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GEOLOGIC INVESTIGATIONS IN THE SALCHA RIVER–POGO GEOPHYSICAL SURVEY TRACT

by Melanie B. Werdon

INTRODUCTION

The Salcha River–Pogo project is part of DGGS's Alaska Airborne-Geophysical/Geological Mineral Inventory (AGGMI) program, a special multi-year investment by the State of Alaska to systematically acquire detailed geophysical data, followed by ground-truth geological data, for about 40 million acres of state-owned lands having high perceived mineral potential. The purpose of the AGGMI program is to expand the knowledge base of Alaska's mineral resources and geology in order to catalyze private-sector mineral exploration and development, leading to high-quality jobs in rural Alaska and diversification of the State's economic base. DGGS produces 1:63,360-scale (one inch equals one mile) bedrock, surficial, comprehensive, and engineering-geologic maps; assesses potential geologic hazards; and evaluates the mineral resource potential of each project area.

Detailed airborne magnetic, electromagnetic, and radiometric data were released by DGGS for the Salcha River–Pogo (SRP) area in the Big Delta Quadrangle in February 2000 (Burns *et al*., 2000), and an additional geophysical survey was flown southeast of Pogo in summer 2001 (see "New Publications" section in this newsletter). The center of the study area is 78 air miles (125 km) east of Fairbanks, and 43 miles (70 km) northeast of Delta Junction (fig. 1). The SRP geophysical tract includes the recently discovered Pogo property (a high-grade, plutonic-related, 5.6-million-ounce gold deposit) and the Caribou Creek placer gold district, which has a combined historical and recent gold production of over 50,000 ounces. The area has the potential to contain not only additional lode gold prospects, but also placer gold, ultramafic-hosted platinum-group-element (PGE) lode occurrences, and metasediment-hosted lead–zinc mineralization.

Until the recent discoveries of lode gold mineralization at Pogo and in the Caribou Creek placer district, the Salcha River–Pogo area was widely perceived to have low mineral potential. Even with the recently acquired airborne geophysical data, the present lack of detailed geologic knowledge of the area impedes private-sector mineral exploration. Our initial interpretation of the SRP geophysical data indicates that the existing 1:250,000-scale reconnaissance geologic map of the area (Weber *et al*., 1978) does not reflect some of the geologic features suggested by the new geophysics data. By reconciling apparent differences between the geology indicated by historical geologic mapping and recently acquired geophysical data, the DGGS geologic mapping project will help provide a better geologic framework for this region. Our objective is to characterize the geology of the area in sufficient detail to support mineral industry exploration efforts. Should mineral or other development occur in the future, surficial and engineering-geologic data generated by this project will be useful for mine site and access planning.

During the summers of 2000 and 2001, DGGS conducted short geologic field mapping projects within the boundaries of the SRP airborne geophysical survey. In summer 2002, the third year of our scheduled three-year mapping project, we will be focusing our mapping efforts in the Big Delta C-3, the southwest quarter of the C-2, and the northeast quarter of the B-3 quadrangles (fig. 1).

REGIONAL GEOLOGY

The Salcha River–Pogo area encompasses a strategic setting with regard to the tectonic evolution of Interior Alaska. East-central Alaska is composed of a number of accreted terranes (Jones *et al*., 1984; Silberling *et al*., 1994) that have continental, oceanic, and possibly island-arc affinities. The largest of these, the Yukon–Tanana terrane, is largely derived from continental material (Foster *et al*., 1994) and is commonly divided into subterranes. The nature and definition of these subterranes, the boundaries between them, and even their existence, are controversial. Resolving these subterrane issues is important because the tectonic framework may strongly affect the mineral potential of local areas within the Yukon–Tanana Upland.

Reconnaissance 1:250,000-scale geologic mapping within the Big Delta Quadrangle (Weber *et al*., 1978) identified several greenschist-facies and amphibolite-facies metamorphic rock suites defined by dominant lithologies (fig. 1). Most of these suites contain both sedimentary and igneous protoliths. Sillimanite-bearing gneisses in the area have been interpreted as granulite facies (Dusel-Bacon and Foster, 1983) and are thought to represent a metamorphic core complex (Pavlis *et al*., 1993).

Contacts between the various metamorphic suites were originally mapped as metamorphic–stratigraphic contacts (Weber *et al*., 1978). The contacts are also shown as thrust faults by

(continued on page 2)

some workers and low-angle normal faults by others. Although there are few definitive age constraints, most metamorphic units in the Big Delta Quadrangle have been assigned Paleozoic ages, but a few may be as old as Precambrian in age. A belt of ultramafic rocks, along with greenstone and metasedimentary rocks (including Permian chert [Foster *et al*., 1978]), are referred to as the Nail Ridge ultramafic suite (light green map unit; fig. 1) and are interpreted to be in thrust contact with underlying metamorphic rocks (Weber *et al*., 1978).

The various metamorphic suites were intruded by granitic rocks that have been assigned Tertiary and Cretaceous ages based on sparse K/Ar and U/Pb data. The Yukon–Tanana terrane is bounded by two major regional strike-slip fault systems: the Tintina fault to the northeast, and the Denali fault to the southwest. Northeast-trending faults observed throughout Interior Alaska are broadly related to stress created by these two fault systems. In the study area, the most prominent northeast-trending high-angle fault is the Shaw Creek fault (fig. 1).

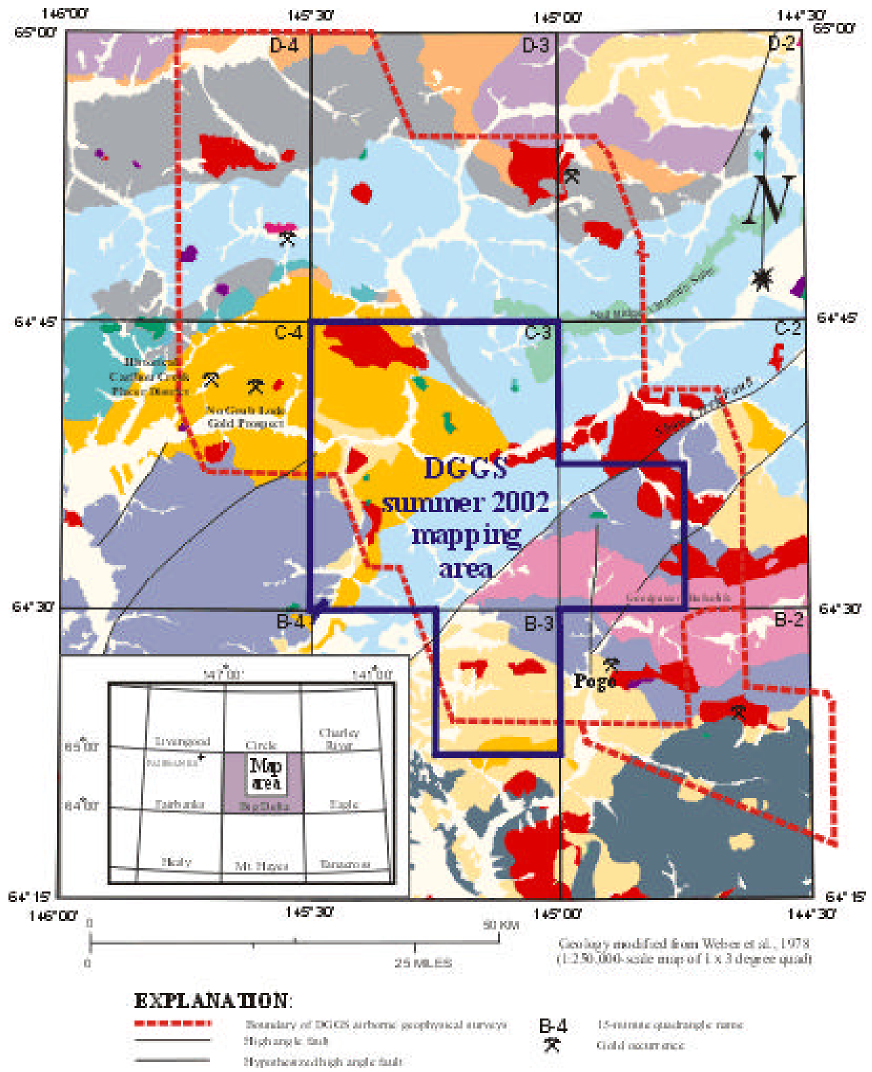

Figure 1. *Regional geologic map of a portion of the Big Delta Quadrangle.*

DGGS Salcha River–Pogo Area Geologic Investigations

Currently within the Salcha River–Pogo (SRP) study area, only very broad stratigraphy has been identified. Preliminary DGGS mapping has determined that the various metamorphic suites in the Big Delta Quadrangle contain distinctive mappable units that can be used to define stratigraphy in this portion of the Yukon–Tanana terrane. Correlating these geologic units with other subterranes in the Yukon–Tanana uplands requires additional mapping and geochemical studies. A better understanding of the local geology is needed both to guide mineral exploration and to resolve longstanding geologic/tectonic controversies.

One example of how DGGS may contribute to the understanding of the metamorphic story of Interior Alaska is by investigating the sillimanite-bearing gneisses in the SRP area, which have been interpreted previously to represent a granulite-facies sillimanite gneiss dome (Dusel-Bacon and Foster, 1983). During reconnaissance work, we noted that both sillimanite and andalusite occur within hydrothermal quartz veins that cross-cut foliation in the metamorphic rocks, suggesting they formed later than the metamorphic event. Although K-feldspar is present in the sillimanite-bearing gneiss, it appears to be a primary/relict igneous mineral (occurring in ortho and augen gneisses), and did not form at the expense of muscovite; hence we will test the hypothesis that the rocks of the gneiss dome are not granulite facies, but instead are part of an amphibolite-facies metamorphic suite. Careful petrographic and microprobe studies using garnet–biotite geothermometry and the best available mineral geothermometers/geobarometers will be employed to resolve this issue. Accurate knowledge of the variations in metamorphic grade within the SRP map area is of critical importance in establishing the area's geologic history.

Additional detailed mapping is needed to sort out conflicting interpretations of contact relationships between metamorphic suites in the Salcha River–Pogo area as well. It is essential to know the actual orientations and types of contact relationships between the metamorphic suites, since the importance of low-angle faults as hosts for gold mineralization has recently been recognized in Interior Alaska (examples include True North, Rhyolite prospect, and Pogo). The Pogo deposit consists of gold-bearing quartz veins that occur within a low-angle mylonite structure exhibiting evidence of both reverse and normal motion (DiMarchi and Friesen, 2000). It is not yet known how the Pogo fault zone relates to other regional structures.

The study area contains many previously unmapped high- and low-angle faults, and we are attempting to determine their sense of motion, cross-cutting relationships, and timing. Extensive high-angle faulting suggested by geophysical data was corroborated in the field, and there appears to be significant movement along high-angle faults with north–south, northeast, and northwest orientations. Further mapping is needed to verify the existence of additional high-angle faults suggested by the geophysical data.

The prominent high-angle, northeast-trending Shaw Creek fault transects the SRP geophysical tract. DGGS plans to better define the displacement on the Shaw Creek fault by comparing igneous rocks and metamorphic suites on opposite sides of the fault. On the current 1:250,000-scale map, the Goodpaster Batholith (pink map unit; fig. 1) is truncated by the Shaw Creek fault, and it appears that the large pluton (red map unit; fig. 1) across the fault to the northeast would be a good candidate to be its right-laterally-offset extension. Alternatively, Griscom (1979) proposed that there has been 55 km of left-lateral displacement on the Shaw Creek fault based on his interpretation of regional magnetic data. If Griscom's hypothesis is correct, it has important implications for the offset of lithologic units and mineral districts. Restoration of the proposed 55 km of left-lateral offset would place Pogo near the Richardson District, which is known for its many lode and placer gold occurrences. In summer 2001, DGGS discovered previously unmapped sedimentary rocks along the northwestern side of the Shaw Creek fault, which suggests northwest-side-down motion as well. This is consistent with the observation that deeper exposure levels of Cretaceous plutons occur southeast of the fault. Additional work is needed to determine the extent, depositional environment (pre-tectonic or syntectonic), and age of this sedimentary unit.

The timing of motion on the Shaw Creek Fault is restricted to be less than 94 Ma, by the age of the Goodpaster Batholith that is truncated by the fault. Preliminary geophysical modeling of magnetic lows along the Shaw Creek fault suggests the lows may correspond to reversely magnetized basalt or gabbro bodies similar to those of Tertiary age found elsewhere in Interior Alaska (Roe and Stone, 1993). If the presence of these mafic rocks is verified, dating them may help constrain the timing of fault motion. Local dikes of gabbro and basalt crop out in the Pogo area just to the south, and based on trace-element character, they are compositionally indistinguishable from early Tertiary, within-plate basalts reported elsewhere in Interior Alaska.

Metamorphic rocks in the SRP area have been intruded by numerous igneous/meta-igneous suites of varying ages (Devonian to Tertiary) and compositions (felsic to ultramafic). In 2000, DGGS began a study of intrusions in the area but additional mapping is needed to delineate their boundaries, to separate phases of intrusions, and to document their compositional variability. There are numerous granitoid plutonic rocks, both mapped and those postulated to exist (but currently not present on existing maps), that have the potential to be sources for plutonic-related gold deposits. DGGS located several previously unmapped intrusions, and we anticipate finding additional igneous bodies as our work continues.

Excluding the Pogo prospect, the mineral resource potential of the area is poorly known, in part because different plutonic suites are not clearly defined, and better age control is needed. Limited geochronological data from unfoliated igneous rocks in the Big Delta Quadrangle indicate that the plutons are Tertiary to Cretaceous in age. Our dating efforts so far have shown that 90 Ma plutons, an age commonly associated with gold deposits in Interior Alaska, are present. Another exciting implication of DGGS's new dates for several intrusions peripheral to the Pogo deposit is that they fall within the 90–107 Ma age range, constraining the timing of mineralization at Pogo; hence these intrusions make good mineral exploration targets.

Plutonic bodies with a slight to moderate foliation (defined by mafic mineral lineation) are largely undated. Our preliminary interpretation is that these rocks are syn- or pre-deformational intrusions, and dating them would better constrain the timing of compressional deformation in the area. In addition, much of the justification for mapping metamorphic rocks in the Big Delta Quadrangle as a separate subterrane from those of the Fortymile area is the apparent lack of Jurassic plutons; but given the sparse age data on foliated plutonic rocks, such a distinction is premature.

Although plutonic-related gold deposits are currently the main exploration focus in Interior Alaska, there is also the potential for ultramafic-related, PGE lode occurrences. Several isolated ultramafic bodies occur within the SRP geophysical tract, two of which we investigated in summer 2001. Both are intrusions, not structurally emplaced bodies, as evidenced by unfoliated textures and contact metamorphic aureoles. One body is a coarse-grained clinopyroxenite intrusion. The second body is compositionally zoned, with clinopyroxene gabbro, clinopyroxenite, and partly serpentinized lherzolite. One of these small ultramafic bodies is associated with anomalous platinum, and due to the mineralogical and textural similarities between these and the PGM-bearing Jurassic intrusions in the Eagle Quadrangle, all the ultramafic bodies need to be critically mapped, dated if possible, and placed in a valid geologic framework so that industry can evaluate their PGE potential.

To date, DGGS has published geochemical analyses and a preliminary geologic map of the Pogo area based on our summer 2000 fieldwork. Geochemical analyses from our summer 2001 work will be published by June 2002. Following the completion of summer 2002 field work, we will be publishing 1:63,360-scale bedrock, surficial, comprehensive, and engineering-geologic maps for each of the Big Delta C-3, the southwest quarter of the C-2, and the northeast quarter of the B-3 quadrangles by June 2003.

References Cited

Burns, L.E., Geoterrex-Dighem, and Stevens Exploration Staff, 2000, CD-ROM containing profile and gridded data and section lines of 2000 geophysical survey data for the Salcha River–Pogo mining area, central Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2000-21, 1 CD-ROM.

DiMarchi, J.J., and Friesen, B., 2000, An update on the recent underground advanced exploration program at Pogo: Alaska Miner's Association November 2000 Meeting Abstracts, p. 46–47.

Dusel-Bacon, Cynthia, and Foster, H.L., 1983, A sillimanite gneiss dome in the Yukon crystalline terrane, east-central

(continued on page 4)

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Alaska: Petrography and garnet-biotite geothermometry: U.S. Geological Survey Professional Paper 1170-E, 25 p.

Foster, H.L., Jones, D.L., Keith, T.E.C., Wardlaw, B., and Weber, F.R., 1978, Late Paleozoic radiolarians and conodonts found in chert of Big Delta quadrangle: U.S. Geological Survey Circular C 772-B, p. B34–B36.

Foster, H.L., Keith, T.E.C., and Menzie, W.D., 1994, Geology of the Yukon-Tanana area of east-central Alaska: *in* Plafker, George, and Berg, H.C., eds., The Geology of Alaska: The Geology of North America, v. G-1, Geological Society of America DNAG Series, p. 205–240.

Griscom, A., 1979, Aeromagnetic interpretation of the Big Delta quadrangle, Alaska: U.S. Geological Survey Open-File Report 78-529B, 2 sheets, scale 1:250,000, 1 accompanying pamphlet, 10 p.

Jones, D.L., Silberling, N.J., Coney, P.J., and Plafker, George, 1984, Lithotectonic terrane map of Alaska (west of the 141st Meridian), Part A: *in* Silberling, N.J., and Jones, D.L., eds., Folio of the lithotectonic terrane maps of the North American Cordillera: U.S. Geological Survey Miscellaneous Field Studies Map MF 1874-A, 1 sheet, scale 1:250,000.

Pavlis, T.L., Sisson, V.B., Foster, H.L., Nokleberg, W.J., and Plafker, George, 1993, Mid-Cretaceous extensional tectonics of the Yukon–Tanana terrane: Trans-Alaska Crustal Transect (TACT), east-central Alaska, Tectonics, v. 12, p. 103–122.

Roe, J.T., and Stone, D.B., 1993, Paleomagnetism of the Fairbanks basalt, Interior Alaska: Alaska Division of Geological & Geophysical Surveys Professional Report 113, p. 61–70.

Silberling, N.J., Jones, D.L., Monger, J.W.H., Coney, P.J., Berg, H.C., and Plafker, George, 1994, Lithotectonic terrane map of Alaska and adjacent parts of Canada: *in* Plafker, George, and Berg, H.C., eds., The Geology of Alaska: The Geology of North America, v. G-1, Geological Society of America DNAG Series, 1 sheet, scale 1:2,500,000.

Weber, F.R., Foster, H.L., Keith, T.E.C., and Dusel-Bacon, C., 1978, Preliminary geologic map of the Big Delta quadrangle, Alaska: U.S. Geological Survey Open-File Report 78-529A, 1 sheet, scale 1:250,000.

Dear Readers:

The year 2002 marks the tenth anniversary of the DGGS Airborne Geophysical/Geological Mineral Inventory (AGGMI) program. This project has been a true partnership sustained by its annual inclusion in the Governor's budget, funded by special annual Capital Improvement Project (CIP) appropriations by the Legislature, guided by input from Alaska's mining community, and implemented by DGGS. The AGGMI project is widely recognized as an important factor in maintaining Alaska as a prominent region for mineral exploration investment in North America.

A signature feature of this program has been the timely release of the geophysical data to the public within 9 months from the time that funds are appropriated by the Legislature. This feat is accomplished by Dr. Laurel Burns, who works closely with competitively selected contractors to ensure data quality, consistent data organization, and appropriate data display. The 55 geophysical data sets that make up the FY02 airborne geophysical survey are an example of how formidable this task can be. Laurel has been the project leader for the airborne geophysical survey program since its inception and the success of DGGS in implementing the surveys is a direct consequence of her knowledge and skill.

The geologic work outlined in this newsletter for the Salcha River–Pogo geophysical survey tract is typical of the studies that have been completed within the AGGMI program. The geophysical data, combined with modern geologic mapping, petrochemical, and geochronologic data create a body of mineral-related geologic framework information that is highly valued by exploration geologists. This investment in Alaska's resource knowledge infrastructure has an immediate impact on Alaska's economy in the form of new exploration investment; it continues to generate investment in Alaska for years after the publication of our maps and reports.

The Airborne-Geophysical/Geological Mineral Inventory program is truly a team effort. DGGS's scientific contribution to that effort in FY02 was made by Laurel Burns, Dave Szumigala, Melanie Werdon, Rainer Newberry, Jennifer Athey, and DeAnne Pinney. Going forward on the Salcha River–Pogo project, Patty Craw will replace DeAnne on the team. The quality of the data, maps, and reports generated by these geologists speaks for itself. Their professionalism is demonstrated by their work and its reception by their peers.

It is my privilege to be associated with these scientists.

Sincerely,

Milton A. Wiltse
Director and State Geologist

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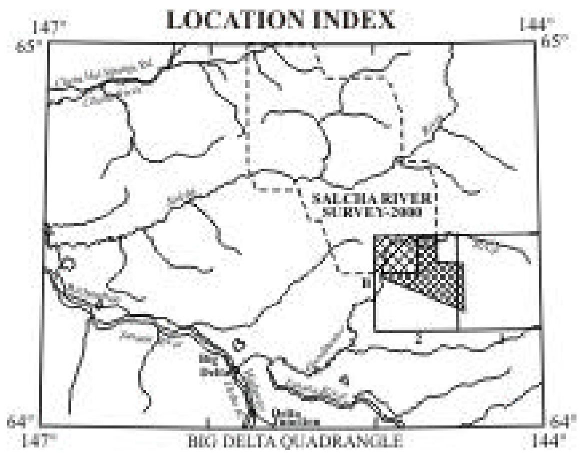


GPR 2002_1_1a. Total magnetic field of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Topography included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_1_1b. Total magnetic field of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Magnetic contours and section lines included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_1_1c. Color shadow magnetic map of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_1_1d. Total magnetic field and electromagnetic anomalies of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Magnetic contours, simplified electromagnetic anomalies, and section lines included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_1_2a. Total magnetic field and detailed electromagnetic anomalies of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:31,680 (parts of northern Big Delta B-1 and B-2 quadrangles). Magnetic contours, detailed electromagnetic anomalies, and topography included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_1_2b. Total magnetic field and detailed electromagnetic anomalies of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:31,680 (parts of southern Big Delta B-1 and B-2 quadrangles). Magnetic contours, detailed electromagnetic anomalies, and topography included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_1_3a. 7200 Hz coplanar resistivity of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Topography included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_1_3b. 7200 Hz coplanar resistivity of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Resistivity contours and section lines included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_1_3c. 7200 Hz coplanar resistivity of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Resistivity contours and section lines included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_1_4a. 900 Hz coplanar resistivity of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Topography included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_1_4b. 900 Hz coplanar resistivity of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Resistivity contours and section lines included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_1_4c. 900 Hz coplanar resistivity of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Resistivity contours and section lines included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_1_5a. Flight lines of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Topography included. Blueline. $3.

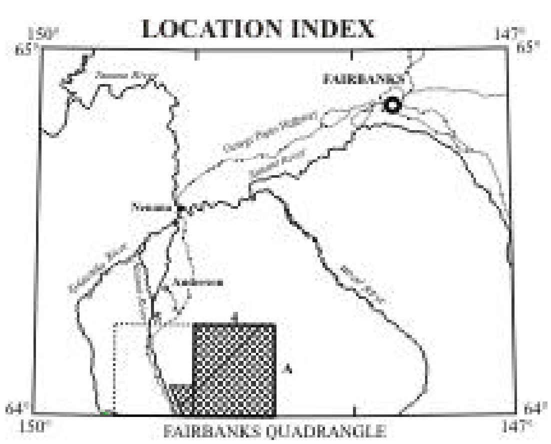
GPR 2002_2. Line, gridded, and vector data of airborne geophysical survey data for the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 2 CD-ROM set. Line data in ASCII format; gridded data in Geosoft format; vector files in Autocad 14 dxf files. $40.

GPR 2002_3. Gridded and vector data of airborne geophysical survey data for the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 CD-ROM. Gridded data in Geosoft format; vector files in Autocad 14 dxf files. $20.

GPR 2002_4. Project report of the airborne geophysical survey of the Salcha-River–Pogo mining area, central Alaska, by Ruth Pritchard, Fugro Airborne Surveys, 2002, text and interpretation map, scale 1:63,360. Price to be determined

GPR 2002_5. Portfolio of aeromagnetic and resistivity maps of the southeastern extension of Salcha River–Pogo survey, Goodpaster mining district, east-central Alaska, by L.E. Burns, 2002, 17 p. Includes color and shadow maps. Maps fit 8½” x 11” sheet. $15.

GPR 2002_6. Plot files of the airborne geophysical survey data of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 CD-ROM. Contains the 13 maps listed below as GPR2002_6_xy in prn printer file format made with an HP Designjet 2500 HPGL/2 printer driver v4.61. Check for printer compatibility. $10.



GPR 2002_6_1a. Total magnetic field of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Topography included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_6_1b. Total magnetic field of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Magnetic contours and section lines included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_6_1c. Color shadow magnetic map of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_6_1d. Total magnetic field and electromagnetic anomalies of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Magnetic contours, simplified electromagnetic anomalies, and section lines included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_6_2a. Total magnetic field and detailed electromagnetic anomalies of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:31,680 (part of northern Fairbanks A-4 quadrangle). Magnetic contours, detailed electromagnetic anomalies, and topography included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_6_2b. Total magnetic field and detailed electromagnetic anomalies of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:31,680 (parts of southern Fairbanks A-4 and A-5 quadrangles). Magnetic contours, detailed electromagnetic anomalies, and topography included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_6_3a. 7200 Hz coplanar resistivity of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Topography included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_6_3b. 7200 Hz coplanar resistivity of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Resistivity contours and section lines included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_6_3c. 7200 Hz coplanar resistivity of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Resistivity contours and section lines included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_6_4a. 900 Hz coplanar resistivity of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Topography included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_6_4b. 900 Hz coplanar resistivity of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Resistivity contours and section lines included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_6_4c. 900 Hz coplanar resistivity of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Resistivity contours and section lines included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_6_5a. Flight lines of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Topography included. Blueline. $4.

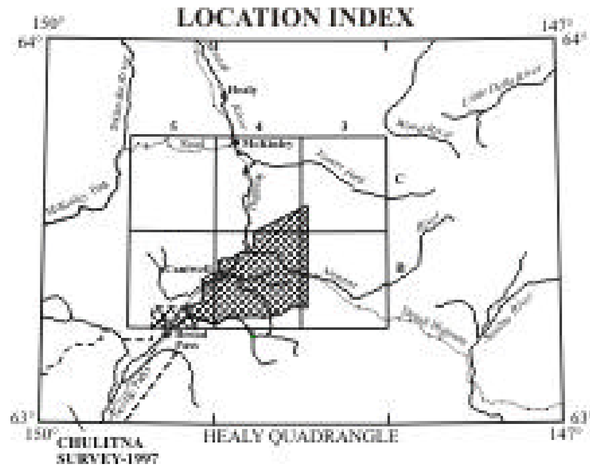
GPR 2002_7. Line, grid, and vector data of airborne geophysical survey data for the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 CD-ROM. Line data in ASCII format; gridded data in Geosoft format; vector files in Autocad 14 dxf files. $40.

GPR 2002_8. Grid and vector data of airborne geophysical survey data for the Liberty Bell area, western Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 CD-ROM. Gridded data in Geosoft format; vector files in Autocad 14 dxf files. $20.

GPR 2002_9. Project report of the airborne geophysical survey of the Liberty Bell area, western Bonnifield mining district, central Alaska, by Ruth Pritchard, Fugro Airborne Surveys, 2002, text and interpretation map, scale 1:63,360. Price to be determined

GPR 2002_10. Portfolio of aeromagnetic and resistivity maps of the Liberty Bell area, western Bonnifield mining district, central Alaska, by L.E. Burns, 2002, 14 p. Includes color and shadow maps. Maps fit 8½" x 11" sheet. $15.

GPR 2002_11. Plot files of the airborne geophysical survey data of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 CD-ROM. Contains the 14 maps listed below as GPR2002_11_xy in prn printer file format made with an HP Designjet 2500 HPGL/2 printer driver v4.61. Check for printer compatibility. $10.



GPR 2002_11_1a. Total magnetic field of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Topography included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_11_1b. Total magnetic field of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Magnetic contours and section lines included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_11_1c. Color shadow magnetic map of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_11_1d. Total magnetic field and electromagnetic anomalies of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Magnetic contours, simplified electromagnetic anomalies, and section lines included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_11_2a. Total magnetic field and detailed electromagnetic anomalies of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:31,680 (parts of Healy B-3, B-4, C-3, and C-4 quadrangles). Magnetic contours, detailed electromagnetic anomalies, and topography included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_11_2b. Total magnetic field and detailed electromagnetic anomalies of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:31,680 (parts of Healy B-4 and B-5 quadrangles). Magnetic contours, detailed electromagnetic anomalies, and topography included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_11_2c. Total magnetic field and detailed electromagnetic anomalies of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:31,680 (parts of Healy B-3, B-4, and D-3 quadrangles). Magnetic contours, detailed electromagnetic anomalies, and topography included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_11_3a. 7200 Hz coplanar resistivity of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Topography included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_11_3b. 7200 Hz coplanar resistivity of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Resistivity contours and section lines included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_11_3c. 7200 Hz coplanar resistivity of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Resistivity contours and section lines included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_11_4a. 900 Hz coplanar resistivity of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Topography included. Full-color plot from electronic file, 600 dpi. $13.

GPR 2002_11_4b. 900 Hz coplanar resistivity of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Resistivity contours and section lines included. Full-color plot from electronic file, 600 dpi. $8.

GPR 2002_11_4c. 900 Hz coplanar resistivity of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Resistivity contours and section lines included. Black and white plot from electronic file, 600 dpi. $8.

GPR 2002_11_5a. Flight lines of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 sheet, scale 1:63,360. Topography included. Blueline. $4.

GPR 2002_12. Line, grid, and vector data of the airborne geophysical survey data for the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 2 CD-ROM set. Line data in ASCII format; gridded data in Geosoft format; vector files in Autocad 14 dxf files. $40.

GPR 2002_13. Grid and vector data of the airborne geophysical survey data for the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Alaska Division of Geological & Geophysical Surveys, Fugro Airborne Surveys, Stevens Exploration Management Corp., and L.E. Burns, 2002, 1 CD-ROM. Gridded data in Geosoft format; vector files in Autocad 14 dxf files. $20.

GPR 2002_14. Project report of the airborne geophysical survey of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by Ruth Pritchard, 2002, text and interpretation map, scale 1:63,360. Price to be determined.

GPR 2002_15. Portfolio of aeromagnetic and resistivity maps of the Broad Pass area, southwestern Bonnifield mining district, central Alaska, by L.E. Burns, 2002, 16 p. Includes color and shadow maps. Maps fit 8½" x 11" sheet. $15.

IC 48. Alaska's mineral industry 2001: a summary, by R.C. Swainbank and D.J. Szumigala, 2002, 15 p. Free.

MP 124. Preliminary engineering-geologic database of the proposed Alaska Natural Gas Transportation System (ANGTS) corridor from Prudhoe Bay to Livengood, Alaska, by C.E. Cameron, E.E. Thoms, and C.A. Galló, 2002, 4 CD-ROMS. $40.

RI 2001-1A. Bedrock geologic map of the Chulitna region, southcentral Alaska, by K.H. Clautice, R.J. Newberry, R.B. Blodgett, T.K. Bundtzen, B.G. Gage, E.E. Harris, S.A. Liss, M.L. Miller, R.R. Reifenstuhl, J.G. Clough, and D.S. Pinney, 2001, 31 p., 1 sheet, scale 1:63,360. $16.

RI 2001-1B. Geologic map of the Chulitna region, southcentral Alaska, by K.H. Clautice, R.J. Newberry, D.S. Pinney, R.B. Blodgett, T.K. Bundtzen, B.G. Gage, E.E. Harris, S.A. Liss, M.L. Miller, R.R. Reifenstuhl, and J.G. Clough, 2001, 32 p., 1 sheet, scale 1:63,360. $16.