GRAVITY SURVEY OF BELUGA BASIN AND ADJACENT AREA, COOK INLET REGION, SOUTH-CENTRAL ALASKA

By
Steve W. Hackett

GEOLOGIC REPORT 49

STATE OF ALASKA

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Cover: University of Alaska geophysicist Juergen Kienle taking a gravity reading in Tordrillo Mountains, adjacent to Beluga basin. Photo by S.W. Hackett.

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GRAVITY SURVEY OF BELUGA BASIN AND ADJACENT AREA, COOK INLET REGION, SOUTH-CENTRAL ALASKA

By Steve W. Hackett[1]

ABSTRACT

Two hundred gravity stations were occupied in a previously unsurveyed area between latitudes 60° and 62° N. and longitudes 151° and 153° W. Interpretation of a simple Bouguer gravity map, compiled from this survey and from previously acquired U.S. Geological Survey reconnaissance data, indicates that the tectonic framework of the region differs in many respects from that previously published.

Several gravity lows identify sedimentary basins within the Cook Inlet petroleum province. Geologic interpretation of the geophysical data provides a better estimate of the structural configuration and thickness of Tertiary sedimentary deposits in the Cook Inlet, Beluga, Susitna, and Yentna basins. Steep gravity gradients indicate these subprovinces were down dropped along deep-seated basement faults. The gravity gradients, which are offset from the fault traces, suggest a high-angle reverse nature for the Castle Mountain, Bruin Bay, and Beluga Mountain fault zones. The Beluga Mountain fault, a newly recognized structural feature, is inferred to have a vertical displacement in excess of 10,000 feet (3,000 m).

ACKNOWLEDGMENTS

The data and interpretations presented in this report are the result of a 2-year geological and geophysical study of the upper Cook Inlet region, which was part of an M.S. graduate program at the Geology Department and Geophysical Institute, University of Alaska, Fairbanks. The thesis represents a partial synthesis of gravity, magnetics, and structural geology data. The author's interest in the Beluga basin and adjacent areas began in the summer of 1967 while working in Alaska for Union Oil Company of California.

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Helicopter and logistical support for this gravity survey was provided by the Alaska DGGS. Special thanks are extended to Dr. Smith, former Chief Mining Geologist for the Alaska DGGS, for his continued interest and recommendations in supporting the Beluga basin project.

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INTRODUCTION

The report area (fig. 1) centers on Beluga basin and lies between latitudes 60° and 62° N. and longitudes 151° and 153° W. The Beluga basin occupies approximately 600 square miles (1,560 square km) in the west-central portion of the Cook Inlet lowlands, a long, narrow embayment in the south-central coast of Alaska. The Cook Inlet region, which includes the Cook Inlet, Beluga, Susitna, and Yentna basins (fig. 2), is

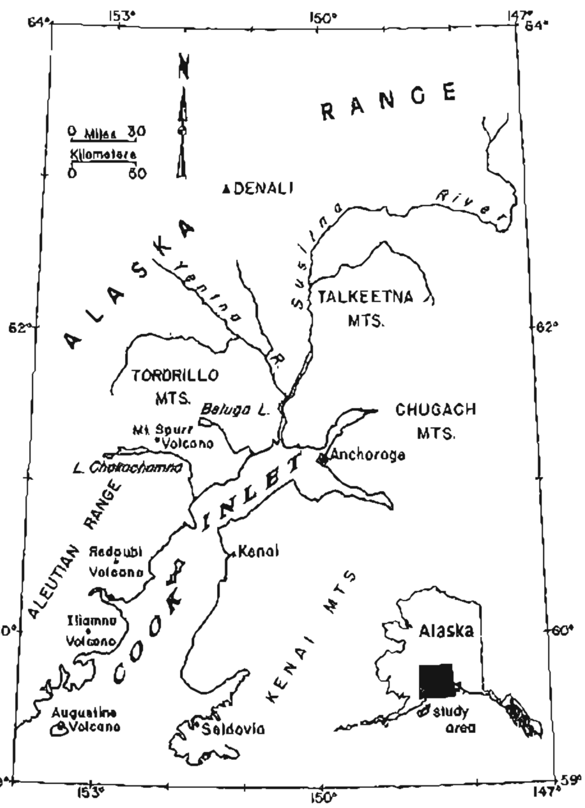

Figure 1. Location of study area, south-central Alaska, showing boundaries of gravity survey.

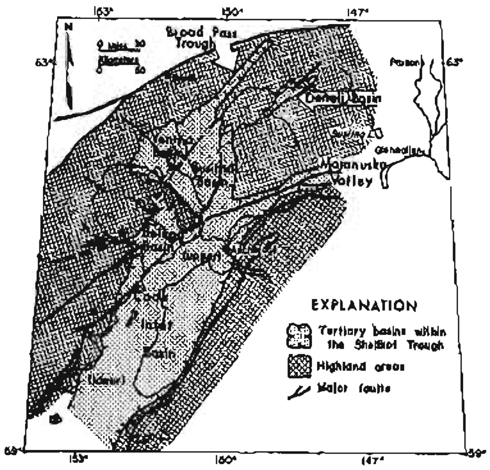

Figure 2. Cenozoic basin outline, Cook Inlet region, outlining the upper Shelikof Trough with enclosing Tertiary basins, highland areas, and major fault systems.

bordered on the east by the Kenai, Chugach, and Talkeetna Mountains, and on the north and west by the Alaska and Aleutian Ranges. These highland areas enclose a lowland embayment that is underlain by oil-, gas-, coal-, and uranium-bearing (Eakins and Forbes, 1976) beds of Tertiary age which form exposures along the Cook Inlet shoreline and river systems. The region is generally mantled by surficial deposits of glacial and fluvial origin. Exposed bedrock units ranging in age from Permo-Triassic through late Tertiary have been identified in the area. Several major regional fault systems and their junctions are present in the upper Cook Inlet region.

In the summer of 1974, 200 gravity stations were occupied in the previously unsurveyed Beluga basin area. The data have been incorporated in a gravity map of the State of Alaska at a scale of 1:2,500,000 (Barnes, 1976).

The primary objectives of the Beluga basin gravity study were: 1) to partially eliminate a regional gravity data void in south-central Alaska (Barnes, 1967), 2) to compile and interpret the regional gravity and magnetic data over the upper Cook Inlet region, 3) to outline and trace the major structural features throughout the area, and 4) to delineate the basement configuration and gross thicknesses of Tertiary sediments in the northern portion of the Shelikof Trough.

COLLECTION AND REDUCTION OF GEOPHYSICAL DATA

GRAVITY DATA

A LaCoste-Romberg gravimeter (No. 248) of the University of Alaska Geophysical Institute and standard field-data reduction procedures were used for the Beluga basin gravity survey. Two hundred new gravity stations were located on U.S. Geological Survey 1:63,360- and 1:250,000-scale topographic maps of the Tyonek and Kenai quadrangles (fig. 3). Elevation control for the gravity survey was obtained by occupying sites located at U.S. Coast and Geodetic Survey Vertical Angle Bench Marks (VABM's), prominent topographic features for which photogrammetric spot elevations had been given, and accessible points along streams and rivers for which gradients could be calculated. Many of the gravity stations did not fall on sites with known elevation, and extensive use of altimetry was required to provide additional elevation control. Most stations were reached by helicopter. The Beluga River gasfield airstrip on the western shore, operated by Standard Oil Company of California, was the base of operations during the 7-day gravity survey.

Observed gravity values were tied to the Anchorage International Airport Post Office gravity base station BL31 (Barnes, 1968). A second-order base station (BELU Base) was established at the Beluga gasfield airstrip. By using a reduction density of 2.67 gm/cm^3, simple Bouguer anomalies were computed with an IBM 360/40 computer. Principal facts of the gravity observations and reductions are listed in appendix A.

Elevations, when altimetry was used, may be in error by as much as 33 feet (10 m), giving rise to anomaly errors as large as ± 2 milligals (app. B). Terrain corrections were calculated for selected stations out to zone M on Hammer's charts (Hammer, 1939; Hayford and Bowie, 1912), which ranged from 0 in the lowland areas to 5 mgals in the most mountainous areas. Fortunately, the low topographic relief over much of the study area resulted in terrain corrections which were less than the errors due to poor elevation control. Therefore, a simple Bouguer gravity anomaly map, which is not corrected for terrain effects (pl. 1), was contoured from the gravity values.

AEROMAGNETIC DATA

Reconnaissance aeromagnetic data over the region were obtained from Grantz and others (1963), who summarized the results of 42 east-west aeromagnetic profile lines flown across the Cook Inlet-Susitna lowlands at an altitude of about 2,500 feet above mean sea level. These lines were flown 2 miles apart over most of the Beluga basin area, but elsewhere they were up to 16 miles apart and only regional trends were investigated.

Because of the generally wide line spacing, no attempt was made to construct a contoured map. The profiles were not adjusted to a common datum and were therefore used for qualitative interpretation only. The variety of trends and anomaly patterns in the reconnaissance magnetic data reflects the diverse basement geology of the Beluga basin area, which includes a complex assembly of igneous, metamorphic, and volcanic rocks. Major magnetic anomalies are described by Grantz and others (1963). Flight lines coincident with selected gravity profiles were used in constructing geological cross sections.

GROUND MAGNETIC DATA

Ground magnetic field data were measured in 154 stations in the survey area (app. C). A portable total-field proton-procession magnetometer with a digital counter was set up at each station. Five 3-second digital readings (± 3 gammas) of the total magnetic field were recorded in succession at each locality. Because diurnal and other time variations affect the field data, individual measurements at a particular station varied by as much as 20 gammas. However, most of the stations occupied had a repeatibility of ± 5 gammas. Near-surface effects are believed to have caused extremely high magnetic gradients up to 100 gammas per 25 feet in some areas. Magnetic storms produced invalid readings that may have varied as much as ± 50 to ± 200 gammas in a few minutes. Errors of 5 to 200 gammas are believed to be present in the data but greater errors are surely possible. The mean arithmetic values of the measured magnetic field data are given in appendix C. The magnetic field data were reduced and calculated by computer program. The magnetic declination, dip (inclination), theoretical regional field (1965 IGRF updated to 1974), the total measured magnetic field, and an uncorrected anomaly were computed for each occupied station. The total field values with the regional trend removed probably express deep-seated intrabasement discontinuities. Thus, ground magnetic data (anomalies) generally outline the "grain" of the basement and are useful in defining the major tectonic trends in the area. The large data net, uncertainty of errors, and high magnetic gradients prohibit the presentation of an accurate ground magnetic anomaly contour map. Selected ground magnetic profiles were qualitatively interpreted and are presented with the structural sections (pl. 3).

REGIONAL GEOLOGICAL SETTING AND MAJOR TECTONIC FEATURES

The geology of the study area is summarized from work of several investigators whose names and publications are listed on the geologic map (pl. 2).

The larger portions of the Tyonek, Kenai, and Talkeetna quadrangles are included in the upper Shel-

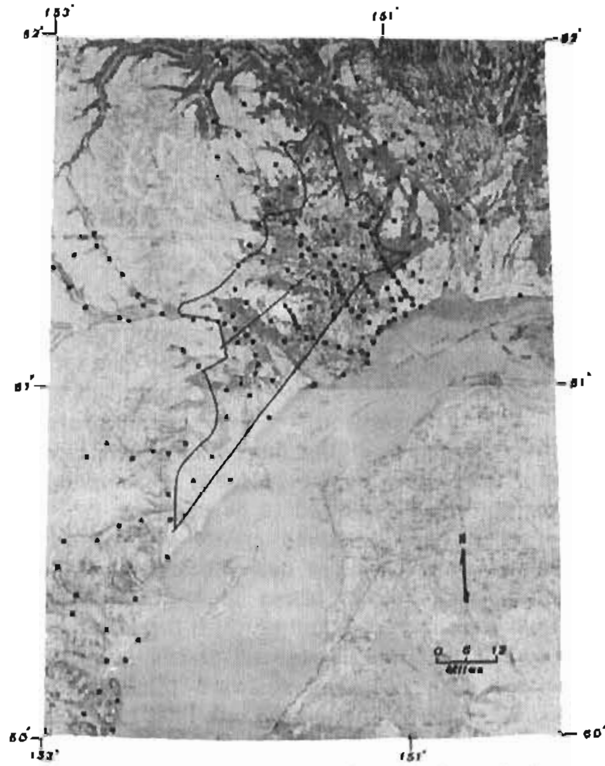

Figure 3. Gravity stations in Beluga basin and adjacent areas.

ikof Trough. This large Cenozoic trough encloses the Cook Inlet, Beluga, Susitna, and Yentna basins (fig. 2).

Regional structural trends and major tectonic elements in south-central Alaska were first delineated by Payne (1955), who recognized that south-central Alaska is dominated by five narrow, parallel, and arcuate tectonic features developed in Mesozoic time. The Shelikof Trough was superimposed on these features in early Cenozoic time (fig. 4). The predominant strike of lithologic contacts and major faults and folds either parallels or cuts obliquely across these Mesozoic and Cenozoic tectonic elements. Gates and Gryc (1963) noted that the Cenozoic Shelikof Trough is apparently not directly controlled by, but is superimposed on, all the older Mesozoic tectonic elements. This trough is characterized by broad negative gravity anomalies and magnetic patterns. The arcuate Talkeetna geanticline, which exposed a sequence of Jurassic plutonic, volcanic, and marine sedimentary rocks, appears to be laterally offset by faults in the Cook Inlet region. The Mesozoic Talkeetna geanticline is represented by areas of dextrally offset high-Bouguer values (Hackett, 1976b).

A geologic map compiled by Beikman (1974) and data from USGS and Alaska DGGS personnel provide more detail information about the major lithologic units of south-central Alaska (fig. 5). Published data from industrial sources, combined with those available from state and federal agencies, provide sufficient detail on fault trends, alignment of fault blocks, and orientation of folded structures to permit a fairly detailed synthesis and delineation of the structural features in the upper Cook Inlet region (Hackett, 1974 and 1976a). Generalized geology, major fault-bounded blocks, and physiography of the area are shown in figures 5 and 6.

REGIONAL GEOPHYSICAL SETTING

GRAVITY ANOMALIES

The structural grain of Beluga basin and adjacent areas is clearly delineated by the gravity data (pl. 1) and reconnaissance aeromagnetic data (Grantz and others, 1963). Gravity highs are generally associated with all known exposures of the pre-Tertiary basement rocks, and gravity lows in the lowlands correspond to the areas known or suspected to be underlain by Tertiary sediments. However, steep gravity gradients and low Bouguer anomaly values over portions of the Beluga, Susitna, and Yentna basins imply the existence of large basement discontinuities which form deep tectonic basins. In addition, a regional gravity gradient is associated with probable westward thickening of the earth's crust over the upper Cook Inlet region (Barnes, 1976). Gravity anomalies produced by the density contrast between the Tertiary sedimentary deposits and the denser, older pre-Tertiary basement complex are superimposed on the regional gravity field—a field that is related to the presumably thickening crust—and on gravity anomalies caused by variations in the density of the basement rock. Most anomaly amplitudes have too large a wavelength to originate within the Tertiary stratigraphic sequence itself, but many of the gradients are too steep to originate deep within the earth's crust. Hence, the larger anomalies over the Cook Inlet-Susitna lowlands are believed to result mostly from relief on the pre-Tertiary basement surface.

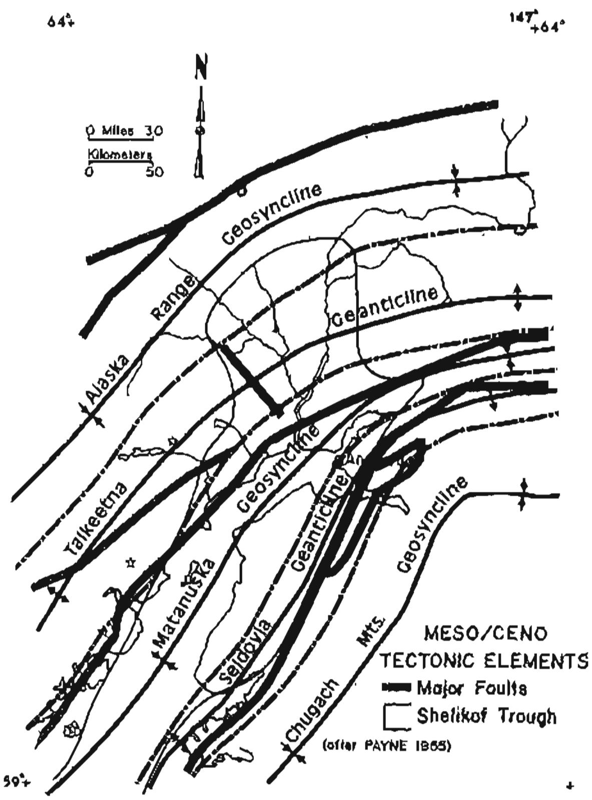

Figure 4. Major Mesozoic and Cenozoic tectonic elements in the Cook Inlet region, south-central Alaska (after Payne, 1955).

AEROMAGNETIC PROFILES

Aeromagnetic profiles flown across the study area (Grantz and others, 1963) generally reveal the same major structural features as the gravity map. Large-amplitude steep magnetic gradients indicate major structural discontinuities such as the Beluga Mountain, Lake Clark, Bruin Bay, and Castle Mountain fault systems, and broad magnetic closures outline the Cook Inlet, Beluga, Susitna, and Yentna sedimentary basins. Several aeromagnetic profiles are shown with geologic interpretations on plate 3.

GEOLOGICAL INTERPRETATION OF GEOPHYSICAL DATA

GENERAL PATTERN

The most prominent gravity anomalies in the upper Cook Inlet region are the extensive gravity minimums found over portions of the lowland areas. These large lows are generally bounded by steep gravity gradients associated with the faulted flanks of the sedimentary basins.

A preliminary study of the subsurface pre-Tertiary rocks in the Cook Inlet basin based on well data shows that some of the components of the larger low-gravity anomalies are probably caused by changes in basement lithology. Variation in bulk-rock density and susceptibility within the Mesozoic and Cenozoic rocks complicate the interpretation of the gravity and magnetic data.

MAJOR ANOMALIES

The following discussions refer to the gravity and magnetic anomalies illustrated on plates 1, 2, and 3 in order of magnitude and prominence. Seventeen anomalous regions have been identified and are numbered on the simple Bouguer gravity map (pl. 1).

1. BRUIN BAY FAULT SYSTEM

A wide but steep northeast-trending gravity gradient along the western margin of Cook Inlet from Tuxedni Bay to Beluga River is associated with the Bruin Bay fault system. The steep gradient reflects the faulted contact between the high-density (2.60 to 2.90 gm/cm^3)

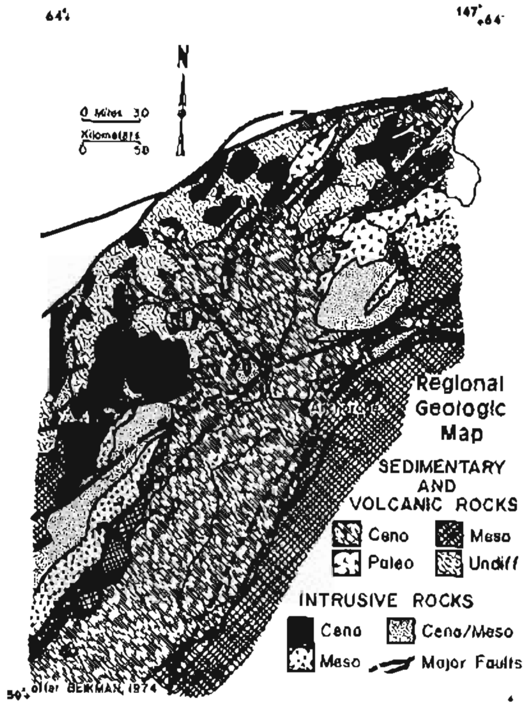

Figure 5. Generalized geologic map of south-central Alaska (modified after Beikman, 1974).

Figure 6. Major structural features of south-central Alaska based on ERTS-1 photo interpretation and available geologic and geophysical data.

Jurassic rocks to the west and the low-density (2.20 to 2.55 gm/cm^3) Tertiary sedimentary rocks of the Cook Inlet basin to the east. A prominent magnetic feature, the Moquawkie magnetic contact, marks this fault zone, where the high-susceptibility rocks of mostly Jurassic age are juxtaposed against the nonmagnetic sedimentary rocks of the Cook Inlet basin. Profiles across the magnetic anomaly are shown on plate 3, sections C-C' and D-D'.

2. ALEUTIAN RANGE AND McARTHUR RIVER HIGH

An elongate northeast-trending gravity high is coextensive with portions of the Aleutian volcanic mountain chain and continues as a narrow gravity ridge across the McArthur River flats towards Beluga River. This feature, herein designated as the Aleutian Range and McArthur River high, is the most prominent gravity high within the study area, with a closure of 100 mgals; it is bounded by the Lake Clark fault system to the northwest and the Bruin Bay fault system to the southeast. Plutonic, volcanic, and sedimentary rocks of the Mesozoic Talkeetna geanticline (Payne, 1955) coincide in part with this gravity trend and are inferred to be abruptly truncated in the Beluga basin area. Grantz and others (1963) also noted a possible transverse magnetic feature, near the northern end of this gravity high, that separates magnetic rocks at shallow depths to the south from the deeply buried or absent magnetic basement to the north. This geophysical trend is offset and may correlate with a similar trend in the Talkeetna Mountains (Hackett, 1976b).

3. BELUGA BASIN

A re-entrant gravity low is seen in the Capps Glacier area between Chackachatna River and Beluga Lake; the associated structural feature is designated the Beluga basin. The narrow gravity minimum, with a closure of at least −35 mgals, trends northeasterly from the Chakachatna River towards Beluga Lake and suggests a possible Tertiary depocenter within the Beluga basin area. This trend is indicated by both regional gravity and magnetic data. A smooth aeromagnetic feature suggesting thick Tertiary deposits is seen in western portions of profiles 97, 99, 101, and 103 (Grantz and others, 1963), substantiating the gravity interpretation that the area contains considerable thicknesses of nonmagnetic sedimentary rocks bounded on the south by a large basement discontinuity.

4. COOK INLET BASIN

A large pronounced gravity trough is centered over Cook Inlet and the adjacent lowlands. The largest gravity feature in the upper Shelikof Trough (the Cook Inlet basin) is a broad -140 to -150 mgal minimum that extends northeast-southwest for over 200 km from south of Kalgin Island to the lower Matanuska Valley. The axis of this gravity low is nearly coincident with the Tertiary depocenter axis of the Cook Inlet basin (Kirschner and Lyon, 1973; Hartman and others, 1972). The magnetic profiles across the Cook Inlet basin are characterized by low gradients and broadly arched configurations. The Cook Inlet magnetic pattern reflects the presence of a large, deep elongate mass of magnetic rock overlain by a thick sequence of sedimentary rocks (Grantz and others, 1963). The Cook Inlet basin is bordered on the west and north by steep gravity and magnetic gradients, indicating large basement discontinuities.

5. APEX OF THE TORDRILLO BLOCK

A multicrested gravity high lies just west of the Beluga-Susitna mountain front. The southeasternmost feature is termed the Mount Susitna anomaly, and the composite north and west-central highs are called the Beluga Mountain-Talachulitna River-Judd Lake highs. The overall associated structural feature is designated the "Apex of the Tordrillo Block." This composite set of four gravity highs reflects the intrusive and metavolcanic rocks of the northern Beluga basin, Beluga Mountain, and Mount Susitna areas. Anomalies of high magnetic intensity were also found over Mount Susitna and the adjacent area to the north and west. These magnetic features are attributed to volcanic and plutonic rocks that may underlie the area at shallow depths. The closed and offset gravity maximum over the Mount Susitna pluton indicates that this quartz diorite body (rock sample and thin section SWH-74-2) is wedge shaped and that it is probably underlain to the west by a more mafic plutonic phase. The displaced inflection points of the asymmetric gravity gradients flanking this anomaly imply that the wedge-shaped pluton is bounded on the southeast and northeast by two converging high-angle reverse faults, forming the apex of the Tordrillo Block.

Other composite gravity maxima are generally centered over outcrops of pre-Tertiary metavolcanic, volcanic, and intrusive rocks; the Beluga Mountain gravity high is believed to be associated with a sequence of altered tuffaceous metavolcanic rocks (rock sample and thin sections SWH-74-8) of probable Mesozoic or Paleozoic(?) age; the Talachulitna River high is associated with a pyroxene-rich gabbro assemblage (rock sample and thin section SWH-74-9); the Judd Lake gravity high seems to reflect a complex of phonolite intrusives (rock sample and thin section SWH-74-5). These composite gravity maxima probably outline a large uplifted, fault-bounded, wedge-shaped basement block that is tilted downward to the southwest towards Beluga Lake and Beluga River.

6. BELUGA MOUNTAIN FAULT

A steep asymmetric gravity gradient trends northwest along the Beluga Mountain-Mount Susitna mountain front. Its associated structural feature is designated the Beluga Mountain fault zone. The feature, about 5 miles wide and 40 to 50 mgals in amplitude, extends from Mount Susitna to the Skwentna River and probably beyond. This high-gravity gradient coincides with the Yentna-Mount Beluga lineament (fig. 7) but the gradient inflection point is offset toward the southwest. This gravity feature is therefore interpreted to be the expression of a high-angle reverse fault dipping 60°-75°, upthrown on the southwest along the Susitna lowland-Beluga Mountain boundary.

7. SUSITNA BASIN

A prominent gravity low lies just west of the Kahiltna and Yentna River confluence. Its associated structural feature, the Susitna basin, is a -120 mgal minimum that extends for 80 km from Alexander Creek to the west-central part of the Susitna lowlands. The elbow-shaped gravity low strongly suggests a large structural trough that contains substantial thicknesses of low-density Tertiary rocks. This gravity feature correlated well with an area of low intensity but moderately dipping magnetic gradients as indicated on aeromagnetic profile 65 (Grantz and others, 1963). The gravity anomaly is postulated to be coincident with the axis of the Susitna basin Tertiary depocenter.

8. YENLO BASEMENT HIGH

A relative and partially defined gravity high (-70 mgals) centered over pre-Tertiary basement outcrops of the Yenlo Hills is designated the Yenlo basement high. This north-northeast trending relative gravity maximum centered over the Yenlo Hills area is believed to reflect a fault-bounded pre-Tertiary basement block of metasedimentary, metavolcanic, and igneous rocks of probable Mesozoic or Paleozoic(?) age or both. The gravity high extends from beyond the Shell Hills in the south to the Peters Hills in the north. The southwestern and northeastern flanks of this gravity anomaly are coincident with the Peters Creek magnetic contact described by Grantz and others (1963). This geophysical feature is also expressed on detailed 1:63,360-scale aeromagnetic maps produced for the Alaska DGGS (Talkeetna quadrangle, 1972).

9. YENTNA BASIN

A gravity low lies just northwest of the Kahiltna and Yentna Rivers confluence. Its associated structural feature is designated the Yentna basin. This gravity minimum, centered over the Yentna River lowlands, is suggestive of another thick sequence of Tertiary rocks.

The very poorly defined Yentna basin low has a closure and amplitude of at least 35 mgals and includes a large portion of the Yentna River lowlands between the Shell Hills-Yenlo Hills and the southern Alaska Range. Reconnaissance and detailed aeromagnetic data (Grantz and others, 1963; and Alaska DGGS 1:63,360 aeromagnetic maps) indicate that major portions of the Yentna basin area are underlain by thick sequences of nonmagnetic rocks. The pre-Tertiary basement is probably at considerable depth in the central portions of this basin.

10. CASTLE MOUNTAIN FAULT SYSTEM

A zone of steep east-northeast gravity gradients trends along the southern Talkeetna Mountain front towards Mount Susitna. The steep gradient reflects the western segment of the Castle Mountain fault system. This steep gravity-gradient zone extends from the southern flank of the Talkeetna Mountains along the Matanuska Valley across the Susitna lowlands towards Mount Susitna, where it swings abruptly southward. This zone is believed to trace the western segment of the Castle Mountain fault system (Detterman and others, 1974). The inflection point of the gradients is displaced northward from the surface expression of the fault zone, implying a high-angle reverse throw for the fault system. The Moquawkie magnetic contact described by Grantz and others (1963) trends into the Castle Mountain fault system in the Mount Susitna area. Regional gravity and magnetic data strongly suggest that the Castle Mountain fault system does not continue west-southwest into the Lake Clark fault as previously inferred, but bends or splays into the Bruin Bay fault system to the south.

11. LAKE CLARK FAULT SYSTEM

A wide and very steep gravity gradient trends from the Tlikakila River valley through the Lake Clark Pass-Blockade Glacier area towards Chakachatna River and reflects the Lake Clark fault system. This northeast-trending high-gravity-gradient zone, about 5 miles wide and 30 mgals in amplitude, is parallel to the Tlikakila River valley-Lake Clark Pass-Blockade Glacier area. The large gravity feature, distinctly expressed on ERTS-1 imagery (fig. 7) reflects the complex Lake Clark shear zone, which is probably a major crustal fracture. Regional gravity data imply that this fault zone splays northeasterly across the Beluga basin lowlands and does not trend directly into the Castle Mountain fault system to the east (pl. 2).

12. CHIGMIT MOUNTAIN LOW

A poorly defined gravity minimum—the Chigmit Mountain low—is centered over the northern Chigmit Mountains. Part of the gravity minimum may be associated with a linear belt of intrusive rocks within the Aleutian Range batholith; this belt has been outlined, mapped, and dated by Reed and Lanphere (1973). An isostatic mountain root at the base of the crust probably contributes to the large Bouguer gravity anomaly.

13. TORDRILLO MOUNTAIN LOW

A partially defined gravity low is centered in the Tordrillo Mountains. This gravity minimum, designated the Tordrillo Mountain low, implies isostatic thickening of the crust beneath a high, rugged, mountainous region. Part of this anomaly, however, could also be due to the Cenozoic plutonic complex mapped at the surface by Reed and Lanphere (1973).

14. EAST BASIN-BORDER RANGES FAULT SYSTEM

A broad, steep gravity gradient along the eastern portions of Cook Inlet basin lies parallel to the Kenai Mountain front. Its associated structural feature is called the East Basin-Border Ranges fault system (MacKevett and Plafker, 1974). This wide and relatively steep gravity-gradient zone extends across the Kenai Peninsula and along the Kenai Mountain front. The

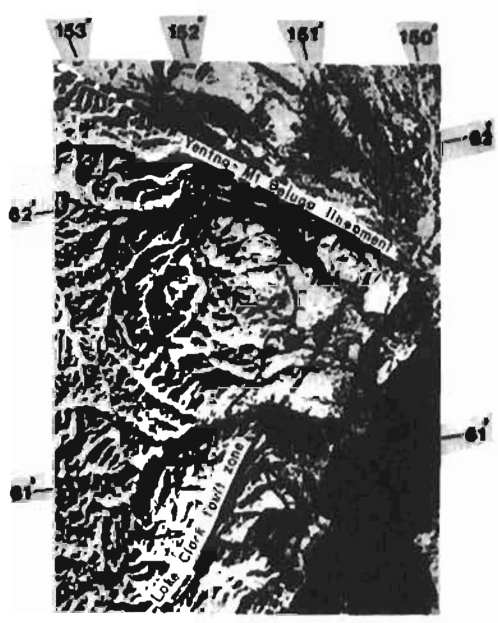

Figure 7. ERTS-1 mosaic photo of upper Cook Inlet region (showing Beluga basin outline, Yentna-Mount Beluga lineament and the Lake Clark fault zone).

zone borders the eastern flank of the Cook Inlet basin and is interpreted to be caused by extensive basement faulting. Reconnaissance aeromagnetic data (Grantz and others, 1963) indicate northeast-trending basement discontinuities along this part of the Kenai Peninsula. The width and extent of both the gravity and magnetic gradients imply considerable regional stratigraphic truncation of the Tertiary sediments along the eastern margin of the Cook Inlet basin.

15. CHIGMIT MOUNTAIN HIGH-MOUNT SPURR LOW

A poorly defined gravity high and low lies between McArthur River on the south and Mount Spurr on the north. The associated structural features are designated the Chigmit Mountain high and the Mount Spurr low. The Chigmit Mountain gravity high, between Chakachatna River and McArthur River, is coincident with severely sheared plutonic rocks in the extreme northeastern Chigmit Mountains. This gravity maximum may partially outline igneous rocks of Jurassic(?) age. The poorly defined gravity low, found along the southern flanks of Mount Spurr volcano, probably reflects the large Cenozoic accumulation of low-density andesitic lavas and associated pyroclastic and sedimentary deposits (pl. 2) (Barnes, 1966).

16. TORDRILLO MOUNTAIN FLANK HIGH

A poorly defined elongate gravity maximum, the Tordrillo Mountain flank high, is suggested along the eastern edge of the Tordrillo Mountains between Capps Glacier on the south and West Fork Coal Creek on the northeast. This gravity high, located along the northwestern flank of the Beluga basin, is adjacent to a highly faulted plutonic and metavolcanic rock complex of pre-Tertiary age. The gravity high reflects the structurally complex contacts between igneous, metavolcanic, and Tertiary sedimentary rocks along the eastern edge of the Tordrillo Mountain front.

17. HAYES RIVER PASS HIGH-DICKASON MOUNTAIN LOW

A roughly outlined gravity high and low lie between Hayes River Pass on the south and the Skwentna River on the north. The southerly gravity maximum is designated the Hayes River Pass high; the northerly gravity minimum is referred to as the Dickason Mountain low. The Hayes River Pass gravity high reflects a fault-bounded sequence of altered tuffaceous metavolcanic rocks (rock sample and thin section SWH-74-6) that are petrographically similar to the rock sequence associated with the Beluga Mountain anomaly.

The Dickason Mountain gravity minimum roughly outlines two undefined granitic plutons (rock sample and thin section SWH-74-9) that seem to be separated by regional faulting. This broad gravity low strongly suggests a batholitic complex of considerable areal extent connected at depth.

STRUCTURE SECTIONS AND GEOPHYSICAL PROFILES

Available gravity, magnetic coverage, and physical rock property data for the study area are insufficient to justify a quantitative depth analysis of all the anomalous areas. However, the most prominent geophysical features may be qualitatively and semiquantitatively interpreted. Four regional structural cross sections (pl. 3) were constructed along selected gravity profiles that transect major anomalies in the study area. Although the gravity profiles have simple shapes because of the broad data base, structures giving rise to the gravity anomalies are believed to consist of complicated systems of faults and slabs (i.e., fault-bounded blocks). Only regional highs and lows bounded by steep gravity gradients have been interpreted in this section.

STRUCTURAL SECTION - PROFILE A-A'

The southwest-northeast gravity profile A-A' (pl. 3) suggests that thick sedimentary sequences of low-density Tertiary rocks are present in the Beluga basin and in the southwestern portions of Susitna basin. The inflection point of the asymmetric gravity gradient is offset to the west of the Yentna-Mount Beluga lineament. The Beluga Mountain fault, which bounds the western edge of the Susitna basin, is therefore believed to be a high-angle reverse fault that dips 60°-75° southwesterly. The gravity data imply perhaps as much as 12,000 feet (3,600 m) of reverse throw for this fault. The pre-Tertiary basement surface in the Beluga basin is believed to dip 8,200 feet (2,500 m) toward the southwest from Kitty pluton, near the northeastern flank of the basin. A semiquantitative two-dimensional interpretation of gravity profile A-A' was attempted with a computer program modified after Talwani and others (1959). Densities are based in part on Cook Inlet well data and values used in nearby areas (Andreasen and others, 1964). The agreement between the measured and computed anomalies is fair, and the two selected density models 01 and 11 lend credence to the qualitative interpretation. The areas of gravity minima over the Beluga and Susitna basins partly coincide with the areas of low-gradient magnetic relief noted by Grantz and others (1963). Because of insufficient rock density and susceptibility data, these Tertiary thicknesses are considered to be approximate.

STRUCTURAL SECTION - PROFILE B-B'

The east-west geophysical profiles along section B-B' (pl. 3) indicate that the Castle Mountain fault system has possibly 12,000 feet (3,600 m) of high-angle offset. The Cook Inlet and Beluga basins are outlined on the gravity profile and appear to have maximum thicknesses of 10,000 feet (3,000 m) and 3,300 feet (1,000 m), respectively, in this area. The depth of the basins, throw of the high-angle reverse fault, and stratigraphic thicknesses are also inferred qualitatively from magnetic data.

STRUCTURAL SECTION - PROFILE C-C'

Interpretation of the gravity minimum over Beluga basin along the northwest-southeast profile C-C' (pl. 3) is controlled vertically by the 10,717-foot (3,125-m) Pan American Chuit State No. 1 exploratory well on the western side of Cook Inlet basin (pl. 2). Subsurface well information provides some constraints for the interpretation of pre-Tertiary basement. The Beluga low is mainly caused by a relatively thick 8,200-foot (2,500-m) section of low-density Tertiary sediments (2.2-2.6 gm/cm^3)—in contrast with the higher density (2.6-3.0 gm/cm^3) pre-Tertiary basement. This gravity minimum coincides with an area of flat magnetic pattern described by Grantz and others (1963). Prominent gravity gradients along the southeast flank of the elongate gravity ridge correlate well with the Moquawkie contact, a large, recognized magnetic signature. These geophysical gradients are believed to delineate the Bruin Bay fault zone and the western boundary of the Cook Inlet basin. High Bouguer values and high-amplitude magnetic anomalies occur over rocks of Jurassic age along the extreme western portions of the Cook Inlet basin.

STRUCTURAL SECTION - PROFILE D-D'

Profile D-D' (pl. 3) depicts an east-west structural section from the middle of Cook Inlet basin into the Chigmit Mountain front. The Bruin Bay fault, bounding Cook Inlet basin, was interpreted to be a high-angle reverse fault with 5,000 feet (1,500 m) of upthrown displacement on the west side. On the basis of available surface data (pl. 2), reconnaissance aeromagnetic information (Grantz and others, 1963), and the exploratory well data (Shell Kustatan River No. 1 and Arco Middle River State No. 2), the thickness of Tertiary sediments is inferred to be greater than 10,000 feet (3,000 m) in the extreme eastern portion of the cross section.

SUMMARY

Structural subdivisions of the upper Cook Inlet region are outlined by simple Bouguer gravity data. In addition to the partially explored Cook Inlet basin, regional gravity data imply the presence of other major Tertiary subprovinces: the Beluga, Susitna, and Yentna basins. Substantial accumulations of oil, gas, coal, and uranium may be contained within these sedimentary basins of Tertiary age.

Regional structural sections and geophysical profiles (A-A', B-B', C-C', and D-D') indicate that the deep tectonic basins are controlled by large basement faults or fault systems. Displaced inflection points of steep asymmetric gravity gradients strongly suggest a high-angle reverse nature for the Castle Mountain, Bruin Bay, and Beluga Mountain fault systems. The Beluga Mountain fault, a newly recognized linear, is implied to have a vertical displacement in excess of 10,000 feet (3,000 m). These newly outlined major tectonic features and inferred sedimentary basins (fig. 8) of possible economic significance remain to be confirmed by future detailed geophysical and geological investigations.

This generalized geophysical synthesis and semiquantitative interpretation is offered to further understanding of the tectonic features in south-central Alaska and to spur new scientific interest and exploration activity in the upper Cook Inlet region.

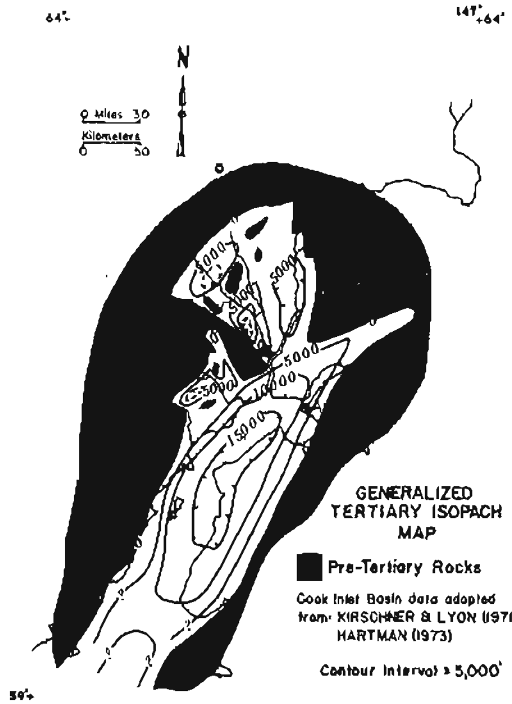

Figure 8. Generalized Tertiary isopach map of the Cook Inlet region delineating the probable thickness of Tertiary sedimentary rocks; Beluga, Susitna, and Yentna basin isopachs inferred from geophysical data.

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APPENDIX A

Principal facts for gravity stations occupied in Beluga basin and adjacent area, Alaska.

STATION	LATITUDE	LONGITUDE	ELEV(FT)	Q	OBSERVED	NORMAL	F.AIR	B 1.00	1.80	2.00	2.30	2.40	2.60	2.67	2.80	2.85
BL31 BASE	61 10.54N	149 58.87W	88.0	01	981921.2	982014.9	-85.4	-86.6	-87.5	-87.7	-88.0	-88.1	-88.4	-88.4	-88.6	-88.6
BELU BASE	61 10.25N	151 2.55W	84.0	02	981878.3	982014.5	-128.3	-129.4	-130.3	-130.5	-130.8	-130.9	-131.1	-131.2	-131.3	-131.4
BELU 1	61 11.39N	151 6.60W	158.0	04	981882.6	982016.0	-118.5	-120.5	-122.2	-122.6	-123.2	-123.4	-123.8	-123.9	-124.2	-124.3
BELU 2	61 13.43N	151 8.71W	85.0	05	981900.9	982018.6	-109.7	-110.8	-111.7	-111.9	-112.2	-112.3	-112.5	-112.6	-112.7	-112.8
BELU 3	61 12.72N	151 10.17W	100.0	05	981898.3	982017.1	-109.6	-110.8	-111.8	-112.1	-112.5	-112.6	-112.9	-113.0	-113.1	-113.2
BELU 4	61 13.52N	151 13.04W	140.0	05	981916.3	982018.7	-89.2	-91.0	-92.5	-92.8	-93.4	-93.5	-93.9	-94.0	-94.2	-94.3
BELU 5	61 14.41N	151 14.59W	175.0	05	981936.8	982019.8	-66.6	-68.8	-70.6	-71.1	-71.7	-71.9	-72.4	-72.5	-72.8	-73.0
BELU 6	61 16.27N	151 15.82W	215.0	05	981939.5	982022.2	-62.5	-65.2	-67.4	-68.0	-68.8	-69.1	-69.6	-69.8	-70.2	-70.3
BELU 7	61 16.84N	151 17.34W	220.0	05	981934.3	982022.9	-67.9	-70.7	-73.0	-73.6	-74.4	-74.7	-75.2	-75.4	-75.8	-75.9
BELU 8	61 17.92N	151 17.60W	230.0	05	981927.6	982024.3	-75.1	-78.0	-80.4	-80.9	-81.8	-82.1	-82.7	-82.9	-83.3	-83.4
BELU 9	61 19.36N	151 18.42W	240.0	05	981924.3	982026.1	-79.3	-82.3	-84.8	-85.4	-86.3	-86.6	-87.2	-87.4	-87.8	-88.0
BELU 10	61 19.93N	151 19.33W	242.0	04	981924.8	982026.9	-79.3	-82.4	-84.9	-85.5	-86.4	-86.7	-87.3	-87.5	-87.9	-88.1
BELU 11	61 21.19N	151 20.38W	244.0	04	981928.5	982028.5	-77.0	-80.1	-82.6	-83.2	-84.2	-84.5	-85.1	-85.3	-85.7	-85.9
BELU 12	61 22.97N	151 25.93W	245.0	04	981931.5	982030.7	-76.2	-79.3	-81.8	-82.4	-83.4	-83.7	-84.3	-84.5	-84.9	-85.1
BELU 13	61 23.97N	151 28.44W	256.0	04	981931.7	982032.0	-76.2	-79.5	-82.1	-82.7	-83.7	-84.1	-84.7	-84.9	-85.4	-85.5
BELU 14	61 23.04N	151 30.99W	258.0	05	981932.1	982030.8	-74.4	-77.7	-80.4	-81.0	-82.0	-82.3	-83.0	-83.2	-83.7	-83.8
BELU 15	61 24.78N	151 31.29W	270.0	07	981937.9	982033.0	-69.7	-73.2	-75.9	-76.6	-77.6	-78.0	-78.7	-78.9	-79.4	-79.5
BELU 16	61 26.27N	151 30.79W	400.0	07	981931.9	982034.9	-65.4	-70.5	-74.6	-75.6	-77.1	-77.6	-78.7	-79.0	-79.7	-79.9
BELU 17	61 28.42N	151 33.30W	620.0	07	981927.2	982037.6	-52.1	-60.0	-66.4	-67.9	-70.3	-71.1	-72.7	-73.2	-74.3	-74.7
BELU 18	61 28.60N	151 37.13W	800.0	07	981912.6	982037.8	-50.0	-60.2	-68.4	-70.4	-73.5	-74.5	-76.6	-77.3	-78.6	-79.1
BELU 19	61 19.05N	151 26.10W	430.0	05	981916.7	982025.7	-68.6	-74.1	-78.5	-79.6	-81.2	-81.8	-82.9	-83.3	-84.0	-84.2
BELU 20	61 16.33N	151 21.99W	511.0	04	981919.0	982022.3	-55.2	-61.7	-67.0	-68.3	-70.2	-70.9	-72.2	-72.6	-73.5	-73.8
THEO 1	61 11.44N	150 59.59W	27.0	02	981882.6	982016.1	-130.9	-131.3	-131.5	-131.6	-131.7	-131.8	-131.8	-131.8	-131.9	-131.9
THEO 2	61 11.87N	150 58.09W	27.0	02	981882.6	982016.6	-131.5	-131.8	-132.1	-132.2	-132.3	-132.3	-132.4	-132.4	-132.4	-132.5
THEO 3	61 12.71N	150 53.49W	13.0	03	981884.6	982017.7	-131.9	-132.0	-132.2	-132.2	-132.2	-132.3	-132.3	-132.3	-132.3	-132.3
THEO 4	61 14.06N	150 47.99W	8.0	06	981880.2	982019.4	-138.4	-138.5	-138.6	-138.7	-138.7	-138.7	-138.7	-138.7	-138.7	-138.7
THEO 5	61 14.38N	150 51.23W	10.0	05	981884.0	982019.8	-134.9	-135.0	-135.1	-135.1	-135.2	-135.2	-135.2	-135.2	-135.2	-135.2
THEO 6	61 15.34N	150 51.12W	27.0	03	981887.4	982021.0	-131.1	-131.4	-131.7	-131.8	-131.9	-131.9	-132.0	-132.0	-132.1	-132.1
THEO 7	61 15.83N	150 53.45W	82.0	02	981888.0	982021.6	-125.9	-127.0	-127.8	-128.0	-128.3	-128.4	-128.7	-128.7	-128.9	-128.9
THEO 8	61 16.45N	150 53.95W	45.0	05	981893.8	982022.4	-124.6	-125.0	-125.4	-125.6	-125.7	-125.8	-125.9	-125.9	-126.0	-126.0

Appendix A (cont.)

STATION	LATITUDE	LONGITUDE	ELEV(FT)	Q	OBSERVED	NORMAL	F.AIR	B 1.00	1.80	2.00	2.30	2.40	2.60	2.67	2.80	2.85
THEO 9	61 18.08N	150 56.26W	90.0	05	981896.8	982024.5	-119.2	-120.4	-121.3	-121.5	-121.9	-122.0	-122.2	-122.3	-122.5	-122.5
THEO 10	61 19.33N	150 57.97W	150.0	05	981900.1	982026.1	-111.9	-113.8	-115.3	-115.7	-116.3	-116.5	-116.9	-117.0	-117.3	-117.3
THEO 11	61 15.27N	150 54.70W	82.0	08	981886.9	982020.9	-126.3	-127.4	-128.2	-128.4	-128.7	-128.8	-129.0	-129.1	-129.3	-129.3
THEO 12	61 13.45N	150 57.51W	30.0	08	981887.4	982018.6	-128.4	-128.8	-129.1	-129.2	-129.3	-129.3	-129.4	-129.4	-129.5	-129.5
OLSE 1	61 14.42N	151 4.00W	60.0	05	981895.9	982019.9	-118.3	-119.1	-119.7	-119.8	-120.1	-120.2	-120.3	-120.4	-120.5	-120.5
OLSE 2	61 16.18N	151 5.08W	75.0	05	981897.6	982022.1	-117.[illegible]	-118.4	-119.2	-119.4	-119.6	-119.7	-119.9	-120.0	-120.1	-120.2
OLSE 3	61 16.79N	151 6.94W	230.0	07	981899.7	982022.9	-101.5	-104.5	-106.8	-107.4	-108.3	-108.6	-109.2	-109.4	-109.8	-109.9
OLSE 4	61 17.70N	151 7.52W	300.0	07	981899.7	982024.0	-96.1	-99.9	-103.0	-103.8	-104.9	-105.3	-106.1	-106.3	-106.8	-107.0
OLSE 5	61 19.62N	151 9.00W	425.0	05	981913.4	982026.5	-73.1	-78.5	-82.9	-83.9	-85.6	-86.1	-87.2	-87.6	-88.3	-88.6
OLSE 6	61 20.49N	151 12.07W	690.0	08	981901.9	982027.6	-60.8	-65.6	-76.6	-78.4	-81.0	-81.9	-83.7	-84.3	-85.4	-85.9
OLSE 7	61 21.14N	151 15.36W	425.0	05	981919.8	982028.4	-68.6	-74.0	-78.4	-79.5	-81.1	-81.6	-82.7	-83.1	-83.8	-84.1
OLSE 8	61 22.67N	151 18.70W	380.0	05	981925.2	982030.3	-69.4	-74.2	-78.1	-79.1	-80.6	-81.0	-82.0	-82.3	-83.0	-83.2
OLSE 9	61 24.78N	151 18.06W	435.0	05	981923.8	982033.0	-68.3	-73.8	-78.3	-79.4	-81.1	-81.6	-82.7	-83.1	-83.8	-84.1
OLSE 10	61 27.16N	151 19.41W	1025.0	08	981896.5	982036.0	-43.1	-56.2	-66.7	-69.3	-73.2	-74.5	-77.1	-78.1	-79.8	-80.4
OLSE 11	61 28.11N	151 9.29W	780.0	08	981912.3	982037.2	-51.6	-61.5	-69.5	-71.5	-74.5	-75.5	-77.5	-78.2	-79.4	-79.9
OLSE 12	61 28.00N	151 7.73W	685.0	05	981924.4	982037.1	-48.3	-57.0	-64.0	-65.8	-68.4	-69.3	-71.0	-71.6	-72.7	-73.2
OLSE 13	61 26.50N	151 5.41W	590.0	07	981929.6	982035.2	-50.1	-57.6	-63.7	-65.2	-67.4	-68.2	-69.7	-70.2	-71.2	-71.6
OLSE 14	61 24.60N	151 3.81W	490.0	07	981934.4	982032.8	-52.3	-58.6	-63.6	-64.8	-66.7	-67.3	-68.6	-69.0	-69.8	-70.1
OLSE 15	61 22.47N	151 1.75W	340.0	07	981930.1	982030.1	-68.0	-72.3	-75.8	-76.7	-78.0	-78.4	-79.3	-79.6	-80.2	-80.4
OLSE 16	61 22.02N	151 1.02W	300.0	07	981931.9	982029.5	-69.4	-73.2	-76.3	-77.1	-78.2	-78.6	-79.4	-79.6	-80.1	-80.3
OLSE 17	61 21.35N	151 0.39W	260.0	07	981928.7	982028.7	-75.5	-78.8	-81.5	-82.1	-83.1	-83.5	-84.1	-84.4	-84.8	-85.0
OLSE 18	61 20.03N	150 59.45W	190.0	05	981918.5	982027.0	-90.6	-93.0	-95.0	-95.5	-96.2	-96.4	-96.9	-97.1	-97.4	-97.5
CHUI 1	61 9.66N	151 3.53W	89.0	02	981878.0	982013.8	-127.4	-128.6	-129.5	-129.7	-130.0	-130.2	-130.4	-130.5	-130.6	-130.7
CHUI 2	61 7.87N	151 5.48W	145.0	08	981873.7	982011.5	-124.2	-126.0	-127.5	-127.9	-128.4	-128.6	-129.0	-129.1	-129.4	-129.5
CHUI 3	61 5.77N	151 7.68W	28.0	02	981877.8	982008.8	-128.4	-128.8	-129.0	-129.1	-129.2	-129.3	-129.3	-129.4	-129.4	-129.4
CHUI 4	61 6.32N	151 9.50W	50.0	05	981881.5	982009.5	-123.3	-124.0	-124.5	-124.6	-124.8	-124.9	-125.0	-125.0	-125.1	-125.2
CHUI 5	61 6.33N	151 13.33W	160.0	05	981888.4	982009.5	-106.1	-108.1	-109.8	-110.2	-110.8	-111.0	-111.4	-111.6	-111.8	-111.9
CHUI 6	61 7.12N	151 17.69W	215.0	05	981900.1	982010.6	-90.2	-93.0	-95.2	-95.7	-96.5	-96.8	-97.[illegible]	-97.6	-97.9	-98.1
CHUI 7	61 8.13N	151 22.32W	522.0	02	981898.6	982011.8	-64.1	-70.8	-76.1	-77.5	-79.5	-80.1	-81.5	-81.9	-82.8	-83.1
CHUI 8	61 8.86N	151 26.76W	540.0	05	981920.0	982012.8	-42.0	-48.9	-54.4	-55.8	-57.8	-58.5	-59.9	-60.4	-61.3	-61.6

Appendix A (cont.)

STATION	LATITUDE	LONGITUDE	ELEV(FT)	Q	OBSERVED	NORMAL	F.AIR	B 1.00	1.80	2.00	2.30	2.40	2.60	2.67	2.80	2.85
CHUI 9	61 8.87N	151 28.98W	650.0	05	981917.6	982012.8	-34.0	-42.3	-49.0	-50.6	-53.1	-54.0	-55.6	-56.2	-57.3	-57.7
CHUI 10	61 10.58N	151 32.00W	910.0	07	981897.7	982015.0	-31.7	-43.3	-52.6	-54.9	-58.4	-59.6	-61.9	-62.7	-64.2	-64.8
CHUI 11	61 11.28N	151 33.05W	1060.0	07	981888.1	982015.9	-28.1	-41.6	-52.4	-55.1	-59.2	-60.5	-63.2	-64.2	-66.0	-66.6
CHUI 12	61 12.16N	151 33.42W	1150.0	07	981885.1	982017.0	-23.7	-38.4	-50.1	-53.1	-57.5	-59.0	-61.9	-62.9	-64.8	-65.6
CHUI 13	61 12.67N	151 33.84W	1090.0	07	981882.7	982017.6	-32.4	-46.3	-57.5	-60.2	-64.4	-65.8	-68.6	-69.6	-71.4	-72.1
CHUI 14	61 13.40N	151 35.16W	1250.0	07	981872.9	982018.6	-28.1	-44.0	-56.8	-60.0	-64.8	-66.4	-69.6	-70.7	-72.8	-73.6
CHUI 15	61 14.34N	151 36.39W	1330.0	07	981863.5	982019.8	-31.2	-48.1	-61.7	-65.1	-70.2	-71.9	-75.3	-76.5	-78.7	-79.6
SUSI 1	61 21.22N	150 54.53W	130.0	05	981917.6	982028.5	-96.8	-98.7	-100.2	-100.6	-101.2	-101.4	-101.8	-101.9	-102.2	-102.2
SUSI 2	61 25.98N	150 50.44W	1035.0	07	981900.2	982034.5	-37.0	-50.2	-60.8	-63.4	-67.4	-68.7	-71.3	-72.3	-74.0	-74.6
SUSI 3	61 28.96N	150 57.05W	2740.0	10	981796.6	982038.3	16.0	-19.0	-47.0	-54.0	-64.4	-67.9	-74.9	-77.4	-81.9	-83.7
SUSI 4	61 33.97N	150 49.75W	390.0	07	981927.8	982044.6	-80.2	-85.1	-89.1	-90.1	-91.6	-92.1	-93.1	-93.5	-94.1	-94.3
SUSI 5	61 38.72N	150 51.15W	195.0	05	981928.6	982050.6	-103.7	-106.2	-108.2	-108.7	-109.4	-109.7	-110.2	-110.3	-110.7	-110.8
SUSI 6	61 39.70N	150 44.07W	93.0	05	981946.8	982051.9	-96.3	-97.5	-98.5	-98.7	-99.1	-99.2	-99.4	-99.5	-99.6	-99.7
SUSI 7	61 35.62N	150 39.74W	61.0	05	981962.3	982046.7	-78.7	-79.5	-80.1	-80.2	-80.5	-80.6	-80.7	-80.8	-80.9	-80.9
SUSI 8	61 30.95N	150 34.05W	32.0	05	981946.5	982040.8	-91.3	-91.7	-92.0	-92.1	-92.3	-92.3	-92.4	-92.4	-92.5	-92.5
SUSI 9	61 28.66N	150 25.31W	32.0	04	981909.7	982037.9	-125.2	-125.6	-126.0	-126.0	-126.2	-126.2	-126.3	-126.3	-126.4	-126.4
SUSI 10	61 24.01N	150 27.73W	26.0	02	981891.4	982032.0	-138.2	-138.5	-138.8	-138.9	-139.0	-139.0	-139.1	-139.1	-139.1	-139.1
SUSI 11	61 16.52N	150 28.26W	61.0	03	981873.9	982022.7	-143.0	-143.8	-144.4	-144.6	-144.8	-144.9	-145.0	-145.1	-145.2	-145.2
SUSI 12	61 15.62N	150 12.25W	5.0	04	981894.9	982021.4	-126.0	-126.1	-126.1	-126.1	-126.2	-126.2	-126.2	-126.2	-126.2	-126.2
COOK 1	61 17.68N	150 39.14W	10.0	07	981882.5	982024.0	-140.6	-140.7	-140.8	-140.8	-140.9	-140.9	-140.9	-140.9	-140.9	-140.9
COOK 2	61 19.82N	150 50.87W	115.0	02	981900.9	982026.7	-115.0	-116.5	-117.6	-117.9	-118.4	-118.5	-118.8	-118.9	-119.1	-119.2
COOK 3	61 18.19N	150 47.74W	40.0	05	981893.2	982024.6	-127.7	-128.2	-128.6	-128.7	-128.9	-128.9	-129.0	-129.1	-129.1	-129.1
COOK 4	61 17.18N	150 59.96W	80.0	05	981899.2	982023.4	-116.6	-117.7	-118.5	-118.7	-119.0	-119.1	-119.3	-119.4	-119.5	-119.6
COOK 5	61 15.15N	150 58.33W	40.0	05	981893.1	982020.8	-123.9	-124.4	-124.8	-124.9	-125.1	-125.1	-125.3	-125.3	-125.4	-125.4
SKWT 1	61 23.75N	151 40.88W	248.0	04	981937.7	982031.7	-70.7	-73.8	-76.4	-77.0	-78.0	-78.3	-78.9	-79.1	-79.5	-79.7
SKWT 2	61 27.93N	151 46.31W	1250.0	10	981893.3	982037.0	-26.1	-42.1	-54.9	-58.0	-62.8	-64.4	-67.6	-68.7	-70.8	-71.6
SKWT 3	61 31.66N	151 42.60W	1252.0	04	981889.0	982041.7	-35.0	-50.9	-63.7	-66.9	-71.7	-73.3	-76.5	-77.6	-79.7	-80.5
SKWT 4	61 34.40N	151 47.21W	1180.0	07	981896.3	982045.2	-37.9	-53.0	-65.0	-68.0	-72.5	-74.1	-77.1	-78.1	-80.1	-80.8
SKWT 5	61 37.38N	151 52.88W	1350.0	07	981885.1	982048.9	-36.9	-54.1	-67.9	-71.3	-76.5	-78.2	-81.7	-82.9	-85.1	-86.0
SKWT 6	61 39.59N	152 1.33W	3025.0	10	981797.6	982051.7	30.4	-8.2	-39.1	-46.8	-58.4	-62.3	-70.0	-72.7	-77.7	-79.7

Appendix A (cont.)

STATION	LATITUDE	LONGITUDE	ELEV(FT)	Q	OBSERVED	NORMAL	F.AIR	B 1.00	1.80	2.00	2.30	2.40	2.60	2.67	2.80	2.85
SKWT 7	61 43.77N	151 53.94W	2050.0	07	981863.1	982057.0	-1.1	-27.2	-48.2	-53.4	-61.3	-63.9	-69.1	-71.0	-74.4	-75.7
SKWT 8	61 45.77N	152 2.66W	825.0	07	981938.8	982059.5	-43.1	-53.6	-62.1	-64.2	-67.3	-68.4	-70.5	-71.2	-72.6	-73.1
SKWT 9	61 50.51N	152 5.54W	690.0	07	981948.2	982065.5	-52.4	-61.2	-68.2	-70.0	-72.6	-73.5	-75.3	-75.9	-77.0	-77.5
SKWT 10	61 55.62N	151 58.84W	1800.0	10	981889.0	982071.9	-13.6	-36.5	-54.9	-59.5	-66.4	-68.7	-73.3	-74.9	-77.9	-79.1
SKWT 11	61 57.17N	152 1.84W	570.0	07	981972.0	982073.8	-48.2	-55.5	-61.3	-62.8	-64.9	-65.7	-67.1	-67.6	-68.6	-68.9
SKWT 12	61 58.23N	151 50.20W	425.0	05	981977.8	982075.1	-57.4	-62.8	-67.1	-68.2	-69.8	-70.4	-71.5	-71.9	-72.6	-72.8
SKWT 13	61 55.42N	151 41.26W	340.0	05	981981.6	982071.6	-58.0	-62.4	-65.9	-66.7	-68.0	-68.5	-69.3	-69.6	-70.2	-70.4
SKWT 14	61 52.73N	151 30.64W	260.0	05	981983.4	982068.2	-60.4	-63.7	-66.4	-67.0	-68.0	-68.4	-69.0	-69.3	-69.7	-69.9
SKWT 15	61 43.70N	151 23.17W	752.0	04	981942.5	982056.9	-43.7	-53.3	-61.0	-62.9	-65.8	-66.7	-68.6	-69.3	-70.6	-71.0
SKWT 16	61 40.75N	151 22.07W	620.0	07	981948.4	982053.2	-46.5	-54.4	-60.7	-62.3	-64.7	-65.5	-67.1	-67.6	-68.6	-69.0
SKWT 17	61 33.75N	151 22.36W	775.0	05	981928.9	982044.4	-42.6	-52.5	-60.4	-62.4	-65.3	-66.3	-68.3	-69.0	-70.3	-70.8
REDO 1	60 54.96N	151 42.27W	24.0	02	981948.3	981995.0	-44.5	-44.8	-45.0	-45.1	-45.2	-45.2	-45.2	-45.3	-45.3	-45.3
REDO 2	60 44.01N	151 56.24W	26.0	03	981936.1	981981.0	-42.4	-42.7	-43.0	-43.1	-43.2	-43.2	-43.3	-43.3	-43.3	-43.4
REDO 3	60 31.60N	152 16.84W	20.0	05	981949.8	981965.0	-13.3	-13.5	-13.7	-13.8	-13.9	-13.9	-13.9	-14.0	-14.0	-14.0
REDO 4	60 23.95N	152 28.73W	360.0	07	981943.7	981955.1	22.5	17.9	14.2	13.3	11.9	11.5	10.6	10.2	9.6	9.4
REDO 5	60 17.03N	152 27.30W	7.0	02	981929.4	981946.1	-16.0	-16.1	-16.2	-16.2	-16.2	-16.2	-16.3	-16.3	-16.3	-16.3
REDO 6	60 13.62N	152 31.79W	22.0	02	981932.7	981941.7	-6.9	-7.2	-7.4	-7.4	-7.5	-7.6	-7.6	-7.6	-7.7	-7.7
REDO 7	60 6.55N	152 34.75W	23.0	02	981914.4	981932.5	-15.9	-16.2	-16.4	-16.5	-16.6	-16.6	-16.7	-16.7	-16.7	-16.7
REDO 8	60 1.41N	152 36.19W	22.0	02	981900.8	981925.7	-22.9	-23.2	-23.4	-23.4	-23.5	-23.6	-23.6	-23.6	-23.7	-23.7
REDO 9	60 3.43N	152 44.59W	85.0	07	981913.4	981928.4	-7.0	-8.1	-8.9	-9.2	-9.5	-9.6	-9.8	-9.9	-10.0	-10.1
REDO 10	60 8.17N	152 40.88W	14.0	02	981927.8	981934.6	-5.4	-5.6	-5.8	-5.8	-5.9	-5.9	-5.9	-5.9	-5.9	-6.0
REDO 11	60 13.49N	152 38.32W	22.0	02	981940.3	981941.5	0.9	0.6	0.4	0.3	0.2	0.2	0.2	0.1	0.1	0.1
REDO 12	60 18.38N	152 38.60W	145.0	05	981943.5	981947.8	9.3	7.5	6.0	5.6	5.0	4.9	4.5	4.4	4.1	4.0
REDO 13	60 21.39N	152 50.57W	559.0	04	981934.0	981951.7	38.6	31.0	24.8	23.3	21.0	20.2	18.7	18.2	17.2	16.8
REDO 14	60 24.68N	152 49.17W	1200.0	07	981903.9	981956.0	60.8	45.4	33.2	30.1	25.5	24.0	20.9	19.9	17.9	17.1
REDO 15	60 29.43N	152 55.76W	1405.0	07	981866.8	981962.2	36.8	18.9	4.5	0.9	-4.5	-6.3	-9.8	-11.1	-13.4	-14.3
REDO 16	60 33.90N	152 53.51W	1275.0	07	981868.5	981967.9	20.5	4.2	-8.8	-12.1	-16.9	-18.6	-21.8	-23.0	-25.1	-25.9
REDO 17	60 33.85N	152 42.30W	835.0	07	981922.5	981967.9	33.2	22.5	14.0	11.9	8.7	7.6	5.5	4.7	3.3	2.8
REDO 18	60 36.23N	152 33.61W	340.0	07	981956.0	981970.9	17.0	12.7	9.2	8.4	7.1	6.6	5.8	5.5	4.9	4.7
REDO 19	60 37.15N	152 26.88W	195.0	07	961979.4	981972.1	25.6	23.1	21.1	20.6	19.9	19.6	19.2	19.0	18.7	18.5

Appendix A (cont.)

STATION	LATITUDE	LONGITUDE	ELEV(FT) Q	OBSERVED	NORMAL	F.AIR	B 1.00	1.80	2.00	2.30	2.40	2.60	2.67	2.80	2.85
REDO 20	60 41.90N	152 17.54N	95.0 07	981991.6	981978.2	22.3	21.1	20.1	19.9	19.5	19.4	19.1	19.1	18.9	18.8
REDO 21	60 48.20N	152 3.05N	55.0 05	981988.3	981986.3	7.1	6.4	5.9	5.7	5.5	5.4	5.3	5.3	5.2	5.1
REDO 22	60 54.69N	151 57.14W	60.0 05	981988.0	981994.7	-1.0	-1.8	-2.4	-2.6	-2.8	-2.9	-3.0	-3.1	-3.2	-3.2
REDO 23	60 69.78N	151 57.60W	75.0 04	981973.3	982001.2	-20.8	-21.8	-22.5	-22.7	-23.0	-23.1	-23.3	-23.4	-23.5	-23.6
MCAR 1	61 4.56N	151 7.82W	100.0 10	981870.4	982007.3	-127.5	-128.8	-129.8	-130.0	-130.4	-130.5	-130.8	-130.9	-131.1	-131.1
MCAR 2	61 2.37N	151 16.00W	33.0 02	981895.3	982004.5	-106.1	-106.5	-106.8	-106.9	-107.1	-107.1	-107.2	-107.2	-107.3	-107.3
MCAR 3	61 0.85N	151 26.51W	30.0 02	981917.1	982002.5	-82.6	-83.0	-83.3	-83.4	-83.5	-83.5	-83.6	-83.6	-83.7	-83.7
MCAR 4	61 1.44N	151 40.99W	40.0 05	981955.3	982003.3	-44.2	-44.8	-45.2	-45.3	-45.4	-45.5	-45.6	-45.6	-45.7	-45.7
MCAR 5	61 2.51N	151 47.03W	75.0 05	981949.8	982004.7	-47.8	-48.8	-49.5	-49.7	-50.0	-50.1	-50.3	-50.4	-50.5	-50.5
MCAR 6	61 4.11N	151 46.06W	90.0 05	981947.5	982006.7	-50.7	-51.9	-52.8	-53.0	-53.4	-53.5	-53.7	-53.8	-54.0	-54.0
MCAR 7	61 5.88N	151 47.16W	115.0 05	981948.7	982009.0	-49.5	-50.9	-52.1	-52.4	-52.8	-53.0	-53.3	-53.4	-53.6	-53.6
MCAR 8	61 8.11N	151 48.18W	160.0 05	981943.1	982011.8	-53.7	-55.7	-57.3	-57.8	-58.4	-58.6	-59.0	-59.1	-59.4	-59.5
MCAR 9	61 9.31N	151 50.32W	180.0 05	981945.3	982013.3	-51.1	-53.4	-55.3	-55.7	-56.4	-56.6	-57.1	-57.3	-57.6	-57.7
MCAR 10	61 10.25N	151 54.39W	225.0 07	981922.3	982014.5	-71.1	-74.0	-76.3	-76.8	-77.7	-78.0	-78.6	-78.8	-79.1	-79.3
MCAR 11	61 11.03N	151 58.27W	340.0 07	981935.5	982015.5	-48.1	-52.4	-55.9	-56.7	-58.0	-58.5	-59.3	-59.7	-60.2	-60.4
MCAR 12	61 11.52N	152 0.51W	405.0 07	981931.8	982016.2	-46.3	-51.4	-55.6	-56.6	-58.2	-58.7	-59.7	-60.1	-60.7	-61.0
MCAR 13	61 11.89N	152 4.29W	530.0 07	981917.8	982016.6	-49.0	-55.8	-61.2	-62.5	-64.5	-65.2	-66.6	-67.1	-67.9	-68.3
MCAR 14	61 11.96N	152 9.36W	740.0 08	981905.5	982016.7	-41.6	-51.1	-58.6	-60.5	-63.4	-64.3	-66.2	-66.8	-68.1	-68.5
MCAR 15	61 14.32N	152 27.02W	1145.0 07	981881.0	982019.7	-31.0	-45.7	-57.3	-60.3	-64.7	-66.1	-69.0	-70.1	-72.0	-72.7
MCAR 16	61 15.91N	152 29.29W	1435.0 07	981849.8	982021.8	-37.0	-55.3	-70.0	-73.6	-79.1	-80.9	-84.6	-85.9	-88.3	-89.2
MCAR 17	61 19.16N	152 34.89W	2275.0 07	981800.9	982025.9	-11.0	-40.0	-63.3	-69.1	-77.8	-80.7	-86.5	-88.6	-92.3	-93.8
MCAR 18	61 21.76N	152 40.22W	2730.0 07	981777.7	982029.2	5.3	-29.6	-57.5	-64.4	-74.9	-78.4	-85.4	-87.8	-92.3	-94.1
MCAR 19	61 26.38N	152 44.77W	2790.0 07	981770.7	982035.0	-1.9	-37.5	-66.0	-73.2	-83.8	-87.4	-94.5	-97.0	-101.7	-103.4
MCAR 20	61 23.95N	152 43.77W	2850.0 07	981771.2	982032.0	7.3	-29.1	-58.2	-65.5	-76.4	-80.0	-87.3	-89.8	-94.6	-96.4
MCAR 21	61 21.92N	152 52.07W	3750.0 04	981730.1	982029.4	53.4	5.6	-32.7	-42.3	-56.7	-61.5	-71.1	-74.6	-80.6	-83.0
MCAR 22	61 20.27N	152 59.62W	1560.0 07	981870.0	982027.3	-10.6	-30.5	-46.4	-50.4	-56.4	-58.4	-62.3	-63.7	-66.3	-67.3
MCAR 23	61 17.14N	152 53.47W	1245.0 07	981883.3	982023.3	-22.9	-38.8	-51.5	-54.7	-59.5	-61.1	-64.2	-65.4	-67.4	-68.2
MCAR 24	61 13.77N	152 47.58W	1150.0 07	981887.8	982019.0	-23.1	-37.7	-49.5	-52.5	-56.8	-58.3	-61.[illegible]	-62.3	-64.2	-64.9
MCAR 25	61 11.83N	152 35.37W	1142.0 04	981877.7	982016.6	-31.4	-46.0	-57.7	-60.6	-65.0	-66.4	-69.4	-70.4	-72.3	-73.0
MCAR 26	61 11.50N	152 32.04W	1145.0 10	981874.2	982016.1	-34.2	-48.9	-60.6	-63.5	-67.9	-69.3	-72.3	-73.3	-75.2	-75.9

Appendix A (cont.)

STATION	LATITUDE	LONGITUDE	ELEV(FT)	Q	OBSERVED	NORMAL	F.AIR	B 1.00	1.80	2.00	2.30	2.40	2.60	2.67	2.80	2.85
MCAR 27	61 12.74N	152 20.26W	1105.0	08	981876.4	982017.7	-37.4	-51.5	-62.8	-65.6	-69.8	-71.2	-74.1	-75.1	-76.9	-77.6
MCAR 28	61 13.70N	151 59.84W	820.0	07	981903.0	982018.9	-38.8	-49.3	-57.7	-59.8	-62.9	-63.9	-66.0	-66.8	-68.1	-68.7
MCAR 29	61 14.68N	151 50.68W	2725.0	10	981765.8	982020.2	1.9	-32.9	-60.7	-67.7	-78.1	-81.6	-88.5	-91.0	-95.5	-97.2
MCAR 30	61 14.06N	151 28.04W	1820.0	08	981853.9	982019.4	5.7	-17.5	-36.1	-40.8	-47.8	-50.1	-54.7	-56.4	-59.4	-60.5
MCAR 31	61 12.80N	151 19.41W	750.0	08	981914.7	982017.8	-32.5	-42.1	-49.8	-51.7	-54.6	-55.5	-57.4	-58.1	-59.4	-59.8
DICK 1	61 29.41N	151 22.36W	1355.0	03	981880.4	932038.9	-31.0	-48.3	-62.2	-65.6	-70.8	-72.5	-76.0	-77.2	-79.5	-80.3
DICK 2	61 34.29N	151 34.06W	980.0	04	981927.7	982045.0	-25.2	-37.7	-47.7	-50.2	-53.9	-55.2	-57.7	-58.6	-60.2	-60.8
DICK 3	61 38.47N	151 40.19W	2256.0	04	981847.8	982050.3	9.7	-19.1	-42.2	-47.9	-56.6	-59.5	-65.2	-67.2	-71.0	-72.4
DICK 4	61 42.03N	151 37.66W	1475.0	10	981893.2	982054.8	-20.9	-39.7	-54.8	-58.5	-64.2	-66.1	-69.8	-71.1	-73.6	-74.5
DICK 5	61 44.52N	151 32.66W	1525.0	10	981891.5	982057.9	-23.0	-42.5	-58.0	-61.9	-67.8	-69.7	-73.6	-75.0	-77.5	-78.5
DICK 6	61 46.13N	151 44.91W	2560.0	04	981833.3	982060.0	14.0	-18.6	-44.7	-51.2	-61.0	-64.3	-70.9	-73.1	-77.4	-79.0
DICK 7	61 48.72N	151 51.49W	2850.0	08	981817.1	982063.2	22.0	-14.6	-43.5	-50.8	-61.7	-65.4	-72.7	-75.2	-79.9	-81.8
DICK 8	61 50.69N	151 44.91W	2241.0	04	981849.9	982065.7	-5.0	-33.6	-56.5	-62.2	-70.8	-73.7	-79.4	-81.4	-85.1	-86.5
DICK 9	61 49.42N	151 31.12W	575.0	07	981965.3	982064.1	-44.7	-52.1	-57.9	-59.4	-61.6	-62.3	-63.8	-64.3	-65.3	-65.6
DICK 10	61 49.16N	151 20.85W	340.0	05	981978.0	982063.8	-53.8	-58.1	-61.6	-62.5	-63.8	-64.2	-65.1	-65.4	-65.9	-66.2
DICK 11	61 53.67N	151 18.77W	190.0	05	981983.0	932069.4	-68.6	-71.0	-72.9	-73.4	-74.1	-74.4	-74.9	-75.0	-75.3	-75.5
DICK 12	61 57.97N	151 13.01W	149.0	03	981983.9	982074.8	-76.9	-78.8	-80.3	-80.7	-81.3	-81.5	-81.8	-82.0	-82.2	-82.3
DICK 13	61 53.32N	151 10.55W	180.0	05	981958.5	982069.0	-93.6	-95.9	-97.7	-98.2	-98.8	-99.1	-99.5	-99.7	-100.0	-100.1
DICK 14	61 46.65N	151 10.38W	325.0	08	981937.7	982060.6	-92.3	-96.5	-99.8	-100.6	-101.9	-102.3	-103.1	-103.4	-104.0	-104.2
DICK 15	61 42.97N	151 13.52W	3050.0	10	981778.8	982056.0	9.7	-29.2	-60.4	-68.2	-79.9	-83.8	-91.6	-94.3	-99.3	-101.3
ALEX 1	61 24.30N	151 8.64W	818.0	04	981909.1	982032.4	-46.4	-56.8	-65.2	-67.3	-70.4	-71.4	-73.5	-74.2	-75.6	-76.1
ALEX 2	61 29.46N	151 4.95W	785.0	07	981916.7	982038.9	-48.4	-58.4	-66.4	-68.4	-71.5	-72.5	-74.5	-75.2	-76.5	-77.0
ALEX 3	61 31.31N	151 1.70W	1010.0	07	981903.4	982041.3	-42.9	-55.8	-66.1	-68.7	-72.5	-73.8	-76.4	-77.3	-79.0	-79.6
ALEX 4	61 33.20N	150 58.88W	1185.0	07	981888.2	982043.7	-44.0	-59.1	-71.2	-74.3	-78.7	-80.3	-83.3	-84.4	-86.4	-87.1
ALEX 5	61 36.09N	150 55.53W	550.0	10	981926.5	982047.3	-69.1	-76.1	-81.7	-83.1	-85.2	-85.9	-87.3	-87.8	-88.7	-89.1
ALEX 6	61 41.83N	150 46.80W	92.0	05	981939.8	982054.6	-106.1	-107.3	-108.2	-108.4	-108.8	-108.9	-109.2	-109.2	-109.4	-109.4
ALEX 7	61 43.94N	150 51.81W	160.0	08	981931.3	982057.2	-110.9	-112.9	-114.5	-114.9	-115.6	-115.8	-116.[illegible]	-116.3	-116.6	-116.7
ALEX 8	61 43.35N	150 57.46W	165.0	05	981926.8	982056.5	-114.1	-116.3	-117.9	-118.4	-119.0	-119.2	-119.6	-119.8	-120.0	-120.1
ALEX 9	61 42.06N	151 0.13W	260.0	05	981927.3	982054.8	-103.1	-106.4	-109.1	-109.7	-110.7	-111.1	-111.7	-111.9	-112.4	-112.5
ALEX 10	61 40.55N	151 4.80W	650.0	07	981926.8	982052.9	-65.0	-73.3	-79.9	-81.6	-84.1	-84.9	-86.6	-87.2	-88.2	-88.7

Appendix A (cont.)

STATION	LATITUDE	LONGITUDE	ELEV(FT) Q	OBSERVED	NORMAL	F.AIR	B 1.00	1.80	2.00	2.30	2.40	2.60	2.67	2.80	2.85
ALEX 11	61 39.13N	151 8.10W	1200.0 07	981905.8	982051.1	-32.5	-47.8	-60.1	-63.1	-67.7	-69.3	-72.3	-73.4	-75.4	-76.1
ALEX 12	61 37.00N	151 11.29W	1760.0 04	981880.3	982048.5	-2.6	-25.1	-43.1	-47.6	-54.3	-56.6	-61.0	-62.6	-65.5	-66.7
ALEX 13	61 36.86N	151 16.94W	660.0 05	981941.4	982048.3	-44.8	-53.2	-60.0	-61.7	-64.2	-65.0	-66.7	-67.3	-68.4	-68.8
ALEX 14	61 39.19N	151 28.46W	790.0 07	981940.6	982051.2	-36.3	-46.4	-54.5	-56.5	-59.5	-60.5	-62.5	-63.2	-64.6	-65.1
ALEX 15	61 31.79N	151 14.43W	740.0 05	981935.0	982041.9	-37.3	-46.7	-54.3	-56.2	-69.0	-60.0	-61.8	-62.5	-63.7	-64.2
CAPP 1	61 17.50N	151 33.95W	975.0 10	981882.4	982023.8	-49.7	-62.1	-72.1	-74.6	-78.3	-79.5	-82.0	-82.9	-84.5	-85.1
CAPP 2	61 20.42N	151 35.46W	445.0 05	981909.5	982027.5	-76.1	-81.8	-86.4	-87.5	-89.2	-89.8	-90.9	-91.3	-92.0	-92.3
CAPP 3	61 18.21N	151 42.01W	1050.0 08	981871.0	982024.7	-54.9	-68.3	-79.0	-81.7	-85.7	-87.1	-89.8	-90.7	-92.5	-93.1
CAPP 4	61 21.70N	151 44.62W	630.0 07	981913.5	982029.1	-56.3	-64.4	-70.8	-72.4	-74.8	-75.7	-77.3	-77.8	-78.9	-79.3
CAPP 5	61 24.33N	151 49.84W	630.0 07	981921.9	982032.4	-51.3	-59.3	-65.8	-67.4	-69.8	-70.6	-72.2	-72.8	-73.8	-74.2
CAPP 6	61 21.30N	151 53.58W	1295.0 07	981887.3	982028.6	-19.5	-36.0	-49.3	-52.6	-57.5	-59.2	-62.5	-63.6	-65.8	-66.6
CAPP 7	61 17.27N	151 54.50W	3105.0 04	981753.1	982023.5	21.7	-18.0	-49.7	-57.6	-69.5	-73.5	-81.4	-84.2	-89.3	-91.3
CAPP 8	61 12.67N	151 55.35W	530.0 07	981917.2	982017.6	-50.6	-57.3	-62.8	-64.1	-66.1	-66.8	-68.2	-68.6	-69.3	-69.9
CAPP 9	61 11.57N	151 41.72W	1610.0 07	981846.1	982016.2	-18.7	-39.2	-55.7	-59.8	-66.0	-68.0	-72.1	-73.6	-76.3	-77.3
CAPP 10	61 8.34N	151 36.74W	1349.0 03	981867.9	982012.1	-17.3	-34.5	-48.3	-51.8	-56.9	-58.7	-62.1	-63.3	-65.6	-66.4
CAPP 11	61 4.32N	151 34.13W	42.0 05	981958.0	982007.0	-45.0	-45.6	-46.0	-46.1	-46.3	-46.3	-46.4	-46.5	-46.5	-46.6
CAPP 12	60 58.69N	151 48.74W	50.0 05	981965.5	981999.8	-29.6	-30.2	-30.7	-30.9	-31.1	-31.1	-31.2	-31.3	-31.4	-31.4
CAPP 13	61 0.98N	151 52.46W	70.0 05	981960.4	982002.7	-35.7	-36.6	-37.3	-37.5	-37.8	-37.9	-38.1	-38.1	-38.2	-38.3
CAPP 14	61 3.78N	152 7.27W	183.0 05	981944.3	982006.3	-44.8	-47.1	-49.0	-49.5	-50.2	-50.4	-50.9	-51.0	-51.3	-51.4
CAPP 15	61 6.46N	152 12.82W	245.0 07	981916.4	982009.7	-70.3	-73.4	-75.9	-76.5	-77.5	-77.8	-78.4	-78.6	-79.0	-79.2
CAPP 16	61 7.82N	151 53.66W	195.0 08	981944.6	982011.4	-48.5	-51.0	-53.0	-53.5	-54.2	-54.5	-55.0	-55.2	-55.5	-55.6

APPENDIX B

Bouguer Anomaly Quality[1]

Code (Q)	Combined elevation correction for p = 2.67 gm/cc		Elevation control
	Feet	mgal	
1	+ 1.0	0.06	Stable bench marks (BM)
2	+ 1.5	0.10	Surveyed wellsites (KB) or at sea level
3	+ 3.0	0.20	Vertical angle bench marks (VABM)
4	+ 7.5	0.50	Photometric spot elevations on lakes, rivers, etc., or with good altimetry loops.
5	+10.0	0.60	River gradients (50-foot contour interval maps)
6	+15.0	1.0	Short distance altimetry
7	+20.0	1.2	River gradients (100-foot CI maps)
8	+25.0	1.5	Interpolation from 50-foot CI maps
9	+30.0	2.0	Moderate distance altimetry
10	+50.0	3.0	Interpolation from 100-foot CI maps or long-distance altimetry
11	+75.0	5.0	Interpolation between two control points or long range altimetry with control errors.

[1]Modified from Barnes, 1972; and Kienle, 1968.

APPENDIX C

Ground magnetic field reductions for selected stations in Beluga Basin, Alaska, showing declination, inclination, calculated field values based on IGRF 1965 reference field updated to 1974, measured total field, and uncorrected magnetic field anomaly.

DATE	TIME(ADT)	STATION	LATITUDE	LONGITUDE	ALTITUDE	DECLINATION	INCLINATION	CALCULATED TOTAL FIELD	MEASURED TOTAL FIELD	UNCORRECTED ANOMALY
8/14/74	1057	BELU BASE	61.17	-151.04	84.000	25.427	16.091	55613.04	55630.00	16.96
	1148	BELU 1	61.19	-151.11	158.000	25.399	16.090	55608.00	55754.00	146.00
	1203	BELU 2	61.22	-151.15	85.000	25.397	16.071	55614.25	55647.00	22.75
	1215	BELU 3	61.20	-151.17	100.000	25.375	16.089	55604.65	55623.00	18.35
	1229	BELU 4	61.23	-151.22	140.000	25.369	16.082	55604.03	55615.00	10.97
	1239	BELU 5	61.24	-151.24	175.000	25.353	16.076	55604.53	55687.00	82.47
	1250	BELU 6	61.27	-151.26	215.000	25.356	16.057	55610.56	55513.00	-97.56
	1300	BELU 7	61.28	-151.29	220.000	25.347	16.054	55609.79	55499.00	-110.79
	1307	BELU 8	61.30	-151.29	230.000	25.353	16.042	55614.48	55536.00	-78.48
	1317	BELU 9	61.32	-151.31	240.000	25.357	16.027	55619.61	55793.00	173.39
	1328	BELU 10	61.33	-151.32	242.000	25.353	16.023	55620.30	55749.00	128.70
	1337	BELU 11	61.35	-151.34	244.000	25.353	16.010	55624.06	55745.00	120.94
	1353	BELU 12	61.38	-151.43	245.000	25.317	16.005	55619.92	55609.00	-10.92
	1400	BELU 13	61.40	-151.47	256.000	25.302	16.000	55618.94	55300.00	-318.94
	1412	BELU 14	61.30	-151.52	258.000	25.235	16.079	55583.45	55636.00	52.55
	1420	BELU 15	61.50	-151.52	270.000	25.321	15.938	55640.93	55217.00	-423.93
	1433	BELU 16	61.44	-151.51	400.000	25.299	15.979	55623.73	55402.00	-221.73
	1445	BELU 17	61.39	-151.55	620.000	25.254	16.020	55602.04	55539.00	-63.04
	1454	BELU 18	61.48	-151.62	800.000	25.259	15.968	55617.45	55324.00	-293.45
	1514	BELU 19	61.32	-151.43	430.000	25.286	16.053	55598.58	55326.00	-272.58
	1527	BELU 20	61.27	-151.37	511.000	25.302	16.074	55593.99	55408.00	-185.99
	1616	THEO 1	61.19	-150.99	27.000	25.462	16.068	55626.44	55721.00	94.56
	1618	THEO 2	61.20	-150.97	27.000	25.479	16.059	55632.14	55561.00	-71.14
	1634	THEO 3	61.21	-150.89	13.000	25.525	16.036	55647.33	55738.00	90.67
	1643	THEO 4	61.23	-150.80	8.000	25.584	16.003	55667.11	55783.00	115.89

Appendix C (cont.)

DATE	TIME(ADT)	STATION	LATITUDE	LONGITUDE	ALTITUDE	DECLINATION	INCLINATION	CALCULATED TOTAL FIELD	MEASURED TOTAL FIELD	UNCORRECTED ANOMALY
	1652	THEO 5	61.24	-150.85	10.000	25.558	16.009	55660.98	55810.00	149.02
	1700	THEO 6	61.26	-150.85	27.000	25.570	15.996	55666.69	55814.00	147.31
	1709	THEO 7	61.26	-150.88	82.000	25.557	15.995	55664.29	55974.00	309.71
	1717	THEO 8	61.27	-150.90	45.000	25.550	15.992	55664.43	55817.00	152.57
	1730	THEO 9	61.30	-150.94	90.000	25.543	15.979	55666.65	55814.00	147.35
	1739	THEO 10	61.32	-151.97	150.000	25.004	16.140	55527.95	55785.00	257.05
	1753	THEO 11	61.25	-150.91	82.000	25.535	16.008	55656.56	55832.00	175.44
	1802	THEO 12	61.22	-150.96	30.000	25.496	16.038	55641.32	55855.00	213.68
8/15/74	1213	OLSE 1	61.25	-151.07	60.000	25.449	16.041	55632.20	55787.00	154.80
	1219	OLSE 2	61.27	-151.08	75.000	25.450	16.027	55636.55	55751.00	114.45
	1234	OLSE 3	61.28	-151.12	230.000	25.439	16.025	55633.96	55606.00	-27.96
	1244	OLSE 4	61.29	-151.13	300.000	25.440	16.016	55636.39	55650.00	13.61
	1251	OLSE 5	61.33	-151.15	425.000	25.442	15.997	55641.56	55715.00	73.44
	1313	OLSE 6	61.34	-151.20	690.000	25.421	15.995	55636.56	55784.00	147.44
	1325	OLSE 7	61.35	-151.26	425.000	25.397	15.997	55634.15	55915.00	280.85
	1339	OLSE 8	61.38	-151.31	380.000	25.379	15.988	55634.23	55970.00	335.77
	1350	OLSE 9	61.41	-151.30	435.000	25.401	15.960	55645.71	55703.00	57.29
	1403	OLSE 10	61.45	-151.32	1025.000	25.406	15.935	55649.64	55456.00	-193.64
	1420	OLSE 11	61.47	-151.15	780.000	25.504	15.895	55679.76	55713.00	33.24
	1428	OLSE 12	61.47	-151.13	685.000	25.517	15.892	55683.60	55006.00	-677.60
	1438	OLSE 13	61.44	-151.09	590.000	25.526	15.903	55682.45	55274.00	-408.45
	1448	OLSE 14	61.41	-151.06	490.000	25.526	15.922	55677.69	55537.00	-140.69
	1458	OLSE 15	61.37	-151.03	340.000	25.528	15.942	55673.28	55775.00	101.72
	1513	OLSE 16	61.37	-151.02	300.000	25.531	15.945	55673.10	55925.00	251.90
	1521	OLSE 17	61.36	-151.01	260.000	25.531	15.951	55671.61	55840.00	168.39
	1528	OLSE 18	61.33	-150.99	190.000	25.529	15.964	55667.90	55711.00	43.10
	1605	CHUI 1	61.16	-151.06	89.000	25.414	16.101	55607.73	55475.00	-132.73
	1615	CHUI 2	61.13	-151.12	145.000	25.371	16.133	55590.23	55793.00	202.77

Appendix C (cont.)

DATE	TIME(ADT)	STATION	LATITUDE	LONGITUDE	ALTITUDE	DECLINATION	INCLINATION	CALCULATED TOTAL FIELD	MEASURED TOTAL FIELD	UNCORRECTED ANOMALY
	1623	CHUI 3	61.10	-151.13	28.000	25.348	16.160	55578.87	55642.00	63.13
	1631	CHUI 4	61.11	-151.16	50.000	25.337	16.159	55577.12	55670.00	92.88
	1639	CHUI 5	61.11	-151.22	160.000	25.303	16.170	55567.19	55641.00	73.81
	1648	CHUI 6	61.12	-151.29	215.000	25.270	16.173	55560.35	55636.00	75.65
	1658	CHUI 7	61.14	-151.37	522.000	25.237	16.174	55552.05	55797.00	244.95
	1714	CHUI 8	61.14	-151.45	540.000	25.198	16.186	55541.39	55923.00	381.61
	1723	CHUI 9	61.15	-151.48	650.000	25.184	16.184	55539.01	55861.00	321.99
	1735	CHUI 10	61.17	-151.53	910.000	25.168	16.174	55537.62	55463.00	-74.62
	1744	CHUI 11	61.19	-151.55	1060.000	25.165	16.166	55538.36	55499.00	-39.36
	1746	CHUI 12	61.20	-151.56	1150.000	25.168	16.157	55541.23	55650.00	108.77
	1757	CHUI 13	61.21	-151.56	1090.000	25.168	16.152	55543.27	55600.00	56.73
	1805	CHUI 14	61.22	-151.59	1250.000	26.162	16.146	55542.60	55581.00	38.40
	1811	CHUI 15	61.24	-151.61	1330.000	25.158	16.139	55543.82	55328.00	-215.82
8/16/74	0907	SUSI 1	61.35	-150.91	150.000	25.582	15.936	55685.63	55653.00	-32.63
	0920	SUSI 2	61.43	-150.84	1035.000	25.653	15.867	55711.45	56090.00	378.55
	0936	SUSI 3	61.48	-150.95	2740.000	25.616	15.849	55696.99	56545.00	848.01
	1001	SUSI 4	61.57	-150.83	390.000	25.723	15.769	55756.68	55597.00	-159.68
	1024	SUSI 5	61.65	-150.85	195.000	25.748	15.716	55777.69	54896.00	-881.69
	1036	SUSI 6	61.66	-150.73	93.000	25.818	15.684	55799.56	56167.00	367.44
	1151	SUSI 7	61.59	-150.66	61.000	25.825	15.720	55790.47	55654.00	-136.47
	1202	SUSI 8	61.52	-150.57	32.000	25.838	15.760	55781.72	55783.00	1.28
	1215	SUSI 9	61.48	-150.42	32.000	25.896	15.762	55791.34	55785.00	-6.34
	1225	SUSI 10	61.40	-150.38	26.000	25.882	15.810	55775.24	56151.00	375.76
	1245	SUSI 11	61.28	-150.47	61.000	25.776	15.915	55726.18	55881.00	154.82
	1257	SUSI 12	61.26	-150.20	5.000	25.906	15.881	55760.04	55813.00	52.96
8/17/74	1039	COOK 1	61.29	-150.65	10.000	25.689	15.934	55705.86	55837.00	131.14
	1054	COOK 2	61.33	-150.85	115.000	25.603	15.942	55687.70	55943.00	255.30
	1104	COOK 3	61.30	-150.80	40.000	25.618	15.953	55687.72	55863.00	175.28
	1120	COOK 4	61.29	-151.00	80.000	25.503	16.000	55653.54	55758.00	104.46

Appendix C (cont.)

DATE	TIME(ADT)	STATION	LATITUDE	LONGITUDE	ALTITUDE	DECLINATION	INCLINATION	CALCULATED TOTAL FIELD	MEASURED TOTAL FIELD	UNCORRECTED ANOMALY
	1130	COOK 5	61.25	-150.97	40.000	25.502	16.020	55647.70	55783.00	135.30
	1332	SKWT 1	61.40	-151.68	248.000	25.190	16.038	55589.01	55407.00	-182.01
	1349	SKWT 2	61.47	-151.77	1250.000	25.171	16.002	55589.42	55416.00	-173.42
	1401	SKWT 3	61.53	-151.71	1252.000	25.231	15.948	55615.74	55488.00	-127.74
	1413	SKWT 4	61.57	-151.79	1180.000	25.211	15.927	55619.95	55595.00	-24.95
	1447	SKWT 5	61.62	-151.88	1350.000	25.181	15.906	55620.38	55506.00	-114.38
	1500	SKWT 6	61.66	-152.02	3025.000	25.119	15.903	55598.96	55461.00	-137.96
	1516	SKWT 7	61.56	-151.90	2050.000	25.144	15.953	55594.62	55503.00	-91.62
	1531	SKWT 8	61.76	-152.04	825.000	25.155	15.832	55643.64	55430.00	-213.64
	1544	SKWT 9	61.84	-152.09	690.000	24.164	15.783	55661.42	55474.00	-187.42
	1558	SKWT 10	61.93	-151.98	1800.000	25.262	15.702	55692.48	55402.00	-290.48
	1618	SKWT 11	61.95	-152.03	570.000	25.248	15.692	55702.96	55491.00	-211.96
	1628	SKWT 12	61.97	-151.84	425.000	25.363	15.647	55735.09	55562.00	-173.09
	1640	SKWT 13	61.93	-151.67	340.000	25.433	15.652	55745.00	55472.00	-273.00
	1700	SKWT 14	61.88	-151.51	260.000	25.500	15.659	55753.88	56309.00	555.12
	1718	SKWT 15	61.73	-151.39	752.000	25.499	15.747	55723.61	55829.00	105.39
	1727	SKWT 16	61.68	-151.37	620.000	25.486	15.779	55712.92	55769.00	56.08
	1743	SKWT 17	61.56	-151.37	775.000	25.430	15.864	55677.04	55781.00	103.96
8/18/74	0944	REDO 1	60.92	-151.70	24.000	24.964	16.391	55441.23	55148.00	-293.23
	1005	REDO 2	60.73	-151.94	26.000	24.761	16.563	55350.52	55480.00	129.48
	1031	REDO 3	60.53	-152.28	20.000	24.491	16.773	55234.64	55543.00	308.36
	1047	REDO 4	60.40	-152.48	360.000	24.333	16.901	55161.60	55854.00	692.40
	1113	REDO 5	60.28	-152.45	7.000	24.297	16.981	55129.79	55343.00	213.21
	1127	REDO 6	60.23	-152.53	22.000	24.234	17.036	55099.82	55301.00	201.18
	1302	REDO 7	60.11	-152.58	23.000	24.159	17.131	55053.16	0.0	99999.00
	1410	REDO 8	60.02	-152.60	22.000	24.111	17.198	55020.76	55601.00	580.24
	1421	REDO 9	60.06	-152.74	85.000	24.052	17.197	55010.90	55287.00	176.10
	1438	REDO 10	60.14	-152.68	14.000	24.117	17.128	55047.21	55256.00	208.79
	1451	REDO 11	60.22	-152.64	22.000	24.176	17.056	55083.10	55735.00	651.90
	1502	REDO 12	60.31	-152.64	145.000	24.207	16.997	55108.59	55402.00	293.41

Appendix C (cont.)

DATE	TIME(ADT)	STATION	LATITUDE	LONGITUDE	ALTITUDE	DECLINATION	INCLINATION	CALCULATED TOTAL FIELD	MEASURED TOTAL FIELD	UNCORRECTED ANOMALY
	1518	REDO 13	60.36	-152.84	599.000	24.122	16.994	55092.68	55615.00	522.32
	1541	REDO 14	60.41	-152.82	1200.000	24.156	16.950	55109.60	54555.00	-554.60
	1800	REDO 15	60.49	-152.93	1405.000	24.131	16.910	55118.34	54606.00	-512.34
	1817	REDO 16	60.56	-152.89	1275.000	24.182	16.849	55149.26	54176.00	-973.26
	1830	REDO 17	60.56	-152.70	835.000	24.281	16.818	55179.22	54831.00	-348.22
	1845	REDO 18	60.62	-152.56	340.000	24.382	16.753	55221.77	55358.00	136.23
	1855	REDO 19	60.62	-152.45	195.000	24.442	16.734	55239.03	55143.00	-96.03
	1906	REDO 20	60.70	-152.29	95.000	24.558	16.650	55287.68	55339.00	51.32
	1919	REDO 21	60.80	-152.05	55.000	24.732	16.532	55356.06	55413.00	56.94
	1931	REDO 22	60.91	-151.95	60.000	24.831	16.436	55404.10	57266.00	1861.90
	1941	REDO 23	61.00	-151.96	75.000	24.864	16.376	55429.34	54983.00	-446.34
8/19/74	1015	MCAR 1	61.08	-151.13	100.000	25.338	16.175	55571.90	55554.00	-17.90
	1030	MCAR 2	61.04	-151.27	33.000	25.250	16.225	55541.83	55293.00	-248.83
	1040	MCAR 3	61.01	-151.44	30.000	25.146	16.274	55509.05	55502.00	-7.05
	1102	MCAR 4	61.02	-151.68	40.000	25.023	16.308	55477.53	55792.00	314.47
	1112	MCAR 5	61.04	-151.78	75.000	24.978	16.313	55468.42	55070.00	-398.42
	1126	MCAR 6	61.07	-151.77	90.000	24.998	16.290	55478.81	55021.00	-457.81
	1134	MCAR 7	61.10	-151.79	115.000	25.001	16.272	55485.08	55118.00	-367.08
	1142	MCAR 8	61.14	-151.80	160.000	25.008	16.248	55493.73	55269.00	-224.73
	1148	MCAR 9	61.16	-151.84	180.000	24.998	16.239	55494.67	55744.00	249.33
	1156	MCAR 10	61.17	-151.91	225.000	24.969	16.240	55489.56	55298.00	-191.56
	1203	MCAR 11	61.18	-151.97	340.000	24.940	16.241	55483.55	55078.00	-405.55
	1208	MCAR 12	61.19	-152.01	405.000	24.923	16.241	55480.31	55198.00	-282.31
	1216	MCAR 13	61.20	-152.07	530.000	24.892	16.248	55472.42	54980.00	-492.42
	1225	MCAR 14	61.20	-152.16	740.000	24.847	16.261	55459.32	54741.00	-718.32
	1244	MCAR 15	61.24	-152.45	1145.000	24.704	16.282	55427.36	54702.00	-725.35
	1334	MCAR 16	61.27	-152.49	1435.000	24.694	16.269	55428.04	54994.00	-434.04
	1345	MCAR 17	61.32	-152.58	2275.000	24.665	16.245	55425.37	54670.00	-755.37
	1350	MCAR 18	61.36	-152.67	2730.000	24.635	16.227	55423.11	54962.00	-461.11
	1406	MCAR 19	61.44	-152.75	2790.000	24.626	16.184	55435.93	55213.00	-222.93

Appendix C (cont.)

DATE	TIME(ADT)	STATION	LATITUDE	LONGITUDE	ALTITUDE	DECLINATION	INCLINATION	CALCULATED TOTAL FIELD	MEASURED TOTAL FIELD	UNCORRECTED ANOMALY
	1421	MCAR 20	61.40	-152.73	2850.000	24.618	16.211	55425.26	55118.00	-307.26
	1431	MCAR 21	61.37	-152.87	3750.000	24.526	16.258	55388.92	55053.00	-335.92
	1444	MCAR 22	61.34	-152.99	1560.000	24.448	16.300	55380.31	54935.00	-445.31
	1456	MCAR 23	61.29	-152.89	1245.000	24.483	16.321	55380.46	55180.00	-200.46
	1503	MCAR 24	61.23	-152.79	1150.000	24.513	16.346	55377.13	54795.00	-582.13
	1516	MCAR 25	61.20	-152.59	1142.000	24.610	16.335	55395.20	54909.00	-486.20
	1527	MCAR 26	61.19	-152.53	1345.000	24.638	16.330	55401.17	54780.00	-621.17
	1607	MCAR 27	61.21	-152.34	1105.000	24.754	16.282	55435.16	55120.00	-315.16
	1700	MCAR 28	61.23	-152.00	820.000	24.945	16.213	55489.77	54898.00	-591.77
	1715	MCAR 29	61.24	-151.84	2725.000	25.031	16.175	55501.17	55426.00	-75.17
	1740	MCAR 30	61.23	-151.47	1820.000	25.229	16.118	55558.16	55955.00	396.84
	1800	MCAR 31	61.21	-151.32	750.000	25.298	16.109	55580.60	55591.00	10.40
8/20/74	0950	DICK 1	61.49	-151.37	1355.000	25.396	15.917	55651.24	55950.00	298.76