- 77) Hydrogeological Consultants Ltd. Mar-1982. Norcen Energy Resources Ltd. Primrose Pilot Project: 1980-81 Annual Groundwater Monitoring Report. Cold Lake Area. 24-065-02 W4M. (unpublished contract report Mar-1982.) [81-008] [73L09 .C648L3 1982/03]
- 78) Hydrogeological Consultants Ltd. Mar-1983. Drummond Oil and Gas Ltd. Ardmore Thermal Project: 1981-1982 Groundwater Monitoring Report. Ardmore Area. 20-062-06 W4M. (unpublished contract report Mar-1983.) [82-016] [73L08 .A72 1983/03]
- 79) Hydrogeological Consultants Ltd. Jun-1983a. Husky Oil Operations Ltd. Steam Generation Project: 1983 Groundwater Program. Tucker Lake area. 28-064-04 W4M. (unpublished contract report Jun-1983.) [83-104] [73L10 .T8L3 1983/06]
- 80) Hydrogeological Consultants Ltd. Jun-1983b. Husky Oil Operations Ltd. Heavy Oil Project: General Hydrogeology. Tucker Lake. 064-03 W4M; 064-04 W4M; 064-05 W4M; 065-03 W4M; 065-04 W4M; 065-05 W4M. (unpublished contract report Jun-1983.) [73L10 .T8L3 1983/06a]
- 81) Hydrogeological Consultants Ltd. Nov-1983. BP Exploration Canada Limited. Heavy Oil Project: 1982 Annual Groundwater Monitoring Report: 2nd Revision. Marguerite Lake Area. 07-066-05 W4M. (unpublished contract report Nov-1983.) [82-002] [73L10 .M37L3 1983/11]
- 82) Hydrogeological Consultants Ltd. Feb-1984. Canadian Occidental Petroleum Ltd. Groundwater Supply Proposal: Quotation Request No. CO-198. Morgan Area. (unpublished contract report Feb-1984.) [73E08.M673 1984/02]
- 83) Hydrogeological Consultants Ltd. Aug-1984. Peter C. Nichols and Associates Ltd. Chickenhill Lake Subdivision: Water Test Hole No. 1-84. Chickenhill Lake Area. 23-059-08 W4M. (unpublished contract report Aug-1984.) [84-142] [73L03.C484L3 1984/08]
- 84) Hydrogeological Consultants Ltd. Nov-1984. Husky Oil Operations Ltd. Water Well Survey: Appendix C. Morgan Area. (unpublished contract report Nov-1984.) [84-128] [73E08.M673 1984/11c]
- 85) Hydrogeological Consultants Ltd. Apr-1985a. Amerada Minerals Corporation of Canada Ltd. 1985 Groundwater Program. Cold Lake Area. 26-063-03 W4M. (unpublished contract report Apr-1985.) [85-112] [73L08.C648L3 1985/04]
- 86) Hydrogeological Consultants Ltd. Apr-1985b. Amerada Minerals Corporation of Canada Ltd. Water Source Well: 1985 Aquifer Test. Cold Lake Area. 33-062-03 W4M. (unpublished contract report Apr-1985.) [85-112] [73L08 .C648L3 1985/04a]
- 87) Hydrogeological Consultants Ltd. May-1985a. Drummond Oil and Gas Ltd. Ardmore Thermal Project: 1983-1984 Groundwater Monitoring Report. Ardmore Area. 20-062-06 W4M. (unpublished contract report May-1985.) [84-016] [73L08 .A72 1985/05]
- 88) Hydrogeological Consultants Ltd. May-1985b. Husky Oil Operations Ltd. Thermal Project: 1984 Groundwater Monitoring Report. Tucker Lake Area. 28-064-04 W4M. (unpublished contract report May-1985.) [84-018] [73L10 .T8L3 1985/05]
- 89) Hydrogeological Consultants Ltd. May-1985c. Koch Exploration Canada Ltd. 1984-1985 Groundwater Program. Fort Kent Area. 061-04 W4M; 061-05 W4M. — (unpublished contract report - May-1985.) [84-173] [73L07 .F677K4 1985/05]



- 90) Hydrogeological Consultants Ltd. Sep-1985. Husky Oil Operations Ltd. Thermal Project Phase II: 1985 Groundwater Evaluation. Tucker Lake Area. 28-064-04 W4M. — (unpublished contract report -Sep-1985.) [85-158] [73L10 .T8L3 1985/09]
- 91) Hydrogeological Consultants Ltd. Nov-1985. Husky Oil Operations Ltd. Water Source Well: Proposed Groundwater Monitoring Program. Charlotte Lake Area. 28-060-03 W4M. (unpublished contract report Nov-1985.) [73L01 .C48L3 1985/11]
- 92) Hydrogeological Consultants Ltd. Jan-1986. Alberta Environment, Planning Division. Beaver River Basins: Regional Groundwater Assessment: Proposal. Cold Lake Area. 063-01 W4M. (unpublished contract report Jan-1986.) [86-103] [73L08.C648L3 1986/01]
- 93) Hydrogeological Consultants Ltd. Feb-1986. Husky Oil Operations Ltd. Water Source Well: December 1985-February 1986: Groundwater Monitoring Program. Charlotte Lake Area. 28-060-03 W4M. (unpublished contract report Feb-1986.) [85-175] [73L01 .C48L3 1986/02]
- 94) Hydrogeological Consultants Ltd. Mar-1986. Husky Oil Operations Ltd. Tucker Lake Thermal Project: 1985 Annual Groundwater Monitoring Report. Tucker Lake Area. 28-064-04 W4M. (unpublished contract report Mar-1986.) [85-018] [73L10 .T8L3 1986/03]
- 95) Hydrogeological Consultants Ltd. May-1986. Koch Exploration Canada Ltd. 1985-1986 Groundwater Monitoring Report. Fort Kent Area. 33-061-04 W4M. — (unpublished contract report - May-1986.) [85-027] [73L07 .F677K4 1986/05]
- 96) Hydrogeological Consultants Ltd. Feb-1987a. Drummond Oil and Gas Ltd. Ardmore Thermal Project: 1985-1986 Groundwater Monitoring Report. Ardmore Area. 20-062-06 W4M. (unpublished contract report Feb-1987.) [86-016] [73L08 .A72 1987/02]
- 97) Hydrogeological Consultants Ltd. Feb-1987b. Koch Exploration Canada Ltd. 1986 Groundwater Monitoring Report. Fort Kent Area. 33-061-04 W4M. (unpublished contract report Feb-1987.) [86-027] [73L07 .F677K4 1987/02]
- 98) Hydrogeological Consultants Ltd. May-1987. Husky Oil Operations Ltd. Tucker Lake Thermal Project: 1986 Annual Groundwater Monitoring Report. Tucker Lake Area. 28-064-04 W4M. (unpublished contract report May-1987.) [86-018] [73L10 .T8L3 1987/05]
- 99) Hydrogeological Consultants Ltd. Jul-1987. Cold Lake/Grand Centre Regional Utilities Board. Sewage Lagoon Study. Cold Lake/Grand Centre. 13-062-02 W4M. — (unpublished contract report - Jul-1987.) [87-175] [73L08.C648L3 1987/07]
- 100) Hydrogeological Consultants Ltd. Nov-1987. Husky Oil Operations Ltd. 1986 Groundwater Monitoring Report. Charlotte Lake Area. 28-060-03 W4M. — (unpublished contract report - Nov-1987.) [86-028] [73L01.C48L3 1987/11]
- 101) Hydrogeological Consultants Ltd. Jan-1988a. Canadian Occidental Petroleum Ltd. 1987 Groundwater Monitoring Report. Manatokan Steam Project. 13-063-08 W4M. — (unpublished contract report -Jan-1988.) [87-037] [73L06.M36 1988/01]
- 102) Hydrogeological Consultants Ltd. Jan-1988b. Drummond Oil and Gas Ltd. Ardmore Thermal Project: 1987 Groundwater Monitoring Report. Ardmore Area. 20-062-06 W4M. — (unpublished contract report - Jan-1988.) [87-016] [73L08 .A72 1988/01]



- 103) Hydrogeological Consultants Ltd. Feb-1988a. Husky Oil Operations Ltd. Thermal Project: 1987 Annual Groundwater Monitoring Report. Tucker Lake Area. 28-064-04 W4M. (unpublished contract report Feb-1988.) [87-018] [73L10 .T8L3 1988/02]
- 104) Hydrogeological Consultants Ltd. Feb-1988b. Koch Exploration Canada Ltd. 1987 Annual Groundwater Monitoring Report. Fort Kent Area. 33-061-04 W4M. (unpublished contract report Feb-1988.) [87-027] [73L07 .F677K4 1988/02]
- 105) Hydrogeological Consultants Ltd. Jan-1989. Koch Exploration Canada Ltd. 1988 Annual Groundwater Monitoring Report. Fort Kent Area. 33-061-04 W4M. — (unpublished contract report - Jan-1989.) [88-027] [73L07 .F677K4 1989/01]
- 106) Hydrogeological Consultants Ltd. Jun-1989. Home Oil Company Limited. Home Esso Lloyd EX: Groundwater Monitoring. Kitscoty Area. 3AM-2SK-051-02 W4M. — (unpublished contract report - Jun-1989.) [73E08.K578 1989/06]
- 107) Hydrogeological Consultants Ltd. Nov-1989. Indian and Northern Affairs Canada. Kehewin Indian Reserve No. 123: 1989 Groundwater Prognosis. Bonnyville Area. 059-06 W4M. — (unpublished contract report - Nov-1989.) [89-170] [73L02 .B666 1989/11]
- 108) Hydrogeological Consultants Ltd. Feb-1990. Koch Exploration Canada Ltd. 1989 Annual Groundwater Monitoring Report. Fort Kent Area. 33-061-04 W4M. — (unpublished contract report - Feb-1990.) [89-027] [73L07 .F677K4 1990/02]
- 109) Hydrogeological Consultants Ltd. Jul-1990. Canadian Occidental Petroleum Ltd. 1988 Groundwater Monitoring Report. Manatokan Steam Project. 13-063-08 W4M. — (unpublished contract report -Jul-1990.) [89-037] [73L06 .M36 1990/07]
- 110) Hydrogeological Consultants Ltd. Oct-1990a. Excel Energy Inc. Ardmore Thermal Project: 1988-89 Groundwater Monitoring Report. Ardmore Area. 062-03 W4M; 063-03 W4M. (unpublished contract report Oct-1990.) [89-016] [73L08 .A72 1990/10]
- 111) Hydrogeological Consultants Ltd. Oct-1990b. Husky Oil Operations Ltd. Thermal Project: 1988-89 Groundwater Monitoring Report. Tucker Lake Area. 28-064-04 W4M. (unpublished contract report Oct-1990.) [88-018] [73L10 .T8L3 1990/10]
- 112) Hydrogeological Consultants Ltd. Aug-1992. Koch Exploration Canada Ltd. 1990-1991 Groundwater Monitoring Report. Fort Kent Area. 061-04 W4M. — (unpublished contract report - Aug-1992.) [91-027] [73L07 .F677K4 1992/08]
- 113) Hydrogeological Consultants Ltd. Jun-1993. Koch Exploration Canada Ltd. 1992 Groundwater Monitoring Report. Fort Kent Area. 061-04 W4M. — (unpublished contract report - Jun-1993.) [92-027] [73L07 .F677K4 1993/06]
- 114) Hydrogeological Consultants Ltd. Jul-1993. Koch Exploration Canada Ltd. Proposed Increased Groundwater Diversion. Fort Kent Area. 061-04 W4M. — (unpublished contract report - Jul-1993.) [93-150] [73L07 .F677K4 1993/07]
- 115) Hydrogeological Consultants Ltd. Oct-1995. Elan Energy Inc. Muriel Lake Pilot Project: Groundwater Prognosis. Muriel Lake Area. 22-059-04 W4M. (unpublished contract report Oct-1995.) [95-185] [73L01 .M87L3 1995/10]



- 116) Hydrogeological Consultants Ltd. Feb-1996. Elan Energy Inc. Groundwater Prognosis. Wolf Lake Area. 02-065-08 W4M. — (unpublished contract report - Feb-1996.) [96-103] [73L10 .W6L3 1996/02]
- 117) Hydrogeological Consultants Ltd. Apr-1996. Koch Exploration Canada Ltd. 1993-1995 Groundwater Monitoring Report. Fort Kent Area. 061-04 W4M. — (unpublished contract report - Apr-1996.) [MR-027] [73L07 .F677K4 1996/04]
- 118) Hydrogeological Consultants Ltd. Aug-1996. Elan Energy Inc. Water Supply Prognosis. Cold Lake Area. 14-062-04 W4M. (unpublished contract report Aug-1996.) [96-183] [73M07 .C648L3 1996/08]
- 119) Hydrogeological Consultants Ltd. Dec-1996. County of St. Paul No. 19. Part of the North Saskatchewan River Basin: Regional Groundwater Assessment Proposal. St. Paul Area. Parts of Tp 055-063, R 03-13, W4M. (unpublished contract report Dec-1996.) [97-102] [73L .S7P3 1996/12]
- 120) Hydrogeological Consultants Ltd. Feb-1997. Elan Energy Inc. Groundwater Supply. Muriel Lake Area. 22-059-04 W4M. (unpublished contract report Feb-1997.) [95-185] [73L01 .M87L3 1997/02]
- 121) Hydrogeological Consultants Ltd. Mar-1997a. County of St. Paul No. 19. Part of the North Saskatchewan River Basin: Regional Groundwater Assessment Module 1. St. Paul Area. Parts of Tp 055-063, R 03-13, W4M. (unpublished contract report Mar-1997.) [97-102] [73L .S7P3 1997/03]
- 122) Hydrogeological Consultants Ltd. Mar-1997b. Koch Exploration Canada Ltd. 1996 Annual Groundwater Monitoring Report. Fort Kent Area. 061-04 W4M. (unpublished contract report Mar-1997.) [MR-027] [73L07 .F677K4 1997/03]
- 123) Hydrogeological Consultants Ltd. Apr-1997. Elan Energy Inc. Water Prognosis. Cold Lake Area. 36-062-04 W4M. (unpublished contract report Apr-1997.) [97-145] [73M07.C648L3 1997/04]
- 124) Hydrogeological Consultants Ltd. Oct-1997. Canadian Occidental Petroleum Ltd. Bonnyville and Wolf Lake Sectors: Application for Primary Recovery Scheme. Bonnyville Area. 31-062-06 W4M. (unpublished contract report Oct-1997.) [97-231] [73L07.B666 1997/10]
- 125) Hydrogeological Consultants Ltd. Jan-1998. Elan Energy Inc. 1996 to 1997 Groundwater Monitoring Report. Muriel Lake Area. 22-059-04 W4M. (unpublished contract report Jan-1998.) [MR-086] [73L02 .M87L3 1998/01a]
- 126) Hydrogeological Consultants Ltd. Jul-1999a. Fishing Lake Metis Settlement. 1998 Water Supply Well. Fishing Lake Area. 17-057-02 W4M. — (unpublished contract report - Jul-1999.) [98-166] [73E16 .F5L3 1999/07]
- 127) Hydrogeological Consultants Ltd. Jul-1999b. Ranger Oil Limited. Application for Reduced Spacing Groundwater Details. Cold Lake Area. Tp 063, R 02 & 03, W4M. (unpublished contract report Jul-1999.) [98-123] [73L08 .C648L3 1999/07]
- 128) Hydrogeological Consultants Ltd. Oct-1999a. Ranger Oil Limited. Review of Axell Water Wells. Cold Lake Area. NE 22-063-03 W4M. (unpublished contract report Oct-1999.) [99-158] [73L08 .C648L3 1999/10]



- 129) Hydrogeological Consultants Ltd. Oct-1999b. Ranger Oil Limited. Review of Bodnar Water Wells. Cold Lake Area. SE 10-062-04 W4M. (unpublished contract report Oct-1999.) [99-158] [73L08 .C648L3 1999/10c]
- 130) Hydrogeological Consultants Ltd. Oct-1999c. Ranger Oil Limited. Review of David Water Well. Cold Lake Area. 13-20-063-02 W4M. — (unpublished contract report - Oct-1999.) [99-158] [73L08 .C648L3 1999/10a]
- 131) Hydrogeological Consultants Ltd. Oct-1999d. Ranger Oil Limited. Review of Ulfsten Water Wells. Cold Lake Area. SW 25-063-03 W4M. — (unpublished contract report - Oct-1999.) [99-158] [73L08 .C648L3 1999/10b]
- 132) Imperial Oil Resources and Komex International Ltd. July 31, 1998. Summary of Groundwater Investigation Results Under Environmental Protection Order 95-07.
- 133) Ing, A. S., O'Connell, B. Hitchon, and C. Sauveplane. 1985. Alberta Geological Survey. Hydrogeology of the Cold Lake Study Area Alberta, Canada. Data Base: Section 1 - Phanerozoic Data. Cold Lake Area. [QE 186 Op96-1H].
- 134) Kerr, H. A. April 1978a. Alberta Department of Environment, Environmental Protection Services, Earth Sciences and Licensing Division, Groundwater Development Branch. Lac La Biche Mission Settlement. Northern Water Supply Program. [73L13 .L325L3B5 1978]
- 135) Kerr, H. A. April 1978b. Alberta Department of Environment, Environmental Protection Services, Earth Sciences and Licensing Division, Groundwater Development Branch. Elinor Lake. Northern Water Supply Program. [73L12 .E4L3 1978]
- 136) Kerr, H. A. April 1978c. Alberta Department of Environment, Environmental Protection Services, Earth Sciences and Licensing Division, Groundwater Development Branch. Imperial Mills. [73L13 .I4M5 1978]
- 137) Mossop, G., and I. Shetsen (co-compilers). 1994. Geological Atlas of the Western Canada Sedimentary Basin. Produced jointly by the Canadian Society of Petroleum Geology, Alberta Research Council, Alberta Energy, and the Geological Survey of Canada.
- 138) Ozoray, G., M. Dubord, and A. Cowen. 1990. Groundwater Resources of the Vermilion 73E Map Area, Alberta. Alberta Environmental Protection.
- 139) Ozoray, G. F., E. I. Wallick, and A. T. Lytviak. 1980. Alberta Geological Survey. Hydrogeology of the Sand River Area, Alberta. Sand River Area. [QE 186 P7 No. 79-01]
- 140) Pawlowicz, J. G., and M. M. Fenton. 1995. Alberta Geological Survey. Bedrock Topography of Alberta. [AGS MAP 226]
- 141) Prosser, D. W. 1973. Alberta Department of Environment, Environmental Protection Services, Earth Sciences and Licensing Division, Groundwater Development Branch. Metis Water Supply Program, Elizabeth Colony. Elizabeth Metis Colony Area. 060-01 W4M. [73L01.E45M4C6 1973]
- 142) Root, J. D. 1973. Alberta Research Council. Index to Current Geological, Soils, and Groundwater Maps of Alberta. [QE 186 P7 No. 73-04]
- 143) Root, J. D. 1978. Alberta Geological Survey. Index to Geological, Bedrock Topography, Soils and Groundwater Maps of Alberta. [QE 186 P7 No. 77-03]



- 144) Sauveplane, C., and D. Borneuf. 1985. Alberta Geological Survey. Hydrogeology of the Cold Lake Study Area Alberta, Canada. Part 4. Hydrodynamics. [QE 186 Op96-1D]
- 145) Shaw, J., and R. Kellerhals. 1982. Alberta Geological Survey. The Composition of Recent Alluvial Gravels in Alberta River Beds. [AGS Bulletin 041]
- 146) Shetsen, I. 1990. Alberta Geological Survey. Quaternary Geology, Central Alberta. [AGS MAP 213]
- 147) Strong, W. L., and K. R. Legatt, 1981. Ecoregions of Alberta. Alta. En. Nat. Resour., Resour. Eval. Plan Div., Edmonton as cited <u>in Mitchell</u>, Patricia and Ellie Prepas (eds.). 1990. Atlas of Alberta Lakes. The University of Alberta Press. Page 12.
- 148) Thornthwaite, C. W. and J. R. Mather. 1957. Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance. Drexel Institute of Technology. Laboratory of Climatology. Publications in Climatology. Vol. 10, No. 3, P. 181-289.
- 149) Tokarsky, O. Geoscience Consulting Ltd. Feb-1984a. Alberta Department of Municipal Affairs, Metis Development Branch. Water Well Inventory, Elizabeth Metis Settlement. 060-01 W4M.
- 150) Tokarsky, O. Geoscience Consulting Ltd. Feb-1984b. Alberta Department of Municipal Affairs, Metis Development Branch. Water Well Inventory, Fishing Lake Metis Settlement. 32-056-02 W4M.
- 151) Yoon, T. N., and H. Vander Pluym. June 1974. Department of the Environment. Environmental Protection Services. Buried Channels in the Edmonton Lac La Biche-Cold Lake Area. Alberta.
- 152) Znak, M. Jun-1974. Alberta Department of Environment, Environmental Protection Services, Earth Sciences and Licensing Division, Groundwater development Branch. Town of Grand Centre Groundwater Investigation. 02-063-02 W4M. [<hc fiche 1974.14>]



9. Conversions

| Multiply | by | To Obtain |
|---------------------------|------------------|---------------------------|
| Length/Area | | |
| feet | 0.304 785 | metres |
| metres | 3.281 000 | feet |
| hectares | 2.471 054 | acres |
| centimetre | 0.032 808 | feet |
| centimetre | 0.393 701 | inches |
| acres | 0.404 686 | hectares |
| inches | 25.400 000 | millimetres |
| miles | 1.609 344 | kilometres |
| kilometre | 0.621 370 | miles (statute) |
| square feet (ft²) | 0.092 903 | metres (m²) |
| metres (m²) | 10.763 910 | square feet (ft²) |
| metres (m²) | 0.000 001 | kilometres (km²) |
| | | · · · |
| Concentration | | |
| grains/gallon (UK) | 14.270 050 | ppm |
| ppm | 0.998 859 | mg/L |
| mg/L | 1.001 142 | ppm |
| | | |
| Volume (capacity) | | |
| acre feet | 1233.481 838 | cubic metres |
| cubic feet | 0.028 317 | cubic metres |
| cubic metres | 35.314 667 | cubic feet |
| cubic metres | 219.969 248 | gallons (UK) |
| cubic metres | 264.172 050 | gallons (US liquid) |
| cubic metres | 1000.000 000 | litres |
| gallons (UK) | 0.004 546 | cubic metres |
| imperial gallons | 4.546 000 | litres |
| | | |
| <u>Rate</u> | | |
| litres per minute | 0.219 974 | ipgm |
| litres per minute | 1.440 000 | cubic metres/day (m³/day) |
| igpm | 6.546 300 | cubic metres/day (m³/day) |
| cubic metres/day (m³/day) | 0.152 759 | igpm |
| | | |
| Pressure | | |
| psi | 6.894 757 | kpa |
| kpa | 0.145 038 | psi |
| | | |
| <u>Miscellaneous</u> | | |
| | = 9/5 (C° + 32) | Fahrenheit |
| | = (F°- 32) * 5/9 | Celsius |
| degrees | 0.017 453 | radians |
| US\$ | 0.000 000 | Canadian\$ |

