U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

Digital representation of the Idaho state geologic map: a contribution to the Interior Columbia River Basin Ecosystem Management Project

by

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Open File Report 95-690

Prepared in cooperation with the U.S. Forest Service and Bureau of Land Management.

1996

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Acknowledgments

Digital products such as this map would not exist without the geologic mapping of generations of geologists whose work contributed to the small-scale state geologic maps that have been published by most states. We gratefully acknowledge the work of the geologists and agencies that supported compilation of this map. Those agencies include the U.S. Geological Survey and the Washington State Department of Natural Resources.

USGS geologists, Thor Kiilsgaard and Fred Miller, provided useful advice about regional geology and the identification of unlabeled features on the published state geologic maps.

We particularly wish to acknowledge Patrick Geehan, the Bureau of Land Management Project coordinator for the Interior Columbia River Basin Ecosystem Management Project, for recognizing the importance of geology to ecosystem management and for supplying funds to digitize the Washington map.

Introduction

This report provides the digital representation of the Idaho state geologic map (Bond and Wood, 1978). This report contains an explantion of why the data were prepared, a description of the digital data, and information on obtaining the digital files. This report is one in a series of digital maps, data files, and reports generated by the U.S. Geological Survey to provide geologic process and mineral resource information to the Interior Columbia Basin Ecosystem Management Project (ICBEMP). The various digital maps and data files are being used in a geographic information system (GIS)-based ecosystem assessment including an analysis of diverse questions relating to past, present, and future conditions within the general area of the Columbia River Basin east of the Cascade Mountains.

The Interior Columbia Basin Ecosystem Management Project

In July of 1993, President Clinton directed the Forest Service (USFS) to “develop a scientifically sound and ecosystem-based strategy for management of eastside forests.” (SIT, 1994) What was first called the Eastside Ecosystem Management Project was chartered in January, 1994, by the Chief of the Forest Service and Director of the Bureau of Land Management (BLM) in response to the President's directive and charged to “develop an ecosystem management framework and assessment for land administered by the Forest Service and the Bureau of Land Management on those lands east of the Cascade crest in Washington and Oregon and within the interior Columbia River Basin.” (SIT, 1994) The driving force behind the project was the need to develop a strategy for dealing with anadromous fish habitat and watershed conservation and to develop overall land management policy in eastern Oregon and Washington. When it subsequently became clear that similar strategies were needed for anadromous fish in the remainder of the Columbia River Basin (particularly in Idaho and Montana), the project was extended to include all of the Columbia River drainage basin in the United States, east of the Cascade Mountain divide plus the remainder of southeastern Oregon, which is not within the drainage basin (fig. 1). At that time, the project was renamed the Interior Columbia Basin Ecosystem Management Project (ICBEMP).

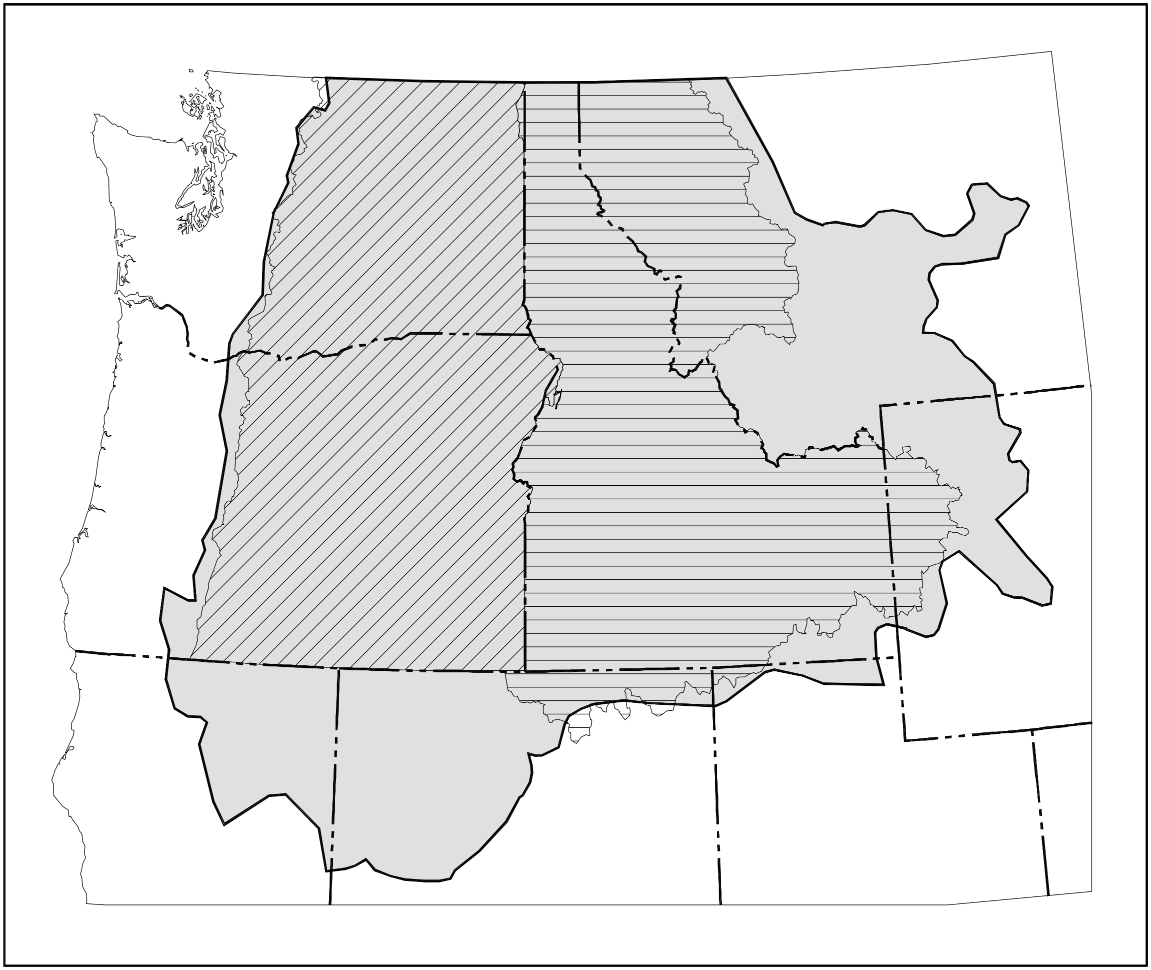

Figure 1. Index map showing the geographic extent of the Interior Columbia Basin Ecosystem Management Project. Shown on the map are the Landscape Characterization Area (grey shading) which is the study area used by most Science Integration Team staff areas, the Eastside EIS area (diagonal hatching), and the Upper Columbia EIS area (horizontal hatching).

The ICBEMP is producing scientific assessments of current and historic landscape conditions; aquatic and terrestrial habitat, species distributions, and populations; and economic and social conditions as well as the potential future conditions and possible tradeoffs likely to result from a range of possible disturbances and management practices on public lands in the basin. Although the scientific assessment is being conducted for the entire basin, the management decisions that will result from the assessments will be for public lands (USFS and BLM) only.

The goal of the ICBEMP management strategy is to provide management tools to sustain or restore ecosystem integrity and produce desired conditions, uses, products, values, and services over the long term. The intent of the project is to understand the ramifications of management practices or disturbances both in the area subject to the practice or disturbance as well as effects which may be removed, in time and space, from the area.

The project objectives are to:

- Conduct a broad integrated scientific assessment of the resources within the interior Columbia River basin to characterize and assess landscape, ecosystem, social, and economic processes and functions and describe probable outcomes of various management practices and trends.
- Develop an ecosystem management framework that includes principles and processes which may be used in a National Environmental Protection Act (NEPA) process to develop management direction for federal agencies at all levels with the basin.
- Write an Eastside Environmental Impact Statement (EIS) proposing a broad array of management alternatives for an area that encompasses ten national forests and portions of four BLM districts in eastern Washington and Oregon (fig. 1).
- Write an Upper Columbia River Basin EIS with a similar array of management alternatives for an area that encompasses lands administered by the BLM and USFS in Idaho, western Montana, Wyoming, Utah, and Nevada within the Columbia River Basin (fig. 1).
- Conduct a scientific evaluation of issues and alternatives identified through the NEPA scoping process for the Eastside EIS.

The ICBEMP is an intense, short term assessment and planning activity used to develop a set of regional implementation management alternatives. These alternatives, derived from basin-wide analyses of regional (1:500,000 and 1:1,000,000 scales) and locally more detailed (1:100,000 scale) data, will form a framework for implementation decisions at the local level. This framework will then be adapted as better data and understanding of the basin are developed. The project will provide a basin-wide, digital data framework that will evolve and improve as higher resolution data become available. All data are being collected in a GIS-compatible format for digital display, analysis, and distribution. Information on the availability of all digital data sets, paper maps, and other reports generated by the ICBEMP can be obtained from:

Interior Columbia Basin Ecosystem Management Project
ATTN: Cindy Dean
112 E. Poplar Street
Walla Walla, WA 99362
(509) 522-4030

or from:
Bureau of Land Management
ATTN: Becky Gravenmeier, OR99.2
Oregon - Washington State Office
P.O. Box 2965
Portland, OR 97208
(503) 952-6273

Project extent and scale

The scope and extent of the project area varies depending on the objective. The broad scientific assessment considers all lands, not just those that are federally managed. It is focused on the Columbia River Basin but is not strictly limited to the actual drainage basin boundaries. Some scientific assessment staff areas have extended their work beyond the formal project area because factors such as wildfires and wildlife migration are not limited to drainage divides or political boundaries. Most staff areas use the Landscape Characterization boundary developed by the Landscape Ecology group (fig. 1). The broad assessment uses information suitable for compilation at a scale of 1:1,000,000.

U.S. Geological Survey involvement

In May, 1994, the USGS approached ICBEMP staff about providing estimates of undiscovered mineral resources to the economic, landscape ecology, and aquatic-riparian assessment staff. In discussions with members of various staff areas, it became apparent that the USGS could also provide geoscientific background information relevant to the assessment of historic, current, and future ecological, economic, and social systems. Within the ICBEMP's tight schedule (7 months from the USGS start date until the information had to be available to the rest of the Science Integration Team), the USGS was able to provide basin-wide, integrated, digital information about bedrock lithology, compositional classifications of lithology, potential animal habitat, stream sediment geochemistry, volcanic and earthquake hazards, and mineral resources. The bedrock lithology information is summarized in Johnson and Raines (1995). The potential animal habitat information is summarized in Frost, Raines, Almquist, and Johnson (1996). The stream sediment geochemistry is summarized in Raines and Smith (1996). The digital hazards information was derived from Algermissen, et al (1990) and Hoblitt, Miller, and Scott (1987). The mineral resources information is summarized in Box and others (1996); Bookstrom, Zientek, and others (1996); Zientek and others (1996); and Bookstrom, Raines, and Johnson (1996). The compositionally classified lithology information is reported Raines and others (1996). The bedrock lithology, compositionally classified lithology, and potential animal habitat maps were all derived from interpretation of state geologic maps at scales of 1:500,000 to 1:750,000. Johnson and Raines (1995) summarizes the strategy that was used for the rapid analysis of geologic map data using GIS techniques. Considerably more information was identified as potentially useful to the ICBEMP, but integrated digital products could not be provided for the entire study area within the time frame of the assessment.

Data Sources, Processing, and Accuracy

The starting point for the digital geology map of Idaho was a paper copy of the published geologic map (Bond and Wood, 1978). The characteristics of the source material is summarized in Table 1. The map was processed in the ARC/INFO GIS of ESRI and based on the results presented in Table 1 is considered an accurate geographic representations of the original map.

State	Date	Scale	Source Material	Registration Error (RMS) input (inches), output (meters)
Idaho	1978	1:500,000	Paper	0.011, 145.720

Table 1. Source of materials and registration errors for the digital geologic map of Idaho. The registration root-mean-square (RMS) errors are obtained while transforming from scanner units of inches (input in table) to real world coordinates of meters (output in table). These errors are the RMS difference between the scanned latitude-longitude location points from the source material and the calculated locations of these points.

The map was processed digitally, as follows: the source material was scanned, the scanned image was vectorized and topologically structured, the lines and polygons were edited and proofed, attributes were added and proofed, the map was transformed from scanner units to geographic coordinates, and finally, map distortions were removed by rubber-sheeting. The initial objective was to obtain a digital representation that, when plotted, would overlay the source material within a line width; the digital version of the map meets this test.

A measure of the geometric accuracy of the source materials (as represented digitally) was obtained by comparing 21 points with known latitudes and longitudes from the source material with calculated locations of these points. The result of this comparison is the registration root-mean-square error (RMS error in Table 1). Appendix B contains a detailed breakdown of registration errors for each point. The RMS error on this map (145 meters) is slightly larger than the national standard for 1:500,000-scale topographic base maps (plus or minus 140 meters horizontally), which is probably attributable to the age and condition of the paper source materials.

Each polygon and line on the digital map was assigned attribute information based on the original map explanation. Details of the attributes used and the values which those attributes can contain are given in Appendix A. At least two GIS coverages are required to efficiently represent a geologic map. One coverage (idgeol) contains all of the polygon data and all of the contacts between polygons. To prevent polygons from being dissected by cross-cutting lines, a second coverage (idfaults) is used to contain all of the linework other than contacts (faults, fold axes, etc.) Where the contact between polygons (lithologic units) represents a fault, the identical line (fault/contact) will exist in both coverages. An additional coverage is the geologic point features (idpnt), such as hot springs, that are included on the published map. Appendix B contains detailed documentation of the three coverages which were used to represent the map digitally. There were approximately 100 to 200 tiny polygons on the original map that were either ambiguously attributed or un-attributed on the original published map. These polygons were assigned map-unit attributes by consultation with regional experts and inspection of more detailed maps.

Obtaining Digital Data

To obtain copies of the digital data, do the following:

1. Download the digital files from the USGS public access World Wide Web site on the Internet.

URL = http://wrgis.wr.usgs.gov/docs/geologic/id/idaho.html

The World Wide Web site contains the three geologic GIS coverage in Arc/Info Export file format as well as the associated data files and Arc/Info macro programs which are used to plot the map at 1:1,000,000 and 1:2,000,000 scales. Use of this data requires a GIS that is capable of reading Arc/Info Export formatted files and a computer capable of reading UNIX ASCII files. To use these files on a DOS computer, they must be put through a unix-to-dos filter.
Or,

2. Obtain the digital files from the ICBEMP project office. Contact information is given in the section, **U.S. Geological Survey involvement**, above.

Digital versions of other state geologic maps in the Northwest are available as follows:

Arizona	Data files are available at **http://geology.wr.usgs.gov/docs/geologic/az/arizona.html**
California:	Contact the California Division of Mines and Geology, 1416 Ninth Street, Room 1341, Sacramento, CA 95814
Montana:	Raines and Johnson (1996a)
Nevada:	Turner and Bawiec (1991) — CD-ROM
Oregon:	Data files are available at **http://geology.wr.usgs.gov/docs/geologic/or/oregon.html**
Utah:	Data files are available from **http://geology.wr.usgs.gov/docs/geologic/ut/utah.html**
Washington:	Raines and Johnson (1996b)
Wyoming:	Green and Drouillard (1994) This report is a description of the digital data files only. The data files are available from http://pubs.usgs.gov/of/1994/ofr-94-0425/

Obtaining Paper Maps

Paper copies of the Idaho state geologic map are not available from the USGS. Printed copies of the original published geologic map may be available from the Idaho Geological Survey. Paper copies of the map can also be created by obtaining the digital files as described above, and then creating a plot file in a GIS.

References Cited

Algermissen, S. T., Perkins, D. M., Thenhaus, P. C., Hanson, S. L., and Bender, B. L., 1990, Probabilistic earthquake acceleration and velocity maps for the United States and Puerto Rico: U.S. Geological Survey Miscellaneous Field Studies Map, MF-2120, scale 1:7,500,000.

Bond, J.G., and Wood, C.H., 1978, Geologic map of Idaho: Idaho Department of Lands, Bureau of Mines and Geology, 1 plate, scale 1:500,000.

Bookstrom, A. A., Raines, G. L., and Johnson, B. R., 1996, Digital mineral resource maps of phosphate and natural aggregate in the Pacific Northwest: a contribution to the Interior Columbia Basin Ecosystem Management Project: U.S. Geological Survey Open-File Report 95-681, 31 pp.

Bookstrom, A. A., Zientek, M. L., Box, S. E., Derkey, P. D., Elliott, J. E., Frishman, David, Evarts, R. C., Ashley, R. P., Moyer, L. A., Cox, D. P., and Ludington, S. D., 1996, Status and contained metal content of significant base and precious metal deposits in the Pacific Northwest: a contribution to the Interior Columbia Basin Ecosystem Management Project: U.S. Geological Survey Open-File Report 95-688, 93 pp.

Box, S. E., Bookstrom, A. A., Zientek, M. L., Derkey, P. D., Ashley, R. P., Elliott, J. E., and Peters, S. G., 1996, Assessment of undiscovered mineral resources in the Pacific Northwest: a contribution to the Interior Columbia Basin Ecosystem Management Project: U.S. Geological Survey Open-File Report 95-682, 415 pp.

Green, G.N. and Drouillard, P.H., 1994, The digital geologic map of Wyoming in ARC/INFO format: U.S. Geological Survey Open-File Report 94-0425, 10 p.

Hoblitt, R. P., Miller, C. D., and Scott, W. E., 1987, Volcanic hazards with regard to siting nuclear power plants in the Pacific Northwest: U.S. Geological Survey Open-File Report 87-297, 196 pp.

Johnson, B.R. and Raines, G.L., 1995, Digital map of major lithologic bedrock units for the Pacific Northwest: a contribution to the Interior Columbia River Basin Ecosystem Management Project: U.S. Geological Survey Open-File Report-680, 36 p. plus 2 plates.

Raines, G. L., Johnson, B. R., Frost, T. P., and Zientek, M. L., 1996, Digital maps of compositionally classified lithologies derived from 1:500,000 scale geologic mapping for the Pacific Northwest: a contribution to the Interior Columbia Basin Ecosystem Management Project: U.S. Geological Survey Open-File Report 95-685, 28 pp.

Raines, G.L., and Johnson, B.R., 1996a, Digital representation of the Montana state geologic map: a contribution to the Interior Columbia River Basin Ecosystem Management Project:, U.S. Geological Survey Open-File Report 95-691, 36 pp.

Raines, G.L., and Johnson, B.R., 1996b, Digital representation of the Washington state geologic map: a contribution to the Interior Columbia River Basin Ecosystem Management Project:, U.S. Geological Survey Open-File Report 95-648, 20 pp.

Raines, G. L. and Smith, C. L., 1996, Digital maps of National Uranium Resource Evaluation (NURE) geochemistry for the Pacific Northwest: a contribution to the Interior Columbia Basin Ecosystem Management Project: U.S. Geological Survey Open-File Report 95-686, 22 pp.

SIT (Science Integration Team), 1994, Framework for ecosystem management in the Interior Columbia River Basin - version 1: eastside Ecosystem Management Project, USFS, Walla Walla, Washington, 48 p.

Turner, R.M., and Bawiec, W.J., 1991, Geology of Nevada - a digital representation of the 1978 geologic map of Nevada: U.S. Geological Survey Digital Data Series, DDS-2, 1 CD-ROM.

Zientek, M. L., Bookstrom, A. A., Box, S. E., and Johnson, B. R., 1996, Future minerals related activity, Interior Columbia Basin Ecosystem Management Project area: an overview: U.S. Geological Survey Open-File Report 95-687, xx pp.

Appendix A: Geologic Map Attributes.

Attributes Compiled for Classification

The table below is a list of the ARC/INFO attributes that were compiled for each geologic map unit.

Attribute	Description
FORMATION	The map unit symbol used on the published map. This is the item that is related to the map coverage. This is not necessary a formation in the normal usage. It is a map unit.
UNIT_NAME	The map unit name from the map explanation.
ROCK_TYPE	The general rock category from the map explanation. Generally this is something like sedimentary, igneous, or metamorphic.
ERA, SYSTEM, SERIES	Age information from the map explanation.
LITH1, LITH2, etc.	Lithology from the map explanation. LITH1 is the first described lithology, LITH2 is the next, etc.
LOCATION1, LOCATION2	Notes on location of this particular map unit within the state. Some state maps have differing lithologic descriptions for a single geologic unit in different geographic portions of the state.
COMMENTS	Other comments from map explanation that do not fit in previous attributes

Example of Complete Data for One Stratigraphic Unit

Description from map explanation:

Sedimentary and Metasedimentary Rocks

Ordovician rocks — Mainly black to gray slate or slatey argillite, argillite, black to dark-gray limestone, and some black to gray quartzite. Includes dark gray siltstone in north-central Stevens County and grayish olive-green silty argillite in west-central Stevens County. Many occurrences of Early and Middle Ordovician graptolites; also rare conodonts.

GIS attributes derived from map explanation:

Attribute Name	Contents
FORMATION	O
UNIT_NAME	Ordovician rocks
ROCK_TYPE	Marine sedimentary and metasedimentary rocks
ERA	Paleozoic
SYSTEM	Ordovician
SERIES	
LITH1	slate
LITH2	argillite
LITH3	limestone
LITH4	quartzite
LITH5	siltstone
LITH6	
LITH7	
LITH8	
LOCATION1	
LOCATION2	
COMMENTS	Many occurrences of Early and Middle Ordovician graptolites; also rare conodonts.

Time Stratigraphic Symbols used for Formation Names

Because the database tables that are used with the GIS are confined to ASCII characters, the following ASCII character substitutions were used for representing geologic time designators in formation names:

Geologic Time	Map Symbols	ASCII Equivalent
Quaternary	Q	Q
Tertiary	T	T
Pliocene	P	PL
Miocene	M	MI
Oligocene	Ol	OL
Eocene	E	E
Paleocene	pE	EP
Mesozoic	Mz	MZ
Cretaceous	K	K
Jurassic	J	J
Triassic	TR	TR
Permian	PM	P
Carboniferous	C	PNM
Devonian	D	D
Silurian	S	S
Ordovician	O	O
Cambrian	$\bar{C}$	C
Precambrian	p$\bar{C}$	pC

Appendix B: GIS Coverage Documentation

Registration Tics and Registration Errors

Latitude and longitude tics that could be identified on the original map were used to rubber sheet the coverage to calculated latitude-longitude points to reduce the distortion of the paper. The latitude and longitude and the adjustment report for the points are listed below.

Results of coordinate transformation of Idaho registration points:

Scale (X, Y) = (12688.917, 12703.406)

RMS Error (input, output) = (0.011, 145.720)

The RMS error measures the errors between the output coverages tics and the transformed location of the input coverages tics. It indicates how good the derived transformation is and is foremost a measure of the quality of the original materials used for scanning.. The first number is the error in digitizer units and the second is the error in transformed map units, meters. Scale, translation, and rotation have to do with the scanning parameters, i.e. how the original map was placed on the scanner.

The following table lists the tics and their associated longitude, latitude, input and output locations, and location errors.

id	Long	Lat	inputx (in)	inputy (in)	outputx (m)	outputy (m)	xerror (m)	yerror (m)
1	111	44	40.260	18.327	240169.016	5180304.000	-72.608	-31.499
2	117	42	1.839	0.895	-247480.203	4958918.500	100.560	-143.579
3	117	43	2.116	9.613	-243827.172	5069533.500	-59.560	-7.217
4	117	44	2.408	18.328	-240169.016	5180304.000	-40.652	-73.376
5	117	45	2.685	27.062	-236504.516	5291266.000	-202.447	-73.730
6	116	42	8.331	0.740	-165003.453	4956649.000	7.527	169.962
7	115	42	14.832	0.625	-82506.719	4955287.000	-10.046	80.909
8	117	46	2.980	35.831	-232832.469	5402457.500	-151.966	124.020
9	117	49	3.876	62.229	-221758.016	5737795.500	73.526	140.217
10	115	47	15.320	44.330	-76396.188	5510553.500	-32.106	14.793
11	116	48	9.497	53.233	-150322.188	5623614.500	-18.565	41.773
12	116	49	9.708	62.055	-147853.594	5735762.000	168.049	-38.962
13	114	42	21.350	0.590	0.000	4954833.500	201.104	97.947
14	114	43	21.346	9.282	0.000	5065508.500	127.353	-159.985
15	113	42	27.840	0.618	82506.719	4955287.000	39.283	0.581
16	113	43	27.744	9.332	81288.852	5065956.000	23.694	28.683
17	114	45	21.341	26.734	0.000	5287362.000	18.981	-318.288
18	112	42	34.336	0.733	165003.453	4956649.000	-27.611	103.425
19	112	43	34.143	9.434	162567.859	5067297.500	-69.336	-13.479
20	111	42	40.836	0.907	247480.203	4958918.500	-26.852	60.673
21	111	43	40.548	9.610	243827.172	5069533.500	-48.328	-2.867

Details of Lithology Coverage

Coverage Name: idgeol
Descriptive Location: Idaho
Brief Description: Contacts and lithologic units for the geologic map of Idaho

SOURCE

Data Source: Bond, J.G. and Wood, C.H., 1978, Geologic map of Idaho: Idaho Department of Lands, Bureau of Mines and Geology, 1 Plate, Scale 1:500,000
Point of Contact: Idaho Department of Lands, Bureau of Mines and Geology
Telephone: (208) 885-7991
Source Material: paper
Source Scale: 1:500,000
Source Projection: PROJECTION lambert, North American datum, 1927
UNITS METERS
PARAMETERS
33 00 00 /* 1ST STANDARD PARALLEL
45 00 00 /* 2ND STANDARD PARALLEL
-114 00 00 /* CENTRAL MERIDIAN
0 0 0 /* LATITUDE OF PROJECTIONS ORIGIN
0.0 /* FALSE EASTING
0.0 /* FALSE NORTHING
Source Date (Publication date): 1978
General Comments (disclaimers, qualifications): Digitized on contract from a flat paper copy. The contractor, Optronics Specialty Co., used scanning technology and delivered the coverage in digitizer coordinates. The latitude and longitude tics that could be identified on the original were digitized. These tic points were used to rubber sheet the coverage to calculated latitude-longitude points to reduce the distortion of the paper. The latitude and longitude and the transformation report for the points are listed above.

Date Received: November 1994

DIGITAL COMPILER

Responsible Organization/Agency: Spokane and Reno Office USGS
Project Name: Interior Columbia River Basin Project
Point of Contact: Gary Raines and Bruce Johnson
Telephone: 702/784-5591 or 509/359-3176

ATTRIBUTES

Creation Date: November, 1994
GIS ARC/INFO
Feature Types: polygons, arcs
Topology Present: poly, arc

Precision: Single Precision

DATAFILE NAME: IDGEOL.PAT 5 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	Description
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	IDGEOL#	4	5	B	-	
13	IDGEOL-ID	4	5	B	-	
17	FORMATION	11	11	C	-	Map unit name

DATAFILE NAME: IDGEOL.AAT 12 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	Description
1	FNODE#	4	5	B	-	
5	TNODE#	4	5	B	-	
9	LPOLY#	4	5	B-		
13	RPOLY#	4	5	B	-	
17	LENGTH	4	12	F	3	
21	IDGEOL#	4	5	B	-	
25	IDGEOL-ID	4	5	B	-	
29	ARC_TYPE	8	8	C		Short name for line type. Example: CON, FLTC.
37	LTYPE	31	31	C		Contact, fault, fold or other the of line
68	MODIFIER	21	21	C		Type of contact, fault, fold or other.
89	ACCURACY	16	16	C	-	Positional accuracy.
105	FAULT_CONT	3	3	C		Denotes that arc is both a fault and a contact. Value can be yes or no.
	** REDEFINED ITEMS **					
37	LINE_DESCRIP	68	68	C		ltype, modifier, and accuracy combined as one attribute.

List of unique arc attributes.

ARC_TYPE	LTYPE	MODIFIER	ACCURACY
CON	contact	normal	certain
FLTC	fault	normal	certain
FLTCNCLC	fault	normal	concealed
FLTINFC	fault	normal	inferred

ARC_TYPE	LTYPE	MODIFIER	ACCURACY
FLTTHRC	fault	thrust	certain
FLTTHRIC	fault	thrust	inferred
FOLDANTC	fold	anticline	certain
FOLDOAC	fold	overturned anticline	certain
FOLDSYNC	fold	syncline	certain
LINEARC	linear	normal	certain
POLYBRK	polybrk	N/A	N/A

The following table is derived from the explanation that accompanies the map. All the data in the table is explicitly stated in the map explanation.

DATAFILE NAME: IDAHO.TBL 23 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	Description
1	FORMATION	11	11	C	-	Map unit name
12	UNIT_NAME	75	76	C	-	Descriptive name
87	ROCK_TYPE	50	51	C	-	General rock group
137	ERA	24	25	C	-	Age
161	SYSTEM	24	25	C	-	Age
185	SERIES	24	25	C	-	Age
209	LITH1	40	41	C	-	First lithology listed in the map explanation.
249	LITH2	40	41	C	-	Second lithology.
289	LITH3	40	41	C	-	Third lithology.
329	LITH4	40	41	C	-	etc.
369	LITH5	40	41	C	-	
409	LITH6	40	41	C	-	
449	LITH7	40	41	C	-	
489	LITH8	40	41	C	-	
529	LOCATION1	60	61	C	-	Geographic reference
589	LOCATION2	60	61	C	-	Geographic reference
649	COMMENTS	70	71	C	-	

** REDEFINED ITEMS **

209	LITH_MAJOR	120	123	C	-	Lith1, 2, and 3
329	LITH_MINOR	200	205	C	-	Lith 4, 5, 6 and 7
209	LITHOLOGY	320	328	C	-	Lith1 to 7
137	AGE	72	75	C	-	

Details for the fault coverage

Coverage Name: idarcs
Descriptive Location: Idaho
Brief Description: All arcs that do not form polygon boundaries. Dangling arcs of Idaho, such as faults, folds, and other arcs to complete the geologic map.

SOURCE

Data Source: Bond, J.G. and Wood, C.H., 1978, Geologic map of Idaho: Idaho Department of Lands, Bureau of Mines and Geology, 1 Plate, Scale 1:500,000
Point of Contact: Idaho Department of Lands, Bureau of Mines and Geology
Telephone: (208)885-7991
Source Material: paper
Source Scale: 1:500,000
Source Projection: PROJECTION lambert
UNITS meters
PARAMETERS
33 00 00 /* 1ST STANDARD PARALLEL
45 00 00 /* 2ND STANDARD PARALLEL
-114 00 00 /* CENTRAL MERIDIAN
0 0 0 /* LATITUDE OF PROJECTIONS ORIGIN
0.0 /* FALSE EASTING
0.0 /* FALSE NORTHING
Source Date (Publication date): 1978
General Comments (disclaimers, qualifications): See comments with the Idaho geologic map coverage.

Date Received: November 1994

DIGITAL COMPILER

Responsible Organization/Agency: Spokane and Reno Office/WMR/USGS
Project Name: Interior Columbia River Basin Project
Point of Contact: Gary Raines and Bruce Johnson
Telephone: 702/784-5591 or 509/359-3176

ATTRIBUTES

Creation Date: November, 1994
GIS ARC/INFO
Feature Types: arcs
Topology Present: arc
Precision: Single Precision

DATAFILE NAME: IDGEOL.AAT 12 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	Description
1	FNODE#	4	5	B	-	
5	TNODE#	4	5	B	-	
9	LPOLY#	4	5	B	-	
13	RPOLY#	4	5	B	-	
17	LENGTH	4	12	F	3	
21	IDGEOL#	4	5	B	-	
25	IDGEOL-ID	4	5	B	-	
29	ARC_TYPE	8	8	C	-	
37	LTYPE	31	31	C	-	Contact, fault, fold or other type of line
68	MODIFIER	21	21	C	-	Type of contact, fault, fold or other.
89	ACCURACY	16	16	C	-	Positional accuracy.
105	FAULT_CONT	3	3	C	-	
	** REDEFINED ITEMS **					
37	LINE_DESCRIP	68	68	C	-	ltype, modifier, and accuracy combined as one attribute.

List of unique values of arc attributes. The apparent duplication, such as FLT and FLTC, differentiate those lines that are contacts between polygons (FLTC) and not contacts (FLT). Another item FAULT_CONT, which is not listed in this table, uniquely differentiates such lines. POLYBRK is an artifical arc added to break up large polygons to meet limitations of the software.

ARC_TYPE	LTYPE	MODIFIER	ACCURACY
CALDERA	fault	caldera	certain
CROSSECT	other	cross section	certain
FLT	fault	normal	certain
FLTC	fault	normal	certain
FLTCNCL	fault	normal	concealed
FLTCNCLC	fault	normal	concealed
FLTINF	fault	normal	inferred
FLTINFC	fault	normal	inferred
FLTTHR	fault	thrust	certain
FLTTHRC	fault	thrust	certain
FLTTHRI	fault	thrust	inferred

ARC_TYPE	LTYPE	MODIFIER	ACCURACY
FLTTHRIC	fault	thrust	inferred
FOLDANT	fold	anticline	certain
FOLDANTC	fold	anticline	certain
FOLDOA	fold	overturned anticline	certain
FOLDOAC	fold	overturned anticline	certain
FOLDOS	fold	overturned syncline	certain
FOLDSYN	fold	syncline	certain
FOLDSYNC	fold	syncline	certain
LINEAR	linear	normal	certain
LINEARC	linear	normal	certain
POLYBRK	polybrk	polygon break	N/A
TERDIKE	other	tertiary dikes	certain
VOLCANF	other	volcanic feeder	certain

Details for the point coverage
Coverage Name: idpnt
Descriptive Location: Idaho
Brief Description: Idaho hot springs and other point features.

SOURCE

Data Source: Bond, J.G. and Wood, C.H., 1978, Geologic map of Idaho: Idaho Department of Lands, Bureau of Mines and Geology, 1 Plate, Scale 1:500,000
Point of Contact: Idaho Department of Lands, Bureau of Mines and Geology
Telephone: (208) 885-7991
Source Material: paper
Source Scale: 1:500,000
Source Projection:
PROJECTION lambert, North American datum, 1927
UNITS METERS
PARAMETERS
33 00 00 /* 1ST STANDARD PARALLEL
45 00 00 /* 2ND STANDARD PARALLEL
-114 00 00 /* CENTRAL MERIDIAN
0 0 0 /* LATITUDE OF PROJECTIONS ORIGIN
0.0 /* FALSE EASTING
0.0 /* FALSE NORTHING
Source Date (Publication date): 1978
General Comments (disclaimers, qualifications): See comments with the Idaho geologic map coverage.

Date Received: November 1994

DIGITAL COMPILER

Responsible Organization/Agency: Spokane and Reno Office/WMR/USGS
Project Name: Interior Columbia River Basin Project
Point of Contact: Gary Raines and Bruce Johnson
Telephone: 702/784-5591 or 509/359-3176

ATTRIBUTES

Creation Date: November, 1994
GIS ARC/INFO
Feature Types: points
Topology Present: points
Precision: Single Precision

DATAFILE NAME: IDPNT.PAT

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	Description
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	IDPNT#	4	5	B	-	
13	IDPNT-ID	4	5	B	-	
17	SYM_NAME	11	11	C	-	Symbol name

List of unique point attributes.

SYM_NAME	Definition
TSPRING	Thermal springs
VVENT	Volcanic vents