Projects That Improve Water Quality

PRODUCER HIGHLIGHT - DWANE MORVIK

WHO: Dwane Morvik

WHERE: Adjacent to the Frenchman River Valley, RM of White Valley No. 49.

WHEN: Spring 2002

WHY: The sheep preferred to graze native grasses along the river resulting in overgrazing and trampling of the river banks, which increased erosion and sedimentation into the river. Dwane seeded tame grass on the uplands a half-mile away from the river and wanted to force the sheep to graze this grass during the spring and summer allowing the riverbanks and lowlands to re-establish.

Dwane Morvik and Mario Dordu.

WHAT: A water supply was not available on the upland tame pasture, so an underground pipeline was installed. The lowlands pasture was fenced off to form a fall grazing and spring lambing paddock.

BENEFITS: Dwane was able to control livestock access to the river, maintain good vegetation throughout his pastures, reduce erosion and sedimentation and improve water quality for downstream users.

COST: Half of the cost was paid by Saskatchewan Wetlands Conservation Corporation (SWCC).

Information Source: Electronic presentation by Dwane Morvik entitled "SWCC Pipeline Project". Summary by: Jenna King and Bob Springer.

PRODUCER HIGHLIGHT - THE DORDU's

WHO: Joint Creek Ranch - Frantz, Mario, and Mark Dordu

WHERE: At the Southfork junction of the Swift Current Creek and Jones Creek, RM of Arlington No. 79.

WHEN: Spring 2002

WHY: The creek is an unreliable water source during the summer. The Dordu's wanted to create a more reliable water source while improving grazing distribution and water use efficiency. Also, they wanted to take pressure off the creek banks and improve water quality for their cattle and downstream users.

WHAT: A spring-fed dam was deepened to increase its storage capacity and a solar water pumping system was installed to pump water to a nearby trough. This trough was connected with an underground pipeline to another trough several hundred feet away using a gravity flow system. These two water troughs provided water to draw cattle away from the creek.

BENEFITS: The Dordu's provided their cattle with a good water source away from the creek, improved grazing distribution and reduced livestock impact on the creek banks. The Dordu's are planning to further extend this project.

COST: Half of the cost was paid by Saskatchewan Wetland Conservation Corporation (SWCC).

Information Source: Electronic presentation by Mario Dordu and Bob Springer entitled "Developing Water Sources Off the Swift Current Creek". Summary by: Jenna King and Bob Springer.

Did You Know Water Facts

* Their Majesties, the King and Queen, had two carloads of Shaunavon's excellent water transported to Moose Jaw on May 3, 1939 for use during their visit.
* Poor sanitation of Swift Current's water supply caused typhoid fever and diphtheria outbreaks in the 1880's, some cases ended fatally. In 1888, there were 15 cases at one time of typhoid fever.
* 1.5 billion people lack safe drinking water and at least 5 million deaths per year can be attributed to waterborne diseases.

Information Sources: Shaunavon Standard for May 3, 1939; Grassland Settlers: The Swift Current Region During the Era of the Ranching Frontier. Written By D.C. McGowan and published by Cactus Publications, Victoria, BC in 1980; and the Water Pollution and Society (http://www.umich.edu/~gs265/society/waterpollution.htm) website. Compiled by Jenna King.

Lac Pelletier Lagoon Committee

Some folks used to say that there was a sewage disposal problem out at Lac Pelletier. The year-round homes and summer cabins used sewage holding tanks that were pumped out when they were full and the pumped-out sewage effluent was then land-spread. During good weather, land-spreading and thus, effluent disposal was relatively easy. However during bad weather, the sanitary company's truck would often get stuck, which made disposal difficult. As more and more people began using their cabins frequently, the sewage disposal issue became even more of a problem.

Four home owners at the lake (Tom Kehoe, Ed Fiala, Glenn Bratvold and Joan Williamson) initiated a committee to find a solution for sewage disposal; their solution has since provided a high capacity lagoon for all residents and cabin owners at Lac Pelletier and will indirectly help improve water quality at the lake. The RM of Lac Pelletier had access to partial funds to build a lagoon through a grant program called the Canada Saskatchewan Infrastructure Program. The volunteer group did a massive amount of work on the grant application, including meetings, research on sewage disposal requirements, writing and even a land transfer! The work from both the volunteers and the RM office paid off. As of fall 2001, the lagoon was complete.

Information Sources: Interviews with home owners at the lake (Tom Kehoe and Glenn Bratvold) and the RM of Lac Pelletier (Rose Lawrence and Bob Parker) as well as a letter to Lac Pelletier Cabin Owners from the Lagoon Committee dated October 2002. Article by: Cher King.

Effluent Irrigation

The City of Swift Current, like many other municipalities on the prairies, uses effluent irrigation as one method of sewage disposal. The Effluent Irrigation Project began in 1973, a joint pilot project among Agriculture Canada's Swift Current research station, Saskatchewan Environment and the City of Swift Current. The purpose of the pilot project was to look into the suitability of using sewage effluent for irrigation, and in doing so, provide a cost-effective method to dispose of sewage other than discharges into the creek.

After thirty years on the project, researchers at ICDC (Irrigated Crop Diversification Corporation) state that effluent irrigation is an efficient way to dispose of a large part of Swift Current sewage. The effluent provides crops with additional water and some nutrients including nitrogen, phosphorus and micronutrients that are required for productive growth. By using effluent to irrigate, producers can increase their crop yield three to four fold compared to dryland. For example, the long term average dryland yield is about 1.1 tons per acre per year. Yet at two effluent irrigation sites monitored by ICDC from 1998 to 2000, the average yield of irrigated alfalfa was 4.4 tons per acre per year (after two cuts), a substantial increase in yield. This feed crop can then be used in the livestock industry; thus, our own sewage comes back as a steak! Scientists are aware that effluent irrigation could potentially have negative impacts on soil salinity as effluent tends to be much 'saltier' than water. However, according to soil scientist Y.W. Jame, the risk of salinity problems can be dealt with through over-irrigation. ICDC agrologist Korvin Olfert adds that careful monitoring of the effluent and soil samples is also important to prevent increases in soil salinity.

Information Sources:"Municipal Waste Disposal - Sewage Effluent Irrigation Pilot Project" by W. Nicholaichuk published as a Weekly Letter for February 19, 1975 by Agriculture Canada; "Conservation irrigation" by Bryan Lyster, pages 16-18 in Country Guide: The Farm Magazine. September 1979; and scientific articles (titles available) written by Bix Biederbeck. Article written by: Korvin Olfert and Cher King.

The Swift Current Creek Watershed Stewards

The Swift Current Creek Watershed Stewards (SCCWS) is a non-profit organization that promotes environmental stewardship through education and awareness initiatives. Incorporated in 2001, the SCCWS is the result of three years of water-related discussions among residents of the watershed. The mission of the SCCWS is to enhance water quality and stream health of the Swift Current Creek Watershed by promoting awareness and understanding among water users. The specific goals of the group are to (1) Educate water users of the watershed about issues and impacts which affect water quality, (2) Monitor water quality and riparian health to assist in cooperative solutions regarding water management issues, and (3) to foster an attitude of individual responsibility toward watershed stewardship.

The SCCWS encourages public participation in all of our meetings, workshops and educational products. If you are interested in further information on our watershed or the Swift Current Creek Watershed Stewards, take a look at our web site or call the coordinator, Cher King, at 778-5007.

Swift Current Creek Watershed Stewards
Box 1088, Swift Current, SK S9H 3X3
Phone: 306-778-5007 Fax: 306-778-5020
Email: sccws@canada.com Web site: http://www.t2.net.sccws

CREDITS AND ACKNOWLEDGMENTS

We gratefully acknowledge the support and assistance of many persons and organizations toward the completion of this newsletter. In addition to the informational contributions listed with each article, the following persons contributed to the newsletter content and development: Glenn Bratvold, Les Bohrson, Robin Hilts, Sean Lopeter, Randy McKeil, Rob Niewenhuizen, Bev Ruggeri, and Korvin Olfert. Bix Biederbeck assisted with planning and provided copies of many of his scientific publications on the effluent irrigation project to give us background on the project. The following persons and organizations assisted with research and gave us access to needed information: Kathy Collins and volunteers of the Grand Coteau Cultural Centre in Shaunavon, George Driscoll at the Southwest Booster, Dianne Hahn at the City of Swift Current, Hugh Henry at the Swift Current Museum and Brad Ulrich at Ducks Unlimited. The City of Swift Current and the Canadian Adaptation and Rural Development Fund in Saskatchewan (CARDS) provided the SCCWS with funding for our 2001-2002 project year. Funding for the CARDS program is provided by Agriculture and Agri-Food Canada.

"Know Your Watershed" is a newsletter produced by the Swift Current Creek Watershed Stewards. Editor: Cher King. Assistant Editor: Jenna King.

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada | Canada | CARDS

Swift Current Creek Watershed Stewards

Know Your Watershed

Volume 1 #2 **Know Your Watershed** **January 2003**

Water and Sewage: Necessities of life

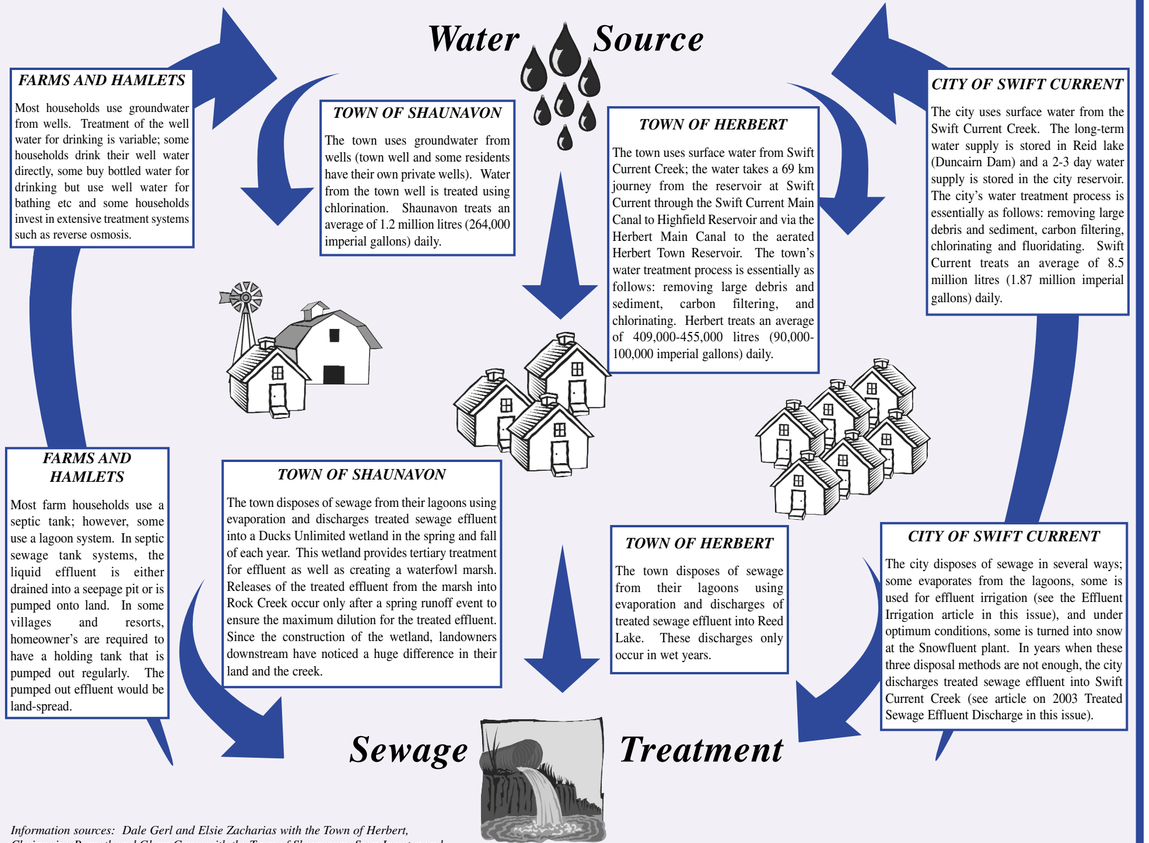
Water is one of the necessities of life. We drink it, bathe in it and use it to generate income. But do we understand where our water comes from or where it goes? Most of us can turn on a tap at any time of day or night and fill a glass with water. Although we may not be crazy about the taste, we don't usually worry about catching an awful disease. We can flush toilets and turn on the dishwasher or washing machine without thinking about where that water drains. We have become disconnected from the obvious need to treat our water and sewage because of the modern convenience of running water; we are no longer constantly reminded of how our daily living can influence the quality of water that comes into our homes and goes down our drains.

Treating Water and Sewage. Usually water is treated to remove debris and harmful substances before it enters the distribution system that delivers drinking water to our taps. Once water is used in a toilet, sink or washing machine, it becomes wastewater that must be treated to remove chemicals and waste. This wastewater is pumped from homes through a collection system of underground pipes to a treatment facility. The more water we use, the more it costs to treat and deliver drinking water and to collect and treat sewage. Our increased water demand has increased the demand on aging infrastructure that forms the treatment and distribution or collection systems. This demand leads to increased utility costs to cover upgrades and new construction.

Daily Living and Drinking Water. All homes in a watershed are connected by water, and living within a watershed, we are all living upstream and downstream of a sewage treatment system. For most towns and cities, wells or drinking water reservoirs are upstream of sewage treatment system. This makes sense– after all, no one wants sewage (even treated sewage) in their drinking water! But then again, we all live downstream of some other farm, town or city and many farms, towns and cities live downstream from us. So...our source for drinking water contains some sewage, treated or not, from the people who live upstream. And our sewage will become part of someone else's drinking water source downstream. Knowing this, it makes sense for all of us to respect our water source and to return our sewage back to the source in good condition.

Information Sources: Summit to the Sea (http://coastgis.marsci.uga.edu/summit/k12wattreat.htm), Environment Canada http://www.greeninggovernment.gc.ca/water/water.htm) and The Environment and Canadian Society, edited by Thomas Fleming and published by ITP Nelson, Scarborough ONT in 1997. Article written by: Cher King.

Where Does the Water Come From?



Information sources: Dale Gerl and Elsie Zacharias with the Town of Herbert, Chairmaine Bernath and Glenn Greve with the Town of Shaunavon, Sean Lopeter and Rob Niewenhuizen with the City of Swift Current Engineering Department, Saskatchewan Water Corporation Handi-Facts publication entitled "Farm Home Sewage Disposal", written submission from Brad Ulrich of Ducks Unlimited and Interviews with Glenn Bratvold, Wally Envik, Shirley Faber, Doug and Alma Ferguson, Ken Hymers, Audrey King, Boyd Nicolson, Ralph and Pat Thistlewaite, Randy Vopni (Saskatchewan Ag, Food and Rural Revitalization), and Rob Wiebe (Saskatchewan Watershed Authority). Article written by Cher King and Jenna King, graphic by Jenna King and Randy McKeil.

Where Does the Sewage Go?

HOMES AND BUSINESSES → SEWER MAINS → LIFT STATIONS → LAGOONS

Water and Sewer Timeline

For the settlers, supplying water and disposing of waste was simple compared to the maze of pipes and infrastructure that we have today. Drinking water was often hauled from the nearest creek or body of water, although a few houses and farms had wells. In larger settlements, the hamlet or village would supply a well. Most houses had cisterns and rain barrels to collect rainwater for washing and other needs, and drinking water was available by dipping a ladle into a common water crock. Toilet pails, outhouses, cesspools and the honeywagon were used for waste disposal. Most towns and cities did not start introducing piped water and sewage until they needed a reliable supply of water for fire fighting. The time line below describes the history and some major changes to our water supply and sewage disposal systems since our watershed was settled.

1882 The CPR dam was built at Swift Current to ensure a reliable water supply for the steam engines

1901 A public well was bored in Swift Current

1905 A water pumping station was built in conjunction with the powerhouse reservoir for Swift Current

1909 The provincial Health Officer believed there was "an unlimited supply of good water" in Swift Current from springs and the creek (Swift Current Sun, September 17, 1909). In rural areas, people were digging deep water wells to replace the hand dug shallow wells that tended to go dry very quickly

1910 Swift Current citizens voted on the bylaw to construct a waterworks and sewerage system; the vote results were: Waterworks (95 FOR and 4 AGAINST) and Sewer (97 FOR and 2 AGAINST). The CPR superintendent and the mayor negotiated for the town to use the water from the CPR dam, rather than build their own dam, until the population reached 5000

1911 The first water and sewer mains were installed in downtown Swift Current. The sewer mains were made of brick and wood and drained into the creek. Swift Current passed a bylaw regulating sewage disposal within town

1912 Herbert became a town. Several 'modern' homes were built that included running water and a sewage system. A cistern in the basement was filled with water, and then the water was hand pumped to storage tanks in the attic

1913 Swift Current built a dam that created a water reservoir and flooded the popular park area, Fenton's Grove. The cost estimate for the waterworks and sewer was $483,330, which was several times greater than the original estimate

1914 Shaunavon became a town. The CPR drilled a well to supply water for the steam engines. Swift Current became a city and built their first sewage disposal plant, although most sewage was still drained into the creek

1921 Swift Current expanded the water and sewer main lines and the city's Public Welfare Committee inspected the sewage works and wrote that if the problems were not corrected, they would lead to "the health of the community [to be] menaced by contamination of the river water below the disposal works." (Public Welfare Committee Minutes, August 16, 1921)

1925 Shaunavon citizens voted on a bylaw for a sewer system and sewage disposal plant; the results were 137 FOR and 63 AGAINST. The cost estimate for the system was $38,602, but it was completed for $33,790. The sewage system was built as an activated sludge system; the first of its kind in the province and the engineers claimed it to be "the best that science has yet to evolve." (Shaunavon Standard, March 5, 1925). When inspected by Public Health, the inspector stated he had "never inspected a more perfect piece of work on installation, [with] not one single fault found". (Shaunavon Standard, January 14, 1926)

1934 Swift Current passed a bylaw that prohibited recreational use on the reservoir due to water quality problems

1935 A Deputy from Public Health stated: "I wish to point out that the City of Swift Current is the only City in the province which supplies unfiltered water from a surface source to its residents." Water samples frequently showed high counts of coliform bacteria indicating contamination of the water supply. The Deputy urged Council to act to "protect the health of the citizens by the installation within a few months of a filtration plant in connection with the water supply."(City Council Minutes, May 17, 1935)

1936 The water filtration plant was approved and built

1941 Swift Current completed a water reservoir at South Hill (planning had started in 1935)

1943 Duncairn Dam was completed at a cost of $135,000. Duncairn Dam created Reid Lake, which was meant to be the long term, guaranteed water supply for Swift Current

1945 Residences within Swift Current could now have indoor private toilets

1946 A population explosion (40-50% increase) in Swift Current resulted in a treated water shortage and watering restrictions, as the water filtration plant could not keep up with the demand. The city added some indoor public restrooms, expanded their water and sewer mains, and constructed a new sewage disposal plant with a sludge removal tank (cost = $93,500)

1957 Power reached rural areas and some farms began to hook up to the grid. Swift Current built the North Hill Reservoir

1958 Herbert built a municipal sewer and water system. Ratepayers voted 143 FOR and 73 AGAINST sewage lagoons at a cost of $124,840. Swift Current built two sewage lagoons and sewage effluent discharges into the creek were only made in spring and fall when needed, rather than a continuous sewage discharge into the creek year-round

1959 Herbert completed construction on their water storage reservoir and Swift Current built their main sewage lift station to the lagoons

1961 The Family Farm Improvement Branch of the provincial government began a new program to assist farmers with the design and plumbing for sewer and water systems. Some farms built sewage lagoons and some built pump-out septic tanks. Shaunavon built a water tower for fire protection, which also supplied domestic and commercial running water in town

1970's Swift Current upgraded their water and sewer systems

1970 Herbert was awarded the Sanitary Environment award despite "the 40 outhouses and the faulty sewage lagoon wall." (Bittersweet Years: The Herbert Story). The provincial Department of Environment warned Swift Current that they would have to develop an alternative to dumping sewage into the creek

1976 Swift Current built another sewage lagoon (Lagoon C)

1978 The effluent irrigation project began after 5 years of planning. The project disposed of a great deal of sewage and reduced discharges into the creek

1983 Swift Current built a new weir at the city reservoir

1985 Herbert imposed strict water restrictions on its residents due to low water supply

1987 An inspection of the Swift Current's sewage main lines indicated that the lines laid in the mid 50's would have to be replaced

1989 Shaunavon built a main sewage lift station to their lagoons and the Ducks Unlimited wetland was constructed

1991 Swift Current made a sewage effluent discharge into the creek that received local attention. The city began considering additional methods for sewage disposal including a treatment plant

1993 Swift Current made an effluent discharge into the creek and downstream users were upset about the release

1994 Swift Current built another sewage lagoon (Lagoon D) and upgraded the water treatment plant. A Saskatchewan Environment report on the 1993 effluent discharge stated that all of the samples 'checked out'. Downstream users were not as confident

1995 Swift Current has researched the following options for sewage disposal: purchasing additional irrigation lands, enlarging and upgrading the irrigation pump house, twinning the supply line and installing new supply lines for irrigation, creating rapid infiltration, evaporation ponds, or marshland/wetland treatment, expanding the lagoons, and a sewage treatment plant

1996 Swift Current purchased additional effluent irrigation land and pivots

1997 Swift Current built the Snowfluent plant. Due to energy prices and the local climate, the Snowfluent plant has not functioned at its expected capacity

1999 Swift Current was fined for an accidental effluent spill into the creek

2001 Swift Current enhanced drainage around the existing sewage lagoons and installed 'actuated valves' that automatically close when dugout levels are too high, preventing unauthorized sewage discharges

Information Sources: Written submission from Rob Niewenhuizen; Newspapers: Swift Current Sun for June 10,1910; February 13, 1911, February 19, May 14 and June 25, 1946; Shaunavon Standard for January 22 and July 9, 1925; October 12 and November 9, 1960; January 18 and August 16, 1961; The City Sun for October 24, 1993 and April 6, 1994 and the Leader-Post for August 19, 1987. Meeting Minutes: Town Council Minutes,Town of Swift Current for 1907 - 1913; City Council Minutes, City of Swift Current for 1914 - 1946; and Public Welfare Committee Meeting Minutes, City of Swift Current for 1914- 1946. Interviews: Chairmaine Bernath, Glenn Bratvold, Shirley Faber, Doug and Alma Ferguson, Dale Gerl, Glenn Greve, Hugh Henry, Ken Hymers, Audrey King, Randy McKeil, Glenn McLaughlin, Ralph and Pat Thistlewaite, and Elsie Zacharias. Books: Peter Godfrey. 1989. 75 years a city. City of Swift Current, Swift Current, Saskatchewan. B. Hall, J. Buhr, R. Sapinsky and L. Redekop. Bittersweet Years: The Herbert Story. M.J. Hammer. 1977. Water and Wastewater Technology. John Wiley & Sons, New York. I.W. Heathcote. 1997. Chapter 4: Canadian Water Resources and Management. Pp 59-84. The Environment and Canadian Society. Thomas Fleming (Ed.) ITP Nelson, Scarborough Ontario. Don C. McGowan. 1980. Grassland Settlers: The Swift Current Region During the Era of the Ranching Frontier. Cactus Publications, Victoria, British Columbia. Don C. McGowan. 1982. The Green and Growing Years: Swift Current, 1907-1914.Cactus Publications, Victoria, British Columbia. The information for this article was compiled by: Cher King and Jenna King.

How is Sewage Treated?

There are three possible levels of sewage treatment:

Primary(1°): Heavy solids in the sewage settle to the bottom of the lagoon and fine solids float at the top.

Secondary(2°): Fine solids not removed during primary treatment are broken down by sunlight, algae, microbes and oxygen.

Tertiary(3°): Nitrogen, phosphorus, organic materials, chemicals and heavy metals are removed.

Municipalities in Saskatchewan are required to have a two-cell lagoon system, ensuring that the sewage receives at least secondary treatment.

Information provided by: Electronic presentation by Rod Lemon of Saskatchewan Environment entitled "Wastewater: A Valuable Resource". Article written by: Jenna King.

What is a honeywagon?

A horse drawn wagon used for sewage disposal in towns. As the wagon went up and down town streets, the sewage from household toilet pails would be emptied into the drums on the wagon's flatdeck.

Swift Current Weir by the Water Treatment Plant.

Did You Know Sewage Facts

- Sewage is surprisingly 99.9% water and only 0.1% solids.
- Only approximately 57% of Canadians are served by sewage treatment plants, compared with 74% of Americans, 86.5% of Germans, and 99% of Swedes.
- One drop of oil can render up to 25 litres of water unfit for drinking.
- One gram of 2,4-D (a common household herbicide) can contaminate ten million litres (2.2 million imperial gallons) of drinking water.

Information Sources: Electronic presentation by Rod Lemon of Saskatchewan Environment entitled "Wastewater: A Valuable Resource", Sean Lopeter and Rob Niewenhuizen with the City of Swift Current Engineering Department, and the Environment Canada Clean Water (http://www.ec.gc.ca/water/en/info/pubs/FS/e_FSA3.htm) website. Compiled by Jenna King.

Sewage and Pollution Potential

Sewage is a mixture of many things such as water, human/animal waste, pathogens (bacteria, viruses, fungi, parasites), debris, sediment, chemicals (pesticides, fertilizers, antibiotics) and heavy metals. Depending on the level of treatment, any or all of these parts of sewage can enter the creek through runoff or a sewage effluent discharge. When parts of treated sewage, such as overabundant nutrients, enter the creek, they become pollutants. The table below describes some pollutants and their potential impacts:

Example of a Pollutant	*Potential Result of Pollution*
Overabundant Nutrients (Phosphorus, Nitrogen, etc.)	* Excessive plant and algal growth in a stream * Reduced dissolved oxygen in water * Decreased water quality and degraded fish habitat
Pathogens (Bacteria, Viruses, Fungi, Parasites)	* Infectious diseases from bacteria (typhoid fever, dysentery, and tetanus), and viruses (meningitis, hepatitis, and respiratory disease) * Gastrointestinal illness from parasites like crytosporidium and giardia
Sediment	* Decreased water quality
Heavy Metals (Selenium, Lead, Arsenic, etc.)	* High concentrations may be toxic to living organisms
Chemicals (Pesticides, Fertilizers, Antibiotics)	* High levels of chemicals like pesticides are linked to cancer, birth defects, genetic mutation, and damage to the liver or central nervous system in laboratory animals

Information provided by: "How's the Water", a 2001 publication by Cathy Holtslander and published by Saskatchewan Eco-network, Saskatoon, Electronic presentation by Rod Lemon of Saskatchewan Environment entitled "Wastewater: A Valuable Resource", scientific articles written by Bix Biederbeck (titles available), Water Pollution by Southampton University (http://www.soton.ac.uk/~engenvir/environment/water/water.html) website and Pesticide by Cornell University (http://pmep.cce.cornell.edu/facts-slides-self/facts/pes-heef-grw85.html) website. Article written by: Jenna King and Cher King.

2003 Treated Sewage Effluent Discharge

The City of Swift Current has applied to Saskatchewan Environment for a permit for an emergency discharge of treated sewage effluent into Swift Current Creek. The volume estimate for the discharge is 455-682 million litres (100-150 million imperial gallons), and depending on the dilution rate and creek flow, the discharge will take about 3 months.

How will the discharge occur?

Saskatchewan Environment will issue the City of Swift Current an emergency discharge permit. This permit will list the requirements that the City will have to follow in order to minimize degradation to the aquatic habitat in the stream measured at a point one mile downstream from the discharge point. Two of the requirements that would be listed are dilution rate (depending on quality of the effluent) and monitoring process (how many sites need to be monitored, how often, by whom, what are they measuring, how will this information be used etc.).

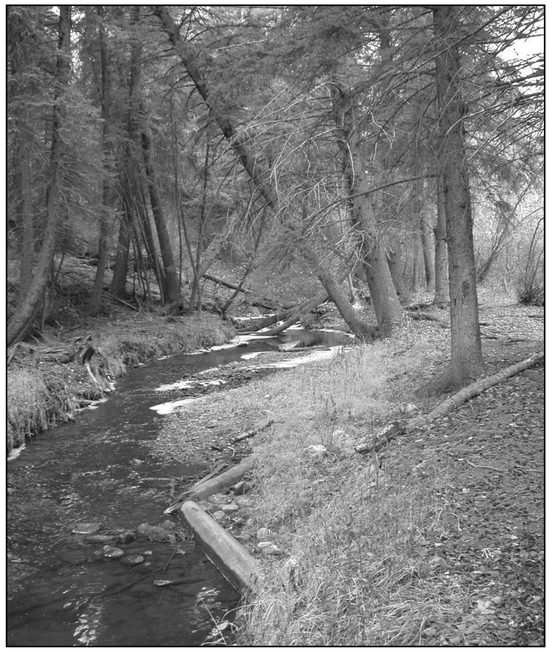
The Saskatchewan Watershed Authority will periodically metre the creek flow to determine the amount of water in the creek during the discharge, and the rate of discharge of effluent into the creek will be set proportional to the creek flow (depending on the dilution rate set by Saskatchewan Environment).

Water samples above the discharge point, at the discharge point, and at several points downstream of the discharge point will be taken. These samples will be analyzed and in the event of a result that exceeds the water quality guidelines for aquatic habitat, Saskatchewan Environment will require the city to alter its discharge rate.

What are the impacts of this discharge?

The discharged effluent will have been treated according to the minimum provincial regulations. Thus, most of the solids will have been removed and the level of nutrients and pathogenic microorganisms (bacteria, viruses, parasites) will be much lower than in raw sewage. The effluent discharge will also be diluted to a small percentage of the total creek flow. Water samples will be taken throughout the discharge and the results will be assessed using water quality standards suitable for aquatic habitat (i.e. fish habitat). The Saskatchewan Environment "Surface Water Quality Objectives" publication states that the aquatic habitat "objectives will also likely afford protection to wildlife which rely upon surface water for drinking water and for their source of food supply". However, this publication also advises ranchers to contact a veterinarian for advice if young animals will be drinking water with potentially high levels of bacteria.

Information Sources: Saskatchewan Environment "Surface Water Quality Objectives", and Interviews with the local Saskatchewan Environment office, Saskatchewan Watershed Authority office and the City of Swift Current Engineering Department. Article written by: Cher King.



Swift Current Creek flowing through Pine Cree Regional Park near Eastend.

"No amount of advertising and boasting will make a community great if that community has an inadequate water supply, and the town or city with an abundance of good water need not be limited in ambition for the future. In other words nature seems to have said to certain communities 'thus far shalt thou go and no further'.

Excerpt taken from Swift Current Sun, article titled "Great Asset in water supply", February 11, 1910