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Explanation of fields used in the Alaska Resource Data File of mines, prospects, and mineral occurrences in Alaska

Descriptions of mines, prospects, and mineral occurrences in the Alaska Resource Data File (ARDF) are published for individual U.S. Geological Survey 1:250,000 scale quadrangles in Alaska (see accompanying map) and are available for downloading from USGS World Wide Web site:

<https://www.wr.usgs.gov/ardf>. These descriptions are divided into a number of fields which describe features of each mine, prospect, or mineral occurrence.

If you have any questions, comments, or suggestions, or need more information, please contact:

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Introduction

The Alaska Resource Data File or “ARDF” is intended as a comprehensive data base of Alaskan mineral deposits and significant mineral occurrences. The ARDF data base describes all mines, prospects, and occurrences in Alaska, which in general, are called “sites.” Claim information may be included if it suggests the presence of mineral resources in areas not otherwise known to contain a site, but nonetheless is being or has recently been aggressively explored by industry. However, ARDF is not a claims data base. The information in the database is compiled from published reports and unpublished information from industry, the U.S. Bureau of Land Management, the U.S. Geological Survey, and other government and private sources. Some thoughts on where to obtain information to update ARDF are in Appendix I. The goal is that each ARDF record be factual, current, comprehensive, and done to professional standards. ARDF is not meant to include the opinion or interpretation of the data by updater, but rather to report pertinent available information. Where conflicting or diverse data, and/or geologic interpretations or opinions are available, they all should be included and referenced.

ARDF data is released as an USGS Open-File Report on the ARDF web site:
<https://ardf.wr.usgs.gov> .

ARDF is mainly focused on metallic commodities. Common industrial minerals or commodities, such as sand and gravel, crushed stone, and limestone are not included in ARDF, nor are energy minerals such as peat, coal, and oil and gas. However, uranium, thorium, and rare earth elements, as well as some high-unit-value industrial minerals, such as barite, jade, graphite, and gypsum are included.

The data base incorporates unpublished industry information to the maximum extent possible. We solicit such information and encourage users of ARDF to submit such material

when possible. Those charged with updating ARDF are expected to exercise due diligence in contacting individuals or organizations who may have knowledge or evidence of new mines, prospects, or mineral occurrences. Note, however, when adding unpublished information, updaters should be certain that they have permission to make the information public from the companies or the individuals furnishing the information.

The descriptions of the Alaskan mines, prospects, and mineral occurrences are entered into the ARDF data base, which is structured into 31 fields, using FileMaker Pro software. Originally, much of the information in ARDF came from the records in the USGS, MRDS (Mineral Resource Data System) national database, which in turn was largely derived from Edward H. Cobb's monumental series of maps and summaries of the mineral deposits of Alaska.

Explanation and notes on individual fields:

Site Name(s): Name or names for the site from the literature.

The three most common situations are:

- 1) The site is known by a proper name or names. The most commonly used proper name is cited first (as determined by the judgment of the updater). If several names have been used at or within the site, those additional names follow (in no particular order), separated by semi-colon. Now and then, the names of claim groups or ore bodies within a deposit may be used in the literature in referring to a site. These aren't to be used in this field but may be added to the additional comments field.
- 2) The site coincides with a geographic feature (as distinct from being nearby). Typically these are creeks that have placer deposits. These placers should be designated by their geographic name; e.g. "Gold Creek."
- 3) The site, usually a prospect or an occurrence, does not have a proper name or names, does not coincide with a geographic feature, and has never or only informally been identified using a geographic name. These should be identified as "Unnamed" or in the style "Unnamed (near Crooked Creek)."

Site Type: The mineral deposits in this database are classified as mines, prospects, and mineral occurrences.

The only acceptable designations are: "Mine," "Mines," "Prospect," "Prospects," "Occurrence," and "Occurrences."

Mines have past production, though it may be small or trivial; prospects have had some mapping, or geochemical or geophysical surveys, or physical excavation by industry. Mineral occurrences include unexplored occurrences of minerals of economic interest, or multiple samples having substantial values of one or more metals as determined by analysis or mineralogy. By convention, an occurrence does not become a prospect if only government workers have found it or studied it.

In some cases, the only suggestion of a mineral deposit may exist at a site is that a claim or claims have been staked there. These sites are included if: 1) the claim or claims have been identified as a site in a previous publication, especially if they already have an MRDS number; or 2) there is clear evidence that the claim or claims have had substantial work by a reputable source. However, ARDF is not a claim-location data base and no attempt should be made to make it one.

ARDF No.: A label assigned to each mineral deposit in the database.

The form of the ARDF number is a two-letter, quadrangle code (see Appendix II), followed by a three digit number, e.g. “FB001”. (There is no space between the letters and the numbers.)

MRDS No.: This is the unique identification number used in the USGS’s National Mineral Resource Data System (MRDS).

District: **As of the 2010, the District field has been abandoned.** Until that version of the Standards there was a District field in the ARDF records. Several mining, recording, and political district schemes have been used in Alaska over the years using markedly different criteria. Through 2010, ARDF used the mining districts developed by Ransome and Kerns for the U.S. Bureau of Mines (Ransome and Kerns, 1954). (The Ransome and Kerns scheme is now little used and does not coincide with any political or recording-district boundaries. As well, the word district is often used informally for deposits grouping together geographically based on some individual’s initiative or by local convention, rather than under a formal statewide system). The District field for records that already have the District field populated will not be deleted. If in the future there is a call to provide the Ransome and Kerns District, this can be populated using GIS by the USGS.

Latitude and Longitude: The location of the site in decimal degrees. It is assumed that the latitude is north and longitude is west, hence these are positive numbers. In the rare cases where a site is located in the eastern hemisphere (western Aleutian Islands), the longitude should be given as a negative number.

The latitude and longitude fields are given to 4 decimal places. The coordinates in early ARDF records were given to 2 or 3 places as an indication of how accurately the site was located. Truthfully, this was a bad idea that will eventually be rectified for all the records! Protocol now is that uncertainty is explained in the “Location description and accuracy” field. Some sites are areas or are aligned linearly. For these, the geographic coordinates should be the center of the area or linear zone.

Coordinates in records done before about 2005 use the NAD’27 datum; those since use the NAD’83 datum (which is very similar to the WGS84 datum). Note that there is up to 300 meters difference if a given coordinate set is plotted on a map using the NAD’27 versus the NAD’83 datum. For the moment, we are not replacing all the NAD’27 coordinates with NAD’83 coordinates but eventually we will. New sites should use the NAD’83 datum and if possible revisions to existing sites should correct the latitude and longitude to the NAD’83 datum.

Quadrangle and Quad-250: Prior to these standards, there was a single quadrangle field that used a 2-letter code for the 1:250,000-scale quadrangles. As of these standards, there will be two fields to identify the 1:250,000-scale quadrangle. One will spell out the quadrangle name in full; the other will use the two-letter code.

Quad-63,360: The letter, a hyphen, and number used to designate the 1:63,360-scale USGS topographic map sheet on which the site is located. For example: “A-1.” The style of the entry follows the conventional scheme for 1:63,360 maps used in Alaska. That is,

the 1:63,360-scale quadrangles in all the 1:250,000 quadrangles are labeled in a system that originates in the lower right corner of the quadrangle. The tiers of 1:63,360 quadrangles are labeled upward from A through D, and from 1 to 6 (or occasionally to 8), right to left.

State: All entries will be "AK"

Location description and accuracy: This is a narrative description of the location of the mineral deposit and its areal extent, as well as an assessment of the accuracy of the location as given in the latitude and longitude fields. The locality description is keyed to geographic names on the appropriate 1:63,360-scale topographic map and located by section, township, and range. The USGS suggests the following form for describing areas using the public land grid: "SE1/4NW1/4 sec. 4, T. 12 S., R. 15 E., of the Seward Meridian." The location description and accuracy field should be considered as an alternate way to locate the site and a description of how accurately the site is located by the latitude and longitude. An example: "The latitude/longitude listed, when plotted on Google Earth lands in the middle of the Fort Knox Mine area (which has an approximate radius of 2 miles from that point)." For areas, such as placer deposits, this description should indicate the extent of the deposit, for example, x distance along creek above and below location.

Commodities, main and other: These fields contain lists of elements or commodities of real or potential economic value in the mineral deposit. Commodities are listed alphabetically by chemical symbol; commodities such as barite, chromite, gypsum, and jade are spelled out. When described collectively, rare-earth elements = REE; platinum group elements = PGE. The chemical symbols for individual REE and PGE elements are used if they have been cited by element specifically as the commodities of interest at a site. Although arsenic is rarely a commodity of economic interest, it is commonly a pathfinder element and may be listed among the other commodities.

Main refers to the dominant commodities of economic interest in the opinion of the compiler.

Other commodities are present in minor amounts as determined by analysis or mineralogy.

The distinction between "Main" and "Other" is a matter of judgment, as it is not possible to establish criteria to define their boundaries for every mine, prospect, or occurrence. "Main" will include the major commodity in a producing mine and possibly one or more other commodities. "Other" might include by-products from a mine. For prospects and occurrences, the list of commodities may only be a list of elements identified in a sample or samples and does not necessarily indicate which commodities ultimately may be of economic value. In such cases, the distinction between "Main" and "Other" becomes highly subjective, if not meaningless.

Ore minerals: An alphabetical list of the ore minerals at the site. By convention, the ore minerals include all of the native metals, sulfides and sulfosalts, metallic oxides and metal-rich minerals of real or potential economic value. (This includes pyrite and arsenopyrite if they are of economic value.) Their relative abundance should be described in the "Geologic description" field. Barite, gypsum, chromite, fluorite, and

the like should be listed here if they are the chief mineral(s) of economic interest at the site. All mineral names are spelled out in full.

Gangue minerals: An alphabetical list of the non-economic minerals at the site that can not be avoided in mining. As conventionally used, gangue minerals are silicates, carbonates, and other minerals that are intergrown with the ore minerals. The term “gangue” mineral was originally used in the context of classic vein or replacement deposits and may not apply in discussing the mineralogy of many deposits. The field can be left blank in those cases. “Gangue” usually does not include the minerals in the host rock, nor does it normally include alteration minerals. Minerals like barite, fluorite, and gypsum are usually included as gangue minerals if they are present in relatively minor amounts. The relative abundance of the gangue minerals should be described in the “Geologic Description” field.

Geologic description: This critically important field should be a full description of the geology and character of the deposit or occurrence, as complete as possible. This field should provide information on the host rock, structure of the host and mineralized system, mineralogy and mineralogical relations, alteration, age, and the shape and form of the deposit. This field should be treated as a “stand-alone” field in the sense that it **may** duplicate information in other fields in order to fully describe the site. This field thus may include a summary of the information in the exploration, production, and reserves or resources fields; however it should not simply duplicate those fields. Note, this field is **not** the place for a history of site ownership or discussion of who is/was contracted for exploration; if the reporter deemed this information important, it would be placed in the “Additional comments” field.

Alteration: A description of alteration at the deposit. The information in this field should also be summarized in the “Geologic description” field.

Age: The age of mineralization and the evidence for the age, including a source reference, whenever possible. This information should also be summarized in the “Geologic description” field. While the literature may not specify an age for a deposit, a limit or range may be inferred from the age of the host rock; e.g., “Cretaceous or younger based on the age of the host rock.”

Generic deposit model (Newly added field as of August, 2017): This new field will contain a fixed list of generic deposit models, largely derived from Hedenquist and others (2005). The existing deposit model field will remain and can and should be used for more detailed responses. It contains free-form text. The existing deposit model field, while useful, has been problematic. Reasons for this are varied, but include:

- Deposit models are somewhat in the eye of the beholder;
- Deposit model names can be entered in various styles (Au versus gold);
- The same deposit model can have alternate names;
- The field is free-form text, meaning it is not systematic;
- Rather than naming a model, some contributors describe them.
- An additional issue that arises is the use of Excel by many users as a database. Because of its very limited database capabilities, the inherent capabilities of the native ARDF software (Filemaker Pro) are lost.

List of generic deposit models:

- Magmatic nickel sulfide deposits (Barnes and Lightfoot (2005)
- PGE, chromium, and vanadium deposits (Cawthorn and others (2005)
- Porphyry deposits (Einaudi and others (2005)
- Skarn deposits (Meinert and others, 2005)
- Granitic uranium and REE ore deposits (Cerny and others, 2005)
- Iron oxide copper-gold deposits (Williams and others, 2005)
- Orogenic gold deposits (Goldfarb and others, 2005)
- Reduced intrusion-related gold deposits (Hart, 2007)
- Epithermal precious and base-metal deposits (Simmons and others, 2005)
- Volcanogenic massive sulfide deposits (Franklin and others, 2005)
- Sediment-hosted lead zinc deposits (Leach and others, 2005)
- Stratiform copper deposits (Hitzman and others, 2005)
- Iron ore deposits (Clout and Simonson, 2005)
- Placer deposits (Garnett and Bassett, 2005)
- Sandstone-hosted uranium deposits (Dahlkamp, 1993)
- Lateritic ore deposits (Freyssinet and others, 2005)
- Carlin-type gold deposits (Cline and others, 2005)
- Diamond deposits (Gurney and others, 2005)

Deposit model: The three usual situations are:

- 1) The deposit can be classified as one of the Cox and Singer (1986) or Bliss (1992) deposit models. In this case, the model is given in the form: “Replacement Sn (Cox and Singer, 1986; model 14c).” While some of the Cox and Singer models are quite specific, some are more general and might be elaborated on. For example, rather than just calling something a “Polymetallic vein (Cox and Singer model 22c),” one might call it a “Tetrahedrite-galena-sphalerite-quartz polymetallic vein (Cox and Singer model 22c).”
- 2) The deposit can be best classified by referring to some other published source rather than a Cox and Singer model or if an appropriate Cox and Singer model doesn’t exist. For instance the model might be identified as a “Stratiform Ni-Mo ore bed (Coveney, Grauch, and Murowchick, 1994).” Any model name used will include the reference citation in the “References” field.
- 3) The deposit is best defined in general terms for lack of or very limited evidence. A query mark might be appropriate; an example might be “Porphyry copper?” where there is little geologic information and nothing but a vague note that it may be such. A reference need not be cited. Experience tells us that the ‘Deposit Model’ is by far the most subjective field in the ARDF data base.

Cox and Singer (1986) or Bliss (1992) Model Number: Filled in (**only**) with the model number if assigned to a Cox and Singer or Bliss model in the “Deposit Model” field.

Production status: A brief description of production from the site. Values are restricted to “None,” “Undetermined,” “Yes,” “Yes, small”, “Yes, medium”, and “Yes, large”. An example of “Small” production is minor gold from a placer deposit; a “Large” example

would be the Alaska-Juneau Mine; and “Medium” production is somewhere in between.

Site Status: A brief description of current activity at the site. The only choices are “Active,” “Active?,” “Probably inactive,” “Inactive,” and “Undetermined.” This is the best estimate by the compiler of recent activity and thus is somewhat subjective. It is not a legal definition of claim validity at the time the record is being updated nor should activity be restricted to excavation or other physical exploration at the site. For instance, sites that have seen substantial geologic mapping, geochemical sampling, or ground geophysics, within the last several years would be considered active.

Workings/exploration: A description of the exploration to evaluate a prospect or occurrence, or a description of the workings at a mine. For mineral occurrences, this field would include the exploration work or evidence to suggest mineral potential. For prospects and mines, the field should include who has worked on or mined the site, and when. For some sites, the data may include several generations of work by different companies. Geochemical or geophysical work would be described by a summary of the results of such work; but generally not by an exhaustive list of the geochemical assays or geophysical data.

Production notes: A summary of published or publicly available production figures. For some deposits, the numbers may be incomplete for some years or are not available. This field should summarize the chronology of production up to and including the present if the mine is still active, even if the actual production figures cannot be documented.

Reserves: Nonproprietary reserve or resource figures. These values are always to be referenced to a source document. For some deposits, there may be conflicting calculations of reserves; in these cases, the different figures are provided with reference to the source, year, and character of each. ARDF does not have a rigid definition of reserves and resources because there are many different (and often ill-defined) criteria that people have used to calculate the various classes of “reserves” or “resources.”

Additional comments: This field includes information considered important but not appropriate for inclusion in other fields. Such information might include restrictions on mineral exploration and development owing to land status, for instance that site is now an EPA Superfund site, or that it is in a National Park. As more and more environmental issues impact sites, brief mention of an appropriate issue or problem might be worth mentioning here. In return for access to their minerals data, at least one Native Corporation has asked us to include a statement of their ownership of the deposits on their land and that they are to be contacted for more information or access to them. This is a convenient field to note that.

References: Since ARDF began there have been three systems used to tabulate references in the “References” field and to refer to the reference in the text fields. ARDF will follow USGS style as defined in *Suggestions to Authors* (Hansen, 1991, also available on the web at: http://www.nwrc.usgs.gov/lib/lib_sta.htm). That reference also includes the USGS convention for unpublished information: “Oral or written communications and unpublished data in the text are referred to in parentheses in the text but do not appear in the reference list at the end of the record report.” *Suggestions to Authors* states that

only publications that are generally available will be cited in the list of references for publications. However, that policy is modified for ARDF; for ARDF purposes, the references may include unpublished reports by industry or other organizations. These citations should include the organization that holds these reports and where they can be accessed.

Through 2006, each quadrangle Open-File report included a list of all the references cited in any of the fields in the data base. Those lists of references could and often did also include publications that apply to the quadrangle but were not cited explicitly in the text fields. As of the date of these Standards, the Open-File reports the USGS releases showing new updates will no longer include a list of all the references used in all the sites in the updates. Rather each ARDF record will have a list of the references in full USGS style in the Reference Field.

Primary reference: A short-form reference citation to the single best or most complete source of information on the site. For example: “Jones, 2000”, or “Smith, 1939 (B 917-A)”. There may be the occasional record where two references should be cited.

Reporter(s): The individual(s) responsible for compiling or updating the record. The reporter’s name is followed by their affiliation or address in parentheses. For example: “A.B. Smith (USGS)” or “S.W. Nelson (Anchorage)”. The first reporter(s) is the initial compiler of the record. Going forward, updaters add their name and affiliation following the names of the previous reporter(s).

Last report date: This is the date that the record was compiled or updated for currency and completeness. It is not the date of the last publication on the site. It is the date that a competent geologist reviewed the information in the record and if necessary added information to bring it up to date. The date indicates that the updater was satisfied that the record was complete and accurate as of that date. The date is entered in the form MM/DD/YYYY.

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