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## The Alaska Geologic Materials Center

John W. Reeder[1]

The Alaska Geologic Materials Center (GMC) is Alaska's "public rock library," and is ranked as one of the largest and most diverse rock collections anywhere (fig. 1). It consists of Alaska surface rock, soil, and archeological samples as well as subsurface rock cuttings and core from oil and gas wells (fig. 1; fig. 2), groundwater wells, mineral holes (fig. 1), and engineering test holes. The collection also includes a huge number of corresponding processed scientific materials such as petrographic thin sections and paleontological microscope slides that were derived from these samples. The facility is northeast of Eagle River off the Glenn Highway at 18205 Fish Hatchery Road, about 18 miles from downtown Anchorage (www.dggs.dnr.state.ak.us; see GMC link).

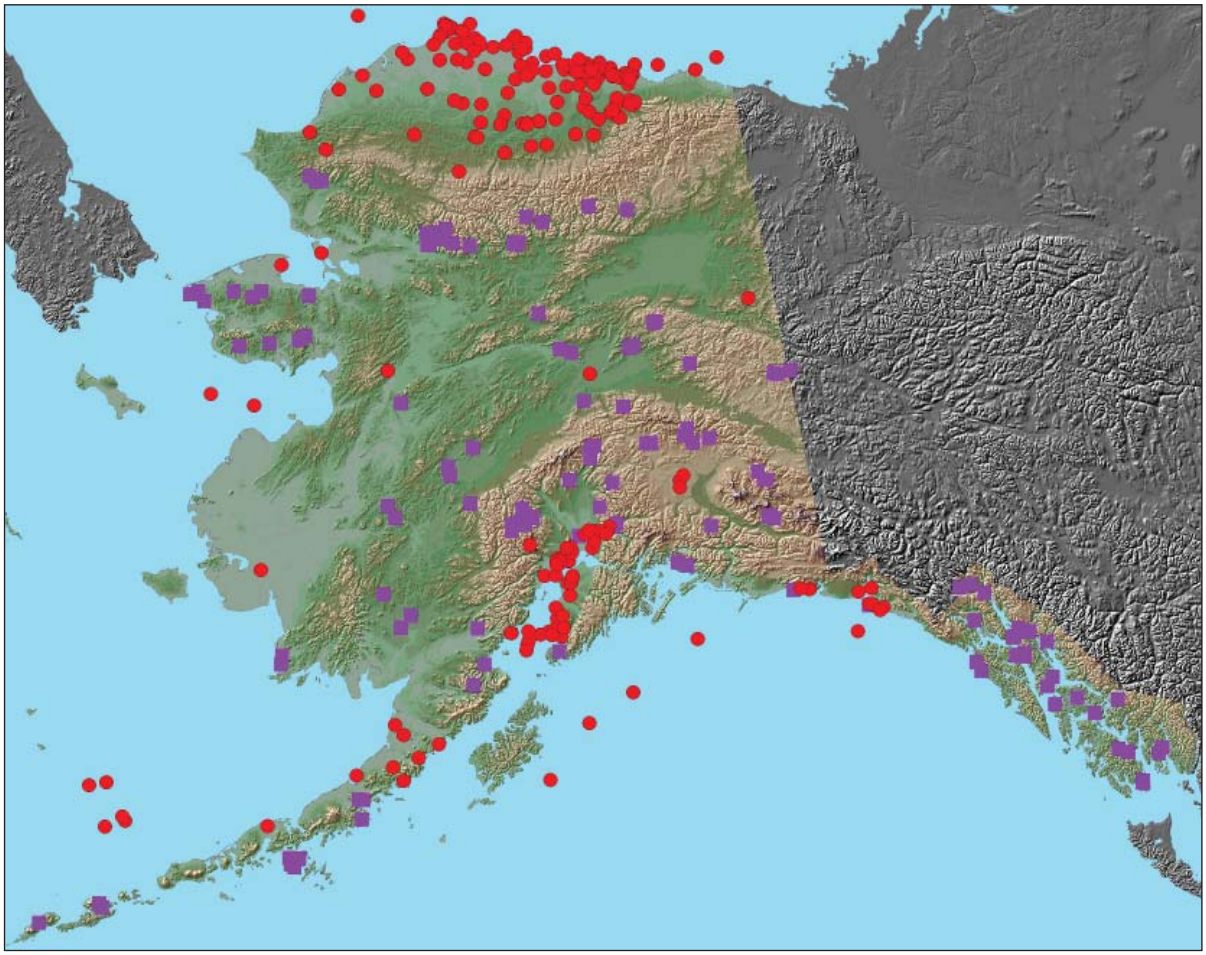

*Figure 1.*

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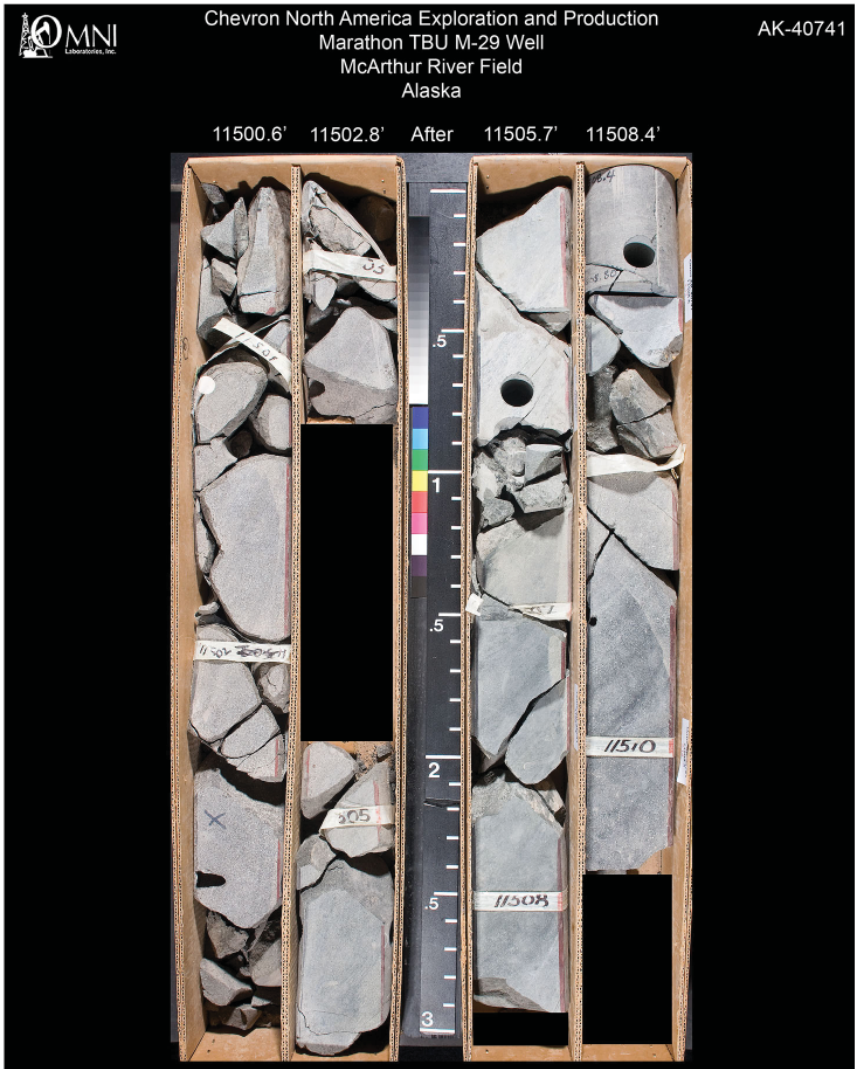



*Figure 2.*

The GMC contains many unique specimens available for examination. Some of the more noteworthy examples are:

- original rock samples from the Atlantic Richfield Prudhoe Bay No. 1 discovery well
- oil samples from the Prudhoe Bay reservoir
- original rock samples from the Swanson River discovery oil wells of the Kenai Peninsula
- gold-bearing quartz veins of the historical Treadwell Mine of the Juneau area
- copper sulfide-bearing cores of the Nikolai Prospect near the historical Kennecott Copper Mine
- beautiful Jurassic ammonites from Fossil Point (fig. 3)
- rare orbicular diorites from the Talkeetna Mountains (fig. 4)
- famous almandine garnets in schist from Wrangell (fig. 5)

The microfossil collection alone is one of the largest collections of its type, attracting scientists from all over the world to view it. It consists of more than 200,000 glass slides of palynomorphs (fig. 6), Foraminifera, siliceous microfossils, and nannoplantons, to name just a few. Nearly all geologic resource exploration in Alaska, by necessity, starts at the Alaska GMC.

At every corner of the facility and on every shelf, the Alaska GMC represents the natural and human history of Alaska. It contains materials from more than 22 government agencies and institutions, universities, and private companies. The GMC is managed by the Alaska Department of Natural Resources' Division of Geological & Geophysical Surveys (DGGS), which established cooperative agreements with the U.S. Geological Survey (USGS; February 1982), the Alaska Oil and Gas Conservation Commission (May 1985), the U.S. Bureau of Mines (1987), the U.S. Minerals Management Service (July 1986), and the U.S. Bureau of Land Management (November 1993).

Two individuals were principally responsible for creating the important first GMC cooperative agreement: former State Geologist **Ross G. Schaff** of DGGS and former Western Region Director's Representative **George Gryc** of USGS. This important agreement was signed February 6, 1982. The official date of the opening of the Alaska GMC was December 12, 1984, at its current location in Eagle River.

*Figure 3.*

*Figure 4.*

*Figure 5.*

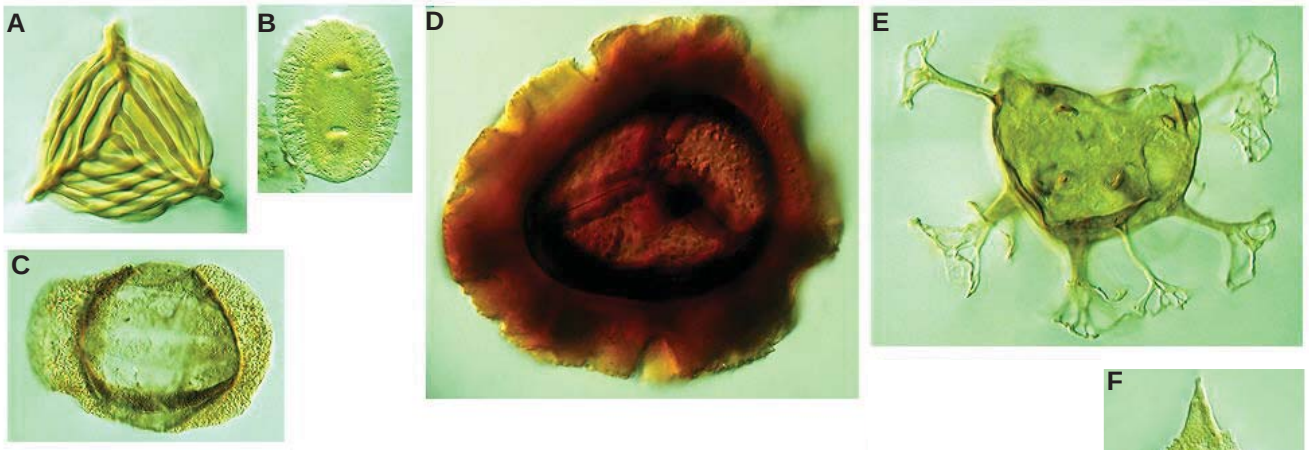
The GMC site, which currently occupies an 11.4-acre lot on the north side of Fire Lake Creek, was originally designed to be a federal fish hatchery; it was transferred to the State of Alaska shortly after statehood in 1959. With a $1.5 million loan from the U.S. Fish and Wildlife Service to the State of Alaska Department of Fish and Game, major expansion of the facility was undertaken in the 1970s, expanding it into one of Alaska's major fish hatcheries. The hatchery was abandoned because of water supply and water contamination problems in the late 1970s and was turned over to the Department of Natural Resources with the understanding that DGGS would, for the USGS, store the federal National Petroleum Reserve–Alaska core at the site. The USGS contributed $300,000 toward rehabilitating the facility, adding extensive shelving, and then transferring rock materials to it with the help of Windsor (Doc) L. Adkison (USGS) and William (Bill) Lyle (DGGS). Mitch Henning of DGGS became the first GMC curator; Dr. John W. Reeder was appointed curator in July 1987 by then-State Geologist Robert B. Forbes.

The cooperative agreements that established the facility required the establishment of a GMC Advisory Board, which was created in 1987 for the main purpose of helping DGGS support, manage, and protect the publicly available GMC collection. The Board consists of the Alaska State Geologist, a representative from each cooperating agency, a representative from the oil and gas industry, and a representative from the mining industry. Between 1987 and 1990, this Advisory Board, chaired by Don Hartman of Texaco Inc., created the Alaska GMC Operating Policy, which defines the dos and the don'ts for the GMC curator and users. Such a policy statement is critical for the successful operation and protection of any public archive.

The opening of the doors on December 12, 1984, was the beginning of the Alaska Geologic Materials Center. However, Alaska rock samples had been publicly available for examination and testing earlier through the Alaska Oil and Gas Conservation Commission (originally part of the Alaska Department of Natural Resources, Division of Mines and Geology).

The Alaska Constitution grants the State of Alaska management ownership of all subsurface fluid and gas resources (oil, gas, geothermal fluids, and water). Alaska Administrative Code 20 AAC 25.071 requires representative rock samples from oil and gas wells to be turned over to the State. After two years of being held confidential, samples become available for public examination. Before the GMC was established, the Alaska Oil and Gas Conservation Commission (AOGCC) held these oil and gas well samples. Companies such as the American/Canadian Stratigraphic Company examined many of the samples. Many of the oil companies expressed the need to not just examine, but to also test parts of the samples for additional information. Many geologists, such as Anchorage-based Alexander Sisson of the former Union Oil Company of California (Unocal), argued that by undertaking such testing, "We would learn more than we would by just examining the samples."

Alaska Department of Natural Resources' former Chief Petroleum Geologist Thomas R. Marshall, Jr., finally agreed in 1972 to allow testing of parts of the samples on the condition that all results including data, slides, and residues, were returned




A. *Plicatella sp* – Fern spore from the middle-Cretaceous Nanushuk Formation
B. *Wodehouseia quadrispina* – Angiosperm (flowering plant) pollen from the latest Cretaceous Canning Formation
C. *Lunatisporites noviaulensis* – Gymnospermous pollen from the earliest Triassic Eileen Shale
D. *Labiadensites fimbriatus* – Terrestrial plant spore of unknown affinity from the Mississippian Kekiktuk Formation
E. *Oligosphaeridium pulcherrimum* – Marine dinoflagellate cyst from the Early Cretaceous Kalubik Formation
F. *Pareodinia sp.* – Marine dinoflagellate cyst from the Jurassic Kingak Formation

*Figure 6.*

and made available to the public. Tom appointed William Van Alen the difficult job of monitoring all sampling and ensuring the return of all materials and data. As a result, the first 60 GMC data reports and 50,000 microfossil and petrographic slides (mostly from Unocal) were received and archived by AOGCC. Available space for public examination and sampling was limited at the AOGCC facility and they realized expansion was needed. Their cooperative agreement with DGGS was signed in 1985.

Since 1984, all GMC samples have been available to the public for examination and additional testing or processing under "GMC policy requirements." The GMC has been predictably busy, servicing an average of about 450 physical visitations per year (fig. 7) by professionals from industry, government agencies, academia, and the public. This number is high compared to other rock depositories; however, the number of visitations per year is fairly constant and seems to be independent of oil or mineral economies. The collection has expanded continually (fig. 9), apparently independent of industry economies.

GMC's collection of new representative samples from oil and gas wells grows annually by about 30 wells (fig. 8); about 25 new mineral holes are added each year (fig. 8). Mineral hole accessions vary considerably because no regulations require such samples to be turned in to a public depository. Instead, all mineral hole samples are received as voluntary donations. Most of the oil and gas well collection at the GMC has also been received as voluntary donations from industry. Such sample donations help supplement the existing cuttings and core chips that were required in the AOGCC collection at the GMC. The extra donated samples allow much more extensive testing, resulting in more rapid growth of processed samples and data reports.

The most sample donations to the Alaska GMC occurred in fall and winter of 1997 when 17 tractor-trailer loads of materials were received, including:

- 14 truckloads from Shell Oil Company (Houston, TX)
- One-half truckload from Marathon Oil Corporation (Denver, CO)
- One truckload of U.S. Geological Survey NPRA well and shot-hole samples (Menlo Park, CA)
- One-half truckload of Jonesville mine coal holes (Palmer, AK)
- One truckload of Death Valley core holes (Seward Peninsula, AK)

The second largest donation arrived in the fall and winter of 2002 with 11 tractor-trailer loads from British Petroleum, including their Amoco collection from Tulsa and Houston and part of their Milne Point collection from Alaska. Two additional tractor-trailer loads of mineral core were also received from the University of Alaska Fairbanks. Three and one-half truck loads of oil/gas well and core hole samples were received during fall 2008.

The GMC's main and most complete oil/gas well sample collection for Alaska is the AOGCC collection. Of the hard-rock minerals housed at the GMC, the U.S. Bureau of Mines collection is the most complete. However, there are other important collections at the GMC, including:

- U.S. Minerals Management Service outer continental shelf collection

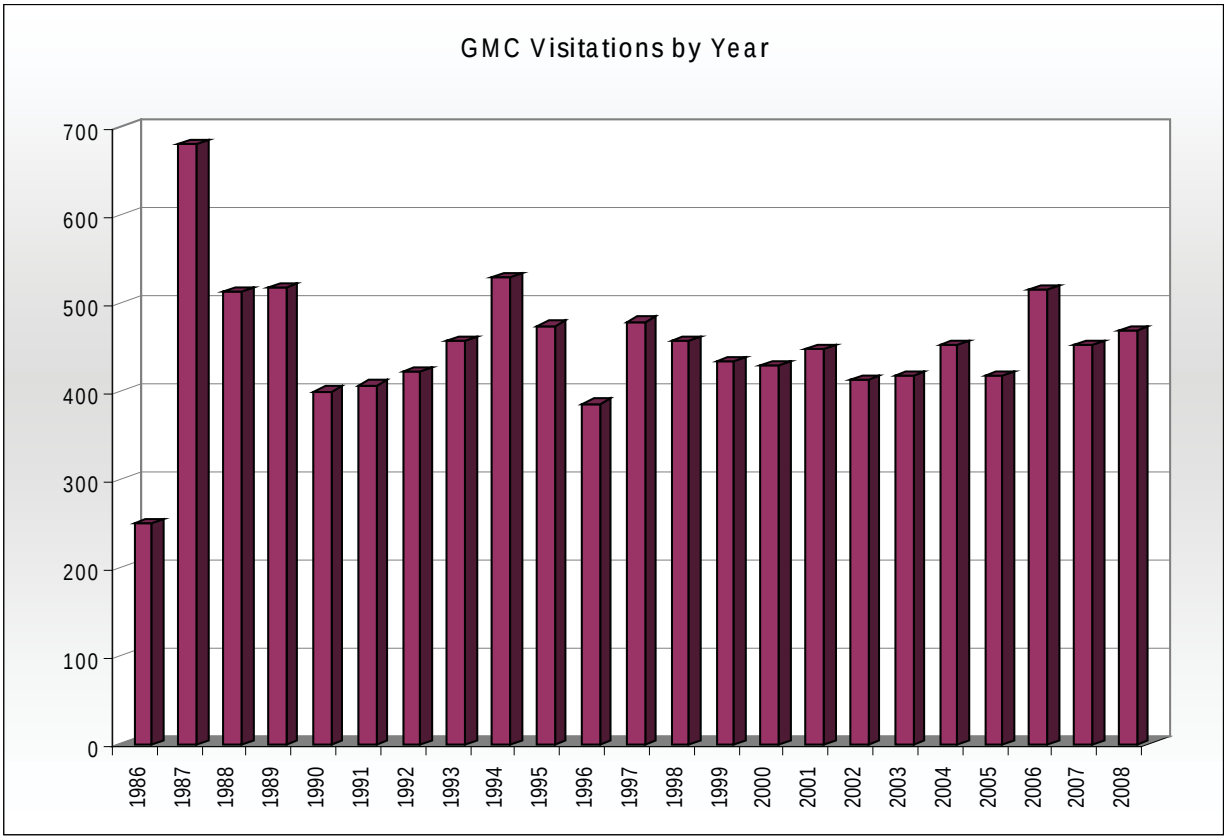



*Figure 7.*

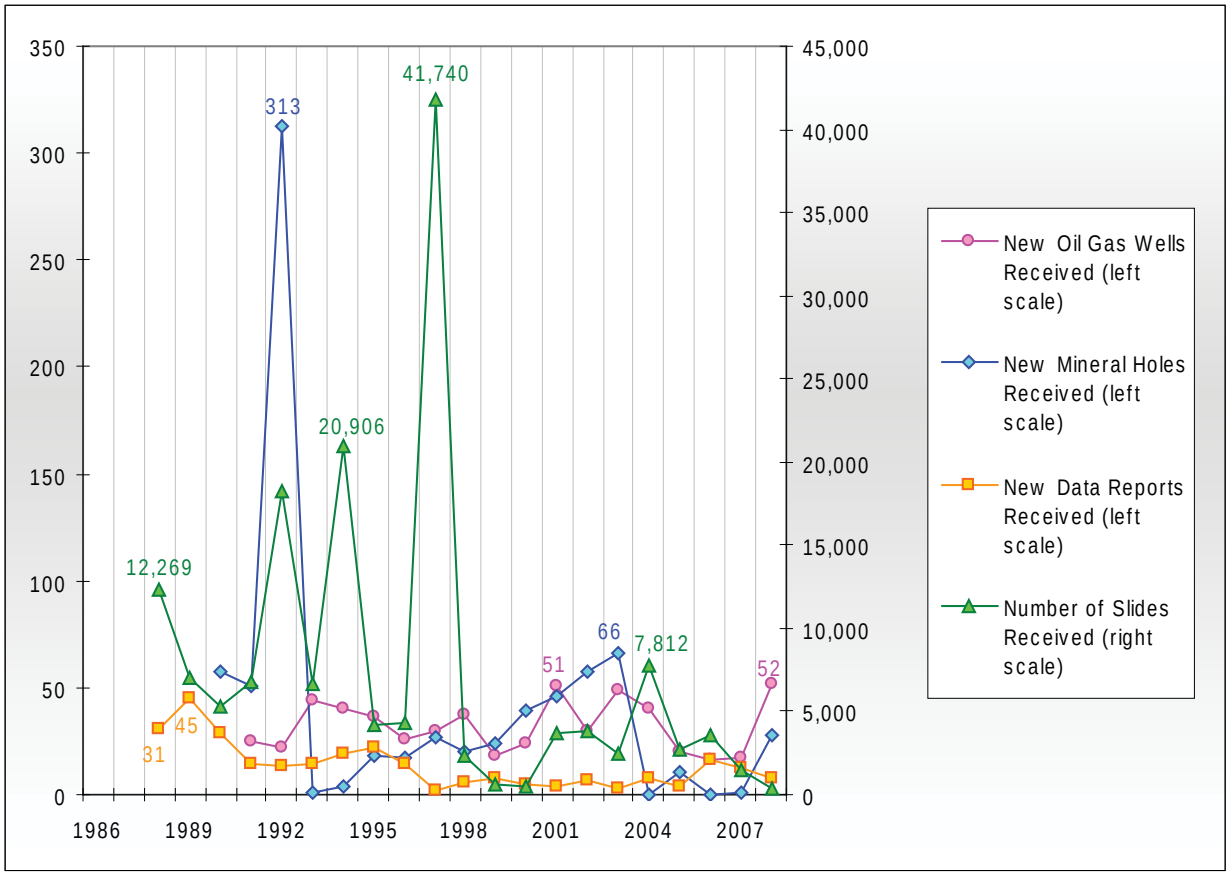



*Figure 8.*

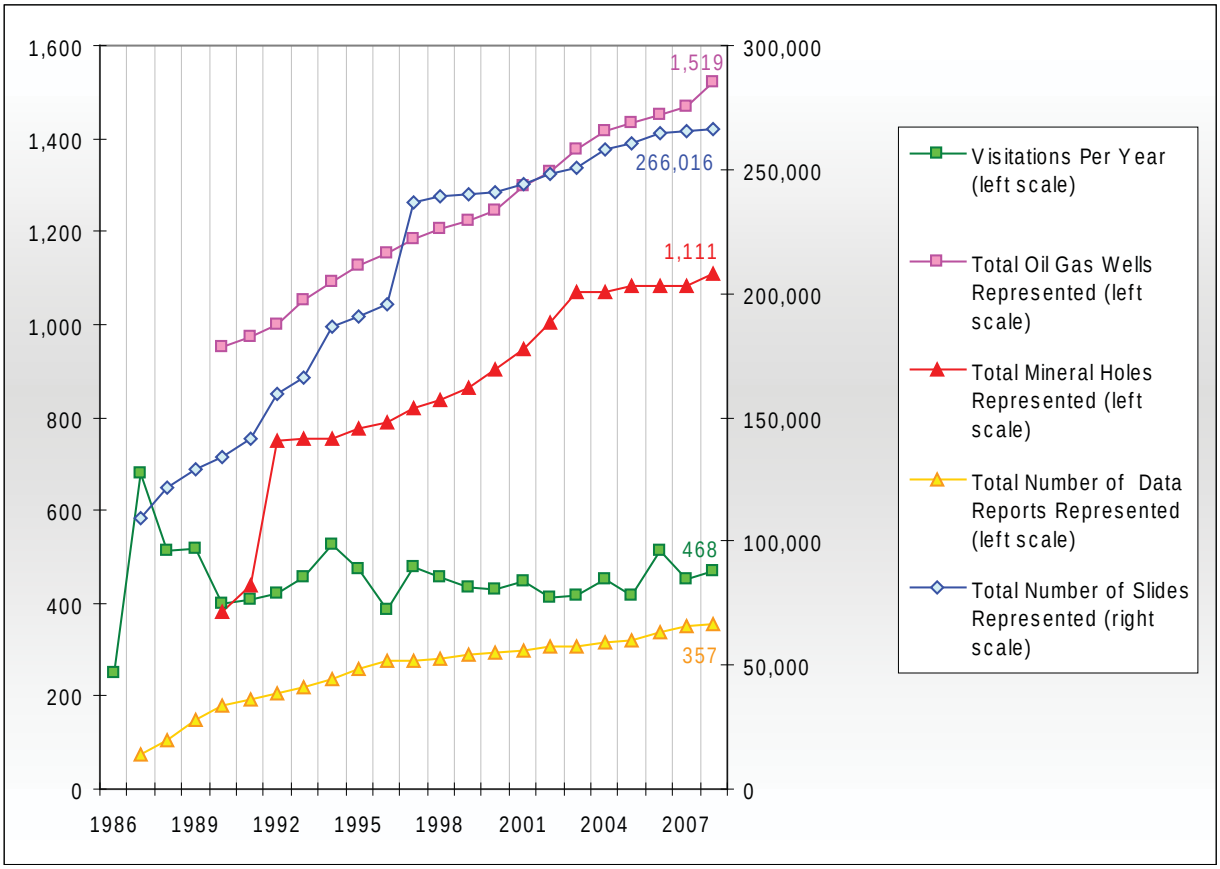



*Figure 9.*

- U.S. Geological Survey oil and gas well sample collection
- Bureau of Land Management oil and gas well sample collection
- State of Alaska DGGS and Division of Oil & Gas surface sample collections
- Amoco Production Company well (from British Petroleum)
- Company geological reports, surface sample, and megafossil collections
- British Petroleum Milne Point and Badami well sample collections
- Cook Inlet Region, Inc. (CIRI) mineral hole and oil/gas well sample collection
- Forest Oil Corporation well sample collection
- Marathon Oil Corporation well sample collection
- OXY USA Inc. (Occidental Petroleum Corporation) well sample collection
- Phillips Petroleum Company well sample collection
- Shell Western E & P Inc. well sample, surface sample, megafossil, and processed slide collections
- Unocal Corporation well sample collection
- Battle Mountain mineral hole collection
- Calista Corporation mineral hole collection
- Aleut Corporation core hole collection
- Kennecott Minerals core hole collection
- Anaconda Mining Inc.core hole and map collections (through CIRI)
- Bristol Bay Native Village mineral hole collection
- University of Alaska Fairbanks core hole collections (Museum, Civil Engineering, Petroleum Engineering, Department of Geology & Geophysics)
- ARCO Alaska Inc. collection
- John Reeder rock specimen collection

The GMC has cuttings and core representing approximately 11,712,000 feet of drilling from 1,519 Alaska oil and gas exploratory and production wells. There are also more than 229,926 feet of diamond drill mineral core from 1,111 exploratory holes from 189 mining prospects/developments. The GMC stores well samples for nearly all oil and gas exploratory wells in Alaska, and at least some core samples from nearly half of the known mineral prospects and developments in Alaska (Nokleberg and others, 1987; Alaska Resource Data File, http://ardf.wr.usgs.gov). If surface samples were included, all areas of Alaska would be represented and figure 1 would be so densely populated with symbols, it would be unreadable.

GMC samples are available to the public for examination and even for additional testing and processing, subject to GMC policy requirements. All resulting processed materials from such testing, such as microfossil slides and resulting technical data such as chemical reports, are added to the GMC collection. As a result, with donations, there are currently 357 data reports and 266,000 glass slides, excluding duplicate slides,

in the GMC collection. Both the numbers of data reports and processed slides have increased continuously since Curator John Reeder instituted record keeping, although the rate of acquisition for both has decreased significantly since 1997. Between 1988 and 1997, the GMC received an average of about 25 data reports (fig. 8) and about 10,000 processed glass slides per year excluding the Shell Oil Company glass slide donation of 1997 (fig. 8). Between 1997 and 2008, the Alaska GMC averaged about 6 data reports and about 5,000 processed glass slides per year. Because at least 75 percent of the GMC visitors represent oil and gas interests, this drop might reflect the maturity of the Prudhoe Bay and Kuparuk oil fields of northern Alaska. However, although the amount of processing of existing GMC samples appears to be less in the last 10 years than in the previous 10 years, the GMC visitations (fig. 7) have *not* decreased.

DGGS's Geologic Communications section staff in Fairbanks recently completed a project to post online the data reports that are housed at the GMC. The reports are now available through the DGGS publications database, http://www.dggs.dnr.state.ak.us/pubs/pubs.jsp. Work is underway on an online-searchable database of materials available at the GMC; completion of that project is anticipated by the end of 2009.

The GMC collection has grown to occupy five buildings and 60 portable metal containers at the Eagle River site. The current facility long ago ran out of space to adequately store new samples. The number of metal containers on site has grown from zero in 1987 to 60 in the current configuration, with no space for additional containers. The need for a larger, state-of-the-art facility has been so obvious to the many GMC users and cooperating agencies that an ad hoc committee in 2005 developed criteria for a new, expanded, and centralized Alaska GMC. In April 2006, members of this committee met with State and other national experts to establish guidelines for a formal concept study. The study was completed in 2006 by the State of Alaska Department of Transportation & Public Facilities. The concept study report is available online (http://www.dggs.dnr.state.ak.us/download/gmc_concept_study_august_2006.pdf)

Alaska's Geologic Materials Center currently contains the largest public collection of core, cuttings, processed slides, data reports, and rock and mineral samples for Alaska. Its importance for future exploration and scientific research is priceless. Investment in a new facility for the preservation and use of these materials is a sound investment in Alaska's future (Reeder, 2008).

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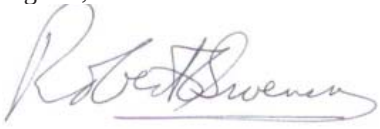
# *Dear Readers:*

There is nothing like a winter in Fairbanks to get your attention. This one has been notably special with more of our beloved 'typical' cold weather snaps, sufficient darkness to keep vampires roaming the streets for most of the day, and of course the hundreds of exciting geologic brushfires to keep things from getting boring. We have had a number of notable events, including triple volcanic events out on the Aleutian chain, a precipitous drop in commodity prices (as well as the economy), and a number of national events and scientific discussions that keep the blood flowing on the cold winter nights.

One of the realities that transcends all of the current debates and discussions is that the most important source of data necessary to keep our hypotheses grounded is archived at the Geologic Materials Center (GMC). Whether you propose vast interpretive changes in the location of sequence boundaries of the Cretaceous strata in the Colville Basin, or climate-associated mitigation and determination of historic climatic shifts, or the metamorphic history in the area around Livengood, or the potential for chemical reaction and adverse diagenetic change to reservoir quality associated with injection of super-critical CO2, the GMC is the place to find that one piece of hard data that will help break the code or provide the necessary level of certainty. John Reeder, the author of this issue's feature article, has been the curator and manager there for many years, and is the reason we have a viable GMC. Please join me in congratulating John for a job well done.

Finally, I can't promise a new GMC building next year, but I can say we are closer than ever before, and would appreciate your support when the time is critical. I will let you know.

Regards,



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