Box 34010, 196 A Kingsway Mall P.O.
EDMONTON, AB, T5G 3G4

Proposals that are accepted will be eligible for a grant from the AWWOA. This development grant will be based on the length of the proposed workshop.

Once all materials are ready, the AWWOA will sponsor one or more workshops. It is proposed that instructors will receive an honorarium of $250.00 per day of instruction plus expenses.

Proposals should include: instructor's name, instructor's qualifications, topic of workshop, summary of content, length of workshop (hours/day) and intended audience (numbers and description).

For more information contact Gerald Samuel at (780) 427-8242 or Andy Bebbington at (780) 987-3415.

ALBERTA WATER AND WASTEWATER OPERATORS ASSOCIATION

NOTICE OF MOTION

Proposed Bylaw Changes

The following are the proposed changes to the AWWOA Bylaws, which will be discussed at the Annual General Meeting in March 1999, at the Annual Banff Operators Seminar. The changes are additions to the membership categories (Article II, Section G).

The changes/additions are highlighted in ***bold italics*** and will read as follows:

G Membership

i). Full Membership
Any persons directly involved with the daily, on-site operation of water treatment, wastewater treatment, water distribution or wastewater collection and who is a member of the Western Canada Water and Wastewater Association.

ii). Associate Membership
Any person who is a member of the Western Canada Water and Wastewater Association and who wishes to be a member of the Association.

iii). ***Life Membership***
Any person who has been an active member of the Association for at least Twenty (20) years, and is retired can apply for a life membership. This allows them to stay as an Association member without having to meet the active duty requirements. Application requirements are attached in appendix 2a.

iv). ***Honorary Life Membership***
Each membership year the Association can award honorary life memberships to a limit of two members. Each of these members must be nominated by two active members within the Association. Details of the nominations, selection and presentation are attached in appendix 2b.

v). Withdrawal of Membership
Any member who wishes to voluntarily withdraw from the Association may do so by writing the Executive Director and requesting their name be removed from the membership roles of the Association. Any member who does not pay their fees in a timely fashion will be expelled from the Association.

AUTOMATION SEMINAR WATER ANALYSIS & CONTROL SYSTEMS

Presented by:

Alberta Provincial Council

Western Canada Water & Wastewater Association

February 16 & 17, 1999

Red Deer Lodge • Red Deer, Alberta

Topics to be covered include:

WATER ANALYSIS	CONTROL SYSTEMS
- pH Meters	- Intelligent Valves
- Chlorine analyzers	-Programmable Logic Controllers
- Fluoride analyzers	- SCADA
- Turbidimeters	- Databases
- Particle Counters	- Hydraulic Modelling

For more information regarding seminar content, please contact:

Mitch Lejeune at Aqualta Inc.
Phone: (780) 412-7676
Fax: (780) 412-7679
E-mail: mlejeune@aqualta.com

Registration: $75.00 – members
$100.00 – non members
Includes continental breakfast and lunch (both days)

Red Deer Lodge: 1-800-661-1657, (403) 346-8841
4311 – 49 Avenue, Red Deer, Alberta
Room rates: $78.00/night, single or double
(be sure to mention the Automation Seminar to get the special rate).

COURSES

Interested in attending the following courses?

Iron and Manganese Control Course - Red Deer ..... March 17 & 18
Chlorination Workshop - Red Deer ..... April 13-16
Level I Cert. Prep. Course - Edmonton ..... April 6 & 7
and May 5 & 6
Small Water Systems Course - Edmonton ..... April 27
Small Wastewater Systems Course - Edmonton ..... April 28

Contact Del Morrison for details at780-427-8130
or email Del.Morrison@gov.ab.ca

AWWA WESTERN CANADA SECTION WATER FOR PEOPLE - CANADA

WATER For PEOPLE CANADA

Water for People Canada is a program designed to help poor people in developing countries help themselves. WFP-C focuses on drinking water projects and related water resource, sanitation and hygiene education initiatives. WFP-C projects are based on meeting local needs and priorities. Local communities are required to take a lead role in projects to ensure "buy in" and ownership. System operation and maintenance requirements are also considered to ensure projects have a high chance of long term success. WFP-C became a registered charity in 1995 and the Western Canada Section of AWWA became active in 1996. Since then the Western Canada Section has been involved in a number of projects in Vietnam and Guatemala.

UPDATE: JANUARY 1999:

Through the generous support of many individuals, companies and Associations, small but important strides are being made toward the goal of providing people in developing countries with safe drinking water.

During 1998, a total of $6969.17 was raised for Water for People – Canada projects by the Western Canada Section. Over $3,700.00 alone was raised through the silent auction held at the 1998 WCWWA Calgary Conference. A special thanks is extended to the many donors of auction items and to those who participated in the bidding. Contributions were also received from operators, the Alberta Water and Wastewater Operators Association, community waterworks divisions, the United Way and individual donors to whom we are indebted for their generosity.

The funds raised are being directed toward the Vietnam A. Luoi school water and sanitation projects, the Guatemala (Xonca & Vijolm Village) school water projects and the Hurricane Mitch relief effort. Of special note is that the Canadian Embassy in Vietnam provided matching funds of $4,000.00 in support of the A. Luoi project. An additional $1,800.00 matching grant was secured from the Wildrose Foundation in support of the Xonca and Vijolm Village school water projects in Guatemala. Obtaining these funds would not have been possible without the initial donations.

We expect in 1999 to be even more successful than 1998 though the hard work of committees in Edmonton, Calgary, Winnipeg, and a new committee in Saskatoon.

Please note that we are always looking for volunteers to help out. You can help to advertise and increase the awareness of WFP-C through the purchase of WFP coffee mugs, T-shirts, and pins.

If you are interested in volunteering please contact Glenda Donovan-Malik at (780) 790-5534 or if you are interested in learning more about Water For People or purchasing any WFP products, please feel free to contact Kathy Abramowski at (780) 427-7713.

CALL FOR PAPERS 1999 DISTRIBUTION AND COLLECTION SEMINAR

The organizing committee for the 1999 Distribution and Collection Seminar is requesting submissions from people interested in making presentations at the Seminar to be held September 27 & 28, 1999, in Calgary.

Written submissions maybe sent to Mr. Allyn Humber at the City of Calgary, P.O. Box 2100, Station M, Calgary, Alberta, T2P 2M5. Phone: (403) 268-4906, Fax: (403) 268-6931.

DO YOU KNOW THE DIFFERENCES AMONG THESE COMMONLY CONFUSED PROBLEMS?

Ozone Depletion: A problem created by pollutants like CFCs that destroy the naturally occurring ozone layer in the upper atmosphere. This allows cancer-causing radiation to reach the earth.

Ozone Pollution: Also known as fog, this refers to the presence of ozone in the air that we breathe. This low-level ozone, which can harm the lungs, is created when two groups of air pollutants (NOx and VOCs) react in the presence of sunlight. This "bad ozone" has no effect on the "good ozone" in the upper atmosphere.

Global Warming: A slow warming of our planet caused by pollutants like carbon dioxide that trap heat close to the earth. This process is sometimes confused with ozone depletion and ozone pollution because some of the same gases that contribute to those problems (like CFCs and NOx) also contribute to global warming.

EXPANDED LEARNING

October 1999, Calgary — The Northern Alberta Institute of Technology (NAIT) expanded learning opportunities in its Water and Wastewater program, thanks to the generous donation of a MetOne Particle Counter. Terry Engelhardt of Pacific Instruments Scientific Instruments Group-MetOne, Oregon, presented the particle counter (a first for NAIT) to Ed Harding, Program Head. The presentation was made at the Annual Conference of the Western Canada Water and Wastewater Association (WCWWA).

Elmer Sommerfeld, Marketing Manager of Anthratech Western Inc. (AWI), a Calgary-based filtration optimization company, spearheaded the tri-corporate donation, valued at over $17,000.00. AWI, a regular participant on NAIT's Advisory Committee, recognized the need for a particle counter and approached Dave Stephens of Mequipco in Calgary, MetOne's agent in Western Canada, to make it happen. "As an entrepreneurial company we know how important it is to develop experienced water technicians", said Sommerfeld. "...broadening horizons and encouraging the use of advanced technology, such as the MetOne Particle Counter, can only increase the effectiveness of the water and wastewater treatment process and the industry as a whole, "he added.

Particle counter technology is rapidly becoming the norm in water quality measurement. Potable water with very low particle counts (say, less than 10 in the 2-5 micron range) indicates the relative absence of those parasites and microbiological organisms (such as cryptosporidium) harmful to humans. By this means a particle counter measures the relative safety of drinking water, all other things being equal.

Harding is thrilled with the donation of the particle counter. "Building private-sector partnerships is critical to the Water and Wastewater Program's success," said Harding. "through the support of AWI, Mequipco and MetOne, students now get to experience the latest water-testing technology in a hands-on environment.

Technicians at AWI use a particle counter for many Filter Audits/Pilot Studies they conduct. "We've been using a counter for about three years", explained Sommerfeld. "It's a vital part of the in-depth data we generate during a study. It helps us provide the best solutions and options for our clients," he added.

NAIT students began using the MetOne Particle Counter in their studies in November 1998.

For more information contact:

Elmer Sommerfeld, Marketing Manager, AWI

Phone:	(403) 255-7377
Cell Phone:	(403) 650-7386
Fax:	(403) 255-3129
E-mail:	awi2@cal.cybersurf.net

The Alberta Utility Operator is published three times a year by the Municipal Program Development Branch of the Environmental Sciences Division, Alberta Environmental Protection, as a means to exchange information for those involved in the operation of water and wastewater facilities. The contents do not necessarily reflect official opinion or policy and, unless otherwise stated, should not be construed as policy or regulations. **The Alberta Utility Operator** and Alberta Environmental Protection allow the Alberta Water and Wastewater Operators Association to publish noteworthy information in this newsletter, however, we cannot be held responsible for the accuracy of information submitted. Contributions, comments and criticisms are welcome.

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