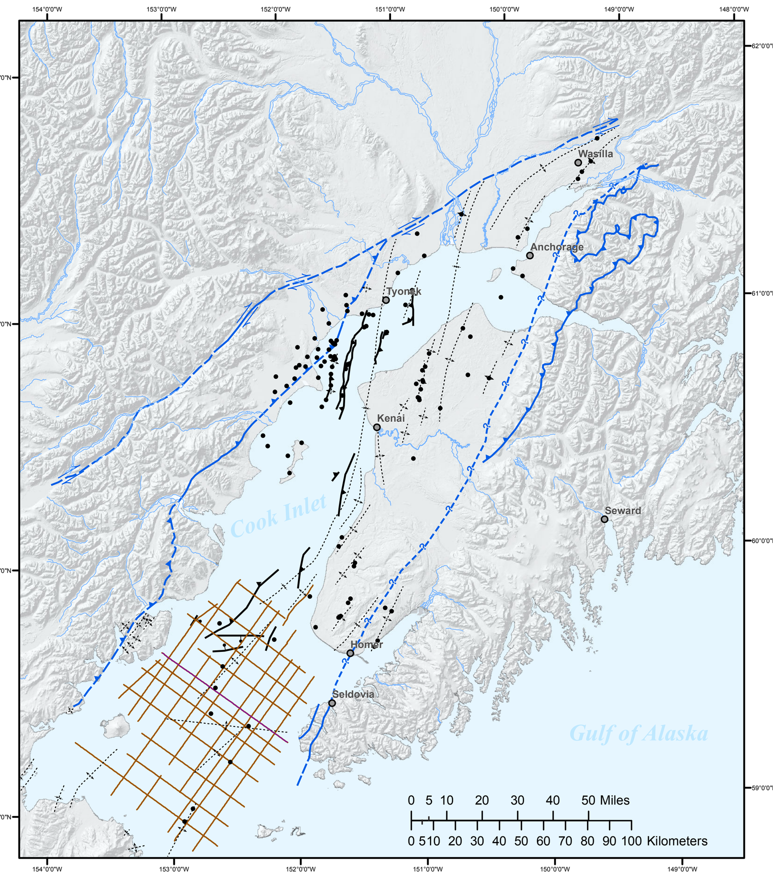
Preliminary Top Mesozoic Unconformity Subcrop Map, Cook Inlet Basin, Alaska

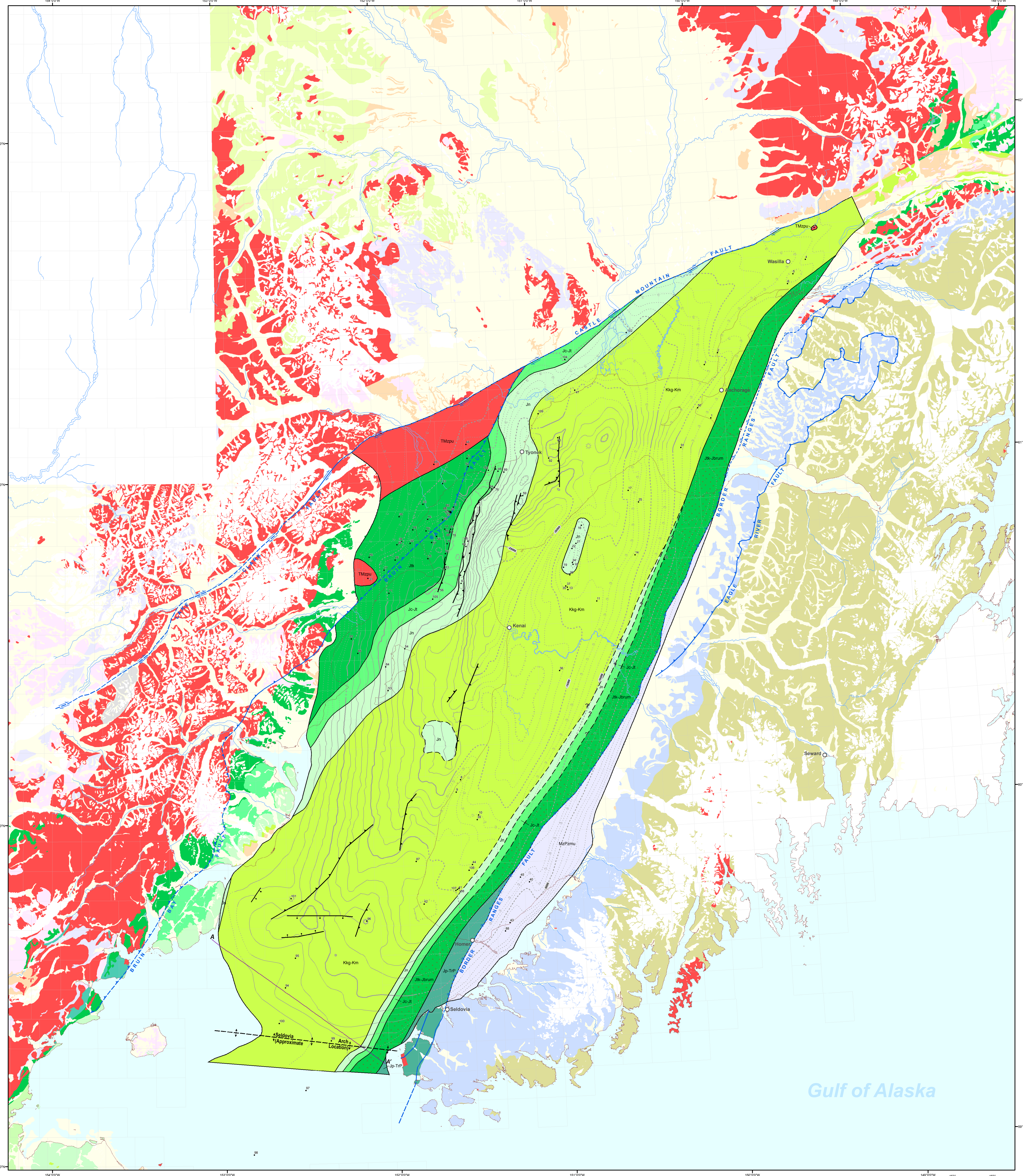
Authors: Gregersen, L.S. & Shellenbaum, D.P.
Alaska Division of Oil & Gas, Anchorage AK, USA

Data Location Map



Formation Tops Table

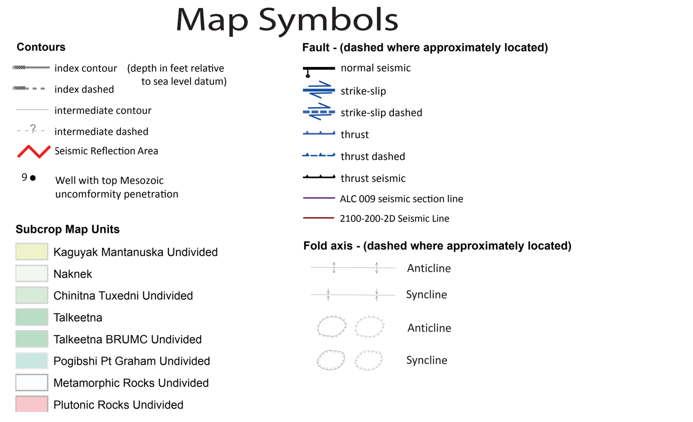
Map No.	API Number	Well Name	Measured Depth (ft)	True Vertical Depth, Subsea (ft)	Formation	Confidence: A=High, B=Moderate, C=Low	Lithology: As Described In Cuttings Or Core	Specific Age Date
1	50009100010000	ROMIG PARK INC - 1	2635	-2494	Mantanuska	A	claystone	
2	50009100030000	KNIK ARM ST - 1	3620	-3521	Mantanuska	A	claystone	
3	50009100040000	LORRAINE ST - 1	7100	-6859	Mantanuska	A	sandstone; Inoceramus	
4	50009100090000	J M NEEDHAM - 1	2121	-1742	Mantanuska	A	claystone; Inoceramus	Maastrictian to Campanian (Zippi)
5	50009100110000	WALLACE KNUTSON - 1A	3453	-3309	Mantanuska	A	claystone; Inoceramus	
6	50009100120000	WASILLA ST - 1	2970	-2937	Mantanuska	A	siltstone	
7	50009200020000	FISHHOOK - 1	1950	-1230	Plutonic Rock	A	granodiorite	
8	50133100020000	NINILCHIK UNION - 1	12700	-12373	Mantanuska	A	claystone	
9	50133100030000	NINILCHIK UNIT MOBIL - 1	12183	-11946	Mantanuska	A	siltstone	E. Maastrichtian (Zippi)
10	50133100047000	DEEP CK - 1RDPB1	13780	-13143	Mantanuska	A	shale; siltstone	
11	50133100170000	NAPTOWNE UNIT - 24-08	14705	-14425	Mantanuska	A	shale	Campanian-Santonian (Zippi)
12	50133100210000	SWAN LK UNIT - 2	5850	-5725	Talkeetna	A	crystalline rock	
13	50133100220000	SOLDOTNA CK UNIT - 22-32	13685	-13330	Matanuska	A	claystone	
14	50133100250000	SWAN LK UNIT - 1	11587	-11232	Mantanuska	A	claystone	
15	50133100280000	W FORELAND - 1	11494	-11404	Talkeetna	A	siltstone, sandstone, tuff	
16	50133100290000	BIRCH HILL UNIT - 22-25	15220	-14992	Naknek	A	shale	
17	50133100360000	PT POSSESSION UNIT - 1	14895	-14680	Mantanuska	A	claystone	
18	50133101090000	SOLDOTNA CK UNIT - 341-04	11090	-10910	Naknek	B	claystone	
19	50133101160000	HALASKO KING OIL - 1	11830	-11705	Naknek	B	claystone	
20	50133101310000	SOLDOTNA CK UNIT - 12-16	12200	-12034	Mantanuska	A	lithology logs unavailable	
21	50133101360000	SWANSON RIV UNIT - 34-10	12020	-11666	Naknek	B	silty shale	
22	50133101450000	SWANSON RIV UNIT - 34-16	12137	-11859	Naknek	B	silty claystone; sandstone	
23	50133200050000	MIDDLE RIV ST SHELL - 1	5250	-5124	Talkeetna	A	volcanic rock	
24	50133200300000	KUSTATAN RIDGE - 1	6686	-6592	Talkeetna	A	basalt	
25	50133200610000	SWANSON LKS - 1	12043	-11801	Mantanuska	A	claystone; Inoceramus	
26	50133201540000	KUSTATAN RIV - 1	3828	-3780	Talkeetna	A	sandstone	
27	50133201700000	JOHNSON SLOUGH - 1	6090	-6045	Talkeetna	A	volcanic rock	
28	50133201770000	BACHATNA CK ST 36448 - 1	6170	-6138	Talkeetna	A	volcanic rock	
29	50133202340000	BACHATNA CK UNIT - 1	3030	-2990	Talkeetna	A	sandstone; tuff	
30	50133202350000	BACHATNA CK UNIT - 3	2825	-2765	Talkeetna	A	conglomerate; volcanic gravel	
31	50133202360000	BACHATNA CK UNIT - 7	2597	-2555	Plutonic Rock	A	granite	
32	50133202500000	W FORELAND ST A - 1	8606	-8549	Talkeetna	A	tuff; pebbles	
33	50133202660000	W MCARTHUR RIV UNIT-INEXCO - 1	5746	-5707	Talkeetna	A	volcanic rock	
34	50133202930000	SOLDOTNA CK UNIT - 33-33	11601	-11446	Naknek	A	claystone; siltstone	
35	50133203620000	WOLF LK ARCO CIRI - 1	13075	-12801	Mantanuska	A	claystone; Inoceramus	
36	50133203650000	FUNNY RIV ARCO CIRI - 1	16650	-16221	Mantanuska	A	claystone	
37	50133203750000	WOLF LK ARCO CIRI - 2	13350	-12738	Mantanuska	A	sandstone	
38	50133204320000	KUSTATAN-CHEVRON - 1	5190	-4866	Talkeetna	A	altered volcanics; claystone	
39	50231100010000	HAPPY VALLEY - 31-22	13209	-12580	Mantanuska	A	sandstone; Inoceramus	
40	50231100030000	ANCHOR RIV - 1	6720	-5224	Metasedimentary Rock	B	claystone; highly siliceous; chert	
41	50231100040000	N FORK UNIT - 41-35	11040	-10260	Matanuska	B	sandstone	
42	50231100050000	ANCHOR PT - 1	8974	-8719	Mantanuska	A	claystone	
43	50231100060000	FRITZ CK - 1	3580	-3425	Metasedimentary Rock	A	sandstone; argillite; muscovite schist	
44	50231200020000	N FORK UNIT - 11-04	12120	-11007	Kaguyak/Matanuska	A	sandstone	
45	50231200030000	S CARIBOU HILL UNIT - 1	9964	-8047	Metasedimentary Rock	A	shale	
46	50283100070000	STEDATNA CK - 1	7080	-6326	Plutonic Rock	A	quartz diorite	
47	50283100080000	IVAN RIV UNIT - 44-01	15135	-15082	Kaguyak/Matanuska	A	sandstone; tuff	Maastrichtian (Zippi)
48	50283100300000	TYONEK ST 17587 - 2	12260	-12154	Tuxedni	B/C	claystone	
49	50283200010000	COTTONWOOD ST - 1	4140	-4061	Plutonic Rock		granite	155 my +/-12 (Zippi)
50	50283200140000	CAMPBELL PT - 1	4315	-4252	Mantanuska	A	tuff; claystone	
51	50283200340000	W TYONEK - 1	6620	-6195	Talkeetna	A	welded tuff	
52	50283200360000	NICOLAI CK UNIT UNION - 5	8540	-8451	Talkeetna	A	volcanic rock	
53	50733100090000	OLDMAN'S BAY ST - 1	11640	-11431	Naknek	A	sandstone	
54	50733100150000	KALGIN IS ST - 1	14101	-14056	Naknek	A	sandstone	
55	50733100160000	DRIFT RIV ST - 1	5010	-4951	Talkeetna	A	claystone; siltstone	
56	50733100240000	REDOUBT SHOAL ST 22064 - 1	14239	-14208	Tuxedni	B/C	claystone	
57	50733100260000	W FORELAND UNIT - 1	10912	-10812	Talkeetna	A	claystone; tuff	
58	50733100350000	W FORELAND UNIT - 4	11070	-11141	Talkeetna	A/B	sandstone;	
59	50733100370000	STATE SRS - 1	16130	-16199	Naknek	A	shale; tuff	
60	50733100410000	MIDDLE RIV ST ARCO - 1	6954	-6873	Talkeetna	A	claystone	
61	50733100450000	KUSTATAN-UNION - 1	11737	-11373	Talkeetna	A/B	claystone; tuff	
62	50733100520000	TRADING BAY - 1A	6010	-5983	Talkeetna	A	claystone; tuff	
63	50733100560000	TRADING BAY ST - A-02	6605	-6291	Talkeetna	A	tuff	
64	50733100590000	GRANITE PT - 1	11508	-11447	Tuxedni	B/C	claystone; indurated	
65	50733100770000	MIDDLE GROUND SHOAL ST SRS - 1	9049	-8995	Naknek	A	claystone	
66	50733100820000	MIDDLE GROUND SHOAL - A43-11	9712	-9549	Naknek	A	claystone	
67	50733200240000	FORELAND ST UNIT - 1	12035	-12001	Naknek	A	claystone; volcanic	
68	50733200310000	W TRADING BAY ST - 1	6251	-6211	Talkeetna	A	lithology logs unavailable	
69	50733200760000	TRADING BAY ST - A-12	7255	-6275	Talkeetna	A	lithology logs unavailable	
70	50733200960000	W FORELAND UNIT - 5	8585	-8494	Talkeetna	A	basalt	
71	50733201280000	KUSTATAN RIV UNIT - 43-30	10440	-10362	Talkeetna	A	sandstone	
72	50733201300000	TRADING BAY UNIT - G-07	11205	-10422	Talkeetna	A/B	lithology logs unavailable	
73	50733201340000	N TRADING BAY UNIT - SPR-04	9985	-9187	Talkeetna	A	lithology logs unavailable	
74	50733201380000	MIDDLE RIV ST UNIT - 2	8080	-7792	Talkeetna	A	silstone; conglomerate	
75	50733201680000	TRADING BAY UNIT - D-17	11630	-10746	Talkeetna	A/B	volcanic fragments	
76	50733201730000	GRANITE PT ST 18761 - MUCI-1	13365	-12041	Naknek	B	shale; sandstone	
77	50733201780000	TRADING BAY UNIT - G-19	12033	-10985	Talkeetna	A	lithology logs unavailable	
78	50733201940000	TRADING BAY UNIT - G-31	12476	-10459	Talkeetna	A/B	lithology logs unavailable	
79	50733201980000	TRADING BAY UNIT - G-32	11535	-10323	Talkeetna	A/B	lithology logs unavailable	
80	50733202140000	TRADING BAY ST - A-11	7180	-6924	Talkeetna	A	lithology logs unavailable	
81	50733204140000	TBU M-28			Talkeetna	A/B	tuff	
82	50733203250000	W TRADING BAY - 1	8660	-8300	Talkeetna	A	tuff; clay	
83	50733203610000	S MCARTHUR RIV - 1A	12830	-12149	Tuxedni	B/C	claystone;	
84	50733203720000	BEARD ST - 1-11	11246	-11126	Naknek	A	claystone	
85	50733204180000	STURGEON - 1	6894	-6830	Talkeetna	A	siltstone	
86	50733204280000	TRADING BAY UNIT - M-29	11191	-10340	Talkeetna	A/B	tuff; claystone	
87	50831100020000	STARICHKOF ST - 1	8750	-8682	Kaguyak/Matanuska	A	claystone	
88	50831100070000	COAL BAY ST - 1	3965	-3908	Metasedimentary Rock	B	silstone; clay; thin bed chert	
89	50883100020000	TYONEK ST 17588 - 1	13200	-13111	Naknek	B	sandstone; conglomerate	
90	50883100180000	N COOK INLET ST - 1	14220	-14291	Matanuska	A	claystone; siltstone	
91	50883200050000	TURNAGAIN ARM UNIT - 1	4213	-4143	Matanuska	A	shale	
92	50883200850000	N FORELAND ST - 1	15569	-15451	Matanuska	A	sandstone	
93	55219000050000	OCS 0168 COHO - 2	4052	-4001	Kaguyak/Matanuska	A	claystone; siltstone	
94	55220000010000	OCS COST LOWER COOK INLET - 1	2550	-2459	Kaguyak/Matanuska	A	siltstone	Maestrichtian - microfossils (Turner 1986)
95	55220000020000	OCS 0097 RAVEN - 1	2595	-2505	Kaguyak/Matanuska	A	siltstone; claystone	
96	55220000030000	OCS 0086 GUPPY - 1	5010	-4965	Kaguyak/Matanuska	A	siltstone; claystone	Campanian @ 5080 - forams & nannofossils (BSEE)
97	55220000050000	OCS 0136 BEDE - 1	3505	-3427	Kaguyak/Matanuska	A	claystone	Campanian or older (Zippi)
98	55220000060000	OCS 0152 BOWHEAD - 1	3935	-3856	Kaguyak/Matanuska	A	claystone	
99	55220000070000	OCS 0124 S ARCH - 1A	1350	-1271	Kaguyak/Matanuska	A	claystone; shale	
100	55220000080000	OCS 0113 IBIS - 1	670	-591	Kaguyak/Matanuska	A	sandstone	
101	55220000090000	OCS 0243 FALCON - 1	1995	-1884	Kaguyak/Matanuska	A	siltstone; claystone	Maastrichtian (BSEE)
102	50283100110000	BELL IS - 1	11000	-10951	Naknek	A	claystone	
103	50283200060000	ALBERT KALOA - 1	13510	-13204	Tuxedni	B/C	claystone	
104	50283200110000	LEWIS RIV - 13-02	11170	-11026	Tuxedni	B	claystone	
105	50733200330000	STATE 36465 - 1	13940	-13826	Tuxedni	A	claystone	
106	50231200210000	RED - 1	12015	-10719	Kaguyak/Matanuska	A	claystone; siltstone	
107	50231200340000	NORTH FORK UNIT - 32-35	11965	-11286	Kaguyak/Matanuska	A	claystone; siltstone	
108	50231200350000	NORTH FORK UNIT - 14-25	11445	-10068	Kaguyak/Matanuska	A	siltstone; claystone	
109	50283100270000	BELUGA RIVER UNIT - 212-35	14760	-14657	Kaguyak/Matanuska	B	claystone	



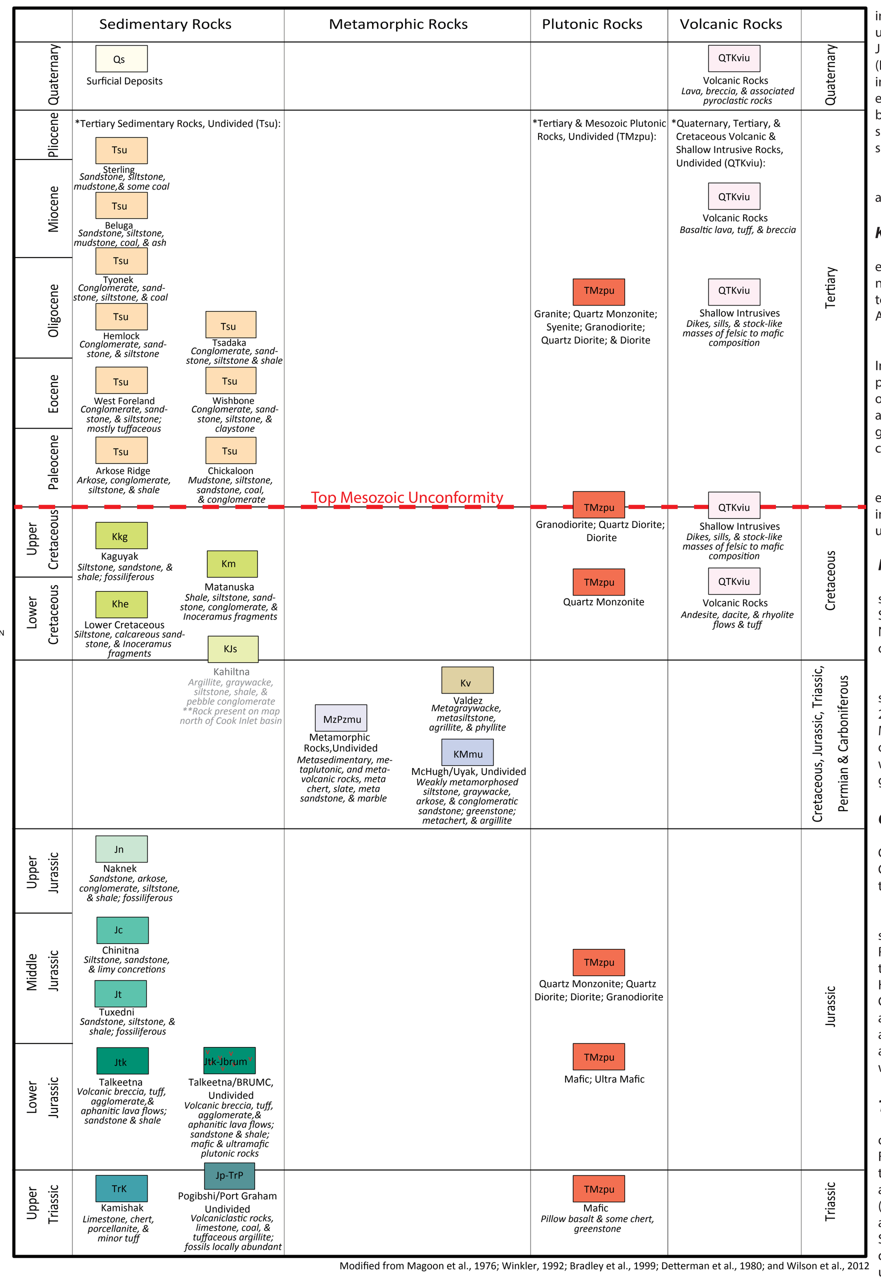
TOP MESOZOIC UNCONFORMITY SUBCROP MAP, COOK INLET BASIN, ALASKA

by L.S. Gregersen and D.P. Shellenbaum
2014

Map Symbols



Cook Inlet Stratigraphic Explanation



Modified from Magoon et al., 1976; Winkler, 1992; Bradley et al., 1999; Detterman et al., 1980; and Wilson et al., 2012

Abstract

This map shows the subcrop pattern of the Mesozoic rock units present at the top Mesozoic unconformity (also commonly referred to as the base Tertiary unconformity) in Cook Inlet basin, Alaska. The subcrop is projected onto the top Mesozoic unconformity depth surface of Cook Inlet basin, Alaska, published by Shellenbaum and others (2010). Oil in Cook Inlet basin is primarily sourced out of the Middle Jurassic Tuxedni Group (Magoon and Anders, 1992; Magoon, 1994), thus the subcrop trends of the Middle Jurassic oil source rock and other potential Mesozoic-age reservoirs are an important consideration in oil exploration in the inlet.

Publicly available geologic and geophysical data from multiple sources were collected, interpreted, and integrated into the subcrop map. Formation picks at the top Mesozoic unconformity were determined for 109 wells. Mesozoic horizons from two regional marine two-dimensional (2-D) seismic datasets (~3,300 miles) were interpreted. Eight map units were established for the Mesozoic subcrop map: Kaguyak–Matanuska Formations, undivided; Naknek Formation; Chinitna Formation–Tuxedni Group, undivided; Talkeetna Formation; Talkeetna–Border Ranges ultramafic and mafic complex (BRUMC), undivided; Pogibshi–Port Graham formations, undivided; plutonic rocks, undivided; and metamorphic rocks, undivided. Well formation picks, marine 2-D seismic interpretation, projection from outcrop, and interpreted aeromagnetic data had the greatest influence on the subcrop map unit boundaries.

Each Mesozoic sedimentary map unit regionally trends northeast–southwest, with perturbations in the map pattern often due to paleogeography and localized faulting and folding. The Mesozoic sedimentary rocks, in general, form a broad syncline with the Lower Jurassic Talkeetna bounded by plutonic rocks of the Alaska Range batholith on the west, and the Lower Jurassic and Upper Triassic bounded by metasedimentary rocks of the McHugh Formation on the east (Fisher and Magoon, 1978; Boss and others, 1976). Seismic line ALC-009, a migrated dip line located in lower Cook Inlet, illustrates the broad syncline shape of the Mesozoic units. The subcrop patterns of the Middle and Upper Jurassic map units parallel the Talkeetna on each side of the basin, and the Upper Cretaceous Kaguyak–Matanuska map unit lies in the center of the subcrop map.

This map was prepared as part of a multi-year effort by the Alaska Department of Natural Resources to provide the public with the most accurate information possible on the geologic framework of this economically important area.

Data Collection

Publicly available geologic and geophysical data that inform the subcrop map were collected and cataloged. These data include: wireline logs and lithology logs obtained from the Alaska Oil and Gas Conservation Commission (AOGCC); AMSTRAT logs (Canadian Stratigraphic Services); drill cuttings and core available at the Alaska Geologic Materials Center; palynology data (Zippi, 2006); biostratigraphy data (BSEE library; Magoon, 1986); Spectrum Geo and Seitel, Inc.-owned (Spec 2-D Marine CI88 and CI89 prefix) seismic data; public 1975 Marine seismic data (ALC prefix, donated to the U.S. Geological Survey (USGS) by WesternGeco); aeromagnetic data (R.W. Saltus, written commun.; Haeussler and Saltus, in press); geologic maps of the Cook Inlet region (Magoon and others, 1976; Winkler, 1992; Bradley and others, 1999; Detterman and Reed, 1980; Wilson and others, 2012); previous subcrop map interpretations (Kirshner and Lyon, 1973; Magoon and others, 1980; Gregersen and Shellenbaum, 2010); published cross sections through the basin (Boss and others, 1976; Magoon and Claypool, 1981; Church and others, 1969; Church and others, 1970; Wilson and others, 1985; Laughbaum and others, 1975; Seamount, 2005); and the top Mesozoic unconformity depth map for Cook Inlet basin (Shellenbaum and others, 2010).

Subcrop Map Structural Surface

The Mesozoic subcrop map is projected onto the top Mesozoic unconformity depth surface of Cook Inlet basin, Alaska, published by Shellenbaum and others (2010). This surface is the boundary between the Tertiary sediments that comprise the majority of the oil and gas reservoirs and the Mesozoic oil source rock. The contours and seismically derived fault patterns are the same as the 2010 publication.

The outer boundary of the subcrop map mimics the map boundaries of the top Mesozoic unconformity depth map of Cook Inlet basin, Alaska, as defined by Shellenbaum and others (2010). The northern boundary is the Castle Mountain fault. The northwestern boundary is the Bruin Bay fault. The western and eastern boundaries are the zero contour (mean sea level) of the top Mesozoic unconformity structure map. The southern boundary is the southernmost extent of the top Mesozoic unconformity depth map contours, which lies just south of the Seldovia Arch.

Formation Picks

Formation picks at the top Mesozoic unconformity were determined for 109 wells in Cook Inlet basin (see formation tops table). The formation picks were primarily interpreted from drill cuttings and wireline logs, and, when available, core, palynology, biostratigraphy, and mapped bedrock. Each formation pick was assigned a confidence rating.

The easiest formations to distinguish from cuttings and core chips at the top Mesozoic unconformity were the Upper Cretaceous to upper Lower Cretaceous Kaguyak–Matanuska Formations, undivided, and the Lower Jurassic Talkeetna Formation. Plutonic and metamorphic rock cuttings were also relatively easy to identify. The most challenging formations to clearly identify in cuttings at the top Mesozoic unconformity were the Upper Jurassic Naknek Formation and the Middle Jurassic Chinitna Formation–Tuxedni Group, undivided. Age calls from palynology and biostratigraphy, seismic character, and proximity to mapped bedrock helped differentiate between the Upper and Middle Jurassic rock units.

Geophysical Interpretation

Two regional 2-D marine seismic datatsets (data location map) were used to interpret three Mesozoic horizons, Upper Jurassic Naknek, Middle Jurassic Tuxedni, and Lower Jurassic Talkeetna. The primary data were the same CI88 and CI89 multi-client seismic (~2,280 miles, now marketed by Spectrum Geo and Seitel, Inc.) used in the construction of the top Mesozoic unconformity depth map. USGS seismic data from lower Cook Inlet were migrated and interpreted to provide additional control (~1,020 miles, 1975 vintage ALC data available from the NAMSS website) . The final interpretation was an internally consistent set of horizon picks that honored all of the well control. Between well control the interpretation was sometimes based on wavelet character, but in many areas depended on projections and dip interpretation rather than consistent character picks. The fact that the Naknek and Talkeetna Formations are significant unconformities, often angular, aids in the regional correlation and extrapolation away from well control. Naknek and Tuxedni/Talkeetna horizons are also often characterized by high-energy packages. Wells with Mesozoic formation tops used to constrain the horizon picks included Outer Continental Shelf [OCS] wells in lower Cook Inlet and the North Forelands St 1 well in upper Cook Inlet. In the middle and upper Cook Inlet, where Mesozoic well control was sparse, the horizon picks were influenced by the formation picks at the top Mesozoic unconfomity and by seismic character. Synthetic seismograms from sonic and density logs were created when available, but due to low seismic frequencies and poor signal to noise in the deeper data, statistical or character ties were problematic. Insights from the synthetics were used to guide the picks away from wells, (for instance, in the OCS synthetics the Naknek Formation was often a strong peak); and the Talkeetna Formation often had a strong peak near the base of a high-energy section. Picks away from well control were also guided by higher/lower energy trends in the section and interpretations of regional dip. Interpretations were complicated by interference from strong multiples, which overrode true formation dips in many places.

Formation top depths were projected in seismic two-way time based on interpolated check shots constrained by the top Mesozoic unconformity depth surface. Public check shots are available in three wells, OCS 0243 (Falcon) #1, OCS 0086 (Guppy) #1, and OCS 0168 (Coho) #2. In areas where little to no publicly available seismic or well data were available, interpreted aeromagnetic data were used to guide map unit boundaries (R.W. Saltus, written commun.; Haeussler and others, in press).

Subcrop Map Units

Eight map units were established for the top Mesozoic subcrop map, based on well formation picks, 2-D seismic interpretation, interpreted aeromagnetic data, and surrounding bedrock geology. The sedimentary rock units include: Kaguyak–Matanuska Formations, undivided (Upper to upper Lower Cretaceous); Naknek Formation (Upper Jurassic); Chinitna Formation–Tuxedni Group, undivided (Middle Jurassic); Talkeetna Formation (Lower Jurassic); Talkeetna Formation–Border Ranges ultramafic and mafic complex (BRUMC), undivided (Lower Jurassic); and Pogibshi–Port Graham formations, undivided (Lower Jurassic to Upper Triassic). The metamorphic rocks are lumped into one unit, Metamorphic rocks, undivided (Cretaceous to Triassic); the igneous rocks are lumped into one unit, Plutonic rocks, undivided (Triassic to Tertiary). A composite of 15 map units exist from the combined subcrop map in the subsurface and the surrounding bedrock geology from the USGS 2012 geologic map of the Cook Inlet region (Wilson and others, 2012). These units include the eight subcrop map units listed above as well as surficial deposits (Quaternary); Tertiary sedimentary rocks, undivided; Lower Cretaceous sedimentary rocks; Valdez Group (Upper Cretaceous); and McHugh–Uyak, undivided (Cretaceous to Mississippian).

The following paragraphs provide rock descriptions for the eight subcrop map units as they are observed in outcrop, cuttings, and core.

Kaguyak-Matanuska Formations, undivided

The Kaguyak–Matanuska Formations, undivided, are interpreted at the top Mesozoic unconformity in wells in central and east-central Cook Inlet basin. In the subsurface these two units are treated as correlative, with the formation name changing from Matanuska in upper Cook Inlet to Kaguyak south of Kalgin Island in lower Cook Inlet. Outcrops of Matanuska Formation are present along trend to the northeast in the Matanuska Valley, and outcrops of the Kaguyak Formation are present along trend to the south on the upper Alaska Peninsula.

The Matanuska Formation is described in outcrop as dark-gray, marine shale, siltstone, sandstone, and conglomerate with Inoceramus fragments and ammonites (Grantz, 1964; Trop, 2008). The Kaguyak Formation is described in outcrop as dark-gray to pale-brown, marine, fossiliferous, siltstone, sandstone, and shale (Detterman and Miller, 1985; Wartes and others, 2013b). Documentation of nonmarine sediments in the Kaguyak is found in the COST LCI well and in outcrop (Magoon, 1986; Magoon, and others, 1980; LePain and others, 2012). The cuttings interpreted as Kaguyak–Matanuska Formations, undivided, are described as dark-gray shale, gray–green to gray–brown siltstone, and sandstones with Inoceramus prisms. Palynology data analyzed in these wells are interpreted to be Late Cretaceous (Zippi, 2006), which supports the Kaguyak–Matanuska Formation, undivided, interpretation.

The Lower Cretaceous is not included in this map unit because of seismic and outcrop observations. In lower Cook Inlet, on the east side of the basin, the Lower Cretaceous appears to pinch out, based on seismic data, before it reaches the subcrop surface (see interpreted seismic line). In lower Cook Inlet on the west side of the basin, the Upper Cretaceous Kaguyak–Matanuska, undivided, map unit (Saddle Mountain) is in contact with the underlying Naknek Formation.

Naknek Formation

The Naknek Formation is interpreted at the top Mesozoic unconformity in wells in the west-central portion of the basin, along strike of Naknek outcrops on the Iniskin Peninsula. The Naknek Formation is also interpreted at the top Mesozoic unconformity in wells at Swanson River Field on the east side of the basin. Seismic data in lower Cook Inlet indicate a northeast–southwest subcrop trend for the Naknek on the east side of the basin. The 2-D data also suggest that there is a window of Naknek at the top Mesozoic unconformity, offshore, northwest of the Ninilchik Union 1 well.

The Naknek Formation is described in outcrop as light- to dark-gray, fossiliferous, marine sandstone, arkose, conglomerate, siltstone, and shale having a primarily plutonic provenance (Detterman and Hartsock, 1966; Detterman and others, 1996; Trop and others, 2005; Wartes and others, 2013 b). Multiple wells in the west-central portion of the basin are assigned an age of Late Jurassic at the top Mesozoic unconformity: Bell Island 1, State SRS 1, MGS State SRS 1, Kalgin Island State 1, and Oldmans Bay State 1 (Zippi, 2006; Boss and others, 1976). Cuttings in these wells at the top Mesozoic unconformity are described mostly as gray to gray–green claystone, siltstone with some sandstone, arkose, tuff, and argillite. In the Swanson River field area, the cuttings interpreted to be Naknek include: gray to gray–green siltstone, sandstone, and claystone, mica, tuff, and glauconite.

Chinitna Formation-Tuxedni Group, undivided

The Chinitna Formation–Tuxedni Group, undivided, is interpreted at the top Mesozoic unconformity in wells on the west side of Cook Inlet, along strike of the Chinitna and Tuxedni outcrops on the Iniskin Peninsula. On the east side of the basin, seismic data in lower Cook Inlet indicate a northeast–southwest subcrop trend, but no wells are interpreted to have Chinitna Formation or Tuxedni Group at the top Mesozoic surface on the east side of the basin.

In outcrop, the Chinitna Formation and Tuxedni Group are described as light- to dark-gray and green, marine, fossiliferous, siltstone, sandstone, and shale with the Chinitna Formation having many limy concretions (Detterman and Hartsock, 1966; Detterman and Reed, 1980). Both the Chinitna Formation and the Tuxedni Group contain a mixture of plutonic and volcanic detritus and clasts presumed to be derived from erosion of the Talkeetna Formation and related plutonic rocks of the early Jurassic magmatic arc (Detterman and Hartsock, 1966; Trop and others, 2005). Two wells, Iniskin Unit Beal and Iniskin Unit Zappa, are drilled in surface outcrops of Tuxedni. Green–gray and brown–gray siltstone, sandstone, conglomerate, and shale are documented in cuttings in these wells. A Middle Jurassic age call was assigned to the rocks at the top Mesozoic unconformity in the State 364651 1 well (Zippi, 2006). The cuttings in those wells are described as light-gray to green–gray and brown, claystone, silty claystone, indurated, argillaceous, weathered, and slightly micaceous at the top Mesozoic unconformity. The remaining wells were inferred to be Chinitna Formation–Tuxedni Group because of similar cuttings, wireline log signature, and/or proximity to the age-dated wells.

Talkeetna Formation and Talkeetna Formation-Border Ranges ultramafic and mafic complex, undivided

Error and Uncertainty

Acknowledgements

References

Affiliations

Presented at 2014 Alaska Geological Society Technical Conference
Anchorage, Alaska, May 15, 2014