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Ministry of Employment and Investment
Energy and Minerals Division

Specifications & Guidelines for Bedrock Mapping in British Columbia

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INTRODUCTION

This document, part of the provincial Resource Inventory Committee initiative, provides guidelines and is a step toward development of common standards and methodologies for bedrock mapping in British Columbia. It recommends methodology for the presentation of geological information and describes the types of data that must be collected for the production of geological maps. Implementing these guidelines will make significant progress toward the goal of making comparison and exchange of geological data in the province easier. These standards will be of interest to both specialists and non-specialists, and will help users understand the underlying bedrock data that is used to produce geologic maps and reports. It is important to note that geologic maps are NOT raw data, they are interpretations of the raw data.

Although the standards contain specific recommendations, they should be treated as guidelines. The guidelines are intended to be detailed enough to provide consistency, but not so restrictive that they cannot be easily implemented. They will not be usable in every circumstance, but will cover most applications. It is hoped that this flexible approach will ensure faster and wider acceptance for the recommended standards.

The conceptual design and content of this manual is based on recommendations made by the RIC Bedrock Geology Task Group of the Earth Sciences Task Force, which involved a multi-agency workshop and a client survey. The manual was compiled by W.J. McMillan, F. Ferri and C. Rees with major input and desktop publishing by B. Grant. Comments on earlier drafts were received from many sources, in particular those by M. Mihalynuk and J. Newell are gratefully acknowledged.

This document is broken into five parts:

- Part 1 provides a general overview of bedrock mapping methodology.
- Part 2 describes methodology involved in project planning and information about bedrock field surveys. It also describes both essential and desirable data that should be collected to produce geological maps using symbols outlined in Part 3. We strongly recommend that field data be collected on formatted field forms to facilitate digital data capture.
- Part 3 covers data representation and provides guidelines for the graphical presentation of geological information.
- Part 4 describes typical map symbols and refers to Appendix IX, which is a "library" containing comprehensive cartographic descriptions of specific geological symbols. Appendix IX contains geologic and digital definitions for geologic symbols. ***Note:*** *the British Columbia Geological Survey Branch plans to make the descriptions and AutoCad definitions of the symbols available in digital form.*
- Part 5 contains the main references used to help compile this manual and to establish standards in conformance with accepted practice within the geosciences.
- Nine appendices provide background information on aspects of bedrock mapping discussed in parts 1 to 3, and provide definitions for selected geological terms.

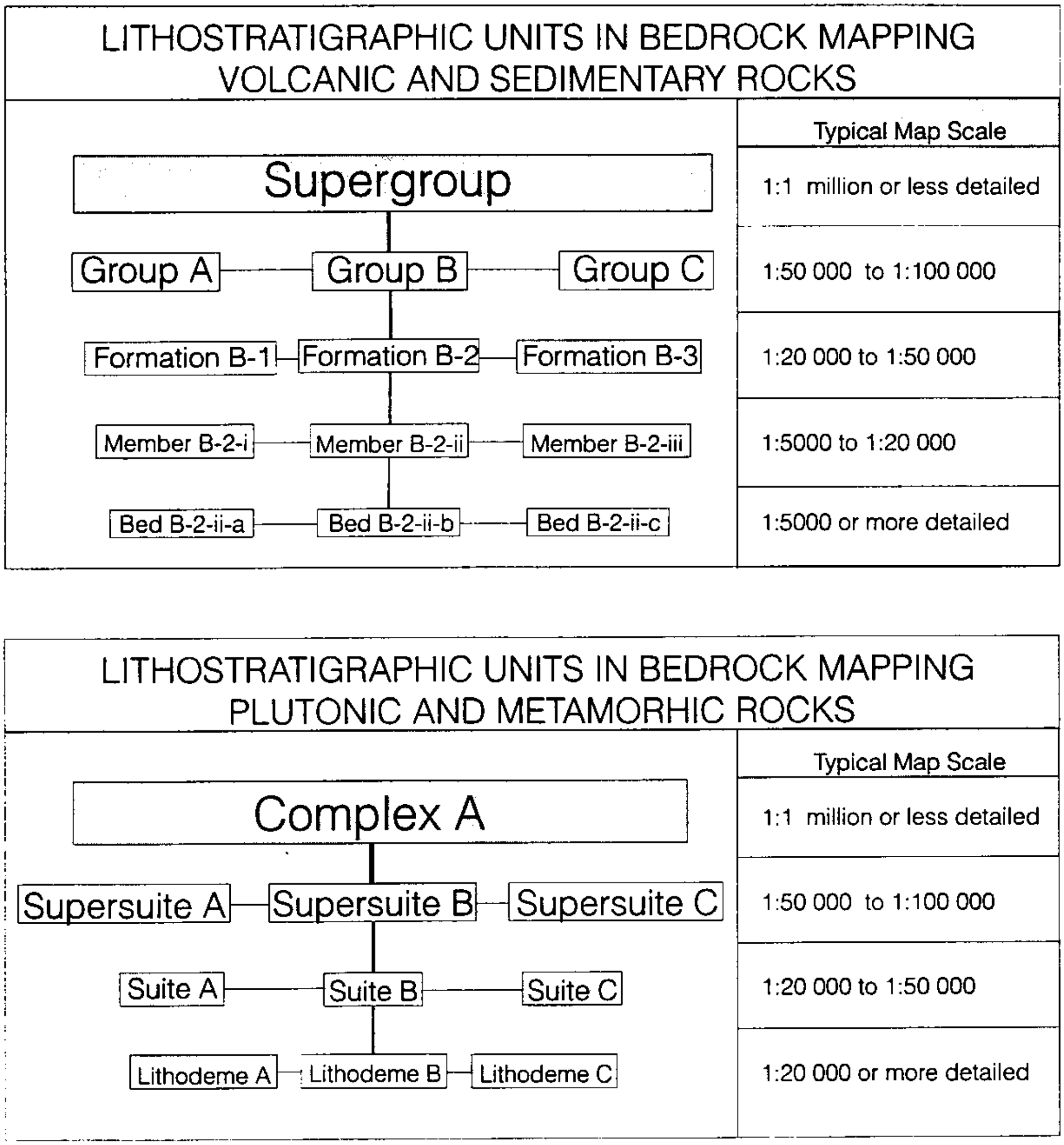

Figure 1. In bedrock mapping, map-unit designations are based on a hierarchical system. This figure illustrates the systems for volcanic and sedimentary rocks, and for plutonic and metamorphic rocks.

PART 1: Fundamental Bedrock Mapping Concepts

Bedrock geological maps are generally plotted on topographic bases and use rock types (lithology), age (based on fossil or isotopic information) and structural data to define map-units and portray their distribution.

The map-unit designations are based on a hierarchical system (Figure 1). The terminology is described in more detail Appendix III. The system progresses from the very general to the more specific. For example, based on lithology, a supergroup consists of a number of related volcanic and/or sedimentary rock packages (groups) that occur over a wide area. Successively finer subdivisions split out distinctive map-units (formations) within groups, mappable rock subunits within formations (members) and even specific rock layers (beds). For intrusive or metamorphic rocks, like granites or gneisses, equivalent divisions are the complex, supersuite, suite and lithodeme.

A similar progression has also been developed to classify rocks based on age rather than rock type. In this approach, all rocks formed during a specific period of time are grouped together, for example, all rocks of the Jurassic Period or the Oligocene Epoch. This kind of grouping is usually based on fossils found in the rocks, but may be based on isotopic dating. Its application is limited because age boundaries cannot be mapped directly.

In practice, subdivisions on bedrock maps are based on lithology within a time framework (stratigraphy). For example, a map legend for northeastern British Columbia shows rocks of Late Triassic age that consist of three rock packages, the Pardonet, Baldonnel and Charlie Lake Formations. Lithologic units and packages of lithologic units in themselves provide no indication of when they formed; a sandstone could be Cambrian or Cretaceous. Without age control, the relative stratigraphic positions of map-units can only be surmised based on geometric position; units overlying other units are presumed to be younger. However, folding and faulting often modify such relationships, and place younger rocks over older. Determining relative age is a critically important element of bedrock mapping.

- define program objectives and parameters
- select map areas that meet the program objectives
- prepare project proposals with budget estimates
- gain management approval to proceed

Step 2: Preparation for Field Surveys

- compile exisiting geologic data, including geoscience maps, reports, remote sensing data, topographic base maps, etc., determine logistical needs, make contact with key people
- study air photos and other remote sensing data for geological information
- compile a draft geological map from this information, then a 'working map'
- prepare a preliminary traverse plan

Step 3: Conducting Field Surveys

- assemble a qualified field crew and equipment
- carry out systematic ground traverses to establish ground control and determine the distribution of bedrock types, mineralization and structures

Step 4: Data Synthesis and Analysis

- interpretation of the data to produce bedrock geological maps - involves plotting data and interpreting geologic contacts (both stratigraphic and structural) and defining structures that control lithologic (rock type) distribution patterns
- conduct literature research and applied research

THESE A

Map Production

- compilation of all digital and hard copy data completion of a cartographically correct map that meets agency standards
- production of a final publication master product appropriate to the publication medium

Production of Written Report

- a report written to agency standards in conjuction with the map provides details related to the objectives of the survey, and aids understanding of the geology of the region mapped.

Figure 2. Stages in a bedrock mapping program from inception to final map and report production.

PART 2: Mapping and Field Survey Procedures

2-1 OVERVIEW

This section outlines the major steps followed to produce a bedrock geological map - from the planning stage to production of the final map. These steps, summarized in Figure 2, must be clearly understood and followed if the objective of producing bedrock geological maps that conform to a provincial standard is to be met.

2-1-1 Step 1: Project Planning

Project planning is a crucial step in a mapping and inventory project. It is needed both to ensure that the project meets the objectives of the organization, and to gain approval to proceed. The planning stage sets the scene for the project by: defining objectives for the survey, ensuring involvement by necessary individuals and clients, and setting targets, products and time-lines. The planning stage also sets budgets and determines the scope and scale of the project.

2-1-2 Step 2: Preparation for Field Surveys

Preparation begins with compilation of all existing data, and acquisition of the basic tools needed to carry out the survey. Project personnel needs are defined, field logistics determined, traverses planned, and all available existing geologic data reviewed. If circumstances permit, preliminary interpretation of the bedrock geology is made with the assistance of remotely sensed data (air photographs, satellite images, geophysics, geochemistry). Stages involved when planning to carry out a bedrock field mapping project are described in more detail below.

Step 2, Stage 1:

- Compile information on existing geological maps and related information for the area. Collect copies of maps and reports, and review contents.
- Assemble topographic maps and air photographs for the area.
- Determine crew size, timing of field work, field logistics (such as equipment needed, what transportation will be used (foot, truck, fixed wing aircraft, helicopter, boat, horse)).
- Contact people knowledgeable about the geology (if possible) and logistics of the area (such as access to and within the area, where to put camps, the nearest helicopter base, sources of supplies, names of expediters, whether other field crews will be in the area).

Step 2, Stage 2:

- Review all available geological materials to develop an initial understanding of the nature and distribution of lithologic units and their inter-relationships in the area, and to develop a preliminary understanding of the structural development of the area.
- Review remote sensing data (satellite imagery, air photographs & geophysical maps *e.g.*, aeromagnetic maps) to interpret structural and lithologic features that will be verified by field checks.

Step 2, Stage 3:

- Develop a working geological legend from the initial list of geological units identified in stage 2, and incorporate lithologic units predicted (based on units in nearby map areas) to exist in the map area. If possible initiate discussions with geologists familiar with the area to define geological problems that can be expected to be encountered during the field mapping. The working legend, which is based on age, litholology, and lithological groupings, should include unit symbols and names (see Appendix I). It is used to develop mapping and sampling strategy.

British Columbia GEOLOGICAL SURVEY BRANCH
FIELD MAPPING SURVEY DATA COLLECTION CARD

PROJECT [______________] MAPPER [____________________] N.T.S. MAP [_____] DATE [__/__/__] PAGE [__] /[__]
AREA [________________] PROPERTY [____________________] AIR PHOTO [_______] PREFIX [___] TRAVERSE [__]

STN/SUB [___/__] TYPE [__] ELEV [___] DIM 1 [_____] DIM 2 [_____]
MAP [______] AGE [____] GROUP [___] FORM [___] MEMB [___] OTH [___]
NOTES [____] ROCK [____]
[____] MINZ [____]
[____] ALTR [____]
[____] META [____]
[____] STRC [____]
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REMARKS [____]

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REMARKS [____]

Figure 3. An Example of a computer-oriented data collection form. The illustration is a field form used for data capture by the British Columbia Geological Survey Branch.

- If a field reconnaissance is possible, the initial working legend would be modified to include observations made during the reconnaissance.

Step 2, Stage 4:

- Produce a "working map" for the area of interest based on data from stage 1 and research carried out in stages 2 and 3. It is important that existing geological maps be consulted at this early stage so that general rock unit boundaries can be transferred to a topographic base map to create this working map. In general such contacts are significantly modified as field mapping progresses. The working map is augmented by adding interpretations from remote sensing data (stage 2). Areas of suspected bedrock exposure are identified to aid in planning traverse location and density. This preparation should be completed prior to field reconnaissance (if any) as it helps establish areas where relationships between remotely sensed and ground features can be checked. Areas should be selected that represent the range of complexity expected. Brief field visits to these areas will help to confirm geological relationships and make subsequent remote sensing interpretations more reliable. When previous mapping, to the same standards and scale, is completed in adjacent areas the stratigraphy and geology should be correlated.

Preparation of a working map helps provide an initial understanding of the distribution of lithological units in an area; it helps to determine where ground traverses and sampling are required; and, it provides a framework in which mappers can test concepts developed.

Step 2, Stage 5:

- Prepare a preliminary plan of traverse locations, patterns and spacing. This should be reviewed daily as the work progresses and modified as needed.

2-1-3 Step 3: Project Implementation

Overview

Field mapping surveys may only require weeks or can take several field seasons to complete. The activities described following would be undertaken annually during the life of the project.

- conduct interviews and select a field team.
- assemble equipment needed for the survey.
- travel to the field area (may involve trucking, shipping, air support).
- carry out the field program. Bedrock mapping is generally carried out during the summer months to avoid problems caused by snow cover. All successive elements of the project hinge on this vitally important phase.
- During the field program, traverses are made and geological data collected. The bedrock maps are continually revised as the work progresses to update geological interpretions and identify problem areas so that the preliminary traverse plan can be modified to deal with them.

Field Inventory Surveys

Bedrock mapping (inventory) is required to develop or refine the classification of rock types and to confirm map-unit designations and boundaries. The resulting grouping of rock types into representative units establishes a framework for the area that enables extrapolation of contacts and rock units between traverse/sampling control lines. A series of ground traverses provides site-specific information on the distribution and characteristics of rock units, their interrelationships, their structural characteristics, alteration and other information that is critical to properly interpreting the geology.

Inventory Methods:

The recommended method of bedrock mapping at 1:50 000-scale is to carry out sufficient systematic traverses on foot, or by vehicle to establish at least 1000 control points or stations distributed throughout the map area. At each of these stations systematic descriptions are recorded that include rock type, rock association, structural information and comments on alteration or mineralization present. Information should be collected on forms with data in a format that can easily be entered into a computer database (*see* Figure 3). Copies of the database format, which runs on a DBase or Foxpro platform, are available on request from the Geological Survey Branch, Ministry of Employment and Investment.

General descriptions of geologic features are also made along traverse lines between stations. In addition, visual checks, which are the least detailed form of field observation, are carried out during field surveys to improve projections of geological unit contacts, faults or folds through areas between traverse lines. They are also used to decide whether ground traverses or spot checks are needed to confirm interpretations in the intervening areas. Visual checks may also consist of observations from low-flying (or hovering) aircraft. This is often an effective way of tracing geological units through areas where bedrock exposures are too abundant to check them all, and may help to trace units through areas where bedrock exposures are scarce, such as alpine tundra or wetlands. Although a minimum of data are recorded, it is recommended that field forms, maps or air photos be used to preserve a record of the observations.

Macrofossils are collected wherever possible to provide age control on the host rocks. Chert and calcareous units may be sampled to determine if they contain identifiable microscopic fossils. Samples of igneous rocks may be analysed to derive an isotopic age based on breakdown of radioactive isotopes in the rock (see Appendix II for information about isotopic dating methods).

Survey Intensity

Survey intensity is a function of the scale of the mapping and could be characterized either as the number of stations per unit area in the region mapped, or the line-kilometres of ground traversed during the mapping. However, several factors prevent completely uniform coverage of a given area:

- the relative abundance of bedrock exposures varies widely, from nearly one hundred percent in the mountains, to just a few percent in the lowlands where glacial and other cover may be thick.
- local infrastructure, that is roads, trails, etc. Some areas have well developed road networks, others have none.
- topography and natural barriers, like rivers, cliffs, or glaciers.
- vegetation density that may hamper access and conceal outcrops.
- ease of land and air access.
- funding levels that affect field time available.

A lower survey intensity does not necessarily mean the map will be less accurate, although this is generally the case. Other factors also influence reliability: geological complexity, whether geological variations are readily identifiable on air photos or other remotely sensed images, and the knowledge and experience of the mapping team.

Survey intensity level is related to scale, although local variations in intensity level are common, for example, small areas of closely spaced traverses may be needed to understand geologically complex areas within a 1:50 000-scale map. In general, 1:50 000-scale maps provide the minimum amount of data needed for informed land-use decisions and to guide mineral exploration. The higher cost of an intense survey level is not usually warranted for broad government land management planning, but detailed mapping is common in mineral exploration programs.

2-1-4 Applied Research, Data Synthesis and Report & Map Production

After the field season, the focus of the project changes to report preparation and readying the bedrock map for publication. Literature research and applied research on samples collected, for example petrography, are carried out. Selected samples are submitted for assay and chemical analyses. Fossil collections and samples collected for isotopic analysis are submitted for processing.

In the case of the British Columbia Geological Survey Branch, a preliminary version of the bedrock map (Open File series map) must be published within a few months of the field season so all new mapping results are available to clients quickly. Therefore Branch geologists must proceed without the benefit of vital back-up information, such as fossil identifications or isotopic age dates. As a consequence, Open File maps present preliminary interpretations and are subject to change.

In the final stage of a project, which, may involve several map sheets, geological interpretations are refined based on experience gained during the study. Age constraints from fossil and isotopic dating results, and other results, such as those from thin-section studies and chemical analyses of rock samples further refine the interpretations. The map legend is finalized during this stage. Once the final interpretation is made, the bedrock map(s) is ready for drafting, checking, then publication and sale to the public.

Maps are prepared in digital format (AutoCad). Paper copies are marketed as Geological Survey Branch Geoscience Maps; over time, these will be provided through the internet.

2-2 BEDROCK FIELD SURVEY DATABASES

This part of the manual could have been termed the 'Data Acquisition Stage' because it deals primarily with the types of data that should be collected during the course of field surveys. It is broken into three sections: 1) 'Systematic Data Collection', which describes computer-oriented data collection forms; 2) 'Essential Data', which is a listing of the minimum amount of information that should be gathered at each field station (a site where geologic observations are recorded); and 3) 'Desirable Data', which is a list of data that should be recorded where possible.

2-2-1 Systematic Data Collection - Formatted Field Forms

To facilitate and encourage proper data capture, it is recommended that computer-oriented data sheets, like the BCGSB's formatted field forms, (Figure 3) be used when collecting data. The headings on these forms correspond to the data types listed in the essential and desirable data categories discussed. Use of standardized forms encourages collection of a standard data set in a systematic format and facilitates data entry into a geological database.

2-2-2 Essential Data

Data acquisition for a geological map involves the collection of different types of geological and nongeological information in the field. Commonly, and for practical reasons, the information collected at each station varies (some factors are the quality of the bedrock exposure, the nature of the bedrock, and the scale of the mapping). However, it is important that a minimum "baseline" amount of information is available to prepare the map. It is strongly recommended that the following types of information be collected at every locality to guarantee that key data are in the database for every station. This will also allow effective use of this database by subsequent workers. This minimum information should include:

1. Location: X,Y map coordinates must be provided, preferably as UTM coordinates. Z location (elevation) is also desirable, although it can be determined using X-Y coordinates and a topographic base map.
2. Full field station and substation identifier following a standard method, preferably that used by the BCGSB (Appendix V).
3. Rock type: For computerized data collection, it is recommended that standardized four-letter rock and mineral code abbreviations be used to ensure rapid and standarized data capture (a listing of those used by the BCGSB is given in Appendix VI). A possible field station data collection form is presented in Figure 3 (example copies are available from the BCGSB). In rare cases where a rock type cannot be entered other features of interest should be noted, for example, soil colour, a mineral spring or diagnostic vegetation, like "zinc moss." Evidence of exploration activity, such as claim posts, diamond drill holes, adits, or other features should be recorded.
4. Name of mapper.
5. Date.
6. NTS or BCGS sheet (See Part 3, Figure 4).
7. Air photo number, if used.
8. Type of rock exposure (bedrock, float, displaced bedrock, other).
9. Rock samples, if any are taken.
10. If present, alteration, mineralization, fossils, must be recorded. If samples or specimens are collected record the kind of sample (*e.g.*, a grab sample of chalcopyrite mineralization, a chip sample across 2 metres of silicified volcanic rock, a channel sample across a quartz vein).

2-2-3 Non-Essential but Desirable Data

The following is a recommended list of information to supplement the essential data set listed above. The collection of any of these data depends on: their availability at the station locality; the scale of mapping; the purpose of mapping; available resources and time.

1. Structural measurement(s) are not essential at every station, but the mapper should record a statistically significant amount of structural data and portray it on the map.
2. Samples are not necessary at every station, but the exact type of sample must be recorded. Typically the purposes of sampling include:
   a. Analysis - indicate sample type: grab, selected, grab, chip or channel.
   b. Whole-rock lithogeochemistry.
   c. Petrography.
   d. Reference hand specimens.
   e. Fossils: specify whether the samples contain macrofossils or are for microfossil analysis. The Geological Survey of Canada locality number is added to the database, when available, if the sample was submitted to a GSC paleontologist for identification.
   f. Radiometric analysis (include full field description; specify size, intended dating method, and destination laboratory for sample).
3. Photographs at any given site should have the date, time and location identified; show the direction of view, if appropriate; include a scale indicator; and be keyed to the traverse or geological station identifier.
4. Other data not specifically included in bedrock mapping, but helpful to map users should also be collected, for example, orientation of glacial striae, information about the type and thickness of surficial materials and historic cultural features (old cabin, sluice boxes, and artifacts such as old cabins or old workings.

2-3 QUALITY CONTROL, CORRELATION, AND MAP RELIABILITY

2-3-1 Quality Control and Correlation

This manual provides standards for bedrock geological mapping in the province, so that surveys follow the same methodology and so data is compatible from project to project. It also offers recommended standardized map symbols to represent geological entities. It recognizes that a number of rock classification schemes exist, and recommends referencing methodology to avoid confusion for users of bedrock maps.

For each project, a project leader must be identified who is responsible for ensuring that project team members, who may be technicians or students, are mapping consistently and meeting quality standards. The BCGSB only assigns project leader status to geological staff who are registered members of the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC). The APEGBC code of practice requires full acountability, and APEGBC bylaws specify conceptual reviews and also field reviews if the work of the professional is questioned. If the project leader is not a registered professional, then reviews are required to evaluate preparations for fieldwork, the fieldwork itself, final map interpretations, map legends and accompanying reports that describe the geological units that are mapped.

2-3-2 Map Reliability

An assessment of map reliability provides an evaluation of how accurately the map and legend represents the bedrock geology. Both qualitative and semi-quantitative assessments of map reliability are possible. Production of a geological map of necessity involves much interpretation, so the map cannot truly be quantitatively evaluated.

Qualitative Assessment

Table 1 outlines the type of information that can be used to qualitatively assess the reliability of a map. A visual representation of this information should be provided on the geological map as a "reliability diagram" that consists of a "source map" and a "traverse map" (*see* Section 3-3 for details).

Semi-Quantitative Assessment

Periodic discussions with the project leader and field visits by the project supervisor during the field work are generally adequate to assess the mapping being done, particularly if the project leader is a registered professional. In unusual circumstances, a selected area or areas of the map could be assessed in the field by the mapping project supervisor or a qualified designate. The objective of this assessment would be to provide some statistics on the accuracy of the contact locations, rock type designations and to evaluate the geological interpretation in order to "audit" the mapping project. There would be a need to allow for reasonable alternative interpretations. The following processes of assessing map reliability semi-quantitatively, similar to those outlined in Mitchell *et al.*, (1989) and adapted from those in the Standards for Terrestrial Ecosystems Mapping in British Columbia manual, could be followed:

1. Identify attributes from the legend (or attribute file) to be assessed at each station checked, for example, lithology, structural measurements (attributes), stratigraphic correlation, accuracy of location, and determine the allowable variation from the recorded information.
2. Randomly select stations to check. This could be done for the total map area (not more than 1 % of the stations for a map area) or for areas within the map that are representative of larger areas (for example a small area containing the contact of a granite body with a specific rock unit.
3. Plot transects within the map area that cross a number of geological features. Mark ten to twenty sample sites at a fixed interval (if outcrop abundance makes this feasible) along the transect.
4. Sample along each transect and assess each sample site using the ground-truthing attributes selected in 1 above.
5. Analyze the data and generate statistics. We suggest that for a simple map-unit, that the measured value of the attribute "equal" the estimate in at least 75% of the reliability check samples. For complex map-units, the proportion of a polygon attribute should be within 20% of the true proportion. For example, if a geological unit is estimated to cover 80% of the area being checked then the measured proportion should be between 60 and 100%.

The proportion of test areas meeting the quantitative criteria will vary depending upon the scale of the mapping (survey intensity level). At more general scales (1:250 000, for example), perhaps only half the areas will pass the reliability "test", whereas in areas mapped in more detail (1:50 000 scale), most areas should pass.

Table 1: Type of Information required for qualitative assessment of map

1. air photo scale, year, flight lines and numbers.
2. survey intensity level:
   - expressed as number of stations; and
   - line-kilometres of ground traversing (on foot, by truck or by boat).
3. modes of access and coverage attained:
   - kilometres of road per map sheet
   - locations and number of traverses
   - number of stations and sample points
4. name of mapper and whether a registered member of APEGBC.
5. names of project leader and supervisor approving mapping project results.
6. previously available data and maps.

PART 3: Data Representation on Bedrock Maps

To be functional, a bedrock geologic map must contain sufficient information to allow the user to decipher the lithologies, structures and symbols depicted on the map. In this section are recommendations for the basic kinds of information that should be provided on any 1:50 000-scale geologic map. Although detailed guidelines for symbols, such as bedding attitudes, and map-unit designations are provided, we do not specify map layout. Instead, we recommend using guidelines already published, for example, the reader is referred to the *B.C. Geological Survey Branch Style Guide* (Grant and Newell, 1992), that describe text formatting of data and its exact placement within the body of the map. The symbols presented are drawn from and/or modified after those described in various guidelines published in Canada and elsewhere.

Our recommendations fall into eight categories: title; base map specifications; reliability diagrams; legend; map attributes; rock terminology; cross-sections and reference-authorization. The recommendations focus on the information in these categories, not their layout.

The scale of mapping and the nature of the geological problems being addressed influence the kinds of data collected. Consequently, the recommended standards are flexible. This is best exemplified by comments in Part 3-8 and Appendix IV that deal with rock classification schemes. We do not stipulate which schemes to use, but allow authors the freedom to use almost any lithological classification system they prefer. However, there are two conditions that must be met: the scheme must have been published, and it must be referenced both on the map and in the body of any accompanying report.

3-1 TITLE Block

The map title or header must include the general location of the map area, a clear statement of the purpose of the mapping, the authors and the scale. It is recommended that the layout of the title block follow that described in the *B.C. Geological Survey Branch Style Guide* (Figure 5, after Grant & Newell, 1992). The minimum information required for a map title is listed below:

1. A title, preferably including a named geographic feature that generally will be the name given to the 1:50 000-scale National Topographic System (NTS) map sheet if one is used as a base map. The 1:20 000-scale British Columbia Geographic System (BCGS) map sheets do not use geographic names as part of the map sheet designation, if mapping is done on these bases, the title should contain the name of one of the most prominent geographic features present in the map area. The general NTS and BCGS map organization schemes are illustrated in Fig. 4.
2. The main purpose of the mapping, for example, "*Bedrock and Surficial Geology of ...* " or "*Bedrock Geology and Mineral Deposits of ....*".
3. Relevant NTS or BCGS map sheet numbers (*e.g.*, NTS 93A/12W or BCGS 083A.035).
4. The scale of the map must be shown by a bar scale (divisions may be as low as hundreds of metres if needed, but kilometres are generally adequate). The scale ratio, for example 1:20 000, indicates that one centimetre on the map represents 20 000 centimetres or 200 metres on the ground should also be given.
5. Author(s), with professional status.
6. All government maps must include appropriate corporate identifications, such as logos, and Ministry and Branch names.

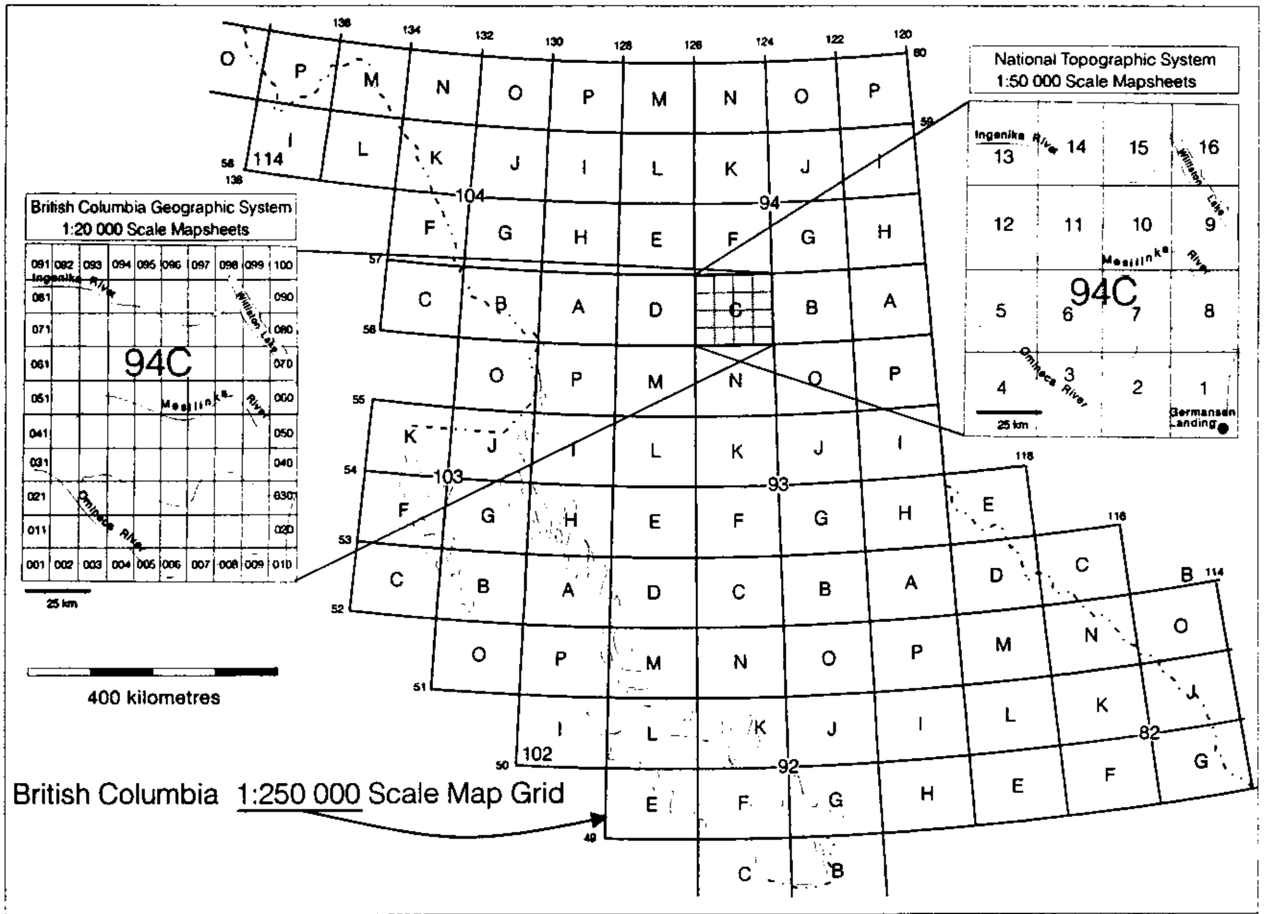


Figure 4. Index maps showing the grids used for the National Topographic System (NTS) and British Columbia Geographic System (BCGS) maps.

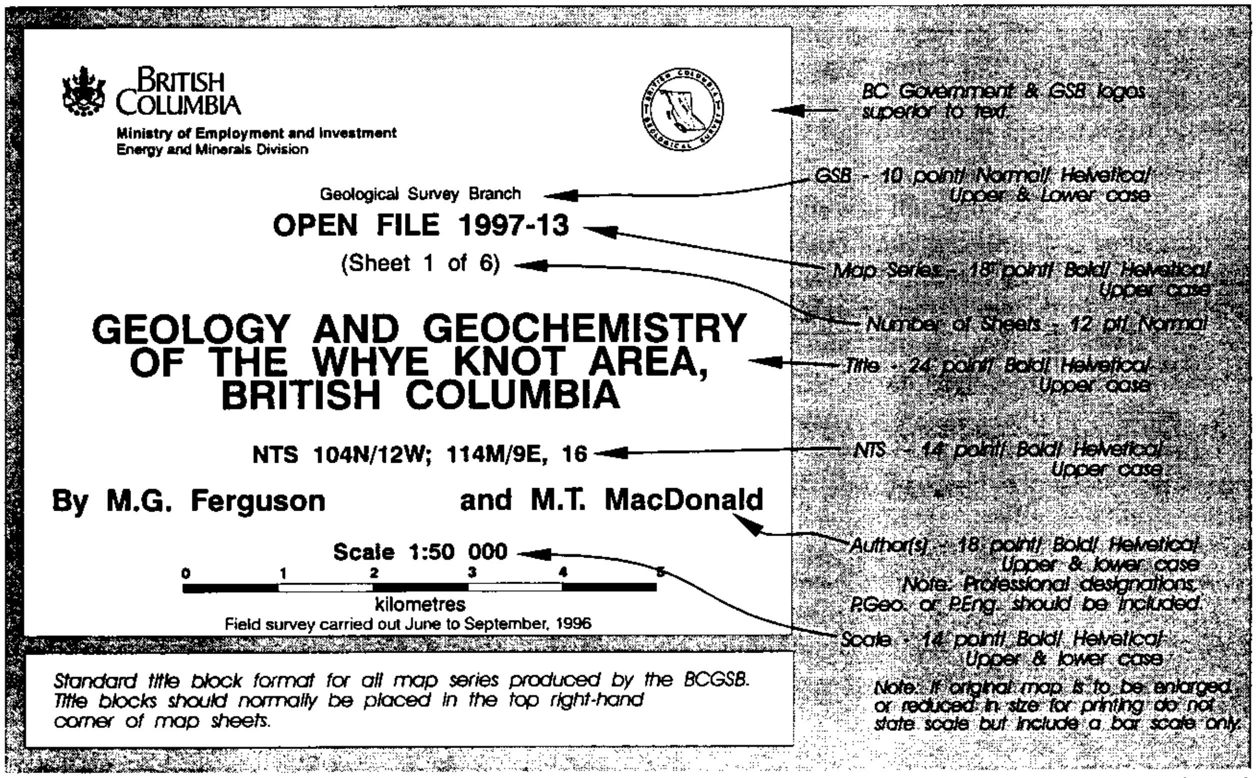


Figure 5. An example of the structure of the title block recommended for use on bedrock maps (that used by the B.C. Geological Survey Branch; from Grant and Newell, 1992)

3-2 BASE MAP SPECIFICATIONS

The topographic base map is the foundation of the geological map. It is vitally important that the specifications of the base map are clearly displayed. The necessary information includes the datum used (*e.g.*, North American datum (NAD) 27 or NAD 83) and type of projection used (such as Lambert conformal conic projection, or Universal Transverse Mercator (UTM) projection), and a small, provincial-scale reference map showing the location of the map area within the province. Knowing the base map specifications is critical for computer processing of the map data, particularly if the base and geological information will be transferred into a Geographic Information System (GIS), or if the data are to be merged with data from adjacent areas. A properly configured base map is also necessary so that the user of the map can accurately locate point data, such as a station on a mineralized showing or a fossil locality, and be able to relocate the station on the ground.

Where they are available, use of digital bases, like TRIM files, is strongly recommended. Otherwise, merging maps and transporting the data into CAD or GIS systems can be a technical nightmare.

Essential base map specifications are:

1. The North American datum (NAD) used to construct the base map.
2. The source and age of the topographic database, whether it is part of the federal government's NTS system or the provincial government's BCGS system, and the latitude and longitude along the neat lines (the lines that surround a map, separating it from its margins).
3. The Universal Transverse Mercator (UTM) zone.
4. The 1-kilometre Universal Transverse Mercator (UTM) grid (along the border of the map sheet).
5. The magnetic declination, the year, and the relative annual rate of change.
6. A reference location map with two components: (1) a simplified map of the province with an overlaid NTS grid showing the location of the map area, and (2) an enlargement of the region around the map area showing the area mapped relative to the NTS grid, and indicating the main physiographic and cultural features (Figure 6).
7. Brief notes on the method of locating points on the ground, for example, on topographic maps, transferred to topographic maps from air photographs, on scale-corrected orthophotos, or by means of a geographic positioning system (GPS).

3-3 RELIABILITY DIAGRAMS

This section describes several diagrams that are used to visually display the underlying sources of existing information used to produce the geological map, and also the distribution of new information collected during the present mapping. This is accomplished through the use of "source" and "traverse" diagrams (Figures 7a, b). Both diagrams are presented as inset maps on the bedrock map, and are plotted on simplified versions of the base map. The source diagram shows regions where bedrock mapping has been done, who did the work, a reference and the scale of the mapping. For example, that in Figure 7a depicts the area of the quadrangle map covered by the present mapping project, and shows areas mapped at 1:50 000-scale by Nixon *et al.*, and published in 1990, unpublished 1:250 000 scale mapping by Monger in 1986, and an area of 1:20 000-scale mapping carried out by Irvine and published in 1974. The figure also depicts areas where mapping during the present study was less intense, where contacts were established based on air photographic interpretation, and where no mapping was done. The traverse map (Figure 7b) shows all traverses and spot checks completed by the authors of the geologic map. Stations (sites where notes containing observations about the bedrock are taken) are located along the traverse lines but the diagram is too small to show them individually. Presentation of reliability diagrams, in combination with the information given by the way contacts are drawn on the geological map (defined, approximate, inferred - see Part 4 and Appendix IX for symbols), allows the user to judge the level of accuracy or reliability of any part of the geological map.

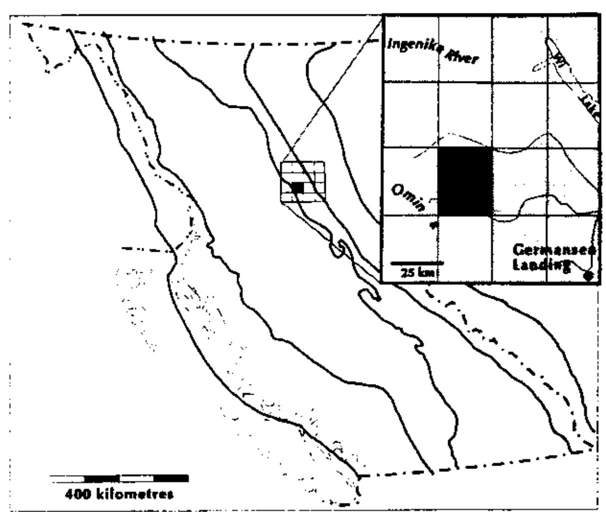
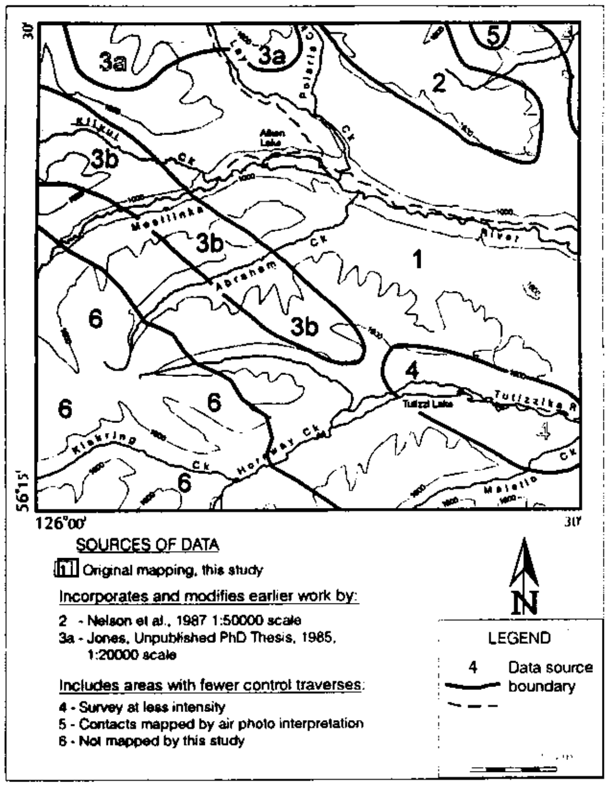


Figure 6. Example of a project area 'Location Map' to accompany a bedrock geological map.



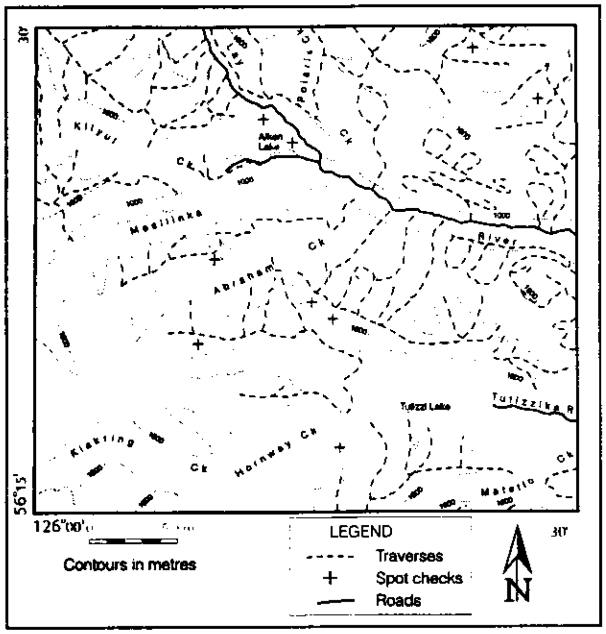


Figure 7. Data reliability maps for a bedrock map are provided by two 'inset' maps:
a) The 'source map' displays the sources of information used to produce the main geologic map, and
b) The 'traverse map' shows all traverse lines, including roads mapped, and individual spot checks made during the field survey.

Detailed specifications for these two diagrams are:

1. Information Source Diagram.

The diagram should be subdivided to indicate the source(s) of all information incorporated in the map, such as original mapping (the present work); compilation of data from other maps; and adaptation or re-interpretation of previous work. It must also show any areas surveyed in less detail (sparse traverses); areas where contacts were mapped in by air photo interpretation; and unmapped area(s). Any data on the map that are incorporated from the work of others must be cited in the map reference list. A small legend describing the various regions must accompany the diagram. No scale is specified, but the horizontal length should be approximately 10 centimetres. It should also show major drainages, simplified contours and several cultural features as geographic reference points (Figure 7a).

3. Traverse Diagram

This diagram portrays all traverse lines walked and all isolated localities, such as boat landings or helicopter spot checks, where data were collected. It should also show all roads driven, whether bedrock outcroppings were present or not. This diagram (Figure 7b) should be the same size and be plotted on the same base (showing major drainages, simplified contours, key geographic features) as the source diagram (Figure 7a).

3-4 LEGEND

The map legend is essential; it describes all lithologic units and geologic symbols used on the map. This section provides information to ensure that legends have a consistent style and adhere to the North American Stratigraphic Code.

1. It is recommended that legends follow the layout described in the B.C. Geological Survey Branch Style Guide (Grant and Newell, 1992). In this format lithostratigraphic units are separated from lithodemic (intrusive) units, and descriptions of the units are listed from youngest at the top to oldest at the bottom of each subsection of the legend (Figure 8). A listing and brief description of all geologic symbols, such as faults or geologic contacts, that appear on the map are placed after rock unit descriptions.
2. It is important to review all previous work in the area, so that rock unit nomenclature complies with usage for the area as established in authoritative sources. Rock units may then be further divided where desirable or new units established as necessary. These may be either formal or informal, but must be in accordance

with the guidelines established by the North American Commission on Stratigraphic Nomenclature (NACSN, 1983), especially names applied to new units. Appendix I presents a condensed version of the NACSN rules.

The specific geologic time scale followed should be referenced as several are widely used. This is particularly important if unit ages have been constrained by radiometric dating rather than fossils. The British Columbia Geological Survey Branch uses the scale depicted in Figure 9.

3-5 MAP ATTRIBUTES

For a map to be usable, the legend must clearly identify map-unit designations and symbols. Use of standardized map-unit designations and geologic symbols makes this task simpler. The format for map-unit symbols used by both the provincial and federal geological surveys is based on the sequence: age, name and lithology. Only general guidelines on usage of geologic symbols are outlined here, for a detailed symbol listing and their cartographic elements see Part 4 and Appendix IX.

3-6 SYMBOLS

1. Only symbols found in the Symbol Library (Appendix IX) should be used on the map. If no applicable symbol can be found in the library then a new symbol may be created but it must be clearly defined in the map legend. For ease of reference, commonly used symbols are presented in Figure 10.
2. The map originator must ensure that the correct symbols are being used by checking the definitions found with each symbol in the Symbol Library.
3. Each symbol description in the map library also has a statement about the relative accuracy of the location of the site of the sample attribute (degree of confidence for the map location of the symbol).
4. Any uncertainty about the nature or location of a geological boundary is shown by breaking the contact line and inserting a question mark (?).
5. It is not necessary to add labels to attribute information sites unless there is a reference to marginal data tables (for example the label site might be for a mineral occurrence, and the MINFILE reference number on the map would be keyed to a table describing the commodities present and other information about the occurrence).
6. The Symbol Library also describes the exact placement of each symbol, that is what point on the symbol overlies the ground location of the data point.

3-7 MAP-UNIT DESIGNATIONS

1. Map-unit designation should follow the standard formats used by both the British Columbia Geological Survey Branch (BCGSB) and the Geological Survey of Canada (GSC). Where age constraints exist, this system is based on both the geological age of the unit and a stratigraphic identifier. It uses the appropriate geologic age symbol (representing the age of the stratigraphic unit) followed by a condensed stratigraphic unit name which is capitalized but in smaller point size than the age symbol, for example KG would represent the Cretaceous Gething Formation. This symbol may be modified by other qualifiers (usually in lower case) to indicate lithology type or as a subunit designator or to avoid confusion, for example KBi for the Cretaceous Bickford Formation but KBp for the Beattie Peaks Formation. A detailed guide for applying this methodology is given in Appendix III. Where there are no age constraints, a numerical system is applied. The oldest, or if"way-up" is unknown, the structurally lowest unit is designated unit 1 and successive units are 2, 3 and so on.
2. It is recommended that map labels be kept simple. Qualifiers such as 'early, middle and late' should be omitted in the label and only be retained in the legend subheadings (for examples see Appendix III).
3. Uncertainty in applying any map-unit designation to a given area on the map is indicated by putting a question mark, for example KBp?, after the map symbol.
4. Every geological entity or field (polygon) on the map must be clearly identified by a color or a label. Areas on the map that are outside the limit of mapping must be indicated as 'Not Mapped'.

3-8 ROCK TERMINOLOGY

1. Rock terminology or classification is too varied to be standardized, but marginal notes on the map must reference the classification scheme used for each particular rock type found within the map area, for example Le Maitre (1989) for igneous rocks (plutonic and volcanic rocks) and Dunham (1962) for carbonates. A list of the most commonly used rock classification schemes is given in Appendix IV. The use of contentious and ambiguous rock terms should be avoided; if such terms are used there must be a reference to the corresponding classification scheme.
2. The main rock classes which must be addressed are:

   Igneous Rocks
   Volcanic rocks

INTERMONTANE BELT

QUATERNARY

Qal	*Unconsolidated glacial, fluvial and alluvial deposits*

NEOGENE

CHILCOTIN GROUP

mTc	*Olivine basalt; minor andesite, tuff, breccia, conglomerate, sandstone and siltstone*

OLIGOCENE AND(?) LOWER MIOCENE

omTv	*Andesite and basalt tuff, breccia and flows*

TERTIARY

Tu	*Eocene to Miocene volcanic rocks (undivided)*

EARLY CRETACEOUS

ALBIAN

SPENCES BRIDGE GROUP

EKSB	*Amygdaloidal andesite, dacite; andesitic breccia; minor basalt flows*

JURASSIC AND/OR CRETACEOUS(?)

JKs	*Siltstone, sandstone, conglomerate*
JKv	*Andesite beccia, tuffs and flows; minor argillaceous tuff*

CADWALLADER TERRANE

LATE TRIASSIC

MIDDLE? AND LATE NORIAN

TYAUGHTON GROUP

LTrT	*Conglomerate, conglomeratic sandstone and sandstone; limestone and limestone conglomerate; siltstone, calcareous sandstone and coquina*

EARLY AND MIDDLE NORIAN

CADWALLADER GROUP (lTrH to lTrCv)

HURLEY FORMATION (lTrCH and lTrCHv)

ETrHs	*Sandstone, calcarenite and siltstone; polymict conglomerate, pebbly mudstone, limestone-greenstone breccia and micritic limestone*
ETrHv	*Greenstone, mafic volcanic breccia, mafic tuff, sandstone, tuffaceous sandstone, polymict conglomerate and micritic limestone*

VOLCANIC UNIT

ETrCv	*Pillowed to massive greenstone, mafic volcanic breccia and mafic tuff*

CACHE CREEK TERRANE

PENNSYLVANIAN TO TRIASSIC

CACHE CREEK COMPLEX

CCtpv	*Phyllite, siliceous phyllite, ribbon and massive chert, argillite, tuff, mafic flows, limestone, sandstone*
CCu	*Undivided sedimentary and volcanic rocks*

INTRUSIVE ROCKS

MIOCENE

MTg	*Quartz monzonite; minor granite*

LATE CRETACEOUS

LKgd	*Granodiorite, quartz diorite*

EARLY CRETACEOUS

MOUNT ALEX PLUTONIC COMPLEX

EKat	*Hornblende leucotonalite, granodiorite*

AGE UNKNOWN

gb	*Gabbro*

Figure 8. Reproduced portions of a bedrock map legend showing layout and formatting of a typical geological legend. See Figure 11 for explanation of symbols used. (Modified from Schiarizza and Gaba, 1996)

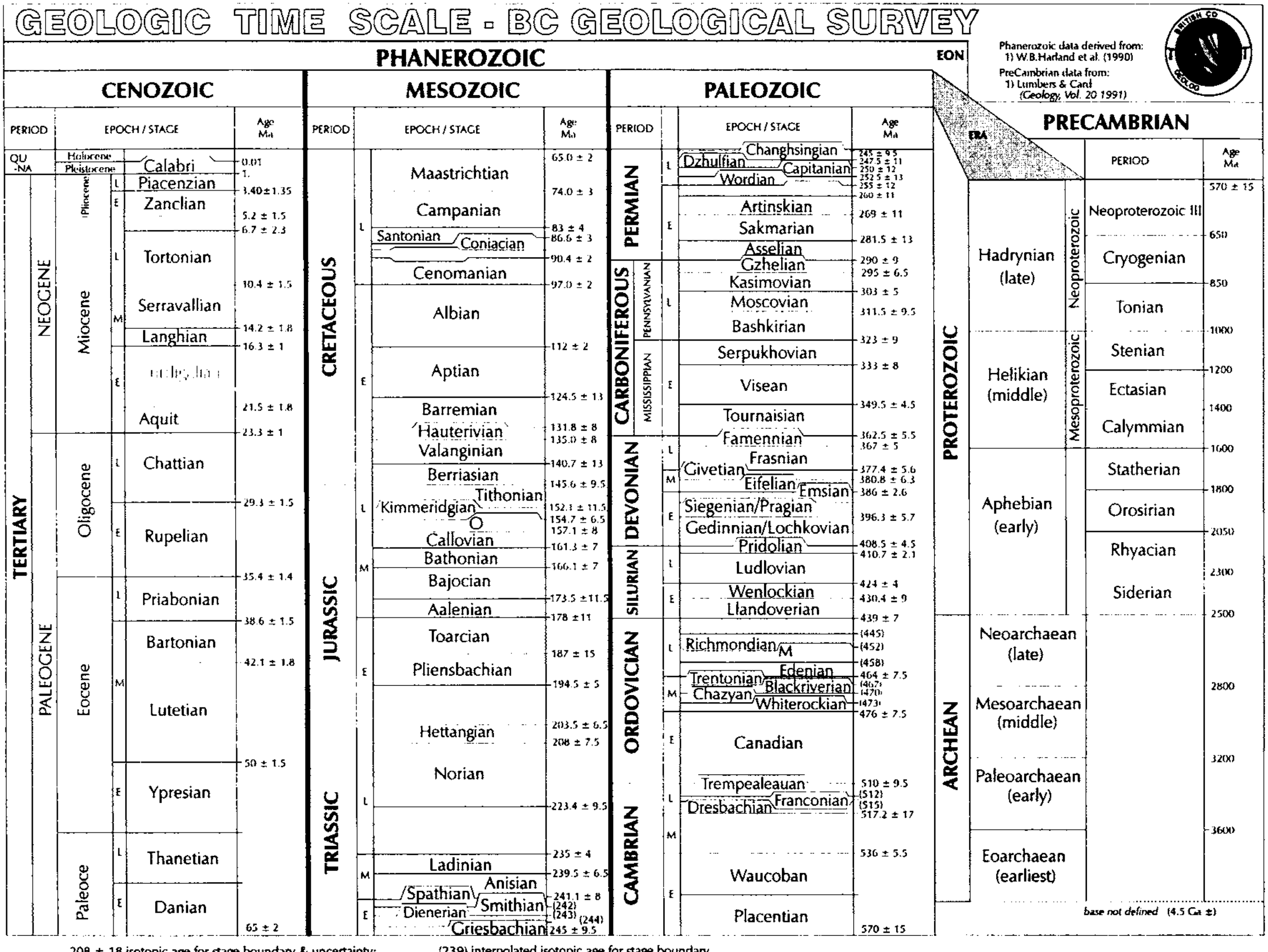


Figure 9. Geological time scale updated from the geologic time scales of Harland et al., (1990a, b) and Lumbers and Card (1991).

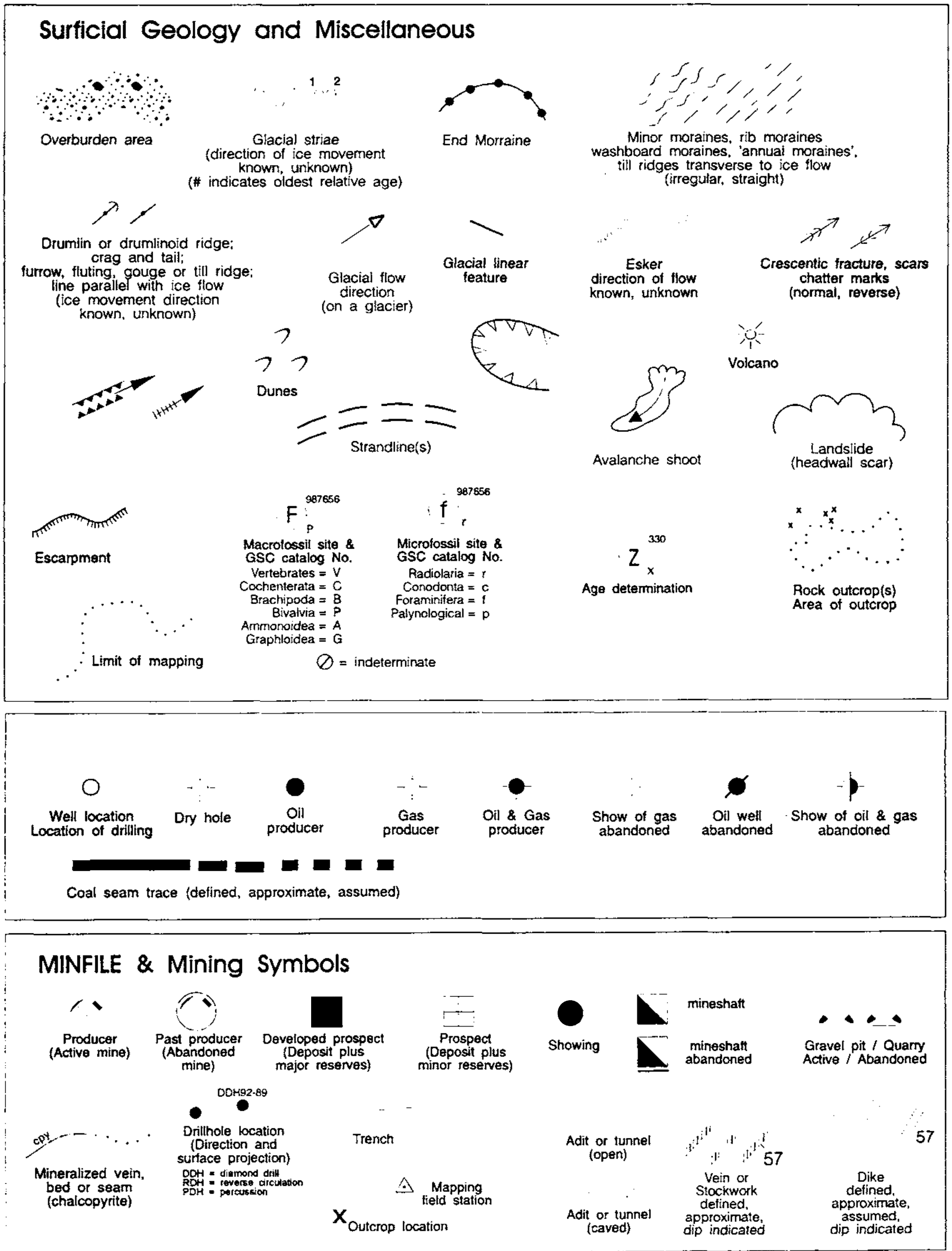
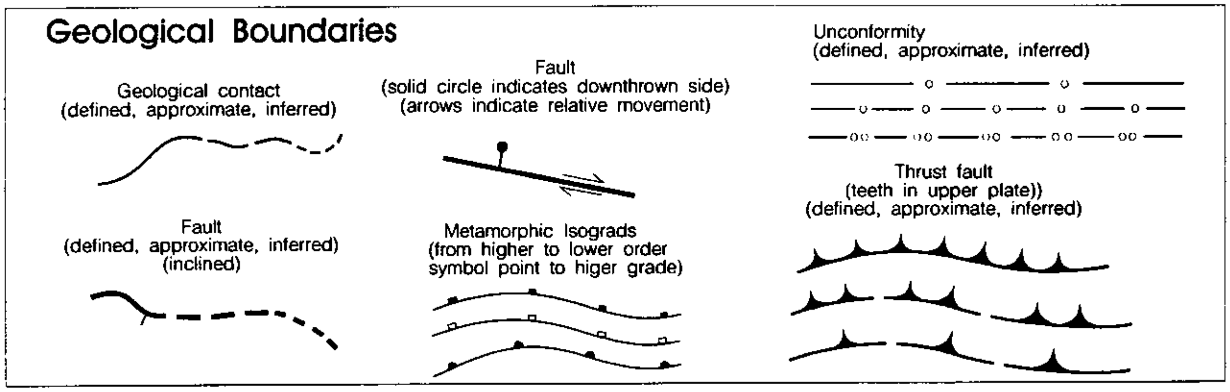
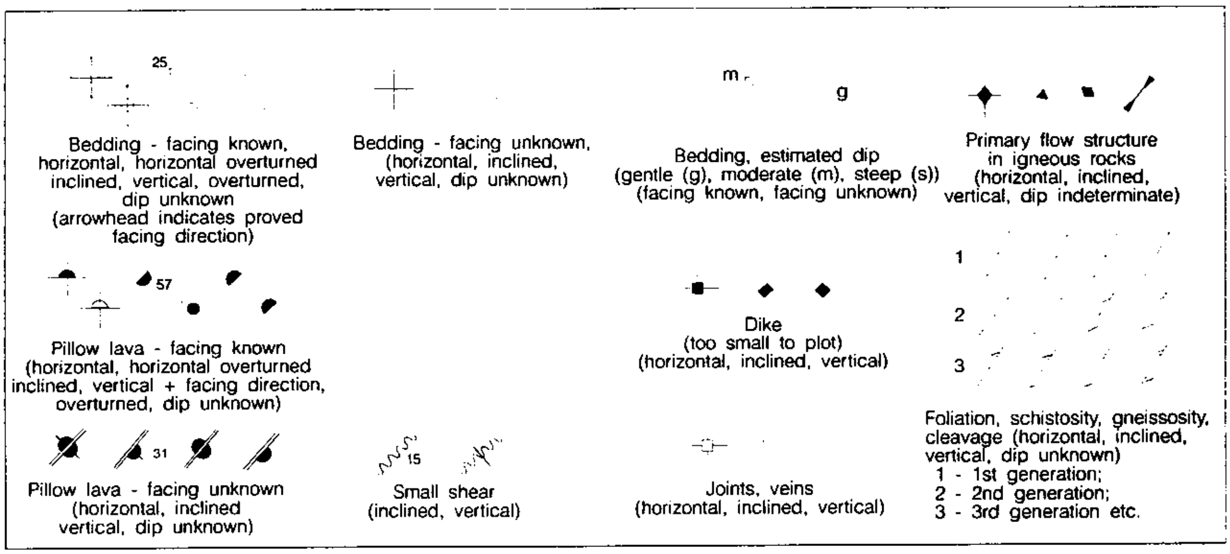
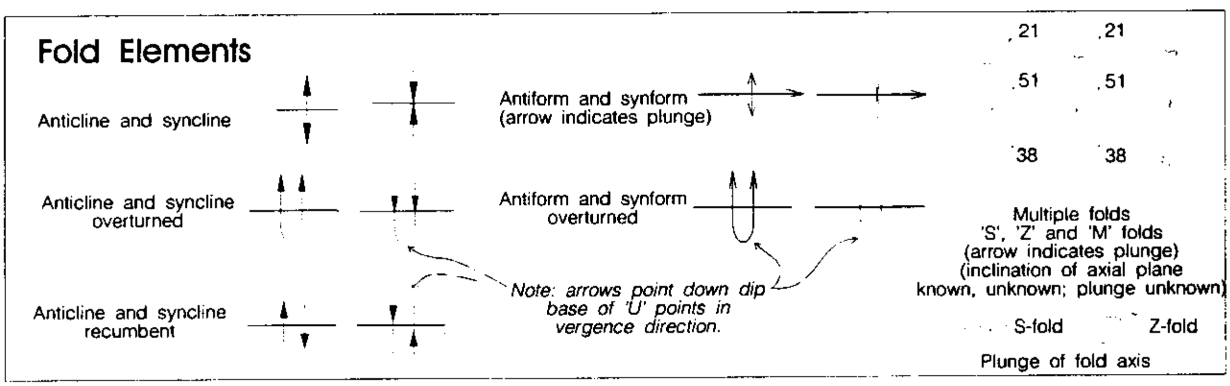


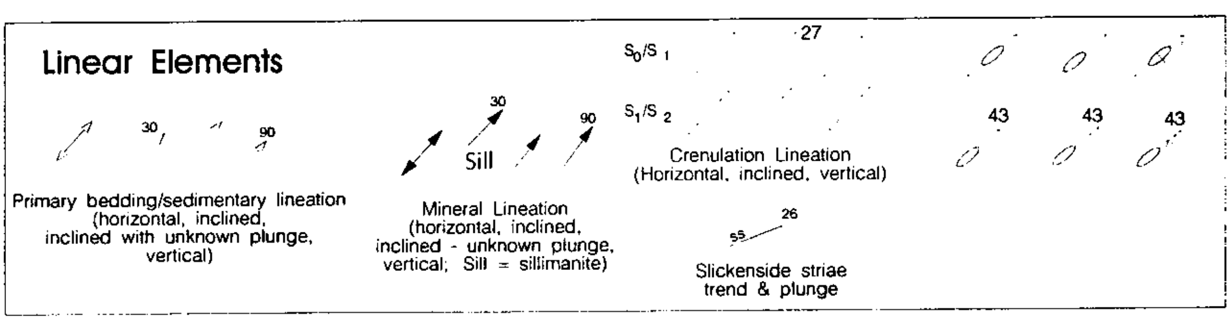
Figure 10. Symbols commonly found on geology maps (modified after Grant and Newell, 1992). Note that surficial geology features are not described in Appendix IX. They are included here only because they are often portrayed on bedrock geology maps. {refer to RIC Surficial Geology mapping standards}

Standard Map Symbols









Geological Time- Symbols and Usage

Cenozoic	**C**
Quaternary	Q
Holocene/Recent	R
Pleistocene	Ꝑ
Tertiary	T
Neogene	N
Pliocene	P
Miocene	**M**
Paleogene	Ꝑ
Oligocene	O
Eocene	E
Paleocene	P
Mesozoic	**M**
Cretaceous	K
Jurassic	J
Triassic	TR

Paleozoic	**P**
Permian	**P**
Carboniferous	C
Pennsylvanian	**P**
Mississippian	**M**
Devonian	D
Silurian	S
Ordovician	O
Cambrian	Є
Proterozoic	P
Hadrynian	**H**
Helikian	H
Aphebian	A
Archean	Ā

Age Modifiers *(these are placed at the left side of the age symbol)*

Early **E** Middle **M** Late **L**

e.g., LTR

Group, Formation or Member are designated by small capitals placed on the right side of the age symbol:

e.g., E NC

Lower case letters designate

***e.g.,* Cretaceous granite** - K

Hyphens are used to separate Group, Formation and member symbols:

e.g., -

Figure 11. Guide to geological age symbols and their usage to describe ages of geological units in reports and on maps (after Grant and Newell, 1992)

Plutonic rocks
Sedimentary rocks
Carbonate rocks
Siliciclastic rocks
Metamorphic rocks
Miscellaneous rocks

3-9 CROSS-SECTIONS

Cross-sections are important to help illustrate the author's interpretation of the geology represented on the map. They also help the user to understand this interpretation. If no cross-sections are presented, the geologist should list reasons for their omission in the marginal notes, for example, insufficient data, lack of multiple rock types or lack of structural data).

3-10 REFERENCE-AUTHORIZATION

This section describes the kind of information that should be placed on the map to help end users find published references or to locate specific material used in its preparation. This information should include a note about where the map may be purchased (if applicable), the publication date, any cited references, reference to any accompanying reports, and so on. An expanded listing of desirable information follows.

1. The dates when the fieldwork (or data collection) was carried out.
2. The scale of field mapping, if different from the published scale.
3. The map publication date, and the date the material on the map was compiled (relevant for researchers and for time-dependent databases like MINFILE where new showings may have been discovered after the fieldwork.
4. The revision date, if the map is an updated version of a previously published map.
5. Where the map was published.
6. Reference to any accompanying report, if applicable.
7. If the map is part of a series, or is a compilation of maps from a series, there should be a reference to the map series.
8. Reference should be made to any accompanying map sheets. One way to do so is to label the map sheet x of y, for example, sheet 2 of 4.
9. Reference should be made to Bedrock Mapping Standards employed, for example, this manual, and which edition was followed, and to standard lithologic classification schemes followed.
10. A listing of key references should be provided; generally, this will consist of 5 or fewer references; less significant references are cited in the text, but not on the map.

Part 4: Symbol Library

Symbols commonly found on 1:50 000-scale geological maps are presented in Figure 10 (after Grant and Newell, 1992). These and many other map symbols are described in detail in the Geologic Symbol Library (Appendix IX). The structure of the data in the library is illustrated by the symbol template shown below, in which fields in the template are explained. The format of this library was influenced by the structure used to define geographic objects in the TRIM database by the Ministry of Environment, Lands and Parks.

The main groups in the library are sequenced according to economic activity (A, B), then field station information (C), then geological elements on the map (D to G):

A. Coal, Oil and Gas
B. MINFILE, Exploration and Mining
C. Outcrop Features, Fossils, Geochronology, Geochemistry
D. Geological Boundaries
E. Planar Elements
F. Fold Elements
G. Linear Elements

These group headings follow the main subdivisions defined within the BCGSB Style Guide. Some of the fields within the Symbol Library are blank (Cartographic Definition and Feature Code) and await the recommendations of the Symbol Committee for their definitions.

Group: The main subdivision for the symbol library	**Symbol Description:**
Cartographic Definition: Field Blank at this time. *(Detailed cartographic definition of the symbol, including line widths, lengths, spacing, etc.)*	A graphic example of the symbol is placed here.
Positional Definition: This field describes what part of the symbol corresponds to the actual' map location of the data point. The precision and accuracy, both positional and geological, of the symbol is also defined here.	
Definition:	**Remarks:** This field describes the general parts of the symbol and what they represent.
CAD Layer: This field specifies the name of the CAD layer within which the symbol should be placed.	**Feature Code:**

Part 5: Bibliography

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APPENDIX I: Stratigraphic Nomenclature

INTRODUCTION

One of the most important tasks facing the geologist is to name and organize bedrock geological units in a way that is consistent, logical and avoids ambiguity. As a result of considerable effort over many years, a guide or code of recommendations has been developed for defining stratigraphic terminology in North America; it is also widely used internationally. Development of the code is an ongoing process, and it continues to be revised and improved.

This appendix derives from two relatively recent works: *The North American Stratigraphic Code (1983),* hereafter called NACSN (1983), and *The International Stratigraphic Guide (1976),* [hereafter called ISSC (1976)]. The guidelines presented are not regulations, they are recommendations. They establish working definitions for the fundamental elements of stratigraphy, and use these to build a relatively unrestrictive system of terminology and nomenclature which will serve the widest possible range of users. Geologists of the British Columbia Geological Survey Branch (BCGSB) are strongly encouraged to follow the guidelines.

The following section summarizes the main points of the NACSN (1983) as they apply to the most common requirements of bedrock mapping. It begins with an explanation of the basic categories of stratigraphy. This is followed by an outline of the criteria for establishing and ranking formal stratigraphic units, and their terminology. Finally, criteria for naming formal and informal stratigraphic units are presented. Although this section is somewhat lengthy, it is intended to help the non-specialist to understand bedrock geological maps and their legends; it may also serve as a convenient reference for specialists, although they are encouraged to consult the original document for a complete formulation of the guidelines.

MAIN STRATIGRAPHIC CATEGORIES

Although rocks can be classified or differentiated in many ways, each having its advantages depending on the objectives of the work and the data available, the stratigraphic code distinguishes three main categories. Those based on rock characteristics (lithostratigraphic and lithodemic units); those based on fossil content (biostratigraphic units); and those based on age (chronostratigraphic and geochronologic units), as follows:

The term *Lithostratigraphic* covers stratified sedimentary, volcanic or volcaniclastic units, or their (low-grade) metamorphic equivalents, where order of formation (relative age) is generally deducible from the unit's relative position (they obey the Law of Superposition). *Lithodemic* refers to units which are generally not stratified, such that neither their internal configuration nor their position with respect to bounding units necessarily reflects their order of formation. Intrusive rocks and strongly metamorphosed or pervasively deformed rocks generally fall into this category.

Lithostratigraphic and *lithodemic* units are based on the composition of the rock, including texture, fabric, components, structure, colour, and fossil content (in the sense of constituent material). In defining such a unit, these physical characteristics take priority over the relative time interval over which the rocks formed, as implied by their stratigraphic position. Thus, these units may have formed over a different time interval from place to place (diachronous).

A *biostratigraphic* unit is based on a distinctive, determinate fossil or fossil assemblage, regardless of lithology, and so is strongly indicative of geologic age. A biostratigraphic unit may well have a distinctive lithology, but this is incidental to its definition. The basic unit is the biozone.

Chronostratigraphic and *geochronologic* units are defined entirely on the basis of geologic age. A chronostratigraphic unit represents all rocks formed during a given span of time (*e.g.*, the Jurassic Period, the Oligocene Epoch). A geochronologic unit refers to that time span itself (*e.g.*, the Callovian Age of the Middle Jurassic Period, the Chattian Age of the Oligocene Epoch); it is not a stratigraphic unit.

Although lithostratigraphic and biostratigraphic units are area specific, chronostratigraphic and geochronologic units are interpretive, relying on time-diagnostic criteria. Since age is a universal property, the units, such as the Jurassic Period, are potentially recognizable worldwide, and their names have been adopted internationally, at least for the higher ranks (Figure 9). Each unit boundary is defined to be synchronous, within the limits of resolution of the criteria used. Its numerical age limits are based on localities around the world with clear age relationships, and are subject to international acceptance. Occasionally this 'calibration' is refined or revised when new information or localities with better age constraints are found; compare, for example, the error limits for the ages of the upper and lower boundaries of the Cretaceous in Figure 9. Chronostratigraphic units provide the age part of a map-unit name (see Appendix II on map-unit designation) rather than its definitive name; it is effectively impossible to map time lines as such.

The objective of the code is to organize tangible stratigraphic criteria into useful units for mapping purposes. One problem is that lithostratigraphic and biostratigraphic elements do not always coincide. For example, a single stratigraphic unit may be diachronous, hence of Triassic age in one locality, but Jurassic in another. Priority is generally given to the lithostratigraphy because rock properties are inherent and readily observable in the field, whereas biozones are sometimes problematic. Biota are not evenly distributed, and they may not be preserved as fossils. Further, fossils found may be poorly preserved and not identifiable, or, well preserved fossils may not be distinctive.

The guiding principle is that lithostratigraphic (and lithodemic) units should be defined objectively so other geologists will be able to recognize and map the units based on your description in areas away from the type area.

LITHOSTRATIGRAPHIC UNITS

The formal lithostratigraphic unit terms are: supergroup, group, formation, member and bed; they are capitalized only if they are part of a name that has been formally proposed and approved. The terms should not be used in an informal way, except during the early stages of a mapping project, although there are exceptions (see subsection on Informal Nomenclature). Groups and formations must be mappable (capable of being delineated over a reasonably wide area), but members and beds may be regionally restricted.

Supergroup: On very general scale, a supergroup is a formal assemblage of *superposed* or *related* groups, or of groups and formations. To illustrate, the Windermere Supergroup is actually used in both senses: in the Cariboo Mountains, the Windermere Supergroup consists of the Kaza Group and the overlying Cariboo Group; elsewhere throughout the Cordillera it is used to relate a series of similar Upper Proterozoic groups, including the Miette, Horsethief Creek, Kaza, Cariboo, Ingenika and Misinchinka groups.

Group: A group consists of two or more formations that are distinguishable but have some unifying characteristic(s). The names and boundaries of the constituent formations of a group may change from place to place, provided that there is broad equivalence. A group may also include rock packages that have not been classified as formations. Due to the practical limitations of exposure and structural disruption, type sections of the constituent formations in a group need not be contiguous. Groups are key lithostratigraphic units on a regional rather than a local scale.

Although 'group' is a formal term and should be used responsibly, it is more flexible than 'formation' in that it may be used for a lithostratigraphic unit which lacks sufficient detailed information to be divided into formations, in whole or in part, but which may be in the future. Historically, the term group has often been used in this way. This usage recognizes that some widespread rock units merit formal designation even though, because of patchy exposure, stratigraphic complexity or structural disturbance, it may not be possible to measure type sections to define formations (for example, the Takla Group in Quesnellia, which is a volcanic island-arc sequence). The characteristics on which such a group is based should be specified, and its distinction from bounding units outlined. This formal description should take the form of a *composite stratotype*, rather than type sections. The stratotype will consist of several reference sections or descriptions from various areas that represent the lithological character of the group. Its age range should be reasonably well constrained.

Formation: The fundamental building block of formal lithostratigraphic nomenclature is the formation. A formation comprises a set of contiguous strata that is unified by a particular lithology or combination of lithologies, or even great heterogeneity, providing that the characteristic distinguishes it from adjacent strata. Formations are most valuable when mapping at a relatively local scale (1:50 000 and more detailed).

The thickness of a formation can vary from less than a metre to several thousand metres. However, to be valid, a member must be mappable, so very thin formations, that can be depicted only as lines on maps at the most scales of mapping, are not desirable unless they are significant regional markers (very distinctive rocks, such as the Cadomin Formation in the Rockies, a thin conglomerate that is traceable for hundreds of kilometres.

A formation may represent a short or very long time interval, may include minor hiatuses (periods of nondeposition or erosion), and may be diachronous. Often the upper and lower time brackets of a formation, such as may be indicated by fossils, vary regionally and do not necessarily correspond to a particular biozone. However, in general, formations are not strongly diachronous.

A formation should be based on a standard type section or *stratotype*. There should be a reasonably detailed lithological and paleontological description of its constituent strata, complete with thickness measurements, as observed at the locality where it was first recognized or is best represented. The unit's upper and lower boundaries are particularly important; where the boundary is gradational, arbitrary criteria are used but must be clearly explained, for example, the uppermost sandstone layer that is more than 5 metres thick in a sequence that is grading from sandstone dominated to shale dominated.

Member: Subdivisions of formations can be made if they facilitate mapping. The member is the next subordinate unit to formation. The term is used for a distinctive lithologic subunit within a formation, that is readily recognized and *sufficiently extensive to be traceable for several kilometres*. The term may also be applied to lateral lithologic variations, or facies, within a formation, if warranted. The terms *lens* and *tongue* may be used in this way, and would be regarded as formal terms (Article 25, NACSN, 1983).

Bed: On occasion, an even smaller unit, the bed (or beds) is defined. A bed is the smallest formal lithostratigraphic unit of sedimentary rocks. The equivalent rank for volcanic flow rocks is a flow. Only beds or flows that are stratigraphically significant, for example, a distinctive green sandstone layer in a shale sequence, or a distinctive flow, should be formalized.

LITHODEMIC UNITS

The formal lithodemic unit ranks are supersuite, suite, complex and lithodeme. Each should be defined based on its lateral and vertical lithological variations and contact relationships, preferably by designating a type locality or section(s). Geologic age properly plays no part in the definition of lithodemic units, although it may be practical to use this criterion. For example, two granitic intrusions which are lithologically indistinguishable should be assigned to different units if they are known to have significantly different ages.

A **supersuite** consists of two or more suites, with or without complexes (defined following), that have some vertical or lateral relationships.

A **complex** is an assemblage or mixture of two or more genetic classes of rocks, for example, a complex might consist of igneous, deformed sedimentary and metamorphic lithodemes. Complexes may or may not be structurally complicated. Complex is a useful term where it is impractical to separate diverse components, which is often the case at regional scales. Complex has a rank comparable to suite or supersuite; therefore, the term can be used for two or more constituent lithodemic units, with or without lithostratigraphic units, that might be separable if more detailed mapping existed. For example, complex may be used for a poorly divided assemblage of volcanic, volcaniclastic and related intrusive rocks; or a heterogeneous terrain of metamorphic and plutonic rocks; or a mixed unit (mélange) consisting of *structurally* disrupted rock bodies. The term should not be applied to either heterogeneous plutonic or metamorphic units, for which suite or supersuite are more appropriate.

The next smaller lithodemic unit is the**suite**. It comprises two or more associated or related lithodemes of the same class, for example, an intrusive suite or a metamorphic suite. Constituent lithodemes may or may not be formally named. Although their names may change or be abandoned from place to place, the suite may be continued as long as its character remains the same, for example, medium grade metamorphic rocks.

The **lithodeme** is the fundamental building block of the lithodemic nomenclature. It comprises a body of intrusive or pervasively deformed or highly metamorphosed rock, unified either by a characteristic rock type or mixture of rock types, or by a distinctive lithic heterogeneity. Key criteria are mineralogy, texture and structure; chemical composition alone is an unsuitable criterion because it is not mappable as such, however, it may be used informally. Contacts with other units may be depositional, intrusive, tectonic or metamorphic. A lithodeme is comparable in rank to a formation although the term is not used as part of a formal name in the same way (see subsection on Naming of Units). Any units below the rank of lithodeme are informal.

NAMING OF FORMAL UNITS

When naming a geological unit, it is the responsibility of the geologist to review all other maps and reports to confirm or reject the possibility that the unit correlates with an existing named unit. If the geologist correlates a newly mapped unit with an existing stratigraphic unit, perhaps from an adjacent map area, the source should be referenced, either on the map or in an accompanying report. It is important to find out whether the term has been used formally or informally, and to make this clear in the current work. Priority of publication should be respected, particularly if the existing term (precedent) was applied in accordance with the NACSN (1983). Even if the earlier usage does not comply with the present guidelines on formal or informal nomenclature, it should be continued if it is widely accepted and functional. However, if the precedent is very recent, not well publicized, not properly proposed, or incorrectly applied, it may be necessary to revise the name or rank. A new informal name may be assigned, but it is desirable to replace the old term with a new formal name by providing a stratotype (see subsection on Precedence, and article 7 in the NACSN, 1983).

A new name may also be introduced if the unit is newly recognized or if extending the use of an existing unit name from adjacent areas into the present map area would be inappropriate for some reason, such as a gap in exposure that makes correlation uncertain, or lack of age control in the new region. Any new formal unit should be introduced in a recognized publication, with a full account of its properties and significance. To be accepted, the new name must be published. Published maps are not acceptable publication vehicles because the format does not allow an adequate description of the geology. However, a published report, such as a BCGSB Paper Series report like *Geological Fieldwork*, or a journal article is acceptable. A new name should not duplicate an existing name (see subsection on Precedence, below, and articles 4, 5 and 7 in the NACSN, 1983).

A formal stratigraphic term is one which combines a geographic term with a simple lithic term or rank term (or both). The initial letters of all names and terms are capitalized. Formal *formation* and *member* names are preferably based on a named geographic (or artificial but permanent) feature, which should reflect the locality of the unit's type section or area, or perhaps where it was first recognized, for example, Bonanza Formation or Quatsino Limestone. Formation in this usage has the advantage of remaining valid even if lithology changes along strike. The name of a formal *bed* or *flow* combines a geographic term and a lithic term. The name of a *group* would normally be derived from a geographic area containing its constituent formations and no lithic term is used, for example, Fort St. John Group.

Lithodemic unit names also begin with a suitable geographic name. For **lithodemes**, this is followed by a capitalized descriptive term which may be compositional, such as Hell's Gate Granite, Anarchist Schist or Cross Amphibolite, or morphological, such as Rupert Stock, Gnawed Mountain Dike or Guichon Creek Batholith. In either case, such terms should be general, simple and familiar, to accommodate any spatial variations in the lithology or form of the body. The neutral terms 'pluton' and 'intrusion' may be best for inhomogeneous or incompletely mapped bodies. Genetic terms like diatreme are acceptable but 'sensitive' because the interpretation is open to dispute; it is better to avoid generic terms if there is any uncertainty.

For **suites,** the geographic name is followed by an adjective describing the fundamental character of the suite, as in Anvil Plutonic Suite, and Polaris Ultramafic Suite. The geographic name need not be the same as that of any of the component lithodemes, although this may be appropriate if the component is dominant or strongly representative. The term **supersuite** is simply preceded by a geographic term. A **complex** may be named the same way as a suite or supersuite, to which it is comparable in rank. For example: Wolverine Complex, Monashee Complex or Bridge River Complex.

PRECEDENCE

To avoid confusion, the name of a formal lithostratigraphic or lithodemic unit should be unique in Canada (strictly, North America!). The catalogue of formal names is maintained by the Committee on Stratigraphic Nomenclature at the GSC in Ottawa; the committee should be contacted for approval before a new name is proposed. First consult the NACSN (1983), especially articles 3 to 15, for details on the naming of stratigraphic units.

The geological literature contains some long-established stratigraphic unit names and rankings that are not consistent with the NACSN (1983). In most cases it is not practical or desirable to change these unless there is a pressing need. One example would be if new fossil information shows that areas mapped as such a unit have different ages and do not actually correlate. Another might be if a region is remapped or reinterpretated by a recognized authority, and the revisions are published in a widely circulated journal or report. The purpose of the stratigraphic code is to promote the use of standards in stratigraphic practice. To attempt to rename or reclassify existing units, would cause a great deal of confusion.

INFORMAL NOMENCLATURE FOR LITHOSTRATIGRAPHIC AND LITHODEMIC UNITS

A separate informal terminology is a valuable tool for providing temporary designations of map-units while mapping is in progress, for casual reference, to meet unconventional criteria, or for non-stratigraphic applications. An informal unit should generally be distinguished on a map where possible, but may be used only for descriptive purposes because it was useful during mapping to determine relative stratigraphic position, for example, the 'upper argillaceous member of the X Formation'.

It is difficult to avoid ambiguity between formal and informal usage. NACSN (1983) recommended not capitalizing status, that is formation, group *etc.*, to indicate informal usage, for example, not capitalizing 'formation' in 'Seller Creek formation'. Unfortunately, this approach has not been effective because the distinction is often overlooked. Worse, different agencies have their own editorial preferences on capitalization, which causes confusion. Even stating that Seller Creek formation is an "informal unit" may not prevent it being adopted sooner or later as if it was formal (although this might confirm the validity of the unit, problems may arise if new information causes the unit to be renamed or the informal name to be abandoned). **Although it is not strictly in keeping with the code, we recommend capitalization in all cases.**

Informal usage can be indicated in several ways. One way is to consistently omit a geographic term in the name. In this way, formal terms like formation, member, schist and intrusion can be still be used, as in shaly formation, upper member, rusty schist, feldspar porphyry intrusion. They would not be capitalized unless succeeded by an identifier, such as Dike G, Porphyry III. Another way is to use informal nouns such as succession, unit, facies, phase, division, marker, horizon or band (avoid 'sequence'). None would be capitalized unless succeeded by an identifying letter or number, such as Phase B, Division 4. Other names can be coined and added to facilitate frequent mention, as in Camp succession, Ptarmigan facies, Summit phase, Ridge subunit. The first name will not appear on a topographic map, and it should be obvious that the unit has a temporary and informal designation. Informal terms may or may not form part of the map-unit designation. A number of informal map-unit terms can be assembled in the map legend under a heading such as 'Unnamed Unit'.

OTHER INFORMAL STRATIGRAPHIC TERMS: ASSEMBLAGE, AND TERRANE

Although in the strict sense it is a biostratigraphic term, **assemblage** has often been used as an informal term for lithostratigraphic and/or lithodemic rock units on a variety of scales. However, the term should be reserved for biostratigraphic units, or alternatively a regionally important package of rocks called a 'tectonostratigraphic assemblage' or 'tectonic assemblage'. This package may or may not have been divided into formal units. It is bounded by regionally important unconformities, or faults, or both. A tectonic assemblage differs from adjacent assemblages in a fundamental feature(s) of its depositional or tectonic environment of formation. This usage clearly has regional rather than local significance, such that assemblage has a rank comparable to supergroup (*cf.* 'subterrane'). It should not be used for relatively restricted rock units which, with a little more work, could be defined as a group(s) or another formal term. Like tectonic terranes and subterranes (defined following), these tectonic assemblages are interpretive, and their contents are subject to change. For this reason, 'assemblage' does not lend itself to more formal guidelines. Nevertheless, when combined with a geographic or other name, assemblage should be capitalized. To illustrate, the Earn **Assemblage** covers a number of formal Devonian-Mississippian groups and formations from the MacMillan Pass area in the north to the Cariboo Mountains in the south, that are characterized by distinctive clastic lithologies with unusual westerly or northerly source areas. The most recent compilation of tectonic assemblages in the Cordillera is by Wheeler and McFeely (1991, GSC Map 1712A) and the terminology used in it should be followed if possible.

Just as lithostratigraphic units are organized into tectonic assemblages, tectonic assemblages are organized into **terranes**. A terrane consists of one or more tectonic assemblages. These may have formed in a different geographic location that at present, and perhaps in a tectonically discrete environment. Subsequently, the terrane was transported and emplaced into its present position (accreted) as a result of large-scale plate tectonic processes. Terrane maps and terminology are also interpretive and subject to change. The most recent terrane map of the Cordillera is by Wheeler *et al.*, (1991, GSC Map 1713A).

UNCERTAINTY

If enough information is available, informal terms may be avoided by assigning a tentative or provisional name, using question marks to express doubt. The following is based on ISSC (1976, page 21):

Devonian?	doubtfully Devonian
Macao? Formation	doubtfully Macao Formation
Peroc-Macao formation	intermediate between the two formations and may be assigned to either
Silurian-Devonian	unit includes both Silurian and Devonian rocks
Silurian or Devonian	questionably either Silurian or Devonian
Silurian and Devonian	both but no distinction yet possible (undifferentiated)

The question marks denoting uncertainty may be used in mid-sentence, but should be avoided at the end of a sentence to avoid confusion.

APPENDIX II: Radiometric Dating Methods and Geologic Time Scales

IIA. GEOCHRONOLOGY: A GEOLOGICAL MAPPING TOOL

The determination of the ages of rocks and minerals by the measurement of radioactive elements and their decay products, and the measurement of the isotopic abundances of strontium and lead have become accepted tools for mappers, researchers and exploration geologists in oil and metals exploration. Age control is vitally important in geological, petrogenetic, tectonic and geomorphological studies and for stratigraphic correlations.

There are three basic assumptions underlying calcualtions of ages based on radioactive decay of unstable isotopes:

- The half-life, or "decay-constant", of the parent isotope is accurately known.
  NOTE: that any older dates from the literature must be re-calculated with the latest decay constants to be compared to newer dates.
- Precise corrections can be made for the amount of pre-existing daughter product, if any, incorporated in the mineral at the time of its formation, and the amounts of the isotope introduced in the lab procedure.
- THERE HAVE BEEN NO LOSSES OR GAINS OF EITHER PARENT ISOTOPE OR DAUGHTER ISOTOPE BY ANY PROCESSES OTHER THAN RADIOACTIVE DECAY.

THE POTASSIUM-ARGON TECHNIQUE

The relatively high abundance and widespread distribution of potassium in the earth's crust enables the potassium-argon (K-Ar) technique of age determination to be applied to common rocks and minerals. Ages can be measured with an analytical uncertainty of 1 to 2% for rocks as young as 100 Ka or older than 3000 Ma.

RUBIDIUM-STRONTIUM TECHNIQUE

Rubidium, because of its geochemical association with potassium, is also found in a wide range of rocks and minerals. Because of its lower relative abundance, its longer half-life and the universal presence of common ^{87}Sr (the radiogenic isotope), the Rb-Sr method does not usually produce a very precise age when applied to young rocks (*e.g.*, Mesozoic or Cenozoic). However, it is superior to the K-Ar method for dating rocks that have suffered thermal or dynamic metamorphism and has been widely applied to rocks of Precambrian age.

STRONTIUM ISOTOPE RATIOS

Normal strontium contains four stable isotopes of mass 84, 86, 87 and 88. The relative abundance of these isotopes in nature is constant for all, except ^{87}Sr, which is produced by the radioactive decay of ^{87}Rb and will therefore occur in different concentrations in rocks of differing ages and Rb/Sr ratios. Thus, the ratio of $^{87}Sr/^{86}Sr$ will vary with time and place. Waters containing strontium dissolved from rocks will therefore have a range of $^{87}Sr/^{86}Sr$ ratios and, on a gross scale, marked variations can be found between the strontium isotopic compositions of marine and continental waters. Carbonates deposited from, and calcareous organisms living in these waters will have distinctive $^{87}Sr/^{86}Sr$ ratios, depending on the environment in which they form.

This property can be utilised to determine whether a carbonate rock devoid of fossils, was deposited in a marine or freshwater lacustrine, or an alternating marine/freshwater environment.

URANIUM-LEAD TECHNIQUE

The presence of uranium-rich accessory minerals (*e.g.*, zircon, monazite, sphene and apatite) in acid to intermediate igneous and metamorphic rocks enables the uranium-lead technique to be applied to the problems of precisely defining crystallization ages of such minerals. The differing half-lives for the radioactive ^{235}U and ^{238}U means that two systems can be used to calculate ages and when plotted against each other provide a test for closed system behaviour; *i.e.* when there is concordancy of the two uranium-lead ages, giving rise to a conventional concordia diagram (a plot of $^{207}Pb/^{235}U$ *vs* $^{206}Pb/^{238}U$). Further, a model lead/lead age can be determined from the $^{207}Pb/^{206}Pb$ ratio alone.

The main advantage of the uranium-lead technique rests with the resistance of accessory phases, notably zircon, to post-crystallization disturbances and alteration. Even though lead may be lost from the system, in most cases a cogenetic suite of zircons will preserve the age of crystallization.

LEAD-LEAD TECHNIQUE

Measurement of lead isotope ratios in whole-rocks, minerals and ores has long been recognized as an important technique in studying the origins of igneous and metallogenic suites. This technique, sometimes referred to as the common lead method, relies on the assumption that lead-rich (or uranium poor) phases preserve the lead isotopic signatures of their source U/Pb and Th/Pb ratios. These ratios are dependent both on geological age, due to the different rates of radioactive decay of $^{232}Th/^{208}Pb$, $^{235}U/^{207}Pb$ and $^{238}U/^{206}Pb$, and also on geological evolution, as uranium and thorium are mobile elements during fractionation in crustal processes. Hence, Precambrian galenas from a massive sulphide deposit will have a characteristic lead isotopic signature that will be reflected in material derived from a massive sulphide source.

FISSION TRACK DATING TECHNIQUE

This technique relies on the formation of damage tracks in minerals, produced by the spontaneous decay of uranium. The fission track density of a mineral is thus a function of its age as defined by the time since the mineral was last heated through its annealing temperature (*i.e.* the temperature at which fission tracks are destroyed) and its uranium content.

USUAL APPLICATION OF GEOCHRONOLOGY

DATING SUBSURFACE SAMPLES to determine whether igneous rocks encountered in drillholes in sedimentary basins are old basement, interlayered volcanics or late intrusives;

DATING METALLOGENIC PROVINCES or relating igneous or metamorphic rocks to mineralized zones;

ESTIMATING RATES OF RECENT GEOMORPHOLOGICAL PROCESSES affecting Cenozoic igneous rocks (*e.g.*, uplift, denudation, laterite, silcrete and duricrust formation). The K-Ar method is most suited to this application and the error, for Cenozoic rocks, can be less than 1 Ma so that relatively short episodes can be distinguished;

DATING DETRITAL MINERALS (*e.g.*, muscovite) to assist investigations in alluvial mineral fields or in paleogeographic studies of old terrains by indicating the age of the source rocks;

DATING MINERALIZATION to determine the time relation between mineralization and hostrock formation.

MATERIALS SUITABLE FOR DATING

All radiometric dating methods are based on the assumption of closed system behaviour of the sample throughout geological time; *i.e.* there is no loss or gain of either parent or daughter nuclide except that produced by the radioactive decay of one to the other. If these conditions are not met, then the "age" determined will not be correct and, frequently, will be impossible to interpret.

POTASSIUM-ARGON DATING

Not all potassium-bearing minerals are suitable for K-Ar dating. Some minerals may lose radiogenic argon continuously throughout geological time. Ages determined on such minerals are invariably too young and have no geological significance.

Four groups of samples may be considered for K-Ar dating, as follows:

Potassium-Bearing Minerals

These minerals contain potassium as a major element, which is always present in the theoretical formula. Minerals in this group are biotite, muscovite, sanidine-anorthoclase, glauconite, illite, sericite and alunite.

TABLE II-1. MINERALS THAT MAY BE USEFUL FOR POTASSIUM-ARGON DATING

MATERIAL	ROCK TYPE			
	VOLCANIC	PLUTONIC	METAMORPHIC	SEDIMENTARY
FELDSPARS				
sanidine	1*			
anorthoclase	1			
plagioclase	2			
adularia	2(?)			
FELDSPATHOIDS				
leucite	2			
nepheline	2	2		
MICAS				
biotite	1	1	1	
phlogopite			1	
muscovite		1	1	
lepidolite		1		
glauconite				2
AMPHIBOLES				
hornblende	1	1	2	
PYROXENE	2	3	3	
SECONDARY MINERALS				
alunite	2	2		
sericite	2	2	2	
WHOLE ROCK				
basalt	1			

** This table lists the most widely used materials for K-Ar dating. Reliability of these materials is rated on a scale of 1 to 3; with 1 indicating consistently reliable results and 3 indicating poor reliability.*

It should be noted that although sanidine-anorthoclase is suitable for dating, other K-feldspars of plutonic or metamorphic origin are not (*e.g.*, orthoclase and microcline). Adularia, a low-temperature form of K-feldspar, has been dated, but as of yet, there are insufficient data to confirm the suitability of this mineral.

Non-Potassium Minerals

These minerals do not usually have potassium in their theoretical formulae, but may carry minor amounts (usually %) as impurities or as substitutions for sodium (*e.g.*, in plagioclase). Minerals in this group are hornblende, plagioclase and pyroxene. Hornblende is excellent for dating, but the other minerals, particularly plagioclase and pyroxene, are not always suitable for K-Ar dating.

Whole Rock

If all components of a rock are of primary origin and completely unaltered, a whole-rock sample may be suitable for dating. In practice, only non-prophyritic volcanic rocks have been found to be suitable, and of these, the commonest variety dated is basalt.

Volcanic glass often contains a significant proportion of potassium, and, therefore, argon. Glass, however, may not retain argon quantitatively over extended periods of time, and any trend towards devitrification will result in argon leakage. However, young volcanic rocks (Cenozoic) with moderate amounts of undevitrified glass, appear to have given reliable K-Ar whole-rock ages.

Unusual Minerals

Other minerals have been investigated, with mixed success. One of the earliest minerals to be dated was sylvite, but the solubility of this mineral in water makes it less than ideal for dating, as the mineral may have partially dissolved and reprecipitated more than once since the time of its formation.

Other minerals that have not been commonly used include leucite, nepheline, adularia and alunite. Leucite and nepheline occur more commonly in the groundmass of volcanic rocks and have therefore been dated as part of a whole-rock sample more frequently than as a separated mineral. The fact that the whole-rock age determinations appear to be reliable suggests that these two minerals may be suitable for dating in their own right.

Adularia and alunite are common minerals associated with hydrothermal ore mineralization and are therefore potentially useful to determine the age of ore emplacement. Most of the work done on these minerals has been on mineralized rocks of Tertiary to Quaternary age, and while the K-Ar ages appear to fit within the time constraints of dates from older and younger rocks, the argon retentitivity of adularia and alunite over more extensive periods of geological time has not been tested extensively. Some manganese minerals (*e.g.*, cryptomelane) contain minor potassium and are also potentially suitable for dating.

Table II-1 lists the most widely used materials for K-Ar dating and the reliability of these materials.

The grain size of the mineral should be greater than 0.15 millimetre because a mineral concentrate coarser than 200 mesh (BSS) is preferred for analysis. If possible, at least 1-2 kilograms of rock should be collected because a minimum weight of 1-2 grams of high-potassium mineral or 2-3 grams of low-potassium mineral is required.

RUBIDIUM-STRONTIUM DATING

High Rb-Sr minerals such as micas (biotite and muscovite) and all potassium-feldspars are the most common minerals used for Rb-Sr dating. Whole-rock samples of igneous and metamorphic rocks are frequently used, but to avoid errors due to uncertainty in the initial Sr isotopic composition, it is necessary that analyses of several genetically related whole-rock samples be made. If possible, at least 2 kilograms of rock should be submitted.

Shales may be dated by whole-rock techniques and also by separation and analysis of the fine-grained (micron) clay fraction. Interpretation of these results is often made complex because of diagenetic and post-diagenetic changes in the chemical and crystallographic properties of the clay minerals.

URANIUM-LEAD DATING

ZIRCON

Zircon is the most appropriate mineral for precise dating of igneous events (*e.g.*, crystallization ages for granitoids and felsic volcanics). It is generally resistant to metamorphic overprinting, up to lower granulite facies, and the low-grade alteration of total rock samples has minimal effect on the zircon uranium-lead concordia age. For granitoid sampling, approximately 15 kilograms is required, whereas slightly more (*c.* 20 kg) is needed to extract sufficient zircon from felsic volcanics.

Zircon from metamorphic rocks can also be dated. However, in some cases, scattering of the data may be observed. This is particularly seen in lower metamorphic-grade paragneisses. For high-grade gneisses, complex metamorphic histories may be unravelled through careful studies of zircon morphology and uranium-lead measurements of differing morphological types.

MONAZITE

Monazite is usually found in granitoids and high-grade metasedimentary rocks. It is enriched in thorium and uranium, and low in initial lead, making it suitable for uranium-lead dating. For igneous rocks, monazite may be used to supplement a zircon concordia plot. Monazite is well suited to the dating of upper amphibolite-grade and higher, metamorphic events, as under these conditions, it invariably yields concordant uranium-lead ages.

TITANITE (sphene)

Titanite generally occurs in acid to intermediate plutonic igneous rocks. It is generally lower in uranium and thorium than zircon, and the relative proportions of common lead may be high. It can prove to be a useful phase to date granitoids where inherited zircon may complicate the age determination. The presence of titanite in more intermediate to basic igneous rocks enables the uranium-lead technique to provide ages for igneous rocks of these compositions.

APATITE

Apatite is a very common accessory phase, but is more susceptible to open system behaviour than zircon, particularly during lower temperature alteration.

OTHERS

Uranium-lead dating can also be applied to other uranium-rich phases, such as xenotime, allanite, uraninite and thorite.

Whole-rock dating by the uranium-lead technique is also possible as a useful sideline to common lead analysis of whole-rocks.

LEAD ISOTOPE ANALYSIS

A wide variety of materials may be examined for lead isotope measurement, ranging from relatively straight-forward determinations of isotope ratios for galenas, to whole-rocks and feldspars, and to more complex samples of gossans and soils. It is generally recommended that isotope dilution analysis to determine uranium and lead contents be carried out at the same time, particularly, for example, when looking at whole-rocks and mixed sulphide ores, as the uranium-lead systematics may be used to more effectively evaluate the Pb isotope ratios.

FISSION TRACK DATING

Very small sample quantities are required for fission track dating (one crystal will in many cases suffice) and thus minerals best suited for fission track dating are apatite (annealing temperature 125°C to 240°C), titanite (annealing temperature 400°C to 500°C) and zircon (annealing temperature above 600°C); these minerals are commonly found in small amounts in a wide variety of rocks.

Those minerals with high annealing temperatures may not be affected by hydrothermal alteration and can often give a primary date, even if the rock is strongly altered, while those minerals with low annealing temperatures would generally be annealed during hydrothermal alteration, and thus give the age of the alteration.

Sample weights of a few hundred grams are required.

ANALYTICAL PROCEDURES

Thin sections are prepared from all samples and a petrographic examination made to evaluate their suitability for dating and to select an appropriate mineral. Suites of samples for Rb-Sr dating are crushed and approximate estimates of rubidium and strontium abundances by x-ray flourescence analysis are made for selection of the most favourable samples.

A single analysis for argon is made by isotope-dilution mass-spectrometry, and potassium is determined in duplicate by atomic absorption spectroscopy. The precision of an individual analysis is ±1% (standard deviation) for most samples, but is higher for rocks younger than about 1 Ma.

Rubidium-strontium analyses may be made either by isotope-dilution mass-spectrometry or by a combination of replicate Rb/Sr ratios by x-ray diffraction (XRF) and a mass-spectrometric determination of $^{87}Sr/^{86}Sr$. The method used is selected on the basis of the type of sample to be analysed: minerals and total rock samples are analysed by isotope dilution while total rock only samples are analysed by XRF/mass spectrometry. For suites of related rocks for which an isochron is derived, the data are regressed by computer to fit a straight line by a least squares regression. The precision is controlled by the level and variation in Rb/Sr ratios within the group and by the degree of open system behaviour that may have been induced by later geological events.

Uranium-lead determinations are carried out in the highest quality laboratory environment available in the "clean room" using all teflon-ware for specially distilled reagents and dissolutions to minimize the laboratory lead blank contamination. For zircons, a hydrofluoric acid attack is carried out in teflon digestion vessels at elevated temperatures under pressure. uranium and lead contents are determined by isotope-dilution mass-spectrometry and a separate mass-spectrometric determination of the lead isotope ratios is performed.

For the normal method of uranium-lead dating, a suite of four to six zircon fractions having different size/magnetic/morphological features, separated from a single sample is preferable in order to achieve either suitable concordant analyses or to define a straight line discordant array. These fractions consist of several hundred to many thousands of zircon grains whereas the 'single-crystal' technique involves the careful selection of one or several individual zircon crystals of a specific colour, morphology and/or clarity, and which are generally more concordant than the normal separated fractions. Factors such as precision of the mass-spectrometer isotope-ratio determinations, errors associated with the use of spikes and knowledge of laboratory blank and initial common lead ratios are all taken into consideration when computing the final precision of the uranium-lead age determination. In general, a precision of less than ±1% (at least 95% confidence level) is obtained and <0.5% can be achieved for many cogenetic zircon suites from Proterozoic igneous rocks. The 'single-crystal' technique can be used in conjunction with the normal method to significantly reduce the error limits on discordia ages by selection of the most concordant zircons.

For fission track dating, the uranium content of the mineral is determined by irradiation with a known thermal neutron flux, which produce a new set of fission tracks from the induced fission of uranium. The fission tracks are made visible to an optical microscope by etching, and the fission track density is determined by counting the tracks over a known area. A precision of ±5% may be obtained for the most favourable samples.

This section was adapted from an Information Sheet published by Amdel, South Australia. For further information, please contact: The Managing Director, Amdel, P.O. Box 114, Eastwood, South Australia 5063.

QUATERNARY DATING METHODS

Quaternary geologists rely on a suite of dating methods which range from sidereal and isotopic to radiogenic and biochemical. Several types of methods are categorized in Table II-2. The most common methods are briefly summarized below.

Radiocarbon Dating

Developed in the early 1950s, this technique relies on the measuring the amount of ^{14}C isotope retained in an organic sample (*e.g.*, bone, wood, shell). The principles and assumption are simple.

TABLE II-2. CLASSIFICATION OF QUATERNARY DATING METHODS

Sidereal	Isotopic	Radiogenic	Chemical and Biochemical	Geomorphic	Correlation
Historical records	Carbon 14	Uranium-trend	Amino acid racemization	Soil profile development	Stratigraphy
Dendrochronology	K-Ar and 39Ar-40Ar	Thermoluminescence	Obsidian hydration	Rock and mineral weathering	Tephrochronology
Varve chronology	Uranium- series	Electron-spin resonance	Tephra hydration	Rock varnish	Paleomagnetism
	Fission track	Lead 210	Lichenometry	Progressive land-form modification	Fossils and artifacts
		Other cosmogenic isotopes	Soil chemistry	Rate of deposition	Stable Isotopes
				Rate of deformation	Astronomical correlation
				Geomorphic position	Tectites and microtectites

One assumes that the amount of cosmic-ray produced ^{14}C in the atmosphere is constant and that the radioactive decay of ^{14}C is also constant with a half-life of 5570 years. This quantifiable relationship indicates that by documenting the amount of ^{14}C remaining in the dead organic sample, relative to the presumed amount when the organism was living, permits a back estimate of the time of death. The calculation also corrects for isotope fractionation by using the ^{13}C isotope as an indicator of possible enrichment or depletion of sample ^{14}C during its formation. The maximum range attainable is ~70 000 years BP, although most labs rarely exceed ages of 40 000 years BP. Two methods of analysis involve either gas chromatography or mass spectrometry. Samples as small as 0.05 milligram of carbon have been dated (rare and expensive). Cheaper methods require larger samples. Contamination is a common problem from modern roots, old "dead" carbon (coal, carbonates) and reservoir effects. Measurements are given with an error estimate of one standard deviation. Ages are in radiocarbon years and should be converted to actual age or calendric years using calibration curves (established from precisely dated trees).

POTASSIUM-ARGON DATING OF QUATERNARY VOLCANIC ROCKS

There are two basic methods of isotopic dating that make use of the radioactive decay of ^{40}K to ^{40}Ar. These are the conventional potassium-argon method and the $^{40}Ar/^{39}Ar$ method. In the conventional method, the potassium content of the sample is usually measured by flame photometry or atomic absorption spectrometry and the radiogenic ^{40}Ar by mass spectrometric isotope dilution. In the $^{40}Ar/^{39}Ar$ method, ^{39}K is first converted to ^{39}Ar by reaction in a nuclear reactor, and the argon isotope ratios are determined by mass spectrometry.

Three problems associated with dating Quaternary volcanic rocks are: 1) correction for the atmospheric argon is very large and subject to error due to isotope fractionation resulting from incomplete equilibration; 2) samples are more easily biased by extraneous older materials; 3) amounts of excess radiogenic argon that would be negligible for older samples may seriously affect the apparent age of Quaternary rocks.

FISSION TRACK DATING

This method of dating has been primarily used to date volcanic ash layers. When an atom of ^{238}U fissions, the nucleus breaks up into two lighter nuclei which recoil in opposite directions and disrupt the electron balance of the atoms in the host mineral or glass along their path. The result is a zone of damage defining the fission track. Only zircon and glass are routinely used for fission track dating in Quaternary studies and both have different laboratory requirements. Contamination is readily recognized as specific grains are scanned and counted. The disadvantage is that very young samples (<100 000 years) usually have low spontaneous track density. The method has been widely used with tephrochronology, where volcanic ash layers are more than 50 000 years old.

Other popular methods of dating include thermoluminescence, paleomagnetism, conventional uranium-series and Uranium-trend, and Amino-acid racemization geochronology.

The following references should be consulted for specifics on Quaternary dating methods.

Easterbrook, D.J. (1988): Dating Quaternary Sediments; *Geological Society of America*, Special Paper 227.

Rosholt, J.N., Colman, S.M., Stuiver, M., Damon, P. E., Naeser, C.W., Neaser, N. D., Szabo, B.J., Muhs, D. R., Liddicoat, J.C., Forman, S.L., Machette, M.N. and Pierce, K.L. (1991): Dating Methods Applicable to the Quaternary; *in* Quaternary Nonglacial Geology; Conterminous U.S.; Morrison, R.B., Editor, *Geological Society of*

America, The Geology of North America, Volume K-2, pages 45-74.

Rutter, N.W., Brigham-Grette, J. and Catto, N. (1989): Applied Quaternary Geochronology; *Quaternary International*, Volume 1, No. 1, pages 1-166.

Rutter, N.W. and Catto, N. (1994): Dating Methods of Quaternary Deposits; *Geological Association of Canada*, Geoscience Canada Reprint Series 2.

SAMPLING FOR ISOTOPE DATING

SOME SAMPLING TIPS

The date you get is only as good as the sample you collect; great care must be taken to collect a usable sample. Keep in mind that for plutons larger than 50 square kilometres (8 km diameter) you may be dealing with a composite body with a complex intrusive history.

It is tempting to try to get more than one type of mineral separate out of a single bulk sample, but mineral separating procedures are sufficiently different that this shortcut is both time-consuming and more difficult for the laboratory. Depending on the sequence of processing, contamination is a potential problem. In most cases, it is best to collect separate samples for separate methods (*e.g.* U-Pb *vs.* K-Ar). The best isotopic technique to use depends on the nature of the problem you are trying to solve (*see* Table II-3). Pros and cons of various methods are presented in Table II-4.

SAMPLE TYPE/QUALITY

K-Ar and Ar-Ar: Samples must be *fresh*, free of weathered zones, fractures, veinlets and alteration (unless you are trying to date that alteration) unless your are sampling a dike or pluton. Samples should be AT LEAST 100 metres from the nearest dike and AT LEAST 1 kilometre from the nearest stock or pluton, to avoid thermal resetting problems. If you are interested in a crystallization age for an intrusive rock, it must not be metamorphosed.

When there is no alternative, volcanic whole rock or biotite hornfels or sericitic, or other fine potassium-rich concentrates may be used for dating. Since potassium is the parent, a low-K amphibole (actinolite) is not suitable.

Concentrates should be about 5 grams; the amount of the desired mineral for dating in each sample determines how large a sample is required (*e.g.*, 1% biotite requires more sample than 20% biotite). It is wise to collect more sample than you need, - say a small sample bag full.

U-Pb: You must collect the freshest sample available. Weathering, hydrothermal alteration, contact metamorphism, and low to high ranges of regional metamorphism, can all potentially have a profound impact on zircons, especially metamorphism (Pb loss and new zircon growth)and hydrothermal alteration (new zircon growth). Weathered surfaces can be tolerated but should be kept to a minimum. Remove all vein material. Make sure to stay away from contact metamorphosed and hydrothermally altered rocks. If you have a choice, collect from an area of the intrusive body that has visible quartz, and where the predominant mafic mineral is biotite(*i.e.*, biotite granite or quartz monzonite). Normal amounts of more mafic, hornblende-rich varieties (diorite, *etc.*) often do not yield sufficient zircon for analysis. If you collect these mafic types, collect a large sample and expect that you may have to contact a lab that can handle small samples and make special arrangements if zircon yield is low.

The same is true for extrusive rocks. Anything less felsic than rhyodacite and/or a sample that is aphanitic may not yield sufficient zircons for analysis.

NOTE: When you break up the sample, make sure to do it on a surface composed of the same rock that you are trying to date. DO NOT break up the sample on another rock type, or asphalt, or concrete, or any other surface that might contribute exotic zircons and contaminate your sample. Rinse off dirt from samples and store in pails or other containers that prevent contamination.

Rb-Sr: This method is an elegant, sophisticated, complex isotope method that is often difficult and sometimes impossible to interpret. When it works well, it yields a wonderfully clear, unambiguous date that you probably could have obtained with K-Ar. For a given mineral, Rb-Sr has a slightly higher closure temperature than K-Ar. A useful byproduct of the Rb-Sr method is the Sr-Sr "initial ratio" (*see* Table II-3), from which inferences can be made about the nature of the source rocks.

With the Rb-Sr method, multiple samples are analysed, and the points are plotted on a diagram of $^{87}Sr/^{86}Sr$ *versus* $^{87}Rb/^{86}Sr$. The age of the igneous body is indicated by the slope of the line (isochron) that passes through these points. Thus, while two points can define a line and provide a date (this method is frequently used), the more points there are, the more precisely the line can be defined. The initial ratio is the y-intercept of the line. If the age of the igneous body is well known by other methods, the Sr initial ratio can be calculated using a single sample. *See* Faure (1986), for a comprehensive and comprehensible review of this method.

For Rb-Sr, several samples must be collected from the same igneous body. The key to collecting a useable Rb-Sr sample set is **to maximize the heterogeneity of your samples.** This is relatively easy to achieve with intrusive rocks, hetero-

Table II-3: RADIOGENIC ISOTOPE METHODS IN GEOLOGY

METHOD	STATUS Routine (R) versus Experimental (X)	APPLICATIONS	MATERIALS
K-Ar	R	provides cooling ages for igneous rocks and thermal events	whole rock (all classes)* hornblende*, muscovite*, biotite*, sericite*, K-feldspar, glauconite, feldspathoids, alunite
U-Pb	R	provides crystallization ages for felsic igneous rocks and approx. ages of metamorphism(1) and inherited zircon(2)	zircon*(3), titanite* (sphene), monazite*, xenotime, epidote, rutile apatite, baddeleyite
Rb-Sr	R	dates (intrusions,flows, thermal events) yields Sr/Sr data	whole rock* (all classes) feldspars, feldspathoids, micas
Fission Track (U238)	R	dates cooling through 200-100°C range (e.g. lava, intrusions, metamorphism, final tectonic uplift)	zircon*, apatite*, garnet, micas, epidote, sphene, tektites, volcanic glass
Ar-Ar	R	dates (similar to K/Ar) track thermal histories of minerals	same as K-Ar(4);biotite and hornblende, may not be reliable
Sm-Nd	R	dates crustal source/evolution	whole rocks*
Sr-Sr	R	crustal source/evolution (a.k.a. strontium initial ratios)	same as Rb-Sr (wholerock*) sphene, epidote, apatite.
Nd-Nd	X	crustal source/evolution	same as Sm-Nd
Re-Os	X	dates	molybdenite, Re-bearing ores, iron meteorites
Nd-Sr	XX	crustal source/evolution	basalt.
K-Ca	XX	dates	sylvite, mica pegmatites.
Lu-Hf	XX	dates	apatite, garnet, monazite, pegmatites, some whole rocks

** indicates commonly used minerals.*

(1) Generally not used to date metamorphism. Gives rough estimate of age and indicates if the rock has inherited older crustal material.

(2) Single zircon analyses are not available at U.B.C.

(3) U.B.C. has only been doing zircons routinely, however, other minerals can also be run.

(4) Differs from K-Ar in that a single grain can be used through laser step-heating process.

TABLE II-4. PROS AND CONS OF DATING METHODS

METHOD	ADVANTAGES	LIMITATIONS
K-Ar	- quickest lab method - routine analysis - easily interpreted - small samples analysed, but are mineral separates - precision 3% - thermal resetting of minerals	- thermal resetting common - large amount of sample needed - better results from mineral separates than whole rock - minerals must be unweathered, and unaltered - no reliable igneous ages on metamorphosed samples
U-Pb	- high accuracy - high precision (1%) - resists thermal resetting - can analyze xenocrysts	- expensive - very large bulk samples required - sometimes ambiguous or approximate results - suitable for intermediate to felsic rocks only
Rb-Sr	- may work when above methods are unsuitable - yields Sr-Sr data (strontium initial ratios) - applicable to a wide range of rock types	- expensive - attempt only with large total samples set (<2 point isochron) - must be unweathered, and unaltered - results may be ambiguous to unusable, unless samples are fresh (unaltered)
Fission Track	- ideal for low-temperature thermal events	- application limited to low-temperature thermal events
Ar-Ar	- best method for tracking thermal histories - only a small amount of sample needed - no mineral separates needed - thin section should accompany sample	- only 2 labs in Canada with laser-step heating capability (1996)
Pb-Pb	- small samples - quick turnaround - inexpensive - routine analysis	- need a large data set for meaningful interpretations - a poor method of dating, better used to describe sources of lead - interpretation can be complex

geneity is represented by variations in texture, *e.g*:, coarse-grained core zones as opposed to fine-grained border zones (skip chilled margins to avoid chemical exchange problems), by variations in modal composition and by other features. Sample heterogeneity from an extrusive flow can be maximized by determining the flow morphology and orientation, then searching for the most varied locations, *e.g*:, base, flowtop, margins, upstream/downstream, vent or toe. There are no absolute maximum or minimum distances between sample sites; distances should be governed by the size and distribution of the unit "pairs" from at least five sites along its entire length; for an equidimensional stock with a diameter of 5 kilometres, six samples around the rim and four evenly spaced in the central area would give ten sample sites roughly 2 kilometres apart.

[Faure, G., Editor (1986): Principles of Isotope Geology, *John Wiley and Sons*, New York, 589 pages.]

APPENDIX III: Symbol Usage in Map-Unit Designation

Geological map-units are designated after all information available has been evaluated. The name and rank of a map-unit are based on recommendations on stratigraphic nomenclature outlined in Appendix I (stratigraphic nomenclature and the stratigraphic code). This section follows on from Appendix I and deals with the symbolic map designations of rock units. As with stratigraphic nomenclature, symbol format is recommended, but it is acceptable to deviate from it, if necessary.

On many geological maps, particularly early stage products, such as BCGSB Open File maps, some map-unit designations are uncertain (see subsection on Uncertainty, below). Correlation may be hampered by lack of information, such as geochemical analyses, or lack of age control (fossils or radiometric dating).

For map production, the standard basic font style recommended is **Helvetica** regular, or an equivalent sans serif font such as **Ariel.**

To save space and avoid clutter, units on a map are indicated by coded labels, generally on the basis of:

1. geologic age, followed by
2. lithostratigraphic/lithodemic unit name in smaller type, followed by
3. any other necessary identifier, or dominant lithology in lower case.

An example would be **KMns** for the *Cretaceous Monach Formation sandstone.* A similar approach is used for plutonic and ultramafic rocks, for example, KIMd. Such labels should not be too lengthy. Their advantage is that they are self-explanatory once the abbreviations are familiar, and provide consistency between map sheets. The map-unit abbreviations are expanded and explained in the geological legend for the map (for example, Figure 8).

Alternatively, where rock unit ages are unknown, or in reports or articles, or on sketch maps of small areas such as mineral showings, units may be labeled with numbers, '1' always being the relatively oldest unit. Numbers may also be used where computer databases are involved, for compilations, or for presentations where they make understanding of the map easier for the client group.

GEOLOGIC AGE

For the age of a map-unit, abbreviations for the geologic systems and periods, and their divisions follow an international convention (*see* Figures 8 & 11). Some of them are special characters: for example, a modified "P" is needed to distinguish Proterozoic, Paleozoic, Pennsylvanian, Paleogene, Paleocene, Pliocene and Pleistocene from Permian (*see* note on special characters, below).

The term system encompasses rocks formed during a span of time large enough to act as a world reference; the temporal equivalence of the system is the period. That is rocks in the Triassic **system** formed in the **period** between 245 and 208 million years ago Systems and periods are divided into named **series** and **epochs**, respectively, as shown in the Geologic Time Scale (Figure 9, Appendix II). Unfortunately, there is no unequivocal relationship between these named divisions and the qualifiers Lower/Early, Middle, and Upper/Late, especially for divisions like the Jurassic, with more than three stages within a division. Options are discussed in Harland *et al.*, (1990a). In the Cordillera, it is recommended that the divisions Early, Middle, and Late be used as part of the map-unit designation, and the stage (if known) specified in the map legend. Alternatively, the use of qualifiers for divisions of periods as part of the map-unit designation could be dropped, and each division shown as a subheading in the map legend instead, as was done for the Cretaceous in Figure 8.

When writing about lithostratigraphic units, general 1996 usage of division qualifiers is as follows: **Lower**, **Middle** or **Upper** Devonian **rocks** formed during **Early**, **Middle** or **Late** Devonian **time** respectively (Figure 11). Harland *et al.*, (1990a) recommended abandoning this distinction and using only the qualifiers **Early**, **Middle** and **Late**, which is the convention that will be followed here.

Whatever usage is followed, 'formal' divisions are always capitalized **when written out**, for example: Late Cambrian (rocks); Late Jurassic (time). They may be represented in the map-unit designation in the form of a prefix for the system/period abbreviation, as follows:

- For ***lithostratigraphic*** units with ages in the Paleozoic or Mesozoic eras, an upper case E, M or L prefix (of the next lower point size) is used to denote the early, middle or late division or **series** of the system, if the system is so divided. For example, **LK** for Late Cretaceous.
- The Paleogene and Neogene periods of the Tertiary sub-era, have their own epoch names (Paleocene, Eocene, Oligocene, Miocene and Pliocene) and special character abbreviations (*see* Figure 8). As a result, the letter T, for Tertiary, is only used in the map-unit designation if time control is imprecise. As before, the E or L prefixes can be used to further subdivide these epochs; some also have a 'middle' division, as well (*see* the time scale, Figure 9).
- The convention for ***lithodemic*** units (intrusive and high-grade metamorphic rocks) is to denote the ***age*** by the abbreviation for the period, prefixed by a capital E, M, or L (in the next lower point size) to indicate an Early, Middle or Late ***epoch***, if it is known, and if the period is so divided, for example, **LJ** for a Late Jurassic granodiorite intrusion. The comments applied to the Tertiary and its subdivisions that were given above also apply here.
- For high-grade metamorphic rocks, the age assigned to the unit is that of the original rock (protolith), not the metamorphic event.

Note on Special Characters:

The special character abbreviations used to denote geologic periods (Figure 8) are easily reproducible in graphics programs, and are already in use in AutoCad products. They should be used on all maps being published. However, there are no ANSI codes for many of these symbols for use in word processing programs. As a consequence, it is best to write the names out in full in text descriptions.

Note: *As mentioned above, formal geologic age units form part of the map-unit designation and are capitalized where written out. Additional qualifiers are generally informal and are not capitalized, for example: late Early Devonian time; upper Late Triassic limestone.*

Some geologic age designations used are not defined in the Geologic Time Scale. For example, the Cretaceous has no middle series or epoch. Therefore a rock unit dated at *ca.* 100 Ma may be described as 'mid-' or 'middle' Cretaceous, but the qualifier should not be capitalized. In the map-unit designation, a lower case 'm' should be used as follows:

mK	for mid-Cretaceous

The same approach should be applied to other periods with no middle epoch, namely Silurian, Carboniferous and Permian.

Other usages may also cause confusion:

(a) Mississippian is synonymous with Early Carboniferous; Pennsylvanian is synonymous with Late Carboniferous. In North America, the Mississippian and Pennsylvanian map symbols, **M** and P respectively, are generally preferred to the Carboniferous equivalents - EC and LC, respectively. The Mississippian and Pennsylvanian themselves are not broken into early, middle and late divisions, so usage should be kept informal (not capitalized).

(b) Paleogene may be used instead of Early Tertiary; and Neogene instead of Late Tertiary (or vice versa).

(c) By convention, it is acceptable to make indefinite divisions of the Paleozoic (even though they may not appear as such in the Geologic Time Scale), as follows: early Paleozoic for indefinite Cambrian, Ordovician and Silurian; late Paleozoic for Devonian, Mississippian, Pennsylvanian and Permian. For example:

LP	for indefinite late Permian, and:
EM	for indefinite early Mesozoic

(d) In the time scale of Harland *et al.*, (1990 a,b), the authors list the Tertiary is a subera of the Cenozoic, and define the Paleogene and Neogene as periods. As described above, although worldwide the Mississippian and Pennsylvanian are subperiods of the Carboniferous period, they are effectively periods in North America.

STRATIGRAPHIC UNIT NAME

The stratigraphic or other unit name in a map-unit designation may be formal or informal. A lithostratigraphic formal name is usually that of a group or formation (but not both together; *see* below). The name, not including the rank term, is abbreviated to one (or two) ***capital*** letter(s) using the next smaller point size than that used for the geologic age abbreviation discussed above, and follows it, for example, **KM** for the Cretaceous Monteith Formation. Other examples are discussed below and highlighted in bold text on Figure 8.

- If a mapped formation is part of a group, only the formation abbreviation is incorporated in the map-unit designation, however, the full group name forms a heading for the formation(s) in the map legend (*see* Figure 8, Cadwallader Group, Hurley Formation).
- If rocks belonging to a group are not divided into formations on part or all of the map, the unit can be given the group abbreviation (see Figure 8, Spences Bridge Group), or a lower case 'u' for 'undivided' directly after the age abbreviation (*see* Figure 8, Cache Creek Complex), or both.
- If two or more particular formations (whether or not they belong to a group) are known to be present in a map-unit but are not separable, their abbreviations can be strung together (but preferably separated by commas). Alternatively, a 'u' for 'undivided' can be placed directly after the age abbreviation (*see* Figure 8, Intermontane Belt, Tertiary).
- If two or more map-units have the same age symbol and the same name initial (whatever rank), a lower case letter follows the initial of at least one of them to distinguish them (for example, the Jurassic to Cretaceous Monteith Formation (**JKM**) versus the undivided Minnes Group in the same area (**JKMn**) *see* Figure 8,.
- If a member of a formation constitutes a map-unit, its **lower case** initial should be separated from the formation's abbreviation by a hyphen.
- In the case of intrusive or metamorphic rocks (lithodemic units), the unit abbreviation derives from the proper name of the body or suite or complex (*see* Figure 8, Early Cretaceous Mount Alex Complex). If no name is applicable, this element of the map-unit designation is omitted (*see* Figure 8, Miocene quartz monzonite; minor granite).

Informal units which have a proper name and are likely to be useful for several years, are labeled the same way as formal units, for example: Churn Creek succession is abbreviated to **CC** as if it was a formation or group. However, it is advisable to avoid this usage for units which have been given a temporary casual name in order to prevent the unit from being mistaken for a formal unit.

OTHER INFORMAL UNIT IDENTIFIER, OR DOMINANT LITHOLOGY

The last element of the map-unit designation, dominant lithology, is optional. It is given in ***lower case*** in the same point size as the stratigraphic unit abbreviation (described in Section 2 above).

The dominant lithology is generally reduced to one or two letters, so only very general rock types can be indicated, such as v for volcanic, g for granite, gn for gneiss, s for sandstone, l for limestone, and so on. A set of these abbreviations is given in Appendix VI-a. It is important to describe the constituent lithologies of a map-unit in the geological legend. If the lithology of a unit is consistent throughout the map, use of a lithologic qualifier is optional. However, qualifiers become useful if lithologies vary such that different rock types are locally dominant. In these cases the qualifier can be used to indicate facies changes in the unit. Even if a lithological variation is not mappable, the full map-unit symbol can be attached to individual outcrop stations, or groups of outcrops.

***Other informal unit identifiers*:** Alternatively, the lithology element of the map-unit designation may be used as an identifier for unnamed informal map-units or subunits, whether they are subdivisions of formal units (*see* Figure 8, the volcanic unit of the Hurley Formation) or not (*see* Figure 8, Late Jurassic to Early Cretaceous Grouse Creek siltstone unit). Some examples of abbreviations are: i for intrusive; q for quartzite unit; v for volcanic marker; and 1, 2, 3 for the lowermost, middle and uppermost units, such as Ds1, Ds2 and Ds3 for these units in the Stone Formation.

APPENDIX IV: Rock Classification Schemes

The following is a list of references for commonly used rock classification schemes.

SILICICLASTIC ROCKS (Siliceous Sedimentary Rocks)

Compton, R.R. (1985): Geology in the Field; *John Wiley & Sons*, 398 pages.

Pettijohn, F.J. (1975): Sedimentary Rocks, Third Edition; *Harper and Row, Publishers*, 628 pages.

Pettijohn, F.J., Potter, P.E. and Siever, R. (1972): Sand and Sandstone; *Springer-Verlag*, 618 pages.

CARBONATE ROCKS

Compton, R.R. (1985): Geology in the Field; *John Wiley & Sons*, 398 pages.

Dunham, R.J. (1962): Classification of Carbonate Rocks According to Depositional Texture; *American Association of Petroleum Geologists*, Memoir Number 1, pages 108-121.

Folk, R.L. (1962): Spectral Subdivision of Limestone Types; *American Association of Petroleum Geologists*, Memoir Number 1, pages 62-84.

PLUTONIC ROCKS

Le Maitre, R.W., Editor (1989): A Classification of Igneous Rocks and Glossary of Terms; *Blackwell Scientific Publications*, 193 pages.

Streckeisen, A. (1976): To Each Plutonic Rock Its Proper Name; *Earth Science Reviews*, Volume 12, pages 1-33.

VOLCANIC ROCKS

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APPENDIX V: Traverse and Station Numbering Protocol

It is important that each outcrop station created by the mapper has a unique label. One method, that is generally followed by BCGSB geologists, is to use the traverse number and station (outcrop) number, preceded by a five-letter code identifying the geologist and the year the field work was done. The prefix begins with the initial of the geologist's first name, followed by the first two letters of their surname, followed by the year. For example, PDE88-3-2 would indicate the second station established during the third traverse done in 1988 by mapper Patrick Desjardins. An alternative (not recommended) is to omit the traverse number and simply number stations consecutively from the beginning to the end of the field season. The method used should be made clear to avoid potential confusion.

The unique (alphanumeric) number for each field station is the key element for locating information in the resultant geoscientific database. The database could be used to identify a single rock type, whether rock or fossil samples were collected, map-unit and age *etc.*, all linked (related) by this unique number. Laboratory and other results - chemical analyses, thin-section studies, fossil identifications, *etc.* - can also be added and related to the unique identifier. As a result, all geological feature(s) related to a station can be or interrelationships can be evaluated.

If a station has more than one significant rock type, it can be divided into substations, numbered -1, -2 *etc.* after the full station number. The oldest (if known) or most abundant rock type is usually numbered substation 1. Each substation has its own unique identifier, descriptive data and sample information, but all substations of a station have the same map coordinates because they all occupy the same point on the map. Conversely, a new station must be created if data are collected from a new location.

The use of substations is discretionary: lithological variations in an outcrop are common and need not be recorded separately in this way unless they are significant. Minor variations can be described in free-form notes.

On a geological map, the exact position of a station is indicated by a suitable symbol. It may be an outcrop symbol, or a structural measurement, or a mineral occurrence symbol. The station identifier number is not plotted, as this would create clutter and make the map difficult to read. During fieldwork, however, the geologist will compile a traverse map overlay, consisting only of numbered traverses and stations. This is used for planning, cross-reference and to keep track of the area covered. This map will also be used later for digitizing the station points, but is generally not published, except in general form as the "traverse map" to show areal coverage and indicate mapping reliability (*see* Part 3-3); it might be produced in digital form, particularly if the 'raw' database is released digitally.

APPENDIX VI-a: Rock and Mineral Codes Often Used On Geology Maps

For native elements, such as gold, silver and copper, use chemical symbols (Au, Ag, Cu)

Mineral/Rock	Abbrev	Mineral/Rock	Abbrev	Mineral/Rock	Abbrev	Mineral/Rock	Abbrev
actinolite	act	dickite	dk	marble	mb	schist	shst
adularia	ad	diopside	dp	marcasite	marc	scorodite	scor
agglomerate	agg	diorite	dio	marl	marl	sericite	ser
albite	alb	diorite gneiss	dio-gn	microcline	mcln	serpentine	serp
alunite	alun	dolomite	dol	migmatite	mig	serpentine marble	spt-mb
amphibolite	amph	dolomite marble	dol-mb	molybdenite	mo	serpentinite	spt
andalusite	adl	dunite	dun	monazite	mz	shale	sh
andesite	andt	enargite	en	montmorillonite	mm	siderite	sid
anglesite	ang	epidote	ep	monzonite	monz	silica	si
anhydrite	anh	feldspar	fld	mudstone	mdst	sillimanite	sill
ankerite	ank	felsite	fls	muscovite	mus	siltstone	slst
apatite	apt	fluorite	fl	muscovite schist	mus-shst	slate	slt
aplite	apl	fossiliferous limestone	f-ls	nepheline	neph	smithsonite	smth
argentite	agt	gabbro	gb	niccolite	nic	soapstone	spst
argillite	arg	gabbro gneiss	gb-gn	olivine	ol	specularite	spec
arkose	arks	galena	gln	oolitic limestone	o-ls	sphalerite	sph
arsenopyrite	aspy	garnet	gnt	orpiment	orp	spinel	sp
asbestos	asb	garnet schist	gar-shst	orthoclase	orth	spodumene	spod
augen gneiss	a-gn	gneiss	gn	orthopyroxene	opx	stannite	sn
augite	aug	gneiss	gn	peat	peat	staurolite	str
azurite	az	granite	gr	pegmatite	peg	stibnite	sb
banded gneiss	b-gn	granite gneiss	gr-gn	pentlandite	pn	syenite	sy
barite	ba	granodiorite	gd	peridotite	pdt	sylvite	k
basalt	bas	granulite	grnl	phlogopite	phlo	tantalite	ta
bentonite	ben	graphite	gph	phosphorite	phos	tennantite	tnt
beryl	brl	greenschist	gshst	phyllite	phy	tenorite	ten
biotite	bio	greisen	gs	plagioclase	plag	tetrahedrite	tet
biotite schist	bio-shst	greywacke	grwk	polybasite	plb	titanomagnetite	tmag
bismuthinite	bs	gypsum	gyp	porphyry	ppy	topaz	tpz
borax	brx	halite	ha	proustite	prs	tourmaline	tml
bornite	bn	hematite	hem	pyrargyrite	pyg	trachyte	trch
bournonite	bo	hornblende	hb	pyrite	py	trap	trp
breccia	bx	hornblendite	hbt	pyrochlore	pych	travertine	trvt
calcite	calc	hornfels	hf	pyrolusite	pz	tremolite	trem
carbonate	carb	hypersthene	hyp	pyroxene	pyx	tuff	tuff
cassiterite	css	illite	ill	pyroxenite	pyxt	vanadinite	va
cerrusite	ce	ilmenite	ilm	pyrrhotite	po	vermiculite	vm
chalcedony	chal	iron formation	I-Fm	quartz	qtz	vesuvianite	vs
chalcocite	cc	jamesonite	jm	quartz basalt	qbas	volcanic breccia	vbx
chalcopyrite	cpy	jarosite	jr	quartz diorite	qd	wolframite	wf
chert	cht	kaolinite	kaol	quartz gabbro	qgb	wollastonite	wo
chlorite	chl	kyanite	ky	quartz monzonite	qm	zeolite	ze
chlorite schist	chl-shst	kyanite schist	ky-shst	quartzite	qtze	zircon	zr
chromite	cr	latite	lat	realgar	rlg		
cinnabar	cnb	lignite	lgnt	rhodochrosite	rho		
claystone	clst	limestone	ls	rhodonite	rhd		
clinopyroxene	cpx	limonite	lim	rhyolite	rhy		
coal	coal	listwanite	list	rutile	rut		
corundum	cor	magnetite	mag	sandstone	ss		
covellite	cv	malachite	mal	scapolite	scap		
cuprite	cup			scheelite	sch		
dacite	dac						

Modified after Grant and Newell (1992).

APPENDIX VI-b: COMPUTER-ORIENTED ROCK AND MINERAL CODES

The following is an alphabetical listing of rock, mineral, alteration, and some other gedogical terms together with a corresponding four-letter abbreviation as defined in the BCGSB MINFILE manual. Generally, unless the words are short, the code consists of the first letter of the name, then threeconsonants (vowels are omitted), for example, limestone is coded as lmst, and adularia as ADLR

Acanthite	ACNT	Amphibolitic	APBC	Argillaceous	AGLC
Accretionary	ACRN	Amygdaloidal	AMGD	Argillite	ARGL
Acid	ACID	Analcime	ALCM	Arkose	ARKS
Acmite	ACMT	Analcite	ANLC	Arkosic	ARKC
Actinolite	ACNL	Anatase	ANTS	Armenite	ARMT
Adularia	ADLR	Andalusite	ADLS	Arsenic	ARSC
Aegirine	AGRN	Andesine	ANDS	Arsenopyrite	ARPR
Agate	AGTE	Andesite	ANDT	Asbestos	ASBS
Agglomerate	AGLM	Andesitic	ANDC	Ash	ASHH
Agglomeratic	AGMC	Andorite	ANDR	Augelite	AUGL
Aguilarite	AGLR	Andradite	ADRD	Augen	AUGN
Akerite	AKRT	Anglesite	AGLS	Augite	AUGT
Akermanite	AKRM	Anhydrite	ANHY	Aurichalcite	ACLC
Aktashite	AKTS	Ankaramite	ANKM	Aurostibite	ARSB
Alaskite	ALSK	Ankerite	ANKR	Autunite	ATNT
Albandite	ALBD	Ankeritic	ANKT	Awaruite	AWRT
Albertite	ALBR	Annabergite	ABRG	Axinite	AXNT
Albite	ALBT	Anorthite	ANRT	Azurite	AZRT
Albitite	ALBE	Anorthosite	ANRS	Baddeleyite	BDLT
Algal	ALGL	Anthophyllite	ANPL	Banded	BNDD
Algodonite	ALGD	Anthracite	ANRC	Barite	BRIT
Alkali	ALKL	Antigorite	ANGR	Baritic	BRTC
Alkalic	AKLC	Antimony	ANMN	Barytocalcite	BCLC
Allanite	ALNO	Apatite	APTT	Basalt	BSLT
Allemontite	ALMT	Aphanitic	ANPC	Basaltic	BSLC
Alluvium	AVUM	Aphyric	APRC	Basanite	BSNT
Alnoite	ALNT	Aplite	APLT	Basic	BSIC
Altaite	ALTT	Aplitic	APLC	Bastite	BSTT
Altered	ALRD	Apophyllite	APPL	Bastnaesite	BSNS
Aluminous	ALMS	Aragonite	ARGN	Bauxite	BUXT
Alunite	ALUN	Arenaceous	ARCS	Bedded	BDED
Amblygonite	AMBG	Arenite	ARNT	Beforsite	BFRS
Amethyst	AMTS	Arfvedsonite	AFVU	Bentonite	BENT
Amphibole	AMPB	Argentite	ARGT	Berthierite	BRTR
Amphibolite	AMPH	Argentopyrite	AGPR	Beryl	BRYL

Betafite	BTFT	Chalcomenite	CLCM	Cyrtolite	CRTL
Beudantite	BDNT	Chalcopyrite	CLCP	Dacite	DCIT
Bindheimite	BNDM	Chalcostibite	CLCB	Dacitic	DCTC
Biotite	BOIT	Chamosite	CMST	Danaite	DNIT
Bismuth	BSMT	Charnockite	CRCK	Danalite	DNLT
Bismuthinite	BSMN	Chert	CHRT	Datolite	DTLT
Bismutite	BMTT	Cherty	CHTY	Deudantite	DDNT
Bitumen	BTMN	Chevkinite	CVKN	Diabase	DIBS
Bituminous	BMNS	China Stone	CNSN	Diamictite	DMCT
Bixbyite	BXBT	Chloanthite	CLNT	Diamond	DMND
Black	BLCK	Chloride	CLRD	Diaspore	DSPR
Block	BOCK	Chlorite	CLRT	Diatomaceous	DTMS
Boothite	BTHT	Chloritic	CLRC	Diatomite	DITM
Boracite	BRCT	Chloritoid	CLTD	Dickite	DCKT
Borax	BORX	Chondrodite	CDRD	Digenite	DGNT
Bornite	BRNT	Chromite	CRMT	Dike	DIKE
Boulangerite	BLGR	Chromitite	CRTT	Diopside	DPSD
Boulder	BLDR	Chrysocolla	CRCL	Diorite	DORT
Bournonite	BRNN	Chrysolite	CRLI	Dioritic	DORC
Brannerite	BRNR	Chrysotile	CRSL	Djurleite	DJRL
Braunite	BRUN	Cinnabar	CNBR	Dolerite	DLRT
Bravoite	BRVT	Clastic	CSTC	Dolomite	DOLM
Breccia	BRCC	Clausthalite	CLSL	Dolomitic	DLMC
Brecciated	BRCD	Clay	CLAY	Domeykite	DMKT
Breithauptite	BRTP	Claystone	CLSN	Dumortierite	DMRR
Breunnerite	BRRT	Cleavelandite	CLVD	Dunite	DUNT
Brines	BRMS	Clinochlore	CLCL	Dunitic	DNTC
Britholite	BRTL	Clinoptilolite	CLTL	Dyscrasite	DSCR
Brochantite	BRCN	Clinopyroxene	CLPX	Eclogite	ECLG
Bronzite	BRNZ	Clinopyroxenite	CLPT	Electrum	ELCM
Brucite	BRUC	Clinozoisite	CLZS	Ellsworthite	ELSR
Calaverite	CLVR	Coal	COAL	Emery	EMRY
Calcsilicate	CLSC	Coarse Grained	CGRD	Empressite	EMPR
Calcarenite	CLCR	Cobaltite	CBLT	Enargite	ENRG
Calcareous	CLCS	Coffinite	CFNT	Enstatite	ENST
Calciosamarskite	CCMK	Collinsite	CLLT	Epiclastic	EPCL
Calcirudite	CALR	Collophane	CLPN	Epidote	EPDT
Calcite	CLCT	Coloradoite	CLDT	Epsomite	EPSM
Camptonite	CMPN	Columbite	CLMB	Equigranular	EQGL
Cancrinite	CNCR	Conglomerate	CGLM	Erythrite	ERTR
Carbon	CRBO	Conichalcite	CCLC	Eschynite	ESCN
Carbonaceous	CRBC	Copper	CPPR	Esker Sediment	EKSM
Carbonate	CARB	Cordierite	CRDR	Essexite	ESXT
Carbonatite	CRBM	Corkite	CRKT	Euxenite	EXNT
Carbonatized	CARZ	Coronadite	CRND	Evaporite	EVPR
Carbonite	CRBN	Corundum	CRDM	Extrusive	EXTV
Carnallite	CRNL	Corynite	CRYN	Famatinite	FMTN
Carnotite	CRNT	Cosalite	CSLT	Fayalite	FYLT
Carrollite	CRLT	Covellite	CVLT	Feldspar	FLDP
Cassiterite	CSTR	Crackle	CCKL	Feldspathic	FDPC
Cataclasite	CCLS	Crinanite	CRNN	Feldspathoid	FDPD
Cataclastic	CCTC	Cristobalite	CTBL	Felsic	FLSC
Celadonite	CLDN	Crocidolite	CCDL	Felsite	FLST
Celestite	CLST	Crossite	CRSS	Fenite	FNIT
Celsian	CELS	Crushed	CHRD	Ferberite	FRBR
Cerargyrite	CRRG	Cryolite	CRYL	Fergusonite	FRGS
Cerussite	CRST	Cryptomelane	CPML	Ferricrete	FRCR
Cervantite	CRVN	Crystal	XTAL	Ferrimolybdite	FMBD
Chalcanthite	CHLT	Cubanite	CBNT	Ferro	FRRO
Chalcedony	CLCD	Cummingtonite	CMNG	Ferrodolomite	FDLM
Chalcocite	CLCC	Cuprite	CPRT	Ferruginous	FRUG

Fersmite	FRSM
Fine Grained	FGRD
Fireclay	FRCL
Flow	FLOW
Fluorapatite	FLAP
Fluorite	FLRT
Fluorphlogopite	FPGP
Fluorspar	FLRP
Fluvial	FLVL
Foliated	FLTD
Formanite	FRMN
Forsterite	FRSR
Fossiliferous	FLFR
Fractured	FRCD
Fragmental	FRAG
Franckeite	FRCK
Freibergite	FRBG
Freieslebenite	FRLB
Friedelite	FRLT
Frohbergite	FRBT
Froodite	FRDT
Fuchsite	FCST
Gabbro	GBBR
Gabbroic	GBRC
Gadolinite	GDLN
Gahnite	GHNT
Galena	GLEN
Gallium	GLLM
Garnet	GARN
Garnetiferous	GRFR
Garnetite	GART
Garnierite	GRNR
Gaspeite	GSPT
Geikielite	GKLT
Geocronite	GCRN
Germanite	GRMN
Gersdorffite	GRDF
Geyserite	GSRT
Gibbsite	GBST
Glacial	GLCL
Glaciolacustrine	GLLC
Glass	GLSS
Glaucodot	GLCD
Glauconite	GLCN
Glaucophane	GLCP
Gmelinite	GMLN
Gneiss	GNSS
Gneissic	GNSC
Goethite	GTHT
Gold	GOLD
Gorceixite	GRCX
Gossan	GSSN
Gouge	GOUG
Granite	GRNT
Granitic	GRNC
Granitoid	GRND
Granodiorite	GRDR
Granophyre	GRPR
Granulite	GRNU
Graphite	GRPT
Graphitic	GRPC

Gravel	GRVL
Greenalite	GRNL
Greenockite	GRCK
Greensand	GRSD
Greenschist	GRCS
Greenstone	GRNS
Greisen	GRSN
Greywacke	GRWK
Grit	GRIT
Grossularite	GRLR
Grunerite	GRRT
Guano	GUNO
Gudmundite	GDMD
Gummite	GMMT
Gypsite	GPST
Gypsum	GPSM
Halite	HLIT
Harzburgite	HZBG
Hatchettolite	HTCL
Hausmannite	HSMN
Heazlewoodite	HZLD
Hedenbergite	HDBG
Hedleyite	HDLT
Hematite	HMTT
Hematitic	HMTC
Hemimorphite	HMRP
Hercynite	HRCN
Hessite	HSST
Heterolithic	HRLC
Heulandite	HLND
Hollandite	HLDT
Hornblende	HBLD
Hornblendite	HRBD
Hornfels	HRFL
Hornfelsed	HOFD
Howlite	HWLT
Hubnerite	HBNR
Humite	HUMT
Hybrid	HBRD
Hydrocarbon	HDCB
Hydromagnesite	HDMG
Hydrozincite	HDZC
Hypersthene	HPRS
Idaite	IDIT
Idocrase	IDCR
Ignimbrite	IGMB
Ijolite	IJLT
Illite	ILLT
Ilmenite	ILMN
Ilmenorutile	ILMR
Ilvaite	ILVT
Intermediate	INTR
Intraformational	IFML
Intrusive	INTV
Inyoite	INYT
Iridium	IRDM
Iridosmine	IDSM
Iron	IRON
Iron Formation	IRFM
Ironstone	IRSN
Isokite	ISKT

Jacobsite	JCBS
Jacupirangite	JCPG
Jade	JADE
Jadeite	JDIT
Jalpaite	JLPT
Jamesonite	JMSN
Jarosite	JRST
Jasper	JSPR
Jasperoid	JPRD
Jaspilite	JSPL
Jordanite	JRDN
K-Feldspar	KSPA
Kainite	KINT
Kaolin	KOLN
Kaolinite	KLNT
Kasolite	KSLT
Kentallenite	KNLN
Keratophyre	KRPR
Kermesite	KRMS
Kersantite	KRSN
Kimberlite	KMBL
Knebelite	KNBL
Knopite	KNPT
Kobellite	KBLT
Krennerite	KRNR
Kyanite	KYNT
Laboradorite	LBRD
Lahar	LAHR
Lamproite	LMPT
Lamprophyre	LMPP
Lapilli	LPLL
Lapillistone	LPLS
Larnite	LRNT
Latite	LTIT
Laumontite	LMNT
Lava	LAVA
Layered	LYRD
Lazulite	LZLT
Lepidocrocite	LPCC
Lepidolite	LPDL
Lepidomelane	LPDM
Leuchtenbergite	LCBG
Leucite	LUCT
Leucocratic	LCCC
Leucopyrite	LCPR
Leucoxene	LCXN
Lignite	LGNT
Limestone	LMSN
Limonite	LMON
Limy	LIMY
Linarite	LNRT
Linnaeite	LNNT
Listwanite	LSWN
Lit-par-lit	LPRL
Lithic	LTHC
Lithiophilite	LTPL
Lizardite	LZDT
Loilingite	LLGT
Lugarite	LGRT
Luxullianite	LXLN
Lyndochite	LNDC

Mackinawite	MCKN	Morenosite	MRNS	Peridotite	PRDT
Mafic	MAFC	Mudstone	MDSN	Perknite	PRKN
Maghemite	MGHM	Mugearite	MGRT	Perlite	PERL
Magnesian	MGSN	Muscovite	MSCV	Perovskite	PRVK
Magnesite	MGNS	Mylonite	MLNT	Perthite	PRTT
Magnesitic	MGSC	Mylonitic	MLNC	Petzite	PTZT
Magnetite	MGNT	Nagyagite	NGGT	Phlogopite	PLGP
Malachite	MLCT	Natroalunite	NTRL	Phonolite	PNLT
Maldonite	MLDN	Natrolite	NTLT	Phosphate	PSPT
Malignite	MLGN	Naumannite	NMNT	Phosphatic	PSPC
Manganiferous	MGFR	Neodigenite	NDGN	Phosphorite	PSRT
Manganite	MNGN	Neotocite	NTCT	Phosphuranylite	PHUR
Marble	MRBL	Nepheline	NPLN	Phyllite	PLLT
Marcasite	MRCS	Nephelinite	NPLT	Phyllitic	PLLC
Mariposite	MRPS	Nephrite	NPRT	Phyllonite	PLNT
Marl	MARL	Neyite	NYTE	Phyric	PHRC
Marmatite	MRMT	Niccolite	NCLT	Picrite	PCRT
Martite	MRTT	Ningyoite	NGYT	Picritic	PCRC
Massive	MSSV	Niocalite	NOCL	Picrolite	PCRL
Matildite	MTLD	Nitre	NITR	Pillow	PLLW
Maucherite	MCRT	Nodular	NDLR	Pinite	PINT
Mcgillite	MCGL	Nontronite	NNRN	Pipe	PIPE
Medium Grained	MGRD	Nordmarkite	NDMK	Pitchblende	PCBD
Megacrystic	MGCR	Norite	NORT	Pitchstone	PCSN
Melanocratic	MLCR	Novaculite	NVCL	Plagioclase	PLGC
Melanterite	MLNR	Obsidian	OBSD	Platinum	PLNM
Melilite	MLLT	Ochre	OCHR	Pollucite	PLCT
Meneghinite	MNGT	Odinite	ODNT	Polybasite	PLBS
Mercury	MRCR	Oligoclase	OLGC	Polycrase	PLCR
Merenskyite	MRSK	Oligomictic	OGMC	Polydymite	PLDM
Merrschaum	MRCM	Olivine	OLVN	Polymictic	PMCC
Merwinite	MRNT	Oolitic	OLTC	Porcellanite	PORC
Mesocratic	MSCR	Opal	OPAL	Porphyritic	PPRC
Meta	META	Orbicular	OBCL	Porphyroblastic	PPBL
Metabasite	MBST	Orpiment	ORPM	Porphyry	PRPR
Metacinnabar	MCBR	Ortho	ORTH	Powellite	PWLT
Metamorphic	MMPC	Orthoclase	ORCL	Prehnite	PRNT
Metastibnite	MSBN	Orthopyroxene	ORPX	Priorite	PRRT
Metatorbernite	MTRB	Orthopyroxenite	OTPR	Prosopite	PRSP
Metazeunerite	MZNR	Osmiridium	OMDM	Proustite	PRST
Miargyrite	MRGR	Ouachitite	OCTT	Psammite	PSMT
Mica	MICA	Owyheeite	OYHT	Psammitic	PSMC
Micaceous	MCCS	Palladium	PLLM	Psilomelane	PLML
Michenerite	MCNR	Palygorskite	PLGK	Pulaskite	PLSK
Microcline	MCCL	Para	PARA	Pumice	PUMC
Microdiorite	MDRT	Paragonite	PRGN	Pumpellyite	PMPL
Migmatite	MGMT	Parahopeite	PRPT	Pyrargyrite	PRRG
Migmatitic	MGMC	Pararammelsbergite	PMBG	Pyrite	PYRT
Millerite	MLRT	Parisite	PRIS	Pyritic	PYRC
Mimetite	MMIT	Parkerite	PRKR	Pyrobitumen	PYBM
Minette	MNTT	Pearceite	PRCT	Pyrochlore	PCLR
Minnesotaite	MNST	Peat	PEAT	Pyroclastic	PCLC
Molybdenite	MLBD	Pebble	PBBL	Pyrolusite	PRLS
Molybdite	MBDT	Pegmatite	PGMT	Pyromorphite	PRMP
Monazite	MNZT	Pegmatitic	PGMC	Pyrope	PYRP
Monchiquite	MNCQ	Pelite	PLIT	Pyrophanite	PRPN
Monticellite	MNCL	Pelitic	PLTC	Pyrophyllite	PRPL
Montmorillonite	MMRL	Pelletal	PLTL	Pyroxene	PRXE
Monzodiorite	MZDR	Penninite	PNNT	Pyroxenite	PRXN
Monzonite	MNZN	Pentlandite	PNLD	Pyroxenitic	PRXC
Monzonitic	MNZC	Periclase	PRCL	Pyrrhotite	PYTT

Quartz	QRTZ	Serpentinized	SERZ	Sulphidic	SPDC
Quartzite	QRZT	Seybertite	SBRT	Sulphite	SLPH
Quartzitic/Quartzose	QRZS	Shale	SHLE	Sulphur	SLPR
Quartzofeldspathic	QZFP	Shaly	SHLY	Sulvanite	SULV
Rammelsbergite	RMBG	Sharpstone	SHRP	Svanbergite	SVAN
Rankinite	RNKN	Shonkinite	SNKN	Syenite	SYNT
Rapakivi	RPKV	Siderite	SDRT	Syenitic	SYEN
Rauhaugite	RHGT	Siegenite	SGNT	Syeno	SYNO
Realgar	RLGR	Silica	SILC	Sylvanite	SLVN
Reworked	RWRK	Silicate	SLCT	Sylvite	SLVT
Rhodochrosite	RDCR	Siliceous	SLCS	Synchysite	SNCS
Rhodonite	RODN	Sill	SILL	Syngenite	SNGT
Rhyodacite	RDCT	Sillimanite	SLMN	Tachylyte	TCYL
Rhyodacitic	RDCC	Silt	SILT	Tailings	TLGS
Rhyolite	RYLT	Siltstone	SLSN	Talc	TALC
Rhyolitic	RYLC	Silty	SLTY	Talcose	TLCS
Rickardite	RCKD	Silver	SLVR	Talus	TLUS
Riebeckite	RBCK	Sinter	SNTR	Tantalite	TNTL
Rock	ROCK	Skarn	SKRN	Tapiolite	TPLT
Rodingite	RDNG	Skutterudite	SKRD	Tectonic	TCNC
Rozenite	RZNT	Slate	SLTE	Telluride	TLRD
Ruby Silver	RSVR	Slaty	SLAT	Tellurobismuthite	TLBM
Rudite	RUDT	Smaltite	SMLT	Temiskamite	TMKM
Rutile	RUTL	Smectite	SMCT	Tennantite	TNNT
Sabugalite	SBGL	Smithsonite	SMSN	Tenorite	TNRT
Safflorite	SFLR	Soapstone	SPSN	Tephra	TPHR
Sahlite	SHLT	Sodalite	SDLT	Tephrite	TPRT
Saleeite	SLET	Sodic	SODC	Tertiary	TRTR
Salite	SLIT	Soil	SOIL	Teschenite	TSCN
Salts	SLTS	Sovite	SOVI	Tetradymite	TRDM
Samarskite	SMRK	Specularite	SPCL	Tetrahedrite	TRDR
Sand	SAND	Spencerite	SPCR	Theralite	TERL
Sandstone	SNDS	Sperrylite	SPRL	Tholeiite	THLT
Sandy	SNDY	Spessartine	SPSR	Tholeiitic	TLTC
Sanidine	SNDN	Spessartite	SPST	Thomsonite	TMSN
Sapphirine	SPRN	Sphalerite	SPLR	Thorianite	TRNT
Sapropel	SPPL	Sphene	SPHN	Thorite	THRT
Saussurite	SSRT	Spilite	SPLT	Thorogummite	TRGM
Scapolite	SCPL	Spinel	SPNL	Thucholite	TCLT
Scawtite	SCTT	Spodumene	SPDM	Thuringite	TRNG
Schapbachite	SCBC	Spotted	SPTD	Tiemannite	TMNT
Scheelite	SCLT	Spurrite	SPRT	Till	TILL
Schist	SCST	Stalactite	STLC	Tilleyite	TLYT
Schistose	SCTS	Stalagmite	SLGM	Tillite	TLLT
Schorlomite	SCLM	Stannite	STNT	Titanite	TTNT
Schultenite	SCLN	Staurolite	STRL	Tonalite	TNLT
Scoria	SCOR	Steatite	STTT	Topaz	TOPZ
Scorodite	SCRD	Stephanite	STPN	Torbernite	TRBN
Scorzalite	SCRZ	Sternbergite	SRBG	Tourmaline	TRML
Sediment/Sedimentary	SDMN	Stibiconite	SBCN	Tourmalinite	TMLN
Selenide	SLND	Stibnite	STBN	Tourmalite	TRMT
Selenite	SLNT	Stilbite	STLB	Trachyandesite	TCAN
Selenitic	SLNC	Stilpnomelane	SLPM	Trachybasalt	TCBL
Semi	SEMI	Stromatolitic	SMLC	Trachydacite	TRCC
Semseyite	SMST	Stromeyerite	SRMR	Trachyte	TRCT
Senarmontite	SNRM	Strontianite	SRNN	Trachytic	TRTC
Sepiolite	SPOL	Sub	SUBB	Transported	TRPR
Sericite	SRCT	Subfeldspathic	SBFP	Travertine	TRVR
Sericitic	SRCC	Sulphantimonide	SPMD	Tremolite	TMLT
Serpentine	SRPN	Sulphate	SLPT	Tridymite	TDYM
Serpentinite	SERP	Sulphide	SLPD	Troctolite	TRCL

Troilite	TRLT	Uranotile	URNL	Wad	WADD
Trondhjemite	TDJM	Urtite	URTT	Wairauite	WRUT
Tufa	TUFA	Valentinite	VLNN	Wehrlite	WRLT
Tuff	TUFF	Valleriite	VLRT	Welded	WLDD
Tuffaceous	TUFC	Vanadinite	VNDN	Willyamite	WLMT
Tuffite	TUFT	Vandendriesscheite	VDRS	Wilsonite	WLSN
Turbidite	TRBD	Vein	VEIN	Witherite	WTRT
Turgite	TRGT	Vermiculite	VMCL	Wittichenite	WTCN
Twinnite	TWNT	Vesicular	VSCL	Wolframite	WLFM
Ulexite	ULXT	Vesuvianite	VSVN	Wollastonite	WLST
Ullmannite	ULMN	Violarite	VOLR	Woodhouseite	WDST
Ultramafic	UMFC	Vitric	VTRC	Wulfenite	WLFN
Ulvospinel	ULVP	Vitrinite	VTRN	Wurtzite	WRTZ
Unconsolidated	UCDD	Vogesite	VGST	Yukonite	YKNT
Undifferentiated	UNDF	Volborthite	VLBR	Zeolite	ZOLT
Unknown	UNKN	Volcanic	VOLC	Zeunerite	ZNRT
Uralite	URLT	Volcanic Glass	VLGL	Zincite	ZNCT
Uraninite	URNN	Volcaniclastic	VLCC	Zinkenite	ZNKN
Uranophane	URNP	Vuggy	VUGG	Zircon	ZRCN
Uranothorite	URNR	Wacke	WCKE	Zoisite	ZOST
				Zunyite	ZNYT

APPENDIX VII: Glossary of Selected Geologic Terms

These definitions and explanations are designed to help non-specialists understand frequently used basic terms in bedrock geology. Although some more specialized terms are also included, the list is limited to terms commonly used on maps. Many definitions are simplified; please consult appropriate geological, dictionaries (*see* Bates and Jackson (1987), the *American Geological Institute Glossary of Geology*) or BCGSB staff if more information is required.

ADIT A horizontal passage or tunnel that leads from the surface into an underground working, such as a mine.

ALTERATION Any change in the mineralogical composition of the rock caused by physical or chemical means, often the action of hydrothermal fluids. Because such fluids may be rich in base or precious metals, alteration may be associated with mineralization, so recognizing alteration in the field is an important first step in locating many kinds of mineral deposits.

ALLUVIUM Unconsolidated detrital material (silt, sand and gravel) moved by streams and deposited either in the bed of the stream or on its flood plain or delta.

AMPHIBOLITE A medium to coarse-grained hornblende-plagioclase rock of metamorphic origin (not the same as hornblendite, which is of igneous origin). Often hornblende prisms are aligned to form a lineation.

ANTICLINE A fold, usually convex upward, with older rocks in the core.

ANTIFORM A convex upward fold in which the relative ages of the component rock layers is not known.

ASSAY A chemical analysis of the concentration of metallic elements of economic significance, such as gold, copper and zinc in a rock sample.

AXIAL PLANE OR AXIAL SURFACE The plane that connects the hinge lines of successive rock or mineral layers in a fold (a hinge line is the locus of the point of maximum curvature). The term axial plane is used when this surface is nearly planar.

AUGEN Lenticular (eyes) mineral grains or aggregates in a finer grained matrix. Common in gneissic rocks.

BASE METALS Any of the more common and chemically active metals, such as lead, zinc, copper or molybdenum.

BEDDING The layered structure common in sedimentary and fragmental volcanic rocks, such as tuffs. Generally, bedding is the result of settling of particles under gravity and resulting layers are statistically parallel to the earth's surface at the time (paleohorizontal) when they form. Bedding is shown on geological maps by means of strike and dip symbols. Deformation of rocks causes changes in the orientation of bedding, hence bedding measurements are essential tools to help understand bedrock structure at the surface and to project these structures to depth.

CLEAVAGE Deformed fine grained rocks may split along aligned, closely-spaced planar structures called cleavage planes. It is a variety of foliation.

COLLUVIUM Any loose, heterogeneous and incoherent mass of soil and/or rock fragments moved downslope by gravity driven processes (like creep or sheet wash) and deposited at the base of the slope or hillside.

COMPOSITIONAL BANDING Compositional layering in igneous or metamorphic rocks. The term may be used when the origin or significance of the layering is uncertain.

CROSS-SECTION A diagram or drawing showing an interpretation of geological features, generally on a vertical plane. The location of a cross-section is normally indicated as a line on an accompanying map.

CUMULATE LAYERING Layering in igneous rocks produced by the sinking and settling of minerals that crystallized in the magma. The rock produced is called a cumulate.

DEFORMATION A general term for the process of folding, faulting, shearing, compression or extension of rocks due to earth pressures.

DETERMINATE FOSSIL A macrofossil or microfossil which is identifiable with certainty and has an age range (the time span over which the fossil is found) precise enough to be useful as a mapping tool. The most useful fossils had short spans of existence, large, rapidly diversifying populations with wide extent, and preserve well; examples are trilobites during the Paleozoic, or ammonites during the Mesozoic.

DEVELOPED PROSPECT An occurrence of mineralization on which exploration has progressed to the stage where a reasonable estimate of the tonnage and grade of potentially mineable commodities can be made.

DIKE A tabular (sheet-like) body of rock, often an igneous intrusion, that cuts across the layering or dominant fabric of the hostrocks (compare with *sill*).

DIP The angle that a structural surface, like a bedding or a fault plane, makes with the horizontal. It is measured perpendicular to the strike (a horizontal line on the plane).

DRIFT PROSPECTING The term applied to prospecting in glacially derived materials for mineralized float.

DOWN-THROWN BLOCK Rocks on one side of a fault that have moved downward relative to those the opposite side.

FACIES BOUNDARY The boundary, commonly irregular or indistinct, between two areally restricted parts of a geological unit which are in continuity but which differ in composition or some other characteristic. Each of the distinctive parts is called a facies; they reflect different but contemporaneous environments during formation of the whole unit. For example, sandstone may give way to shale, representing a change from near-shore to deeper water conditions when the unit was deposited.

FACING OR TOPS A term used in association with bedding (or other forms of layering) to indicate the direction in which rocks get younger. Facing is indicated by certain physical characteristics of the bedding, like size grading or erosional scours.

FAULT A break, fracture, or zone of fractures along which there has been movement of one side relative to the other.

FLOAT A general term for isolated fragments of rock that have moved from the area where they outcrop. Examples are transported boulders downslope from the source outcrop, and boulders moved many kilometres from the source outcrop by glacial transport.

FOLD AXIS A fold axis is a line along the point of maximum curvature (crest or trough) of a fold; if moved parallel to itself this line will describe the form of the fold.

FOLIATION A general term for a planar fabric in a rock, defined by the parallel orientation of platy minerals (especially micas) that develops during deformation of the rock. Deformation flattens minerals, or causes them to rotate into or actually grow (recrystallize) in a plane perpendicular to the stress direction. Rocks with foliation tend to split easily along the foliation planes.

GEOLOGICAL CONTACT The plane or irregular surface that separates two types or ages of rocks. This term includes contacts produced by tectonic movements (faults and thrusts). Examples would be a normal sandstone-shale sedimentary contact, a thrust fault, or the contact between a pluton and the country rock (even though the country rock could be metamorphosed).

GLACIAL STRIAE OR STRIATIONS Scratches or furrows in the underlying bedrock surface caused by rocks embedded in the base of a glacier moving across the bedrock. Such striae may record a number of episodes of glacial advance and retreat.

GNEISSOSITY A compositional banding in metamorphic rocks, commonly millimetres to centimetres thick. It may represent thoroughly recrystallized bedding, or be the result of the extreme flattening and transposition of other compositionally heterogeneous features during metamorphism and deformation.

GNEISS A medium to coarse-grained, irregularly "banded" rock with micaceous layers alternating with quartzo-feldspathic layers. It has a poorly developed schistosity because of the preponderance of quartz and feldspar. It is of equivalent or higher regional metamorphic grade than a schist.

GOSSAN A generally reddish brown iron-bearing weathered product. It forms when sulphides oxidize and sulphur and most metals are removed by leaching leaving hydrated iron oxides and rarely sulphates. Because, pyrite is commonly associated with alteration and metallic mineralization, gossans tend to be priority targets for mineral exploration. In thinly vegetated areas, they may be visible from a great distance.

GRANULITE An even-grained quartz, feldspar, and to a lesser extent pyroxene and garnet rock poor in micas (not schistose) but typically having a rough foliation due to lighter and darker layers or to the parallelism of flat lenses of quartz or feldspar. This rock type only forms under conditions of very high grade regional metamorphism.

HORNFELSIC OR GRANOBLASTIC A nondirectional, usually contact metamorphic rock texture (country rock adjacent to an intrusive body, like a granite). Any planar or prismatic grains present, are not oriented. The term hornfelsic should be reserved for finer grained and granoblastic for coarser grained textures.

INDETERMINATE FOSSIL A macrofossil or microfossil which is not identifiable, perhaps because of poor preservation or deformation, such that its age or age range cannot be determined.

ISOGRAD A line on a map indicating the appearance or limit of a specified metamorphic mineral or mineral assemblage. Isograds reflect pressure and temperature conditions and compositional controls during metamorphism. The isograd pattern may or may not conform with the lithological pattern or structural trends. Certain index minerals or assemblages are used to differentiate metamorphic facies.

JOINT A fracture or parting in a rock across which there has been no displacement. Joints usually occur in sets of parallel structures, and more than one set is common.

LINEATION A general term for any linear element in a rock. The most common type is caused by an alignment of the long axes of minerals in a rock.

MACROFOSSIL A fossil large enough to be studied with the naked eye.

MICROFOSSIL A fossil so small it must be studied with a microscope.

MINOR FOLD A small-scale fold associated with, and related to, a larger fold. They are significant because the axes and axial planes of minor folds reflect (statistically) that of the major fold, and their symmetry or asymmetry reflects their position with respect to the location of the hinge of the major fold.

NORMAL FAULT A fault in which the rocks 'resting' on the fault plane have moved downward relative to the rocks 'supporting' the fault plane. Normal faults generally dip between 45° and 90°. They are the products of extension.

OUTCROPS Rock exposures at the earth's surface.

PAST PRODUCER A mineral deposit which is currently inactive but which has a record of mining production in the past, by open pit and/or underground methods. The term does not include those deposits in which some mining has been done to extract a large bulk sample for testing purposes only.

PHYLLITE A fine-grained schistose rock resulting from more advanced (higher temperature and/or pressure) regional metamorphism than slate. The schistosity surfaces have a lustrous sheen due to the development of new mica and chlorite. It is part of a progression from shale (unmetamorphosed) to slate to phyllite to schist to gneiss with increasing metamorphic grade.

PILLOW A physical form present in some lava flows in which the flow consists of numerous pillow-shaped masses, commonly 30 to 60 centimetres across. Pillow lavas or pillows form underwater by the quenching of successive, bulbous protrusions of lava at the leading edge of a flow.

PLUNGE The direction and angle of inclination of a linear element in a rock measured in the vertical plane.

PORPHYRY An igneous rock of any composition that contains conspicuous phenocrysts (relatively large crystals) in a finer grained groundmass. Usage of the term depends on the overall grain size of the rock and the relative abundance of phenocrysts. For example, dacite porphyry when phenocrysts are not abundant, feldspar porphyry when the groundmass is fine grained and phenocrysts are abundant, or porphyritic granite when the groundmass is medium to coarse grained.

PREFERRED ORIENTATION A general term to denote parallelism of tabular or elongate grains, as in schistosity or lineation.

PRIMARY FLOW FABRIC A fabric, usually planar but sometimes linear, defined by the alignment of minerals in an igneous rock. It is produced by flow during crystallization of the original magma or lava.

PRODUCER A mineral deposit in which ore is currently being mined by open pit and/or underground methods. This term does not include those deposits in which mining is in progress to extract a large bulk sample for testing purposes only.

PROSPECT A documented occurrence of mineralization that warrants further investigation.

QUATERNARY DEPOSITS Deposits such as alluvium, sand and gravel, usually unconsolidated, which were formed during and after the last glaciation. The term includes material deposited by modern surface processes. Quaternary deposits cover large areas throughout British Columbia, particularly in river valleys and areas of low relief, where little or no bedrock is exposed. On most bedrock maps Quaternary deposits are treated as a single undifferentiated unit. In contrast, surficial mapping focuses primarily on the surficial deposits. Recently, integrated maps that show both bedrock geology and surficial deposits are being produced. These are particularly helpful for drift prospecting.

RADIOMETRIC AGE DETERMINATION Radioactive isotopes decay in a systematic way. By measuring the ratio (using a mass spectrometer) between a radioactive isotope and its stable decay product, the age of formation of a rock, or a subsequent heating event that affected it (expressed in millions (Ma) or billions (Ga) of years before the present) can be calculated. The calculation uses knowledge of the half-life in the decay of the radioactive isotope, that is, the time it takes for half of the amount of the element present at the time the rock formed to change to a daughter product. Methods and precision vary, depending on the isotopic system and the minerals used. Relatively few rocks are suitable for radiometric (isotopic) dating.

REVERSE FAULT A fault in which the rocks 'resting' on the fault plane move upward relative to the rocks 'supporting' the fault plane. Reverse faults generally dip between 45° and 90°; those that dip less than 45° are called thrust faults or thrusts. Reverse faults and thrusts are the products of compression during contraction.

ROOF PENDANT A body of country rock surrounded by intrusive rock.

RGS Regional Geochemical Survey: Refers to the regional reconnaissance-scale geochemical surveys carried out by government to produce baseline data. Data are obtained from non-bedrock materials (stream or lake sediment, moss-mats and water). Where shown on bedrock geological maps, RGS sites show where a sample of stream sediment or other material was taken for analysis. The BCGSB has a database for much of the province at a density of 1 sample each 13 square kilometres (nearly 40 000 samples).

SCHIST A strongly foliated rock with concentrations of medium to coarse grained mica flakes along the folia. Represents more advanced regional metamorphism than a phyllite.

SCHISTOSITY A type of foliation characterized by an abundance of medium to coarse grained mica crystals.

SHAFT OR DECLINE A vertical or inclined excavation driven to provide access to an orebody and for transporting ore from depth to surface in operating underground mines

SHOWING An occurrence with apparently relatively minor amounts of mineralization, in which there is an element(s) of economic significance, such as copper in the mineral chalcopyrite. Judgment is required to distinguish a showing from a prospect

SINK HOLE A commonly funnel-shaped depression with a circular outline at surface, formed by subsidence into a space created by solution and removal of part of the underlying rock by groundwater. Relatively common in areas of limestone bedrock.

SLATE A very fine-grained rock with a well developed platy cleavage. This cleavage results from incipient parallel growth of micaceous minerals, due to metamorphism (generally regional) of fine-grained clastic sediments such as mud, shale, silt, or tuff.

SLICKENSIDES Striations on the polished surface of a fault plane caused by abrasion during movement on the fault.

STATION A point on the ground in a map area where observations were recorded. The station location is then plotted on the base map, either as a station symbol, or another geological symbol

STOCKWORK A three-dimensional network of veins commonly containing quartz but also a variety of other minerals

STRIKE Part of the measurement of the orientation of a plane, the strike being the direction of a horizontal line in the plane. Usually given in degrees measured clockwise from true north. Used in conjunction with dip (the angle of inclination of the plane measured perpendicular to the strike and downward from the horizontal to the plane). Dip is measured in degrees and a direction is specified, for example southeast. A typical convention used is the "right hand rule". In this the dip direction is always "to the right" or clockwise from the strike azimuth. For example if the strike azimuth is written as 025°, then the plane must dip southeasterly, but an azimuth written as 205° indicates a northwesterly dip.

STRIKE-SLIP FAULT A fault in which the dominant relative movement is parallel to the strike of the fault plane, therefore horizontal.

SYNCLINE Generally a concave-upward fold with younger rocks in the core zone. In areas of intense deformation, where folds are overturned, the term is applied to a fold of any geometry that has younger rocks in its core.

SYNFORM A concave-upward fold in which the relative ages of the folded rocks is unknown.

THRUST OR THRUST FAULT See *REVERSE* FAULT.

TOPS *See* FACING.

TREND/AZIMUTH The direction of a horizontal line such as the strike of a foliation plane, or the horizontal projection of an inclined line such as a fold axis, expressed in degrees measured clockwise from true north.

UNCONFORMITY A geological contact separating two units of substantially different age (this does not apply to intrusive contacts). The time gap usually represents a period of non-deposition or erosion. Often, bedding orientations in the rocks above and below the unconformity differ because the older rocks were deformed before the younger rocks were deposited. If the contact represents non-deposition, bedding is likely to be parallel above and below the unconformity and the true relationship may not be evident unless fossils effectively date the two units.

VEIN A tabular (sheet-like) epigenetic (introduced later than the formation of the hostrock) mineral aggregate filling a fault or other fracture in the rock. It may be concordant, but most are discordant with respect to the layering or foliation, if any, in the hostrock.

WHOLE-ROCK ANALYSIS In geochemical analysis: the bulk chemical composition of a rock, generally expressed as weight per cent of oxides of the major rock-forming elements, and parts per million for the minor or trace elements.

APPENDIX VIII: AUTOCAD LAYER DICTIONARY

This is a summary of the **Autocad Layer Dictionary**. Main headings are layers in which general information may be placed which is not appropriate to specific layers. New layers may be created if needed, but please check with your cartographic unit first. Adherence to a standardized layer systemis absolutely necessary if your data is to be easily usable in the future for compilation maps, GIS systems or other applications external to AutoCad. Also note that the illustrated hierarchy is not recognizedby AutoCad (this may vary with newer versions) but is presented in this fashion to make identification of the various datalayers easier. DIGITAL MAPS DO NOT HAVE TO CONTAIN ALL POSSIBLE LAYERS - ONLY THOSE APPROPRIATE TO THE INFORMATION PRESENTED.

Map Layer	ACAD Layer Code
CULTURE	**AAcult**
Claims	ABclms
Coastline	ACCstl
UTM grid	ADugrid
UTM text	AEutxt
Culture text	AFctxt
20 Contours	AG20cnt
50 Contours	AH50cnt
100 Contours	AI100cnt
500 Contours	AJ500cnt
Contour text	AKcntxt
Major rivers	ALriv1
Intermediate rivers	AMriv2
Minor rivers	ANriv3
Drainage text	AOdtxt
Lakes	APlake
Map border	AQmap
Political boundaries	ARpolit
Title-legend	AStitle
TRIM	ATtrim
Hatch patterns	Auhatch
Transport routes	Avtrans
GEOCHEMISTRY	**CAchem**
Chemical symbols	CBcsym
Chemical text	CCctxt
Whole rock analysis	CDwrx
GEOLOGY	**Gageol**
Contacts, defined	GBcnt1
Contacts, approx.	GCcnt2
Contacts, assumed	Gdcnt3
Layered contact, defined	GElcnt1
Layered contact, approx	GFlcnt2
Layered contact, assumed	Gglcnt3
Intrusive contact 1	GHicnt1
Intrusive contact 2	GIicnt2
Intrusive contact 3	Gkicnt3
Dikes	GLdike
Fossils	GMfossl
Mapping limit	GNmaplm
Geochronology	GOgeocrn
Geology text	GPgeotxt
Gossans	GQgoss
Outcrops	GRocrop
Alteration	GSalter
Iosgrad 1	GTisog1
Isograd 2	GUisog2
Isograd 3	GVisog3
Isograd 4	GWisog4
MINFILE	**MAminf**
MINFILE symbols	MBmsym
MINFILE text	MCmtxt
Mineral potential	MDmpot
Mineral potential text	MCmptxt
QUATERNARY	**QAquat**
Glaciers	QBglac
Glacier text	QCgltxt
Surficial geology	QDsg
Surficial geology text	QEsgtxt
Surficial geology symbol	QFsym
STRUCTURE	**SAstru**
Bedding	SBbed
Foliations	SCfoil
Lineations	SDlinea
Faults1	SEflt1
Faults2	SFflt2
Faults3	SGflt3
Thrust faults1	SHtflt1
Thrust faults2	SItflt2
Disconformity	UDucon3
Thrust faults3	SJtflt3
Fold axis 1	SKfaxis1
Fold axis 2	SLfaxis2
Fold axis 3	Smfaxis3
Anticlines	SNantic
Synclines	Sosync
UNCONFORMITIES	**Uaconf**
Unconformity	UBucon1
Angular unconformity	UCucon2
Nonconformity	Ueacon1
MISCELLANEOUS	**Xamisc**
Symbols	XBsym
Symbol text	XCsymtxt
Stops	XDstop
Cross sections	XEsect
Registration points	Xfregis

AUTOCAD LAYER DICTIONARY

The following is the type of information pertinent to each standard layer. Layers are identified by their AutoCad codes as per the summary on the previous page. For further information contact BCGSB, Scientific Review Office.

Aacult **CULTURE** - General layer containing cultural features not otherwise allocated to a layer.

Abclms Claims - polygons identifying the boundaries of mineral or placer claims.

ACCstl Coastline - provincial coastline.

Adugrid UTM grid - linework representing the UTM grid in the map area.

Aeutxt UTM text - text and labels defining the UTM grid.

Afctxt Cultural text - all text associated with cultural features; e.g. place names, highway numbers etc.

AG20cnt Linework - 20-metre topographic contours.

AH50cnt Linework - 50-metre topographic contours.

AI100cnt Linework - 100-metre topographic contours.

AJ500cnt Linework - 500-metre topographic contours.

Akcntxt Contour text - all text associated with contour linework.

Alrivl Major rivers.

Amriv2 Intermediate rivers or streams.

Anriv3 Minor creeks or tributaries and intermittent drainages.

Aodtxt Drainage text - text associated with all classes of drainages.

Aplake Lakes - all polygons representing lakes.

Aqmap Map border - main administrative border defining the limits of the drafting area. Usually corresponds to NTS boundaries.

Arpolit Political boundary - provincial, federal or international boundaries.

Astitle Title/Legend - text and artwork related to title block, legend and summary notes.

Attrim TRIM - all information contained within a TRIM database used for a base map. May duplicate the type of information otherwise broken out to individual layers.

Auhatch Hatch - separate layers for different hatch patterns.

Avtrans Transportation - linework for roads, railways, ferry routes etc:

Cachem **GEOCHEMISTRY** - general layer for geochemical information.

Cbcsym Geochemical symbols - identifying geochemical sample locations or results.

Ccctxt Geochemical text - labels, text or values associated with geochemical samples.

Cdwrx Whole-rock analysis - labels and text relating to whole-rock analysis (symbols go on Xbsym layer)

Gageol **GEOLOGY** - general geological data not allocated to a specific layer.

Gbcnt1 Geological contact, defined (solid line).

Gccnt2 Geological contact, approximate (dashed line).

Gdcnt3 Geological contact, assumed (dotted line).

Gelcnt1 Layered rock contact, defined (solid line).

Gflcnt2 Layered rock contact, approximate (dashed line).

Gglcnt3 Layered rock contact, assumed (dotted line).

Ghicnt1 Intrusive contact, defined (solid line).

Giicnt2 Intrusive contact, approximate (dashed line)

Gkicnt3 Intrusive contact, assumed (dotted line)

Gldike Dikes - geological contacts identifying dike rocks.

Gmfossl Fossil - fossil locality symbols and similar data. Text related to fossils goes on GPgeotxt layer.

Gnmaplm Mapping limit - linework indicating extent of mapping or research.

Gogeocrn	Geochronology - all geochronological data.
Gpgeotxt	Geology text - all geological text, labels, formation/group identification or similar information.
Gqgoss	Gossans - polygons or symbols identifying gossanous rocks (text goes on GPgeotxt layer).
Grocrop	Outcrops - polygons or symbols identifying location or area of outcrop.
Gsalter	Alteration - polygons denoting alteration zones.
Gtisog1	Isograd 1 - isograd linework for the first metamorphic category.
Guisog2	Isograd 2 - linework for the second metamorphic category.
Gvisog3	Isograd 3 - linework for the third metamorphic category.
Gwisog4	Isograd 4 - linework for the fourth metamorphic category.

Maminf	**MINFILE** - general layer for MINFILE or mineral occurrence data.
Mbmsym	MINFILE symbols - MINFILE or mineral occurrence symbols.
Mcmtxt	MINFILE text - text or labels for MINFILE or mineral occurrence data.
Mdmpot	Mineral potential - symbols or linework related to mineral potential or metallogenic data.
Mcmptxt	Mineral potential text - text and data related to mineral potential.

Qaquat	**QUATERNARY** - general layer for surficial geology data.
Qbglac	Glaciers - polygons or point symbols locating glaciers.
Qcgltxt	Glacial text - all text or labels related to glaciation.
Qdsg	Surficial geology - polygons or line-work for surficial geology.
Qesgtxt	Surficial geology text - text or labels related to surficial geology.
Qfsgsym	Surficial geology symbols - all symbols related to surficial geology.

Uaconf	**UNCONFORMITIES** - general layer for data pertaining to unconformable contacts of all types.
Ubunconf	Unconformity - line symbols on side of younger rocks.
Ucagconf	Angular unconformity - line symbols on side of younger rocks.
Uddisconf	Disconformity - line symbols on side of younger rocks.
Uenonconf	Nonconformity - line symbols on side of younger rocks.

Sastru	**STRUCTURE** - general layer for structural data.
Sbbed	Structural symbols - related to bedding attitudes.
Scfoil	Structural symbols - related to foliation.
Sdlinea	Structural symbols - related to lineations.
Sefltl	Faults - defined traces.
Sfflt2	Faults - approximate traces.
Sgflt3	Faults - assumed traces.
Shtfltl	Thrust faults - defined traces.
Sitflt2	Thrust faults - approximate traces.
Sjtflt3	Thrust faults - assumed traces.
Skfaxisl	Fold axis - defined.
Slfaxis2	Fold axis - approximate.
Smfaxis3	Fold axis - assumed.
Snantic	Anticlines - linework for axis.
Sosync	Synclines - linework for axis.

Xamisc	**MISCELLANEOUS**
Xbsym	Symbols - all structural, geological or mining related symbols not allocated specific layers.
Xcsymtxt	Symbol text - all text related to symbols on the Xbsym layer
Xdstop	Stops - invisible edges of unclosed polygon areas. These allow patterns or fills to occupy such polygons.
Xesect	Cross-sections - linework, labels and text associated with geological, geochemical or geophysical cross sections.
Afregis	Registration marks - Three or four points close to the corners and outside the map border. These points are used to register layers when they are printed separately.

APPENDIX IX: SYMBOL LIBRARY

The following pages contain a listing of recommended 1:50 000-scale geological map symbols. It illustrates the contents of the Geologic Symbol Library. The format was influenced by the structure used by the Ministry of Environment, Lands and Parks for the definition of geographic objects within its TRIM database. Most of these symbols originated in the *British Columbia Geological Survey Branch Style Guide* (Grant and Newell, 1992) and reflect conventions recognized by the international geoscience community. Other symbols have been created for less common attributes. A blank symbol template with definitions for each field is shown below:

<table>
<tr><td>Group: The main subdivision for the symbol library.</td><td colspan="2">Symbol Description: Concise geological name of the symbol. These are listed in alphabetical order within each group.</td></tr>
<tr><td colspan="2">Cartographic Definition: FIELD BLANK AT THIS TIME
Will contain detailed cartographic definition of the symbol, including line widths, lengths, spacing etc.</td><td>An example of the symbols is placed here.</td></tr>
<tr><td colspan="3">Positional Definition: This section describes what part of the symbol corresponds to the actual map location of the data point. The precision and accuracy, both positional and geological, of the symbol is also defined here.</td></tr>
<tr><td colspan="2">Definition: This area contains a geologic definition of the symbol.</td><td>Remarks: This section describes the general parts of the symbol and what they represent.</td></tr>
<tr><td colspan="2">CAD Layer: This specifies the name of the CAD layer within which the symbol should be placed. See Appendix VIII for data about layers used by the British Columbia Geological Survey Branch.</td><td>Feature Code: This area will eventually contain a digital code for the symbol.</td></tr>
</table>

Some of the fields within the Symbol Library, for example, **Feature Code**, which is intended to contain a binary definition of the symbol, are blank. A listing of standard AUTOCAD layers used by the British Columbia Geological Survey Branch is given in Appendix VIII, (after Grant and Newell, 1992).

The library is organized on the **Group** heading with all symbols listed alphabetically within each group. The main groups are:

A: COAL, OIL AND GAS
B: MINFILE, EXPLORATION, MINING
C: OUTCROP FEATURES, FOSSILS, GEOCHRONOLOGY, GEOCHEMISTRY
D: GEOLOGICAL BOUNDARIES
E: PLANAR ELEMENTS
F: FOLD ELEMENTS
G: LINEAR ELEMENTS

Detailed listing of symbol elements contained in the library:

MINOR FOLD, FOLD AXIS, SECOND GENERATION,
horizontal, inclined - plunge known,
inclined - plunge angle indeterminate,
vertical

MINOR FOLD, 'M' SYMMETRY, FIRST GENERATION,
inclined - plunge known, inclined - plunge angle indeterminate, vertical

MINOR FOLD, 'S' SYMMETRY, FIRST GENERATION,
inclined - plunge known, inclined - plunge angle indeterminate, vertical

MINOR FOLD, 'S' SYMMETRY, SECOND GENERATION,
inclined - plunge known, inclined - plunge angle indeterminate, vertical

MINOR FOLD, 'Z' SYMMETRY, FIRST GENERATION GENERATION,
inclined - plunge known, inclined - plunge angle indeterminate, vertical

MINOR FOLD, 'Z' SYMMETRY, SECOND GENERATION,
inclined - plunge known, inclined - plunge angle indeterminate, vertical

MINOR FOLD, AXIAL PLANE, FIRST GENERATION,
horizontal, inclined - plunge known,
inclined - plunge angle indeterminate,
vertical

MINOR FOLD, AXIAL PLANE, SECOND GENERATION,
horizontal, inclined - plunge known,
inclined - plunge angle indeterminate,
vertical

MINOR FOLD, AXIAL PLANE, UNKNOWN GENERATION,
horizontal, inclined - plunge known,
inclined - plunge angle indeterminate,
vertical

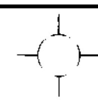
A: COAL, OIL and GAS

Group: COAL, OIL AND GAS	**Symbol Description:** COAL SEAM, DEFINED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: A bed of coal.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

Group: COAL, OIL AND GAS	**Symbol Description:** COAL SEAM, APPROXIMATE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: A bed of coal.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

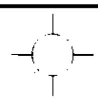
Group: COAL, OIL AND GAS	**Symbol Description:** COAL SEAM, ASSUMED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 1000 metres of position shown.	
Definition: A bed of coal.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

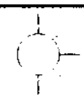
Group: COAL, OIL AND GAS	**Symbol Description:** GENERAL, WELL LOCATION,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A bore hole drilled to attempt to locate economic concentrations of oil and gas.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

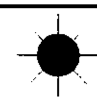
Group: COAL, OIL AND GAS	**Symbol Description:** GENERAL, DRY HOLE,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A bore hole which did not intersect economic concentrations of oil and gas.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

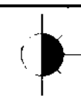
Group: COAL, OIL AND GAS	**Symbol Description:** OIL WELL, PRODUCER,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A bore hole which is currently (at the time the map is made) producing oil.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

Group: COAL, OIL AND GAS	**Symbol Description:** OIL WELL, ABANDONED,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A bore hole which originally produced oil but which has now been abandoned.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

Group: COAL, OIL AND GAS	**Symbol Description:** GAS WELL, PRODUCER,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A bore hole which is currently (at the time the map is made) producing gas.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

Group: COAL, OIL AND GAS	**Symbol Description:** GAS WELL, ABANDONED,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A bore hole which originally produced gas but which has now been abandoned.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

Group: COAL, OIL AND GAS	**Symbol Description:** OIL AND GAS WELL, PRODUCER,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A bore hole which is currently (at the time the map is made) producing oil and gas.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

Group: COAL, OIL AND GAS	**Symbol Description:** OIL AND GAS WELL, ABANDONED,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A bore hole which originally produced oil and gas but which has now been abandoned.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

B. MINFILE/MINING

B-1: MINFILE

Group: MINFILE	**Symbol Description:** MINFILE OCCURRENCE NAME,
Cartographic Definition:	Mt. Milligan
Positional Definition: Symbol is located close to the feature, which is marked by a second symbol, such as a "developed prospect" symbol, (see page 81).	
Definition: Most common or historically relevant name used for a mineral occurrence listed in the MINFILE database.	**Remarks:**
CAD Layer: MBmsym	**Feature Code:**

Group: MINFILE	**Symbol Description:** MINFILE OCCURRENCE NUMBER,
Cartographic Definition:	094C 003
Positional Definition: Symbol is located close to the feature, which is marked by a second symbol, such as a "developed prospect" symbol, (see page 81)..	
Definition: A unique number consisting of NTS location and a sequential three digit number used to identify a mineral occurrence listed in the MINFILE database.	**Remarks:**
CAD Layer: MBmsym	**Feature Code:**

Group: MINFILE	**Symbol Description:** PRODUCER,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: Mineral occurrence from which ore containing one or more commodities is currently (at the time the map was made) being mined.	**Remarks:**
CAD Layer: MBmsym	**Feature Code:**

Group: MINFILE	**Symbol Description:** PAST PRODUCER,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: Mineral occurrence which is not currently being mined but has recorded production in the past.	**Remarks:**
CAD Layer: MBmsym	**Feature Code:**

Group: MINFILE	**Symbol Description:** DEVELOPED PROSPECT,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: Mineral occurrence on which exploration has progressed to a stage where a reasonable estimate of the size and grade of the resource is possible.	**Remarks:**
CAD Layer: MBmsym	**Feature Code:**

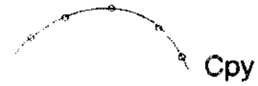
Group: MINFILE	**Symbol Description:** PROSPECT,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: Mineral occurrence documented as containing mineralization that may warrant further exploration.	**Remarks:**
CAD Layer: MBmsym	**Feature Code:**

Group: MINFILE	**Symbol Description:** SHOWING,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: Mineral occurrence *apparently* hosting only small amounts of potentially economic mineralization.	**Remarks:**
CAD Layer: MBmsym	**Feature Code:**

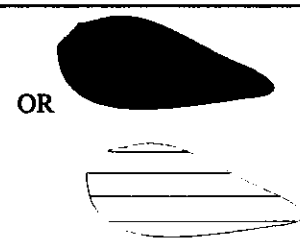
B-2: MISCELLANEOUS

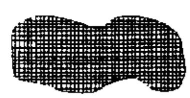
Group: MINFILE	**Symbol Description:** MINERAL OCCURRENCE,
Cartographic Definition: X^Cu	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A minor occurrence of mineralization that is *apparently* not abundant enough to be added to the MINFILE database.	**Remarks:** Most significant commodity is indicated (Cu or copper in the example).
CAD Layer: MBmsym	**Feature Code:**

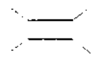
Group: MISCELLANEOUS	**Symbol Description:** MINERALIZED VEIN, DEFINED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: A mineralized vein is a tabular, epigenetic (introduced later that the formation of the host-rock) mineral aggregate filling a fracture in a rock. The infilling may be of economic interest. The valuable mineral in this example is chalcopyrite. See Appendix VI for other mineral codes.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

Group: MISCELLANEOUS	**Symbol Description:** MINERALIZED VEIN, APPROXIMATE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 100 metres of position shown.	
Definition: A mineralized vein is a tabular, epigenetic (introduced after formation of host-rock) mineral aggregate filling a fracture in a rock. The valuable mineral in this example is chalcopyrite. See Appendix VI for other mineral codes.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

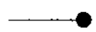
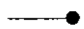
B-3: MINING

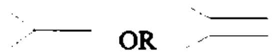
Group: MINING	**Symbol Description:** ALTERATION ZONE - GENERAL,
Cartographic Definition: 	
Positional Definition: Delineating line is accurate to within 500 metres.	
Definition: A general term for changes in the chemical and mineralogical composition of a rock as a result of oxidation or exposure to water or other fluids introduced into the rock, often along fracture systems.	**Remarks:** 
CAD Layer: GSalter	**Feature Code:**

Group: MINING	**Symbol Description:** GOSSAN, OXIDATION ZONE,
Cartographic Definition: 	
Positional Definition: Delineating line is accurate to within 500 metres.	
Definition: An area of weathered rock characterized by a conspicuous, rusty brown colour due to the oxidation of iron-rich sulphides, particularly pyrite.	**Remarks:**
CAD Layer: GSalter	**Feature Code:**

Group: MINING	**Symbol Description:** TRENCH,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A narrow steep sided artificial excavation usually cut across a zone of mineralization.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

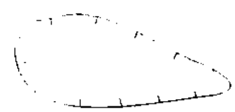
Group: MINING	**Symbol Description:** DRILL HOLE, SURFACE LOCATION,
Cartographic Definition:  **DH 96-13**	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The surface location of a bore hole, generally drilled in search of economic mineralization or to explore a mineralized zone. Identifying lable shown if appropriate.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

Group: MINING	**Symbol Description:** DRILL HOLE, SURFACE PROJECTION,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the circular part of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The surface location of a bore hole showing the projection of the bore hole in plan view. Identifying lable shown if appropriate.	**Remarks:** Where possible, add drill-hole number, azimuth, dip and length of hole 270^o/-55^o; 335m  DDH 95-32
CAD Layer: XBsym	**Feature Code:**

Group: MINING	**Symbol Description:** ADIT OR TUNNEL, OPEN,
Cartographic Definition: 	
Positional Definition: Location of opening to the surface corresponds to the base of the V-shaped part of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A horizontal passage or tunnel from the surface into a mine which is presently (at the time the map is made) open.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

Group: MINING	**Symbol Description:** ADIT OR TUNNEL, CAVED,
Cartographic Definition: 	
Positional Definition: Location of opening to the surface corresponds to the base of the V-shaped part of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A horizontal passage or tunnel from the surface into a mine which has been blocked.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

SURFACE MINING

Group: MINING	**Symbol Description:** OPEN-PIT MINE,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a surface excavation for the extraction of metallic or non-metallic ore: metals, industrial minerals, aggregate or energy resources (coal)	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

Group: MINING	**Symbol Description:** GRAVEL PIT, ACTIVE,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: An open pit where gravel is being mined.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

Group: MINING	**Symbol Description:** GRAVEL PIT, ABANDONED,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: An open pit where gravel was mined in the past.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

UNDERGROUND MINING

Group: MINING	**Symbol Description:** MINE SHAFT,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The surface expression of an underground excavation for the extraction of mineral deposits. It provides access for miners, and a means of transporting ore mined at depth to the surface.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

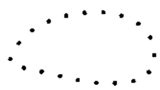
Group: MINING	**Symbol Description:** MINE SHAFT, ABANDONED
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The surface expression of an underground excavation formerly used extraction of a mineral deposit.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

Group: MINING	**Symbol Description:** RAISE OR WINZE
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A mine opening driven to connect levels in an underground mine; a raise is driven upwards from a lower to a higher level; a winze is driven from downward from a higher to a lower level.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

C: OUTCROP FEATURES, FOSSIL, GEOCHRONOLOGY & GEOCHEMICAL SAMPLE SITES

C-1: OUTCROP FEATURES

Group: OUTCROP FEATURES	**Symbol Description:** FIELD STATION,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A point on the map where an observation was recorded.	**Remarks:**
CAD Layer: GRocrop	**Feature Code:**

Group: OUTCROP FEATURES	**Symbol Description:** AREA OF OUTCROP,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the interior of the symbol.	
Definition: A region on the surface of the Earth where one or more geological formations are exposed.	**Remarks:**
CAD Layer: GRocrop	**Feature Code:**

Group: OUTCROP FEATURES	**Symbol Description:** ISOLATED OUTCROP, DEFINED,
Cartographic Definition: X	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A part of one (or more) geological formation(s) that appears at the surface of the Earth and is(are) too small to outline at the map scale.	**Remarks:**
CAD Layer: GRocrop	**Feature Code:**

C-2: FOSSILS

<table>
<tr><td>Group: FOSSILS</td><td>Symbol Description: MACROFOSSIL, DETERMINATE,</td></tr>
<tr><td colspan="2">Cartographic Definition: </td></tr>
<tr><td colspan="2">Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.</td></tr>
<tr><td>Definition: The location of a collection of one or more fossils which can be identified without the aid of a microscope and which give a relative geologic age for the rocks they are found in.</td><td>Remarks: Macrofossils identified should be indicated by a code letter and defined in the map legend. Examples: V=vertebrates; C=cochenterata; B=brachipoda; P=bivalvia; A=ammonoidea; G=graphloidea.</td></tr>
<tr><td>CAD Layer: GMfossl</td><td>Feature Code:</td></tr>
</table>

<table>
<tr><td>Group: FOSSILS</td><td>Symbol Description: MICROFOSSIL, DETERMINATE,</td></tr>
<tr><td colspan="2">Cartographic Definition: </td></tr>
<tr><td colspan="2">Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.</td></tr>
<tr><td>Definition: The location of a collection of one or more fossils which can be identified only with the aid of a microscope and which give a relative geologic age for the rocks they are found in.</td><td>Remarks: Microfossils identified should be indicated by a code letter and defined in the map legend. Examples: r=radiolaria; c=conodonta; f=foraminifera; p=palynological.</td></tr>
<tr><td>CAD Layer: GMfossl</td><td>Feature Code:</td></tr>
</table>

<table>
<tr><td>Group: FOSSILS</td><td>Symbol Description: INDETERMINATE,</td></tr>
<tr><td colspan="2">Cartographic Definition: </td></tr>
<tr><td colspan="2">Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.</td></tr>
<tr><td>Definition: The location of a site where rocks were collected in hopes of finding identifiable fossils but which either had no fossils, or the fossils present are not identifiable or not usable to assign a relative age.</td><td>Remarks:</td></tr>
<tr><td>CAD Layer: GMfossl</td><td>Feature Code:</td></tr>
</table>

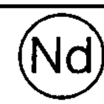
C-3: GECHRONOLOGY

Group: GEOCHRONOLOGY	**Symbol Description:** ARGON-ARGON, BIOTITE,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of ^{40}Ar and ^{39}Ar found within BIOTITE separated from a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; H=hornblende; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

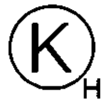
Group: GEOCHRONOLOGY	**Symbol Description:** ARGON-ARGON, HORNBLENDE,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of ^{40}Ar and ^{39}Ar found within HORNBLENDE separated from a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; H=hornblende; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

Group: GEOCHRONOLOGY	**Symbol Description:** ARGON-ARGON, MUSCOVITE,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of ^{40}Ar and ^{39}Ar found within MUSCOVITE separated from a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; H=hornblende; Kf=potassium feldspar; M=muscovite; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

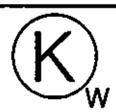
Group: GEOCHRONOLOGY	**Symbol Description:** ARGON-ARGON, WHOLE ROCK,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of ^{40}Ar and ^{39}Ar found within a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

Group: GEOCHRONOLOGY	**Symbol Description:** NEODYMIUM-SAMARIUM,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of neodymium and samarium found within a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

Group: GEOCHRONOLOGY	**Symbol Description:** POTASSIUM-ARGON, BIOTITE,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of potassium and argon found within the mineral BIOTITE separated from a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

Group: GEOCHRONOLOGY	**Symbol Description:** POTASSIUM-ARGON, HORNBLENDE,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of potassium and argon found within the mineral HORNBLENDE separated from a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; H=hornblende; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

Group: GEOCHRONOLOGY	**Symbol Description:** POTASSIUM-ARGON, MUSCOVITE,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of potassium and argon found within the mineral MUSCOVITE separated from a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; Kf=potassium feldspar; M=muscovite; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

Group: GEOCHRONOLOGY	**Symbol Description:** POTASSIUM-ARGON, WHOLE ROCK,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of potassium and argon found within a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

Group: GEOCHRONOLOGY	**Symbol Description:** RUBIDIUM-STRONTIUM, WHOLE ROCK,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of station where a radiometric age was determined based on the relative proportions of rubidium and strontium found within a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

Group: GEOCHRONOLOGY	**Symbol Description:** RUBIDIUM-STRONTIUM, BIOTITE,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of station where a radiometric age was determined based on the relative proportions of rubidium and strontium found within BIOTITE separated from a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

Group: GEOCHRONOLOGY	**Symbol Description:** RUBIDIUM-STRONTIUM, FELDSPAR,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of rubidium and strontium found within ALKALI FELDSPAR separated from a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

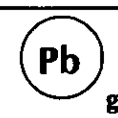
Group: GEOCHRONOLOGY	**Symbol Description:** RUBIDIUM-STRONTIUM, HORNBLENDE,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of rubidium and strontium found within HORNBLENDE separated from a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; H=hornblende Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocm	**Feature Code:**

Group: GEOCHRONOLOGY	**Symbol Description:** RUBIDIUM-STRONTIUM, MUSCOVITE,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of rubidium and strontium found within MUSCOVITE separated from a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocm	**Feature Code:**

Group: GEOCHRONOLOGY	**Symbol Description:** URANIUM-LEAD, MONAZITE,
Cartographic Definition:	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of isotopes of uranium and lead found within the mineral MONAZITE separated from a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocm	**Feature Code:**

	Symbol Description: URANIUM-LEAD, TITANITE,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of isotopes of uranium and lead found within the mineral TITANITE (sphene) separated from a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

Group: GEOCHRONOLOGY	**Symbol Description:** URANIUM-LEAD, ZIRCON,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of isotopes of uranium and lead found within the mineral ZIRCON separated from a rock sample from the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime; Z=zircon.
CAD Layer: GOgeocrn	**Feature Code:**

Group: GEOCHRONOLOGY	**Symbol Description:** LEAD-LEAD, GALENA,
Cartographic Definition: 	
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a station where a radiometric age was determined based on the relative proportions of lead isotopes found within GALENA separated from a rock sample collected at the station.	**Remarks:** Minerals used for analysis: A=allanite; Ab=albite; A-F=alkali feldspar; Ap=apatite; B=biotite; Bd=badellyite; g=galena; Kf=potassium feldspar; Mz=monazite; P=pyroxene; R=rutile; S=sericite; T=titanite; Th=thorite; U=uraninite; W=whole rock; X=xenotime.
CAD Layer: GOgeocrn	**Feature Code:**

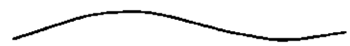
C-4: GEOCHEMISTRY

Group: GEOCHEMICAL FEATURES	**Symbol Description:** ANALYSIS SITE,
Cartographic Definition:	▲
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a sample which has been analysed to determine the concentration of one or more metallic elements of potential economic significance.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

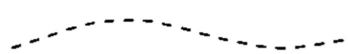
Group: GEOCHEMICAL FEATURES	**Symbol Description:** RGS SAMPLE,
Cartographic Definition:	+
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of a Regional Geochemical Survey point, typically a stream sediment sample which is analyzed for its concentration of various elements.	**Remarks:**
CAD Layer: XBsym	**Feature Code:**

Group: GEOCHEMICAL FEATURES	**Symbol Description:** WHOLE ROCK,
Cartographic Definition:	△
Positional Definition: Location of feature corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The location of an analysis of the bulk chemical composition of a rock.	**Remarks:**
CAD Layer: CDwrx	**Feature Code:**

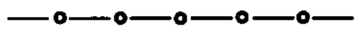
D: GEOLOGIC BOUNDARIES

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** GEOLOGIC CONTACT, DEFINED, DIP UNCERTAIN
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of a plane or irregular surface between two types or ages of rock.	**Remarks:**
CAD Layer: GBcnt1	**Feature Code:**

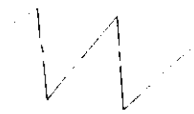
Group: GEOLOGIC BOUNDARIES	**Symbol Description:** GEOLOGIC CONTACT, APPROXIMATE, DIP UNCERTAIN
Cartographic Definition: 	
Positional Definition: Location is accurate to within 100 metres of position shown.	
Definition: The trace of a plane or irregular surface between two types or ages of rock.	**Remarks:**
CAD Layer: GCcnt2	**Feature Code:**

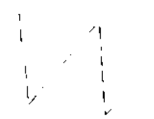
Group: GEOLOGIC BOUNDARIES	**Symbol Description:** GEOLOGIC CONTACT, ASSUMED, DIP UNCERTAIN
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of a plane or irregular surface between two types or ages of rock.	**Remarks:**
CAD Layer: GDcnt3	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** UNCONFORMITY, DEFINED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of a geological contact separating two stratigraphic units of substantially different age that represents an interval of non-deposition or erosion.	**Remarks:**
CAD Layer: UBuncon1	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** UNCONFORMITY, APPROXIMATE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 100 metres of position shown.	
Definition: The trace of a geological contact separating two stratigraphic units of substantially different age that represents an interval of non-deposition or erosion.	**Remarks:**
CAD Layer: UBuncon1	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** UNCONFORMITY, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of a geological contact separating two stratigraphic units of substantially different age that represents an interval of non-deposition or erosion.	**Remarks:**
CAD Layer: UBuncon1	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FACIES BOUNDARY, DEFINED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the boundary between two areally restricted parts (facies) of a geological unit which are in continuity but which differ in composition.	**Remarks:**
CAD Layer: GAgeol	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FACIES BOUNDARY, APPROXIMATE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 100 metres of position shown.	
Definition: The trace of the boundary between two areally restricted parts (facies) of a geological unit which are in continuity but which differ in composition.	**Remarks:**
CAD Layer: GAgeol	**Feature Code:**

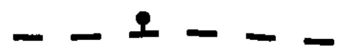
Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FACIES BOUNDARY, ASSUMED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the boundary between two areally restricted parts (facies) of a geological unit which are in continuity but which differ in composition.	**Remarks:**
CAD Layer: GAgeol	**Feature Code:**

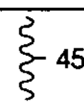
Group: GEOLOGIC BOUNDARIES	**Symbol Description:** LIMIT OF QUATERNARY COVER,
Cartographic Definition: 	
Positional Definition: Location is accurate to within 100 metres.	
Definition: Geographic limit of deposits such as alluvium, sand and gravel, usually unconsolidated, which were formed by glacial, fluvial and mechanical weathering. Includes such materials as alluvium, sand and gravel, debris slides and so on.	**Remarks:**
CAD Layer: QAquat	**Feature Code:**

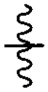
Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, NORMAL, DEFINED, DIP KNOWN
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of a fault which generally dips between 45 and 90 degrees and where the rocks above the fault plane have moved downward relative to those below it.	**Remarks:** Tick and attached solid circle marks which side of the fault has moved down relative to the other. Dip of fault plane indicated in degrees from the horizontal.
CAD Layer: SEflt1	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, NORMAL, DEFINED, EXACT DIP UNKNOWN
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of a fault which generally dips between 45 and 90 degrees and where the rocks above the fault plane have moved downward relative to those below it.	**Remarks:** Tick and attached solid circle marks which side of the fault has moved down relative to the other.
CAD Layer: SEflt1	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, NORMAL, APPROXIMATE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 100 metres of position shown.	
Definition: The trace of a fault which generally dips between 45 and 90 degrees and where the rocks above the fault plane have moved downward relative to those below it.	**Remarks:** Tick and attached solid circle marks which side of the fault has moved down relative to the other.
CAD Layer: SFflt2	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, NORMAL, ASSUMED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of a fault which generally dips between 45 and 90 degrees and where the rocks above the fault plane have moved downward relative to those below it.	**Remarks:** Tick and attached solid circle marks which side of the fault has moved down relative to the other.
CAD Layer: SGflt3	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, SMALL SHEAR, INCLINED,
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to centre of the long axis of the symbol or to the connecting point with another symbol. A positional line may also connect these points to the actual location point. Location is accurate to within 50 metres of position shown.	
Definition: The trace of a small inclined fracture or zone of fractures along which the relative displacement is unknown.	**Remarks:** Azimuth indicated by long axis of symbol. Dip given in degrees from the horizontal and dip direction indicated by tick. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SAstru	**Feature Code:**

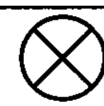
Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, SMALL SHEAR, VERTICAL,
Cartographic Definition:	
Positional Definition: Location of data point corresponds to centre of the long axis of the symbol or to the connecting point with another symbol. A positional line may also connect these points to the actual location point. Location is accurate to within 50 metres of position shown.	
Definition: The trace of a small vertical fracture or zone of fractures along which the relative displacement is unknown.	**Remarks:** Azimuth indicated by long axis of symbol.
CAD Layer: SAstru	**Feature Code:**

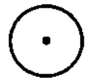
Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, STRIKE-SLIP, DEFINED, DIP KNOWN
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of an inclined fault in which the relative movement is parallel to the strike of the fault plane, the strike being the direction or trend of a horizontal line in the fault plane.	**Remarks:** Arrows indicate relative motion of rocks on either side of the fault. Small tick points in the dip direction of the fault plane with the dip indicated in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SEflt1	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, STRIKE-SLIP, DEFINED, DIP UNCERTAIN
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of a fault in which the relative movement is parallel to the strike of the fault plane, the strike being the direction or trend of a horizontal line in the fault plane.	**Remarks:** Arrows indicate relative motion of rocks on either side of the fault.
CAD Layer: SEflt1	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, STRIKE-SLIP, APPROXIMATE, DIP UNCERTAIN
Cartographic Definition: 	
Positional Definition: Location is accurate to within 100 metres of position shown.	
Definition: The trace of a fault in which the relative movement is parallel to the strike of the fault plane, the strike being the direction or trend of a horizontal line in the fault plane.	**Remarks:** Arrows indicate relative motion of rocks on either side of the fault.
CAD Layer: SFflt2	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, STRIKE-SLIP, ASSUMED, DIP UNCERTAIN
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of a fault in which the relative movement is parallel to the strike of the fault plane, the strike being the direction or trend of a horizontal line in the fault plane.	**Remarks:** Arrows indicate relative motion of rocks on either side of the fault.
CAD Layer: SGflt3	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, STRIKE-SLIP, MOVEMENT INDICATOR - CROSS SECTIONS
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: A symbol used in cross-sections, usually in conjunction with strike-slip faults and which indicates that the rock mass has moved AWAY from the viewer.	**Remarks:** Movement away from the viewer.
CAD Layer: XEsect	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, STRIKE-SLIP, MOVEMENT INDICATOR,
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: A symbol used in cross-sections, usually in conjunction with strike-slip faults, and which indicates that the rock mass has moved TOWARD the viewer.	**Remarks:** Movement toward the viewer.
CAD Layer: XEsect	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, THRUST, DEFINED, DIP MEASURED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of a fault in which rocks above the fault plane have moved upward relative to rocks below the fault plane. Thrust faults generally have dips of less than 90 degrees and more commonly less than 45 degrees.	**Remarks:** Thrust 'teeth' attached on the side of the fault which has been thrust over the other side of the fault. Dip of fault plane given in degrees from the horizontal.
CAD Layer: SHtflt1	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, THRUST, DEFINED, DIP NOT MEASURED OR VARIABLE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of a fault in which rocks above the fault plane have moved upward relative to rocks below the fault plane. Thrust faults generally have dips of less than 90 degrees and more commonly less than 45 degrees.	**Remarks:** Thrust 'teeth' attached on the side of the fault which has been thrust over the other side of the fault.
CAD Layer: SHtflt1	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, THRUST, APPROXIMATE, DIP UNCERTAIN
Cartographic Definition: 	
Positional Definition: Location is accurate to within 100 metres of position shown.	
Definition: The trace of a fault in which rocks above the fault plane have moved upward relative to rocks below the fault plane. Thrust faults generally have dips of less than 90 degrees and more commonly less than 45 degrees.	**Remarks:** Thrust 'teeth' attached on the side of the fault which has been thrust over the other side of the fault.
CAD Layer: SIstflt2	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, THRUST, ASSUMED, DIP UNCERTAIN
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of a fault in which rocks above the fault plane have moved upward relative to rocks below the fault plane. Thrust faults generally have dips of less than 90 degrees and more commonly less than 45 degrees.	**Remarks:** Thrust 'teeth' attached on the side of the fault which has been thrust over the other side of the fault.
CAD Layer: SJtflt3	**Feature Code:**

Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, THRUST, OVERTURNED, DEFINED, DIP MEASURED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of a thrust fault which has been rotated such that rocks which were originally above the fault plane are now below it. Prior to rotation rocks above the fault plane moved upward relative to rocks below the fault plane.	**Remarks:** Thrust 'teeth' attached on the side of the fault which has been thrust over the other side of the fault. Tick points in the down dip direction of the fault plane with the dip indicated in degrees from the horizontal.
CAD Layer: SHtflt1	**Feature Code:**

<table>
<tr><td>Group: GEOLOGIC BOUNDARIES</td><td colspan="2">Symbol Description: FAULT, THRUST, OVERTURNED, DEFINED, DIP NOT MEASURED OR VARIABLE</td></tr>
<tr><td colspan="3">Cartographic Definition:
</td></tr>
<tr><td colspan="3">Positional Definition: Location is accurate to within 50 metres of position shown.</td></tr>
<tr><td colspan="2">Definition: The trace of a thrust fault which has been rotated such that rocks which were originally above the fault plane are now below it. Prior to rotation rocks above the fault plane (which dips less than 90 degrees) moved upward relative to rocks below the fault plane.</td><td>Remarks: Thrust 'teeth' attached on the side of the fault which has been thrust over the other side of the fault prior to overturning.</td></tr>
<tr><td colspan="2">CAD Layer: SHtflt1</td><td>Feature Code:</td></tr>
</table>

<table>
<tr><td>Group: GEOLOGIC BOUNDARIES</td><td colspan="2">Symbol Description: FAULT, THRUST, OVERTURNED, APPROXIMATE, DIP UNCERTAIN</td></tr>
<tr><td colspan="3">Cartographic Definition:
</td></tr>
<tr><td colspan="3">Positional Definition: Location is accurate to within 100 metres of position shown.</td></tr>
<tr><td colspan="2">Definition: The trace of a thrust fault which has been rotated such that rocks which were originally above the fault plane are now below it. Prior to rotation rocks above the fault plane moved upward relative to rocks below the fault plane.</td><td>Remarks: Thrust 'teeth' attached on the side of the fault which has been thrust over the other side of the fault prior to overturning.</td></tr>
<tr><td colspan="2">CAD Layer: SIstflt2</td><td>Feature Code:</td></tr>
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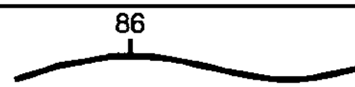
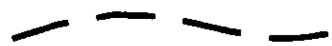
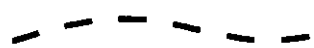
<table>
<tr><td>Group: GEOLOGIC BOUNDARIES</td><td colspan="2">Symbol Description: FAULT, THRUST, OVERTURNED, ASSUMED, DIP UNCERTAIN</td></tr>
<tr><td colspan="3">Cartographic Definition:
</td></tr>
<tr><td colspan="3">Positional Definition: Location is accurate to within 500 metres of position shown.</td></tr>
<tr><td colspan="2">Definition: The trace of a thrust fault which has been rotated such that rocks which were originally above the fault plane are now below it. Prior to rotation rocks above the fault plane moved upward relative to rocks below the fault plane.</td><td>Remarks: Thrust 'teeth' attached on the side of the fault which has been thrust over the other side of the fault prior to overturning.</td></tr>
<tr><td colspan="2">CAD Layer: SJtflt3</td><td>Feature Code:</td></tr>
</table>

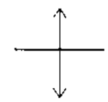
Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, UNKNOWN MOVEMENT SENSE, DEFINED, DIP KNOWN
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of an inclined fracture or zone of fractures along which the relative displacement is unknown.	**Remarks:** Dip of fault plane shown in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SEflt1	**Feature Code:**

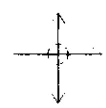
Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, UNKNOWN MOVEMENT SENSE, APPROXIMATE, DIP UNCERTAIN
Cartographic Definition: 	
Positional Definition: Location is accurate to within 100 metres of position shown.	
Definition: The trace of a fracture or zone of fractures along which the relative displacement is unknown.	**Remarks:**
CAD Layer: SFflt2	**Feature Code:**

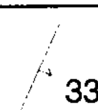
Group: GEOLOGIC BOUNDARIES	**Symbol Description:** FAULT, MOVEMENT SENSE UNKNOWN, ASSUMED, DIP UNCERTAIN
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of a fracture or zone of fractures along which the relative displacement is unknown.	**Remarks:**
CAD Layer: SGflt3	**Feature Code:**

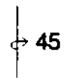
<table>
<tr><td>Group: GEOLOGIC BOUNDARIES</td><td colspan="2">Symbol Description: FAULT, MOVEMENT SENSE UNKNOWN, DEFINED, DIP UNCERTAIN</td></tr>
<tr><td colspan="3">Cartographic Definition:
</td></tr>
<tr><td colspan="3">Positional Definition: Location is accurate to within 50 metres of position shown.</td></tr>
<tr><td colspan="2">Definition: The trace of a fracture or zone of fractures along which the relative displacement is unknown.</td><td>Remarks:</td></tr>
<tr><td colspan="2">CAD Layer: SEflt1</td><td>Feature Code:</td></tr>
</table>

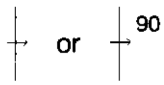
E: PLANAR ELEMENTS

Group: PLANAR ELEMENTS	**Symbol Description:** BEDDING, FACING KNOWN, HORIZONTAL
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A primary layered structure in sedimentary or volcaniclastic rocks. Layering is presently horizontal and right way up.	**Remarks:**
CAD Layer: SBed	**Feature Code:**

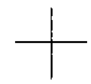
Group: PLANAR ELEMENTS	**Symbol Description:** BEDDING, FACING KNOWN, HORIZONTAL, OVERTURNED
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A primary layered structure in sedimentary or volcaniclastic. Layering is presently horizontal but beds are now inverted, that is upside down.	**Remarks:**
CAD Layer: SBed	**Feature Code:**

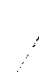
Group: PLANAR ELEMENTS	**Symbol Description:** BEDDING, FACING KNOWN, INCLINED
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A primary layered structure in sedimentary or volcaniclastic rocks. Layering is now inclined and right way up.	**Remarks:** Azimuth is shown by long line and inclination of bedding by small tick. Dip of bedding is indicated in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SBed	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** BEDDING, FACING KNOWN, OVERTURNED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A primary layered structure in sedimentary or volcaniclastic rocks. Layering is now inclined and overturned.	**Remarks:** Azimuth is shown by long line and inclination of bedding by small arrow. Dip of bedding is indicated in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SBed	**Feature Code:**

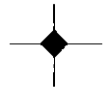
Group: PLANAR ELEMENTS	**Symbol Description:** BEDDING, FACING KNOWN, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A primary layered structure in sedimentary or volcaniclastic rocks. Layering is now vertical; the facing direction (way up) is in the direction of the arrow.	**Remarks:** Azimuth is shown by long line. Arrow indicates direction of stratigraphic top.
CAD Layer: SBed	**Feature Code:**

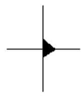
Group: PLANAR ELEMENTS	**Symbol Description:** TREND LINE OF BEDDING, FACING UNKNOWN, DIP UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A primary layered structure in sedimentary or volcaniclastic rocks. The dip and facing direction (way up) of the layering cannot now be determined.	**Remarks:** Azimuth is shown by long line.
CAD Layer: SBed	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** BEDDING, FACING UNKNOWN, HORIZONTAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A primary layered structure in sedimentary or volcaniclastic. Layering is now horizontal but the facing direction (way up) is not determinable.	**Remarks:**
CAD Layer: SBed	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** BEDDING, FACING UNKNOWN, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A primary layered structure in sedimentary or volcaniclastic rocks. Layering is now inclined but the facing direction (way up) is not determinable.	**Remarks:** Azimuth is shown by long line and inclination of bedding by a small tick. Dip of bedding is indicated in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SBed	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** BEDDING, FACING UNKNOWN, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A primary layered structure in sedimentary or volcaniclastic rocks. Layering is now vertical, but the facing direction (way up) is not determinable.	**Remarks:** Azimuth is shown by long line.
CAD Layer: SBed	**Feature Code:**

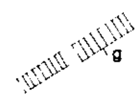
Group: PLANAR ELEMENTS	**Symbol Description:** COMPOSITIONAL BANDING, IGNEOUS OR METAMORPHIC ROCKS, DIP UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the symbol or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A compositional layering in igneous or metamorphic rocks at an unknown inclination. The term may be used when the origin or significance of the layering is uncertain.	**Remarks:**
CAD Layer:	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** COMPOSITIONAL BANDING, IGNEOUS OR METAMORPHIC ROCKS, HORIZONTAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A compositional layering in igneous or metamorphic rocks which is horizontal. The term may be used when the origin or significance of the layering is uncertain.	**Remarks:**
CAD Layer: SCfoil	**Feature Code:**

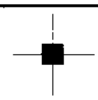
Group: PLANAR ELEMENTS	**Symbol Description:** COMPOSITIONAL BANDING, IGNEOUS OR METAMORPHIC ROCKS, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A compositional layering in igneous or metamorphic rocks which is inclined. The term may be used when the origin or significance of the layering is uncertain.	**Remarks:** Azimuth is shown by long line and inclination of plane by small triangle. Dip of plane is indicated in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SCfoil	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** COMPOSITIONAL BANDING, IGNEOUS OR METAMORPHIC ROCKS, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A compositional layering in igneous or metamorphic rocks which is vertical. The term may be used when the origin or significance of the layering is uncertain.	**Remarks:** Azimuth is shown by long axis of symbol.
CAD Layer: SCfoil	**Feature Code:**

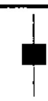
Group: PLANAR ELEMENTS	**Symbol Description:** DIKE, DEFINED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: A tabular igneous intrusion that cuts across the layering or dominant fabric of the hostrocks at an unknown inclination.	**Remarks:** Azimuth is shown by long axis of symbol. Inclination, in degrees from the jorizontal, shown by tick and given by the number. Width of symbol varies to reflect the width of the dike.
CAD Layer: GLdike	**Feature Code:**

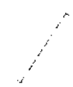
Group: PLANAR ELEMENTS	**Symbol Description:** DIKE, APPROXIMATE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: A tabular igneous intrusion that cuts across the layering or dominant fabric of the host rocks and whose inclination is unknown.	**Remarks:** Azimuth is shown by long axis of symbol. Inclination direction shown by tick and approximate dip shown by symbol: g - gentle; m - moderate; s - steep.
CAD Layer: GLdike	**Feature Code:**

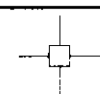
Group: PLANAR ELEMENTS	Symbol Description: DIKE, ASSUMED
Cartographic Definition:	
Positional Definition: Location accurate to within 500 metres of position shown.	
Definition: A tabular igneous intrusion that cuts across the layering or dominant fabric of the hostrocks and whose inclination is unknown.	**Remarks:** Azimuth is shown by long axis of symbol.
CAD Layer: GLdike	**Feature Code:**

Group: PLANAR ELEMENTS	Symbol Description: DIKE, HORIZONTAL
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the symbol or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A tabular igneous intrusion that cuts across the layering or dominant fabric of the hostrocks and is horizontal.	**Remarks:** Feature is generally too small to outline at the scale of mapping.
CAD Layer: GLdike	**Feature Code:**

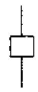
Group: PLANAR ELEMENTS	Symbol Description: DIKE, INCLINED
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A tabular igneous intrusion that cuts across the layering or dominant fabric of the hostrocks in an attitude that is inclined.	**Remarks:** Feature is too small to outline at scale of mapping. Azimuth is shown by long line and inclination of the body by the small rectangle with degrees from the horizontal indicated. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: GLdike	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** DIKE, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A tabular igneous intrusion that cuts across the layering or dominant fabric of the hostrocks and is vertical.	**Remarks:** Feature is too small to outline at scale of mapping. Azimuth is shown by long axis of the symbol.
CAD Layer: GLdike	**Feature Code:**

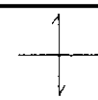
Group: PLANAR ELEMENTS	**Symbol Description:** JOINTS, DIP UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A surface of fracture or parting in a rock across which there has been no displacement and where the inclination is unknown.	**Remarks:** Azimuth is shown by long axis of symbol
CAD Layer: SAstru	**Feature Code:**

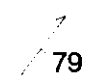
Group: PLANAR ELEMENTS	**Symbol Description:** JOINTS, HORIZONTAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A surface of fracture or parting in a rock across which there has been no displacement and which is horizontal.	**Remarks:**
CAD Layer: SAstru	**Feature Code:**

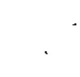
Group: PLANAR ELEMENTS	**Symbol Description:** JOINTS, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A surface of fracture or parting in a rock across which there has been no displacement and which is inclined.	**Remarks:** Azimuth is shown by long line and inclination of joint plane by small open rectangle. Dip of joint plane is indicated in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SAstru	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** JOINTS, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A surface of fracture or parting in a rock across which there has been no displacement and which is vertical.	**Remarks:** Azimuth is shown by long axis of symbol.
CAD Layer: SAstru	**Feature Code:**

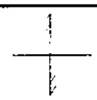
Group: PLANAR ELEMENTS	**Symbol Description:** FOLIATION, FIRST GENERATION, DIP UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A general term for a planar fabric in a rock, defined by the parallel orientation of platy or tabular minerals with unknown inclination, and which was the first foliation to form relative to other similar fabrics in the rock or map area.	**Remarks:** Azimuth is shown by long line of symbol.
CAD Layer: SCfoil	**Feature Code:**

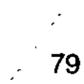
Group: PLANAR ELEMENTS	**Symbol Description:** FOLIATION, FIRST GENERATION, HORIZONTAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A general term for a planar fabric in a rock, defined by the parallel orientation of platy or tabular minerals which in this case is aligned horizontally and was the first foliation to form relative to other similar fabrics in the rock or map area.	**Remarks:**
CAD Layer: SCfoil	**Feature Code:**

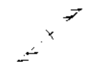
Group: PLANAR ELEMENTS	**Symbol Description:** FOLIATION, FIRST GENERATION, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A general term for a planar fabric in a rock, defined by the parallel orientation of platy or tabular minerals which is inclined and was the first foliation to form relative to other similar fabrics in the rock or map area.	**Remarks:** Azimuth shown by long line of symbol. Inclination is indicated by small tick and is in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SCfoil	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** FOLIATION, FIRST GENERATION, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A general term for a planar fabric in a rock, defined by the parallel orientation of platy or tabular minerals, which is aligned vertically and was the first foliation to form relative to other similar fabrics in the rock or map area.	**Remarks:** Azimuth is shown by long line of symbol.
CAD Layer: SCfoil	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** FOLIATION, SECOND GENERATION, DIP UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A general term for a planar fabric in a rock, defined by the parallel orientation of platy or tabular minerals with unknown inclination and which was the second foliation to form relative to other similar fabrics in the rock or map area.	**Remarks:** Azimuth is shown by long line of symbol.
CAD Layer: SCfoil	**Feature Code:**

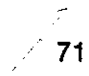
Group: PLANAR ELEMENTS	**Symbol Description:** FOLIATION, SECOND GENERATION, HORIZONTAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A general term for a planar fabric in a rock, defined by the parallel orientation of platy or tabular minerals, which is now aligned horizontally and was the second foliation to form relative to other similar fabrics in the rock or map area.	**Remarks:**
CAD Layer: SCfoil	**Feature Code:**

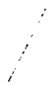
Group: PLANAR ELEMENTS	**Symbol Description:** FOLIATION, SECOND GENERATION, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A general term for a planar fabric in a rock, defined by the parallel orientation of platy or tabular minerals which is inclined and was the second foliation to form relative to other similar fabrics in the rock or map area.	**Remarks:** Azimuth shown by long line of symbol. Inclination is indicated by small tick and is in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SCfoil	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** FOLIATION, SECOND GENERATION, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A general term for a planar fabric in a rock, defined by the parallel orientation of platy or tabular minerals, which is aligned vertically and was the second foliation to form relative to other similar fabrics in the rock or map area.	**Remarks:** Azimuth is shown by long line of symbol.
CAD Layer: SCfoil	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** FOLIATION, UNKNOWN GENERATION, DIP UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A general term for a planar fabric in a rock, defined by the parallel orientation of platy or tabular minerals with unknown inclination and unknown age relative to other foliations in the rock or map area.	**Remarks:** Azimuth is shown by long line of symbol.
CAD Layer: SCfoil	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** FOLIATION, UNKNOWN GENERATION, HORIZONTAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A general term for a planar fabric in a rock, defined by the parallel orientation of platy or tabular minerals, which is aligned horizontally and of unknown age relative to other foliations in the rock or map area.	**Remarks:**
CAD Layer: SCfoil	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** FOLIATION, UNKNOWN GENERATION, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A general term for a planar fabric in a rock, defined by the parallel orientation of platy or tabular minerals, which is inclined and of unknown age relative to other foliations in the rock or map area.	**Remarks:** Azimuth shown by long line of symbol. Inclination is indicated by small tick and is in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SCfoil	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** FOLIATION, UNKNOWN GENERATION, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: A general term for a planar fabric in a rock, defined by the parallel orientation of platy or tabular minerals, which is aligned vertically and of unknown age relative to other foliations in the rock or map area.	**Remarks:** Azimuth is shown by long line of symbol.
CAD Layer: SCfoil	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** METAMORPHIC MINERAL ISOGRAD,
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: A line on a map indicating the appearance or limit of the metamorphic mineral or mineral assemblage of the highest grade in the map-area.	**Remarks:** Symbol on line points to higher metamorphic grade. Mineral or mineral assemblage associated with symbol is indicated in the legend of the map.
CAD Layer: GTisog1	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** METAMORPHIC MINERAL ISOGRAD,
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: A line on a map indicating the appearance or limit of the metamorphic mineral or mineral assemblage of the second highest grade in the map-area.	**Remarks:** Symbol on line points to higher metamorphic grade. Mineral or mineral assemblage associated with symbol is indicated in the legend of the map.
CAD Layer: GTisog2	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** METAMORPHIC MINERAL ISOGRAD,
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: A line on a map indicating the appearance or limit of the metamorphic mineral or mineral assemblage of the third highest grade in the map-area.	**Remarks:** Symbol on line points to higher metamorphic grade. Mineral or mineral assemblage associated with symbol is indicated in the legend of the map.
CAD Layer: GTisog3	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** METAMORPHIC MINERAL ISOGRAD,
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: A line on a map indicating the appearance or limit of the metamorphic mineral or mineral assemblage of the fourth highest grade in the map-area.	**Remarks:** Symbol on line points to higher metamorphic grade. Mineral or mineral assemblage associated with symbol is indicated within legend of the map.
CAD Layer: GTisog4	**Feature Code:**

Group: PLANAR ELEMENTS	Symbol Description: METAMORPHIC MINERAL ISOGRAD,
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: A line on a map indicating the appearance or limit of the metamorphic mineral or mineral assemblage of the fifth highest grade in the map-area.	Remarks: Symbol on line points to higher metamorphic grade. Mineral or mineral assemblage associated with symbol is indicated within legend of the map.
CAD Layer: GTisog4	Feature Code:

Group: PLANAR ELEMENTS	Symbol Description: METAMORPHIC MINERAL ISOGRAD,
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: A line on a map indicating the appearance or limit of a specified metamorphic mineral or mineral assemblage of the sixth highest grade in the map-area.	Remarks: Symbol on line points to higher metamorphic grade. Mineral or mineral assemblage associated with symbol is indicated within legend of the map.
CAD Layer: GTisog4	Feature Code:

Group: PLANAR ELEMENTS	Symbol Description: PILLOW LAVA, FACING KNOWN, DIP ANGLE INDETERMINATE
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the strike line. A positional line may also connect these points to the actual location point.	
Definition: A form present in some submarine volcanic lava flows in which the flow consists of pillow-shaped masses which indicate the paleohorizontal and facing direction, and whose present inclination is known in direction but not angle.	Remarks: Azimuth is shown by long line in symbol. Stratigraphic tops indicated by solid semicircle.
CAD Layer: SBed	Feature Code:

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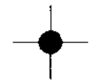
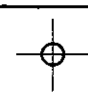
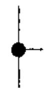
<tr><td>Group: PLANAR ELEMENTS</td><td>Symbol Description: PILLOW LAVA, FACING KNOWN, HORIZONTAL</td></tr>
<tr><td colspan="2">Cartographic Definition: </td></tr>
<tr><td colspan="2">Positional Definition: Location of data point corresponds to the centre of the strike line. A positional line may also connect these points to the actual location point.</td></tr>
<tr><td>Definition: A form present in some submarine volcanic lava flows in which the flow consists of pillow-shaped masses which indicate the paleohorizontal and facing direction, and which are presently horizontal and right way up.</td><td>Remarks:</td></tr>
<tr><td>CAD Layer: SBed</td><td>Feature Code:</td></tr>
</table>

<table>
<tr><td>Group: PLANAR ELEMENTS</td><td>Symbol Description: PILLOW LAVA, FACING KNOWN, HORIZONTAL, OVERTURNED</td></tr>
<tr><td colspan="2">Cartographic Definition: </td></tr>
<tr><td colspan="2">Positional Definition: Location of data point corresponds to the centre of the strike. A positional line may also connect these points to the actual location point.</td></tr>
<tr><td>Definition: A form present in some submarine volcanic lava flows in which the flow consists of pillow-shaped masses which indicate the paleohorizontal and facing direction, and are presently horizontal and overturned.</td><td>Remarks:</td></tr>
<tr><td>CAD Layer: SBed</td><td>Feature Code:</td></tr>
</table>

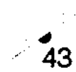
<table>
<tr><td>Group: PLANAR ELEMENTS</td><td>Symbol Description: PILLOW LAVA, FACING KNOWN, INCLINED</td></tr>
<tr><td colspan="2">Cartographic Definition: 
</td></tr>
<tr><td colspan="2">Positional Definition: Location of data point corresponds to the centre of the strike line. A positional line may also connect these points to the actual location point.</td></tr>
<tr><td>Definition: A form present in some submarine volcanic lava flows in which the flow consists of pillow-shaped masses which indicate the paleohorizontal and facing direction, and are presently inclined.</td><td>Remarks: Azimuth shown by long line in symbol. Solid semicircle indicates direction and inclination of bedding in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.</td></tr>
<tr><td>CAD Layer: SBed</td><td>Feature Code:</td></tr>
</table>

Group: PLANAR ELEMENTS	**Symbol Description:** PILLOW LAVA, FACING KNOWN, INCLINED, OVERTURNED
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the strike line. A positional line may also connect these points to the actual location point.	
Definition: A form present in some submarine volcanic lava flows in which the flow consists of pillow-shaped masses which indicate the paleohorizontal and facing direction, and are presently overturned.	**Remarks:** Azimuth shown by long line in symbol. Solid semicircle indicates direction of inclination of bedding and degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SBed	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** PILLOW LAVA, FACING KNOWN, VERTICAL
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the strike line. A positional line may also connect these points to the actual location point.	
Definition: A form present in some submarine volcanic lava flows in which the flow consists of pillow-shaped masses which indicate the paleohorizontal and facing direction, and are presently vertical.	**Remarks:** Azimuth is shown by long line in symbol. Arrow indicates stratigraphic tops.
CAD Layer: SBed	**Feature Code:**

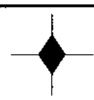
Group: PLANAR ELEMENTS	**Symbol Description:** PILLOW LAVA, FACING UNKNOWN, DIP INDETERMINATE
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the strike line. A positional line may also connect these points to the actual location point.	
Definition: A form present in some submarine volcanic lava flows in which the flow consists of pillow-shaped masses which indicate the paleohorizontal. This symbols is used where facing direction and angle of dip are indeterminate.	**Remarks:** Azimuth shown by two parallel lines.
CAD Layer: SBed	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** PILLOW LAVA, FACING UNKNOWN, HORIZONTAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike. A positional line may also connect these points to the actual location point.	
Definition: A form present in some submarine volcanic lava flows in which the flow consists of pillow-shaped masses which indicate the paleohorizontal. Facing direction is indeterminate but the dip is horizontal.	**Remarks:**
CAD Layer: SBed	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** PILLOW LAVA, FACING UNKNOWN, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line. A positional line may also connect these points to the actual location point.	
Definition: A form present in some submarine volcanic lava flows in which the flow consists of pillow-shaped masses which indicate the paleohorizontal. Facing direction is indeterminate and beds are inclined.	**Remarks:** Azimuth shown by two parallel lines. Solid semicircle indicates inclination of bedding in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SBed	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** PILLOW LAVA, FACING UNKNOWN, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike. A positional line may also connect these points to the actual location point.	
Definition: A form present in some submarine volcanic lava flows in which the flow consists of pillow-shaped masses which indicate the paleohorizontal. Facing direction is indeterminate and beds are vertical.	**Remarks:** Azimuth shown by two parallel lines.
CAD Layer: SBed	**Feature Code:**

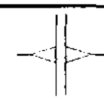
Group: PLANAR ELEMENTS	**Symbol Description:** PRIMARY FLOW, IGNEOUS ROCKS, DIP INDETERMINATE
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the symbol. A positional line may also connect these points to the actual location point.	
Definition: A fabric, usually planar, defined by the alignment of minerals in an igneous rock, and with indeterminate inclination. It is produced by flow during crystallization of the original magma or lava.	**Remarks:** Azimuth is shown by long axis of symbol
CAD Layer: SCfoil	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** PRIMARY FLOW, IGNEOUS ROCKS, HORIZONTAL
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the symbol. A positional line may also connect these points to the actual location point.	
Definition: A fabric, usually planar, defined by the alignment of minerals in an igneous rock, and which is horizontal. It is produced by flow during crystallization of the original magma or lava.	**Remarks:**
CAD Layer: SCfoil	**Feature Code:**

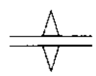
Group: PLANAR ELEMENTS	**Symbol Description:** PRIMARY FLOW, IGNEOUS ROCKS, INCLINED
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the strike line. A positional line may also connect these points to the actual location point.	
Definition: A fabric, usually planar, defined by the alignment of minerals in an igneous rock, and which is inclined. It is produced by flow during crystallization of the original magma or lava.	**Remarks:** Azimuth is shown by long line and inclination of flow plane by small triangle. Dip of flow plane is indicated in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SCfoil	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** PRIMARY FLOW, IGNEOUS ROCKS, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line. A positional line may also connect these points to the actual location point.	
Definition: A fabric, usually planar, defined by the alignment of minerals in an igneous rock, and which is vertical. It is produced by flow during crystallization of the original magma or lava.	**Remarks:** Azimuth is shown by long line.
CAD Layer: SCfoil	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** PRIMARY LAYERING, IGNEOUS ROCKS, DIP INDETERMINATE
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the strike line. A positional line may also connect these points to the actual location point.	
Definition: The mineralogical layering in plutonic rocks caused by the sudden appearance and/or progressive disappearance of some mineral phases, and where the inclination is not known.	**Remarks:** Azimuth is shown by parallel lines.
CAD Layer: SCfoil	**Feature Code:**

Group: PLANAR ELEMENTS	**Symbol Description:** PRIMARY LAYERING, IGNEOUS ROCKS, HORIZONTAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line. A positional line may also connect these points to the actual location point.	
Definition: The mineralogical layering in plutonic rocks caused by the sudden appearance and/or progressive disappearance of some mineral phases and which is horizontal.	**Remarks:**
CAD Layer: SCfoil	**Feature Code:**

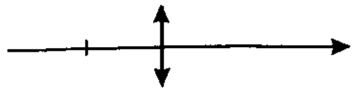
Group: PLANAR ELEMENTS	**Symbol Description:** PRIMARY LAYERING, IGNEOUS ROCKS, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line. A positional line may also connect these points to the actual location point.	
Definition: The mineralogical layering in plutonic rocks caused by the sudden appearance and/or progressive disappearance of some mineral phases and which is inclined.	**Remarks:** Azimuth is shown by parallel lines and inclination direction by small triangle. Dip of flow plane is indicated in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SCfoil	**Feature Code:**

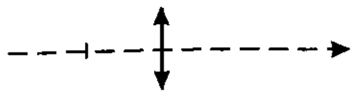
Group: PLANAR ELEMENTS	**Symbol Description:** PRIMARY LAYERING, IGNEOUS ROCKS, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line. A positional line may also connect these points to the actual location point.	
Definition: The mineralogical layering in plutonic rocks caused by the sudden appearance and/or progressive disappearance of some mineral phases and which is vertical.	**Remarks:** Azimuth is shown by parallel lines.
CAD Layer: SCfoil	**Feature Code:**

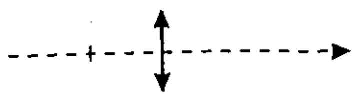
Group: PLANAR ELEMENTS	**Symbol Description:** VEINS OR STOCKWORK, DEFINED, INCLINED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: A vein is a tabular, epigenetic (introduced later that the formation of the hostrock) mineral filling of a fracture in a rock. A stockwork is an occurrence consisting of a three-dimensional network of veins.	**Remarks:** Azimuth is shown by long axis of symbol. Inclination is given as degrees down from the horizontal plane. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: GLdike	**Feature Code:**

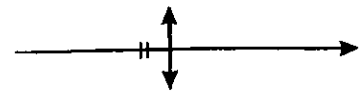
Group: PLANAR ELEMENTS	**Symbol Description:** VEINS OR STOCKWORK, APPROXIMATE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 100 metres of position shown.	
Definition: A vein is a tabular, epigenetic (introduced later that the formation of the hostrock) mineral filling of a fracture in a rock. A stockwork is an occurrence consisting of a three-dimensional network of veins.	**Remarks:** Azimuth is shown by long axis of symbol. Inclination is indeterminate.
CAD Layer: GLdike	**Feature Code:**

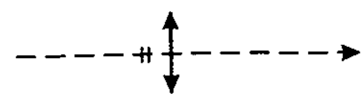
F-1: ANTICLINES

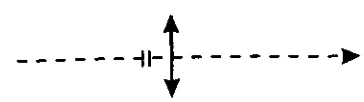
Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, UPRIGHT, FIRST GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a first generation anticline and the earth's surface. An anticline is a convex upward fold which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by long line and the attached arrow indicates general direction of plunge of fold axis.
CAD Layer: SNantic	**Feature Code:**

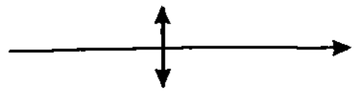
Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, UPRIGHT, FIRST GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a first generation anticline and the earth's surface. An anticline is a convex upward fold which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general direction of plunge of fold axis.
CAD Layer: SNantic	**Feature Code:**

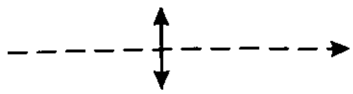
Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, UPRIGHT, FIRST GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a first generation anticline and the earth's surface. An anticline is a convex upward fold which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general direction of plunge of fold axis.
CAD Layer: SNantic	**Feature Code:**

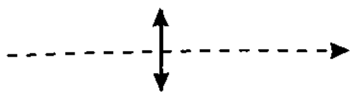
Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, UPRIGHT, SECOND GENERATION, DEFINED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a second generation anticline and the earth's surface. An anticline is a convex upward fold which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by long line and the attached arrow indicates general direction of plunge of fold axis.
CAD Layer: SNantic	**Feature Code:**

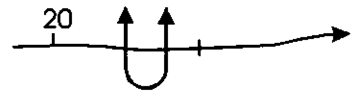
Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, UPRIGHT, SECOND GENERATION, APPROXIMATE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a second generation anticline and the earth's surface. An anticline is a convex upward fold which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general direction of plunge of fold axis.
CAD Layer: SNantic	**Feature Code:**

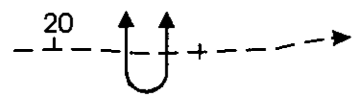
Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, UPRIGHT, SECOND GENERATION, ASSUMED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a second generation anticline and the earth's surface. An anticline is a convex upward fold which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge of fold axis.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, UPRIGHT, UNKNOWN GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of an anticline of unknown generation and the earth's surface. An anticline is a convex upward fold which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by long line and the attached arrow indicates general direction of plunge of fold axis.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, UPRIGHT, UNKNOWN GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of an anticline of unknown generation and the earth's surface. An anticline is a convex upward fold which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general direction of plunge of fold axis.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, UPRIGHT, UNKNOWN GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of an anticline of unknown generation and the earth's surface. An anticline is a foldconvex upward fold which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general direction of plunge of fold axis.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, OVERTURNED, FIRST GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a first generation anticline and the earth's surface. An anticline is a fold, usually convex upward, which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, OVERTURNED, PLUNGING, FIRST GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a first generation anticline and the earth's surface. An anticline is a fold, usually convex upward, which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
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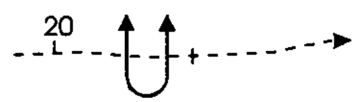
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
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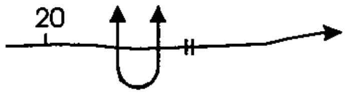
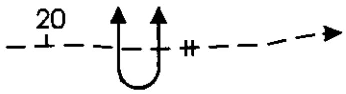
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, OVERTURNED, SECOND GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a second generation anticline and the earth's surface. An anticline is a fold, usually convex upward, which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, OVERTURNED, SECOND GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
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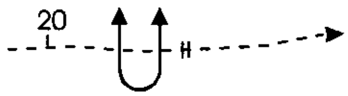
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, OVERTURNED, SECOND GENERATION, ASSUMED
Cartographic Definition:	
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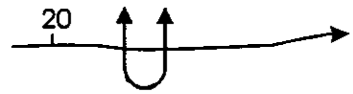
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, OVERTURNED, UNKNOWN GENERATION, DEFINED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
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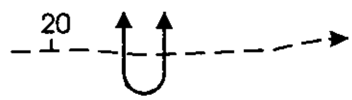
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, OVERTURNED, UNKNOWN GENERATION, APPROXIMATE
Cartographic Definition: 	
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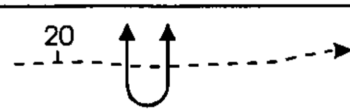
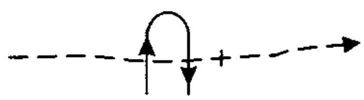
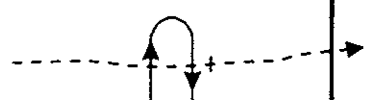
Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, OVERTURNED, UNKNOWN GENERATION, ASSUMED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of an anticline of unknown generation and the earth's surface. An anticline is a fold, usually convex upward, which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, RECUMBENT, FIRST GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a first generation anticline and the earth's surface. An anticline is a fold, usually convex upward, which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, RECUMBENT, FIRST GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a first generation anticline and the earth's surface. An anticline is a fold, usually convex upward, which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, RECUMBENT, FIRST GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a first generation anticline and the earth's surface. An anticline is a fold, usually convex upward, which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SNantic	**Feature Code:**

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<tr><td colspan="3">Positional Definition: Location is accurate to within 50 metres of position shown.</td></tr>
<tr><td colspan="2">Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a second generation anticline and the earth's surface. An anticline is a fold, usually convex upward, which contains stratigraphically older rocks in its core.</td><td>Remarks: Trace of axial surface shown by long line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure.</td></tr>
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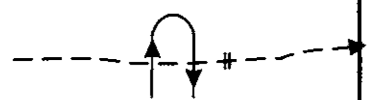</td></tr>
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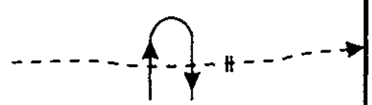</td></tr>
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<tr><td colspan="2">CAD Layer: SNantic</td><td>Feature Code:</td></tr>
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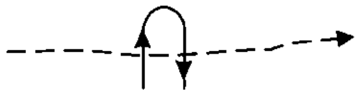
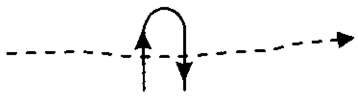
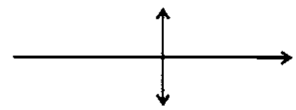
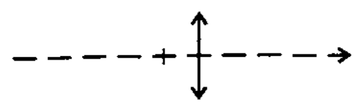
Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, RECUMBENT, UNKNOWN GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of an anticline of unknown generation and the earth's surface. An anticline is a fold, usually convex upward, which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SNantic	**Feature Code:**

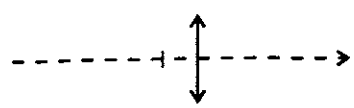
Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, RECUMBENT, UNKNOWN GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of an anticline of unknown generation and the earth's surface. An anticline is a fold, usually convex upward, which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SNantic	**Feature Code:**

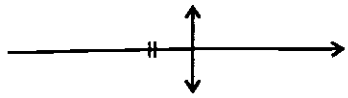
Group: FOLD ELEMENTS	**Symbol Description:** ANTICLINE, TRACE AXIAL SURFACE, RECUMBENT, UNKNOWN GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of an anticline of unknown generation and the earth's surface. An anticline is a fold, usually convex upward, which contains stratigraphically older rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SNantic	**Feature Code:**

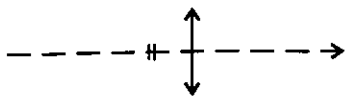
F-2: ANTIFORMS

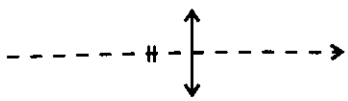
Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, UPRIGHT, PLUNGING, FIRST GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a first generation antiform and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by long line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, UPRIGHT, PLUNGING, FIRST GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a first generation antiform and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, UPRIGHT, PLUNGING, FIRST GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a first generation antiform and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, UPRIGHT, PLUNGING, SECOND GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a second generation antiform and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by long line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, UPRIGHT, PLUNGING, SECOND GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a second generation antiform and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, UPRIGHT, PLUNGING, SECOND GENERATION, ASSUMED
Cartographic Definition:	
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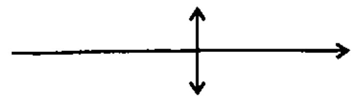
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS

Symbol Description: ANTIFORM, TRACE AXIAL SURFACE, UPRIGHT, PLUNGING, UNKNOWN GENERATION, DEFINED

Cartographic Definition:



Positional Definition: Location is accurate to within 50 metres of position shown.

Definition: The trace of the intersection between the vertical axial surface of an antiform of unknown generation and the earth's surface. An antiform is a convex upward fold where the stratigraphic ages of the folded rocks are not known.

Remarks: Trace of axial surface shown by long line and the attached arrow indicates general plunge direction of fold axis.

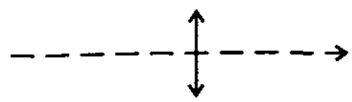
CAD Layer: SNantic

Feature Code:

Group: FOLD ELEMENTS

Symbol Description: ANTIFORM, TRACE AXIAL SURFACE, UPRIGHT, PLUNGING, UNKNOWN GENERATION, APPROXIMATE

Cartographic Definition:



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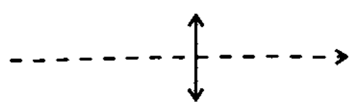
CAD Layer: SNantic

Feature Code:

Group: FOLD ELEMENTS

Symbol Description: ANTIFORM, TRACE AXIAL SURFACE, UPRIGHT, PLUNGING, UNKNOWN GENERATION, ASSUMED

Cartographic Definition:



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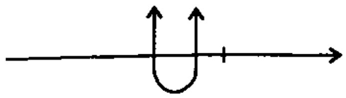
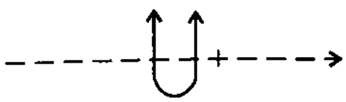
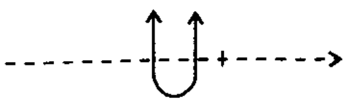
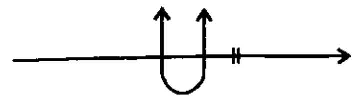
CAD Layer: SNantic

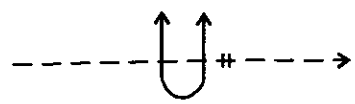
Feature Code:

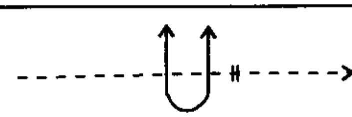
Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, OVERTURNED, PLUNGING, FIRST GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a first generation antiform and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SNantic	**Feature Code:**

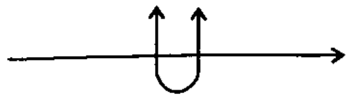
Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, OVERTURNED, PLUNGING, FIRST GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a first generation antiform and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SNantic	**Feature Code:**

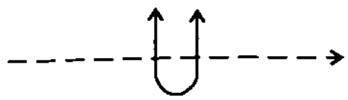
Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, OVERTURNED, PLUNGING, FIRST GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a first generation antiform and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SNantic	**Feature Code:**

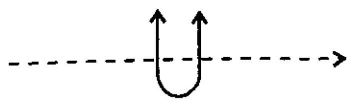
Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, OVERTURNED, PLUNGING, SECOND GENERATION, DEFINED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a second generation antiform and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, OVERTURNED, PLUNGING, SECOND GENERATION, APPROXIMATE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a second generation antiform and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SNantic	**Feature Code:**

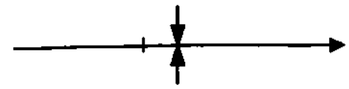
Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, OVERTURNED, PLUNGING, SECOND GENERATION, ASSUMED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a second generation antiform and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SNantic	**Feature Code:**

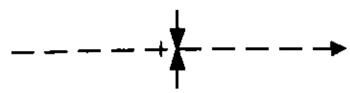
Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, OVERTURNED, PLUNGING, UNKNOWN GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of an antiform of unknown generation and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SNantic	**Feature Code:**

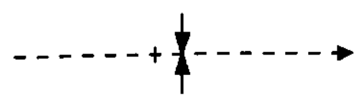
Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, OVERTURNED, PLUNGING, UNKNOWN GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of an antiform of unknown generation and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SNantic	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** ANTIFORM, TRACE AXIAL SURFACE, OVERTURNED, PLUNGING, UNKNOWN GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of an antiform of unknown generation and the earth's surface. An antiform is a convex upward fold where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SNantic	**Feature Code:**

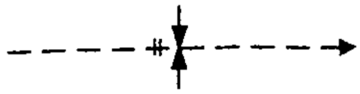
F-3: SYNCLINES

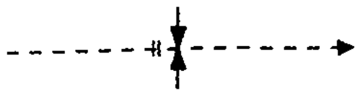
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, UPRIGHT, FIRST GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a first generation syncline and the earths surface. A syncline is a concave upward fold which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by long line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SOsync	**Feature Code:**

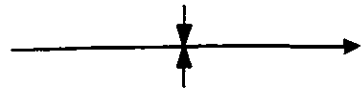
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, UPRIGHT, FIRST GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a first generation syncline and the earths surface. A syncline is a concave upward fold which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SOsync	**Feature Code:**

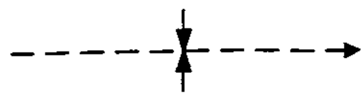
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, UPRIGHT, FIRST GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a first generation syncline and the earths surface. A syncline is a concave upward fold which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SOsync	**Feature Code:**

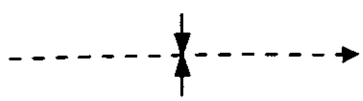
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, UPRIGHT, SECOND GENERATION, DEFINED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a second generation syncline and the earths surface. A syncline is a concave upward fold which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by long line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SOsync	**Feature Code:**

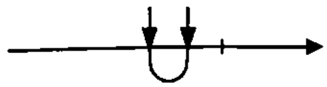
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, UPRIGHT, SECOND GENERATION, APPROXIMATE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a second generation syncline and the earths surface. A syncline is a concave upward fold which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SOsync	**Feature Code:**

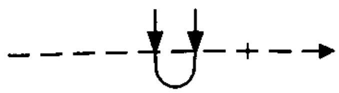
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, UPRIGHT, SECOND GENERATION, ASSUMED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a second generation syncline and the earths surface. A syncline is a concave upward fold which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SOsync	**Feature Code:**

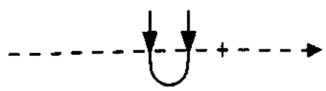
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, UPRIGHT, UNKNOWN GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a syncline of unknown generation and the earths surface. A syncline is a concave upward fold which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by long line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SOsync	**Feature Code:**

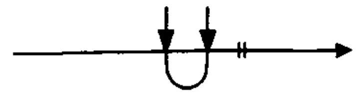
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, UPRIGHT, UNKNOWN GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a syncline of unknown generation and the earths surface. A syncline is a concave upward fold which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SOsync	**Feature Code:**

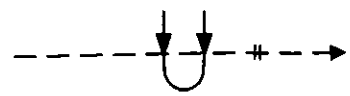
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, UPRIGHT, UNKNOWN GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a syncline of unknown generation and the earths surface. A syncline is a concave upward fold which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge direction of fold axis.
CAD Layer: SOsync	**Feature Code:**

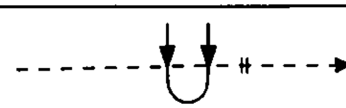
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, OVERTURNED, PLUNGING, FIRST GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a first generation syncline and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

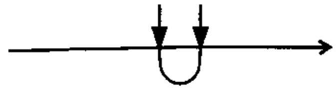
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, OVERTURNED, PLUNGING, FIRST GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a first generation syncline and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

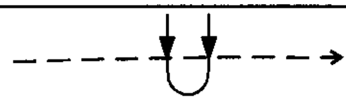
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, OVERTURNED, FIRST GENERATION, PLUNGING, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a first generation syncline and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

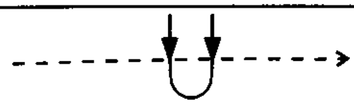
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, OVERTURNED, SECOND GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a second generation syncline and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, OVERTURNED, SECOND GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a second generation syncline and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by defined line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

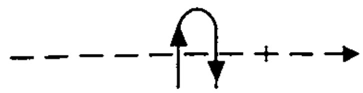
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, OVERTURNED, SECOND GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a second generation syncline and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by defined line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

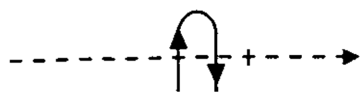
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, OVERTURNED, UNKNOWN GENERATION, DEFINED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a syncline of unknown generation and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

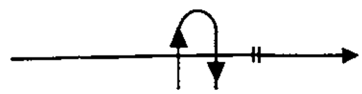
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, OVERTURNED, UNKNOWN GENERATION, APPROXIMATE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a syncline of unknown generation and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

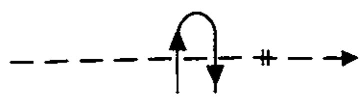
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, OVERTURNED, UNKNOWN GENERATION, ASSUMED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a syncline of unknown generation and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge direction of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

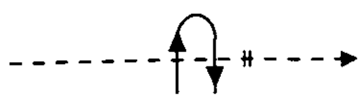
Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, RECUMBENT, FIRST GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a first generation syncline and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, RECUMBENT, FIRST GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a first generation syncline and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, RECUMBENT, FIRST GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a first generation syncline and the earths surface. A syncline is a fold, usually concave upward which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, RECUMBENT, SECOND GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a second generation syncline and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, RECUMBENT, SECOND GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a second generation syncline and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by defined line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** SYNCLINE, TRACE AXIAL SURFACE, RECUMBENT, SECOND GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a second generation syncline and the earths surface. A syncline is a fold, usually concave upward, stratigraphic ages of the folded rocks contains stratigraphically younger rocks in its core.	**Remarks:** Trace of axial surface shown by defined line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS

Symbol Description: SYNCLINE, TRACE AXIAL SURFACE, RECUMBENT, UNKNOWN GENERATION, DEFINED

Cartographic Definition:

Positional Definition: Location is accurate to within 50 metres of position shown.

Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a syncline of unknown generation and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.

Remarks: Trace of axial surface shown by long line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.

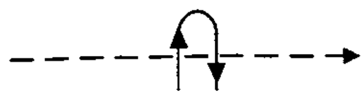
CAD Layer: SOsync

Feature Code:

Group: FOLD ELEMENTS

Symbol Description: SYNCLINE, TRACE AXIAL SURFACE, RECUMBENT, UNKNOWN GENERATION, APPROXIMATE

Cartographic Definition:



Positional Definition: Location is accurate to within 250 metres of position shown.

Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a syncline of unknown generation and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.

Remarks: Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.

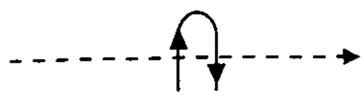
CAD Layer: SOsync

Feature Code:

Group: FOLD ELEMENTS

Symbol Description: SYNCLINE, TRACE AXIAL SURFACE, RECUMBENT, UNKNOWN GENERATION, ASSUMED

Cartographic Definition:



Positional Definition: Location is accurate to within 500 metres of position shown.

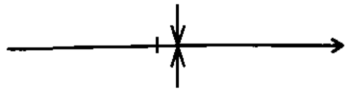
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a syncline of unknown generation and the earths surface. A syncline is a fold, usually concave upward, which contains stratigraphically younger rocks in its core.

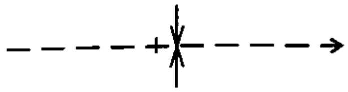
Remarks: Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.

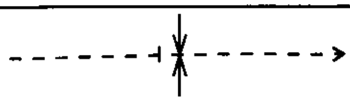
CAD Layer: SOsync

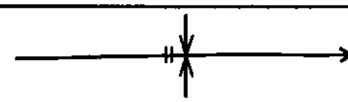
Feature Code:

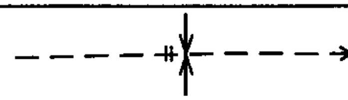
F-4: SYNFORMS

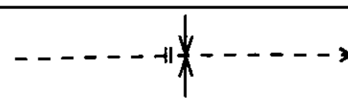
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, UPRIGHT, FIRST GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a first generation synform and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by long line and the attached arrow indicates general plunge of fold axis.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, UPRIGHT, FIRST GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a first generation synform and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge of fold axis.
CAD Layer: SOsync	**Feature Code:**

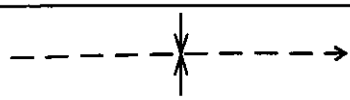
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, UPRIGHT, FIRST GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a first generation synform and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge of fold axis.
CAD Layer: SOsync	**Feature Code:**

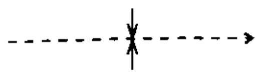
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, UPRIGHT, SECOND GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a second generation synform and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by long line and the attached arrow indicates general plunge of fold axis.
CAD Layer: SOsync	**Feature Code:**

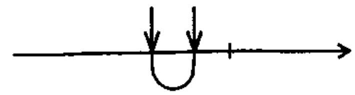
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, UPRIGHT, SECOND GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a second generation synform and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge of fold axis.
CAD Layer: SOsync	**Feature Code:**

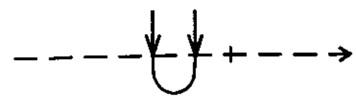
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, UPRIGHT, SECOND GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a second generation synform and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge of fold axis.
CAD Layer: SOsync	**Feature Code:**

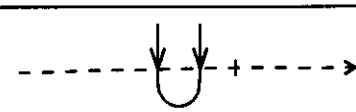
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, UPRIGHT, UNKNOWN GENERATION, DEFINED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a synform of unknown generation and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by long line and the attached arrow indicates general plunge of fold axis.
CAD Layer: SOsync	**Feature Code:**

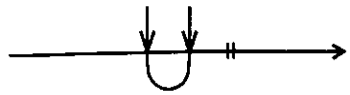
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, UPRIGHT, UNKNOWN GENERATION, APPROXIMATE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a synform of unknown generation and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge of fold axis.
CAD Layer: SOsync	**Feature Code:**

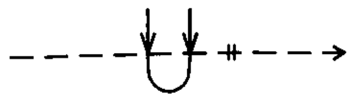
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, UPRIGHT, UNKNOWN GENERATION, ASSUMED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the vertical axial surface of a synform of unknown generation and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by dashed line and the attached arrow indicates general plunge of fold axis.
CAD Layer: SOsync	**Feature Code:**

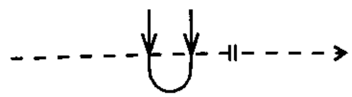
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, OVERTURNED, FIRST GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a first generation synform and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

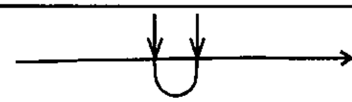
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, OVERTURNED, FIRST GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a first generation synform and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

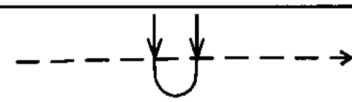
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, OVERTURNED, FIRST GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a first generation synform and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

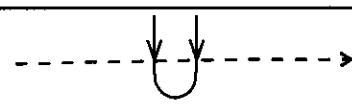
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, OVERTURNED, SECOND GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a second generation synform and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, OVERTURNED, SECOND GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a second generation synform and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, OVERTURNED, SECOND GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a second generation synform and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

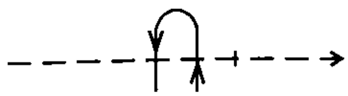
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, OVERTURNED, UNKNOWN GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a synform of unknown generation and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

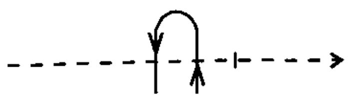
Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, OVERTURNED, UNKNOWN GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a synform of unknown generation and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, OVERTURNED, UNKNOWN GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the inclined axial surface of a synform of unknown generation and the earths surface. A synform is a concave upward fold, in which the relative ages of the strata are unknown.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure, arrows point in down-dip direction of axial plane.
CAD Layer: SOsync	**Feature Code:**

F-5: RECUMBENT FOLDS, way-up unknown

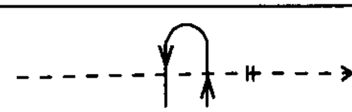
Group: FOLD ELEMENTS	**Symbol Description:** TRACE AXIAL SURFACE, RECUMBENT FOLD, FIRST GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a first generation fold and the earths surface, where the relative stratigraphic ages of the folded rocks are not known..	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** TRACE AXIAL SURFACE, RECUMBENT FOLD, FIRST GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 250 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a first generation fold and the earths surface, where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

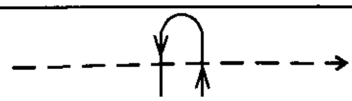
Group: FOLD ELEMENTS	**Symbol Description:** TRACE AXIAL SURFACE, RECUMBENT FOLD, FIRST GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a first generation fold and the earths surface, where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

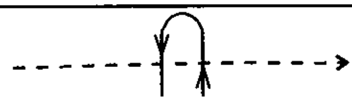
Group: FOLD ELEMENTS	**Symbol Description:** TRACE AXIAL SURFACE, RECUMBENT FOLD, SECOND GENERATION, DEFINED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a second generation fold and the earths surface, where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** TRACE AXIAL SURFACE, RECUMBENT FOLD, SECOND GENERATION, APPROXIMATE
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a second generation fold and the earths surface, where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** TRACE AXIAL SURFACE, RECUMBENT FOLD, SECOND GENERATION, ASSUMED
Cartographic Definition: 	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a second generation fold and the earths surface, where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

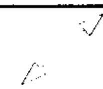
Group: FOLD ELEMENTS	**Symbol Description:** TRACE AXIAL SURFACE, RECUMBENT FOLD, UNKNOWN GENERATION, DEFINED
Cartographic Definition:	
Positional Definition: Location is accurate to within 50 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a fold of unknown generation and the earths surface, where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by long line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** TRACE AXIAL SURFACE, RECUMBENT FOLD, UNKNOWN GENERATION, APPROXIMATE
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a fold of unknown generation and the earths surface, where the relative stratigraphic ages of the folded rocks are not known.	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** SYNFORM, TRACE AXIAL SURFACE, RECUMBENT, UNKNOWN GENERATION, ASSUMED
Cartographic Definition:	
Positional Definition: Location is accurate to within 500 metres of position shown.	
Definition: The trace of the intersection between the horizontal or near horizontal axial surface of a fold of unknown generation and the earths surface, where the relative stratigraphic ages of the folded rocks are not known..	**Remarks:** Trace of axial surface shown by dashed line, attached arrow indicates general plunge of fold axis. Convex part of symbol points in direction of fold closure.
CAD Layer: SOsync	**Feature Code:**

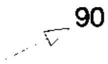
G: LINEAR ELEMENTS

G-1: LINEATIONS

Group: LINEAR ELEMENTS	**Symbol Description:** PRIMARY BEDDING, / SEDIMENTARY LINEATION, HORIZONTAL
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: Any linear structure along a bedding plane (e.g. ripple mark, sole mark, long axis of clasts or fossils) produced at time of deposition of the sedimentary rock and which is now horizontal.	**Remarks:** Azimuth indicated by long axis of symbol.
CAD Layer: SDlinea	**Feature Code:**

Group: LINEAR ELEMENTS	**Symbol Description:** PRIMARY BEDDING, / SEDIMENTARY LINEATION, INCLINED
Cartographic Definition:	 46
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: Any linear structure along a bedding plane (e.g. ripple mark, sole mark, long axis of clasts or fossils) produced at time of deposition of the sedimentary rock and which is now inclined.	**Remarks:** Azimuth indicated by long axis of symbol. Inclination direction of lineation shown by arrow and given in degrees from horizontal. Estimated plunge; g=gentle, m=moderate, s=steep.
CAD Layer: SDlinea	**Feature Code:**

Group: LINEAR ELEMENTS	**Symbol Description:** PRIMARY BEDDING, / SEDIMENTARY LINEATION, INCLINED, PLUNGE ANGLE UNKNOWN
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: Any linear structure along a bedding plane (e.g. ripple mark, sole mark, long axis of clasts or fossils) produced at time of deposition of the sedimentary rock and which is now inclined with unknown plunge.	**Remarks:** Azimuth indicated by long axis of symbol. Inclination direction of lineation given by arrow.
CAD Layer: SDlinea	**Feature Code:**

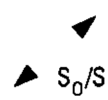
Group: LINEAR ELEMENTS	**Symbol Description:** PRIMARY BEDDING, / SEDIMENTARY LINEATION, VERTICAL
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: Any linear structure along a bedding plane (e.g. ripple mark, sole mark, long axis of clasts or fossils) produced at time of deposition of the sedimentary rock and which is now vertical.	**Remarks:**
CAD Layer: SDlinea	**Feature Code:**

Group: LINEAR ELEMENTS	**Symbol Description:** MINERAL LINEATION, HORIZONTAL
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The direction in which crystals, grains or pebbles have been demonstrably extended by ductile flow or pulled apart and where the extension direction is horizontal.	**Remarks:** Azimuth indicated by long axis of symbol; mineral involved may be indicated by adding abbreviation of name beside symbol.
CAD Layer: SDlinea	**Feature Code:**

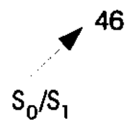
Group: LINEAR ELEMENTS	**Symbol Description:** MINERAL LINEATION, INCLINED
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The direction in which crystals, grains or pebbles have been demonstrably extended by ductile flow or pulled apart and where the extension direction is inclined.	**Remarks:** Azimuth indicated by long axis of symbol. Inclination direction of lineation shown by arrow and given in degrees from horizontal. Estimated plunge; g=gentle, m=moderate, s=steep; mineral involved may be indicated by adding abbreviation of name beside symbol..
CAD Layer: SDlinea	**Feature Code:**

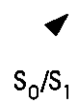
Group: LINEAR ELEMENTS	**Symbol Description:** MINERAL LINEATION, INCLINED, PLUNGE ANGLE UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The direction in which crystals, grains or pebbles have been demonstrably extended by ductile flow or pulled apart and where the extension direction is unknown.	**Remarks:** Azimuth indicated by long axis of symbol. Inclination direction of lineation given by arrow; mineral involved may be indicated by adding abbreviation of name beside symbol..
CAD Layer: SDlinea	**Feature Code:**

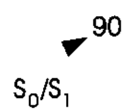
Group: LINEAR ELEMENTS	**Symbol Description:** MINERAL LINEATION, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: The direction in which crystals, grains or pebbles have been demonstrably extended by ductile flow or pulled apart and where the extension direction is vertical.	**Remarks:** Mineral involved may be indicated by adding abbreviation of name beside symbol.
CAD Layer: SDlinea	**Feature Code:**

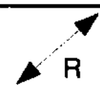
Group: LINEAR ELEMENTS	**Symbol Description:** INTERSECTION LINEATION, HORIZONTAL
Cartographic Definition: Indicate nature of planar elements, for example here is bedding (S_o) and phase one cleavage (S_1) intersection 	
Positional Definition: Location of data point corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A lineation produced by the intersection of two planar elements, such as bedding and foliation, or two foliations, and which is now horizontal. Estimated dip; g=gentle, m=moderate, s=steep.	**Remarks:** Azimuth indicated by long axis of symbol.
CAD Layer: SDlinea	**Feature Code:**

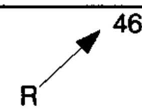
Group: LINEAR ELEMENTS	**Symbol Description:** INTERSECTION LINEATION, INCLINED

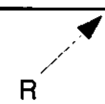
Cartographic Definition:	Indicate nature of planar elements, for example here is bedding (S_o) and phase one cleavage (S_1) intersection 
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A lineation produced by the intersection of two planar elements, such as bedding and foliation, or two foliations, and which is now inclined.	**Remarks:** Azimuth indicated by long axis of symbol. Inclination direction of lineation shown by arrow and given in degrees from horizontal. Estimated plunge; g=gentle, m=moderate, s=steep.
CAD Layer: SDlinea	**Feature Code:**

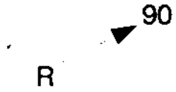
Group: LINEAR ELEMENTS	**Symbol Description:** INTERSECTION LINEATION, INCLINED, PLUNGE ANGLE UNKNOWN
Cartographic Definition:	Indicate nature of planar elements, for example here is bedding (S_o) and phase one cleavage (S_1) intersection 
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A lineation produced by the intersection of two planar elements, such as bedding and foliation, or two foliations, with unknown plunge.	**Remarks:** Azimuth indicated by long axis of symbol. Inclination direction of lineation given by arrow.
CAD Layer: SDlinea	**Feature Code:**

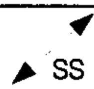
Group: LINEAR ELEMENTS	**Symbol Description:** INTERSECTION LINEATION, VERTICAL
Cartographic Definition:	Indicate nature of planar elements, for example bedding (S_o) and phase one cleavage (S_1) 
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A lineation produced by the intersection of two planar elements, such as bedding and foliation, or two foliations, and which is now vertical.	**Remarks:**
CAD Layer: SDlinea	**Feature Code:**

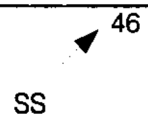
Group: LINEAR ELEMENTS	**Symbol Description:** RODDING MULLION STRUCTURE, HORIZONTAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A linear structure, most commonly consisting of quartz, which has been shaped into a rod or series of parallel rods, embedded in weaker material like mica schist and where the rods are now horizontal.	**Remarks:** Azimuth indicated by long axis of symbol.
CAD Layer: SDlinea	**Feature Code:**

Group: LINEAR ELEMENTS	**Symbol Description:** RODDING MULLION STRUCTURE, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A linear structure, most commonly consisting of quartz, which has been shaped into a rod or series of parallel rods, embedded in weaker material like mica schist and where the rods are now vertical.	**Remarks:** Azimuth indicated by long axis of symbol. Inclination direction of lineation shown by arrow and given in degrees from horizontal. Estimated plunge; g=gentle, m=moderate, s=steep.
CAD Layer: SDlinea	**Feature Code:**

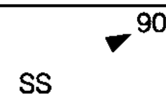
Group: LINEAR ELEMENTS	**Symbol Description:** RODDING MULLION STRUCTURE, INCLINED, PLUNGE ANGLE UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A linear structure, most commonly consisting of quartz, which has been shaped into a rod or series of parallel rods, embedded in weaker material like mica schist and where the plunge of the rods is unknown.	**Remarks:** Azimuth indicated by long axis of symbol. Inclination direction of lineation given by arrow.
CAD Layer: SDlinea	**Feature Code:**

Group: LINEAR ELEMENTS	**Symbol Description:** RODDING MULLION STRUCTURE, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A linear structure, most commonly consisting of quartz, which has been shaped into a rod or series of parallel rods, embedded in weaker material like mica schist and where the rods are now vertical.	**Remarks:**
CAD Layer: SDlinea	**Feature Code:**

Group: LINEAR ELEMENTS	**Symbol Description:** SLICKENSIDE STRIAE, HORIZONTAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A polished, striated surface on a fault plane that has been smoothed and scratched by abrasion due to displacement along the fault and where the striae are horizontal.	**Remarks:** Azimuth indicated by long axis of symbol.
CAD Layer: SDlinea	**Feature Code:**

Group: LINEAR ELEMENTS	**Symbol Description:** SLICKENSIDE STRIAE, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A polished, striated surface on a fault plane that has been smoothed and scratched by abrasion due to displacement along the fault and where the striae are inclined.	**Remarks:** Azimuth indicated by long axis of symbol. Inclination direction of lineation shown by arrow and given in degrees from horizontal. Estimated plunge; g=gentle, m=moderate, s=steep.
CAD Layer: SDlinea	**Feature Code:**

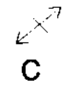
<table>
<tr><td>Group: LINEAR ELEMENTS</td><td colspan="2">Symbol Description: SLICKENSIDE STRIAE, INCLINED, PLUNGE ANGLE UNKNOWN</td></tr>
<tr><td colspan="3">Cartographic Definition:  </td></tr>
<tr><td colspan="3">Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.</td></tr>
<tr><td colspan="2">Definition: A polished, striated surface on a fault plane that has been smoothed and scratched by abrasion due to displacement along the fault and where the plunge of the striae is unknown.</td><td>Remarks: Azimuth indicated by long axis of symbol. Inclination direction of lineation given by arrow.</td></tr>
<tr><td colspan="2">CAD Layer: SDlinea</td><td>Feature Code:</td></tr>
</table>

<table>
<tr><td>Group: LINEAR ELEMENTS</td><td colspan="2">Symbol Description: SLICKENSIDE STRIAE, VERTICAL</td></tr>
<tr><td colspan="3">Cartographic Definition:  </td></tr>
<tr><td colspan="3">Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.</td></tr>
<tr><td colspan="2">Definition: A polished, striated surface on a fault plane that has been smoothed and scratched by abrasion due to displacement along the fault and where the striae are vertical.</td><td>Remarks:</td></tr>
<tr><td colspan="2">CAD Layer: SDlinea</td><td>Feature Code:</td></tr>
</table>

G-2: MINOR FOLD ELEMENTS

Group: FOLD ELEMENTS	**Symbol Description:** CRENULATION LINEATION, SECOND GENERATION ON FIRST GENERATION, HORIZONTAL

Cartographic Definition:

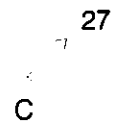


Positional Definition: Location of data point corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.

Definition: A linear, millimetre-scale crinkling or corrugation of a foliation, representing the hinge lines of microfolds of that fabric which effectively represents the axis of that folding and which is now horizontal.	**Remarks:** Azimuth indicated by long axis of symbol.
CAD Layer: SDlinea	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** CRENULATION LINEATION, SECOND GENERATION ON FIRST GENERATION, INCLINED

Cartographic Definition:

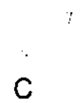


Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.

Definition: A linear, millimetre-scale crinkling or corrugation of a foliation, representing the hinge lines of microfolds of that fabric which effectively represents the axis of that folding and which is now inclined.	**Remarks:** Azimuth indicated by long axis of symbol. Inclination direction of lineation shown by arrow and given in degrees from horizontal. Estimated plunge; g=gentle, m=moderate, s=steep.
CAD Layer: SDlinea	**Feature Code:**

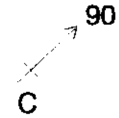
Group: FOLD ELEMENTS	**Symbol Description:** CRENULATION LINEATION, SECOND GENERATION ON FIRST GENERATION, INCLINED, PLUNGE UNKNOWN

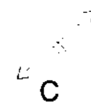
Cartographic Definition:

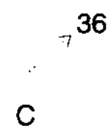


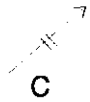
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.

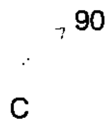
Definition: A linear, millimetre-scale crinkling or corrugation of a foliation, representing the hinge lines of microfolds of that fabric which effectively represents the axis of that folding and whose plunge is indeterminate.	**Remarks:** Azimuth indicated by long axis of symbol. Inclination direction of lineation given by arrow.
CAD Layer: SDlinea	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** CRENULATION LINEATION, SECOND GENERATION ON FIRST GENERATION, VERTICAL
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A linear, millimetre-scale crinkling or corrugation of a foliation, representing the hinge lines of microfolds of that fabric which effectively represents the axis of that folding and which is now vertical.	**Remarks:**
CAD Layer: SDlinea	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** CRENULATION LINEATION, THIRD GENERATION ON FIRST GENERATION, HORIZONTAL
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A linear, millimetre-scale crinkling or corrugation of a foliation, representing the hinge lines of microfolds of that fabric which effectively represents the axis of that folding and which is now horizontal.	**Remarks:** Azimuth indicated by long axis of symbol.
CAD Layer: SDlinea	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** CRENULATION LINEATION, THIRD GENERATION ON FIRST GENERATION, INCLINED
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A linear, millimetre-scale crinkling or corrugation of a foliation, representing the hinge lines of microfolds of that fabric which effectively represents the axis of that folding and which is now inclined.	**Remarks:** Azimuth indicated by long axis of symbol. Inclination direction of lineation shown by arrow and given in degrees from horizontal. Estimated plunge; g=gentle, m=moderate, s=steep.
CAD Layer: SDlinea	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** CRENULATION LINEATION, THIRD GENERATION ON FIRST GENERATION, INCLINED, PLUNGE UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A linear, millimetre-scale crinkling or corrugation of a foliation, representing the hinge lines of microfolds of that fabric which effectively represents the axis of that folding, but with indeterminate plunge.	**Remarks:** Azimuth indicated by long axis of symbol. Inclination direction of lineation given by arrow.
CAD Layer: SDlinea	**Feature Code:**

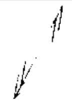
Group: FOLD ELEMENTS	**Symbol Description:** CRENULATION LINEATION, THIRD GENERATION ON FIRST GENERATION, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A linear, millimetre-scale crinkling or corrugation of a foliation, representing the hinge lines of microfolds of that fabric which effectively represents the axis of that folding and which is now vertical.	**Remarks:**
CAD Layer: SDlinea	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, FOLD AXIS, FIRST GENERATION, HORIZONTAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes a horizontal axis of a first generation fold which shows no symmetry.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis1	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, FOLD AXIS, FIRST GENERATION, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes an inclined axis of a first generation fold which shows no symmetry.	**Remarks:** Azimuth indicated by long line of symbol. Inclination direction shown by arrow and given in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SKfaxis1	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, FOLD AXIS, FIRST GENERATION, PLUNGE UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes axis of a first generation fold whose plunge is indeterminate and which shows no symmetry.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis1	**Feature Code:**

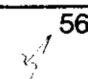
Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, FOLD AXIS, FIRST GENERATION, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes a vertical axis of a first generation fold which shows no symmetry.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis1	**Feature Code:**

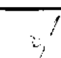
Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, FOLD AXIS, SECOND GENERATION, HORIZONTAL
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the centre of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes a horizontal axis of a second generation fold which shows no symmetry.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis2	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, FOLD AXIS, SECOND GENERATION, INCLINED
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes an inclined axis of a second generation fold which shows no symmetry.	**Remarks:** Azimuth indicated by long line of symbol. Inclination direction shown by arrow and given in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SKfaxis2	**Feature Code:**

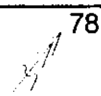
Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, FOLD AXIS, SECOND GENERATION, PLUNGE UNKNOWN
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes axis of a second generation fold whose plunge is indeterminate and which shows no symmetry.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis2	**Feature Code:**

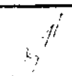
Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, FOLD AXIS, SECOND GENERATION, VERTICAL
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes a vertical axis of a second generation fold which shows no symmetry.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis2	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'M' SYMMETRY, FIRST GENERATION, INCLINED
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes an inclined axis of a first generation fold which shows 'M' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol. Inclination direction shown by arrow and given in degrees from the horizontal. Estimated plunge; g=gentle, m=moderate, s=steep.
CAD Layer: SKfaxis1	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'M' SYMMETRY, FIRST GENERATION, PLUNGE UNKNOWN
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes an axis of a first generation fold, with indeterminate plunge, which shows 'M' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis1	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'M' SYMMETRY, FIRST GENERATION, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes a vertical axis of a first generation fold which shows 'M' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis1	**Feature Code:**

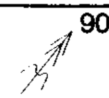
Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'M' SYMMETRY, SECOND GENERATION, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes an inclined axis of a second generation fold which shows 'M' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol. Inclination direction shown by arrow and given in degrees from the horizontal. Estimated plunge; g=gentle, m=moderate, s=steep.
CAD Layer: SKfaxis2	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'M' SYMMETRY, SECOND GENERATION, PLUNGE UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes an axis of a second generation fold with indeterminate plunge which shows 'M' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis2	**Feature Code:**

Group: FOLD ELEMENTS

Symbol Description: MINOR FOLD, 'M' SYMMETRY, SECOND GENERATION, VERTICAL

Cartographic Definition:



Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.

Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes a vertical axis of a second generation fold which shows 'M' symmetry looking down the fold axis.

Remarks: Azimuth indicated by long line of symbol.

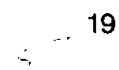
CAD Layer: SKfaxis2

Feature Code:

Group: FOLD ELEMENTS

Symbol Description: MINOR FOLD, 'S' SYMMETRY, FIRST GENERATION, INCLINED

Cartographic Definition:



Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.

Definition: A fold axis is a line measured along the crest of a fold; if moved parallel to itself this line will describe the form of the fold. This symbol describes an inclined axis of a first generation fold which shows 'S' symmetry looking down the fold axis.

Remarks: Azimuth indicated by long line of symbol. Inclination direction shown by arrow and given in degrees from the horizontal. Estimated plunge; g=gentle, m=moderate, s=steep.

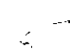
CAD Layer: SKfaxis1

Feature Code:

Group: FOLD ELEMENTS

Symbol Description: MINOR FOLD, 'S' SYMMETRY, FIRST GENERATION, PLUNGE UNKNOWN

Cartographic Definition:



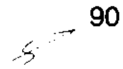
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.

Definition: A fold axis is an imaginary line which, when moved parallel to itself, describes the form of a fold. This symbol describes an axis of a first generation fold with indeterminate plunge and which shows 'S' symmetry looking down the fold axis.

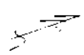
Remarks: Azimuth indicated by long line of symbol.

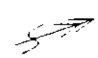
CAD Layer: SKfaxis1

Feature Code:

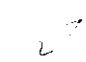
Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'S' SYMMETRY, FIRST GENERATION, VERTICAL
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is an imaginary line which, when moved parallel to itself, describes the form of a fold. This symbol describes a vertical axis of a first generation fold which shows 'S' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis1	**Feature Code:**

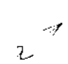
Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'S' SYMMETRY, SECOND GENERATION, INCLINED
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is an imaginary line which, when moved parallel to itself, describes the form of a fold. This symbol describes an inclined axis of a second generation fold which shows 'S' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol. Inclination direction shown by arrow and given in degrees from the horizontal. Estimated plunge; g=gentle, m=moderate, s=steep.
CAD Layer: SKfaxis2	**Feature Code:**

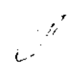
Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'S' SYMMETRY, SECOND GENERATION, PLUNGE UNKNOWN
Cartographic Definition:	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is an imaginary line which, when moved parallel to itself, describes the form of a fold. This symbol describes an axis of a second generation fold with indeterminate plunge which shows 'S' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis2	**Feature Code:**

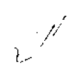
Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'S' SYMMETRY, SECOND GENERATION, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is an imaginary line which, when moved parallel to itself, describes the form of a fold. This symbol describes a vertical axis of a second generation fold which shows 'S' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis2	**Feature Code:**

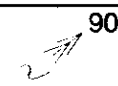
Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'Z' SYMMETRY, FIRST GENERATION, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is an imaginary line which, when moved parallel to itself, describes the form of a fold. This symbol describes an inclined axis of a first generation fold which shows 'Z' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol. Inclination direction shown by arrow and given in degrees from the horizontal. Estimated plunge; g=gentle, m=moderate, s=steep.
CAD Layer: SKfaxis1	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'Z' SYMMETRY, FIRST GENERATION, PLUNGE UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is an imaginary line which, when moved parallel to itself, describes the form of a fold. This symbol describes an axis of a first generation fold with indeterminate plunge which shows 'Z' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis1	**Feature Code:**

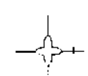
Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'Z' SYMMETRY, FIRST GENERATION, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is an imaginary line which, when moved parallel to itself, describes the form of a fold. This symbol describes a vertical axis of a first generation fold which shows 'Z' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis1	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'Z' SYMMETRY, SECOND GENERATION, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is an imaginary line which, when moved parallel to itself, describes the form of a fold. This symbol describes an inclined axis of a second generation fold which shows 'Z' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol. Inclination direction shown by arrow and given in degrees from the horizontal. Estimated plunge; g=gentle, m=moderate, s=steep.
CAD Layer: SKfaxis2	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'Z' SYMMETRY, SECOND GENERATION, PLUNGE UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is an imaginary line which, when moved parallel to itself, describes the form of a fold. This symbol describes an axis of a second generation fold with indeterminate plunge which shows 'Z' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis2	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, 'Z' SYMMETRY, SECOND GENERATION, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the tail of the symbol unless a positional line connects the symbol to the actual location point.	
Definition: A fold axis is an imaginary line which, when moved parallel to itself, describes the form of a fold. This symbol describes a vertical axis of a second generation fold which shows 'Z' symmetry looking down the fold axis.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SKfaxis2	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, AXIAL PLANE, FIRST GENERATION, DIP UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: The axial plane (whose dip is indeterminate) of a small-scale fold associated with, and the same age as, a larger first generation fold.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SAstru	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, AXIAL PLANE, FIRST GENERATION, HORIZONTAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: The horizontal axial plane of a small-scale fold associated with, and the same age as, a larger first generation fold.	**Remarks:**
CAD Layer: SAstru	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, AXIAL PLANE, FIRST GENERATION, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: The inclined axial plane of a small-scale fold associated with, and the same age as, a larger first generation fold.	**Remarks:** Azimuth indicated by long line of symbol. Inclination direction indicated by small tick and given in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SAstru	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, AXIAL PLANE, FIRST GENERATION, VERTICAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: The vertical axial plane of a small-scale fold associated with, and the same age as, a larger first generation fold.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SAstru	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, AXIAL PLANE, SECOND GENERATION, DIP UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: The axial plane (with indeterminate dip) of a small-scale fold associated with, and the same age as, a larger second generation fold.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SAstru	**Feature Code:**

<table>
<tr><td>Group: FOLD ELEMENTS</td><td>Symbol Description: MINOR FOLD, AXIAL PLANE, SECOND GENERATION, HORIZONTAL</td></tr>
<tr><td colspan="2">Cartographic Definition: </td></tr>
<tr><td colspan="2">Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.</td></tr>
<tr><td>Definition: The horizontal axial plane of a small-scale fold associated with, and the same age as, a larger second generation fold.</td><td>Remarks:</td></tr>
<tr><td>CAD Layer: SAstru</td><td>Feature Code:</td></tr>
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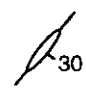
<tr><td colspan="2">Cartographic Definition: </td></tr>
<tr><td colspan="2">Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.</td></tr>
<tr><td>Definition: The inclined axial plane of a small-scale fold associated with, and the same age as, a larger second generation fold.</td><td>Remarks: Azimuth indicated by long line of symbol. Inclination direction indicated by small tick and given in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.</td></tr>
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<tr><td>Definition: The vertical axial plane of a small-scale fold associated with, and the same age as, a larger second generation fold.</td><td>Remarks: Azimuth indicated by long line of symbol.</td></tr>
<tr><td>CAD Layer: SAstru</td><td>Feature Code:</td></tr>
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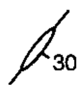
Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, AXIAL PLANE, UNKNOWN GENERATION, DIP UNKNOWN
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: The axial plane (whose dip is indeterminate) of a small-scale fold associated with, and the same age as, a larger fold of unknown generation.	**Remarks:** Azimuth indicated by long line of symbol.
CAD Layer: SAstru	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, AXIAL PLANE, UNKNOWN GENERATION, HORIZONTAL
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: The horizontal axial plane of a small-scale fold associated with, and the same age as, a larger fold of unknown generation.	**Remarks:**
CAD Layer: SAstru	**Feature Code:**

Group: FOLD ELEMENTS	**Symbol Description:** MINOR FOLD, AXIAL PLANE, UNKNOWN GENERATION, INCLINED
Cartographic Definition: 	
Positional Definition: Location of data point corresponds to the centre of the strike line or to the connecting point with another symbol. A positional line may also connect these points to the actual location point.	
Definition: The inclined axial plane of a small-scale fold associated with, and the same age as, a larger fold of unknown generation.	**Remarks:** Azimuth indicated by long line of symbol. Inclination direction indicated by small tick and given in degrees from the horizontal. Estimated dip; g=gentle, m=moderate, s=steep.
CAD Layer: SAstru	**Feature Code:**

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<tr><td colspan="2">Definition: The vertical axial plane of a small-scale fold associated with, and the same age as, a larger fold of unknown generation.</td><td>Remarks: Azimuth indicated by long line of symbol.</td></tr>
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