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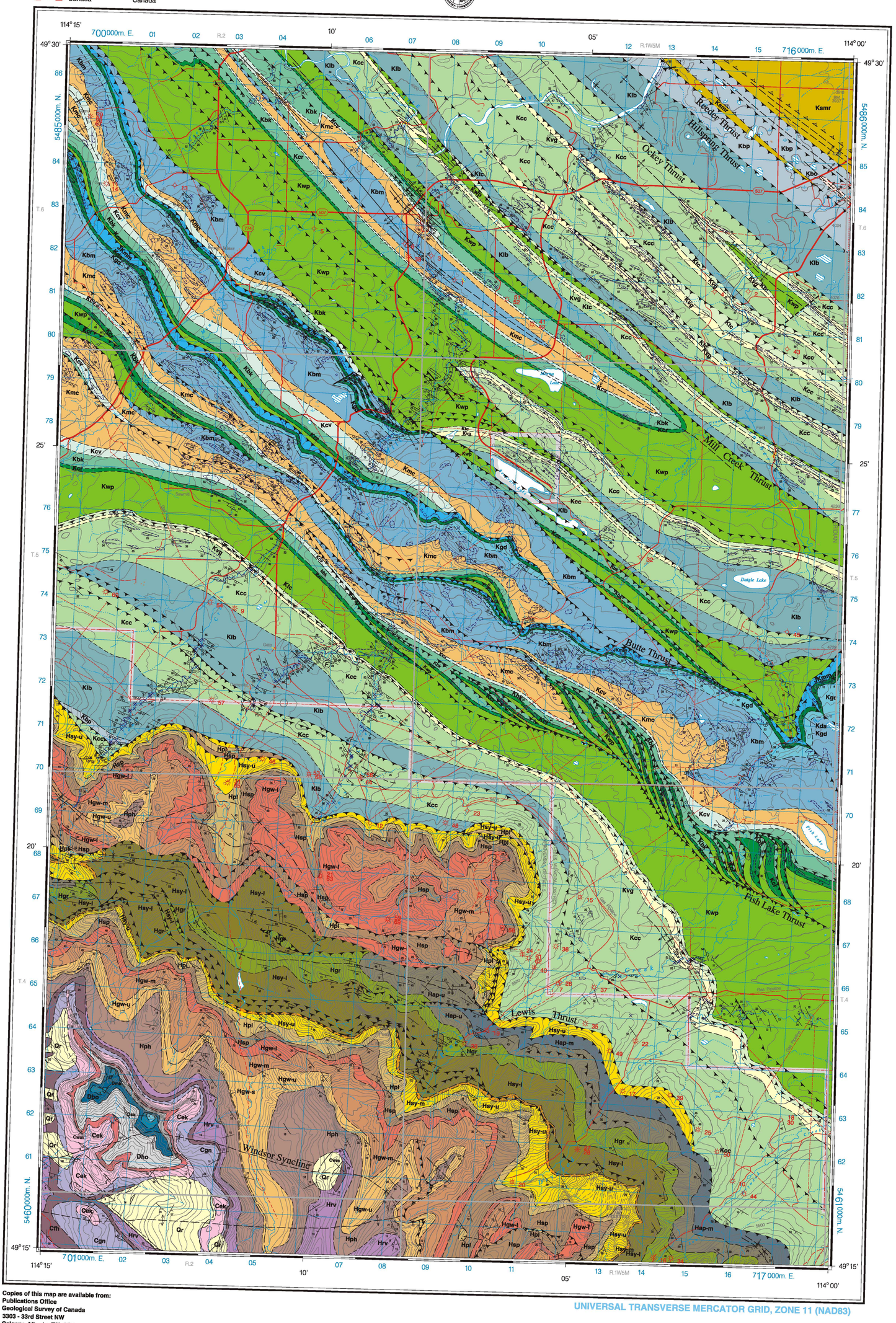


UNIVERSAL TRANSVERSE MERCATOR GRID, ZONE 11 (NAD83)

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NATMAP CARTNAT
Canada's National Geoscience Mapping Program
Le Programme national de cartographie géoscientifique du Canada

GEOLOGY

# BEAVER MINES

## EAST HALF

## ALBERTA

Scale 1:50 000 Échelle 1/50 000

Kilometres 1 0 1 2 3 Kilomètres

Universal Transverse Mercator Projection
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| | | |
|---|---|---|
| 82G/10 Crowsnest | 82G/9 Blairmore MAP 1829A MAP 816A | 82H/12 Brocket GSC Open File 3289 |
| 82G/7 Flathead Ridge MAP 1154A | 82G/8 Beaver Mines MAP 1838A OF 4024 | 82H/5 Pincher Creek GSC Open File 3543 |
| 82G/2 Inverted Ridge | 82G/1 Sage Creek | 82H/4 Waterton Lakes GSC Open File 2855 |

NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND INDEX TO ADJOINING GEOLOGICAL SURVEY OF CANADA MAPS

# LEGEND

## STRATIGRAPHY

### CENOZOIC

**QUATERNARY**
**PLEISTOCENE AND RECENT**

- **Qr** — *Rock slide*

### MESOZOIC

**MESOZOIC**
**UPPER CRETACEOUS**
**MAASTRICHTIAN**

- **Ksmr** — *ST. MARY RIVER FORMATION: siltstone, channel- fill sandstone, and shale; bentonite and ironstone (upper member); brackish grey shale, coal, sandstone (lower member)*
- **Kbo** — *BLOOD RESERVE FORMATION: massive and crossbedded arenite; sandstone concretions; local shale partings; coquina lenses (Ostrea, Halymenites), up to 1 m thick*
- **Kbp** — *BEARPAW FORMATION: dark grey-brown shale; minor thin sandstone, bentonite, and ironstone; basal coquina (Ostrea)*

**CAMPANIAN**
BELLY RIVER GROUP (Kcc, Klb and Kdw)

- **Kdw** — *DRYWOOD CREEK FORMATION: sandstone, dark greenish grey shale; minor coal, coquina*
- **Klb** — *LUNDBRECK FORMATION: greenish grey and red shale; limy concretions, pedogenic limestone, channelized sandstone bodies*
- **Kcc** — *CONNELLY CREEK FORMATION: channelized sandstone bodies and shale; common wood, plants and coaly fragments in sandstone; minor coquina (gastropods), includes laterally equivalent but undifferentiated shale and sandstone of the Pakowki Formation and Deadhorse Coulee Formation (Milk River Group)*

**SANTONIAN**
MILK RIVER GROUP (Ktc and Kvg)

- **Kvg** — *VIRGELLE FORMATION: massive to very thickly crossbedded, fine to medium grained, light grey sandstone, prominent cliff and ridge former.*
- **Ktc** — *TELEGRAPH CREEK FORMATION: coarsening and thickening upward, fine to very fine grained sandstone; siltstone, occasionally nodular; dark grey shale.*

**TURONIAN TO SANTONIAN**
ALBERTA GROUP (Kbk, Kca and Kwp)

- **Kwp** — *WAPIABI FORMATION: dark grey marine shale and minor thin siltstone, fine grained sandstone and calcareous sandstone*
- **Kcr** — *CARDIUM FORMATION: fine to coarse grained, grey sandstone; silty shale; conglomerate*
- **Kbk** — *BLACKSTONE FORMATION: dark grey, silty and concretionary shale; thin beds of fine grained, grey sandstone; basal chert-pebble conglomerate*
- **Kcv** — *CROWSNEST FORMATION: agglomerate; red, green, yellow, and brown tuffaceous shale; green and grey tuffaceous sandstone; minor trachytic flows*

BLAIRMORE GROUP (Kgll to Kmc)

- **Kmc** — *MILL CREEK FORMATION: grey and greenish grey sandstone and shale*
- **Kbm** — *BEAVER MINES FORMATION: grey and greenish grey feldspathic sandstone; green, silty mudstone*
- **Kgd** — *GLADSTONE FORMATION: Calcareous (upper) member : fine-grained grey-green fossiliferous calcareous sandstone, shale and coquina; Lower member: fine grained grey sandstone and siltstone; green and maroon mottled shale with sideritic concretionary horizons*
- **Kda** — *DALHOUSIE FORMATION Basal sandstone member: light grey, medium to very coarse grained quartz arenite*

**JURASSIC TO CRETACEOUS**
KOOTENAY GROUP

- **JKmm** — *MIST MOUNTAIN FORMATION: dark grey and black carbonaceous shale; fine to coarse grained, light and dark grey sandstone and siltstone; medium volatile bituminous coal*

### PALEOZOIC

**DEVONIAN**
**UPPER DEVONIAN**
FAIRHOLME GROUP (Dho-Dsx)

- **Dsx** — *SOUTHESK FORMATION: (carbonate facies): light grey and dark grey-brown, coarsely crystalline biostromal and biohermal dolomite.*
- **Dmh** — *MOUNT HAWK FORMATION: fine-crystalline to very fine-crystalline argilaceous limestone*
- **Dbo** — *BORSATO FORMATION: dark grey and brownish black, finely to coarsely crystalline, fetid dolomite.*
- **Dhc** — *HOLLEBEKE FORMATION: dark grey, very finely crystalline, limestone and argillaceous and nodular limestone; argillaceous and silty dolomite and solution-collapse breccia in the lower part; sandy dolomite and dolomitic quartz sandstone at the base locally.*

**CAMBRIAN**
**MIDDLE CAMBRIAN**

- **Cwm** — *WINDSOR MOUNTAIN FORMATION: grey, medium crystalline dolomite, with dark grey mottled light grey, finely crystalline limestone in lower part.*
- **Cek** — *ELKO FORMATION: medium and light grey, fine to medium crystalline mottled limestone, with dolomite-mottled, fine to very fine crystalline limestone in lower part.*
- **Cgn** — *GORDON FORMATION: micaceous green shale; grey, fine crystalline limestone; minor limonitic quartz sandstone.*
- **Cfh** — *FLATHEAD FORMATION: pale orange, medium and coarse grained conglomerate, quartz sandstone, basal quartzite and conglomerate.*

### PROTEROZOIC

**HELIKIAN (MIDDLE PROTEROZOIC)**
PURCELL SUPERGROUP (Hap-m - Hrv)

- **Hrv** — *ROOSVILLE FORMATION: green and grey argillite; siltstone, and sandstone; oolitic limestone; stromatolitic dolomite.*
- **Hph** — *PHILLIPS FORMATION: red quartzite, sandstone, siltstone and argillite.*
- **Hgw-u** — *GATEWAY FORMATION (Hgw-l - Hgw-u) Upper part: grey and green sandstone; greyish green siltstone; grey and maroon argillite*
  - **Hgw-s** — *Dioritic sill*
- **Hgw-m** — *Middle part: red siltstone and sandstone; thin beds of greyish green siltstone.*
- **Hgw-l** — *Lower part: yellowish grey and red sandstone; colour laminated siltstone; red argillite.*
- **Hsp** — *SHEPPARD FORMATION: pale greyish green dolomite. dolomitic siltstone and sandstone; chloritized and pillowed andesite.*
- **Hpl** — *PURCELL LAVA: dark green, chloritized, amygdaloidal and pillowed andesite.*
- **Hsy-u** — *SIYEH FORMATION (Hsy-l - Hsy-u) Upper part: green , grey and red argillite; light grey molar tooth dolomite; algal limestone and dolomite.*
- **Hsy-m** — *Middle part: grey algal dolomite.*
- **Hsy-l** — *Lower part: grey and green argillite; grey dolomite and limestone; grey algal limestone and dolomite; oolitic limestone.*
- **Hgr** — *GRINNELL FORMATION: red argillite; red and white sandstone and siltstone; intraformational conglomerate.*

*APPEKUNNY FORMATION (Hap-m - Hap-u)*

- **Hap-u** — *Upper part: green and maroon argillite; greyish green and pale red quartzite.*
- **Hap-m** — *Middle part: green argillite; white and grey quartzite.*

## MAP SYMBOLS

*Outcrop (small, large, scattered)*
*Geological boundary (defined, approximate, assumed)*
*Geological boundary (assumed projection under younger deposits)*

### *LOCAL STRUCTURES*

*PLANAR STRUCTURES*
*Bedding, tops known (inclined, overturned)*
*Bedding, tops unknown (inclined, vertical, dip unknown, from triangulation)*
*Cleavage, first phase (inclined)*
*Minor fault (reverse motion, inclined, vertical)*

*Fold axial plane (vertical)*
*Joint (inclined, vertical)*

*LINEAR STRUCTURES*
*Intersection lineation (L$^1_2$)*
*Fold axis (anticline, S-fold, Z-fold)*
*Paleocurrent direction (unknown sense)*

### *REGIONAL STRUCTURES*

*Fault, motion undefined (approximate position)*

### *REGIONAL STRUCTURES*

*Thrust fault (teeth indicate dip direction; defined, approximate, assumed)*
*Thrust fault (assumed projection under cover of younger deposits)*

*Backthrust (assumed)*
*Anticline (upright, overturned)*
*Syncline (upright, overturned)*
*Rockslide scarp or fissure (approximate position)*

*OTHERS*
*Abandonned mine*
*Well (gas [producer, suspended, abandoned]; oil abandoned; dry and abandoned; unknown status)*
*Fossil locality*

*Geology by D. Lebel, 1995,1996, 1999; and S. Hiebert, 1990, 1991; from field work and study of aerial photographs, draped digital orthophoto imagery and seismic data. Contributions from Hage (1943), Hiebert (1992), Jackson and Lebel (1997), Norris (1966) and Price (1964)*

*Acknowledgements to D.A. Spratt, G.S. Stockmal, A.S. Sweet, M. McMechan, T. Jerzykiewicz and Shell Canada for helpful data and discussions. This is a contribution to the Southeastern Cordillera NATMAP project*

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*Price, R.A. 1964. The Devonian Fairholme-Sassenach succession and evolution of reef-front geometry in the Flathead-Crowsnest Pass area, Alberta and British Columbia. Bulletin of Canadian Petroleum Geology, v. 12, p. 427-451.*

*Geological cartography by D. Lebel and S.J. Hinds*

*Any revisions or additional geological information from the user would be welcomed by the Geological Survey of Canada*

*Base map at the same scale published Surveys and Mapping Branch in 1977*

*Copies of the topographical edition of this map area may be obtained from the Canada Map Office, Department of Natural Resources, Ottawa, Ontario*

*CONTOUR INTERVAL 100 FEET*
*Elevations in Feet above Mean Sea Level*
*North American Datum 1983*
*Transverse Mercator Projection*

*NOTES:*

*Base map and geology have been transformed from NAD 27 (North American Datum 1927) to NAD 83.*

## SCHEDULE OF WELLS

| UWID | FULL NAME | Final Drill Date | Surface Location (Easting, Northing) |
|---|---|---|---|
| 1- 100030700601W500 | WEYMARN NO.1 | 31 Dec 1927 | 708301,5481793 |
| 2- 100021100601W500 | CASTLE NO. 1 | 03 Nov 1928 | 715098,5481939 |
| 3- 100050700601W500 | WEYMARN NO.2 | 09 Aug 1937 | 707738,5482318 |
| 4- 100041100601W500 | ANGLO CANADIAN CASTLE RIVER 1 | 07 Mar 1939 | 714321,5481886 |
| 5- 100141100602W500 | ALLIANCE NO.1 | 29 Aug 1940 | 704697,5482779 |
| 6- 100101200602W500 | ARROW-MARION NO.1 | 30 Jun 1945 | 707108,5482556 |
| 7- 100042100401W500 | SHELL WATERTON #1 | 26 Jan 1957 | 711685,5465711 |
| 8- 100030400602W500 | SHELL - IMPERIAL A WATERTON 3-4-6-2 | 14 May 1957 | 701816,5479894 |
| 9- 100061500502W500 | TEXACO GLADSTONE CREEK A-6-15 | 11 Jan 1958 | 703697,5473907 |
| 10- 100070200401W500 | SHELL WATERTON 2 | 18 Feb 1958 | 715988,5461402 |
| 11- 100061700602W500 | SHELL - IMPERIAL B WATERTON 6-17-6-2 | 20 Apr 1958 | 700144,5483523 |
| 12- 100063600402W500 | SHELL 4 WATERTON 6-36-4-2 | 03 Jan 1959 | 707124,5469149 |
| 13- 100061600602W500 | TEXACO CASTLE RIVER 6-16-6-2 | 28 Feb 1959 | 701721,5483582 |
| 14- 100061700602W502 | SHELL - IMPERIAL B WATERTON 6-17-6-2 | 20 Apr 1958 | 700144,5483523 |
| 15- 100062800401W500 | SHELL 5 WATERTON 6-28-4-1 | 07 Jun 1959 | 712073,5467734 |
| 16- 100073400301W500 | SHELL 7 WATERTON 7-34-3-1 | 19 Nov 1959 | 714273,5459530 |
| 17- 100121000401W500 | SHELL 8 WATERTON 12-10-4-1 | 02 Feb 1960 | 713328,5463322 |
| 18- 100061200401W500 | SHELL 9 WATERTON 6-12-4-1 | 03 Feb 1960 | 717018,5462886 |
| 19- 100121700401W500 | SHELL 10 WATERTON 5-17-4-1 | 19 Jun 1960 | 710108,5466528 |
| 20- 100090500401W500 | SHELL 12 WATERTON IN 7-5-4-1 | 07 Nov 1960 | 710911,5461072 |
| 21- 100162600402W500 | SHELL 13 WATERTON 14-26-4-2 | 15 Dec 1960 | 706049,5467858 |
| 22- 100061500401W500 | SHELL 16 WATERTON 5-15-4-1 | 03 Jun 1961 | 713554,5464493 |
| 23- 100123200401W500 | SHELL 17 WATERTON 9-31-4-1 | 05 Aug 1961 | 709347,5469574 |
| 24- 100160300401W500 | SHELL 18 WATERTON 10-20-4-1 | 24 Aug 1961 | 710825,5466343 |
| 25- 100160300401W500 | SHELL 19 WATERTON 4-11-4-1 | 18 Sep 1961 | 715128,5462542 |
| 26- 100042100401W500 | SHELL 14 WATERTON 4-21C-4-1 | 09 Oct 1964 | 711734,5465740 |
| 27- 100150400401W500 | SHELL 21 WATERTON IN 14-4-4-1 | 02 Sep 1968 | 712367,5461912 |
| 28- 100150400401W502 | SHELL 21 WATERTON IN 14-4-4-1 | 02 Sep 1966 | 712367,5461912 |
| 29- 100052000602W500 | SHELL - IMPERIAL WATERTON 14-17-6-2 | 11 Feb 1967 | 699678,5480047 |
| 30- 100061200401W502 | SHELL 9 WATERTON 6-12-4-1 | 26 Mar 1967 | 717018,5462886 |
| 31- 100020300502W500 | SHELL 24 WATERTON 7-34-4-2 | 20 Aug 1970 | 703781,5469877 |
| 32- 100082200501W500 | BAYSEL PHILLIPS ET AL SORGE 6-22-5-1 | 05 Feb 1971 | 712980,5475869 |
| 33- 102121700401W500 | SHELL 29 WATERTON 8-18-4-1 | 07 Aug 1973 | 709616,5464199 |
| 34- 100053500301W500 | SHELL 30 WATERTON 8-34-3-1 | 03 Oct 1974 | 714676,5459632 |
| 35- 100101600401W500 | SHELL 38 WATERTON 10-16-4-1 | 03 Aug 1978 | 712373,5464828 |
| 36- 100132100401W500 | SHELL 39 WATERTON 13-21-4-1 | 28 Dec 1979 | 711581,5466565 |
| 37- 100022100401W500 | SHELL 40 WATERTON 2-21-4-1 | 19 May 1980 | 712528,5465678 |
| 38- 100071200602W500 | OPAL ET AL WATERTON 7-12-6-2 | 09 Aug 1980 | 707209,5482269 |
| 39- 100091000401W500 | SHELL 41 WATERTON 9-10-4-1 | 11 Oct 1980 | 714433,5463298 |
| 40- 100082000401W500 | SHELL 42 WATERTON 8-20-4-1 | 18 Mar 1981 | 711112,5466048 |
| 41- 100160500601W500 | SHELL CDN-SUP WATERTON 16-5-6-1 | 26 Aug 1981 | 710163,5480880 |
| 42- 100160500601W502 | SHELL CDN-SUP WATERTON 16-5-6-1 | 26 Aug 1981 | 710163,5480880 |
| 43- 100060100601W500 | CHEVRON CDN-SUP WATERTON 6-1-6-1 | 09 Mar 1983 | 716078,5480666 |
| 44- 100001020401W500 | SHELL 43 WATERTON 1-2-4-1 | 30 Oct 1985 | 716270,5481128 |
| 45- 100101300501W500 | CHEVRON CDN-SUP WATERTON 10-13-5-1 | 20 Jan 1986 | 716473,5474143 |
| 46- 100050200502W500 | SHELL 44 WATERTON 5-2-5-2 | 24 Oct 1986 | 704555,5470479 |
| 47- 100110400601W500 | SHELL WATERTON 11-4-6-1 | 28 Apr 1986 | 711274,5480245 |
| 48- 100073100401W500 | SHELL 46 WATERTON 7-31-4-1 | 09 Jan 1987 | 708866,5469260 |
| 49- 100011600401W500 | SHELL 47 WATERTON 1-16-4-1 | 22 Feb 1987 | 712973,5464231 |
| 50- 100110200401W500 | SHELL 48 WATERTON 11-2-4-1 | 23 May 1987 | 715594,5462058 |
| 51- 100060800601W500 | SHELL WATERTON 6-8-6-1 | 09 Jul 1987 | 709542,5481420 |
| 52- 100060800601W502 | SHELL WATERTON 6-8-6-1 | 12 Aug 1987 | 709543,5481420 |
| 53- 100133500402W500 | SHELL 49 WATERTON 5-35-4-2 | 25 Jan 1988 | 705645,5470187 |
| 54- 100021600502W500 | SHELL 50 WATERTON 2-16-5-2 | 23 Jul 1988 | 703125,5474009 |
| 55- 100129000401W500 | SHELL WATERTON 12-29-4-1 | 02 Oct 1988 | 709752,5467638 |
| 56- 100032900401W500 | SHELL 52 WATERTON 3-29-4-1 | 07 Oct 1988 | 710317,5466928 |
| 57- 100031000502W500 | SHELL WATERTON 3-10-5-2 | 01 Dec 1988 | 703299,5471765 |
| 58- 100020100502W500 | SHELL 54 WATERTON 9-36-4-2 | 12 Jul 1989 | 706841,5470184 |
| 59- 100113000401W500 | SHELL WATERTON 11-30-4-1 | 06 Mar 1990 | 707665,5466955 |
| 60- 100091700502W500 | SHELL 56 WATERTON 9-17-5-2 | 09 Jul 1990 | 700701,5474103 |
| 61- 100042000401W500 | SHELL 57 WATERTON 4-20-4-1 | 05 Feb 1992 | 710976,5466251 |
| 62- 100042000401W502 | SHELL 57 WATERTON 4-20-4-1 | 25 Apr 1992 | 710976,5466251 |
| 63- 100142600402W502 | SHELL 13 WATERTON 14-26-4-2 | 09 Nov 1995 | 706049,5467858 |
| 64- 100093600402W502 | SHELL 54 WATERTON 9-36-4-2 | 06 Apr 1996 | 706841,5470184 |
| 65- 100073400402W502 | SHELL 24 WATERTON 7-34-4-2 | 31 Jul 1996 | 703781,5469877 |
| 66- 100141700602W502 | SHELL - IMPERIAL WATERTON 14-17-6-2 | 24 Sep 1996 | 699678,5480047 |
| 67- 100141700602W503 | SHELL - IMPERIAL WATERTON 14-17-6-2 | 28 Oct 1996 | 699678,5480047 |
| 68- 100053500402W502 | SHELL 49 WATERTON 5-35-4-2 | 17 Apr 1996 | 705645,5470187 |
| 69- 100053000401W500 | SHELL 58 WATERTON 5-30-4-1 | 03 Jul 1997 | 707665,5466955 |

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Oct. 2001

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