MUNICIPAL (WATER) USE DATABASE (MUD)

The MUD database is designed to provide easy access to basic data on municipal water and wastewater. The 1999 database (spreadsheet) currently contains water and sewage systems information from Canadian municipalities with populations over 1000. The total population of these municipalities is 25 million out of a total 1999 Statistics Canada Census population of 30 million. The database is now "Up-N-Running", debugging and other tests have been completed. The data are usually released as an Excel95 spreadsheet format, and can be sorted into a variety of aggregations, including; Provincial, Regional, Hydrologic, population size groups, and others.

Should you have any questions, or problems with this data, please contact:

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1. General Information

All of the data have been entered on a "Municipality Specific" basis, rather than on a "Plant Specific" basis. In other words, the database quantifies the water actually used in each municipality, rather than the more general water or sewage plant information. Some revision or estimation procedures were used when municipalities utilised shared systems. A primary advantage of this type of information is that all municipalities will have independent data, and possible double counts (within shared systems) will have been removed.

The information presented in this database (MUD) is rather general, and is primarily aimed at the production of aggregate and summary statistics. The basic types of data collected can be summarised as follows: Municipal Population (six base years), Populations Served (water and sewer systems), Average Daily Flows (water and treated sewage), Water User Classes (four different classes), Water Source (Ground, Combined, or Surface), Sewage Treatment type (Primary, Secondary etc.), and a field summarising quantity or quality problems by year. A few specific questions relating to such issues as water disinfection/treatment types, maximum water flow, BOD5 discharge values, final effluent disinfection/discharge, have been added in 1996. There is also a small

section with some basic plant information such as operating authority, construction, and/or most recent renovation. The database is designed to complement the Municipal Water Pricing database maintained by Environment Canada.

2. Data Sources

There were three main sources of data for this database. Firstly, the basic framework, and original raw data was provided from the 1986 MUNDAT database. Secondarily, this data was corrected, revised, or updated on the basis of supplemental information collected as the result of six water pricing studies conducted by this department. These studies (in 1983, 1986, 1989, 1991, 1994, and 1996) have now directly contacted all municipalities with populations in excess of 1000. The 1999 study was very successful, with about 87 percent of the municipalities being revised. The third data source was a series of phone calls, in order to resolve any problems with the earlier data sources, and to collect data for new municipalities, municipal annexations, major non-respondents, and for some municipalities with major boundary changes.

The information presented in the database can be considered as current to December 31, 1999. Although the database is not designed for time series analysis, the previous data have been retained as separate and independent files. A future municipal water pricing study is proposed for 2002, all information from this, or any other municipal water use studies will be used to further revise and expand this database.

3. Definitions

The definitions and basic data parameters for each column of the standard spreadsheet are presented below in a "Column/Name Criteria" format:

A. Hydrometric Area - as defined by Environment Canada, Water Survey of Canada. (alpha-numeric/ hierarchical)

B. 1991 Standard Geographic Code - as defined by Statistics Canada. Seven digit; Province = first two digits:

- 10 = Newfoundland
- 11 = Prince Edward Island
- 12 = Nova Scotia
- 13 = New Brunswick
- 24 = Quebec
- 35 = Ontario
- 46 = Manitoba
- 47 = Saskatchewan
- 48 = Alberta
- 59 = British Columbia

60 = Yukon
61 = North West Territories,
Census Division (3digit), Subdivision (3digit).

C. Municipality - as listed by Statistics Canada. The population cut-off is at 1000. (Individual municipal water/wastewater systems within municipal areas are entered if they serve more than 200 people.) Most rural areas such as, Townships or Parishes are not included. (Exception to preceding; some parts of Census Metropolitan Areas (CMA's), or Census Agglomerations (CA's) with populations in excess of 1000 are included, see note at end.) When a municipal population has fallen below 1000, the municipal name is enclosed in brackets for one survey update. In some cases old municipal names (in brackets) may follow new names to reduce confusion. In the municipal water pricing database, separate area names (in brackets) identify areas within municipalities with differing water rates. The database does not list unincorporated areas as municipalities.

D. Date Revised, most recent revision.

E. Present Population - from the municipality, may not agree with the most recent census.

F. C.M.A., C.A. Codes - Census Metropolitan, or Census Agglomeration area codes, as defined by Statistic Canada.

G. Size Group Code - groups are: 1, (less than 1000 population), 2, population 1000-1999, 3, population 2000-4999, 4, population 5000-49999, 5, population 50000-499999, and, 6, population 500000 plus. (A few “declining” municipalities with populations less than 1000 are retained as size group “1" in the interest of consistency across survey years).

H. 1996 population - from Statistics Canada Census.

I. 1991 population - as above.

J. 1986 population - as above.

K. 1981 Population - as above.

L. 1976 Population - as above.

M. 1971 Population - as above.

N. Population Served, Water - population in the municipality served by any water system. Does not include population external to the municipality. Does not include private individual groundwater supplies.

O. Population Served, Sewers - population in the municipality served by any sewer system. Does not include population external to the municipality. (In Northern Canada, includes municipal pumpouts.)

P. Population Served, Sewage Treatment - population in the municipality served by any type of sewage treatment. Does not include population external to the municipality. Does not include private individual septic tanks, and/or tile fields.

Q. Average Daily Flow (A.D.F.) Water - in the municipality from all sources, in cubic metres per day. Does not include water provided to other municipalities.

R. Maximum Daily Flow (M.D.F.) Water - non additive value of the flow on the maximum day. In cubic metres. In the case of a municipality supplying water to other areas, this is the total for all areas. The actual day will also vary for different municipalities. Non-additive for these two reasons. New in 1996 survey.

S. Average Daily Flow (A.D.F.) Treated Sewage - includes only the sewage from the municipality. In cubic metres per day. Includes only the volume of sewage which receives treatment. Due to the difficulties of sewage metering, and a general lack of volume detail on the part of some municipalities, this value has been estimated in some cases.

T. Degree of domestic water metering, as a percentage of the population served. (N.A. means not applicable, there is no municipal water system.)

U. Water Use, Domestic - a municipal estimate of the total A.D.F. used for domestic purposes. In cubic metres per day.

V. Water Use, Commercial & Institutional - as above.

W. Water Use, Industrial - as above.

X. Water Use, Other - as above. Includes system losses, and unaccounted. In earlier surveys, includes all flows from municipalities that were unable to estimate the preceding user classes. Note, this value is believed to be often under-reported.

Y. Groundwater Only - the population in the municipality, which is served exclusively by municipal groundwater (wells) system(s). Does not include private individual wells.

Z. Combined Surface & Groundwater - as above, but includes some surface (lake, river, etc.) supply also feeding into the municipal system. (All remaining serviced population is thus serviced exclusively by surface sources.). See also Note 2 at end.

AA. Groundwater Only, A.D.F. The Average Daily Flow for the "Groundwater Only" criteria above.

AB. Combined Surface and Groundwater, A.D.F. As above.

AC. Population With No Sewage Treatment - all population in the municipality without any servicing by a sewage treatment plant (STP).

AD. Primary - all population in the municipality served only by any form of mechanical sewage treatment. Does not double count population served by more advanced methods.

AE. Waste Stabilisation Ponds - all population in the municipality served only by W.S.P.'s (also called “lagoons”). This treatment type can achieve treatment levels equal to the following "Secondary" treatment level, however there is no double counting between the two levels.

AF. Secondary - All population in the municipality served only by biological sewage treatment. An assumption is made that any secondary STP is actually operating at a higher level of pollution reduction than a primary STP. The "Primary and Tertiary" combined type of STP is usually counted as secondary. Municipal septic tanks are assumed to be operating correctly, and providing a secondary level of service.

AG. Tertiary - All population in the municipality served only by some form of sewage treatment providing a higher level of treatment than secondary. Usually includes effluent polishing, phosphate removal, and sometimes spray irrigation. Does not double count population in the preceding columns.

AH. Rural Population Served, Water. The population in nearby non-surveyed areas served by the municipal water system(s). This value is "rural" population, and is not included anywhere else in the database. (1996: The Canada total is 227,727 or +0.9% of the database population).

AI. Rural Population Served, Sewers. Same criteria as above, except the data applies to the municipal sewer system(s). (1996: 70,299, +0.3%).

AJ. Rural Population Served, Sewage Treatment. As above, except the data applies to the municipal sewage treatment plant(s). (1996: 87,954, +0.3%).

AK. Problems, Water Quantity. The range of years (i.e. '94-'96) during which the municipality has experienced supply quantity problems.

AL. Problems, Water Quantity. As above, except lists the number of years.

AM. Problems, Water Quality. The range of years during which the municipality has experienced water supply quality problems.

AN. Problems, Water Quality. As above, except lists the number of years.

AO. Notes. Most of these relate to the “problems” in columns AK, and AL.

AP. Use Restrictions, number of days in the survey data year when the municipality imposed water quantity restrictions.

AQ. Boil Days, as above, quality restrictions.

AR-AW.

Effluent Disinfection, “Y”es answers to type of sewage disinfection after the sewage treatment stage. Possibilities are; none, chlorinating, dechlorination, ozone, ultraviolet , or other.

AX-BC.

BOD5 removal rate (%), and BOD5 30 day effluent average (mg/l) for largest three sewage treatment plants. New in 1996 survey.

BD-BF.

Effluent discharge, “Y”es answers to freshwater, marine , or other.

In rare cases, two types are possible. (“Ground infiltration” entered as “freshwater and other”, “tidal river/estuary” entered as “marine and other”.) New in 1996.

BG-BM
Water Disinfection, “Y”es answers to type(s) of water disinfection. Possibilities are; none, chlorination, chloramination, chlorine dioxide, ozone, ultraviolet, or other. Question has been simplified since 1994.

BN. Alum, “Y”es or ”N”o answer to use of aluminium base coagulant in water treatment.

BO. Fluoridation - as above, fluoride addition.

BP. Fl. Raw - Fluoride concentration (PPM) in raw water. Not revised in 1996 or 1999.

BQ. Fl. Treated - as above, treated water. Not revised in 1996.

BR. Frequency, number of times per year the fluoride is monitored. Not revised in 1996 or 1999.

BS. Fl. Start, date, year/month fluoride started. Not revised in 1996 or 1999.

BT. Fl. End - as above, fluoride ended. Not revised in 1996 or 1999.

BU. Hi. Nat. Fl., municipalities which reported a requirement to reduce the fluoride in raw water. There were no responses to this question in 1994. Not revised in 1996 or 1999.

BV-CN
“Y”es answers to a variety of water treatment types. Types are: none, pre-treatment by micro straining, flocculation and coagulation, sedimentation, flotation, slow sand filtration (not revised in 1996), rapid sand (dual/multi media) filtration (not revised in 1996), sand filtration (includes previous two categories), activated carbon (T.&O.), pH correction, corrosion control, iron or manganese removal, pressure filtration (not revised in 1996), biological active filtration (not revised in 1996), membrane filtration (not revised in 1996), ion exchange (not revised in 1996), sequestering (not revised in 1996, usually same as iron or manganese removal), taste and odour (not revised in 1996, usually the same as activated carbon), and, other. Note, some of the preceding have changed in order of presentation since 1994.

CO. First Water Treatment Plant. The reporting authority for the largest (in terms of A.D.F.) municipal water treatment plant. Can be "SELF" (own municipality), an "S.G.C." (of an other municipality), "NONE". In the case of multiple plants, the first three letters of the plant name are used. Thus “SELF-MAI”(n), and “SELF-OTH”(er).

CP. Year Built, expressed as a calendar year, earliest possible entry is '01.

CQ. Last Renovation, expressed as a calendar year, for last major renovation.

CR-DF.

A series of repetitive columns similar to the preceding three columns for the "First Sewage Treatment Plant", "Second Water Treatment Plant" etc. A maximum of three water and sewage plants is possible for each municipality.

DG Use restrictions, number of days in 1998 when the municipality imposed water restrictions.

DH Boil days, as above.

DI-DJ.

Latitude and Longitude for each municipality. Source is usually "Gazetteer of Canada".

4. Supplemental notes to the 1999 update

1. It has always been the intention of this database to cover all areas where there are, or could possibly be municipal water or wastewater services. The 1999 database surveys municipalities with a total population of 25.0 million, of which 23.1 million are served by municipal water systems. The 1996 Canadian Census conducted by Statistics Canada showed an urban population of 22.5 million with 24.7 million included in the 1996 MUD Survey. About 20 to 25% of the Canadian population lives in rural surroundings, much of which is unlikely to ever be provided with municipal piped services. The actual legal definitions of "City", "Village", "Town" etc. are set by each province, and in some cases may contain what would otherwise be called "rural" population. The selection of areas for the database has always assumed that where there is a legal incorporation of a municipal area, then there is also some sort of administration, and at least the possibility of municipal services. This is not always so.
2. The database has also included components of Statistics Canada's "Census Metropolitan", and "Census Agglomeration" areas (if over 1000 population) as these areas are close to major municipal systems, and might logically be expected to be serviced. Since one of the major definitions of C.M.A.'s, or C.A.'s is based upon percentage of people working (i.e., commuting) in the central area, large areas which would otherwise be considered as "rural" have also been included in the MUD database.
3. In order to improve the database definition of "urban", all of the preceding possibly rural areas were compared with Statistics Canada data under the following criteria. If the area had over 5000 population it was retained, or, was discarded if the population density was less than 30 per square kilometre AND the area had historically never had more than 1000 population served by water or sewer services. In 1996, this correction resulted in the deletion of 66 "municipalities" which provided water services to about 9000 population in total. About 5,500 of this population appears in the "rural population" column (AH), so

the actual loss of data is for about 3500 people out of a total of 22,300,000 served by water services.

4. The question regarding "combined surface and groundwater systems" was improved by asking for the percentage of each. When this could be answered, the proportion of groundwater was entered as groundwater only. It is believed that this is a more accurate measure of groundwater use. The effect of this revision is to move about 1,100,000 people out of the "combined" category, of which about 600,000 appear in the groundwater category in 1996.
5. In a few cases the sewage categories were adjusted on the basis of BOD5 information first asked for in 1996. This change is believed to have had minimal effects.
6. Aboriginal population. In many cases during the 1991 Statistics Canada Census, access was not available, or enumeration was incomplete of residents of various aboriginal communities. This deficiency was mostly corrected in the 1996 Census. The MUD database has not surveyed aboriginal communities in the past. (Prior to 1991, there were few aboriginal communities over 1000 population.) Aboriginal population resident in surveyed areas, as well as those served by neighbouring municipalities (as "rural population", column AH) is included in the database. A review of the 1996 Census Data indicated that there were 60 aboriginal communities in Canada, with populations of over 1000. Many of these would meet the definitions above for inclusion in the database. This is a significant data gap, and will be investigated.

5. Summary

The database is designed to provide basic municipal water and wastewater statistics, in commonly used aggregations such as Provinces, population size ranges, basic types of systems etc. Up to 200 requests a year are received by this department for this type of information from a wide variety of sources including other government agencies, academia, and market research, as well as others. Many other data sortings or aggregations may be possible.