VULNERABILITY OF THE UPPERMOST GROUND WATER TO CONTAMINATION IN THE GREATER DENVER AREA, COLORADO

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PLATE

(Plate is in pocket)

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CONVERSION FACTORS AND ACRONYMS

Multiply	By	To obtain
acre	4,047	square meter
foot	0.3048	meter
foot per day	0.3048	meter per day
gallon per minute	0.003785	cubic meter per minute
inch per year	25.40	millimeter per year
meter	3.281	foot
mile	1.609	kilometer
millimeter	0.03937	inch
square mile	2.59	square kilometer

Degree Fahrenheit (°F) may be converted to degree Celsius (°C) by using the following equation:

$$°C = 5/9\ (°F-32).$$

The following acronyms are used in this report:

DEM: digital elevation models

DRASTIC: D for depth to water, R for recharge, A for aquifer media, S for soil media, T for topography (land-surface slope), I for impact of the vadose zone (unsaturated media), and C for hydraulic conductivity (Aller and others, 1987).

Sea level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Vulnerability of the Uppermost Ground Water to Contamination in the Greater Denver Area, Colorado

By Glenn A. Hearne, Mike Wireman, Angus Campbell, Sandy Turner, *and* George P. Ingersoll

Abstract

Information about vulnerability of ground water to contamination facilitates ground-water management. Vulnerability of ground water refers to the intrinsic characteristics that determine the sensitivity of the water to being adversely affected by an imposed contaminant load. Within the greater Denver area, vulnerability of the uppermost ground water to contamination from the surface was assessed by considering the intrinsic characteristics included in a method developed by the U.S. Environmental Protection Agency and the National Water Well Association, the DRASTIC method. The seven geohydrologic characteristics considered are: (1) aquifer media, (2) hydraulic conductivity, (3) unsaturated media, (4) depth to water, (5) recharge, (6) soil media, and (7) land-surface slope. Recharge from precipitation generally is less than 2 inches per year; no effort was made to quantify the variation of recharge throughout the study area. Data for geology, depth to water, soils, and elevation were obtained and processed to produce maps of the other six characteristics. Spatial and attribute data for these maps were stored and processed by geographic-information-system software to produce a map showing vulnerability of the uppermost ground water to contamination from the surface. This report describes the assessment of each geohydrologic characteristic and the 157 vulnerability response units that are delineated within the greater Denver area. These response units are unique with respect to the geohydrologic characteristics considered. The uppermost ground water within each of the vulnerability response units is described in a series of tables, which include qualitative and selected quantitative data and the vulnerability rating assigned for each of the seven geohydrologic characteristics.

INTRODUCTION

Ground water in aquifers receiving recharge from the land surface is vulnerable to contamination from the land surface. In the greater Denver area, many private and community water supplies are obtained from these uppermost aquifers. As of 1988, more than 18,000 permitted domestic wells were within the greater Denver area. Owing to cost considerations and yield requirements, most domestic wells are developed in the uppermost aquifer. Many high-yield wells that are less than 100 feet deep provide water for commercial, industrial, municipal, and irrigation uses. The Front Range urban corridor, which includes the greater Denver area, is the most densely populated area in Colorado. As population growth and development in this area increases, ground-water use will increase.

To facilitate ground-water management, local governments and land-use planners need to have readily available information about the vulnerability of shallow aquifers to contamination from the land surface. In an effort to provide this information, the U.S. Geological Survey, the Colorado Department of Health, the U.S. Environmental Protection Agency, and the U.S. Soil Conservation Service have cooperated in a study to assess and compile the vulnerability of the shallow ground-water resources in the greater Denver area. A method is needed to apply a consistent assessment technique for ground-water vulnerability to large areas by utilizing available data bases and computer techniques.

Purpose, Scope, and Method

This report presents the method used to assess ground-water vulnerability in the greater Denver area and presents the results of the assessment in map form. For the purposes of this study, only the uppermost aquifers were assessed. Following a discussion of the ground-water regions in the greater Denver area, the report describes the assessment of each geohydrologic characteristic used to subdivide the ground-water regions into vulnerability response units. The criteria used for forming groups and the groups designated within the study area are specified for each of seven geohydrologic characteristics: aquifer media, hydraulic conductivity, unsaturated media, depth to water, recharge, soil media, and land-surface slope.

The vulnerability of the uppermost ground water to contamination from sources at the land surface was assessed using a modified form of the DRASTIC method, which was developed by the U.S. Environmental Protection Agency and the National Water Well Association (Aller and others, 1987). The following description of the DRASTIC method provides a background for the description of the method used in this study. The DRASTIC method assesses ground-water vulnerability in a small area of 100 acres or more by a three-step process. First, the small area is associated with a hydrogeologic setting. A hydrogeologic setting is defined as "a composite description of all the major geologic and hydrologic factors which affect and control ground-water movement into, through, and out of an area. It is a mappable unit with common hydrogeologic characteristics, and as a consequence, common vulnerability to contamination by introduced pollutants." (Aller and others, 1987, p. 13). In this report, "setting" is used to refer to "hydrogeologic setting." Second, the small area is characterized by rating aquifer media, hydraulic conductivity, unsaturated media, depth to water, recharge, soil media, and land-surface slope. Values of ratings range from 1 to 10, such that 1 is least vulnerable and 10 is most vulnerable. Finally, a numeric value, assumed to be an index of vulnerability, is calculated by summing the products of each rating multiplied by a fixed weighting variable assigned to each of these seven geohydrologic characteristics. The product resulting from the DRASTIC method is a map showing the areal distribution of the calculated index of vulnerability. The variety of settings described and the ranges of ratings are intended to permit the DRASTIC method to be systematically applied anywhere in the United States.

This study adapted some but not all of the conventions from the DRASTIC method (Aller and others, 1987), and the resulting product is different. Assessment of ground-water vulnerability begins by associating each area with one of the settings from the DRASTIC method. The same geohydrologic characteristics and rating conventions from the DRASTIC method were adapted. However, no attempt was made to assign a fixed weighting variable to each geohydrologic characteristic or to calculate an index of vulnerability. The product resulting from this study is a map showing the areal distribution of vulnerability response units, areas having similar geohydrologic characteristics and, therefore, similar vulnerability. By adhering to the setting and ratings conventions of DRASTIC, the method used in this study could be qualitatively compared with other studies that apply a DRASTIC or modified DRASTIC approach anywhere in the United States.

A geographic information system was used to assess vulnerability of ground water for a study area of about 2,400 square miles in north-central Colorado (fig. 1). The assessment was done on a PRIME computer using ARC/INFO (Environmental Systems Research Institute, Inc., 1987) software. In addition to providing a useful tool for spatial analysis, a geographic information system introduces some new terms and requires an explicit formulation of the method. Several published maps were used to generate four digital maps (generalized bedrock geology, surficial geology, depth to water, and soil associations) that were used as input to the assessment. Regular arrays of elevations, called Digital Elevation Models (DEM), were used to generate a fifth digital map (land-surface slope) as input to the assessment. The process of overlaying digital maps is analogous to overlaying printed maps of the same scale; the information on both maps is accessible simultaneously. The five input digital maps were overlaid to produce a digital map of vulnerability response units. For any readers interested in details concerning individual digital maps, documentation files for each of these digital maps, or covers, are included in the "Supplemental Information" section at the back of this report.

Although very small map areas can be represented in a geographic information system, a size of 100 acres was arbitrarily selected as the minimum size for map areas to be retained. Map areas smaller than 100 acres were eliminated from input digital maps before overlaying. Each overlay operation resulted in an intermediate digital map having several map areas smaller than 100 acres. These map areas were eliminated from the intermediate digital map before proceeding with the assessment. For any readers interested in details concerning the process of eliminating small map areas or the process of overlaying digital maps, the explicit conventions and commands are presented in the "Supplemental Information" section.

Physical Setting

The study area consists of about 2,400 square miles in north-central Colorado (fig. 1). All or part of Adams, Arapahoe, Boulder, Denver, Douglas, Elbert, Jefferson, and Weld Counties are within the study area. The Denver metropolitan area is in the central part of the study area. Other cities and towns within the study

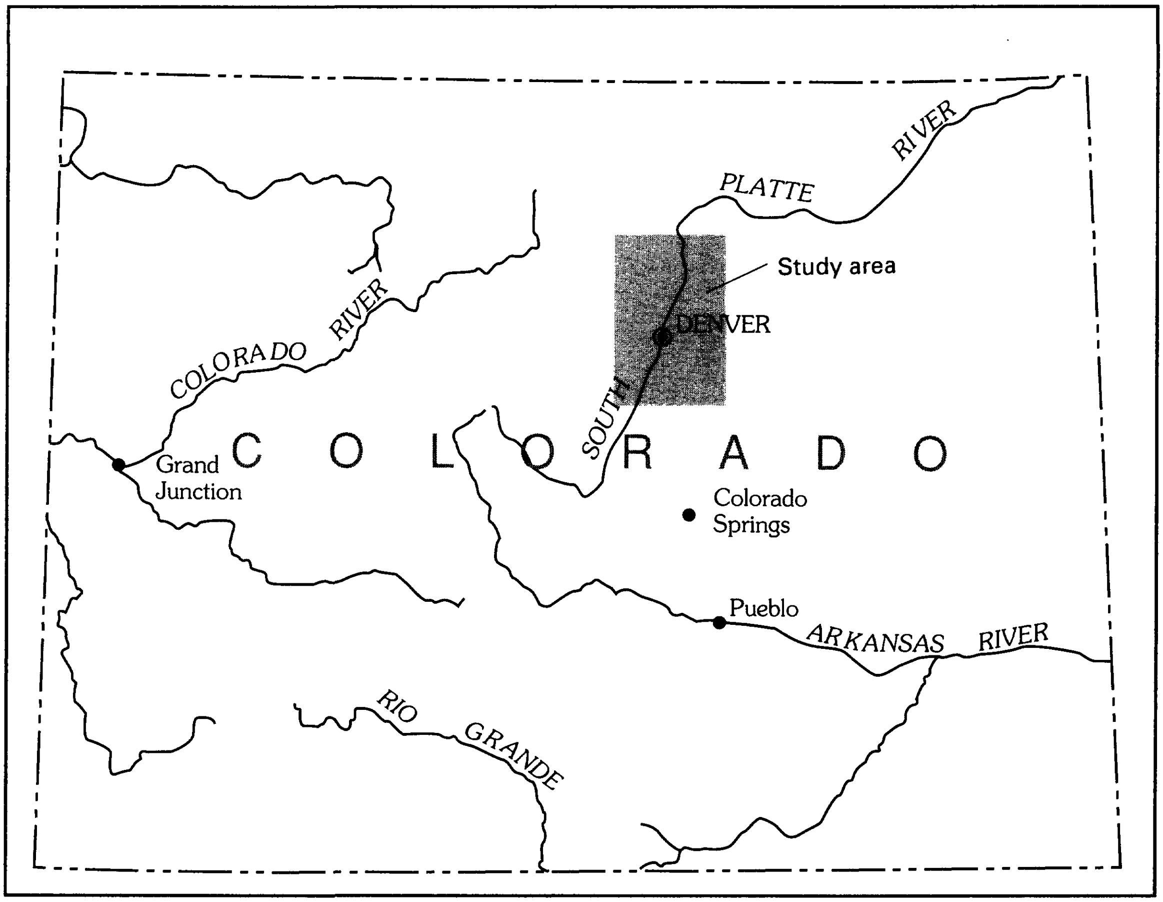

Figure 1. Location of the study area.

area include Boulder, Longmont, and Brighton to the north, Golden to the west, and Castle Rock to the south (pl. 1). Land use in the study area includes urban and residential; agricultural land use dominates the northeast part of the study area.

Surface topography within the study area is quite variable. The western one-third of the study area is characterized by rolling hills, valleys, and canyons of the foothills of the Front Range. On the eastern side of the foothills, upturned sedimentary rocks form strike valleys and hogbacks. The belt of upturned rocks is about 1–2 miles wide. Between this belt and the South Platte River, the area consists largely of northeast-trending mesas. Stream erosion has created several levels of alluvial terraces along the major streams. Broad, planar alluvial-fan deposits occur adjacent to the foothills. One of these fan deposits, the Rocky Flats Alluvium forms a broad, flat, steep-sided tableland, the top of which is 150–250 feet above the adjacent stream valleys.

In the southern part of the study area, between the South Platte River and Cherry Creek, the Dawson Formation is at the surface and commonly forms mesas and other resistant landforms. East of the South Platte River and Cherry Creek the study area is characterized by relatively flat prairie lands. Elevations above sea level within the study area range from about 4,800 feet where the South Platte River leaves the study area to about 9,700 feet in the foothills to the west.

The study area is drained by the South Platte River and its tributaries. Major tributaries to the South Platte River in the study area include St. Vrain Creek, Boulder Creek, Clear Creek, and Bear Creek on the west; major tributaries on the east include Sand Creek, Cherry Creek, and Plum Creek (pl. 1). St. Vrain Creek, Boulder Creek, Clear Creek, and Bear Creek head in the mountains west of the study area. The valleys of these streams and their tributaries dissect the igneous and metamorphic rocks of the foothills and the sedimentary rocks of the hogbacks to form steep-walled canyons as much as 2,000 feet deep. East of the hogbacks, the surface drainage is dominated by the South Platte River, which flows to the northeast. Few natural lakes are in the study area; however, several reservoirs have been constructed on or close to the South Platte River and the major tributaries. These reservoirs are used to store water for agricultural and municipal use.

The Denver area has a semiarid continental climate with 11–18 inches of mean annual precipitation. Mean annual precipitation for the foothills in the western part of the study area is as much as 25 inches (Colorado Climate Center, 1984).

The study area is geologically complex. The western part of the area is composed of Precambrian metamorphic and igneous rocks that form the Front Range of the Colorado Rocky Mountains. These rocks consist of quartzite, schist, gneiss, with intrusive granodiorite, monzonite, and pegmatite. Along the eastern flank of the mountain front, steeply dipping Paleozoic and Mesozoic sedimentary rocks form strike valleys and hogbacks. These rocks consist of bedded sequences of conglomerate, sandstone, siltstone, claystone, shale, and limestone, which are folded and faulted and dip steeply to the east. However, the rocks flatten to a dip of less than 5 degrees within 1–2 miles east of the mountain front.

The eastern two-thirds of the study area is within the west-central part of the Denver Basin, a large structural and sedimentary basin that extends across eastern Colorado into adjacent states to the northeast. As much as 13,000 feet of intertongued marine and clastic-continental sediments were deposited in the deepest part of the basin near Parker, Colorado. The post-Pierre Shale sedimentary rocks within the basin constitute the Denver ground-water basin. Four major bedrock aquifers are primarily within the sandstones and siltstones sequence of rocks. In ascending order, the aquifers are the Laramie-Fox Hills aquifer, the Arapahoe aquifer, the Denver aquifer, and the Dawson aquifer. The maximum combined thickness of the aquifers is about 3,000 feet near Parker. In the study area, the formations that comprise the aquifers crop out or are covered by surficial deposits such as alluvium.

A variety of unconsolidated quaternary alluvial and eolian deposits overlie the sedimentary rocks in the eastern two-thirds of the study area. Along the mountain front, Pleistocene alluvial fan deposits overlie pediment surfaces. Away from the mountain front, alluvial deposits consist primarily of present-day flood-plain deposits and older terrace deposits. Small colluvial and landslide deposits fill erosional valleys on the upturned sedimentary rocks along the mountain front. Eolian deposits make up a large area in the northeastern part of the study area. The alluvial deposits generally are less than 50 feet thick and the eolian deposits generally are less than 20 feet thick.

ASSESSMENT OF GROUND-WATER VULNERABILITY

The term "ground-water vulnerability" is used "to represent the intrinsic characteristics which determine the sensitivity of various parts of an aquifer to being adversely affected by an imposed contaminant load" (Foster, 1987, p. 73). Ground-water vulnerability is determined by the accessibility of the saturated zone and the attenuation capacity of the geologic materials between the land surface and the saturated zone. As defined for this report, ground-water vulnerability is a function of the intrinsic geohydrologic characteristics of the aquifer and the geologic materials and soil that overlie the aquifer. The assessment of ground-water vulnerability consists of the delineation of vulnerability response units distinguishable as part of a specific setting and having a unique combination of geohydrologic characteristics. The approach parallels the first two steps of the DRASTIC method (Aller and others, 1987). First, each area is associated with a specific setting. Second, each area is characterized by rating specific geohydrologic characteristics. For this study, the settings and geohydrologic characteristics are those used in the DRASTIC method (Aller and others, 1987).

Aquifer media, hydraulic conductivity, unsaturated media, and depth to water were assessed from geologic and hydrologic data. Recharge was assessed from precipitation and hydrologic data. Soil media were assessed from soil surveys and soil-association maps. Slope of the land surface was assessed from digital elevation data. No single method was appropriate for assessing all the geohydrologic characteristics. The method used for each was dependent on variability within the study area and data available to characterize the spatial variation. Geohydrologic characteristics, in the order they were assessed for this study and are presented in this report, are aquifer media, hydraulic conductivity, unsaturated media, depth to water, recharge, soil, and land-surface slope. These are the same characteristics that have been rearranged to form the acronym DRASTIC: D for depth to water, R for recharge, A for aquifer media, S for soil media, T for topography (land-surface slope), I for impact of the vadose zone (unsaturated media), and C for hydraulic conductivity (Aller and others, 1987). The DRASTIC ratings were used as guidelines to enable the results of this study to be qualitatively compared with other studies that use a DRASTIC or modified DRASTIC approach.

Ground-Water Regions and Settings

The United States has been divided into 15 geographic ground-water regions (Heath, 1984). The DRASTIC method uses these major ground-water regions as a basic geographic framework for assessing ground-water vulnerability. Because ground-water vulnerability may be highly variable within a ground-water region, each region as described by Heath has been subdivided into settings. A group of distinct settings has been characterized for each of the ground-water regions included in the DRASTIC manual (Aller and others, 1987).

The State of Colorado is in five ground-water regions: (1) Colorado Plateau, (2) Western Mountain Ranges, (3) Nonglaciated Central, (4) High Plains, and (5) Alluvial Basins. The study area is in two of these regions: (1) Western Mountain Ranges and (2) Nonglaciated Central (pl. 1). The Western Mountain Ranges is composed of 12 settings and the Nonglaciated Central region is composed of 13 settings (Aller and others, 1987). Six settings are present within the study area. Two settings are present within the Western Mountain Ranges region: (1) Mountain Slopes East and (2) Alluvial Mountain Valleys East. Four settings are present within the Nonglaciated Central region: (1) Mountain Flanks, (2) Alternating Sandstone, Limestone and Shale—Thin Soil, (3) Unconsolidated and Semiconsolidated Aquifers, and (4) River Alluvium Without Overbank Deposits. The six settings (pl. 1) are described in this order.

In the study area, the boundaries of the settings were delineated on the basis of rock type, geologic structure, and Denver Basin aquifer boundaries. The Mountain Slopes East setting consists of the igneous and metamorphic rocks that compose the foothills of the Front Range. A few detached blocks of Pennsylvanian and Permian Fountain Formation are included with the igneous and metamorphic rocks of the Mountain Slopes East setting. Ground water flows through a complex fracture network. Depth to water is highly variable, ranging from near land surface to more than 100 feet. Yields from these rocks generally are less than 10 gallons per minute (McConaghy and others, 1964) and suitable only for domestic supplies.

The Alluvial Mountain Valleys East setting consists of the alluvium and other unconsolidated deposits that are adjacent to the streams within the foothills. These deposits commonly are alluvial deposits that yield water to domestic wells.

The Mountain Flanks setting includes all the pre-Pierre Shale Paleozoic rocks in the study area and rocks of Pierre Shale and Cretaceous formations of the Denver Basin where they are faulted, folded, or steeply dipping. These rocks commonly form hogbacks and strike valleys between the mountain front and the plains. Also included within this setting is a structurally complex area located in southeastern Boulder County, northeastern Jefferson County, and southwestern Weld County. This area is characterized by numerous high-angle reverse and normal faults within the Cretaceous Fox Hills, Laramie, and Arapahoe Formations. The Mountain Flanks setting is bounded on the west by the contact between the Precambrian igneous and metamorphic rocks and the Fountain Formation. The eastern boundary of this setting is defined by the eastern boundary of the Hygiene Sandstone Member of the

Pierre Shale from the north edge of the study area south to the structurally complex area described above. The boundary extends east to accommodate the complex area. South of the structurally complex area, the eastern boundary of the Mountain Flanks setting follows the contact between the Arapahoe and Laramie Formations or the contact between the Arapahoe and Denver Formations, depending on which of these formations crops out as a resistant ridge. From Green Mountain to the southern edge of the study area, the eastern boundary of the Mountain Flanks setting follows the western edge of the Denver aquifer. These steeply dipping and fractured rocks may be a recharge area for aquifers that are confined throughout much of Denver Basin. Aquifers in this setting commonly are developed only for domestic supplies.

The Alternating Sandstone, Limestone, Shale—Thin Soil setting consists of the flat-lying post-Hygiene Sandstone sedimentary rocks of the Denver Basin. This setting has the largest areal extent of the settings within the study area. The Denver Basin aquifers are developed for public supply by a number of municipalities. Yields from these aquifers range from 5 to 600 gallons per minute (Hurr and Hearne, 1985). The Arapahoe and Dawson aquifers are the most productive. Throughout much of the basin, these aquifers are confined. In the outcrop area, these aquifers are unconfined. Recharge occurs by infiltration of precipitation in the outcrop areas and by movement of water from one aquifer to another.

The Unconsolidated and Semiconsolidated Aquifers setting consists of lower Quaternary alluvial and eolian deposits that overlie the Paleozoic and Mesozoic rocks east of the mountain front. Yields from these deposits generally are less than 50 gallons per minute (Smith and others, 1964); however, the deposits are a source of domestic supply. Recharge is primarily by infiltration of precipitation on the deposits. Ground water can discharge to contact springs in adjacent stream valleys.

The River Alluvium Without Overbank Deposits setting consists of the upper Quaternary alluvial deposits along the present-day streams east of the mountain front. These deposits primarily are Piney Creek and post-Piney Creek deposits. Alluvial deposits along present-day streams compose the most productive unconsolidated aquifer. Well yields range from 45 to 2,040 gallons per minute (Smith and others, 1964). Aquifers in the unconsolidated deposits are unconfined. Saturated thickness of alluvial aquifers along the South Platte River generally ranges from about 50 to 100 feet; the saturated thickness of alluvial aquifers along tributaries of the South Platte River generally is less than 50 feet. Ground water in the alluvial deposits is hydraulically connected to the adjacent stream.

Aquifer Media, Hydraulic Conductivity, and Unsaturated Media

Aquifer media, hydraulic conductivity, and unsaturated media are primarily determined by the geologic materials that compose the uppermost aquifer and the unsaturated zone between the water table in the uppermost aquifer and the soil. Aquifer media include all consolidated or unconsolidated rock that composes the uppermost aquifer. Unsaturated media include all unsaturated or discontinuously saturated material below the soil and above the water table. The unsaturated material can be the same as the aquifer material it overlies. However, a different type of unsaturated material or more than one type of unsaturated material commonly overlies an aquifer.

An aquifer is defined as a geologic formation, group of formations, or part of a formation that will yield water to a well. For purposes of this study, only the uppermost aquifers were evaluated. These aquifers include unconsolidated deposits and subcropping bedrock aquifers. Bedrock aquifers were not evaluated where they are overlain by younger saturated formations.

The aquifer medium affects ground-water vulnerability in that the rate at which a contaminant can move in an aquifer and the potential for contaminant-attenuating processes of adsorption, ion exchange, and dispersion depend in part on the aquifer media. Adsorption and ion exchange are processes by which molecules or ions become attached to the surface of sediment particles. Adsorption can occur on all types of particles and is a function of surface area and ionic charge. Ion exchange is controlled by ion size and charge, and occurs more frequently on smaller particles (less than 0.001 millimeter diameter). Dispersion is the process of mixing by which a contaminant spreads to occupy an increasing volume of the flow system. The rate of dispersion is a function of the aquifer medium. In a homogeneous porous medium, dispersion generally results in an expanding ellipsoidal shape in which the contaminant concentration decreases with distance from the source. Dispersion patterns in a fractured and bedded medium are made more complex because of preferential flow. In general, ground water in sandstones, limestones, and unconsolidated sands and gravels is more vulnerable to contamination than ground water in shales, tills, and unfractured igneous and metamorphic rocks.

The hydraulic conductivity of an aquifer is a measure of its ability to transmit water. Hydraulic conductivity is a function of the amount and interconnection of void spaces in the aquifer medium. Hydraulic conductivity affects ground-water vulnerability in that travel times for contaminant movement are a function of hydraulic conductivity of the aquifer, hydraulic gradient, porosity, and contaminant properties. Generally, unconsolidated sands and gravels have high hydraulic conductivities, whereas unfractured igneous and metamorphic rocks and unweathered shales have low hydraulic conductivities.

The unsaturated medium significantly affects attenuation of contaminants moving from the surface to the water table. The attenuating processes of adsorption, ion exchange, and degradation can occur in the unsaturated zone. Degradation refers to the breakdown of substances by chemical or biological means. The potential for these processes generally increases as the residence time increases. The residence time in the unsaturated zone is controlled by the path length and routing, which are functions of the geologic material in the unsaturated zone. The routing and residence time are greatly affected by secondary fracturing of the unsaturated medium. Fractured media generally provide high-conductivity flow paths and can shorten residence time. Soil development also is affected by the material at the top of the unsaturated zone. Generally, unsaturated media having the highest vulnerability to contamination are sands and gravels, karst limestones, and sandstones. Silts, clays, and shales are less vulnerable.

Criteria for Delineation of Geohydrologic Units

Geologic, bedrock-aquifer, and depth-to-water data were used to delineate and assess aquifer media and unsaturated media. The surficial geology within the study area (Colton, 1978; Trimble and Machette, 1979) was digitized from maps at a scale of 1:100,000. Bedrock- and surficial-geology maps at a scale of 1:24,000 were consulted where available because the geology at this scale is of greater detail with respect to structural and stratigraphic features. Documentation file 1 in the "Supplemental Information" section is a documentation file for the digital geologic map.

The boundaries of the major bedrock aquifers in the Denver ground-water basin were determined by hydrologic characteristics of individual layers and do not correspond to geologic-formation boundaries. The areal boundaries of the Laramie-Fox Hills aquifer, the Arapahoe aquifer, the Denver aquifer, and the Dawson aquifer were digitized from maps obtained from the Colorado State Engineer's Office (Van Slyke, and others, 1988a-d). These aquifer boundaries were used to differentiate selected bedrock aquifers. Documentation file 2 in the "Supplemental Information" section is a documentation file for the digital map of Denver Basin aquifers.

Depth to water was digitized from maps at a scale of 1:100,000 (Hillier and Schneider, 1979; Hillier and others, 1983). Documentation file 3 in the "Supplemental Information" section is a documentation file for the digital map of depth to water.

The three digital maps were processed to generate geohydrologic units. Geohydrologic units are mapped areas of similar aquifer media, hydraulic conductivity, and unsaturated-media characteristics. The processing of these digital maps is described here and details are available in the "Supplemental Information" section. The digital geologic map was overlaid on the digital map of Denver Basin aquifers and simplified by grouping geologic units within each setting that have similar geohydrologic characteristics (Command file 1 in the "Supplemental Information" section). Characteristics, including lithology, texture, bedding, fracturing, hydraulic conductivity, and nature of underlying bedrock were assumed to be uniform within each geohydrologic unit.

The ratings for aquifer media (table 1), hydraulic conductivity (table 2), and unsaturated media (table 3), proposed by Aller and others (1987), also were considered in grouping geologic units. The ratings proposed by Aller and others (1987) for aquifer media are based on the potential for attenuation and dispersion within the aquifer. The ratings for hydraulic conductivity are based on the rate at which a contaminant moves away from the point where it enters the aquifer. The ratings for unsaturated media are based on the potential for attenuation between the land surface and the aquifer. In tables 1, 2, and 3 higher ratings indicate higher vulnerability to contamination.

Table 1. Vulnerability ratings for types of aquifer media

[Modified from Aller and others, 1987, table 6, p. 22]

Type of aquifer medium	Vulnerability rating[1]
Karst limestone	9–10
Basalt	2–10
Sand and gravel	4–9
Bedded sandstone, limestone, and shale sequences	5–9
Massive limestone	4–9
Massive sandstone	4–9
Glacial till	4–6
Weathered metamorphic and igneous rocks	3–5
Metamorphic and igneous rocks	2–5
Massive shale	1–3

[1]Higher rating indicates higher vulnerability to contamination.

Table 2. Vulnerability ratings for range categories of aquifer hydraulic conductivity

[Modified from Aller and others, 1987, table 10, p. 25]

Hydraulic conductivity (feet per day)	Vulnerability rating[1]
More than 270	10
130–270	8
90–130	6
40–90	4
13–40	2
Less than 13	1

[1]Higher rating indicates higher vulnerability to contamination.

Table 3. Vulnerability ratings for types of unsaturated media

[Modified from Aller and others, 1987, table 9, p. 24]

Type of unsaturated medium	Vulnerability rating[1]
Karst limestone	8–10
Basalt	2–10
Sand and gravel	6–9
Sand and gravel having significant silt and clay	4–8
Bedded sandstone, limestone, and shale	4–8
Sandstone	4–8
Metamorphic and igneous rocks	2–8
Limestone	2–7
Silt and clay	2–6
Shale	2–5

[1]Higher rating indicates higher vulnerability to contamination.

The digital map of depth to water was simplified (Command file 2 in the "Supplemental Information" section) and overlaid on the digital map of grouped geologic units (Command file 3 in the "Supplemental Information" section) to produce a digital map of geohydrologic units. Depth to water was used to determine whether the uppermost aquifer was in the surficial geologic units or in the underlying bedrock (Command files 4 and 5 in the "Supplemental Information" section). If the water table is in the surficial geologic material, then both the uppermost aquifer and the unsaturated zone is considered to be composed of these surficial materials. If the water table is in bedrock underlying the surficial material, then the uppermost aquifer is considered to be composed of bedrock. In the case where the unsaturated media consists of both the surficial geologic unit and the underlying bedrock above the water table, the layered unsaturated medium was described and assigned a rating appropriate for the more vulnerable of the geologic units. This situation is present where eolian deposits or lava flows overlie Denver Basin aquifers and where colluvium is in the Western Mountain Ranges ground-water region.

The digital map of geohydrologic units contained many map areas that were smaller than 100 acres. Nonwater map areas less than 100 acres were eliminated through a three-step process. First, these map areas were merged with adjacent map areas that had the same geologic units and Denver Basin aquifers (Command file 6 in "Supplemental Information" section). Second, mapped areas of colluvium were merged with adjacent mapped areas (Command file 7 in "Supplemental Information" section). Third, all remaining small (less than 100 acres) mapped areas were merged with adjacent mapped areas (Command file 8 in the "Supplemental Information" section). Where a small area was adjacent to a mapped area having a similar description, the small area was merged with that area. For example, a small area mapped as Denver aquifer overlain by unsaturated eolian deposits would be merged with an adjacent area mapped as Denver Formation for both aquifer and unsaturated media. However, each small map area was merged with some adjacent area regardless of the description of adjacent areas.

Designated Geohydrologic Units

Twenty-three geohydrologic units were designated within the six settings that are present within the study area (table 4). Each geohydrologic unit is labeled with an alphabetic character; J, L, Q, and Z were not used, lower case d was used. Each of the geohydrologic units is unique with respect to either setting, aquifer media, or unsaturated media. Many pairs of geohydrologic units (D and E, F and G, I and K, M and N, O and P, R and S, and U and V) are composed of the same aquifer media, but the former unit (D, F, I, M, O, R, and U) in each pair is a surficial bedrock aquifer, while the latter unit (E, G, K, N, P, S, and V) in each pair is the bedrock aquifer overlain by unsaturated silt and fine-grained sand. In some cases, aquifers crop out in two settings, for example, the Arapahoe aquifer (geohydrologic units F and O), and Laramie-Fox Hills aquifer (geohydrologic units D and I). The comments on table 4 contain descriptive information unique to particular geohydrologic units, and other aquifer characteristics the reader may find useful.

All of the geohydrologic units in the study area are within two ground-water regions: the Western Mountain Ranges and the Nonglaciated Central. The first two geohydrologic units in table 4, A and B, are

Table 4. Vulnerability characteristics of geohydrologic units

[Each area on the vulnerability map (pl. 1) is identified by a four-character code, an alphabetic character followed by three digits. The alphabetic character indicates the geohydrologic unit. For example, for an area identified by the code A413, the geohydrologic unit is A]

Geo-hydro-logic unit	Geologic units[1]	Aquifer media	Unsaturated media	Vulnerability rating: Aqui-fer media	Vulnerability rating: Unsatu-rated media	Vulnerability rating: Hydraulic conduc-tivity	Comments
			Mountain Slopes East setting				
A	Gneiss, Schist, Quartzite, Boulder Creek Granodiorite, Quartz Monzonite, Silver Plume Quartz Monzonite, Granite, and Pegmatite.	Fractured igneous and metamorphic rocks.[2]	Fractured and weathered igneous and metamorphic rocks.[3,4]	5	7	[5]1	These rocks form the foothills in the western one-third of the study area and are mostly granodiorite and quartz monzonite. Ground water occurs in fractures; Ground-water flow patterns and contaminant attenuation processes are complex. Yields are generally less than 10 gallons per minute[6] and commonly yield domestic supplies only.
			Alluvial Mountain Valleys East setting				
B	Piney Creek Alluvium, and post-Piney Creek Alluvium.	Coarse sand and gravel alluvial deposits along present day streams.[7]	Coarse sand and gravel alluvial deposits along present-day streams.[4,8]	8	8	[9]8	Holocene alluvial deposits composed primarily of coarse sand and gravel overlie fractured igneous and metamorphic rocks. Well yields depend on the combination of alluvial composition and fracture control, and range from 10 to 100 gallons per minute[6]. These deposits are commonly thin and of limited areal extent, but do yield domestic water supplies.

Table 4. Vulnerability characteristics of geohydrologic units--Continued

Geo-hydro-logic unit	Geologic units[1]	Aquifer media	Unsaturated media	Vulnerability rating			Comments
				Aqui-fer media	Unsatu-rated media	Hydraulic conduc-tivity	
			Mountain Flanks setting				
C	Fountain, Lykins, Morrison and Ralston Creek Formations, undifferentiated; Dakota, Carlisle, Greenhorn and Graneros Formations, undifferentiated; Niobrara, and Pierre Formations.	Moderately to steeply dipping, fractured, consolidated sedimentary rocks, primarily fine-grained sandstone, siltstone, and shale.[10]	Moderately to steeply dipping, fractured, consolidated sedimentary rocks, primarily fine-grained sandstone, siltstone, and shale.[4,11]	5	6	[5]1	These rocks form hogbacks and strike valleys between the mountain front and the Denver ground-water basin. Not very productive aquifers, these units yield domestic supplies only. North of 40 degrees latitude, the Pierre Shale is differentiated, and this unit includes only that part of the Pierre below the middle shale member.
D	Laramie-Fox Hills aquifer.	Fine- to medium-grained, silty, consolidated sandstone.[10]	Fine- to medium-grained, silty, consolidated sandstone.[4,11]	6	6	[5]1	Located along the mountain flanks and extending into the plains in the north-central part of the mapped area, this unit is a major bedrock aquifer in the Denver ground-water basin. See comment on unit I for description of the Laramie-Fox Hills aquifer.
d	Fox Hills, Laramie, Arapahoe, Denver, and Dawson Formations.	Consolidated sandstone, conglomerate and shale.[10]	Consolidated sandstone, conglomerate siltstone, claystone, and shale.[4,11]	6	6	[5]1	Located where formations composing Denver ground-water-basin aquifers crop out south of 40 degrees latitude, this unit includes post-Pierre Shale sedimentary rocks. These formations lie beyond the Denver Basin aquifer boundaries (Van Slyke and others, 1988a-d) and may be unsaturated or partially saturated. Well yields are probably lower than similar geohydrologic units D, F, I, M, O, R, and U.

Table 4. Vulnerability characteristics of geohydrologic units--Continued

Geo-hydro-logic unit	Geologic units[1]	Aquifer media	Unsaturated media	Vulnerability rating: Aqui-fer media	Vulnerability rating: Unsatu-rated media	Vulnerability rating: Hydraulic conduc-tivity	Comments
			Mountain Flanks setting--Continued				
E	Laramie-Fox Hills aquifer where overlain by unsaturated eolian deposits.	Fine- to medium-grained, silty, consolidated sandstone.[10]	Silt and fine-grained sand overlying fine- to medium-grained silty consolidated sandstone.[12]	6	4	[5]1	Located along the mountain flanks and extending into the plains in the north-central part of the study area, this unit is highly faulted in the primary recharge area in the Mountain Flanks setting. See comment for unit I for description of the Laramie-Fox Hills aquifer.
F	Arapahoe aquifer.	Interbedded conglomerate, sandstone and siltstone.[10]	Interbedded conglomerate, sandstone, and siltstone.[4,11]	7	6	[5]1	Located along the mountain front. The Arapahoe aquifer (units F, G, O, and P) is a major bedrock aquifer in the Denver ground-water basin. See comment on unit O for description of the Arapahoe aquifer.
G	Arapahoe aquifer where overlain by unsaturated eolian deposits.	Interbedded conglomerate, sandstone, and siltstone.[10]	Silt and fine-grained sand overlying interbedded conglomerate sandstone, and siltstone.[12]	7	4	[5]1	Located along the mountain front. See comment for unit O for description of the Arapahoe aquifer.
			Alternating Sandstone, Limestone, and Shale—Thin Soil setting				
H	Pierre Shale (from middle shale member up) and lower part of Fox Hills Formation (below Laramie-Fox Hills aquifer).	Marine shale and very fine-grained sandstone and siltstone.[13]	Marine shale and very fine-grained sandstone and siltstone.[4,14]	2	5	[5]1	A major confining bed, this unit forms the base of the Denver ground-water basin and is differentiated only in that part of the Alternating Sandstone, Limestone, Shale—Thin Soil setting north of 40 degrees latitude.

Table 4. Vulnerability characteristics of geohydrologic units--Continued

Geo-hydro-logic unit	Geologic units[1]	Aquifer media	Unsaturated media	Vulnerability rating: Aqui-fer media	Vulnerability rating: Unsatu-rated media	Vulnerability rating: Hydraulic conduc-tivity	Comments
		Alternating Sandstone, Limestone, and Shale—Thin Soil setting—Continued					
I	Laramie-Fox Hills aquifer.	Fine- to medium-grained, silty, consolidated sandstone.[10]	Fine-to medium-grained silty, consolidated sandstone.[4,11]	6	6	[5]1	Located east of the Mountain Flanks setting in the north-central part of the study area. This aquifer is composed of the upper part of the Fox Hills Formation and the lower sandstone of the Laramie Formation. Well yields range from 20 to 300 gallons per minute.[6] The structure dips moderately to the east, is extensively faulted in some areas, and may be in fault contact with the upper part of the Laramie Formation. The primary recharge area for the Laramie-Fox Hills aquifer is within the Mountain Flanks setting. The Laramie-Fox Hills aquifer generally is flat lying in this setting.
K	Laramie-Fox Hills aquifer overlain by unsaturated eolian deposits.	Fine- to medium-grained, silty, consolidated sandstone.[10]	Silt and fine-grained sand overlying fine- to medium-grained silty consolidated sandstone.[12]	6	4	[5]1	Located east of the Mountain Flanks setting in the north-central part of the study area. See comment for unit I for description of the Laramie-Fox Hills aquifer. The Laramie-Fox Hills aquifer generally is flat lying in this setting.
M	Laramie Formation above the top of the Laramie-Fox Hills aquifer.	Marine shale, coal seams, and minor siltstone and sandstone.[13]	Marine shale, coal seams, and minor siltstone and sandstone.[4,14]	2	5	[5]1	Forms a confining bed between the Laramie-Fox Hills aquifer (units D, E, I, K) and the Arapahoe aquifer (units F, G, O, P). Located to the southeast of units D, E, I, and K.

Table 4. Vulnerability characteristics of geohydrologic units--Continued

Geo-hydro-logic unit	Geologic units[1]	Aquifer media	Unsaturated media	Vulnerability rating			Comments
				Aqui-fer media	Unsatu-rated media	Hydraulic conduc-tivity	
		Alternating Sandstone, Limestone, and Shale—Thin Soil setting—Continued					
N	Laramie Formation above the top of the Laramie-Fox Hills aquifer overlain by unsaturated eolian deposits.	Marine shale, coal seams, and minor siltstone and sandstone.[13]	Silt and fine-grained sand overlying marine shale, coal seams, and minor siltstone and sandstone.[12]	2	4	[5]1	Forms a confining bed between the Laramie-Fox Hills aquifer (units D, E, I, K) and the Arapahoe aquifer (units F, G, O, P). Located to the southeast of units D, E, I, and K.
O	Arapahoe aquifer outcrop.	Interbedded conglomerate, sandstone, and siltstone.[10]	Interbedded conglomerate, sandstone, and siltstone.[4,11]	7	7	[5]1	Located in the east-central part of the study area. Well yields range from 10 to 600 gallons per minute.[15] The Arapahoe aquifer is equivalent to the Arapahoe Formation over most of its areal extent; however, in some places the aquifer includes an underlying upper sandstone unit (50–75 feet) of the Laramie Formation.[6]
P	Arapahoe aquifer overlain by unsaturated eolian deposits.	Interbedded conglomerate, sandstone, and siltstone.[10]	Silt and fine-grained sand overlying interbedded conglomerate, sandstone, and siltstone.[12]	7	4	[5]1	Located in the east-central part of the study area, this major bedrock aquifer in the Denver ground-water basin is commonly overlain by eolian deposits in east-central part of the study area. See comment for unit O for description of the Arapahoe aquifer. The Arapahoe aquifer generally is flat lying and not significantly fractured or faulted in this setting.

Table 4. Vulnerability characteristics of geohydrologic units--Continued

Geo-hydro-logic unit	Geologic units[1]	Aquifer media	Unsaturated media	Vulnerability rating: Aqui-fer media	Vulnerability rating: Unsatu-rated media	Vulnerability rating: Hydraulic conduc-tivity	Comments
		Alternating Sandstone, Limestone, and Shale—Thin Soil setting—Continued					
R	Denver aquifer.	Interbedded shale, clay-stone, silt-stone, and sandstone.[10]	Interbedded shale, clay-stone, silt-stone, and sandstone.[4,11]	6	6	[5]1	Located throughout the central part of the study area, the Denver aquifer is a major bedrock aqui-fer in the Denver ground-water basin. Well yields range from 5 to 100 gallons per minute.[15] Only the silt-stone and sandstone beds yield usable vol-umes of water. The Denver aquifer includes all but the lower 100 feet of the Denver Forma-tion, is flat lying, and is not significantly frac-tured or faulted.
S	Denver aquifer overlain by unsaturated eolian depos-its.	Interbedded shale, clay-stone, silt-stone, and sandstone.[10]	Silt and fine-grained sand overlying interbedded shale, clay-stone, silt-stone, and sandstone.[12]	6	4	[5]1	Large areas of the Denver aquifer are overlain by eolian deposits in the central part of the study area. See comment on unit R for description of the Denver aquifer.
T	Denver aquifer overlain by Paleocene lava flows.	Interbedded shale, clay-stone, silt-stone, and sandstone.[10]	Lava flows overlying interbedded shale, clay-stone, silt-stone, and sandstone.[4,16]	6	3	[5]1	Present only at North and South Table Mountains in Golden. The lava flows over the Denver Formation have little or no primary permeability and restrict recharge to the Denver aquifer. The Denver aquifer is topo-graphically high at this location, the saturated thickness is very thin, and the aquifer is not developed by wells in this location. See com-ment on unit R for description of the Den-ver aquifer.

Table 4. Vulnerability characteristics of geohydrologic units--Continued

Geo-hydro-logic unit	Geologic units[1]	Aquifer media	Unsaturated media	Vulnerability rating: Aqui-fer media	Vulnerability rating: Unsatu-rated media	Vulnerability rating: Hydraulic conduc-tivity	Comments
			Alternating Sandstone, Limestone, and Shale—Thin Soil setting—Continued				
U	Dawson aquifer.	Poorly to moderately well consolidated conglomerate and sandstone.[10]	Poorly to moderately well consolidated conglomerate and sandstone.[4,11]	7	7	[5]1	The Dawson aquifer occurs in the southeast part of the study area; it is a major bedrock aquifer in the Denver ground-water basin. Well yields range from 59 to 150 gallons per minute.[15] The Dawson aquifer includes the Dawson Formation and, in places, upper sandstone units in the underlying Denver Formation and is flat lying and not significantly fractured or faulted.
V	Dawson aquifer overlain by unsaturated eolian deposits.	Poorly to moderately well consolidated conglomerate and sandstone.[10]	Silt and fine-grained sand overlying poorly to moderately well consolidated conglomerate and sandstone.[12]	7	4	[5]1	Large areas of the Dawson aquifer are overlain by eolian deposits in the southeast part of the study area. See comment on unit U for description of the Dawson aquifer.
			Unconsolidated and Semiconsolidated Aquifers setting				
W	Pre-Rocky Flats Alluvium, Nussbaum Alluvium, Rocky Flats Alluvium, Verdos Alluvium, Slocum Alluvium, landslide deposits, and colluvium.	Interbedded sands, silts, and clays with some gravels.[7]	Interbedded sands, silts, and clays with some gravels.[12]	7	7	[17]6	Relatively thin Pleistocene alluvial deposits form the land surface over large areas in this setting between the mountains and the South Platte River. Well yields are generally less than 50 gallons per minute.[18]

Table 4. Vulnerability characteristics of geohydrologic units--Continued

Geo-hydro-logic unit	Geologic units[1]	Aquifer media	Unsaturated media	Vulnerability rating: Aqui-fer media	Vulnerability rating: Unsatu-rated media	Vulnerability rating: Hydraulic conduc-tivity	Comments
			Unconsolidated and Semiconsolidated Aquifers setting--Continued				
X	Saturated eolian deposits.	Silt and fine-grained sand.[7]	Silt and fine-grained sand.[12]	5	4	[5]1	Very fine-grained windblown deposits and unconsolidated silt forms the land surface over large areas east of the South Platte River. Well yields generally are less than 50 gallons per minute.[19] The depth-to-water maps[20] were used to determine where the windblown sand and eolian deposits are saturated. The deposits commonly are saturated where they overlie the Denver Formation.
			River Alluvium Without Overbank Deposits setting				
Y	Louviers Alluvium, Broadway Alluvium, Piney Creek Alluvium, and post-Piney Creek Alluvium.	Coarse sand and gravel alluvial deposits along present-day streams.[7]	Coarse sand and gravel alluvial deposits along present-day streams.[8]	9	8	[21]10	Holocene and upper Pleistocene alluvial deposits along present-day streams east of the mountains are the most productive aquifers in the study area. Well yields range from 45 to 2,040 gallons per minute.[18] Ground water in the deposits is hydraulically connected to the adjacent streams.

Table 4. Vulnerability characteristics of geohydrologic units--Continued

Geo-hydro-logic unit	Geologic units[1]	Aquifer media	Unsaturated media	Vulnerability rating			Comments
				Aqui-fer media	Unsatu-rated media	Hydraulic conduc-tivity	

[1] These geologic units are listed in stratigraphic sequence, beginning with oldest.
[2] Aquifer media are "metamorphic and igneous rocks" (table 1).
[3] Unsaturated media are "metamorphic and igneous rocks" (table 3) and commonly a thin mantle of colluvium.
[4] The saturated media that were considered did not include any thin, unconsolidated materials that are at the surface, such as sand, gravel, clay, and so forth.
[5] Aquifer hydraulic conductivity is "less than 13 feet per day" (table 2).
[6] George Van Slyke, Colorado Department of Natural Resources, Water Resources Division, Office of the State Engineer, oral commun., 1991.
[7] Aquifer media are "sand and gravel" (table 1).
[8] Unsaturated media are "sand and gravel" (table 3).
[9] Generally lower well yields than geohydraulic unit Y. The rating of 8 corresponds to a hydraulic conductivity of "130–270 feet per day" (table 2).
[10] Aquifer media are "bedded sandstone, limestone, and shale sequences" (table 1).
[11] Unsaturated media are "bedded limestone, sandstone, and shale" (table 3).
[12] Unsaturated media are "sand and gravel having significant silt and clay" (table 3).
[13] Aquifer media are "massive shale" (table 1).
[14] Unsaturated media are "shale" (table 3).
[15] Hurr and Hearne, 1985.
[16] Unsaturated media are "basalt" (table 3).
[17] Generally lower well yields than geohydrologic unit B. The rating of 6 corresponds to a hydraulic conductivity of "90–130 feet per day" (table 2).
[18] Smith and others, 1964.
[19] McConaghy and others, 1964.
[20] Hillier and Schneider, 1979, and Hillier and others, 1983.
[21] Generally highest well yields of any aquifer in the study area. The rating of 10 corresponds to a hydraulic conductivity of "more than 270 feet per day" (table 2).

only units in the Western Mountain Ranges ground-water region. Geohydrologic unit A is in the Mountain Slopes East setting, and geohydrologic unit B is in the Alluvial Mountain Valleys East setting. The remainder of geohydrologic units lie within the Non-glaciated Central ground-water region. Units C, D, d, E, F, and G are in the Mountain Flanks setting. Units H, I, K, M, N, O, P, R, S, T, U, and V are in the Alternating Sandstone, Limestone, and Shale—Thin Soil setting. Units W and X compose the Unconsolidated and Semiconsolidated Aquifers setting in the study area. And lastly, unit Y is in the River Alluvium Without Overbank Deposits setting.

Ratings for aquifer media (table 4) were based on the degree of fracturing and grain size as indicated by lithologic descriptions (Colton, 1978; Trimble and Machette, 1979). Fractured aquifers generally are more vulnerable than unfractured. Aquifers having mostly large particles and few small particles generally are more vulnerable than those having more small particles. Igneous and metamorphic rocks (geohydrologic unit A) are commonly fractured in the study area and were rated 5. Sand and gravel aquifers, in order of increasing proportion of small particles (decreasing vulnerability) are geohydrologic units Y (rated 9), B (rated 8), W (rated 7), and X (rated 5). Bedded sandstone, limestone, and shale sequences, in order of increasing proportion of small particles (decreasing vulnerability) are geohydrologic units F, G, O, P, U, and V (rated 7); D, d, E, I, K, R, S, and T (rated 6); and C (rated 5). Shales of geohydrologic units H, M, and N were rated 2.

Ratings for unsaturated media (table 4) were based on the characteristics of bedding, fracturing, and grain size as indicated by lithologic descriptions (Colton, 1978; Trimble and Machette, 1979). Unbedded media generally are more vulnerable than bedded media. Fractured media generally are more vulnerable than unfractured. Media having mostly large particles and few small particles generally are more vulnerable than those having more small particles. Igneous and metamorphic rocks (geohydrologic unit A) are commonly fractured in the study area and were rated 7. Sand and gravel in order of decreasing vulnerability (increasing proportion of small particles) are geohydrologic units B and Y (rated 8); W (rated 7); and E, G, K, N, P, S, V, and X (rated 4).

the Bedded sandstone, limestone, and shale sequences in order of decreasing vulnerability are geohydrologic units O and U (rated 7), and C, D, d, F, I, and R (rated 6). Shales of geohydrologic units H and M were rated 5. Lava flows overlying interbedded shale, claystone, siltstone, and sandstone (geohydrologic unit T) were rated 3.

Ratings for aquifer hydraulic conductivity (table 4) were based on general hydraulic conductivity ranges for similar media (Freeze and Cherry, 1979, p. 29), reported well yields, and lithologic descriptions (Colton, 1978; Trimble and Machette, 1979). Igneous and metamorphic rocks (geohydrologic unit A), shale (geohydrologic units H, M, and N), as well as bedded sandstone, limestone, and shale (geohydrologic units C, D, d, E, F, G, I, K, O, P, R, S, T, U, and V) generally have hydraulic conductivity less than 13 feet per day (rated 1). Sand and gravel aquifers generally have hydraulic conductivities of 0.1 to 10,000 feet per day. Lithologic descriptions and reported well yields were used to distinguish between the units. From most to least conductive, the geohydrologic units are Y (rated 10), B (rated 8), W (rated 6), and X (rated 1).

Depth to Water

Ground water can be under either confined or unconfined conditions. In this study, the uppermost aquifer was assumed to be unconfined, and the depth to water was the vertical distance between the land surface and the water table. Significant variation in depth to water may result from variations in land-surface elevation and the recharge or discharge conditions. For purposes of this study, depth to water was considered to be depth to the first continuously saturated zone. Perched water was not considered to be the top of the water table. The vertical distance through which water and any contaminants must travel before reaching the uppermost ground water is an important characteristic in determining vulnerability to contamination. In general, at greater depths to water the contact time with the surrounding unsaturated media increases. This relation was expressed by assigning higher vulnerability ratings for shallower depths to water (table 5).

The assessment of depth to water was limited by the level of detail in available data. The depth-to-water cover (Command file 2 in the "Supplemental Information" section) contains data mapped at a scale of 1:100,000 (Hillier and Schneider, 1979; Hillier and others, 1983). For unconsolidated alluvial deposits, depth-to-water ranges were delineated (0–5 feet, 5–10 feet, 10–20 feet, and greater than 20 feet). For other aquifers, depth-to-water ranges were not delineated. For the Dawson, Denver, and Arapahoe aquifers,depth to water generally was more than 20 feet. For areas underlain by consolidated rock older than the Arapahoe aquifer, the unconfined aquifers are in unconsolidated rocks and in consolidated rocks that are fractured and weathered. For fractured crystalline rocks, depth to water varies significantly over short distances.

Table 5. Vulnerability ratings for range categories of depth to water

[Modified from Aller and others, 1987, table 4, p. 21]

Depth to water (feet)	Vulnerability rating[1]
0 to 5	10
5 to 15	9
15 to 30	7
30 to 50	5
50 to 75	3
75 to 100	2
More than 100	1

[1]Higher rating indicates higher vulnerability to contamination.

Criteria for Assignment to Depth-to-Water Groups

Four depth-to-water groups were designated in the study area; 0–5 feet, 5–20 feet, greater than 20 feet, and highly variable (table 6). The digital map of geohydrologic units retains data on depth to water as well as aquifer media, hydraulic conductivity, and unsaturated media. The "Criteria for delineation of geohydrologic units" section describes the processing of these data. Where the source map was not specific about both depth to water and saturated media, depth to water was assumed to depend on surficial geology. Generally, where the surface geologic unit was bedrock (geohydrologic units C, D, d, F, H, I, M, O, R, T, and U) or unsaturated eolian deposits (geohydrologic units E, G, K, N, P, S, and V), the depth to water was assumed to be greater than 20 feet. Where the surface geologic unit was unconsolidated fluvial deposits (geohydrologic units B, W, and Y) or saturated eolian deposits (geohydrologic unit X), the depth to water was assumed to be 5–20 feet.

Designated Depth-to-Water Groups

Four depth-to-water groups are differentiated in the study area (table 6). Depth to water generally was less than 5 feet in depth-to-water group 1. Locally, the water table may fluctuate seasonally; seasonal lows can result in depths to water of more than 5 feet. These generally occur in marshy areas along the South Platte River and some tributaries.

Table 6. Vulnerability ratings for designated depth-to-water groups

[Each area on the vulnerability map (pl. 1) is identified by a four-character code, an alphabetic character followed by three digits. The first digit indicates the depth-to-water group. For example, for an area identified by the code X321, the depth-to-water group is 3]

Depth-to-water group	Depth to water	Vulnerability rating[1]
1	less than 5 feet	[2]10
2	5 to 20 feet	[2]9
3	greater than 20 feet	[2]7
4	highly variable	not rated[3]

[1]Higher rating indicates higher vulnerability to contamination.

[2]Vulnerability ratings are modified from those proposed by Aller and others (1987) (table 5) to be consistent with available data.

[3]The vulnerability rating for depth-to-water area 4 may be as low as 1 or as high as 10 on the rating scale proposed by Aller and others (1987) (table 5).

Depth to water generally was 5–20 feet in depth-to-water group 2. This group is composed of geohydrologic units B, W, X, and Y. In the Nonglaciated Central ground-water region, these areas (geohydrologic units W, X, and Y) generally were mapped by Hillier and Schneider (1979) and Hillier and others (1983) as having a depth to water between 5 and 20 feet. In the Western Mountain Ranges ground-water region, these areas (geohydrologic unit B) are grouped with crystalline rocks by Hillier and Schneider (1979) and Hillier and others (1983) but mapped separately for this report. Local and seasonal depths to water near streams, lakes, and marshy areas may be less than 5 feet but farther away may be more than 20 feet.

Depth to water generally is greater than 20 feet and commonly greater than 100 feet in depth-to-water group 3. Depth to water can be less than 20 feet near streams, lakes, and irrigated areas. Depths to water of greater than 30 feet generally are farther from streams and lakes. Depths to water of more than 100 feet are common. The Dawson, Denver, and Arapahoe Formations (geohydrologic units F, G, O, P, R, S, T, U, and V) were mapped by Hillier and Schneider (1979) and Hillier and others (1983) as having a depth to water of more than 20 feet. Sedimentary rocks older than the Arapahoe Formation (geohydrologic units C, D, E, H, I, K, M, N, and part of d) were grouped by Hillier and Schneider (1979) and Hillier and others (1983) with unconsolidated sedimentary rocks. For this study, many of the older rocks are mapped separately. Although data are sparse (Hillier and others, 1979), depth to water was assumed to be greater than 20 feet for all consolidated sedimentary rocks.

Depth to water was quite variable in depth-to-water group 4. Hillier and Schneider (1979) and Hillier and others (1983) reported a range for depth to water from 5 to 113 feet. These areas are composed of geohydrologic unit A. In these crystalline rocks water is present locally in fractures and assuming an average value for the area is not appropriate. Sparse data and uncertain connection among the fractures that serve as local aquifers precluded the accurate delineation of depth-to-water areas. Therefore, no single vulnerability rating is appropriate. The vulnerability rating for depth to water at a specific site within this depth-to-water area can be as low as 1 or as high as 10 on the rating scale proposed by Aller and others (1987) (table 5).

Aquifer Recharge Rate

Ground water in the uppermost aquifer is replenished at the water table through the process of areal recharge. The rate of recharge is the rate at which water infiltrates to the water table, commonly expressed in inches per year. Recharge rate for the uppermost aquifer depends on the rate and duration at which precipitation reaches the land surface, topography, soil type, characteristics of the unsaturated zone, vegetation, evaporation rate, and transpiration rate. Recharge rate determines the rate at which water is available to leach or transport contaminants to the water table. Generally, ground water is more vulnerable where the recharge rate is high. This relation is expressed by assigning higher ratings to higher recharge rates (table 7).

Table 7. Vulnerability ratings for range categories of recharge rate

[Modified from Aller and others, 1987, table 5, p. 21]

Recharge rate (inches per year)	Vulnerability rating[1]
More than 10	9
7 to 10	8
4 to 7	6
2 to 4	3
0 to 2	1

[1]Higher rating indicates higher vulnerability to contamination.

Recharge is commonly estimated as a percentage of precipitation. Precipitation in the greater Denver area ranges from 12 to 25 inches per year; higher rates occur in the foothills and mountainous areas along the western side of the study area, and lower rates occur on the plains along the eastern side of the study area (Colorado Climate Center, 1984). The recharge rate has been estimated for nonirrigated areas in locations that are hydrologically similar to, but lie outside of, the study area. In the South Platte River basin between Henderson and the Colorado-Nebraska State line, the recharge rate was estimated to be less than 10 percent of precipitation (Hurr, and others, 1975). Applying this limit to the study area results in an estimated recharge rate of less than 1.2 inches per year on the plains and less than 2.5 inches per year in the foothills. Both of these limits fit approximately into the lowest range category (table 7) of 0–2 inches per year. In the Black Squirrel Creek basin of the Arkansas River basin, about 30 miles south of the southern boundary of the study area, the recharge rate was estimated to be 4 percent of precipitation (Erker and Romero, 1967). Applying this rate to the greater Denver area results in an estimated recharge rate of from 0.5 to 1.0 inch per year. This range is within the lowest range category (table 7) of 0–2 inches per year. On the high plains east of the greater Denver area, the recharge rate on fallow land was estimated to be 2 to 4 inches per year (Longenbaugh, 1975).

The recharge in the greater Denver area generally is in the lowest range category of less than 2 inches per year. This recharge rate would be consistent with a vulnerability rating of 1, an end member of the rating scale proposed by Aller and others (1987) (table 7). Although the recharge rate probably varies, no effort was made to quantify the variation of recharge throughout the study area. Higher recharge rates occur in areas of sandy soil having little slope and little vegetative cover. Higher recharge rates also occur in depressions and along ephemeral streams where water accumulates and is on the land surface for longer than the duration of the storm events. At higher altitudes, the recharge rate may be higher in areas where a snowpack develops and provides a source of water during spring snowmelt. Irrigation practices greatly affect recharge to ground water. However, because irrigated lands are not considered an intrinsic characteristic but rather a land use that can change over time, the recharge rates caused by irrigation were not considered within the scope of this study.

Soil Media

Soil media refers to the type of soil through which water and any contaminant introduced at the land surface must move to reach ground water. Soil is a natural, unconsolidated mineral and organic material on the Earth's surface that supports plants. Soil has properties resulting from the integrated effects of climate (including moisture and temperature) and living matter on parent material (geologic media) and is affected by topographic relief over time. Characteristics of soil media considered in the assessment of ground-water vulnerability include soil thickness, texture, and shrink-swell potential. Soil texture refers to the relative proportions of variously sized particles. Shrink-swell potential is a measure of the volume change associated with the shrinking of soil when dry and the swelling when wet.

Data describing soil are available from soil surveys conducted by the U.S. Soil Conservation Service to describe the soils of a specific area using field investigation and supporting information. Some of the key terms used in classifying soils are soil series, soil map units, and soil associations. The lowest, most homogeneous classification category of the national soil classification system is the soil series (U.S. Soil Conservation Service, 1983, p. 602–603). Soils of one series may differ in texture of the surface layer and in slope, stoniness, or some other characteristics but still share major layers that are similar in thickness, arrangement, and other characteristics. Each soil series is composed of as many as six layers. Soil thickness, texture, and shrink-swell potential are available for each layer. For a given soil survey, soil series can be mapped individually, or two or more soil series can be combined to form a soil map unit. Soil map units are comprised of one to three soil series. The aggregation of soil series into soil map units is unique for each soil survey. In a general soil map, soil series are grouped into soil associations that are comprised of 1 to 21 soil series. In associations that are composed of multiple soil series, the series may differ in slope, depth, stoniness, drainage, and other characteristics.

Soil media affect vulnerability in that the rate at which a contaminant can move from the land surface to the unsaturated zone and the potential for contaminant-attenuating processes of filtration, biodegradation, sorption, and volatilization depend in part on the soil media. The extent to which soil medium restricts vertical movement and permits contaminant-attenuating processes results primarily from the depth and texture of the soil and the type of clay present. In general, sandy and gravelly soils are more vulnerable than clayey soils; loamy soils are intermediate. Organic matter in the soil may increase the attenuating process for organic contaminants. Clays having a high shrink-swell potential could be more vulnerable because they may provide channels for flow by forming cracks as they dry and shrink. This ranking of soil media is expressed by assigning a rating of 1 to 10 for each of 11 soil-media types. The soil-media types are listed in table 8 from most vulnerable to least vulnerable.

Table 8. Vulnerability ratings for types of soil media

[Modified from Aller and others, 1987, table 7, p. 22]

Soil-media type	Vulnerability rating[1]
Thin or absent	10
Gravel	10
Sand	9
Peat	8
Shrinking or aggregated clay	7
Sandy loam	6
Loam	5
Silty loam	4
Clay loam	3
Muck	2
Nonshrinking and nonaggregating clay	1

[1]Higher rating indicates higher vulnerability to contamination.

Data for soil characteristics in the study area were obtained from soil surveys published by the U.S. Soil Conservation Service (Crabb, 1980; Larsen, 1980 a,b; Larsen and Brown, 1971; Moreland and Moreland, 1975; Price and Amen, 1984; Sampson and Baber, 1974), an unpublished survey for part of Douglas County, and unpublished maps of soil associations (Dale Holden, U.S. Soil Conservation Service, Denver, written commun., 1988). The digital soil-association map for the greater Denver area is described in Documentation file 4 in the "Supplemental Information" section.

Criteria for Assignment of Soil Associations to Soil Groups

The assessment of soil media was limited due to the variation in soil characteristics over short distances. Data for thickness, texture, and shrink-swell potential were used to assign soil associations mapped within the greater Denver area to groups composed of soil series having similar vulnerability characteristics. These data were assumed to indicate the contaminant-attenuating processes of filtration, biodegradation, sorption, and volatilization. The soil groups used in the assessment of ground-water vulnerability represent areas where the soils have a similar ability to resist or facilitate the transport of contaminants. Grouping was a four-step procedure.

1. Texture ratings were based on attenuation potential.
2. Soil-layer ratings were based on thickness, texture, and shrink-swell potential.
3. Soil series were assigned ratings on the basis of soil-layer characteristics.
4. Soil associations were grouped into eight soil groups on the basis of the ratings of the soil series that compose the associations.

Soil data were assessed by first assigning a rating to each soil texture, each individual soil layer, and each soil series. Ratings were assigned to soil series by generalizing the soil-media types listed in table 8 to fit the soil characteristics in the greater Denver area. Many of the conventions adopted were arbitrary. At each step, information about the specific soil series is necessarily obscured because of this generalization. However, the procedure is repeatable and does maintain the general relation between the potential for contaminant-attenuating processes to occur in the soil and the rating assigned to the soil series. Generally, the potential for attenuation is less in soil series identified by a high vulnerability rating.

Although data about soil characteristics are available only for individual soil layers of each soil series, spatial data are consistently available only at the level of soil associations. Thus, soil groups are composed of soil series that have different vulnerability ratings.

Rating Soil Texture

Texture refers to the relative proportions of sand-, silt-, and clay-sized particles in a mass of soil. Texture consists of a texture class and appropriate modifiers; both are considered in rating the texture. The basic textural classes in order of increasing proportion of fine particles are: sand, loamy sand, sandy loam, loam, silty loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy-sand, and sandy-loam classes are further divided by specifying coarse, fine, or very fine (Moreland and Moreland, 1975). By arbitrary convention, qualifiers such as coarse, fine, and very fine did not affect the rating to which a sand or a sandy loam was assigned. Similarly, qualifiers such as silty and sandy did not affect the rating to which a clay or a clay loam was assigned. The texture-class ratings (table 9) are modified from those suggested by Aller and others (1987) (table 8) to associate a rating with each texture class in the study area. Soil textures in the greater Denver area consist of very restrictive clays, assigned a rating of 1; transmissive sands, assigned a rating of 9; and other textures, assigned ratings of 3, 4, 5, or 6 (table 9).

Table 9. Vulnerability ratings of texture classes

Texture class	Soil-media type[1]	Vulnerability rating
None[2]	Thin or absent	10
Coarse sand	Sand	9
Sand	Sand	9
Fine sand	Sand	9
Loamy coarse sand	Sandy loam	6
Loamy sand	Sandy loam	6
Loamy fine sand	Sandy loam	6
Loamy very fine sand	Sandy loam	6
Coarse sandy loam	Sandy loam	6
Sandy loam	Sandy loam	6
Fine sandy loam	Sandy loam	6
Very fine sandy loam	Sandy loam	6
Loam	Loam	5
Silty loam	Silty loam	4
Silt	Silty loam	4
Sandy clay loam	Clay loam	3
Clay loam	Clay loam	3
Silty clay loam	Clay loam	3
Sandy clay	Clay	1
Silty clay	Clay	1
Clay	Clay	1

[1]The soil-media types are listed in table 8.
[2]No texture class is appropriate here.

Modifiers describe rock-fragment content of soils. Modifiers that were used to describe soils in the greater Denver area are: gravelly, very gravelly, extremely gravelly, cobbly, very cobbly, extremely cobbly, channery, very channery, stony, very stony, and extremely stony. Gravelly, cobbly, channery, and stony refer to soils that contain more than 15 percent by volume of rock fragments. The terms "very" and "extremely" are included when rock fragments exceed 35 and 60 percent by volume. The rock fragments decrease the volume of soil in which the contaminant-attenuating processes can occur. This decrease in volume was considered in the rating of soil textures by using the arbitrary convention of increasing the rating by 1 for those soils containing more than 15 percent by volume of rock fragments. By arbitrary convention, no texture was rated higher than 10. For example, the rating for a gravelly sandy loam (rating of 6, table 9) was revised to 7 because the modifier "gravelly" indicates more than 15 percent of rock fragments. Rating revision for textural modifiers is demonstrated in the following table. In addition to the vulnerability ratings listed in table 9, this arbitrary convention resulted in textures rated as 2 and 7. The relation between texture rating and potential for contaminant-attenuating processes generally is consistent; textures assigned a low rating generally have more potential for attenuating processes than textures assigned a high rating.

Rating revision for textural modifiers

Initial rating[1]	Rating revised for more than 15 percent rock fragments
10	10
9	10
6	7
5	6
4	5
3	4
1	2

[1]Rating based on texture class (table 9).

Rating Individual Soil Layers

In published soil surveys, individual soil layers commonly are characterized by as many as three textural descriptions, by a shrink-swell potential, by the depth from land surface to the top and bottom of the layer, and by other soil properties. The following two steps resulted in the assignment of a rating to each layer of each soil series in the greater Denver area.

First, soil layers were rated on the basis of the textural description. Each layer is described by as many as three textures, and each texture in the textural description was assigned a rating (table 9). Each texture in the textural description for a soil layer could be assigned a different rating. The soil-layer was assigned a rating equal to the highest soil-texture rating in the layer. This convention was adopted because the listing of multiple textures for an individual layer implies that at a particular site the texture of that soil layer could be any one of the listed textures. Therefore, the soil-layer rating is representative of the most vulnerable texture that is described as common for that layer. For example, a soil layer described as clay loam (rating of 3), loam (rating of 5), and sandy loam (rating of 6) was assigned a rating of 6 because of the sandy-loam texture.

Second, the soil-layer rating was revised on the basis of the shrink-swell potential for the layer because soil layers having a moderate or greater shrink-swell potential can form desiccation cracks as the soil dries (Aller and others, 1987). Although these cracks may later close as the clay is hydrated and swells, contaminants may move rapidly upon initial wetting. This phenomenon has not been documented in the greater Denver area; however, by arbitrary convention, a rating of 7 was assigned to any layer having low-to-moderate or greater shrink-swell potential, regardless of texture. For example, the layer described above as clay loam (rating of 3), loam (rating of 5), and sandy loam (rating of 6) has a low-to-moderate shrink-swell potential and the layer was assigned a rating of 7.

Rating Soil Series

Soil series were assigned ratings based on the soil-layer rating and thickness in a four-step procedure. First, for each soil series, the thicknesses of layers assigned the same vulnerability rating were added together as though they were a single layer. For example, consider a 4-inch-thick layer of gravelly sandy loam and a 12-inch-thick layer of clay loam having a moderate shrink-swell potential. The sandy loam (rating of 6, table 9) was assigned a rating of 7 because the modifier "gravelly" indicates more than 15 percent rock fragments as described in the preceding table of rating revision for textural modifiers. The clay loam (rating of 3, table 9) was assigned a rating of 7 because of having a moderate shrink-swell potential. These two layers were considered as though they were one 16-inch-thick layer that was assigned a rating of 7.

Second, the thickness of each layer was considered by assigning a higher vulnerability rating to thin layers. The change in rating associated with ranges of thickness was arbitrarily assigned to incorporate the fact that thin soils have a smaller volume of soil in which contaminant attenuation may occur. The assigned rating was not changed for layers that were more than 15 inches thick. Soil layers that were 11 to 15 inches thick were assigned a rating that was larger by 1 than the rating for a layer thicker than 15 inches with the same texture and shrink-swell potential. Soil layers that were 6 to 10 inches thick were assigned a rating that was larger by 3 than the rating for a layer thicker than 15 inches with the same texture and shrink-swell potential. Soil layers that were less than 6 inches thick were assigned a rating that was larger by 5 than the rating for a layer thicker than 15 inches with the same texture and shrink-swell potential. By arbitrary convention, no soil layer was rated higher than 10. Rating revision for layer thickness is demonstrated in the following table.

Rating revision for layer thickness

Initial rating[1]	Rating revised for thickness of			
	More than 15 inches	11–15 inches	6–10 inches	Less than 6 inches
10	10	10	10	10
9	9	10	10	10
7	7	8	10	10
6	6	7	9	10
5	5	6	8	10
4	4	5	7	9

[1]Rating based on table 9 with revisions for textural modifiers and shrink-swell potential.

Third, each soil series was assigned a vulnerability rating that was the same as the lowest rating given to any soil layer in that series. This convention was adopted because water moving vertically through the soil must pass through each layer of that soil. Therefore, the potential for contaminant-attenuating processes of the soil series is determined by the soil layer that offers the most potential for attenuating processes.

Fourth, within the study area, many soil series occur in more than one soil survey, and the descriptions may differ among soil surveys. For soil series described in two or more soil surveys, the above procedure commonly resulted in the soil series being assigned the same rating. For those soil series that were assigned different ratings on the basis of different descriptions, each description was reevaluated, and the soil series was assigned a single rating. Soil-series ratings range from 4 to 10.

As an example of the rating procedure, consider the description of the Ascalon soil series (Moreland and Moreland, 1975) in Boulder County. A rating is assigned to each layer based on texture (table 9), including any needed revisions for textural modifiers.

Ascalon soil series

Soil layer	Texture	Rating
1	Sandy loam	6
2	Sandy clay loam	3
3	Sandy loam	6

The rating for each layer was revised based on shrink-swell potential.

Ascalon soil series

Soil layer	Initial rating	Shrink-swell potential	Revised rating
1	6	Low	6
2	3	Moderate	7
3	6	Low	6

Finally, a rating is assigned to the Ascalon soil series by combining the thickness of layers having the same rating, revising the ratings based on thickness, and assigning the soil series an overall rating equal to the lowest of the resultant ratings.

Ascalon soil series

Soil layers	Combined thickness (inches)	Initial rating	Rating revised for thickness
1, 3	49	6	6
2	11	7	8

The Ascalon soil series has an overall vulnerability rating of 6.

Soil series assigned higher ratings generally are more vulnerable (offer less potential for contaminant-attenuating processes to occur in the soil media) than soil series assigned lower ratings. For example, the Ratake soil series (a thin, gravelly, sandy loam assigned a rating of 8) is generally more vulnerable than the Denver soil series (a clay or clay loam having high shrink-swell potential assigned a rating of 7). However, because of the arbitrary conventions adopted, this general relation may not always be valid.

Grouping Soil Associations

Within the study area, 26 soil associations have been mapped (Dale Holden, written commun., 1988) at a scale of 1:250,000. A digital map of these data was obtained for the study area (Documentation File 4 in the "Supplemental Information" section. These associations are composed of as many as 11 named soil series. Most of the named soil series were mapped by at least one of the soil surveys (Crabb, 1980; Larsen, 1980 a,b; Larsen and Brown, 1971; Moreland and Moreland, 1975; Price and Amen, 1984; Sampson and Baber, 1974). Soil series that were named in associations but not mapped by one of these soil surveys were assigned a rating on the basis of descriptions in the U.S. Soil Conservation Service data base and appropriate soil surveys (Dale Holden, written commun., 1988).

The 26 soil associations in the area were grouped into 8 soil groups by combining soil associations composed of soil series that were assigned similar ratings. Soil associations are characterized by naming the dominant soil series and stating as a percentage the estimated area of the association that consists of each soil series (Dale Holden, written commun., 1988). This percentage was used as a general indication of the relative importance of each named series. However, the percentage applies to the total extent of the mapped soil association and may not be representative of conditions in the study area. Soil groups generally consist of associations that include soil series assigned the same range of ratings. Command File 9 in the "Supplemental Information" section lists the specific commands used to group soil associations. The simplified digital map of soil groups was overlaid onto the digital map containing information about aquifer media, hydraulic conductivity, unsaturated media, and depth to water (Command File 10 in the "Supplemental Information" section). Areas smaller than 100 acres were merged with adjacent areas (Command File 11 in the "Supplemental Information" section).

Designated Soil Groups

The relation between soil group and the potential for contaminant-attenuating processes to occur in the soil depends on the range of soil-series ratings. The characteristics of soil-media groups are presented in tables 10–18. For soil groups consisting of a wide range of soil series ratings, a map of soil series might be needed to assess the potential for attenuating processes to occur in the soil. For example, consider a site on the south side of Valmont Reservoir in Boulder County. The vulnerability response code (pl. 1) is Y251. The soil-group code, second digit in the code, is 5. For this soil group, the most common vulnerability rating assigned to a named soil series is 7. Vulnerability ratings at the site could be as low as 5 or as high as 10, but probably are 6–8, according to table 10. If a narrower range of vulnerability rating is required, the soil survey (Moreland and Moreland, 1975) shows the Ascalon-Otero soil-series complex at the site. Both of the soil series in this soil complex are named series for soil association CO163 in soil group 5 and both were assigned a vulnerability rating of 6 (table 15). Additional information about soils at the site are available in the soil survey.

Table 10. Characteristics of soil groups

[Each area on the vulnerability map (pl. 1) is identified by a four-character code, an alphabetic character followed by three digits. The second digit indicates the soil group. For example, for an area identified by the code W271, the soil group is 7. Dashes indicate no soil associations were assigned this vulnerability rating]

Soil group	Soil associations in group	Percentage of area[1] in soil association where named soil series were assigned a vulnerability rating of [2]								General area of occurrence
		4 (Low)	5	6	7	8	9	10 (High)	None[3]	
1	CO193	--	--	--	10	30	--	60	--	Southwestern part of study area.
	CO339	--	--	--	15	--	--	85	--	
2	CO173	--	--	25	--	--	75	--	--	Northwestern part of study area.
3	CO021	--	--	5	70	--	--	25	--	Along mountain front in central part of study area.
	CO159	--	--	--	35	55	--	10	--	
	CO191	--	--	17	23	40	--	20	--	
	CO232	--	--	--	10	70	--	20	--	
4	CO192	35	--	--	55	--	--	10	--	Southwestern part of study area.
5	CO156	--	6	--	59	25	--	10	--	Along mountain front and in north-central part of study area.
	CO158	--	--	--	80	15	--	5	--	
	CO162	--	--	10	86	--	--	4	--	
	CO163	--	--	25	60	10	--	5	--	
	CO185	--	8	--	60	30	--	2	--	
	CO231	--	--	34	61	--	--	5	--	
6	CO180	2	17	8	18	--	15	--	40	Along South Platte River and its tributaries.
	CO229	32	--	10	45	-	--	--	13	
7	CO168	--	--	--	100	--	--	--	--	Between mountain front to the west and South Platte River to the east.
	CO186	--	--	15	85	--	--	--	--	
	CO190	--	--	24	76	--	--	--	--	
	CO230	--	--	--	100	--	--	--	--	
8	CO164	--	10	80	10	--	--	--	--	East of South Platte River.
	CO165	--	10	49	41	--	--	--	--	
	CO169	--	75	20	5	--	--	--	--	
	CO176	--	--	99	1	--	--	--	--	
	CO208	--	--	88	4	--	8	--	--	
	CO226	--	30	17	53	--	--	--	--	

[1]Soil associations are characterized by stating as a percentage the estimated area of the association that consists of each named soil series (Dale Holden, written commun., 1988). This percentage is tabulated here as a general indication of the relative importance of each named series. However, the percentage applies to the total extent of the mapped soil association and may not be representative of conditions in the study area.

[2]Soil series within the study area were assigned ratings from 4 to 10.

[3]Fluvaquents were not assigned a rating. The texture of these soils ranges from clay loam (appropriate for rating of 3) to gravelly sand (appropriate for rating of 10).

Table 11. Named soil series in the soil associations composing soil group 1

[Each area on the vulnerability map (pl. 1) is identified by a four-character code, an alphabetic character followed by three digits. The second digit indicates the soil group. For example, for an area identified by the code A413, the soil group is 1]

Soil association	
CO193	CO339
VERY HIGH VULNERABILITY RATING OF 10	
Resort	Legault
Rock outcrop	Rock outcrop
Sphinx	Sphinx
MODERATELY HIGH VULNERABILITY RATING OF 8	
Herbman	
Raleigh	
Ratake	
MIDRANGE VULNERABILITY RATING OF 7	
Garber	Aquolls
	Garber
	Guffey

Table 12. Named soil series in the soil associations composing soil group 2

[Each area on the vulnerability map (pl. 1) is identified by a four-character code, an alphabetic character followed by three digits. The second digit indicates the soil group. For example, for an area identified by the code X321, the soil group is 2]

Soil association CO173
HIGH VULNERABILITY RATING OF 9
Valent
MIDRANGE VULNERABILITY RATING OF 6
Dailey
Haxtun
Inavale
Julesburg
Manter
Vona

Table 13. Named soil series in the soil associations composing soil group 3

[Each area on the vulnerability map (pl. 1) is identified by a four-character code, an alphabetic character followed by three digits. The second digit indicates the soil group. For example, for an area identified by the code A432, the soil group is 3]

Soil association			
CO021	**CO159**	**CO191**	**CO232**
	VERY HIGH VULNERABILITY RATING OF 10		
Rock outcrop	Rock outcrop	Hiwan	Rock outcrop
Rubble land		Legault	
		Rock outcrop	
	MODERATELY HIGH VULNERABILITY RATING OF 8		
	Baller	Cathedral	Juget
	Midway	Ratake	
	MIDRANGE VULNERABILITY RATING OF 7		
Leighcan	Carnero	Aquolls	Garber
MacFarlane	Renohill	Curecanti	
Newcomb	Sixmile	Grimstone	
Scout		Security	
Upson			
	RATING OF 6		
Cryaquolls		Lininger	
		Palboone	

Table 14. Named soil series in the soil associations composing soil group 4

[Each area on the vulnerability map (pl. 1) is identified by a four-character code, an alphabetic character followed by three digits. The second digit indicates the soil group. For example, for an area identified by the code B241, the soil group is 4]

Soil association CO192
VERY HIGH VULNERABILITY RATING OF 10
Rock outcrop
MIDRANGE VULNERABILITY RATING OF 7
Lake Helen
Larand
Leighcan
Scanard
VERY LOW VULNERABILITY RATING OF 4
Granile
Leadville

Table 15. Named soil series in the soil associations composing soil group 5

[Each area on the vulnerability map (pl. 1) is identified by a four-character code, an alphabetic character followed by three digits. The second digit indicates the soil group. For example, for an area identified by the code W251, the soil group is 5]

Soil association					
CO156	**CO158**	**CO162**	**CO163**	**CO185**	**CO231**
			VERY HIGH VULNERABILITY RATING OF 10		
Rock outcrop	Rock outcrop	Cascajo	Cascajo	Schamber	Rock outcrop
			MODERATELY HIGH VULNERABILITY RATING OF 8		
Ratake	Baller		Shingle	Midway	
				Shingle	
			MIDRANGE VULNERABILITY RATING OF 7		
Boyle	Barnum	Altvan	Fondis	Heldt	Garber
Kirtley	Connerton	Dacona	Iliff	Manzanola	Kassler
Moen	Kirtley	Eachuston	Piñata	Razor	Newlin
Purner	Purner	Halverson	Renohill	Stoneham	Sampson
Satanta	Sixmile	Nunn	Stoneham		
Watmore			Tassel		
			RATING OF 6		
		Ascalon	Ascalon		Gove
		Vona	Otero		Redtom
			Terry		
			MODERATELY LOW VULNERABILITY RATING OF 5		
Edloe				Colby	
Farnuf				Wiley	
Trag					

Table 16. Named soil series in the soil associations composing soil group 6

[Each area on the vulnerability map (pl. 1) is identified by a four-character code, an alphabetic character followed by three digits. The second digit indicates the soil group. For example, for an area identified by the code Y261, the soil group is 6]

Soil association	
CO180	CO229
HIGHLY VARIABLE VULNERABILITY[1] APPROPRIATE RATING MAY RANGE FROM 3 TO 10	
Fluvaquents	Fluvaquents
HIGH VULNERABILITY RATING OF 9	
Bankard	
MIDRANGE VULNERABILITY RATING OF 7	
Hayford	Blakeland
Las	Orsa
Loveland	Sampson
Westplain	Satanta
RATING OF 6	
McCook	Bresser
Wann	Fluvents
LOW VULNERABILITY RATING OF 5	
Alda	
Paoli	
VERY LOW VULNERABILITY RATING OF 4	
Lamo	Colombo

[1]Fluvaquents were not assigned a rating. The texture of these soils ranges from clay loam (appropriate for rating of 3) to gravelly sand (appropriate for rating of 10).

Table 17. Named soil series in the soil associations composing soil group 7

[Each area on the vulnerability map (pl. 1) is identified by a four-character code, an alphabetic character followed by three digits. The second digit indicates the soil group. For example, for an area identified by the code W2712, the soil group is 7]

Soil association			
CO168	CO186	CO190	CO230
MIDRANGE VULNERABILITY RATING OF 7			
Denver	Halverson	Denver	Chaseville
Englewood	Heldt	Heldt	Denver
Kutch	Limon	Kutch	Kutch
Loveland	Nunn	Leyden	Newlin
Manzanola		Longmont	Razor
Nunn		Standley	
Ulm		Valmont	
		Veldkamp	
RATING OF 6			
	Fort Collins	Hargreave	
	Olney	Nederland	

Table 18. Named soil series in the soil associations composing soil group 8

[Each area on the vulnerability map (pl. 1) is identified by a four-character code, an alphabetic character followed by three digits. The second digit indicates the soil group. For example, for an area identified by the code S381, the soil group is 8]

Soil association					
CO164	CO165	CO169	CO176	CO208	CO226
		HIGH VULNERABILITY RATING Of 9			
				Ellicott	
		MIDRANGE VULNERABILITY RATING OF 7			
Halverson	Cushman	Pleasant	Platner	Yoder	Englewood
	Nunn				Fondis
	Platner				Kutch
	Satanta				Manzanola
	Stoneham				Newlin
					Renohill
		RATING OF 6			
Ascalon	Ascalon	Adena	Ascalon	Ascalon	Bresser
Olney	Olney		Bayard	Bresser	
Otero	Thedalund		Haxtun	Truckton	
Terry	Vona		Inavale		
Thedalund	Wages		Manter		
Vona			Vona		
		MODERATELY LOW VULNERABILITY RATING OF 5			
Kim	Weld	Colby			Weld
		Kuma			
		Norka			
		Weld			
		Wiley			

Land-Surface Slope

The land-surface slope influences whether a contaminant will run off or remain on the land surface long enough to infiltrate into the subsurface. Slopes that facilitate infiltration of precipitation, as well as contaminants, result in a higher ground-water vulnerability. On gentle slopes, neither the contaminant nor much precipitation exits the area as runoff; therefore, contaminant infiltration and ground-water vulnerability in areas having gentle slopes generally are high. On steep slopes, runoff generally is high; therefore, infiltration rates and ground-water vulnerability in areas having steep slopes generally are low. This relation is expressed by assigning high vulnerability ratings for gentle slopes and low ratings for steep slopes (table 19).

Table 19. Vulnerability ratings for range categories of land-surface slope

[Modified from Aller and others, 1987, table 8, p. 23]

Land-surface slope	Vulnerability rating[1]
0 to 2 percent	10
2 to 6 percent	9
6 to 12 percent	5
12 to 18 percent	3
More than 18 percent	1

[1]Higher rating indicates higher vulnerability to contamination.

The percent-slope classification of an area was based on 1:24,000-scale digital elevation data (U.S. Geological Survey, 1987) where available (pl. 1, index map). These data are available in files that provide the same coverage as a standard U.S. Geological Survey 1:24,000-scale map series quadrangle. The data consist of a regular array of elevations referenced horizontally in the Universal Transverse Mercator coordinate system (Elassal and Caruso, 1983). The reference datum is North American Datum of 1927. The data are ordered from south to north in profiles that are ordered from west to east. The data are stored as profiles in which the spacing of the elevations along and between each profile is 30 meters (98 feet).

The percent-slope classification of areas for which 1:24,000-scale data were not available (pl. 1, index map) was based on 1:250,000-scale data from the Defense Mapping Agency (U.S. Geological Survey, 1987). Most of these areas were in the plains, where slope generally is less than 6 percent. These data are available in files that provide the same coverage as half of a Defense Mapping Agency 1:250,000-scale map series quadrangle. The data consist of a regular array of elevations referenced horizontally in the geographic (latitude/longitude) coordinate system of the World Geodetic System 1972 Datum. Spacing of the elevations along each profile is 3 arc-seconds, equivalent to 3 seconds of latitude or about 300 feet. The first and last data points of each profile are at the integer degrees of latitude. Spacing between profiles varies by latitude; however, data points of the first and last profile are at the integer degrees of longitude.

Criteria for Assignment to Land-Surface-Slope Groups

Data from each 1:24,000-scale file were processed to produce a smooth surface. Elevation data may include sharp transitions that can interfere with the accurate representation of the surface. A process called filtering modifies selected elevation values to eliminate the detail introduced by small surface features and produce a generalized map. Data were filtered until the filtered data produced a smooth contour map of the surface. The filtered data were then converted into a cover of percent slope. Command file 12 in the "Supplemental Information" section lists the specific commands. Areas less than 25 acres were selectively merged with adjacent areas (Command file 13) and area boundaries were smoothed (Command file 14).

For convenience, 1:250,000-scale data were processed in areas corresponding to the coverage of a standard U.S. Geological Survey 1:24,000-scale map series quadrangle. The 1:250,000-scale data were used to obtain a regular array having an elevation value every 30 meters (98 feet) over an area somewhat larger than the quadrangle. The larger arrays were used to simplify the joining of the resulting digital maps for each quadrangle into a single digital map of the study area and to more accurately identify the slope at the edges of each quadrangle. Each array was filtered or smoothed until the filtered data produced a smooth contour map of the surface. A program (Command file 15) was used to produce the sequence of commands having appropriate map boundaries (Command file 16) for each area of 1:250,000-scale data. The filtered data were converted into a cover of percent slope through a process identical to that for 1:24,000-scale data, except for the extent to which data were filtered. Areas less than 25 acres were selectively merged with adjacent areas (Command file 13) and area boundaries were smoothed (Command file 14).

The above procedure resulted in 42 individual digital maps of percent slope, one for each 7.5-minute quadrangle in the study area. Each map was interactively edited to only differentiate between the land-surface-slope groups listed in table 20 and to remove spurious polygons introduced during processing. Individual maps were then joined together. Each quadrangle from the 42-quadrangle area was joined to the adjacent quadrangles to produce a map covering the study area. To preserve the integrity of each individual map, no lines were moved to eliminate sharp edges at the boundaries of the original maps. The final digital map has some areas with sharp edges along quadrangle boundaries that are an artifact of this process.

Table 20. Characteristics of designated land-surface-slope groups

Land-surface-slope group	Land-surface slope	Assigned rating[1]
1	Less than 6 percent	[2]10
2	6 to 12 percent	5
3	More than 12 percent	[2]3

[1]Higher rating indicates higher vulnerability to contamination.
[2]Vulnerability ratings are modified from those proposed by Aller and others (1987) (table 19) to be consistent with available data.

Land-surface-slope data were integrated with the other data that describe ground-water vulnerability. First, small areas were merged with adjacent areas (Command file 17 in the "Supplemental Information" section). Documentation file 5 (in the "Supplemental Information" section) describes this digital map. The resulting slope map was overlaid on the digital map of aquifer media, hydraulic conductivity, unsaturated media, and soil media (Command File 18 in "Supplemental Information" section). Small areas resulting from the overlay were merged with adjacent areas (Command file 19 in "Supplemental Information" section). The resulting digital map was interactively edited to merge the 12 small areas that remained after automatic processing with adjacent areas.

Designated Land-Surface-Slope Groups

Three ranges of percent slope were differentiated in the study area: 0 to 6; 6 to 12; and over 12 percent slope. Each slope group was assigned a rating (table 20) that is modified from those suggested by Aller and others (1987) (table 19) to be consistent with available data. Land-surface-slope group 1 is mainly in the Nonglaciated Central ground-water region and received the highest possible rating, which indicates that contaminants and precipitation are likely to infiltrate the soil rather than run off. Land-surface-slope group 2 is mainly in and near the Western Mountain Ranges ground-water region and received a midrange rating, which indicates that contaminants and precipitation are less likely to infiltrate the soil than in areas in land-surface-slope group 1 and more likely to infiltrate the soil than in areas in land-surface-slope group 3. Land-surface-slope group 3 is mainly in and near the Western Mountain Ranges ground-water region and received the lowest rating assigned in the study area, which indicates that contaminants and precipitation are likely to run off rather than infiltrate the soil.

GROUND-WATER-VULNERABILITY MAP

The map of ground-water vulnerability (pl. 1) is intended to be useful in comparing the vulnerability of ground water to contamination in two or more areas. The section "Assessment of Ground-Water Vulnerability" describes the procedure for delineating ground-water vulnerability response units based on seven geohydrologic characteristics (aquifer media, hydraulic conductivity, unsaturated media, depth to water, recharge, soil media, and land-surface slope). Each area on the map is identified by color and by a unique four-character code—one alphabetic character and three digits. This section describes the information that is presented on the ground-water-vulnerability map (pl. 1) and discusses some potential applications for using other data.

How to Relate the Map Unit to Geohydrologic Information

The color of each area on plate 1 indicates the setting in which the area lies. These settings correspond to the hydrogeologic settings defined and described by Aller and others (1987). Mountain Slopes East setting and Alluvial Mountain Valleys East setting are in the Western Mountain Ranges ground-water region. Mountain Flanks setting, Alternating Sandstone, Limestone, and Shale—Thin Soil setting, Unconsolidated and Semiconsolidated Aquifers setting, and River Alluvium Without Overbank Deposits setting are in the Nonglaciated Central ground-water region.

The four-character code differentiates between areas within each setting that were delineated as separate vulnerability response units on the basis of seven geohydrologic characteristics. The alphabetic character identifies the geohydrologic unit (table 4). The first digit identifies the depth-to-water group (table 6). The second digit identifies the soil group (tables 10–18). The third digit identifies the land-surfaces-slope group (table 20). The information content of the code assigned to a specific area can be determined by referring to the appropriate tables and associated text in this report. Within the study area, 157 unique ground-water vulnerability response units were delineated (table 21).

For example, the Unconsolidated and Semiconsolidated Aquifers setting (geohydrologic units W and X) includes 29 unique vulnerability response units (table 21). Twenty-six polygons are identified

Table 21. Unique vulnerability response units identified in the greater Denver area

Geohydrologic unit[1]	Depth-to-water group[2]	Soil group[3]	Land-surface-slope group[4]	Number of polygons	Total area (acres)
		Mountain Slopes East setting			
A	4	3	2	31	11,142
A	4	3	3	11	131,984
A	4	1	2	10	4,789
A	4	1	3	9	27,137
A	4	4	1	8	2,429
A	4	4	2	35	24,505
A	4	4	3	29	77,485
A	4	5	2	3	926
A	4	5	3	7	10,351
A	4	7	3	2	286
		Alluvial Mountain Valleys East setting			
B	2	3	1	1	171
B	2	3	2	3	426
B	2	1	2	2	341
B	2	4	1	3	555
B	2	4	2	8	1,698
B	2	5	1	1	129
		Mountain Flanks setting			
C	3	3	1	4	924
C	3	3	2	9	1,871
C	3	3	3	11	7,443
C	3	6	1	6	952
C	3	6	2	1	180
C	3	6	3	1	193
C	3	5	1	12	3,467
C	3	5	2	13	2,156
C	3	5	3	26	13,215
C	3	7	1	23	7,919
C	3	7	2	21	4,599
C	3	7	3	7	2,279
C	3	8	1	1	229
D	3	6	2	1	210

Table 21. Unique vulnerability response units identified in the greater Denver area--Continued

Geohydrologic unit[1]	Depth-to-water group[2]	Soil group[3]	Land-surface-slope group[4]	Number of polygons	Total area (acres)
		Mountain Flanks setting--Continued			
D	3	5	1	4	787
D	3	5	2	1	297
D	3	7	1	3	2,555
D	3	7	2	4	1,025
D	3	8	1	1	1,144
d	3	6	1	1	164
d	3	5	1	1	109
d	3	5	2	2	471
d	3	5	3	1	165
d	3	7	1	12	2,256
d	3	7	2	4	809
d	3	8	2	1	130
E	3	6	1	4	1,124
E	3	5	1	7	17,758
E	3	7	1	8	8,477
E	3	8	1	5	28,674
F	3	7	1	2	790
G	3	7	1	3	11,037
G	3	8	1	3	3,294
		Alternating Sandstone, Limestone, and Shale—Thin Soil setting			
H	3	3	1	1	306
H	3	6	1	2	501
H	3	5	1	8	5,614
H	3	5	2	1	214
H	3	8	1	5	5,286
I	3	8	1	4	769
K	3	8	1	5	6,089
K	3	2	1	1	2,662
M	3	5	1	5	3,051
M	3	5	2	1	174
M	3	7	1	7	1,709
M	3	7	2	3	1,772
M	3	8	1	4	1,061
N	3	5	1	1	619
N	3	7	1	2	458

Table 21. Unique vulnerability response units identified in the greater Denver area--Continued

Geohydrologic unit[1]	Depth-to-water group[2]	Soil group[3]	Land-surface-slope group[4]	Number of polygons	Total area (acres)
		Alternating Sandstone, Limestone, and Shale—Thin Soil setting--Continued			
O	3	5	1	1	117
O	3	5	2	1	140
O	3	7	1	24	12,097
O	3	7	2	7	3,049
O	3	8	1	8	2,046
O	3	2	1	3	436
P	3	6	1	1	205
P	3	7	1	12	25,934
P	3	8	1	8	37,045
P	3	2	1	4	20,670
R	3	3	1	1	189
R	3	3	2	1	143
R	3	6	1	7	1,017
R	3	5	1	5	1,398
R	3	7	1	22	8,415
R	3	7	2	6	2,601
R	3	7	3	1	1,688
R	3	8	1	18	6,475
R	3	8	2	3	652
S	3	6	1	20	5,238
S	3	5	1	1	295
S	3	7	1	52	75,711
S	3	7	2	1	237
S	3	8	1	20	97,622
S	3	8	2	2	317
S	3	2	1	3	1,231
T	3	3	1	2	1,195
T	3	3	2	3	419
T	3	3	3	3	565
U	3	6	1	28	6,185
U	3	5	1	8	7,427
U	3	5	2	3	529
U	3	7	1	3	4,926
U	3	8	1	44	107,610
U	3	8	2	32	11,278
U	3	8	3	6	1,157
V	3	6	1	7	1,535

Table 21. Unique vulnerability response units identified in the greater Denver area--Continued

Geohydrologic unit[1]	Depth-to-water group[2]	Soil group[3]	Land-surface-slope group[4]	Number of polygons	Total area (acres)
		<u>Alternating Sandstone, Limestone, and Shale—Thin Soil setting--Continued</u>			
V	3	5	1	7	1,600
V	3	7	1	3	6,692
V	3	8	1	18	36,960
V	3	8	2	1	221
		<u>Unconsolidated and Semiconsolidated Aquifers setting</u>			
W	1	5	1	1	254
W	1	7	1	1	287
W	2	3	1	7	3,175
W	2	3	2	11	2,099
W	2	3	3	14	3,444
W	2	6	1	11	2,178
W	2	6	2	2	437
W	2	6	3	1	519
W	2	5	1	21	8,814
W	2	5	2	14	3,422
W	2	5	3	8	3,708
W	2	7	1	82	73,544
W	2	7	2	29	10,490
W	2	7	3	18	4,575
W	2	8	1	33	11,165
W	2	8	2	6	2,795
W	3	6	1	1	208
W	3	8	1	4	798
X	1	2	1	2	865
X	2	6	1	13	2,583
X	2	5	1	11	19,399
X	2	7	1	20	8,516
X	2	8	1	26	40,545
X	2	2	1	7	35,021
X	3	6	1	6	920
X	3	5	1	2	1,403
X	3	7	1	12	9,279
X	3	8	1	11	26,996
X	3	2	1	3	13,039

Table 21. Unique vulnerability response units identified in the greater Denver area--Continued

Geohydrologic unit[1]	Depth-to-water group[2]	Soil group[3]	Land-surface-slope group[4]	Number of polygons	Total area (acres)
		River Alluvium Without Overbank Deposits setting			
Y	1	3	1	1	119
Y	1	6	1	3	23,236
Y	1	5	1	9	3,119
Y	1	7	1	2	785
Y	1	8	1	4	1,555
Y	1	2	1	2	467
Y	2	3	1	5	1,005
Y	2	3	2	5	972
Y	2	6	1	50	74,485
Y	2	5	1	32	26,492
Y	2	5	2	9	2,628
Y	2	5	3	4	1,355
Y	2	7	1	77	57,306
Y	2	7	2	12	3,802
Y	2	7	3	2	332
Y	2	8	1	92	51,820
Y	2	8	2	1	214
Y	2	2	1	6	2,316
Y	3	6	1	28	8,406
Y	3	5	1	4	10,003
Y	3	7	1	8	6,483
Y	3	8	1	18	6,939
Y	3	2	1	3	3,334

[1]Additional information about geohydrologic units is presented in table 4 and in the section "Designated Geohydrologic Units."

[2]Additional information about depth-to-water groups is presented in table 6 and in the section "Designated Depth-to-Water Groups."

[3]Additional information about soil groups is presented in tables 10–18 and in the section "Designated Soil Groups."

[4]Additional information about land-surface-slope groups is presented in table 20 and in the section "Designated Land-Surface-Slope Groups."

with the vulnerability response code X281. This code conveys the information that the aquifer and unsaturated media are eolian deposits (table 4), the water table is generally 5 to 20 feet below land surface (table 6), most soils have midrange vulnerability (tables 10 and 18), and the land surface generally has a slope of less than 6 percent (table 20). Tables 4, 6, 10, 18, and 20 also present other pertinent data related to the ground-water vulnerability for the vulnerability response unit designated by the code X281.

To compare the vulnerability of ground water between two areas, the reader needs to note the four-digit code for the vulnerability response units and refer to the text and tables describing the characteristics of the areas. For example, if the area of interest lies west of the south end of Barr Lake, the reader may need to compare map units X221, X281, and X381. Each of the areas have similar aquifer media (table 4), land-surface slope (table 20), and recharge characteristics (table 7 and "Aquifer Recharge Rate" section).

Depths to water generally are greater in the area coded X381 than in X221 or X281 (table 6). Soils generally have higher vulnerability in the area coded X221 than in the other two areas (tables 10, 12, and 18). More vulnerable soil series are more common in the area coded X221 than in the other two areas (table 10). The reader needs to evaluate whether this difference is significant for a specific application and whether additional data are needed to compare the sites.

How to Use the Map of Ground-Water Vulnerability

The map of ground-water vulnerability for the greater Denver area could be one of several tools used by county and municipal planning agencies as an aid in land-use decisions that might affect quality of the uppermost ground water. The map also could be one of the tools used by regulatory agencies to help prioritize remedial and enforcement activities. For each of the 157 unique vulnerability response units on the vulnerability map (pl. 1), geohydrologic information is presented. This information can provide a preliminary indication of whether a particular land use might affect the quality of the uppermost ground water and can facilitate the comparison of ground-water vulnerability among multiple areas in the greater Denver area. The approximate areal extent of the four major bedrock aquifers of the Denver ground-water basin is shown on plate 1. This information could be used to determine where each of the four bedrock aquifers crops out and where significant shallow ground-water systems could be present in these aquifers.

The U.S. Environmental Protection Agency has developed maps of selected potential ground-water contamination sites and water wells. Potential ground-water contamination sites include CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act of 1980) sites and RCRA (Federal Resource Conservation and Recovery Act of 1976) sites. Ground-water resource-use sites include municipal, industrial, irrigation, commercial, and domestic water wells. These potential ground-water contamination sites and water wells have been mapped at the same scale as the ground-water-vulnerability map (pl. 1) for the study area south of 40 degrees latitude. If a selected category of potential ground-water-contamination sites is overlain on the ground-water-vulnerability map, the geohydrologic characteristics in the vicinity of each site can be determined. This information can be an aid in determining the priority in which the sites need further evaluation.

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(p. 41 follows)

SUPPLEMENTAL INFORMATION

DOCUMENTATION FILE 1--DOCUMENTATION OF GEOLOGIC COVER

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DOC-REV           =0.0.6
CREATE-DATE       =900906.132238
UPDATE-PERSON     =GPINGERSOLL
UPDATE-DATE       =900906.132238
COVER             =GEO
WORKSPACE         =<GIS3>DRASTIC>ATTRIBUTES>DISK
EXTENT            =467699.25 4358176 532300.5 4455362
PRECISION         =SINGLE
TOLERANCES        =9.718599319458 0
NUM-ARCS          =15507
NUM-SEGS          =210619
NUM-POLYS         =5918
NUM-POINTS        =5917
NUM-TICS          =60
NUM-ANNOS         =0
THEME             =Geologic polygons
DESCRIPTION       =Geology of study area
CONTACT-PERSON    =Glenn Hearne, USGS, WRD
CONTACT-INSTRUC   =236-4886
ORGANIZATION      =USGS, Water Resources Division
COVER-REV         =
LOCATION          =Greater Denver Metro Area
RESOLUTION        =
SCALE             =1:100,000
ARCHIVE           =DRASTIC>ATTRIBUTES>DISK
PUB-STATUS        =not reviewed
CITATION-1        =
CITATION-2        =
CITATION-3        =
CITATION-4        =
CITATION-5        =
```

Coverage Type: POLYGON

Project: GIS DEMO, #22400

Source: USGS GEOLOGIC MAPS OF: 1)DENVER METRO AREA
2)BOULDER-FT. COLLONS-GREELEY AREA

Accuracy: fewer than 10% of arcs scanned deviated from original position by more than 125 meters (ground units).

Date: Jan., 1990

Processing: DRAFTED FROM ORIGINAL, SCANNED, PROJECTED INTO UTM COORDINATES USING ARC/INFO SOFTWARE,AND EDITED TO CLOSE POLYGONS AROUND LAKES.

Projection Information: UNIVERSAL TRANSVERSE MERCATOR. TICS

PROJECTED FROM GENERATED GEOGRAPHIC COORDINATES

Info Attribute File: GEO.PAT

```
Info Item Definitions: AREA, 4,12,F,3
                       PERIMETER, 4,12,F,3
                       GEO#, 4,5,B
                       GEO-ID, 4,5,B
                       GEO-CODE, 4,5,B
                       GEO-DR, 4,5,B
```

INFO USER DEFINED ITEM DESCRIPTIONS: 1) GEO-CODE

GEO-CODE	DESCRIPTION
1	POST-PINEY CREEK AND PINEY CREEK ALLUVIUM
2	COLLUVIUM
3	WINDBLOWN SAND
4	BROADWAY ALLUVIUM
5	LOUVIERS ALLUVIUM
6	SLOCUM ALLUVIUM
7	VERDOS ALLUVIUM
8	ROCKY FLATS ALLUVIUM
9	NUSSBAUM ALLUVIUM
10	LOESS
11	LANDSLIDE DEPOSITS
12	ARTIFICIAL FILL
13	POST-PINEY CREEK ALLUVIUM
14	TALUS
15	EOLIUM
16	PINEY CREEK ALLUVIUM
17	PRE-ROCKY FLATS ALLUVIUM
18	COLLUVIUM
21	CASTLE ROCK CONGLOMERATE
22	WALL MOUNTAIN TUFF
23	GREEN MOUNTAIN CONGLOMERATE
24	HIGH-LEVEL GRAVEL DEPOSITS
25	SHOSHONITE
26	BOULDER DEPOSITS
27	QUARTZ MONZONITE
28	RHYODACITE AND BASALT
31	DAWSON AND ARAPAHOE FORMATIONS
32	DENVER FORMATION
33	DENVER AND ARAPAHOE FORMATIONS
34	UPPER TRANSITION MEMBER
35	UPPER SHALE MEMBER
36	RICHARD SANDSTONE MEMBER
37	MIDDLE SHALE MEMBER
38	HYGIENE SANDSTONE MEMBER

39 LOWER SHALE MEMBER
41. LARAMIE FORMATION
42 FOX HILLS SANDSTONE
43 PIERRE SHALE, UNDIFFERENTIATED
44 NIOBRARA FORMATION
45 CARLILE SHALE, GREENHORN LIMESTONE, AND GRANEROS SHALE, UNDIFFERENTIATED
46 DAKOTA GROUP

51 MORRISON AND RALSTON CREEK FORMATIONS
52 MORRISON, CANYON SPRINGS MEMBER OF SUNDANCE AND JELM FORMATIONS
61 MORRISON, RALSTON GREEK, AND LYKINS FORMATIONS, UNDIFFERENTIATED
71 LYKINS FORMATION
81 LYONS SANDSTONE
91 LYONS SANDSTONE AND FOUNTAIN FORMATION, UNDIFFERENTIATED
92 FOUNTAIN FORMATION
94 SATANKA AND INGLESIDE FORMATIONS
95 INGLESIDE FORMATION
101 UNNAMED ROCKS
111 PIKES PEAK GRANITE
112 SILVER PLUME QUARTZ MONZONITE
121 PEGMATITE
131 QUARTZ MONZONITE
132 BOULDER CREEK GRANODIORITE
133 QUARTZITE
134 SCHIST
135 GNEISS
136 FELSIC GNEISS
137 AMPHIBOLITE, HORNBLENDITE, AND RELATED ROCKS
138 TONALITE AND METASEDIMENTARY ROCKS
139 QUARTZOFELDSPATHIC
140 KNOTTED MICA SCHIST
141 PORPHYROBLASTIC BIOTITE SCHIST
142 AMPHIBOLITE

2) GEO-DR: assigns DRASTIC codes

DOCUMENTATION FILE 2--DOCUMENTATION OF DENVER BASIN AQUIFERS COVER

```
DOC-REV          =0.0.6
CREATE-DATE      =900907.101221
UPDATE-PERSON    =GPINGERSOLL
UPDATE-DATE      =900907.101222
COVER            =HGS
WORKSPACE        =<GIS3>DRASTIC>ATTRIBUTES>DISK
EXTENT           =467699.3125 4358183 532300.625 4455362
PRECISION        =SINGLE
TOLERANCES       =9.71789932251 0
NUM-ARCS         =404
NUM-SEGS         =5520
NUM-POLYS        =11
NUM-POINTS       =10
NUM-TICS         =56
NUM-ANNOS        =0
THEME            =HYDROGEOLOGIC SETTINGS
DESCRIPTION      =BOUNDARIES OF GROUND-WATER REGIONS AND AQUIFERS
CONTACT-PERSON   =GLENN HEARNE
CONTACT-INSTRUC  =(303)236-4886
ORGANIZATION     =USGS, WRD
COVER-REV        =
LOCATION       =GREATER DENVER METRO AREA
RESOLUTION     =
SCALE          =1:100000
ARCHIVE        =DRASTIC>ATTRIBUTES>DISK
PUB-STATUS     =NOT REVIEWED
CITATION-1     =
CITATION-2     =
CITATION-3     =
CITATION-4     =
CITATION-5     =
```

Coverage Type: polygon

Project: GIS Demo, #22400

Source: Aquifer boundaries were digitized from Colorado State Engineer's Office mylar map sheets at a scale of 1:100000; the boundary along the east edge of the mountains was adapted from Heath, 1984, to delineate the boundary between the Western Mountain Ranges Ground-Water Region and Nonglaciated Central Ground-Water Region. The line along the east edge of the mountain flanks was adapted to mark the eastern boundary of a highly folded, faulted, and fractured area within the Nonglaciated Central Ground-Water Region.

Accuracy: Digitizing was performed on scale-stable mylar map sheets to follow the inside of the .03 inch linewidth for aquifer boundaries. Other lines delineating ground-water region boundaries and the highly faulted area described above were composed of existing lines in the GEO (geologic units polygons) coverage and .02 inch linewidth lines showing fault lines on the mylar geologic map at a scale of 1:100000.

Date: Jan, 1990

Processing: Aquifer boundaries were digitized over a generated 56-tic grid and other lines delineating features mentioned above were either digitized from scribed lines across plots of existing arcs from the GEO cover, or were copied from the GEO cover directly. In some cases, the arcs marking the edge of an aquifer were truncated at the boundaries of the ground-water regions and/or hydrogeologic settings.

Projection Information: Universal Transverse Mercator, tics projected from generated geographic coordinates.

Info Attribute File: HGS.PAT

Info Item Definitions: AREA, 4,12,F,3
PERIMETER, 4,12,F,3
HGS#, 4,5,B
HGS-ID, 4,5,B
HGS-CODE, 4,5,B

Info User Defined Item Descriptions: 1) HGS-CODE:

1 = Western Mountain Ranges Ground-Water Region
2 = highly folded, faulted, and fractured area within the Nonglaciated Central Ground-Water Region.
3 = Arapahoe aquifer in the highly folded, faulted, and fractured area within the Nonglaciated Central Ground-Water Region.
4 = Pierre Shale and Fox Hills Formations, below the Laramie-Fox Hills Aquifer.
5 = Laramie-Fox Hills aquifer
6 = Laramie Formation above Laramie-Fox Hills aquifer
7 = Arapahoe aquifer
8 = Denver aquifer
9 = Dawson aquifer

DOCUMENTATION FILE 3--DOCUMENTATION OF DEPTH-TO-WATER COVER

```
DOC-REV          =0.0.6
CREATE-DATE      =900831.135542
UPDATE-PERSON    =GPINGERSOLL
UPDATE-DATE      =900831.135542
COVER            =DEP
WORKSPACE        =<GIS3>DRASTIC>ATTRIBUTES>DISK
EXTENT           =467699.3125 4358183 532300.625 4455362
PRECISION        =SINGLE
TOLERANCES       =20 0
NUM-ARCS         =6491
NUM-SEGS         =78159
NUM-POLYS        =2550
NUM-POINTS       =2549
NUM-TICS         =60
NUM-ANNOS        =3
THEME            =Depth To Water
DESCRIPTION      =Depth to water polygons in the study area.
CONTACT-PERSON   =Glenn Hearne, USGS, WRD
CONTACT-INSTRUC  =(303)236-4886
ORGANIZATION     =USGS-WRD
COVER-REV        =
LOCATION         =Greater Denver Metro Area
RESOLUTION       =
SCALE            =1:100,000
ARCHIVE          =DRASTIC>ATTRIBUTES>DISK>DEP
PUB-STATUS       =not reviewed
CITATION-1       =
CITATION-2       =
CITATION-3       =
CITATION-4       =
CITATION-5       =
```

Coverage Type: POLYGON

Project: GIS DEMO, #22400

Source: USGS DEPTH TO WATER TABLE 1:100,000 MAPS OF GREATER DENVER AND GREELEY.

Accuracy: FEWER THAN 10% OF ARCS DEVIATE FROM ORIGINAL BY 125m (GROUND UNITS).

Date processing was completed: Feb, 1989

Processing: DRAFTED FROM ORIGINAL, SCANNED, PROJECTED INTO UTM COORDINATES USING ARC/INFO SOFTWARE, EDITED TO CLOSE POLYGONS AROUND LAKES.

Projection Information: UNIVERSAL TRANSVERSE MERCATOR, TICS PROJECTED FROM GENERATED GEOGRAPHIC CO-

```
                    ORDINATES.

Info Attribute File: DEP.PAT

Info Item Definitions: AREA, 4,12,F,3

                       PERIMETER, 4,12,F,3
                       DEP#, 4,5,B
                       DEP-ID, 4,5,B
                       DEP-CODE, 2,2,I
                       DEP-DR, 4,5,B


 Info User Defined Item Descriptions:
            1) DEP-CODE

                     /COLOR FROM/
            DEP-CODE /SOURCE MAP/   FEATURE DESCRIPTION
            ---------------------------------------------------------
            2          PALE BLUE = 0  (SURFACE WATER)
            3             YELLOW = AREAS WHERE UNCONSOLIDATED
                                   ALLUVIAL DEPOSITS ARE NOT
                                   PERENNIALLY SATURATED;
                                   DEPTH TO SEASONAL WATER-
                                   TABLE GENERALLY RANGES
                                   FROM 5 TO 20 FEET
            4           LT. BLUE = 10 TO 20 FEET
            5           DK. BLUE = > 20 FEET
            6               PINK = 5 TO 10 FEET
            7                RED = < 5 FEET
            8   BROWN * (NORTH)  = AREAS WHERE LOCALIZED
                                   WATER-TABLE AQUIFERS
                                   OCCUR IN COLLUVIAL,
                                   LANDSLIDE, AND WIND-
                                   BLOWN DEPOSITS, AND IN
                                   CONSOLIDATED SEDIMENTARY
                                   ROCKS WHERE ROCKS NEAR
                                   LAND SURFACE ARE
                                   FRACTURED AND WEATHERED;
                                   DEPTH TO WATER TABLE
                                   RANGES FROM 5 TO 20 FEET.
             9  BROWN * (SOUTH)  = SAME AS NORTH
                                   BROWN--SEE FOOTNOTE
             10      HASH BROWN  = AREA WHERE WATER-TABLE
                                   CONDITIONS PREDOMINATE
                                   IN THE DAWSON AQUIFER;
                                   DEPTH TO WATER-TABLE
                                   GENERALLY MORE THAN 20
                                   FEET AND COMMONLY MORE
                                   THAN 100 FEET.
```

11	PURPLE =	AREA WHERE LOCALIZED WATER-TABLE AQUIFERS OCCUR IN FRACTURED CRYSTALLINE ROCKS; DEPTH TO WATER MAY BE MORE THAN 100 FEET.
12	LT. GREEN =	AREA WHERE WATER-TABLE CONDITIONS PREDOMINATE IN THE DENVER AQUIFER; DEPTH TO WATER-TABLE GENERALLY MORE THAN 20 FEET AND COMMONLY MORE THAN 100 FEET.
13	DR. GREEN =	AREA WHERE WATER-TABLE CONDITIONS PREDOMINATE IN THE ARAPAHOE AQUIFER; DEPTH TO WATER-TABLE GENERALLY MORE THAN 20 FEET AND COMMONLY MORE THAN 100 FEET.

* NOTE: NORTH BROWN areas are given a distinct code from SOUTH BROWN areas because of questionable boundaries between polygons at the fortieth parallel marking the boundary between the two 1:100000 scale map sheets used in the study.

2) DEP-DR: ASSIGNS DRASTIC CODES

DOCUMENTATION FILE 4--DOCUMENTATION OF SOILS COVER

```
DOC-REV          =0.0.6
CREATE-DATE      =900907.102946
UPDATE-PERSON    =GPINGERSOLL
UPDATE-DATE      =900907.102946
COVER            =SOI
WORKSPACE        =<GIS2>GPINGERSOLL>GLENN>AREA>SOIL
EXTENT           =467699.3125 4358183 532300.625 4455362
PRECISION        =SINGLE
TOLERANCES       =9.707998275757 0
NUM-ARCS         =323
NUM-SEGS         =12520
NUM-POLYS        =108
NUM-POINTS       =107
NUM-TICS         =56
NUM-ANNOS        =1
THEME            =SOIL TYPES
DESCRIPTION      =POLYGON COVERAGE OF SOIL TYPES
CONTACT-PERSON   =DALE HOLDEN
CONTACT-INSTRUC  =(303)236-2910
ORGANIZATION     =SOIL CONSERVATION SERVICE
COVER-REV        =
LOCATION         =GREATER DENVER METRO ARE
RESOLUTION       =
SCALE            =1:100000
ARCHIVE          =DRASTIC>ATTRIBUTES>DISK
PUB-STATUS       =NOT REVIEWED
CITATION-1       =
CITATION-2       =
CITATION-3       =
CITATION-4       =
CITATION-5       =
```

Coverage Type: polygon

Project: GIS DEMO #22400

Source: Denver and Greeley 1:250000 sheets delineating soil groups

Accuracy: 1:250K quads of soil type boundaries were clipped to fit the study area and processed at 1:100K with other layers.

Date: January 1990

Processing: digitized 1:250K quads were clipped to obtain study area and then attributed with the soil-type code.

Info Attribute File: SOI.PAT

Info Item Definitions: AREA 4 12 F 3
PERIMETER 4 12 F 3
SOI# 4 5 B
SOI-CODE 4 5 B

SOI-DR 4 5 B

Info user-defined Item descriptions:

1) SOI-CODE: describes distinct soil types by % present (PCT).

CODE	PCT	COMPONENT
C0021	20	ROCK OUTCROP
C0021	5	SCOUT
C0021	5	RUBBLE LAND
C0021	5	CRYAQUOLLS
C0021	15	LEIGHCAN
C0021	10	NEWCOMB
C0021	40	UPSON and MACFARLANE (20% ea.)
C0156	2	TRAG
C0156	6	SATANTA
C0156	25	RATAKE
C0156	4	FARNUF
C0156	5	PURNER
C0156	8	KIRTLEY
C0156	10	EDLOE
C0156	10	BOYLE
C0156	10	MOEN
C0156	20	WETMORE
C0158	5	PINATA
C0158	5	ROCK OUTCROP
C0158	10	SIXMILE
C0158	15	BALLER
C0158	10	CONNERTON
C0158	15	PURNER
C0158	15	BARNUM
C0158	25	KIRTLEY
C0159	10	MIDWAY
C0159	10	RENOHILL
C0159	10	ROCK OUTCROP
C0159	15	SIXMILE
C0159	45	BALLER
C0159	10	CARNERO
C0162	1	SATANTA
C0162	5	ASCALON
C0162	4	CASCAJO
C0162	5	VONA
C0162	10	HAVERSON

C0162	15	NUNN
C0162	20	DACONO
C0162	35	ALTVAN
C0162	5	EACHUSTON
C0163	1	FONDIS
C0163	5	CASCAJO
C0163	5	OTERO
C0163	5	STONEHAM
C0163	10	ASCALON
C0163	10	SHINGLE
C0163	10	TASSLE
C0163	10	TERRY
C0163	40	RENOHILL
C0163	4	ILIFF
C0164	3	VONA
C0164	7	ASCALON
C0164	10	HAVERSON
C0164	10	KIM
C0164	10	TERRY
C0164	15	OLNEY
C0164	20	THEDALUND
C0164	25	OTERO
C0165	3	SATANTA
C0165	3	THEDALUND
C0165	5	VONA
C0165	10	NUNN
C0165	10	STONEHAM
C0165	10	WELD
C0165	14	PLATNER
C0165	15	ASCALON
C0165	25	OLNEY
C0165	1	WAGES
C0165	4	CUSHMAN
C0168	5	DENVER
C0168	5	KUTCH
C0168	5	LOVELAND
C0168	5	MANZANOLA
C0168	10	ENGLEWOOD
C0168	30	ULM
C0168	40	NUNN
CO169	10	WILEY
C0169	15	COLBY
C0169	20	ADENA
C0169	25	WELD
C0169	5	PLEASANT
C0169	5	KUM
C0169	20	NORKA
C0173	5	MANTER
C0173	5	VONA

C0173	10	JULESBURG
C0173	75	VALENT
C0173	1	HAXTON
C0173	2	DAILEY
C0173	2	INAVALE
C0176	1	PLATNER
C0176	2	ASCALON
C0176	10	MANTER
C0176	10	VONA
C0176	35	JULESBURG
C0176	2	BAYARD
C0176	7	INAVALE
C0176	33	HAXTUN
C0180	2	PAOLI
C0180	3	WANN
C0180	5	LOVELAND
C0180	15	SANDY ALLUVIAL LAND
C0180	2	LAMO
C0180	3	HAYFORD
C0180	5	LAS
C0180	5	MCCOOK
C0180	5	WESTPLAIN
C0180	15	ALDA
C0180	15	BANKARD
C0180	40	FLUVAQUENTS
C0185	2	SHINGLE
C0185	3	STONEHAM
C0185	3	WILEY
C0185	5	COLBY
C0185	10	MANZANOLA
C0185	20	HELDT
C0185	27	RAZOR
C0185	28	MIDWAY
C0185	2	SCHAMBER
C0186	5	OLNEY
C0186	10	FORT COLLINS
C0186	10	HAVERSON
C0186	20	NUNN
C0186	40	HELDT
C0186	15	LIMON
C0190	2	LONGMONT
C0190	4	HARGREAVE
C0190	4	HELDT
C0190	5	RENOHILL
C0190	5	STANDLEY
C0190	5	VELDCAMP
C0190	10	KUTCH
C0190	10	LEYDEN
C0190	10	NUNN

C0190	10	VALMONT
C0190	15	DENVER
C0190	20	NEDERLAND
C0191	2	PALBOONE
C0191	3	AQUOLLS
C0191	5	HIWAN
C0190	5	ROCK OUTCROP
C0191	10	LEGAULT
C0191	15	CATHEDRAL
C0190	15	LININGER
C0191	25	RATAKE
C0191	15	SECURITY
C0191	2	GRIMSTONE
C0191	2	PALBOONE
C0191	3	CURECANTI
C0192	10	ROCK OUTCROP
C0192	10	LARAND
C0192	10	LEIGHCAN
C0192	15	GRANILE
C0192	15	SCANARD
C0192	20	LEADVILLE
C0192	20	LAKEHELEN
C0193	10	GARBER
C0193	10	HERBMAN
C0193	10	RALEIGH
C0193	10	RATAKE
C0193	15	SPHINX
C0193	20	ROCK OUTCROP
C0193	25	RESORT
C0208	6	ASCALON
C0208	8	ELLICOTT
CO2O8	38	TRUCKTON
C0208	44	BRESSER
C0208	4	YODER
C0226	3	KUTCH
C0226	4	ENGLEWOOD
C0226	4	MANZANOLA
C0226	5	NEWLIN
C0226	7	RENOHILL
C0226	17	BRESSER
C0226	30	FONDIS
C0226	30	WELD
C0229	6	BLAKELAND
C0229	6	BRESSER
C0229	6	ORSA
C0229	7	SATANTA
C0229	26	SAMPSON
C0229	32	COLOMBO
C0229	4	FLUVENTS

C0229	13	FLUVAQUENTS
C0230	3	CHASEVILLE
C0230	5	NEWLIN
C0230	7	KUTCH
C0230	40	RAZOR
C0230	10	REDRIDGE
C0230	15	DENVER
C0230	20	REDNUN
C0231	4	REDTOM
C0231	6	SAMPSON
C0231	10	GARBER
C0231	15	NEWLIN
C0231	30	GOVE
C0231	30	KASSLER
C0231	5	ROCK OUTCROP
C0232	10	GARBER
C0232	20	ROCK OUTCROP
C0232	70	JUGET
C0339	1	GARBER
C0339	7	AQUOLLS
C0339	7	GUFFEY
C0339	15	ROCK OUTCROP
C0339	20	LEGAULT
C0339	50	SPHINX

2) SOI-DR: assigns DRASTIC codes

DOCUMENTATION FILE 5--DOCUMENTATION OF LAND-SURFACE-SLOPE COVER

```
DOC-REV           =0.0.6
CREATE-DATE       =900907.113112
UPDATE-PERSON     =GPINGERSOLL
UPDATE-DATE       =900907.113112
COVER             =SLO
WORKSPACE         =<GIS2>GPINGERSOLL>GLENN>AREA>SLOPE
EXTENT            =467699.25 4358183 532300.5 4455362
PRECISION         =SINGLE
TOLERANCES        =5 100
NUM-ARCS          =1861
NUM-SEGS          =198396
NUM-POLYS         =930
NUM-POINTS        =929
NUM-TICS          =58
NUM-ANNOS         =1
THEME             =SLOPE OF LAND SURFACE
DESCRIPTION       =POLYGONS DESCRIBING INTERVALS OF SLOPE OF LAND
CONTACT-PERSON    =GLENN HEARNE
CONTACT-INSTRUC   =(303)236-4886
ORGANIZATION      =USGS
COVER-REV         =
LOCATION          =GREATER DENVER METRO AREA
RESOLUTION        =
SCALE             =1:100000
ARCHIVE           =DRASTIC>ATTRIBUTES>DISK
PUB-STATUS        =NOT REVIEWED
CITATION-1        =
CITATION-2        =
CITATION-3        =
CITATION-4        =
CITATION-5        =
```

Coverage type: Polygon

Project: GIS Demo, #22400

Source: Digital Elevation Model terrain maps at 1:24,000 or 1:250,000

Scale: 1:24,000 in mountains; 1:250,000 on the plains

Accuracy: See the description in the processing section below.

Date:June, 1990

Processing:Original DEM files were processsed in the TIN module of ARC/INFO creating polygon coverages from point elevation data, and then filtering the coverages ten times in the steep, mountainous areas, and filtering fifty times on the less steep plains. Individual quads were then appended together after 'edge-noise' was eliminated from an area <100 meters from 1:24K quad boundaries (from the 1:24K DEM source files).The arcs left dangling at the edges were then

extended to intersect the true 7 1/2 minute quad boundary using the direction of the last vector to proceed to the edge of the quad. DEM files at 1:250K overlapped the actual boundary lines, so these data were clipped in cookie-cutter fashion before being appended to the whole study area coverage depicting the slope polygons of all 42 of the 7 1/2 minute quads.

Contact: Glenn A. Hearne, USGS, and Sandy Turner, USGS.

Projection Information: Universal Transverse Mercator; tics were generated from exact geographic coordinates, then projected to UTM.

Info Attribute File: SLO.PAT

Info Item Definitions: AREA, 4,12,F,3
PERIMETER, 4,12,F,3
SLO#, 4,5,B
SLO-ID, 4,5,B
SLOPE-CODE, 4,5,B

Info User-defined Item Descriptions: 1) SLOPE-CODE: lists slope values as SLOPE-CODES of: 1,3,4,5,6, or 10

where

data from 1:24000 DEMs are coded as:
{ 1 = 0-6% slope
{ 6 = 6-12% "
{ 10 = >12% "

and

data from 1:250000 DEMs are coded as:
{ 3 = 0-6% slope
{ 4 = 6-12% "
{ 5 = >12% "

```
/*      COMMAND FILE 1--GROUP GEOLOGIC UNITS
/*
/*
&ARGS SPLIT FUZZ
/*      FILE NAME IS GEOHGS.AML
/*
/*      THIS AML CALCULATES A VALUE FOR G-CODE FROM THE GEO-CODE
/*      NEO-CODE IS CALCULATED FROM G-CODE AND HGS-CODE
/*      THE COVER IS DISSOLVED ON NEO-CODE
/*
/*      THE COVER GEO%SPLIT% IS DISSOLVED TO DGEO%SPLIT% ON GEO-CODE
/*      G-CODE IS ADDED AS AN ITEM IN SGEO%SPLIT%.PAT
/*
/*      THIS AML USES THE COVER HGS%SPLIT% OF HYDROGEOLOGIC SETTINGS
/*      AND DENVER BASIN AQUIFERS TO INTERSECT WITH GEO%SPLIT%
/*      AND GROUP GEOLOGIC UNITS WITHIN EACH HGS%SPLIT% SETTING.
/*
/*      THE COVER SGEO%SPLIT% OF GROUPED GEOLOGIC UNITS IS GENERATED.
/*
/*      IF COVERS DGEO%SPLIT%, TGEO%SPLIT%, OR SGEO%SPLIT% EXIST
/*      THEY ARE KILLED AND NEW COVERS CREATED
/*
/*      NUMBERS ASSIGNED TO G-CODE AND NEO-CODE ARE ARBITRARY
/*
DELETE GEO%SPLIT%HGS%FUZZ%.COMO
COMO GEO%SPLIT%HGS%FUZZ%.COMO
DATE
TIME
&IF [EXISTS DGEO%SPLIT% -POLY] &THEN KILL DGEO%SPLIT% ALL
&IF [EXISTS TGEO%SPLIT% -POLY] &THEN KILL TGEO%SPLIT% ALL
&IF [EXISTS SGEO%SPLIT%%FUZZ% -POLY] &THEN KILL SGEO%SPLIT%%FUZZ% ALL
DISSOLVE GEO%SPLIT% DGEO%SPLIT% GEO-CODE POLY
DATE
TIME
IDENTITY DGEO%SPLIT% HGS%SPLIT% TGEO%SPLIT% POLY %FUZZ%
DATE
TIME
ADDITEM TGEO%SPLIT%.PAT TGEO%SPLIT%.PAT G-CODE 4 5 I
ADDITEM TGEO%SPLIT%.PAT TGEO%SPLIT%.PAT NEO-CODE 4 5 I
&DATA ARC INFO
REM
REM *************************************************************************
REM SET VALUES OF G-CODE FROM VALUES OF GEO-CODE
REM *************************************************************************
REM
REM
  SEL TGEO%SPLIT%.PAT
REM
REM **************************************************  Qco
REM
```

```
REM THE GROUP G-CODE = 1 INCLUDES
REM   COLLUVIUM, LANDSLIDE, AND TALUS,
REM

REM
    RES GEO-CODE = 2 OR GEO-CODE = 11
    ASEL GEO-CODE = 14 OR GEO-CODE = 18
    CALC G-CODE = 1
REM
REM ************************************************  Qes
REM
REM THE GROUP G-CODE = 2 INCLUDES
REM   WINDBLOWN SAND, LOESS, AND EONLIUM
REM
  ASEL
    RES GEO-CODE = 3
    ASEL GEO-CODE = 10
    ASEL GEO-CODE = 15
    CALC G-CODE = 2
REM
REM ************************************************  af
REM
REM THE GROUP G-CODE = 3 INCLUDES
REM   ARTIFICIAL FILL
REM
  ASEL
    RES GEO-CODE = 12
    CALC G-CODE = 3
REM
REM ************************************************  Ts
REM
REM THE GROUP G-CODE = 4 INCLUDES
REM   SHOSHONITE LAVA FLOWS ON TABLE MOUNTAIN
REM
  ASEL
    RES GEO-CODE = 25
    CALC G-CODE = 4
REM
REM ************************************************  Qa
REM
REM THE GROUP G-CODE = 5 INCLUDES
REM   ALLUVIUM OF LOUVIERS, BROADWAY,
REM   PINEY CREEK AND POST-PINEY CREEK.
  ASEL
    RES GEO-CODE = 1 OR GEO-CODE = 4 OR GEO-CODE = 5
    ASEL GEO-CODE = 13 OR GEO-CODE = 16
    CALC G-CODE = 5
REM
REM ************************************************  Ti
REM
```

```
REM THE GROUP G-CODE = 6 INCLUDES
REM   TERTIARY INTRUSIVES
REM
  ASEL
    RES GEO-CODE = 28
    CALC G-CODE = 6
REM

REM **************************************************  rf
REM
REM THE GROUP G-CODE = 7 INCLUDES
REM   ALLUVIUM OF PRE ROCKY FLATS, NUSSBAUM,
REM   ROCKY FLATS, VERDOS, AND SLOCUM
REM
  ASEL
    RES GEO-CODE GE 6 AND GEO-CODE LE 9
    ASEL GEO-CODE = 17
    CALC G-CODE = 7
REM
REM **************************************************  DB
REM
REM THE GROUP G-CODE = 8 INCLUDES
REM DAWSON, DENVER, AND ARAPAHOE FORMATIONS
REM   OF THE DENVER BASIN
REM   CASTLE ROCK CONGLOMERATE, WALL MOUNTAIN TUFF,
REM   AND GREEN MOUNTAIN CONGLOMERATE ARE INCLUDED
REM
REM
  ASEL
    RES GEO-CODE GE 31 AND GEO-CODE LE 33
    ASEL GEO-CODE GE 21 AND GEO-CODE LE 23
    CALC G-CODE = 8
REM
REM
REM **************************************************   fh
REM
REM THE GROUP G-CODE = 10 INCLUDES
REM   LARAMIE AND FOX HILLS FORMATION OUTCROPS
REM
  ASEL
    RES GEO-CODE GE 41 AND GEO-CODE LE 42
      CALC G-CODE = 10
REM
REM **************************************************   Kp
REM
REM THE GROUP G-CODE = 11 INCLUDES
REM   THE CRETACEONUS AGE SHALES OF
REM   THE BENTON GROUP UNDIFFERENTIATED
REM   NIOBRARA FORMATION, AND PIERRE SHALE
REM PIERRE SHALE IS DOMINANT IN THE STUDY AREA.
```

```
REM
  ASEL
    RES GEO-CODE GE 43 AND GEO-CODE LE 45
    ASEL GEO-CODE GE 34 AND GEO-CODE LE 39
    CALC G-CODE = 11
REM
REM
REM *************************************************   PK
REM
REM THE GROUP G-CODE = 13 INCLUDES
REM   PENNSYLVANIAN THRU LOWER CRETACEOUS UNITS

REM   FROM THE FOUNTAIN THRU THE DAKOTA FORMATIONS
REM
  ASEL
    RES GEO-CODE GE 46 AND GEO-CODE LE 95
    CALC G-CODE = 13
REM
REM *************************************************   PC
REM
REM THE GROUP G-CODE = 14 INCLUDES
REM   ALL PRECAMBRIAN UNITS
REM   AND SMALL AREAS OF CAMBRIAN ROCKS,
REM   TERTIARY GRAVELS, AND
REM   TERTIARY QUARTZ MONZONITE
REM
  ASEL
    RES GEO-CODE GE 101 AND GEO-CODE LE 142
    ASEL GEO-CODE EQ 24 OR GEO-CODE EQ 27
      CALC G-CODE = 14
REM
REM *************************************************   WATER
REM
REM WATER AREAS IDENTIFIED BY G-CODE = 15
REM WATER WILL BE COLORED LIGHT GRAY.
REM
  ASEL
    RES GEO-CODE = 222
    CALC G-CODE = 15
REM
REM *************************************************   CHECK
REM
REM TEST TO SEE IF ALL POLYS HAVE A G-CODE
  ASEL
    RES G-CODE LE 0
     LIST GEO-CODE,HGS-CODE,G-CODE
REM
REM *****************************************************************
REM SET NEO-CODE FROM VALUES OF G-CODE AND HGS-CODE
REM*****************************************************************
```

```
REM
  ASEL
    CALC NEO-CODE = HGS-CODE * 1000 + G-CODE * 10
REM
Q STOP
&END
DISSOLVE TGEO%SPLIT% SGEO%SPLIT%%FUZZ% NEO-CODE POLY
DATE
TIME
DESCRIBE GEO%SPLIT%

DESCRIBE DGEO%SPLIT%

DESCRIBE HGS%SPLIT%


DESCRIBE TGEO%SPLIT%

DESCRIBE SGEO%SPLIT%%FUZZ%

DATE
TIME
COMO -E
&RETURN
```

```
/*      COMMAND FILE 2--GROUP DEPTH-TO-WATER UNITS
/*
/*
/*      FILE NAME IS DEP5TOSDEP5.AML
/*
/*      THIS AML CALCULATES A VALUE FOR D-CODE FROM THE DEP-CODE
/*      AND DISSOLVES THE COVER ON D-CODE.
/*
/*      THE COVER SDEP5 IS GENERATED.
/*      IF THE COVER IS ALREADY THERE, IT IS DELETED.
/*
/*      D-CODE IS ADDED AS AN ITEM IN SDEP5.PAT
/*
/*
DELETE SDEP5.COMO
COMO SDEP5.COMO
&IF [EXISTS TDEP5 -POLY] &THEN KILL TDEP5 ALL
&IF [EXISTS SDEP5 -POLY] &THEN KILL SDEP5 ALL
COPY DEP5 TDEP5
ADDITEM TDEP5.PAT TDEP5.PAT D-CODE 4 5 B
&DATA ARC INFO
REM
  SEL TDEP5.PAT
REM
REM AREAS IDENTIFIED WITH DEP-CODE = 2 ARE ASSIGNED D-CODE = 1
REM
REM THESE ARE WATER BODIES
REM
  RES DEP-CODE = 2
    CALC D-CODE = 1
REM
REM AREAS IDENTIFIED BY DEP-CODE = 7 ARE ASSIGNED D-CODE = 2
REM
REM THESE ARE AREAS WHERE DEP5TH TO WATER IS LESS THAN 5 FEET
REM AND THE UNCONSOLIDATED MATERIAL IS GENERALLY THE AQUIFER
REM
REM ***** RED *****
REM
  ASEL
    RES DEP-CODE = 7
    CALC D-CODE = 2
REM
REM AREAS IDENTIFIED BY DEP-CODE = 6, 4, OR 3 ARE ASSIGNED D-CODE = 3
REM
REM THESE ARE AREAS WHERE DEP5TH TO WATER IS GENERALLY 5-20 FEET
REM AT LEAST SEASONALLY, AND THE UNCONSOLIDATED MATERIAL
REM IS GENERALLY THE AQUIFER
REM
REM ***** PINK - LT. BLUE - YELLOW *****
REM
```

```
    ASEL
      RES DEP-CODE = 6 OR DEP-CODE = 4 OR DEP-CODE = 3
      CALC D-CODE = 3

REM
REM AREAS IDENTIFIED BY DEP-CODE = 5 ARE ASSIGNED D-CODE = 4
REM
REM THESE ARE AREAS WHERE DEP5TH TO WATER IS GENERALLY MORE THAN 20 FEET
REM AND THE UNCONSOLIDATED MATERIAL IS GENERALLY THE AQUIFER
REM
REM ***** DARK BLUE *****
REM
    ASEL
      RES DEP-CODE = 5
      CALC D-CODE = 4
REM
REM AREAS IDENTIFIED BY DEP-CODE = 8 OR 9 ARE ASSIGNED D-CODE = 5
REM
REM THESE ARE AREAS WHERE DEP5TH TO WATER IS GENERALLY 5-20 FEET
REM AND WATER TABLE AQUIFERS MAY OCCUR IN EITHER UNCONSOLIDATED
REM OR CONSOLIDATED ROCKS.
REM
REM ***** BROWN (BOTH MAPS) *****
REM
    ASEL
       RES DEP-CODE = 8 OR DEP-CODE = 9
       CALC D-CODE = 5
REM
REM AREAS IDENTIFIED BY DEP-CODE = 10 TO 13 ARE ASSIGNED D-CODE = 6
REM
REM THESE ARE AREAS WHERE DEP5TH TO WATER IS GENERALLY MORE THAN 20 FEET
REM AND WATER TABLE CONDITIONS GENERALLY OCCUR IN CONSOLIDATED ROCKS
REM OR CRYSTALLINE ROCKS
REM
REM ***** HASHED BROWN - LT GREEN - DK GREEN - PURPLE *****
REM         DAWSON         DENVER    ARAPAHOE   MOUNTAIN SLOPES
REM
     ASEL
      RES DEP-CODE GE 10 AND DEP-CODE LE 13
       CALC D-CODE = 6
REM
Q STOP
&END
DATE
TIME
DISSOLVE TDEP5 SDEP5 D-CODE POLY
DATE
TIME
DESCRIBE DEP5
DESCRIBE SDEP5
```

```
&DATA ARC INFO
SEL SDEP5.PAT
RES AREA LE 404700
RES AREA LE 202350
RES AREA LE 101175
Q STOP
&END
COMO -E
&RETURN
```

```
/*      COMMAND FILE 3--OVERLAY GEOLOGIC AND DEPTH-TO-WATER COVERS
/*
/*
&ARGS FUZZ
/*      FILE NAME IS NEOFUZZ.AML
/*      THIS AML INTERSECTS (USING IDENTITY) COVERS
/*      SGEO51 AND SDEP10 TO CREATE NEO%FUZZ%
/*      THE VALUE OF D-CODE IS ADDED TO NEO-CODE
DELETE NEO%FUZZ%.COMO
COMO NEO%FUZZ%.COMO
&IF [EXISTS NEO%FUZZ% -POLY] &THEN KILL NEO%FUZZ%
IDENTITY SGEO51 SDEP5 NEO%FUZZ% POLY %FUZZ%
DATE
&DATA ARC INFO
SEL NEO%FUZZ%.PAT
   CALC NEO-CODE = NEO-CODE + D-CODE
Q STOP
&END
DESCRIBE SGEO51
DESCRIBE SDEP5
DESCRIBE NEO%FUZZ%
COMO -E
&RETURN
```

```
/*     COMMAND FILE 4--INTRODUCE A NEW ATTRIBUTE CODE
/*
/*
/*        FILE NAME IS BGD1.AML
/*
/*        THIS FILE SETS THE BGD-CODE IN NEO TO COMBINE
/*                  B - BEDROCK SETTING
/*                  G - GEOLOGIC
/*                  D - DEPTH TO WATER
/*        MAP UNITS THAT ACT SIMILARLY HYDROLOGICALLY
/*        AND TO RESET THE BGD-CODE FOR POLYGONS THAT
/*        RESULT FROM LINE DIFFERENCES BETWEEN GEO AND DEP
/*        SO THAT THE LINE FROM GEO PREVAILS
/*
/*        HGS-CODE IS KEPT TO PROVIDE MORE INFORMATION IN
/*        DEALING WITH THE SMALL POLYGONS IN THE NEXT STEP
/*        THE GEOHYDROLOGIC SETTING IS IMPLICITLY PART
/*        OF THE G-CODE, BECAUSE FORMATIONS ARE ASSIGNED
/*        UNIQUE CODES IN EACH SETTING.  SETTINGS WILL BE
/*        IDENTIFIED LATER AS GROUPS OF G-CODE VALUES
/*
/*        DEFINITIONS
/*        AQUIFER MEDIUM REFERS TO THE UPPERMOST SATURATED MEDIUM
/*        NO INFERENCE IS INTENDED CONCERNING THE YIELD TO WELLS
/*        POTENTIAL YIELD TO WELLS OR USE AS A WATER SUPPLY
/*
/*        DETERMINING UNSATURATED MEDIUM REFERS TO THE MEDIUM
/*        OVERLYING THE AQUIFER THAT IS ASSIGNED THE HIGHER
/*        RATING FOR VULNERABILITY OF UNSATURATED MEDIA.
/*        THIS CONVENTION WAS ADOPTED WHERE MORE THAN ONE
/*        GEOLOGIC UNIT OVERLIES THE AQUIFER BECAUSE DATA ARE NOT
/*        AVAILABLE TO DESCRIBE THE RELATIVE THICKNESSES OF
/*        UNSATURATED MEDIA.
/*
/*        WATER BODIES ARE DEFINED BY G-CODE = 15
/*        WATER DEFINED BY D-CODE = 1 IS IGNORED BY TREATING
/*        D-CODE = 1 THE SAME AS D-CODE = 3 (DTW = 5-15)
/*        THE AREAS EFFECTED ARE SMALL (LT 100 ACRES)
/*
DELETE BGD1.COMO
COMO BGD1.COMO
&IF [EXISTS BGD1 -POLY] &THEN KILL BGD1
&IF [EXISTS TBGD1 -POLY] &THEN KILL TBGD1
DISSOLVE NEO1 TBGD1 NEO-CODE POLY
                             ADDITEM TBGD1.PAT TBGD1.PAT ACRES 4 5 B
                             ADDITEM TBGD1.PAT TBGD1.PAT BGD-CODE 4 5 I
/*        THE BGD-CODE WILL BE USED TO HOLD THE NEW VALUES
/*        USED TO IDENTIFY UNIQUE AREAS
/*        STRUCTURE OF BGD-CODE IS SIMILAR TO THAT FOR NEO-CODE
/*             4 DIGITS
```

```
/*                     1ST DIGIT = FOR NOW, THIS IS THE SAME AS HGS-CODE
/*
/*                          1 = MOUNTAINS

/*                          2 = FLANKS
/*                          3 = FLANKS - ARAPAHOE
/*                          4-9 = NONGLACIATED CENTRAL REGION
/*                          4 = PIERRE AND LOWER FOX HILLS
/*                          5 = LARAMIE-FOX HILLS
/*                          6 = LARAMIE
/*                          7 = ARAPAHOE
/*                          8 = DENVER
/*                          9 = DAWSON
/*
/*                                LATER IT WILL BE CHANGED TO
/*                               1 = MOUNTAIN SLOPES
/*                               2 = MOUNTAIN VALLEYS
/*                               3 = MOUNTAIN FLANKS
/*                               4 = BEDDED CONSOLIDATED ROCKS
/*                               5 = UNCONSOLIDATED AQUIFERS
/*                               6 = RIVER ALLUVIUM
/*                               7 = WATER
/*
/*                     2ND AND 3RD DIGITS = HYDROGEOLOGIC UNIT
/*
/*                          01 = COLUVIUM
/*                               COLLUVIUM IS MAPPED IN MANY SETTINGS
/*                               THE NATURE OF THE UNIT VARIES BY SETTING
/*
/*                          14
/*                               IN MOUNTAIN SLOPES, COLLUVIUM
/*                               IS GENERALLY OF SMALL AREAL EXTENT
/*                               AND CONSISTS OF LARGE PARTICLES.
/*                               IT IS ASSUMED TO BE NEGLIGIBLE AS EITHER
/*                               AQUIFER OR UNSATURATED MEDIA
/*
/*                                  ELSEWHERE, COLLUVIUM WILL BE COMBINED
/*                                  WITH ONE OF THE OTHER UNCONSOLIDATED
/*                                  MEDIA - ROCKY FLATS (7) LOESS (2)
/*                                  OR ALLUVIUM (5).  TO MAINTAIN THIS ORDER
/*                                  OF OPERATION AS A FUNCTION OF THE
/*                                  CHARACTER OF ADJACENT POLYGONS, THE
/*                                  ASSIGNMENT WILL BE DONE LATER USING
/*                                  THE METHOD OF DEALING WITH SMALL POLYS.
/*                                  HERE, COLLUVIUM IS ASSIGNED A UNIQUE
/*                                  VALUE OF G
/*
/*
/*
/*                          02 = LOESS
```

```
/*
/*                                     LOESS OCCURS OVER LARGE AREAS OF THE
/*                                     MOUNTAIN FLANKS AND DENVER BASIN
/*
/*                                     IN MTN FLANKS, LOESS IS GENERALLY IN THE
/*                                     AREA OF COMPLEX GEOLOGY WHERE IT IS
/*                                     ASSUMED TO OVERLIE EITHER LARAMIE-FOX HILLS

/*                                     OR ARAPAHOE ROCKS.  THE LOESS IS ASSUMED TO BE
/*                                     UNSATURATED AND IS RATED 32 OR 33
/*
/*                                     IN NGC, LOESS MAY
/*                                     OVERLIE ANY CONSOLIDATED ROCKS
/*                                     THE CODE ASSIGNED HERE REFLECTS WHICH
/*                                     OF THESE ENVIRONMENTS ARE SIMILAR
/*
/*                                02 = LOESS AT SURFACE - SATURATED **
/*                                         LOESS IS AQUIFER AND UNSAT MEDIA
/*
/*                                      UNDERLYING BEDROCK
/*                                02 = LARAMIE-FOX HILLS IN MTN FLANKS **
/*                                02 = ARAPAHOE IN MTN FLANKS **
/*                                02 = LOWER FH/PIERRE IN NGC *
/*                                02 = LARAMIE-FOX HILLS IN NGC **
/*                                02 = LARAMIE IN NGC *
/*                                02 = ARAPAHOE IN NGC **
/*                                02 = DENVER **
/*                                02 = DAWSON **
/*
/*          **   SATURATED LOESS WAS ASSUMED ONLY WHERE LOESS AREAS WERE
/*               MAPPED BY HILLIER AS AREAS WHERE THE WATER TABLE OCCURS
/*               IN UNCONSOLIDATED MEDIA (RED,PINK,LT BLUE, YELLOW, DK BLUE)
/*
/*          *    SATURATED LOESS WAS ASSUMED WHERE LOESS AREAS WERE
/*               MAPPED BY HILLIER AS AREAS WHERE THE WATER TABLE OCCURS
/*               IN EITHER CONSOLIDATED OR UNCONSOLIDATED ROCKS, WHERE
/*               THE UNDERLYING CONSOLIDATED ROCKS ARE OF LOW PERMEABILITY
/*
/*                             32-39 = LOESS AT SURFACE - UNSATURATED **
/*                                          UNDERLYING BEDROCK IS AQUIFER
/*                                          LOESS IS UNSATURATED MEDIA
/*
/*                                          UNDERLYING BEDROCK IS
/*                                32 = LARAMIE-FOX HILLS IN MTN FLANKS *
/*                                33 = ARAPAHOE IN MTN FLANKS *
/*                                34 = LOWER FH/PIERRE IN NGC **
/*                                35 = LARAMIE-FOX HILLS IN NGC *
/*                                36 = LARAMIE IN NGC **
/*                                37 = ARAPAHOE IN NGC *
```

```
/*                        38 = DENVER *
/*                        39 = DAWSON *
/*
/*          **    UNSATURATED LOESS WAS ASSUMED ONLY WHERE LOESS AREAS WERE
/*                MAPPED BY HILLIER AS AREAS WHERE THE WATER TABLE OCCURS
/*                IN CONSOLIDATED ROCKS (PURPLE, LT AND DK GREEN, HASH BROWN)
/*
/*          *     UNSATURATED LOESS WAS ASSUMED WHERE LOESS AREAS WERE
/*                MAPPED BY HILLIER AS AREAS WHERE THE WATER TABLE OCCURS
/*                IN EITHER CONSOLIDATED OR UNCONSOLIDATED ROCKS, WHERE
/*                THE UNDERLYING CONSOLIDATED ROCKS ARE MODERATELY PERMEABLE
/*

/*                        04 = SHOSHONITE LAVA
/*                        05 = RIVER ALLUVIUM
/*
/*                        07 = UNCONSOLIDATED AQUIFERS
/*
/*                        22-29 = DENVER BASIN
/*                                  BEDROCK AT SURFACE
/*                                  BEDROCK IS AQUIFER AND UNSAT MEDIA
/*
/*                        22 = LARAMIE-FOX HILLS IN MTN FLANKS
/*                        23 = ARAPAHOE IN MTN FLANKS
/*                        24 = LOWER FH/PIERRE
/*                        25 = LARAMIE-FOX HILLS
/*                        26 = LARAMIE
/*                        27 = ARAPAHOE
/*                        28 = DENVER
/*                        29 = DAWSON
/*
/*                        12 = PIERRE IN MTN FLANKS - HYGIENE MEMBER DOWN
/*                        13 = FOUNTAIN-TO-DAKOTA
/*                        14 = PRECAMBRIAN
/*
/*                   4TH DIGIT DEPTH TO WATER
/*
/*                        2 = LT 5 FEET (UNCONSOLIDATED)
/*                        3 = 5-20 FEET (UNCONSOLIDATED)
/*                        4 = GT 20 FT (UNCONSOLIDATED)
/*                        6 = GT 20 FT (CONSOLIDATED)
/*
/*   *************************************************************
/*   *************************************************************
/*
&DATA ARC INFO
SEL TBGD1.PAT
                              CALC ACRES = AREA / 4047
                              REDEFINE
                              17,B-CODE,1,1,I
```

```
                                  18,G-CODE,2,2,I
                                  20,D-CODE,1,1,I
                                  25,B,1,1,I
                                  26,G,2,2,I
                                  28,D,1,1,I

REM
REM  *************************************************************
REM  *************************************************************
REM
REM
REM          B-CODE, G-CODE, AND D-CODE ARE THE DIGITS OF NEO-CODE
REM          B, G,  AND D ARE THE DIGITS OF BGD-CODE
REM
REM          VALUES IN NEO-CODE ARE USED TO SELECT POLYGONS AND
REM          ASSIGN VALUES OF BGD-CODE.

REM
REM  *************************************************************
REM  *************************************************************
REM
REM          THE ASSIGNMENTS ARE DONE BY BGD1FIX.AML
REM
Q STOP
&END
&R BGD1FIX.AML
COMO -E
&RETURN
```

```
/*     COMMAND FILE 5--IDENTIFY MAP UNITS CONSISTING OF SIMILAR SATURATED
       AND UNSATURATED MEDIA
/*
/*
/*
/*        FILE NAME IS BGD1FIX.AML
/*
/*        THIS FILE SETS THE BGD-CODE IN BGD1 TO COMBINE
/*                  B - BEDROCK SETTING
/*                  G - GEOLOGIC
/*                  D - DEPTH TO WATER
/*        MAP UNITS THAT ACT SIMILARLY HYDROLOGICALLY
/*        AND TO RESET THE BGD-CODE FOR POLYGONS THAT
/*        RESULT FROM LINE DIFFERENCES BETWEEN GEO AND DEP
/*        SO THAT THE LINE FROM GEO PREVAILS
/*
/*        HGS-CODE IS KEPT TO PROVIDE MORE INFORMATION IN
/*        DEALING WITH THE SMALL POLYGONS IN THE NEXT STEP
/*        THE GEOHYDROLOGIC SETTING IS IMPLICITLY PART
/*        OF THE G-CODE, BECAUSE FORMATIONS ARE ASSIGNED
/*        UNIQUE CODES IN EACH SETTING.  SETTINGS WILL BE
/*        IDENTIFIED LATER AS GROUPS OF G-CODE VALUES
/*
/*        DEFINITIONS
/*        AQUIFER MEDIUM REFERS TO THE UPPERMOST SATURATED MEDIUM
/*        NO INFERENCE IS INTENDED CONCERNING THE YIELD TO WELLS
/*        POTENTIAL YIELD TO WELLS OR USE AS A WATER SUPPLY
/*
/*        DETERMINING UNSATURATED MEDIUM REFERS TO THE MEDIUM
/*        OVERLYING THE AQUIFER THAT IS ASSIGNED THE HIGHER
/*        RATING FOR VULNERABILITY OF UNSATURATED MEDIA.
/*        THIS CONVENTION WAS ADOPTED WHERE MORE THAN ONE
/*        GEOLOGIC UNIT OVERLIES THE AQUIFER BECAUSE DATA ARE NOT
/*        AVAILABLE TO DESCRIBE THE RELATIVE THICKNESSES OF
/*        UNSATURATED MEDIA.
/*
/*        WATER BODIES ARE DEFINED BY G-CODE = 15
/*        WATER DEFINED BY D-CODE = 1 IS IGNORED BY TREATING
/*        D-CODE = 1 THE SAME AS D-CODE = 3 (DTW = 5-15)
/*        THE AREAS EFFECTED ARE SMALL (LT 100 ACRES)
/*
DELETE BGD1FIX.COMO
COMO BGD1FIX.COMO
&IF [EXISTS BGD1 -POLY] &THEN KILL BGD1
/*
/*   ***********************************************************
/*   ***********************************************************
/*
&DATA ARC INFO
SEL TBGD1.PAT
```

```
REM
REM   ************************************************************
REM   ************************************************************
REM

REM
REM           B-CODE, G-CODE, AND D-CODE ARE THE DIGITS OF NEO-CODE
REM           B, G,  AND D ARE THE DIGITS OF BGD-CODE
REM
REM           VALUES IN NEO-CODE ARE USED TO SELECT POLYGONS AND
REM           ASSIGN VALUES OF BGD-CODE.
REM
REM   ************************************************************
REM   ************************************************************
REM
REM           THE VALUES FOR BEDROCK AREA, B-CODE ARE MOVED OVER
REM           WITHOUT CHANGE - THESE ARE THE SAME CODES AS THE
REM           OLD HGS-CODE.  THEY ARE NOT HYDROGEOLOGIC SETTINGS
REM
     ASEL
     CALC B = B-CODE
REM
REM           SMALL AREAS ON THE PERIMETER HAVE B-CODE = 0
REM           THESE AREAS WILL BE ASSIGNED A VALUE OF B
REM           BASED ON THE VALUE OF G-CODE.  THIS WILL
REM           BE CONSISTENT WITH THE ARBITRARY CONVENTION OF
REM           USING LINES FROM THE GEOLOGY MAP PREFERENTIALLY
REM
     ASEL
     RES B = 0
     RES AREA GE 0
     RES G-CODE = 1 OR G-CODE = 14
     CALC B = 1
REM
     ASEL
     RES B = 0
     RES AREA GE 0
     RES G-CODE = 13 OR G-CODE = 11 OR G-CODE = 10
     CALC B = 2
REM
     ASEL
     RES B = 0
     RES AREA GE 0
     RES G-CODE = 8 OR G-CODE = 7 OR G-CODE = 5 OR G-CODE = 2
     CALC B = 4
REM
REM           THE VALUE IN B IS NOW CORRECT AND WILL
REM           BE USED TO SELECT THE BEDROCK AREA FOR
REM           ASSIGNMENT OF VALUES TO G AND D
REM
```

```
REM   **************************************************************
REM   **************************************************************
REM
REM            THE VALUES FOR GEOLOGY ARE REDEFINED TO SHOW
REM            HYDROLOGIC SIMILARITIES
REM
REM            SMALL AREAS ON THE PERIMETER HAVE D-CODE = 0
REM            TO MAINTAIN THE ARBITRARY CONVENTION OF

REM            STAYING WITH THE LINES FROM GEOLOGY MAP
REM            WHERE THEY DIFFER FROM LINE ON DEPTH-TO-WATER MAP
REM            THESE AREAS WILL BE ASSIGNED VALUES OF D BASED
REM            ON G-CODE.  THIS IS FACILITATED HERE BY
REM            ASSIGNING ALL THESE AREAS A D-CODE OF 5.
REM            THIS ASSIGNMENT OF D-CODE VALUES IS
REM            UNAVOIDABLE.  D CANNOT BE USED YET BECAUSE
REM            IT IS STILL EMPTY.  ASSIGNMENT OF D VALUES
REM            DEPENDS ON VALUES OF G.  THIS IS A MINIMAL
REM            MODIFICATION TO THE COVER NEO.  THE AREAS
REM            HAVE BEEN PLOTTED AND LISTED TO VERIFY THAT
REM            THEY ARE SMALL, ON THE PERIMETER, AND FEW.
REM
     ASEL
     RES D-CODE = 0
     RES AREA GE 0
     CALC D-CODE = 5
REM
REM   **************************************************************
REM
REM         COLLUVIUM
REM
REM         IN MOUNTAIN SLOPES AND VALLEYS,
REM         THE AQUIFER AND THE UNSATURATED MEDIA ARE THE BEDROCK
REM         MOST VULNERABLE UNSAT MEDIA IS THE FRACTURED BEDROCK
REM         DTW IS >20
REM
     ASEL
     RES G-CODE = 1 AND B = 1
     CALC G = 14
REM
REM            ELSEWHERE, COLLUVIUM IS ASSIGNED Q UNIQUE
REM            VALUE OF G, AND WILL BE GROUPED WITH THE
REM            SPECIFIED UNIT USING THE METHOD FOR
REM            SMALL POLYGONS
REM
     ASEL
     RES B GE 2
     RES G-CODE = 1
     CALC G = 51
REM
```

```
REM
REM
REM   ************************************************************
REM
REM        LOESS
REM
REM        LOESS OCCURS ONLY IN MTN FLANKS AND IN NGC
REM
REM        WHERE HILLIER INDICATES UNCONSOLIDATED AQUIFER,
REM        (RED, PINK, BLUE, YELLOW, DK BLUE - D-CODE = 2,3,4)
REM        OR WATER - D-CODE = 1
REM        LOESS IS ASSUMED TO BE THE AQUIFER AND THE UNSAT MEDIA

REM
     ASEL
     RES G-CODE = 2
     RES D-CODE GE 1 AND D-CODE LE 4
     CALC G = 52
REM
REM        WHERE HILLIER IS NONCOMMITAL (D-CODE = 5)
REM        LOESS IS ASSUMED SATURATED ONLY IN AREAS INDICATED BY
REM        B (4,6) TO OVERLIE LOWER FOX HILL, PIERRE, OR LARAMIE
REM        DTW WILL BE ASSUMED TO BE 5-20 FEET
REM
REM
     ASEL
     RES G-CODE = 2
     RES D-CODE = 5
     RES B = 4 OR B = 6
     CALC G = 52
REM
REM        WHERE HILLIER IS NONCOMMITAL (D-CODE = 5)
REM        LOESS IS ASSUMED UNSATURATED IN OTHER AREAS
REM        (B = 2,3,5,7,8,9)
REM
REM
     ASEL
     RES G-CODE = 2
     RES D-CODE = 5
     RES B = 2 OR B = 3 OR B = 5 OR B GE 7
     CALC G = 30 + B
REM
REM        WHERE HILLIER INDICATES THE AQUIFER IS CONSOLIDATED ROCK
REM        AND DEPTH TO WATER IS GT 20 FEET
REM        LOESS IS ASSUMED TO BE THE DETERMINING UNSAT MEDIA
REM
REM        THE UNDERLYING BEDROCK IS ASSUMED TO BE THE AQUIFER
REM        DEPTH TO WATER WILL BE ASSUMED TO BE GT 20 FT
REM
REM
```

```
     ASEL
     RES G-CODE = 2
     RES D-CODE = 6
     CALC G = 30 + B
REM
REM       *************************************************************
REM
REM       ARTIFICIAL FILL
REM
REM       AREAS OF ARTIFICIAL FILL ARE SMALL (LT 100 ACRES)
REM       AND WILL BE DEALT WITH AS SMALL POLYGONS
REM       HERE, THEY ARE ASSIGNED A BGD-CODE ANYWAY
REM       THEY OCCUR ONLY IN MOUNTAINS AND MTN FLANKS
REM
     ASEL
     RES G-CODE = 3

     CALC G = 53
REM
REM       *************************************************************
REM
REM       SHOSHONITE LAVA - TABLE MOUNTAIN LAVAS
REM
REM       OCCURS IN MOUNTAINS, MTN FLANKS, ARAP, AND DENVER AREAS
REM       ONLY IN THE DENVER AREA ARE POLYS LARGE ENOUGH TO
REM       SURVIVE THE SMALL POLYGON TEST TO BE APPLIED LATER
REM
REM       HERE, THESE ARE ASSIGNED A BGD-CODE APPROPRIATE FOR
REM       OVERLYING DENVER.  OTHER AREAS ARE ASSIGNED CODE
REM       THAT WILL NOT ALTER SETTING BOUNDARIES.
REM
     ASEL
     RES G-CODE = 4
     CALC G = 54
REM
REM       *************************************************************
REM
REM       RIVER ALLUVIUM
REM
REM       UNIT NOW INCLUDES AREAS OF COLLUVIUM ADJACENT TO
REM       RIVER ALLUVIUM IN NGC
REM
REM       AREAS IN MOUNTAINS ARE IDENTIFIED AS MOUNTAIN VALLEYS
REM       AREAS ELSEWHERE ARE IDENTIFIED AS RIVER ALLUVIUM
REM
REM       DTW IN MOUNTAIN VALLEYS WILL BE ASSUMED TO BE 5-20 FEET
REM       HILLIER DOES NOT DIFFERENTIATE THESE FROM MOUNTAIN SLOPES
REM
     ASEL
     RES G-CODE = 5
```

```
     RES B = 1
     CALC G = 59
REM
REM       ELSEWHERE, HILLIER DATA USED
REM
REM       DEPTH TO WATER FROM HILLIER FOR D-CODE = 2-4
REM       WHERE HILLIER IS NONCOMMITAL (BROWN, D-CODE = 5) DEPTH
REM       TO WATER IS ASSUMED TO BE 5-20 FEET
REM
     ASEL
     RES G-CODE = 5
     RES B NE 1
     CALC G = 55
REM
REM
REM       ************************************************************
REM
REM       TERTIARY INTRUSIVES
REM
REM       THESE ARE SMALL AREAS (LT 100 ACRES) IN MTN FLANKS

REM       HERE THEY ARE GIVEN A UNIQUE CODE
REM
     ASEL
     RES G-CODE = 6
     CALC G = 56
REM
REM       ************************************************************
REM
REM       UNCONSOLIDATED AQUIFERS - 'ROCKY-FLATS' GROUP
REM
REM       ALSO INCLUDES COLLUVIUM IN MTN FLANKS
REM
REM       ASSUMED TO BE AN AQUIFER EVERYWHERE
REM
     ASEL
     RES G-CODE = 7
     CALC G = 57
REM
REM       ************************************************************
REM
REM       DENVER BASIN AQUIFERS - IN MTN FLANKS AND NGC
REM
REM       THE DIVISION BETWEEN LARAMIE-FOX-HILLS (G-CODE = 10)
REM       AND THE REST OF THE DENVER BASIN AQUIFERS (G-CODE = 8)
REM       WAS NOT NEEDED IN NGC AND IS KEPT ONLY FOR MTN FLANKS
REM       IN NGC THE AQUIFERS ARE IDENTIFIED BY HGS-CODE
REM
REM       FOR LARAMIE-FOX HILLS STUFF IN HGS-CODE = 2
REM       AREAS WHERE DEPTH TO WATER HAS BEEN SPECIFIED
```

```
REM        ARE SMALL.  DTW WILL BE ASSUMED TO BE GT 20 FEET
REM
     ASEL
     RES G-CODE = 10
     RES B = 2
     CALC G = 22
REM
REM        FOR OTHER DENVER BASIN STUFF IN HGS-CODE = 2
REM        AND FOR LARAMIE-FOX HILLS OR OTHER DENVER
REM        BASIN STUFF IN HGS-CODE = 3, THE ARAPAHOE
REM        IS ASSUMED TO BE AQUIFER AND UNSAT MEDIA
REM        AREAS WHERE DTW IS SPECIFIED LT 20 FT ARE SMALL
REM        DTW WILL BE ASSUMED TO BE GT 20 FEET EVERYWHERE
REM
     ASEL
     RES G-CODE = 8
     RES B = 2
     CALC G = 23
REM
     ASEL
     RES G-CODE = 8
     ASEL G-CODE = 10
     RES B = 3
     CALC G = 23

REM
REM        IN NGC, AQUIFER AND UNSAT MEDIA FROM HGS-CODE
REM        DEPTH TO WATER IS GENERALLY SPECIFIED GT 20 FT
REM        EXCEPT IN SMALL POLYS AND IN SOME LARGER (GT 100 ACRES)
REM        POLYS IN THE DAWSON AND DENVER AREAS (LARGEST POLY IS 205 ACRES)
REM        AND THESE ARE ALONG STREAMS AND ARE ASSUMED TO RESULT
REM        FROM LINE DIFFERENCES BETWEEN THE GEO AND DEP COVERS
REM        DTW IS ASSUMED TO BE GT 20 FEET EVERYWHERE
REM
     ASEL
     RES G-CODE = 8
     ASEL G-CODE = 10
     RES B GE 4
     CALC G = 20 + B
REM
REM        ************************************************************
REM
REM        PIERRE SHALE
REM
REM        PIERRE OCCURS IN BOTH MTN FLANKS AND IN NGC
REM        DIFFERENT G VALUES ARE ASSIGNED
REM        PIERRE IS NOT DIFFERENTIATED FROM LOWER FOX HILLS -NGC
REM
REM        IN FLANKS
REM
```

```
     ASEL
     RES G-CODE = 11
     RES B = 2 OR B = 3
     CALC G = 12
REM
REM       IN NGC
REM
     ASEL
     RES G-CODE = 11
     RES B GE 4
     CALC G = 24
REM
REM       *************************************************************
REM
REM       OLDER SEDIMENTARY ROCKS - FOUNTAIN TO DAKOTA
REM
REM       OUTLIERS IN MOUNTAINS ARE COMBINED WITH PRECAMBRIAN
REM       DEPTH TO WATER IS GENERALLY NOT SPECIFIED BY HILLIER
REM       DTW IS ASSUMED TO BE GT 20 FEET EVERYWHERE
REM
REM       IN FLANKS
REM
     ASEL
     RES G-CODE = 13
     RES B GT 1
     CALC G = 13
REM
REM       IN MOUNTAINS

REM
     ASEL
     RES G-CODE = 13
     RES B = 1
     CALC G = 14
REM
REM       *************************************************************
REM
REM       PRECAMBRIAN
REM
REM       UNIT INCLUDES COLLUVIUM IN MOUNTAINS AND
REM       INCLUDES OUTLIERS OF FOUNTAIN
REM       DEPTH TO WATER GENERALLY SPECIFIED AS GT 20 FEET BY HILLIER
REM       DTW ASSUMED TO BE GT 20 FEET EVERYWHERE
REM
     ASEL
     RES G-CODE = 14
     CALC G = 14
REM
REM       *************************************************************
REM
```

```
REM       WATER
REM
REM       WATER IS ASSIGNED A UNIQUE SETTING, GEOLOGY, AND DEPTH CODE
REM       FOR NOW, HGS-CODE IS RETAINED
REM
    ASEL
    RES G-CODE = 15
    CALC G = 15
REM
REM
REM   *************************************************************
REM   *************************************************************
REM
REM          THE VALUES FOR DEPTH TO WATER ARE CHANGED TO
REM          ELIMINATE THE CONTRADICTION OF WATER AREAS BETWEEN
REM          THE 2 MAPS (GEO AND DEP) AND TO ELIMINATE THE
REM          UNCERTAINTY IMPLICIT IN NOT SPECIFYING WHETHER
REM          WATER TABLE IS IN SATURATED OR UNSATURATED MEDIA
REM
REM   *************************************************************
REM
REM          WATER AREAS DEFINED ON DEP MAP ARE IGNORED BY ASSIGNING
REM          A CODE TO INDICATE THAT THE WATER TABLE IS IN
REM          UNCONSOLIDATED MEDIA AND DEPTH TO WATER IS 5-20 FT
REM
    ASEL
    RES D-CODE = 1
    CALC D = 3
REM
REM   *************************************************************
REM
REM          AREAS WHERE HILLIER DID NOT SPECIFY (D-CODE = 5, BROWNS

REM          ON HILLIER MAP) ARE ASSIGNED ONE OF TWO VALUES (3 OR 6)
REM          DEPENDING ON GEOLOGY (VALUE OF G)
REM
REM          WHERE THE SURFACE GEOLOGIC UNIT IS BEDROCK, THE WATER TABLE
REM          IS ASSUMED TO BE IN BEDROCK AND DEPTH-TO-WATER IS
REM          ASSUMED TO BE GREATER THAN 20 FT
REM
REM          INCLUDE ARTIFICIAL FILL (G = 53) IN THIS GROUP
REM
    ASEL
    RES G = 54
    ASEL G = 53
    ASEL G = 56
    ASEL G GE 22 AND G LE 29
    ASEL G = 12
    ASEL G = 13
    ASEL G = 14
```

```
    RES D-CODE = 5
    CALC D = 6
REM
REM           WHERE THE SURFACE GEOLOGIC UNIT IS LOESS
REM           AND THE LOESS IS UNSATURATED, THE WATER TABLE
REM           IS ASSUMED TO BE IN THE UNDERLYING BEDROCK
REM           AND DEPTH TO WATER IS ASSUMED TO BE GREATER THAN 20 FT
REM
    ASEL
    RES G GE 32 AND G LE 39
    RES D-CODE = 5
    CALC D = 6
REM
REM           WHERE THE SURFACE GEOLOGIC UNIT IS LOESS
REM           AND THE LOESS IS SATURATED, THE WATER TABLE
REM           IS ASSUMED TO BE IN THE LOESS AND THE DEPTH TO WATER
REM           IS ASSUMED TO BE 5-20 FT.
REM
    ASEL
    RES G = 52
    RES D-CODE = 5
    CALC D = 3
REM
REM           WHERE THE SURFACE GEOLOGIC UNIT IS UNCONSOLIDATED MEDIA
REM           THE MEDIA IS ASSUMED TO BE SATURATED AND
REM           DEPTH TO WATER IS ASSUMED TO BE 5-20 FT
REM
REM         THIS INCLUDES COLLUVIUM WHICH WILL BE
REM         COMBINED WITH ANOTHER UNCONSOLIDATED UNIT LATER
REM
    ASEL
    RES G = 55
    ASEL G = 57
    ASEL G = 59
    ASEL G = 51
    RES D-CODE = 5

    CALC D = 3
REM
REM      *************************************************************
REM
REM           AREAS WHERE HILLIER SPECIFIED AQUIFER TYPE
REM           AND DEPTH TO WATER WERE ASSIGNED D VALUES
REM           CONSISTENT WITH HILLIER
REM
    ASEL
    RES D-CODE = 2
    ASEL D-CODE = 3
    ASEL D-CODE = 4
    ASEL D-CODE = 6
```

```
     CALC D = D-CODE
REM
REM          SET D = 1 FOR WATER AREAS DEFINED BY G = 15
REM
     ASEL
     RES G = 15
     CALC D = 1
REM
REM      ************************************************************
REM      ************************************************************
REM
REM            DO A QUICK TEST FOR UNASSIGNED CODES
REM
     ASEL
     RES B LE 0
     ASEL
     RES G LE 0
     ASEL
     RES D LE 0
REM
REM      ************************************************************
REM      ************************************************************
REM
          Q STOP
&END
/*       ************************************************************
/*       ************************************************************
/*       ************************************************************
/*
DISSOLVE TBGD1 BGD1 BGD-CODE POLY
ADDITEM BGD1.PAT BGD1.PAT ACRES 4 5 B
&DATA ARC INFO
SEL BGD1.PAT
                              REDEFINE
                              17,B,1,1,I
                              18,G,2,2,I
                              20,D,1,1,I

IT
CALC ACRES = AREA / 4047

     RES ACRES LE 100
     RES ACRES LE 50
     RES ACRES LE 25
     RES ACRES LE 5
REM
  ASEL
    RES B LE 0
  ASEL
    RES G LE 0
```

```
  ASEL
    RES D LE 0
                        Q STOP
&END
/*
DATE
COMO -E
&RETURN
```

```
/*     COMMAND FILE 6--ELIMINATE SMALL POLYGONS RESULTING FROM DIFFERENCES
       IN VALUE OF DEPTH-TO-WATER CODE/*
/*
/*
/*     FILE NAME IS XGEODEP.COMI
/*
DELETE XGEODEP.COMO
COMO XGEODEP.COMO
DATE
TIME
ARC
/*
/* DEALS WITH SMALL POLYGONS RESULTING FROM
/* DIFFERENCES IN VALUES OF D
/*
/* AND COLLUVIUM OF ANY SIZE
/*
/* SMALL (LESS THAN 100 ACRES - LESS THAN 404700 SQ METERS
/* POLYGONS ARE ELIMINATED IN SEQUENCE
/* BY DISSOLVING ARCS BETWEEN THEM AND ADJACENT
/* POLYGONS THAT ARE ASSIGNED THE SAME VALUES
/* OF B AND G.  EACH GEOLOGIC TYPE AREA IS CONSIDERED
/*
/* THE PROCESS WILL BE REPEATED AS UNTIL NO ADDITIONAL
/* POLYGONS ARE ELIMINATED
/*
/* STARTS WITH COVER NAMED BGD1 AND RESULTS IN COVER XBGD1
/*
/* WORK COVER NAMES ARE BUD AND LOU
/*
/* TO SHORTEN LENGTH, COMMENTS ARE GROUPED HERE AND
/* AREAS OF THE COMI IDENTIFIED BY INDENTATION
/*
/* EACH PASS CONSISTS OF THREE STEPS
/*
/*                                       THE FIRST STEP IS A SETUP
/*                                       PROCEEDURE TO BE SURE THE
/*                                       ITEMS ARE CORRECTLY RELATED
/*                                       BETWEEN THE ATTRIBUTE AND
/*                                       TOPOLOGY.  THESE COMMANDS ARE
/*                                       INDENTED TO HERE.
/*
/*                                       THE SETUP CAN BE BROKEN INTO
/*                                       DEFINE AND CONDITION PHASES.
/*
/*                                       THE DEFINE PHASE HAS ALREADY
/*                                       BEEN DONE FOR COVER BGD1
/*
/*                                       DEFINE
```

```
/*
/*                                         BUILD LINE TOPOLOGY
/*                                         ADD NEEDED ITEMS TO AAT
/*                                         REDEFINE NEEDED ITEMS

/*
/*                                         CONDITION
/*
/*                                         ASSURE THAT -ID AGREE BETWEEN
/*                                         ATTRIBUTES AND TOPOGRAPHY
/*
/*                    THE SECOND STEP PREVENTS SUBJECT POLYGONS
/*                    FROM COMBINING WITH POLYGONS OTHER THAN
/*                    THE DESIRED TARGET.  THESE COMMANDS ARE
/*                    INDENTED TO HERE.  THIS IS DONE IN TWO PHASES
/*
/*                    MOVE
/*
/*                    MOVE THE CURRENT VALUES OF BGD-CODE FROM
/*                    THE PAT TO THE AAT FOR BOTH LEFT (LP-BGD)
/*                    AND RIGHT (RP-BGD) POLYGONS
/*
/*                    PROTECT
/*
/*                    THE SPECIFIC ARCS TO BE PROTECTED FROM BEING
/*                    DISSOLVED IN TRYING TO ELIMINATE POLYGONS
/*                    ARE PROTECTED BY ASSIGNING COVER-ID = -1
/*
/* THE THIRD STEP IS THE ELIMINATE COMMAND AND THE NEEDED RESPONSES
/* THESE ARE NOT INDENTED
/*
/* HOUSEKEEPING COMMANDS ARE ALSO NOT INDENTED.
/*
/* EACH PASS IS THEN SEPARATED BY A ROW OF ASTERISKS
/*
/* ***********************************************************************
/*
/*     GROUP COLLUVIUM THAT IS DISTINGUISHED ONLY BY VALUE OF D
/*     THIS WILL PREVENT SUBDIVIDING WHAT IS ESSENTIALLY
/*     ONE AREA OF COLLUVIUM INTO SEPARATE ADJACENT POLYGONS
/*
                                         INFO
                                         SEL BGD1.PAT
                                         SORT BGD1#
                                         CALC BGD1-ID = $RECNO - 1
                                         Q STOP
                                         CREATELABELS BGD1 0
                                         IDEDIT BGD1 POLY
                                         INFO
                                         SEL BGD1.AAT
```

```
                                        SORT BGD1#
                                        CALC BGD1-ID = $RECNO
                                        Q STOP
                                        IDEDIT BGD1 LINE
                    INFO
                    SEL BGD1.AAT
                    RELATE BGD1.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE

                    RELATE BGD1.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
          /*
                    INFO
                    SEL BGD1.AAT
                    RES LP-G = 51 AND RP-G = 51
                    RES LP-B = RP-B
                    NSEL
                    CALC BGD1-ID = -1
                    Q STOP
                    IDEDIT BGD1 LINE
/*
ELIMINATE BGD1 LOU NOKEEPEDGE POLY
RES G = 51

N
N
/*      KEEP BGD1 UNCHANGED
/*
/* ***********************************************************************
/*
/*         RIVER ALLUVIUM
/*
                                        BUILD LOU LINE
                                   ADDITEM LOU.AAT LOU.AAT LP-BGD 4 4 I
                                   ADDITEM LOU.AAT LOU.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LOU.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
```

```
                                            SEL LOU.PAT
                                            SORT LOU#
                                            CALC LOU-ID = $RECNO - 1
                                            Q STOP
                                            CREATELABELS LOU 0
                                            IDEDIT LOU POLY
                                            INFO
                                            SEL LOU.AAT
                                            SORT LOU#
                                            CALC LOU-ID = $RECNO
                                            Q STOP
                                            IDEDIT LOU LINE

/*
                    INFO
                    SEL LOU.AAT
                    RELATE LOU.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LOU.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL LOU.AAT
                    RES LP-G = 55 AND RP-G = 55
                    RES LP-B = RP-B
                    NSEL
                    CALC LOU-ID = -1
                    Q STOP
                    IDEDIT LOU LINE
/*
ELIMINATE LOU BUD NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 55

N
N
/*
KILL LOU
/*
DATE
TIME
/*
/* ********************************************************************
/*
/*         SATURATED LOESS
/*
                                            BUILD BUD LINE
                                       ADDITEM BUD.AAT BUD.AAT LP-BGD 4 4 I
                                       ADDITEM BUD.AAT BUD.AAT RP-BGD 4 4 I
                                            INFO
```

```
                                        SEL BUD.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL BUD.PAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO - 1

                                        Q STOP
                                        CREATELABELS BUD 0
                                        IDEDIT BUD POLY
                                        INFO
                                        SEL BUD.AAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO
                                        Q STOP
                                        IDEDIT BUD LINE
/*
                    INFO
                    SEL BUD.AAT
                    RELATE BUD.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE BUD.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL BUD.AAT
                    RES LP-G = 52 AND RP-G = 52
                    RES LP-B = RP-B
                    NSEL
                    CALC BUD-ID = -1
                    Q STOP
                    IDEDIT BUD LINE
/*
ELIMINATE BUD LOU NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 52

N
N
/*
```

```
KILL BUD
/*
/* ****************************************************************
/*
/*         ROCKY FLATS GROUP OF UNCONSOLIDATED AQUIFERS
/*
                                          BUILD LOU LINE
                                     ADDITEM LOU.AAT LOU.AAT LP-BGD 4 4 I
                                     ADDITEM LOU.AAT LOU.AAT RP-BGD 4 4 I
                                          INFO
                                          SEL LOU.AAT
                                          REDEFINE
                                          29,LP-B,1,1,I
                                          30,LP-G,2,2,I
                                          32,LP-D,1,1,I
                                          33,RP-B,1,1,I
                                          34,RP-G,2,2,I
                                          36,RP-D,1,1,I

                                          IT

                                          Q STOP
/*
                                          INFO
                                          SEL LOU.PAT
                                          SORT LOU#
                                          CALC LOU-ID = $RECNO - 1
                                          Q STOP
                                          CREATELABELS LOU 0
                                          IDEDIT LOU POLY
                                          INFO
                                          SEL LOU.AAT
                                          SORT LOU#
                                          CALC LOU-ID = $RECNO
                                          Q STOP
                                          IDEDIT LOU LINE
/*
                    INFO
                    SEL LOU.AAT
                    RELATE LOU.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LOU.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL LOU.AAT
                    RES LP-G = 57 AND RP-G = 57
                    RES LP-B = RP-B
                    NSEL
```

```
                    CALC LOU-ID = -1
                    Q STOP
                    IDEDIT LOU LINE
/*
ELIMINATE LOU BUD NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 57

N
N
/*
KILL LOU
/*
/* *******************************************************************
/*
/*        BEDROCK UNITS - FROM THE TOP DOWN
/*
/* *******************************************************************
/*
/*        DAWSON - WITH OVERLYING LOESS
/*
                                        BUILD BUD LINE
                                   ADDITEM BUD.AAT BUD.AAT LP-BGD 4 4 I
                                   ADDITEM BUD.AAT BUD.AAT RP-BGD 4 4 I
                                        INFO

                                        SEL BUD.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL BUD.PAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS BUD 0
                                        IDEDIT BUD POLY
                                        INFO
                                        SEL BUD.AAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO
                                        Q STOP
                                        IDEDIT BUD LINE
```

```
/*
                    INFO
                    SEL BUD.AAT
                    RELATE BUD.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE BUD.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL BUD.AAT
                    RES LP-G = 39 AND RP-G = 39
                    RES LP-B = RP-B
                    NSEL
                    CALC BUD-ID = -1
                    Q STOP
                    IDEDIT BUD LINE
/*
ELIMINATE BUD LOU NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 39

N
N
/*
KILL BUD
/*
/* *****************************************************************
/*

/*         DENVER - WITH OVERLYING LOESS
/*
                                        BUILD LOU LINE
                                   ADDITEM LOU.AAT LOU.AAT LP-BGD 4 4 I
                                   ADDITEM LOU.AAT LOU.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LOU.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL LOU.PAT
                                        SORT LOU#
```

```
                                        CALC LOU-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LOU 0
                                        IDEDIT LOU POLY
                                        INFO
                                        SEL LOU.AAT
                                        SORT LOU#
                                        CALC LOU-ID = $RECNO
                                        Q STOP
                                        IDEDIT LOU LINE
/*
                    INFO
                    SEL LOU.AAT
                    RELATE LOU.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LOU.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL LOU.AAT
                    RES LP-G = 38 AND RP-G = 38
                    RES LP-B = RP-B
                    NSEL
                    CALC LOU-ID = -1
                    Q STOP
                    IDEDIT LOU LINE
/*
ELIMINATE LOU BUD NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 38

N

N
/*
KILL LOU
/*
/* *******************************************************************
/*
/*        ARAPAHOE - WITH OVERLYING LOESS
/*
                                             BUILD BUD LINE
                                        ADDITEM BUD.AAT BUD.AAT LP-BGD 4 4 I
                                        ADDITEM BUD.AAT BUD.AAT RP-BGD 4 4 I
                                             INFO
                                             SEL BUD.AAT
                                             REDEFINE
                                             29,LP-B,1,1,I
                                             30,LP-G,2,2,I
                                             32,LP-D,1,1,I
```

```
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL BUD.PAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS BUD 0
                                        IDEDIT BUD POLY
                                        INFO
                                        SEL BUD.AAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO
                                        Q STOP
                                        IDEDIT BUD LINE
/*
                    INFO
                    SEL BUD.AAT
                    RELATE BUD.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE BUD.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL BUD.AAT
                    RES LP-G = 37 AND RP-G = 37
                    RES LP-B = RP-B
                    NSEL
                    CALC BUD-ID = -1
                    Q STOP

                    IDEDIT BUD LINE
/*
ELIMINATE BUD LOU NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 37

N
N
/*
KILL BUD
/*
/* ******************************************************************
/*
/*        LARAMIE - WITH OVERLYING LOESS
```

```
/*
                                        BUILD LOU LINE
                                   ADDITEM LOU.AAT LOU.AAT LP-BGD 4 4 I
                                   ADDITEM LOU.AAT LOU.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LOU.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL LOU.PAT
                                        SORT LOU#
                                        CALC LOU-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LOU 0
                                        IDEDIT LOU POLY
                                        INFO
                                        SEL LOU.AAT
                                        SORT LOU#
                                        CALC LOU-ID = $RECNO
                                        Q STOP
                                        IDEDIT LOU LINE
/*
                    INFO
                    SEL LOU.AAT
                    RELATE LOU.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LOU.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO

                    SEL LOU.AAT
                    RES LP-G = 36 AND RP-G = 36
                    RES LP-B = RP-B
                    NSEL
                    CALC LOU-ID = -1
                    Q STOP
                    IDEDIT LOU LINE
/*
ELIMINATE LOU BUD NOKEEPEDGE POLY
```

```
RES AREA LT 404700 AND G = 36

N
N
/*
KILL LOU
/*
/* *******************************************************************
/*
/*        LARAMIE-FOX HILLS - WITH OVERLYING LOESS
/*
                                            BUILD BUD LINE
                                       ADDITEM BUD.AAT BUD.AAT LP-BGD 4 4 I
                                       ADDITEM BUD.AAT BUD.AAT RP-BGD 4 4 I
                                            INFO
                                            SEL BUD.AAT
                                            REDEFINE
                                            29,LP-B,1,1,I
                                            30,LP-G,2,2,I
                                            32,LP-D,1,1,I
                                            33,RP-B,1,1,I
                                            34,RP-G,2,2,I
                                            36,RP-D,1,1,I

                                            IT
                                            Q STOP
/*
                                            INFO
                                            SEL BUD.PAT
                                            SORT BUD#
                                            CALC BUD-ID = $RECNO - 1
                                            Q STOP
                                            CREATELABELS BUD 0
                                            IDEDIT BUD POLY
                                            INFO
                                            SEL BUD.AAT
                                            SORT BUD#
                                            CALC BUD-ID = $RECNO
                                            Q STOP
                                            IDEDIT BUD LINE
/*
                        INFO
                        SEL BUD.AAT
                        RELATE BUD.PAT BY LPOLY# LINK

                        CALC LP-BGD = $1BGD-CODE
                        RELATE BUD.PAT BY RPOLY# LINK
                        CALC RP-BGD = $1BGD-CODE
                        Q STOP
/*
```

```
                    INFO
                    SEL BUD.AAT
                    RES LP-G = 35 AND RP-G = 35
                    RES LP-B = RP-B
                    NSEL
                    CALC BUD-ID = -1
                    Q STOP
                    IDEDIT BUD LINE
/*
ELIMINATE BUD LOU NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 35

N
N
/*
KILL BUD
/*
/* ****************************************************************
/*
/*         ARAPAHOE IN MOUNTAIN FLANKS - WITH OVERLYING LOESS
/*
                                        BUILD LOU LINE
                                   ADDITEM LOU.AAT LOU.AAT LP-BGD 4 4 I
                                   ADDITEM LOU.AAT LOU.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LOU.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL LOU.PAT
                                        SORT LOU#
                                        CALC LOU-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LOU 0
                                        IDEDIT LOU POLY
                                        INFO
                                        SEL LOU.AAT
                                        SORT LOU#
                                        CALC LOU-ID = $RECNO

                                        Q STOP
```

```
                                        IDEDIT LOU LINE
/*
                    INFO
                    SEL LOU.AAT
                    RELATE LOU.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LOU.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL LOU.AAT
                    RES LP-G = 33 AND RP-G = 33
                    RES LP-B = RP-B
                    NSEL
                    CALC LOU-ID = -1
                    Q STOP
                    IDEDIT LOU LINE
/*
ELIMINATE LOU BUD NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 33

N
N
/*
KILL LOU
/*
/* ********************************************************************
/*
/*        ARAPAHOE IN MOUNTAIN FLANKS - WITH OVERLYING LOESS
/*
                                        BUILD BUD LINE
                                   ADDITEM BUD.AAT BUD.AAT LP-BGD 4 4 I
                                   ADDITEM BUD.AAT BUD.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL BUD.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL BUD.PAT
                                        SORT BUD#
```

```
                                        CALC BUD-ID = $RECNO - 1
                                        Q STOP

                                        CREATELABELS BUD 0
                                        IDEDIT BUD POLY
                                        INFO
                                        SEL BUD.AAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO
                                        Q STOP
                                        IDEDIT BUD LINE
/*
                    INFO
                    SEL BUD.AAT
                    RELATE BUD.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE BUD.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL BUD.AAT
                    RES LP-G = 32 AND RP-G = 32
                    RES LP-B = RP-B
                    NSEL
                    CALC BUD-ID = -1
                    Q STOP
                    IDEDIT BUD LINE
/*
ELIMINATE BUD LOU NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 32

N
N
/*
KILL BUD
/*
/* *****************************************************************
/*
/*         DAWSON
/*
                                        BUILD LOU LINE
                                   ADDITEM LOU.AAT LOU.AAT LP-BGD 4 4 I
                                   ADDITEM LOU.AAT LOU.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LOU.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
```

```
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP

/*
                                        INFO
                                        SEL LOU.PAT
                                        SORT LOU#
                                        CALC LOU-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LOU 0
                                        IDEDIT LOU POLY
                                        INFO
                                        SEL LOU.AAT
                                        SORT LOU#
                                        CALC LOU-ID = $RECNO
                                        Q STOP
                                        IDEDIT LOU LINE
/*
                    INFO
                    SEL LOU.AAT
                    RELATE LOU.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LOU.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL LOU.AAT
                    RES LP-G = 29 AND RP-G = 29
                    RES LP-B = RP-B
                    NSEL
                    CALC LOU-ID = -1
                    Q STOP
                    IDEDIT LOU LINE
/*
ELIMINATE LOU BUD NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 29

N
N
/*
KILL LOU
/*
/* ********************************************************************
/*
/*        DENVER
```

```
/*
                                        BUILD BUD LINE
                                   ADDITEM BUD.AAT BUD.AAT LP-BGD 4 4 I
                                   ADDITEM BUD.AAT BUD.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL BUD.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I

                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL BUD.PAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS BUD 0
                                        IDEDIT BUD POLY
                                        INFO
                                        SEL BUD.AAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO
                                        Q STOP
                                        IDEDIT BUD LINE
/*
                    INFO
                    SEL BUD.AAT
                    RELATE BUD.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE BUD.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL BUD.AAT
                    RES LP-G = 28 AND RP-G = 28
                    RES LP-B = RP-B
                    NSEL
                    CALC BUD-ID = -1
                    Q STOP
                    IDEDIT BUD LINE
/*
ELIMINATE BUD LOU NOKEEPEDGE POLY
```

```
RES AREA LT 404700 AND G = 28

N
N
/*
KILL BUD
/*
/* ****************************************************************
/*
/*         ARAPAHOE
/*
                                                     BUILD LOU LINE
                                              ADDITEM LOU.AAT LOU.AAT LP-BGD 4 4 I
                                              ADDITEM LOU.AAT LOU.AAT RP-BGD 4 4 I

                                                     INFO
                                                     SEL LOU.AAT
                                                     REDEFINE
                                                     29,LP-B,1,1,I
                                                     30,LP-G,2,2,I
                                                     32,LP-D,1,1,I
                                                     33,RP-B,1,1,I
                                                     34,RP-G,2,2,I
                                                     36,RP-D,1,1,I

                                                     IT
                                                     Q STOP
/*
                                                     INFO
                                                     SEL LOU.PAT
                                                     SORT LOU#
                                                     CALC LOU-ID = $RECNO - 1
                                                     Q STOP
                                                     CREATELABELS LOU 0
                                                     IDEDIT LOU POLY
                                                     INFO
                                                     SEL LOU.AAT
                                                     SORT LOU#
                                                     CALC LOU-ID = $RECNO
                                                     Q STOP
                                                     IDEDIT LOU LINE
/*
                    INFO
                    SEL LOU.AAT
                    RELATE LOU.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LOU.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
```

```
                    INFO
                    SEL LOU.AAT
                    RES LP-G = 27 AND RP-G = 27
                    RES LP-B = RP-B
                    NSEL
                    CALC LOU-ID = -1
                    Q STOP
                    IDEDIT LOU LINE
/*
ELIMINATE LOU BUD NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 27

N
N
/*
KILL LOU
/*
/* ********************************************************************

/*
/*        LARAMIE
/*
                                        BUILD BUD LINE
                                   ADDITEM BUD.AAT BUD.AAT LP-BGD 4 4 I
                                   ADDITEM BUD.AAT BUD.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL BUD.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL BUD.PAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS BUD 0
                                        IDEDIT BUD POLY
                                        INFO
                                        SEL BUD.AAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO
                                        Q STOP
```

```
                                        IDEDIT BUD LINE
/*
                    INFO
                    SEL BUD.AAT
                    RELATE BUD.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE BUD.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL BUD.AAT
                    RES LP-G = 26 AND RP-G = 26
                    RES LP-B = RP-B
                    NSEL
                    CALC BUD-ID = -1
                    Q STOP
                    IDEDIT BUD LINE
/*
ELIMINATE BUD LOU NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 26


N
N
/*
KILL BUD
/*
/* ****************************************************************
/*
/*         LARAMIE-FOX HILLS
/*
                                        BUILD LOU LINE
                                   ADDITEM LOU.AAT LOU.AAT LP-BGD 4 4 I
                                   ADDITEM LOU.AAT LOU.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LOU.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL LOU.PAT
```

```
                                        SORT LOU#
                                        CALC LOU-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LOU 0
                                        IDEDIT LOU POLY
                                        INFO
                                        SEL LOU.AAT
                                        SORT LOU#
                                        CALC LOU-ID = $RECNO
                                        Q STOP
                                        IDEDIT LOU LINE
/*
                    INFO
                    SEL LOU.AAT
                    RELATE LOU.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LOU.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL LOU.AAT
                    RES LP-G = 25 AND RP-G = 25
                    RES LP-B = RP-B
                    NSEL
                    CALC LOU-ID = -1

                    Q STOP
                    IDEDIT LOU LINE
/*
ELIMINATE LOU BUD NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 25

N
N
/*
KILL LOU
/*
/* ********************************************************************
/*
/*       FOX HILLS-PIERRE
/*
                                        BUILD BUD LINE
                                   ADDITEM BUD.AAT BUD.AAT LP-BGD 4 4 I
                                   ADDITEM BUD.AAT BUD.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL BUD.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
```

```
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL BUD.PAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS BUD 0
                                        IDEDIT BUD POLY
                                        INFO
                                        SEL BUD.AAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO
                                        Q STOP
                                        IDEDIT BUD LINE
/*
                    INFO
                    SEL BUD.AAT
                    RELATE BUD.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE BUD.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*

                    INFO
                    SEL BUD.AAT
                    RES LP-G = 24 AND RP-G = 24
                    RES LP-B = RP-B
                    NSEL
                    CALC BUD-ID = -1
                    Q STOP
                    IDEDIT BUD LINE
/*
ELIMINATE BUD LOU NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 24

N
N
/*
KILL BUD
/*
/* ****************************************************************
/*
```

```
/*          MOUNTAIN FLANKS BEDROCK NOT OVERLAIN WITH LOESS
/*
/* *****************************************************************
/*
/*          ARAPAHOE
/*
                                                  BUILD LOU LINE
                                             ADDITEM LOU.AAT LOU.AAT LP-BGD 4 4 I
                                             ADDITEM LOU.AAT LOU.AAT RP-BGD 4 4 I
                                                  INFO
                                                  SEL LOU.AAT
                                                  REDEFINE
                                                  29,LP-B,1,1,I
                                                  30,LP-G,2,2,I
                                                  32,LP-D,1,1,I
                                                  33,RP-B,1,1,I
                                                  34,RP-G,2,2,I
                                                  36,RP-D,1,1,I

                                                  IT
                                                  Q STOP
/*
                                                  INFO
                                                  SEL LOU.PAT
                                                  SORT LOU#
                                                  CALC LOU-ID = $RECNO - 1
                                                  Q STOP
                                                  CREATELABELS LOU 0
                                                  IDEDIT LOU POLY
                                                  INFO
                                                  SEL LOU.AAT
                                                  SORT LOU#
                                                  CALC LOU-ID = $RECNO
                                                  Q STOP

                                                  IDEDIT LOU LINE
/*
                              INFO
                              SEL LOU.AAT
                              RELATE LOU.PAT BY LPOLY# LINK
                              CALC LP-BGD = $1BGD-CODE
                              RELATE LOU.PAT BY RPOLY# LINK
                              CALC RP-BGD = $1BGD-CODE
                              Q STOP
/*
                              INFO
                              SEL LOU.AAT
                              RES LP-G = 23 AND RP-G = 23
                              RES LP-B = RP-B
                              NSEL
```

```
                    CALC LOU-ID = -1
                    Q STOP
                    IDEDIT LOU LINE
/*
ELIMINATE LOU BUD NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 23

N
N
/*
KILL LOU
/*
/* *******************************************************************
/*
/*         LARAMIE-FOX HILLS
/*
                                          BUILD BUD LINE
                                     ADDITEM BUD.AAT BUD.AAT LP-BGD 4 4 I
                                     ADDITEM BUD.AAT BUD.AAT RP-BGD 4 4 I
                                          INFO
                                          SEL BUD.AAT
                                          REDEFINE
                                          29,LP-B,1,1,I
                                          30,LP-G,2,2,I
                                          32,LP-D,1,1,I
                                          33,RP-B,1,1,I
                                          34,RP-G,2,2,I
                                          36,RP-D,1,1,I

                                          IT
                                          Q STOP
/*
                                          INFO
                                          SEL BUD.PAT
                                          SORT BUD#
                                          CALC BUD-ID = $RECNO - 1
                                          Q STOP
                                          CREATELABELS BUD 0

                                          IDEDIT BUD POLY
                                          INFO
                                          SEL BUD.AAT
                                          SORT BUD#
                                          CALC BUD-ID = $RECNO
                                          Q STOP
                                          IDEDIT BUD LINE
/*
                    INFO
                    SEL BUD.AAT
                    RELATE BUD.PAT BY LPOLY# LINK
```

```
                    CALC LP-BGD = $1BGD-CODE
                    RELATE BUD.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL BUD.AAT
                    RES LP-G = 22 AND RP-G = 22
                    RES LP-B = RP-B
                    NSEL
                    CALC BUD-ID = -1
                    Q STOP
                    IDEDIT BUD LINE
/*
ELIMINATE BUD LOU NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 22

N
N
/*
KILL BUD
/*
/* *****************************************************************
/*
/*        PIERRE - HYGIENE AND BELOW
/*
                                        BUILD LOU LINE
                                   ADDITEM LOU.AAT LOU.AAT LP-BGD 4 4 I
                                   ADDITEM LOU.AAT LOU.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LOU.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*

                                        INFO
                                        SEL LOU.PAT
                                        SORT LOU#
                                        CALC LOU-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LOU 0
                                        IDEDIT LOU POLY
```

```
                                          INFO
                                          SEL LOU.AAT
                                          SORT LOU#
                                          CALC LOU-ID = $RECNO
                                          Q STOP
                                          IDEDIT LOU LINE
/*
                    INFO
                    SEL LOU.AAT
                    RELATE LOU.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LOU.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL LOU.AAT
                    RES LP-G = 12 AND RP-G = 12
                    RES LP-B = RP-B
                    NSEL
                    CALC LOU-ID = -1
                    Q STOP
                    IDEDIT LOU LINE
/*
ELIMINATE LOU BUD NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 12

N
N
/*
KILL LOU
/*
/* ********************************************************************
/*
/*        FOUNTAIN-TO-DAKOTA GROUPING
/*
                                          BUILD BUD LINE
                                     ADDITEM BUD.AAT BUD.AAT LP-BGD 4 4 I
                                     ADDITEM BUD.AAT BUD.AAT RP-BGD 4 4 I
                                          INFO
                                          SEL BUD.AAT
                                          REDEFINE
                                          29,LP-B,1,1,I
                                          30,LP-G,2,2,I
                                          32,LP-D,1,1,I
                                          33,RP-B,1,1,I

                                          34,RP-G,2,2,I
                                          36,RP-D,1,1,I
```

```
                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL BUD.PAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS BUD 0
                                        IDEDIT BUD POLY
                                        INFO
                                        SEL BUD.AAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO
                                        Q STOP
                                        IDEDIT BUD LINE
/*
                    INFO
                    SEL BUD.AAT
                    RELATE BUD.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE BUD.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL BUD.AAT
                    RES LP-G = 13 AND RP-G = 13
                    RES LP-B = RP-B
                    NSEL
                    CALC BUD-ID = -1
                    Q STOP
                    IDEDIT BUD LINE
/*
ELIMINATE BUD LOU NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 13

N
N
/*
KILL BUD
/*
/* *****************************************************************
/*
/*        MOUNTAIN AREA
/*
/* *****************************************************************
/*
/*        MOUNTAIN VALLEYS - RIVER ALLUVIUM
/*
```

```
                                        BUILD LOU LINE
                                   ADDITEM LOU.AAT LOU.AAT LP-BGD 4 4 I
                                   ADDITEM LOU.AAT LOU.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LOU.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL LOU.PAT
                                        SORT LOU#
                                        CALC LOU-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LOU 0
                                        IDEDIT LOU POLY
                                        INFO
                                        SEL LOU.AAT
                                        SORT LOU#
                                        CALC LOU-ID = $RECNO
                                        Q STOP
                                        IDEDIT LOU LINE
/*
                    INFO
                    SEL LOU.AAT
                    RELATE LOU.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LOU.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
                    SEL LOU.AAT
                    RES LP-G = 59 AND RP-G = 59
                    RES LP-B = RP-B
                    NSEL
                    CALC LOU-ID = -1
                    Q STOP
                    IDEDIT LOU LINE
/*
ELIMINATE LOU BUD NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 59
```

```
N
N
/*

KILL LOU
/*
/* *********************************************************************
/*
/*        MOUNTAIN SLOPES - PRECAMBRIAM GROUP
/*
                                        BUILD BUD LINE
                                   ADDITEM BUD.AAT BUD.AAT LP-BGD 4 4 I
                                   ADDITEM BUD.AAT BUD.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL BUD.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL BUD.PAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS BUD 0
                                        IDEDIT BUD POLY
                                        INFO
                                        SEL BUD.AAT
                                        SORT BUD#
                                        CALC BUD-ID = $RECNO
                                        Q STOP
                                        IDEDIT BUD LINE
/*
                    INFO
                    SEL BUD.AAT
                    RELATE BUD.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE BUD.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
                    INFO
```

```
                    SEL BUD.AAT
                    RES LP-G = 14 AND RP-G = 14
                    RES LP-B = RP-B
                    NSEL
                    CALC BUD-ID = -1
                    Q STOP
                    IDEDIT BUD LINE
/*

ELIMINATE BUD XBGD1 NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 14

N
N
/*
KILL BUD
/*
/* *******************************************************************
/*
/*
/* *******************************************************************
/*
/*        DO SOME HOUSEKEEPING
/*        DO A SETUP ON XBGD1
/*        AND INDEXITEM G FOR SPEED OF PLOTS
/*
/*
                                        BUILD XBGD1 LINE
                                   ADDITEM XBGD1.AAT XBGD1.AAT LP-BGD 4 4 I
                                   ADDITEM XBGD1.AAT XBGD1.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL XBGD1.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        IT
                                        Q STOP
/*
                                        INFO
                                        SEL XBGD1.PAT
                                        SORT XBGD1#
                                        CALC XBGD1-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS XBGD1 0
                                        IDEDIT XBGD1 POLY
```

```
                                        INFO
                                        SEL XBGD1.AAT
                                        SORT XBGD1#
                                        CALC XBGD1-ID = $RECNO
                                        Q STOP
                                        IDEDIT XBGD1 LINE
/*
                    INFO
                    SEL XBGD1.AAT
                    RELATE XBGD1.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE XBGD1.PAT BY RPOLY# LINK

                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
DATE
TIME
COMO -E
LOGOUT
```

```
/*      COMMAND FILE 7--MERGE POLYGONS IDENTIFIED AS COLLUVIUM WITH ADJACENT
/*      POLYGONS
/*
/*
/*      FILE NAME IS XQCO.COMI
/*
DELETE XQCO.COMO
COMO XQCO.COMO
/*
/*      ASSIGNS COLLUVIUM (G = 51)  SEQUENTIALLY
/*      TO LOESS OVERLYING DAWSON
/*         ROCKY FLATS GROUP
/*         LOESS OVERLYING OTHER BEDROCK
/*         SATURATED LOESS
/*         RIVER ALLUVIUM
/*
/*
/*      STARTS WITH COVER NAMED LARRY AND RESULTS IN COVER XBGD2
/*      LARRY IS A COPY OF XBGD1
/*
/*      WORK FILES ARE CURLY, MOE, AND LARRY
/*
DATE
TIME
/*
/*
/*
/*
/* ********************************************************************
/*
/*      UNSATURATED LOESS OVERLYING DAWSON
/*
                    /*      CONDITION FILES FOR PROCESSING BY ASSURING
                    /*      THAT THE -ID ARE IN AGREEMENT
                    /*
ARC
                    INFO
                      SEL LARRY.PAT
                      SORT LARRY#
                      CALC LARRY-ID = $RECNO - 1
                    Q STOP
                    CREATELABELS LARRY 0
                    IDEDIT LARRY POLY
                    INFO
                      SEL LARRY.AAT
                      SORT LARRY#
                      CALC LARRY-ID = $RECNO
                    Q STOP
                    IDEDIT LARRY LINE
          /*
```

```
          /*      FOR THE COVER LARRY KEEP POLYS
          /*      WITH G = 51 FROM BEING COMBINED WITH
          /*      ANY POLY OTHER THAN THOSE WITH G = 39

          /*      THAT ARE IN AREAS WITH EQUAL B VALUES
          /*
          /*
          /*
          /*      MOVE THE NEW CODES FROM THE PAT TO THE AAT
          /*
               /*
               /*      SET THE CURRENT VALUES OF BGD-CODE FROM
               /*      THE PAT INTO THE AAT - FOR BOTH LEFT (LP-BGD)
               /*      AND RIGHT (RP-BGD) POLYGONS.
               /*
               INFO
                 SEL LARRY.AAT
                 RELATE LARRY.PAT BY LPOLY# LINK
                 CALC LP-BGD = $1BGD-CODE
                 RELATE LARRY.PAT BY RPOLY# LINK
                 CALC RP-BGD = $1BGD-CODE
               Q STOP
          /*
          /*      NOW PROTECT WITH LARRY-ID = -1
          /*
          INFO
            SEL LARRY.AAT
            RES LP-G = 51 AND RP-G = 39
            ASEL LP-G = 39 AND RP-G = 51
            ASEL LP-G = 51 AND RP-G = 51
            RES LP-B = RP-B
            NSEL
            CALC LARRY-ID = -1
          Q STOP
          IDEDIT LARRY LINE
ELIMINATE LARRY CURLY KEEPEDGE POLY
RES G = 51

N
N
KILL LARRY
/*
/* ******************************************************************
/*
/*      ROCKY FLATS GROUP OF UNCONSOLIDATED AQUIFERS
/*
                    /*
                    /*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
```

```
        BUILD CURLY LINE
        ADDITEM CURLY.AAT CURLY.AAT LP-BGD 4 4 I
        ADDITEM CURLY.AAT CURLY.AAT RP-BGD 4 4 I
        INFO
        SEL CURLY.AAT
        REDEFINE
          29,LP-B,1,1,I

          30,LP-G,2,2,I
          32,LP-D,1,1,I
          33,RP-B,1,1,I
          34,RP-G,2,2,I
          36,RP-D,1,1,I

        IT
        Q STOP
        /*
        /*      CONDITION FILES FOR PROCESSING BY ASSURING
        /*      THAT THE -ID ARE IN AGREEMENT
        /*
        INFO
          SEL CURLY.PAT
          SORT CURLY#
          CALC CURLY-ID = $RECNO - 1
        Q STOP
        CREATELABELS CURLY 0
        IDEDIT CURLY POLY
        INFO
          SEL CURLY.AAT
          SORT CURLY#
          CALC CURLY-ID = $RECNO
        Q STOP
        IDEDIT CURLY LINE
/*
/*      FOR THE COVER CURLY KEEP POLYS
/*      WITH G = 51 FROM BEING COMBINED WITH
/*      ANY POLY OTHER THAN THOSE WITH G = 57
/*      THAT ARE IN AREAS WITH EQUAL B VALUES
/*
/*
/*
/*      MOVE THE NEW CODES FROM THE PAT TO THE AAT
/*
     /*
     /*      SET THE CURRENT VALUES OF BGD-CODE FROM
     /*      THE PAT INTO THE AAT - FOR BOTH LEFT (LP-BGD)
     /*      AND RIGHT (RP-BGD) POLYGONS.
     /*
     INFO
       SEL CURLY.AAT
```

```
                RELATE CURLY.PAT BY LPOLY# LINK
                CALC LP-BGD = $1BGD-CODE
                RELATE CURLY.PAT BY RPOLY# LINK
                CALC RP-BGD = $1BGD-CODE
              Q STOP
         /*
         /*     NOW PROTECT WITH CURLY-ID = -1
         /*
         INFO
           SEL CURLY.AAT
           RES LP-G = 51 AND RP-G = 57

           ASEL LP-G = 57 AND RP-G = 51
           ASEL LP-G = 51 AND RP-G = 51
           RES LP-B = RP-B
           NSEL
           CALC CURLY-ID = -1
         Q STOP
         IDEDIT CURLY LINE
ELIMINATE CURLY MOE KEEPEDGE POLY
RES G = 51

N
N
KILL CURLY
/*
/* *******************************************************************
/*
/*     UNSATURATED LOESS OVERLYING BEDROCK OTHER THAN DAWSON
/*
                    /*
                    /*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD MOE LINE
                    ADDITEM MOE.AAT MOE.AAT LP-BGD 4 4 I
                    ADDITEM MOE.AAT MOE.AAT RP-BGD 4 4 I
                    INFO
                    SEL MOE.AAT
                    REDEFINE
                      29,LP-B,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,RP-B,1,1,I
                      34,RP-G,2,2,I
                      36,RP-D,1,1,I

                    IT
                    Q STOP
                    /*
```

```
            /*      CONDITION FILES FOR PROCESSING BY ASSURING
            /*      THAT THE -ID ARE IN AGREEMENT
            /*
            INFO
              SEL MOE.PAT
              SORT MOE#
              CALC MOE-ID = $RECNO - 1
            Q STOP
            CREATELABELS MOE 0
            IDEDIT MOE POLY
            INFO
              SEL MOE.AAT
              SORT MOE#
              CALC MOE-ID = $RECNO
            Q STOP

            IDEDIT MOE LINE
/*
/*      FOR THE COVER MOE KEEP POLYS
/*      WITH G = 51 FROM BEING COMBINED WITH
/*      ANY POLY OTHER THAN THOSE WITH G=38,37,36,35,33,32
/*      THAT ARE IN AREAS WITH EQUAL B VALUES
/*
/*
/*
/*      MOVE THE NEW CODES FROM THE PAT TO THE AAT
/*
     /*
     /*      SET THE CURRENT VALUES OF BGD-CODE FROM
     /*      THE PAT INTO THE AAT - FOR BOTH LEFT (LP-BGD)
     /*      AND RIGHT (RP-BGD) POLYGONS.
     /*
     INFO
       SEL MOE.AAT
       RELATE MOE.PAT BY LPOLY# LINK
       CALC LP-BGD = $1BGD-CODE
       RELATE MOE.PAT BY RPOLY# LINK
       CALC RP-BGD = $1BGD-CODE
     Q STOP
/*
/*      NOW PROTECT WITH MOE-ID = -1
/*
INFO
  SEL MOE.AAT
  RES LP-G = 51 AND RP-G = 38
  ASEL LP-G = 38 AND RP-G = 51
  ASEL LP-G = 51 AND RP-G = 37
  ASEL LP-G = 37 AND RP-G = 51
  ASEL LP-G = 51 AND RP-G = 36
  ASEL LP-G = 36 AND RP-G = 51
```

```
          ASEL LP-G = 51 AND RP-G = 35
          ASEL LP-G = 35 AND RP-G = 51
          ASEL LP-G = 51 AND RP-G = 33
          ASEL LP-G = 33 AND RP-G = 51
          ASEL LP-G = 51 AND RP-G = 32
          ASEL LP-G = 32 AND RP-G = 51
            ASEL LP-G = 51 AND RP-G = 51
            RES LP-B = RP-B
            NSEL
            CALC MOE-ID = -1
          Q STOP
          IDEDIT MOE LINE
ELIMINATE MOE LARRY KEEPEDGE POLY
RES G = 51

N
N
KILL MOE
/*

/* ***************************************************************
/*
/*      SATURATED LOESS
/*
                    /*
                    /*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD LARRY LINE
                    ADDITEM LARRY.AAT LARRY.AAT LP-BGD 4 4 I
                    ADDITEM LARRY.AAT LARRY.AAT RP-BGD 4 4 I
                    INFO
                    SEL LARRY.AAT
                    REDEFINE
                      29,LP-B,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,RP-B,1,1,I
                      34,RP-G,2,2,I
                      36,RP-D,1,1,I

                    IT
                    Q STOP
                    /*
                    /*      CONDITION FILES FOR PROCESSING BY ASSURING
                    /*      THAT THE -ID ARE IN AGREEMENT
                    /*
                    INFO
                      SEL LARRY.PAT
                      SORT LARRY#
```

```
                    CALC LARRY-ID = $RECNO - 1
                  Q STOP
                  CREATELABELS LARRY 0
                  IDEDIT LARRY POLY
                  INFO
                    SEL LARRY.AAT
                    SORT LARRY#
                    CALC LARRY-ID = $RECNO
                  Q STOP
                  IDEDIT LARRY LINE
        /*
        /*     FOR THE COVER LARRY KEEP POLYS
        /*     WITH G = 51 FROM BEING COMBINED WITH
        /*     ANY POLY OTHER THAN THOSE WITH G = 52
        /*     THAT ARE IN AREAS WITH EQUAL VALUES OF B
        /*
        /*
        /*
        /*     MOVE THE NEW CODES FROM THE PAT TO THE AAT
        /*
             /*
             /*     SET THE CURRENT VALUES OF BGD-CODE FROM
             /*     THE PAT INTO THE AAT - FOR BOTH LEFT (LP-BGD)

             /*     AND RIGHT (RP-BGD) POLYGONS.
             /*
             INFO
               SEL LARRY.AAT
               RELATE LARRY.PAT BY LPOLY# LINK
               CALC LP-BGD = $1BGD-CODE
               RELATE LARRY.PAT BY RPOLY# LINK
               CALC RP-BGD = $1BGD-CODE
             Q STOP
        /*
        /*     NOW PROTECT WITH LARRY-ID = -1
        /*
        INFO
          SEL LARRY.AAT
          RES LP-G = 51 AND RP-G = 52
          ASEL LP-G = 52 AND RP-G = 51
          ASEL LP-G = 51 AND RP-G = 51
          RES LP-B = RP-B
          NSEL
          CALC LARRY-ID = -1
        Q STOP
        IDEDIT LARRY LINE
ELIMINATE LARRY CURLY KEEPEDGE POLY
RES G = 51

N
```

```
N
KILL LARRY
/*
/* ******************************************************************
/*
/*     RIVER ALLUVIUM
/*
/*
/*     SATURATED LOESS
/*
                    /*
                    /*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD CURLY LINE
                    ADDITEM CURLY.AAT CURLY.AAT LP-BGD 4 4 I
                    ADDITEM CURLY.AAT CURLY.AAT RP-BGD 4 4 I
                    INFO
                    SEL CURLY.AAT
                    REDEFINE
                      29,LP-B,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,RP-B,1,1,I
                      34,RP-G,2,2,I
                      36,RP-D,1,1,I


                    IT
                    Q STOP
                    /*
                    /*     CONDITION FILES FOR PROCESSING BY ASSURING
                    /*     THAT THE -ID ARE IN AGREEMENT
                    /*
                    INFO
                      SEL CURLY.PAT
                      SORT CURLY#
                      CALC CURLY-ID = $RECNO - 1
                    Q STOP
                    CREATELABELS CURLY 0
                    IDEDIT CURLY POLY
                    INFO
                      SEL CURLY.AAT
                      SORT CURLY#
                      CALC CURLY-ID = $RECNO
                    Q STOP
                    IDEDIT CURLY LINE
          /*
          /*     FOR THE COVER CURLY KEEP POLYS
          /*     WITH G = 51 FROM BEING COMBINED WITH
```

```
          /*      ANY POLY OTHER THAN THOSE WITH G = 55
          /*      THAT ARE IN AREAS WITH EQUAL VALUES OF B
          /*
          /*
          /*
          /*      MOVE THE NEW CODES FROM THE PAT TO THE AAT
          /*
               /*
               /*      SET THE CURRENT VALUES OF BGD-CODE FROM
               /*      THE PAT INTO THE AAT - FOR BOTH LEFT (LP-BGD)
               /*      AND RIGHT (RP-BGD) POLYGONS.
               /*
               INFO
                 SEL CURLY.AAT
                 RELATE CURLY.PAT BY LPOLY# LINK
                 CALC LP-BGD = $1BGD-CODE
                 RELATE CURLY.PAT BY RPOLY# LINK
                 CALC RP-BGD = $1BGD-CODE
               Q STOP
          /*
          /*      NOW PROTECT WITH CURLY-ID = -1
          /*
          INFO
            SEL CURLY.AAT
            RES LP-G = 51 AND RP-G = 55
            ASEL LP-G = 55 AND RP-G = 51
            ASEL LP-G = 51 AND RP-G = 51
            RES LP-B = RP-B
            NSEL
            CALC CURLY-ID = -1
          Q STOP

          IDEDIT CURLY LINE
ELIMINATE CURLY MOE KEEPEDGE POLY
RES G = 51

N
N
/*
KILL CURLY
/*
/*      COPY MOE TO XBGD2 AND SAVE MOE AS A TEMPORARY BACKUP
/*
COPY MOE XBGD2
/*
/*
/* ************************************************************
/*
/*      CLEAN UP AND INDEX
                    /*
```

```
          /*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
          /*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS
          /*
          BUILD XBGD2 LINE
          ADDITEM XBGD2.AAT XBGD2.AAT LP-BGD 4 4 I
          ADDITEM XBGD2.AAT XBGD2.AAT RP-BGD 4 4 I
          INFO
          SEL XBGD2.AAT
          REDEFINE
            29,LP-B,1,1,I
            30,LP-G,2,2,I
            32,LP-D,1,1,I
            33,RP-B,1,1,I
            34,RP-G,2,2,I
            36,RP-D,1,1,I

          IT
          Q STOP
          /*
          /*      CONDITION FILES FOR PROCESSING BY ASSURING
          /*      THAT THE -ID ARE IN AGREEMENT
          /*
          INFO
            SEL XBGD2.PAT
            SORT XBGD2#
            CALC XBGD2-ID = $RECNO - 1
          Q STOP
          CREATELABELS XBGD2 0
          IDEDIT XBGD2 POLY
          INFO
            SEL XBGD2.AAT
            SORT XBGD2#
            CALC XBGD2-ID = $RECNO
          Q STOP
          IDEDIT XBGD2 LINE

INDEXITEM XBGD2.PAT G
/*
/* *************************************************************
/*
/*      CLOSE OUT COMO AND CONTINUE ON
/*
DATE
TIME
COMO -E
LOGOUT
```

```
/*      COMMAND FILE 8--MERGE SMALL POLYGONS WITH ADJACENT POLYGONS
/*
/*
/*      FILE NAME IS CYCLE.COMI
LATE
1600
DELETE CYCLE.COMO
Y
COMO CYCLE.COMO
/*      COMO FILE NAMED CYCLE.COMO FOR EXECUTION OF CYCLE.COMI
/*
DATE
ARC
/*
/* CLEAR THE DECKS
/*
KILL X2 ALL
KILL X3 ALL
KILL S1 ALL
KILL S2 ALL
KILL S3 ALL
KILL S4 ALL
KILL S5 ALL
KILL S6 ALL
KILL S7 ALL
KILL S8 ALL
KILL LR1 ALL
KILL LR2 ALL
KILL LR3 ALL
KILL LR4 ALL
KILL LR5 ALL
KILL LR6 ALL
KILL LR7 ALL
KILL LR8 ALL
KILL LR9 ALL
KILL BIGA ALL
KILL BIGB ALL
KILL XX3 ALL
KILL XLR1 ALL
KILL XLR2 ALL
KILL XLR3 ALL
KILL XLR4 ALL
KILL XLR5 ALL
KILL XLR6 ALL
KILL XLR7 ALL
KILL XLR8 ALL
KILL XLR9 ALL
KILL XS1 ALL
KILL XS2 ALL
KILL XS3 ALL
```

```
KILL XS4 ALL
KILL XS5 ALL
KILL XS6 ALL

KILL XS7 ALL
KILL XS8 ALL
/*
/* ******************************************************************
/* ******************************************************************
/*
/* REASSIGNS BGD-CODE VALUES IN X2.PAT
/* TO BE CONSISTENT WITH A VARIETY OF ASSUMPTIONS
/*
/* AND PROCESS TO ELIMINATE SMALL POLYGONS
/*
/* MAJOR SEGMENTS ARE DIVIDED BY ONE OR MORE LINE OF ASTERISKS
/*
/* ******************************************************************
/* ******************************************************************
/*
COPY XBGD2 X2
                    /*     CONDITION FILES FOR PROCESSING BY ASSURING
                    /*     THAT THE -ID ARE IN AGREEMENT
                    /*
                    INFO
                      SEL X2.PAT
                      SORT X2#
                      CALC X2-ID = $RECNO - 1
                    Q STOP
                    CREATELABELS X2 0
                    IDEDIT X2 POLY
                    INFO
                      SEL X2.AAT
                      SORT X2#
                      CALC X2-ID = $RECNO
                    Q STOP
                    IDEDIT X2 LINE
               /*
               /*     SET THE CURRENT VALUES OF BGD-CODE FROM
               /*     THE PAT INTO THE AAT - FOR BOTH LEFT (LP-BGD)
               /*     AND RIGHT (RP-BGD) POLYGONS.
               /*
               INFO
                 SEL X2.AAT
                 RELATE X2.PAT BY LPOLY# LINK
                 CALC LP-BGD = $1BGD-CODE
                 RELATE X2.PAT BY RPOLY# LINK
                 CALC RP-BGD = $1BGD-CODE
REM
REM ******************************************************************
```

```
REM ********************************************************************
REM
SEL X2.PAT
REM
REM NO DISTINCTION WILL BE MADE BETWEEN THE UNITS OF
REM     FOUNTAIN-TO-DAKOTA AND PIERRE-BELOW-HYGIENE
REM THESE ARE NOW ONE UNIT FOUNTAIN-HYGIENE

REM
REM LARAMIE-FOX HILLS AND ARAPAHOE (OUTSIDE THE ARAPAHOE AQUIFER)
REM ARE GROUPED AS THE LARAMIE-FOX HILLS
REM
REM
REM
REM BEDROCK GEOLOGIC UNITS AT THE SURFACE ARE ASSUMED TO
REM HAVE WATER TABLE IN BEDROCK AT A DEPTH OF MORE THAN 20 FT
REM D IS ASSIGNED A VALUE OF 6
REM
REM FOUNTAIN-TO-PIERRE
REM
  ASEL
  RES G = 12 OR G = 13
  CALC G = 13
  CALC D = 6
REM
REM
REM PRECAMBRIAN
REM
  ASEL
  RES G = 14
  CALC D = 6
REM
REM LARAMIE-FOX HILLS IN FLANKS
REM AND ARAPAHOE OUTSIDE THE ARAPAHOE AQUIFER BOUNDARY
REM
  ASEL
  RES G = 22 OR G = 23
  RES B = 2
  CALC G = 22
  CALC D = 6
ASEL
RES G = 23
CALC D = 6
REM
REM
REM PIERRE AND LOWER FOX HILLS IN NGC
REM
  ASEL
  RES G = 24
  CALC D = 6
```

```
REM
REM LARAMIE-FOX HILLS IN NGC
REM
  ASEL
  RES G = 25
  CALC D = 6
REM
REM LARAMIE IN NGC
REM
  ASEL
  RES G = 26

  CALC D = 6
REM
REM ARAPAHOE IN NGC
REM
  ASEL
  RES G = 27
  CALC D = 6
REM
REM DENVER IN NGC
REM
  ASEL
  RES G = 28
  CALC D = 6
REM
REM DAWSON IN NGC
REM
  ASEL
  RES G = 29
  CALC D = 6
REM
REM
REM RIVER ALLUVIUM IS ASSUMED TO BE EVERYWHERE SATURATED
REM AREAS - EVEN LARGE AREAS - WHERE THE VALUE OF D
REM INDICATES A WATER TABLE IN BEDROCK IS ASSUMED TO
REM DERIVE FROM DIFFERENCES IN MAPPING RATHER THAN
REM DIFFERENCES IN INTERPRETATION
REM DEPTH TO WATER IS ASSUMED TO BE LESS THAN 20 FEET
REM EVEN FOR THE LARGE AREAS WHERE D=6
REM ONLY SMALL AREAS OF D=4 ARE ASSIGNED A VALUE OF D=3
REM
  ASEL
  RES G = 55
  RES D = 6
  CALC D = 3
REM
  ASEL
  RES G = 55
  RES D = 4
```

```
  RES AREA LT 404700
  CALC D = 3
REM
REM ROCKY FLATS GROUP IS ASSUMED TO BE EVERYWHERE SATURATED
REM AND TO HAVE A WATER TABLE AT 5-20 FEET
REM VALUES OF D ARE ASSIGNED A VALUE OF 3
REM THE LARGE POLYGON WITH D = 2 IS REAL
REM POLYS WITH D=6 ARE ASSIGNED D=3 BY ASSUMPTION.
REM POLYS WITH D = 4 ARE LEFT FOR NOW - MAY GO EITHER WAY
REM
  ASEL
  RES G = 57
  RES D = 2
  RES AREA LT 404700
  CALC D = 3

REM
REM
  ASEL
  RES G = 57
  RES D = 6
  CALC D = 3
REM
REM MOUNTAIN VALLEYS ARE ASSUMED TO BE EVERYWHERE SATURATED
REM AND TO HAVE A WATER TABLE AT 5-20 FEET.
REM
  ASEL
  RES G = 59
  CALC D = 3
REM
REM ***************************************************************
REM
REM THESE ASSUMPTIONS ARE ONLY USED BECAUSE THEY EFFECT
REM VERY SMALL AREAS - THEY MAY NOT BE VALID FOR LARGER AREAS.
REM
REM PRECAMBRIAN STUFF IN FLANKS IS ASSUMED TO RESULT FROM A
REM LINE DIFFERENCE ON THE 2 MAPS.  THE SETTING MAP IS GIVEN
REM PRECEDENCE AND PRECAMBRIAN IS ASSIGNED A CODE FOR
REM FOUNTAIN-TO-DAKOTA = 13
REM
  ASEL
  RES G = 14 AND B = 2
  CALC G = 13
  CALC D = 6
REM
REM PIERRE IN THE ARAPAHOE AREA IS ASSUMED TO BE ANAMALOUS
REM AND IS ASSIGNED A G VALUE OF ARAPAHOE = 27
REM
  ASEL
  RES G = 24 AND B = 7
```

```
  CALC G = 27
  CALC D = 6
REM
REM COLLUVIUM - LEFT FROM THE EARLIER ELIMINATES
REM IS ASSIGNED A G VALUE OF ROCKY-FLATS GROUPING = 57
REM AND A D VALUE FOR A WATER TABLE AT 5-20 FEET (D = 3)
REM
  ASEL
  RES G = 51
  CALC G = 57
  CALC D = 3
REM
REM SATURATED LOESS IS ASSUMED TO HAVE A WATER TABLE AT
REM 5-20 FEET, EXCEPT FOR THE AREAS WHERE DEPTH
REM HAS BEEN SPECIFIED BY HILLIER
REM EVEN SMALL AREAS ARE LEFT FOR NOW - MAY GO EITHER WAY
REM
REM
REM ARTIFICAIL FILL IS ASSIGNED A VALUE OF D = 6

REM AND A VALUE G = 13 OR 14
REM APPROPRIATE FOR EITHER PRECAMBRIAN OR FOUNTAIN-DAKOTA
REM DEPENDING ON WHETHER IT IS IN MOUNTAINS OR FLANKS
REM
  ASEL
  RES G = 53
  RES B = 1
  CALC G = 14
  CALC D = 6
REM
  ASEL
  RES G = 53
  RES B = 2
  CALC G = 13
  CALC D =6
REM
REM SHOSHONITE LAVA IS ASSIGNED A VALUE OF G
REM APPROPRIATE FOR PRECAMBRIAN, FOUNTAIN-DAKOTA, OR
REM ARAPAHOE FORMATION, DEPENDING ON THE AREA
REM
  ASEL
  RES G = 54
  RES B = 1
  CALC G = 14
  CALC D = 6
REM
  ASEL
  RES G = 54
  RES B = 2
  CALC G = 13
```

```
  CALC D = 6
REM
  ASEL
  RES G = 54
  RES B = 7
  CALC G = 27
CALC D = 6
REM
REM THE LARGE AREAS OF SHOSHONITE ARE IN THE DENVER BEDROCK AREA
REM (B=8).  TO INDICATE RELATION WITH THIS AREA, THE VALUE OF G
REM IS CHANGED TO 18
REM THE AQUIFER IN 28, 38, AND 18 IS THE DENVER
REM THE AREAS DIFFER IN UNSATURATED MEDIA
REM
  ASEL
  RES G = 54
  RES B = 8
  CALC G = 18
  CALC D = 6
REM
REM
REM
REM TERTIARY INTRUSIVES ARE ASSIGNED A CODE APPROPRIATE FOR

REM FOUNTAIN-DAKOTA
REM ONLY BECAUSE THEY OCCUR IN THE FLANKS
REM
  ASEL
  RES G = 56
  CALC G = 13
  CALC D = 6
REM
REM ********************************************************
REM ********************************************************
REM
REM THE VALUES OF B ARE NOW ALTERED
REM THEY NO LONGER RELATE TO THE BEDROCK AREA
REM THEY NOW RELATE TO GEOHYDROLOGIC SETTINGS
REM
REM 1 - WATER
REM 2 - MOUNTAIN SLOPES
REM 3 - MOUNTAIN VALLEYS
REM 4 - MOUNTAIN FLANKS
REM 5 - BEDDED CONSOLIDATED ROCK
REM 6 - UNCONSOLIDATED MEDIA
REM 7 - RIVER ALLUVIUM
REM
ASEL
CALC B = 0
RES G GE 18 AND G LE 39
```

```
RES G NE 22 AND G NE 23 AND G NE 32 AND G NE 33
  CALC B = 5
ASEL
RES G = 13 OR G = 22 OR G = 23 OR G = 32 OR G = 33
  CALC B = 4
ASEL
RES G = 14
  CALC B = 2
ASEL
RES G = 59
  CALC B = 3
ASEL
RES G = 52 OR G = 57
  CALC B = 6
ASEL
RES G = 55
  CALC B = 7
ASEL
RES G = 15
  CALC B = 1
Q STOP
DISSOLVE X2 X3 BGD-CODE POLY
                    /*
                    /*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD X3 LINE

                    ADDITEM X3.AAT X3.AAT LP-BGD 4 4 I
                    ADDITEM X3.AAT X3.AAT RP-BGD 4 4 I
                    ADDITEM X3.PAT X3.PAT SMALLFLAG 1 1 I
                    INFO
                    SEL X3.AAT
                    REDEFINE
                      29,LP-B,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,RP-B,1,1,I
                      34,RP-G,2,2,I
                      36,RP-D,1,1,I

          SEL X3.PAT
REDEFINE
17,B,1,1,I
18,G,2,2,I
20,D,1,1,I

                    REM
                    REM      CONDITION FILES FOR PROCESSING BY ASSURING
                    REM      THAT THE -ID ARE IN AGREEMENT
```

```
                    REM
                      SEL X3.PAT
                      SORT X3#
                      CALC X3-ID = $RECNO - 1
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
                    Q STOP
                    CREATELABELS X3 0
                    IDEDIT X3 POLY
                    INFO
                      SEL X3.AAT
                      SORT X3#
                      CALC X3-ID = $RECNO
                    Q STOP
                    IDEDIT X3 LINE
               /*
               /*     SET THE CURRENT VALUES OF BGD-CODE FROM
               /*     THE PAT INTO THE AAT - FOR BOTH LEFT (LP-BGD)
               /*     AND RIGHT (RP-BGD) POLYGONS.
               /*     THIS SECTION MOVED TO FOLLOW THE NEXT COMMENTS
/*
/* ******************************************************************
/* ******************************************************************
/*
/* DEAL WITH SMALL POLYGONS BY MERGING THEM WITH ADJACENT POLYGONS
/* FIRST ATTEMPTS TO MERGE WITH POLYGONS OF SIMILAR MEDIA
/*   - CONSOLIDATED OR UNCONSOLIDATED.
/*
/* SMALL BEDROCK POLYS ARE MERGED WITH ADJACENT POLYGONS (IF ANY) OF
/*     THE SAME BEDROCK OVERLAIN BY UNSATURATED LOESS (IF ANY)

/*
/* SMALL POLYGONS ARE DEALT WITH FOR MEDIA OF
/*        SATURATED LOESS
/*        ROCKY FLATS GROUPING
/*        RIVER ALLUVIUM
/*
/*
/* SMALL (LESS THAN 100 ACRES - LESS THAN 404700 SQ METERS
/* POLYGONS ARE ELIMINATED IN SEQUENCE
/* BY DISSOLVING ARCS BETWEEN THEM AND ADJACENT
/* POLYGONS THAT ARE ASSIGNED THE SPECIFIED VALUES
/*
/* STARTS WITH COVER NAMED X3 AND RESULTS IN COVERS S1, S2, S3, AND S4
/*
/* WORK COVER NAME IS FRED
/*
/* TO SHORTEN LENGTH, COMMENTS ARE GROUPED HERE AND
/* AREAS OF THE COMI IDENTIFIED BY INDENTATION
```

```
/*
/* EACH PASS CONSISTS OF THREE STEPS
/*
/*                                      THE FIRST STEP IS A SETUP
/*                                      PROCEEDURE TO BE SURE THE
/*                                      ITEMS ARE CORRECTLY RELATED
/*                                      BETWEEN THE ATTRIBUTE AND
/*                                      TOPOLOGY.  THESE COMMANDS ARE
/*                                      INDENTED TO HERE.
/*
/*                                      THE SETUP CAN BE BROKEN INTO
/*                                      DEFINE AND CONDITION PHASES.
/*
/*                                      THE DEFINE PHASE HAS ALREADY
/*                                      BEEN DONE FOR COVER BGD1
/*
/*                                      DEFINE
/*
/*                                      BUILD LINE TOPOLOGY
/*                                      ADD NEEDED ITEMS TO AAT
/*                                      REDEFINE NEEDED ITEMS
/*
/*                                      CONDITION
/*
/*                                      ASSURE THAT -ID AGREE BETWEEN
/*                                      ATTRIBUTES AND TOPOGRAPHY
/*
/*                  THE SECOND STEP PREVENTS SUBJECT POLYGONS
/*                  FROM COMBINING WITH POLYGONS OTHER THAN
/*                  THE DESIRED TARGET.  THESE COMMANDS ARE
/*                  INDENTED TO HERE.  THIS IS DONE IN TWO PHASES
/*
/*                  MOVE
/*
/*                  MOVE THE CURRENT VALUES OF BGD-CODE FROM

/*                  THE PAT TO THE AAT FOR BOTH LEFT (LP-BGD)
/*                  AND RIGHT (RP-BGD) POLYGONS
/*
/*                  PROTECT
/*
/*                  THE SPECIFIC ARCS TO BE PROTECTED FROM BEING
/*                  DISSOLVED IN TRYING TO ELIMINATE POLYGONS
/*                  ARE PROTECTED BY ASSIGNING COVER-ID = -1
/*
/* THE THIRD STEP IS THE ELIMINATE COMMAND AND THE NEEDED RESPONSES
/* THESE ARE NOT INDENTED
/*
/* HOUSEKEEPING COMMANDS ARE ALSO NOT INDENTED.
/*
```

```
/* EACH PASS IS THEN SEPARATED BY A ROW OF ASTERISKS
/*
/* *************************************************************************
/*
/*     X3 TO S1     BR TO QES/BR
/*
/* GROUP SMALL BEDROCK POLYGONS WITH ADJACENT POLYGONS OF THE
/* SAME BEDROCK OVERLAIN BY UNSATURATED LOESS.
/*
              INFO
                SEL X3.AAT
                RELATE X3.PAT BY LPOLY# LINK
                CALC LP-BGD = $1BGD-CODE
                RELATE X3.PAT BY RPOLY# LINK
                CALC RP-BGD = $1BGD-CODE
                                       SEL X3.PAT
                                       SORT X3#
                                       CALC X3-ID = $RECNO - 1
                                       Q STOP
                                       CREATELABELS X3 0
                                       IDEDIT X3 POLY
                                       INFO
                                       SEL X3.AAT
                                       SORT X3#
                                       CALC X3-ID = $RECNO
                                       Q STOP
                                       IDEDIT X3 LINE
                   INFO
                   SEL X3.AAT
                   RELATE X3.PAT BY LPOLY# LINK
                   CALC LP-BGD = $1BGD-CODE
                   RELATE X3.PAT BY RPOLY# LINK
                   CALC RP-BGD = $1BGD-CODE
                   SEL X3.AAT
                   RES LP-G = 29 AND RP-G = 39
                   ASEL LP-G = 39 AND RP-G = 29
                   ASEL LP-G = 28 AND RP-G = 38
                   ASEL LP-G = 38 AND RP-G = 28
                   ASEL LP-G = 27 AND RP-G = 37

                   ASEL LP-G = 37 AND RP-G = 27
                   ASEL LP-G = 26 AND RP-G = 36
                   ASEL LP-G = 36 AND RP-G = 26
                   ASEL LP-G = 25 AND RP-G = 35
                   ASEL LP-G = 35 AND RP-G = 25
                   ASEL LP-G = 23 AND RP-G = 33
                   ASEL LP-G = 33 AND RP-G = 23
                   ASEL LP-G = 22 AND RP-G = 32
                   ASEL LP-G = 32 AND RP-G = 22
                   NSEL
```

```
                    CALC X3-ID = -1
                    Q STOP
                    IDEDIT X3 LINE
/*
ELIMINATE X3 S1 NOKEEPEDGE POLY
RES G LE 29 AND G GE 22 AND AREA LT 404700

N
N
/*     KEEP X3 UNCHANGED
/*
KILL FOX
RENAME S1 FOX
DISSOLVE FOX S1 BGD-CODE POLY
                    ADDITEM S1.PAT S1.PAT SMALLFLAG 1 1 I
INFO
          SEL S1.PAT
REDEFINE
17,B,1,1,I
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
/* ***********************************************************************
/*
RENAME S1 LR1
/*
/*        LR1 TO LR2 START     BR TO RF
/*
/* BEDROCK TO ROCKY FLATS
/*
/*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
/*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
/*
                    BUILD LR1 LINE
                    ADDITEM LR1.AAT LR1.AAT LP-BGD 4 4 I
                    ADDITEM LR1.AAT LR1.AAT RP-BGD 4 4 I
                    INFO
                    SEL LR1.AAT
                    REDEFINE

                      29,LP-B,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,RP-B,1,1,I
                      34,RP-G,2,2,I
                      36,RP-D,1,1,I
```

```
                                        SEL LR1.PAT
                                        SORT LR1#
                                        CALC LR1-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LR1 0
                                        IDEDIT LR1 POLY
                                        INFO
                                        SEL LR1.AAT
                                        SORT LR1#
                                        CALC LR1-ID = $RECNO
                                        Q STOP
                                        IDEDIT LR1 LINE
                    INFO
                    SEL LR1.AAT
                    RELATE LR1.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LR1.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL LR1.AAT
    RES LP-G LE 29 AND LP-G NE 15 AND RP-G = 57
   ASEL LP-G = 57 AND RP-G LE 29 AND RP-G NE 15
                    NSEL
                    CALC LR1-ID = -1
                    Q STOP
                    IDEDIT LR1 LINE
/*
ELIMINATE LR1 LR2 NOKEEPEDGE POLY
RES  G LE 29 AND G NE 15 AND AREA LT 404700

N
N
/*
DATE
/*
/*
KILL FOX
RENAME LR2 FOX
DISSOLVE FOX LR2 BGD-CODE POLY
                    ADDITEM LR2.PAT LR2.PAT SMALLFLAG 1 1 I
INFO
          SEL LR2.PAT
REDEFINE
17,B,1,1,I
18,G,2,2,I
20,D,1,1,I


CALC SMALLFLAG = 0
RES AREA LT 404700
```

```
CALC SMALLFLAG = 1
Q STOP
/* *****************************************************************
/*
/*        LR2 TO LR3 START     BR TO QES
/*
/* BEDROCK TO SATURATED LOESS
/*
                                                BUILD LR2 LINE
                                           ADDITEM LR2.AAT LR2.AAT LP-BGD 4 4 I
                                           ADDITEM LR2.AAT LR2.AAT RP-BGD 4 4 I
                                                INFO
                                                SEL LR2.AAT
                                                REDEFINE
                                                29,LP-B,1,1,I
                                                30,LP-G,2,2,I
                                                32,LP-D,1,1,I
                                                33,RP-B,1,1,I
                                                34,RP-G,2,2,I
                                                36,RP-D,1,1,I

                                                SEL LR2.PAT
                                                SORT LR2#
                                                CALC LR2-ID = $RECNO - 1
                                                Q STOP
                                                CREATELABELS LR2 0
                                                IDEDIT LR2 POLY
                                                INFO
                                                SEL LR2.AAT
                                                SORT LR2#
                                                CALC LR2-ID = $RECNO
                                                Q STOP
                                                IDEDIT LR2 LINE
/*
                    INFO
                    SEL LR2.AAT
                    RELATE LR2.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LR2.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL LR2.AAT
   RES LP-G LE 29 AND LP-G NE 15 AND RP-G = 52
   ASEL LP-G = 52 AND RP-G LE 29 AND RP-G NE 15
                    NSEL
                    CALC LR2-ID = -1
                    Q STOP
                    IDEDIT LR2 LINE
/*
ELIMINATE LR2 LR3 NOKEEPEDGE POLY
RES  G LE 29 AND G NE 15 AND AREA LT 404700
```

```
N
N
/*     KEEP LR2 UNCHANGED
/*
/*        LR2 TO LR3 END
/*
DATE
/*
KILL FOX
RENAME LR3 FOX
DISSOLVE FOX LR3 BGD-CODE POLY
                    ADDITEM LR3.PAT LR3.PAT SMALLFLAG 1 1 I
INFO
        SEL LR3.PAT
REDEFINE
17,B,1,1,I
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
/* ********************************************************************
/*
/*        LR3 TO LR4 START     BR TO QA
/*
/* BEDROCK TO RIVER ALLUVIUM
/*
                                        BUILD LR3 LINE
                                   ADDITEM LR3.AAT LR3.AAT LP-BGD 4 4 I
                                   ADDITEM LR3.AAT LR3.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LR3.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        SEL LR3.PAT
                                        SORT LR3#
                                        CALC LR3-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LR3 0
                                        IDEDIT LR3 POLY
```

```
                                        INFO
                                        SEL LR3.AAT
                                        SORT LR3#
                                        CALC LR3-ID = $RECNO
                                        Q STOP

                                        IDEDIT LR3 LINE
/*
                    INFO
                    SEL LR3.AAT
                    RELATE LR3.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LR3.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL LR3.AAT
   RES LP-G LE 29 AND LP-G NE 15 AND  RP-G = 55
   ASEL  LP-G = 55  AND RP-G LE 29 AND RP-G NE 15
   ASEL LP-G = 14 AND RP-G = 59
   ASEL LP-G = 59 AND RP-G = 14
                    NSEL
                    CALC LR3-ID = -1
                    Q STOP
                    IDEDIT LR3 LINE
/*
ELIMINATE LR3 LR4 NOKEEPEDGE POLY
RES G LE 29 AND G NE 15 AND AREA LT 404700

N
N
/*      KEEP LR3 UNCHANGED
/*
/*
/*         LR3 TO LR4 END
/*
DATE
/*
KILL FOX
RENAME LR4 FOX
DISSOLVE FOX LR4 BGD-CODE POLY
                    ADDITEM LR4.PAT LR4.PAT SMALLFLAG 1 1 I
INFO
          SEL LR4.PAT
REDEFINE
17,B,1,1,I
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
```

```
Q STOP
/* ***************************************************************************
/*
RENAME LR4 S1
/*
/*     S1 TO S2     QES/BR TO BR
/*
/* MERGE SMALL POLYGONS OF BEDROCK OVERLAIN BY
/* UNSATURATED LOESS (32-39) WITH ADJACENT POLYGONS

/* OF THE SAME BEDROCK NOT OVERLAIN BY LOESS
/*
                                            BUILD S1 LINE
                                       ADDITEM S1.AAT S1.AAT LP-BGD 4 4 I
                                       ADDITEM S1.AAT S1.AAT RP-BGD 4 4 I
                                            INFO
                                            SEL S1.AAT
                                            REDEFINE
                                            29,LP-B,1,1,I
                                            30,LP-G,2,2,I
                                            32,LP-D,1,1,I
                                            33,RP-B,1,1,I
                                            34,RP-G,2,2,I
                                            36,RP-D,1,1,I

                                            SEL S1.PAT
                                            SORT S1#
                                            CALC S1-ID = $RECNO - 1
                                            Q STOP
                                            CREATELABELS S1 0
                                            IDEDIT S1 POLY
                                            INFO
                                            SEL S1.AAT
                                            SORT S1#
                                            CALC S1-ID = $RECNO
                                            Q STOP
                                            IDEDIT S1 LINE
/*
                    INFO
                    SEL S1.AAT
                    RELATE S1.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE S1.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL S1.AAT
                    RES LP-G = 29 AND RP-G = 39
                    ASEL LP-G = 39 AND RP-G = 29
                    ASEL LP-G = 28 AND RP-G = 38
                    ASEL LP-G = 38 AND RP-G = 28
                    ASEL LP-G = 27 AND RP-G = 37
```

```
                    ASEL LP-G = 37 AND RP-G = 27
                    ASEL LP-G = 26 AND RP-G = 36
                    ASEL LP-G = 36 AND RP-G = 26
                    ASEL LP-G = 25 AND RP-G = 35
                    ASEL LP-G = 35 AND RP-G = 25
                    ASEL LP-G = 23 AND RP-G = 33
                    ASEL LP-G = 33 AND RP-G = 23
                    ASEL LP-G = 22 AND RP-G = 32
                    ASEL LP-G = 32 AND RP-G = 22
                    NSEL
                    CALC S1-ID = -1
                    Q STOP
                    IDEDIT S1 LINE

/*
ELIMINATE S1 S2 NOKEEPEDGE POLY
RES AREA LT 404700 AND G GE 32 AND G LE 39

N
N
/*
KILL FOX
RENAME S2 FOX
DISSOLVE FOX S2 BGD-CODE POLY
                    ADDITEM S2.PAT S2.PAT SMALLFLAG 1 1 I
INFO
          SEL S2.PAT
REDEFINE
17,B,1,1,I
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
/* ******************************************************************
/*
RENAME S2 LR4
/*
/*        LR4 TO LR5 START     QES/BR TO QES
/*
/* BEDROCK OVERLAIN BY UNSATURATED LOESS TO SATURATED LOESS
/*
                                        BUILD LR4 LINE
                                   ADDITEM LR4.AAT LR4.AAT LP-BGD 4 4 I
                                   ADDITEM LR4.AAT LR4.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LR4.AAT
                                        REDEFINE
```

```
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        SEL LR4.PAT
                                        SORT LR4#
                                        CALC LR4-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LR4 0
                                        IDEDIT LR4 POLY
                                        INFO
                                        SEL LR4.AAT
                                        SORT LR4#
                                        CALC LR4-ID = $RECNO

                                        Q STOP
                                        IDEDIT LR4 LINE
/*
                    INFO
                    SEL LR4.AAT
                    RELATE LR4.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LR4.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL LR4.AAT
   RES LP-G GE 32 AND LP-G LE 39 AND RP-G = 52
   ASEL LP-G = 52 AND RP-G GE 32 AND RP-G LE 39
                    NSEL
                    CALC LR4-ID = -1
                    Q STOP
                    IDEDIT LR4 LINE
/*
ELIMINATE LR4 LR5 NOKEEPEDGE POLY
RES G GE 32 AND G LE 39 AND AREA LT 404700

N
N
/*     KEEP LR4 UNCHANGED
/*
/*
/*        LR4 TO LR5 END
/*
KILL FOX
RENAME LR5 FOX
DISSOLVE FOX LR5 BGD-CODE POLY
                    ADDITEM LR5.PAT LR5.PAT SMALLFLAG 1 1 I
INFO
```

```
          SEL LR5.PAT
REDEFINE
17,B,1,1,I
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
/* *******************************************************************
/*
/*         LR5 TO LR6 START     QES/BR TO RF
/*
/* BEDROCK OVERLAIN BY UNSATURATED LOESS TO ROCKY FLATS
/*
                                          BUILD LR5 LINE
                                     ADDITEM LR5.AAT LR5.AAT LP-BGD 4 4 I
                                     ADDITEM LR5.AAT LR5.AAT RP-BGD 4 4 I
                                          INFO
                                          SEL LR5.AAT

                                          REDEFINE
                                          29,LP-B,1,1,I
                                          30,LP-G,2,2,I
                                          32,LP-D,1,1,I
                                          33,RP-B,1,1,I
                                          34,RP-G,2,2,I
                                          36,RP-D,1,1,I

                                          SEL LR5.PAT
                                          SORT LR5#
                                          CALC LR5-ID = $RECNO - 1
                                          Q STOP
                                          CREATELABELS LR5 0
                                          IDEDIT LR5 POLY
                                          INFO
                                          SEL LR5.AAT
                                          SORT LR5#
                                          CALC LR5-ID = $RECNO
                                          Q STOP
                                          IDEDIT LR5 LINE
/*
                    INFO
                    SEL LR5.AAT
                    RELATE LR5.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LR5.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL LR5.AAT
```

```
   RES LP-G GE 32 AND LP-G LE 39 AND RP-G = 57
   ASEL LP-G = 57 AND RP-G GE 32 AND RP-G LE 39
                    NSEL
                    CALC LR5-ID = -1
                    Q STOP
                    IDEDIT LR5 LINE
/*
ELIMINATE LR5 LR6 NOKEEPEDGE POLY
RES G GE 32 AND G LE 39 AND AREA LT 404700

N
N
/*     KEEP LR5 UNCHANGED
/*
/*        LR5 TO LR6 END
/*
DATE
/*
KILL FOX
RENAME LR6 FOX
DISSOLVE FOX LR6 BGD-CODE POLY
                    ADDITEM LR6.PAT LR6.PAT SMALLFLAG 1 1 I
INFO
          SEL LR6.PAT
REDEFINE

17,B,1,1,I
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
/* ******************************************************************
/* ******************************************************************
/*
/*        LR6 TO LR7 START     QES/BR TO QA
/*
/* BEDROCK OVER UNSATURATED LOESS TO RIVER ALLUVIUM
/*
/*
                                        BUILD LR6 LINE
                                   ADDITEM LR6.AAT LR6.AAT LP-BGD 4 4 I
                                   ADDITEM LR6.AAT LR6.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LR6.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
```

```
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        SEL LR6.PAT
                                        SORT LR6#
                                        CALC LR6-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LR6 0
                                        IDEDIT LR6 POLY
                                        INFO
                                        SEL LR6.AAT
                                        SORT LR6#
                                        CALC LR6-ID = $RECNO
                                        Q STOP
                                        IDEDIT LR6 LINE
/*
                    INFO
                    SEL LR6.AAT
                    RELATE LR6.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LR6.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL LR6.AAT
     RES LP-G GE 32 AND LP-G LE 39 AND RP-G = 55
     ASEL LP-G = 55 AND RP-G GE 32 AND RP-G LE 39
                    NSEL
                    CALC LR6-ID = -1

                    Q STOP
                    IDEDIT LR6 LINE
/*
ELIMINATE LR6 LR7 NOKEEPEDGE POLY
RES G GE 32 AND G LE 39 AND AREA LT 404700

N
N
/*
/*     LR6 TO LR7 END
/*
/* SHIFT THESE COVERS WITH A RENAME AND REPEAT THE SEQUENCE
/* X3-S1-LR1-LR2-LR3-LR4-S1-S2-LR4-LR5-LR6-LR7
/* ON A COVER THAT HAS BEEN DISLOVED
/*
RENAME X3 XX3
RENAME LR1 XLR1
RENAME LR2 XLR2
RENAME LR3 XLR3
RENAME S1 XS1
```

```
RENAME LR4 XLR4
RENAME LR5 XLR5
RENAME LR6 XLR6
RENAME LR7 XLR7
DISSOLVE XLR7 X3 BGD-CODE
/*
/* *********************************************************************
/*
/*     X3 TO S1     BR TO QES/BR
/*
/* GROUP SMALL BEDROCK POLYGONS WITH ADJACENT POLYGONS OF THE
/* SAME BEDROCK OVERLAIN BY UNSATURATED LOESS.
/*
/*
/*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
/*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
/*
                    BUILD X3 LINE
                    ADDITEM X3.AAT X3.AAT LP-BGD 4 4 I
                    ADDITEM X3.AAT X3.AAT RP-BGD 4 4 I
                    ADDITEM X3.PAT X3.PAT SMALLFLAG 1 1 I
                    INFO
                    SEL X3.AAT
                    REDEFINE
                      29,LP-B,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,RP-B,1,1,I
                      34,RP-G,2,2,I
                      36,RP-D,1,1,I

          SEL X3.PAT
REDEFINE

17,B,1,1,I
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
                                        SEL X3.PAT
                                        SORT X3#
                                        CALC X3-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS X3 0
                                        IDEDIT X3 POLY
                                        INFO
                                        SEL X3.AAT
                                        SORT X3#
```

```
                                        CALC X3-ID = $RECNO
                                        Q STOP
                                        IDEDIT X3 LINE
                    INFO
                    SEL X3.AAT
                    RELATE X3.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE X3.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL X3.AAT
                    RES LP-G = 29 AND RP-G = 39
                    ASEL LP-G = 39 AND RP-G = 29
                    ASEL LP-G = 28 AND RP-G = 38
                    ASEL LP-G = 38 AND RP-G = 28
                    ASEL LP-G = 27 AND RP-G = 37
                    ASEL LP-G = 37 AND RP-G = 27
                    ASEL LP-G = 26 AND RP-G = 36
                    ASEL LP-G = 36 AND RP-G = 26
                    ASEL LP-G = 25 AND RP-G = 35
                    ASEL LP-G = 35 AND RP-G = 25
                    ASEL LP-G = 23 AND RP-G = 33
                    ASEL LP-G = 33 AND RP-G = 23
                    ASEL LP-G = 22 AND RP-G = 32
                    ASEL LP-G = 32 AND RP-G = 22
                    NSEL
                    CALC X3-ID = -1
                    Q STOP
                    IDEDIT X3 LINE
/*
ELIMINATE X3 S1 NOKEEPEDGE POLY
RES G LE 29 AND G GE 22 AND AREA LT 404700

N
N
/*      KEEP X3 UNCHANGED
/*
/* *************************************************************************

/*
RENAME S1 LR1
/*
/*         LR1 TO LR2 START     BR TO RF
/*
/* BEDROCK TO ROCKY FLATS
/*
/*
/*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
/*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS
/*
                    BUILD LR1 LINE
```

```
                 ADDITEM LR1.AAT LR1.AAT LP-BGD 4 4 I
                 ADDITEM LR1.AAT LR1.AAT RP-BGD 4 4 I
                 INFO
                 SEL LR1.AAT
                 REDEFINE
                   29,LP-B,1,1,I
                   30,LP-G,2,2,I
                   32,LP-D,1,1,I
                   33,RP-B,1,1,I
                   34,RP-G,2,2,I
                   36,RP-D,1,1,I

                                     SEL LR1.PAT
                                     SORT LR1#
                                     CALC LR1-ID = $RECNO - 1
                                     Q STOP
                                     CREATELABELS LR1 0
                                     IDEDIT LR1 POLY
                                     INFO
                                     SEL LR1.AAT
                                     SORT LR1#
                                     CALC LR1-ID = $RECNO
                                     Q STOP
                                     IDEDIT LR1 LINE
                 INFO
                 SEL LR1.AAT
                 RELATE LR1.PAT BY LPOLY# LINK
                 CALC LP-BGD = $1BGD-CODE
                 RELATE LR1.PAT BY RPOLY# LINK
                 CALC RP-BGD = $1BGD-CODE
                 SEL LR1.AAT
    RES LP-G LE 29 AND LP-G NE 15 AND RP-G = 57
   ASEL LP-G = 57 AND RP-G LE 29 AND RP-G NE 15
                 NSEL
                 CALC LR1-ID = -1
                 Q STOP
                 IDEDIT LR1 LINE
/*
ELIMINATE LR1 LR2 NOKEEPEDGE POLY
RES  G LE 29 AND G NE 15 AND AREA LT 404700


N
N
/*
DATE
/*
/*
/* *************************************************************
/*
```

```
/*          LR2 TO LR3 START      BR TO QES
/*
/* BEDROCK TO SATURATED LOESS
/*
                                               BUILD LR2 LINE
                                          ADDITEM LR2.AAT LR2.AAT LP-BGD 4 4 I
                                          ADDITEM LR2.AAT LR2.AAT RP-BGD 4 4 I
                                               INFO
                                               SEL LR2.AAT
                                               REDEFINE
                                               29,LP-B,1,1,I
                                               30,LP-G,2,2,I
                                               32,LP-D,1,1,I
                                               33,RP-B,1,1,I
                                               34,RP-G,2,2,I
                                               36,RP-D,1,1,I

                                               SEL LR2.PAT
                                               SORT LR2#
                                               CALC LR2-ID = $RECNO - 1
                                               Q STOP
                                               CREATELABELS LR2 0
                                               IDEDIT LR2 POLY
                                               INFO
                                               SEL LR2.AAT
                                               SORT LR2#
                                               CALC LR2-ID = $RECNO
                                               Q STOP
                                               IDEDIT LR2 LINE
/*
                    INFO
                    SEL LR2.AAT
                    RELATE LR2.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LR2.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL LR2.AAT
   RES LP-G LE 29 AND LP-G NE 15 AND RP-G = 52
   ASEL LP-G = 52 AND RP-G LE 29 AND RP-G NE 15
                    NSEL
                    CALC LR2-ID = -1
                    Q STOP
                    IDEDIT LR2 LINE
/*
ELIMINATE LR2 LR3 NOKEEPEDGE POLY

RES  G LE 29 AND G NE 15 AND AREA LT 404700

N
N
```

```
/*     KEEP LR2 UNCHANGED
/*
/*        LR2 TO LR3 END
/*
DATE
/*
/* *********************************************************************
/*
/*        LR3 TO LR4 START     BR TO QA
/*
/* BEDROCK TO RIVER ALLUVIUM
/*
                                            BUILD LR3 LINE
                                       ADDITEM LR3.AAT LR3.AAT LP-BGD 4 4 I
                                       ADDITEM LR3.AAT LR3.AAT RP-BGD 4 4 I
                                            INFO
                                            SEL LR3.AAT
                                            REDEFINE
                                            29,LP-B,1,1,I
                                            30,LP-G,2,2,I
                                            32,LP-D,1,1,I
                                            33,RP-B,1,1,I
                                            34,RP-G,2,2,I
                                            36,RP-D,1,1,I

                                            SEL LR3.PAT
                                            SORT LR3#
                                            CALC LR3-ID = $RECNO - 1
                                            Q STOP
                                            CREATELABELS LR3 0
                                            IDEDIT LR3 POLY
                                            INFO
                                            SEL LR3.AAT
                                            SORT LR3#
                                            CALC LR3-ID = $RECNO
                                            Q STOP
                                            IDEDIT LR3 LINE
/*
                        INFO
                        SEL LR3.AAT
                        RELATE LR3.PAT BY LPOLY# LINK
                        CALC LP-BGD = $1BGD-CODE
                        RELATE LR3.PAT BY RPOLY# LINK
                        CALC RP-BGD = $1BGD-CODE
                        SEL LR3.AAT
   RES LP-G LE 29 AND LP-G NE 15 AND  RP-G = 55
   ASEL  LP-G = 55  AND RP-G LE 29 AND RP-G NE 15
   ASEL LP-G = 14 AND RP-G = 59
   ASEL LP-G = 59 AND RP-G = 14
```

```
                    NSEL
                    CALC LR3-ID = -1
                    Q STOP
                    IDEDIT LR3 LINE
/*
ELIMINATE LR3 LR4 NOKEEPEDGE POLY
RES G LE 29 AND G NE 15 AND AREA LT 404700

N
N
/*     KEEP LR3 UNCHANGED
/*
/*
/*        LR3 TO LR4 END
/*
DATE
/*
/* **********************************************************************
/*
RENAME LR4 S1
/*
/*     S1 TO S2     QES/BR TO BR
/*
/* MERGE SMALL POLYGONS OF BEDROCK OVERLAIN BY
/* UNSATURATED LOESS (32-39) WITH ADJACENT POLYGONS
/* OF THE SAME BEDROCK NOT OVERLAIN BY LOESS
/*
                                             BUILD S1 LINE
                                        ADDITEM S1.AAT S1.AAT LP-BGD 4 4 I
                                        ADDITEM S1.AAT S1.AAT RP-BGD 4 4 I
                                             INFO
                                             SEL S1.AAT
                                             REDEFINE
                                             29,LP-B,1,1,I
                                             30,LP-G,2,2,I
                                             32,LP-D,1,1,I
                                             33,RP-B,1,1,I
                                             34,RP-G,2,2,I
                                             36,RP-D,1,1,I

                                             SEL S1.PAT
                                             SORT S1#
                                             CALC S1-ID = $RECNO - 1
                                             Q STOP
                                             CREATELABELS S1 0
                                             IDEDIT S1 POLY
                                             INFO
                                             SEL S1.AAT
                                             SORT S1#
                                             CALC S1-ID = $RECNO
```

```
                                        Q STOP
                                        IDEDIT S1 LINE
/*

                    INFO
                    SEL S1.AAT
                    RELATE S1.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE S1.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL S1.AAT
                    RES LP-G = 29 AND RP-G = 39
                    ASEL LP-G = 39 AND RP-G = 29
                    ASEL LP-G = 28 AND RP-G = 38
                    ASEL LP-G = 38 AND RP-G = 28
                    ASEL LP-G = 27 AND RP-G = 37
                    ASEL LP-G = 37 AND RP-G = 27
                    ASEL LP-G = 26 AND RP-G = 36
                    ASEL LP-G = 36 AND RP-G = 26
                    ASEL LP-G = 25 AND RP-G = 35
                    ASEL LP-G = 35 AND RP-G = 25
                    ASEL LP-G = 23 AND RP-G = 33
                    ASEL LP-G = 33 AND RP-G = 23
                    ASEL LP-G = 22 AND RP-G = 32
                    ASEL LP-G = 32 AND RP-G = 22
                    NSEL
                    CALC S1-ID = -1
                    Q STOP
                    IDEDIT S1 LINE
/*
ELIMINATE S1 S2 NOKEEPEDGE POLY
RES AREA LT 404700 AND G GE 32 AND G LE 39

N
N
/*
/* *****************************************************************
/*
RENAME S2 LR4
/*
/*         LR4 TO LR5 START     QES/BR TO QES
/*
/* BEDROCK OVERLAIN BY UNSATURATED LOESS TO SATURATED LOESS
/*
                                        BUILD LR4 LINE
                                   ADDITEM LR4.AAT LR4.AAT LP-BGD 4 4 I
                                   ADDITEM LR4.AAT LR4.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LR4.AAT
                                        REDEFINE
```

```
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I


                                        SEL LR4.PAT
                                        SORT LR4#
                                        CALC LR4-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LR4 0
                                        IDEDIT LR4 POLY
                                        INFO
                                        SEL LR4.AAT
                                        SORT LR4#
                                        CALC LR4-ID = $RECNO
                                        Q STOP
                                        IDEDIT LR4 LINE
/*
                    INFO
                    SEL LR4.AAT
                    RELATE LR4.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LR4.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL LR4.AAT
   RES LP-G GE 32 AND LP-G LE 39 AND RP-G = 52
   ASEL LP-G = 52 AND RP-G GE 32 AND RP-G LE 39
                    NSEL
                    CALC LR4-ID = -1
                    Q STOP
                    IDEDIT LR4 LINE
/*
ELIMINATE LR4 LR5 NOKEEPEDGE POLY
RES G GE 32 AND G LE 39 AND AREA LT 404700

N
N
/*     KEEP LR4 UNCHANGED
/*
/*
/*        LR4 TO LR5 END
/*
/* *****************************************************************
/*
/*        LR5 TO LR6 START     QES/BR TO RF
/*
/* BEDROCK OVERLAIN BY UNSATURATED LOESS TO ROCKY FLATS
```

```
/*
                                        BUILD LR5 LINE
                                   ADDITEM LR5.AAT LR5.AAT LP-BGD 4 4 I
                                   ADDITEM LR5.AAT LR5.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LR5.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I

                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        SEL LR5.PAT
                                        SORT LR5#
                                        CALC LR5-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LR5 0
                                        IDEDIT LR5 POLY
                                        INFO
                                        SEL LR5.AAT
                                        SORT LR5#
                                        CALC LR5-ID = $RECNO
                                        Q STOP
                                        IDEDIT LR5 LINE
/*
                    INFO
                    SEL LR5.AAT
                    RELATE LR5.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LR5.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL LR5.AAT
   RES LP-G GE 32 AND LP-G LE 39 AND RP-G = 57
   ASEL LP-G = 57 AND RP-G GE 32 AND RP-G LE 39
                    NSEL
                    CALC LR5-ID = -1
                    Q STOP
                    IDEDIT LR5 LINE
/*
ELIMINATE LR5 LR6 NOKEEPEDGE POLY
RES G GE 32 AND G LE 39 AND AREA LT 404700

N
N
/*      KEEP LR5 UNCHANGED
/*
/*         LR5 TO LR6 END
```

```
/*
DATE
/*
/* ****************************************************************
/* ****************************************************************
/*
/*        LR6 TO LR7 START      QES/BR TO QA
/*
/* BEDROCK OVER UNSATURATED LOESS TO RIVER ALLUVIUM
/*
/*
                                            BUILD LR6 LINE
                                       ADDITEM LR6.AAT LR6.AAT LP-BGD 4 4 I
                                       ADDITEM LR6.AAT LR6.AAT RP-BGD 4 4 I
                                            INFO

                                            SEL LR6.AAT
                                            REDEFINE
                                            29,LP-B,1,1,I
                                            30,LP-G,2,2,I
                                            32,LP-D,1,1,I
                                            33,RP-B,1,1,I
                                            34,RP-G,2,2,I
                                            36,RP-D,1,1,I

                                            SEL LR6.PAT
                                            SORT LR6#
                                            CALC LR6-ID = $RECNO - 1
                                            Q STOP
                                            CREATELABELS LR6 0
                                            IDEDIT LR6 POLY
                                            INFO
                                            SEL LR6.AAT
                                            SORT LR6#
                                            CALC LR6-ID = $RECNO
                                            Q STOP
                                            IDEDIT LR6 LINE
/*
                    INFO
                    SEL LR6.AAT
                    RELATE LR6.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LR6.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL LR6.AAT
     RES LP-G GE 32 AND LP-G LE 39 AND RP-G = 55
     ASEL LP-G = 55 AND RP-G GE 32 AND RP-G LE 39
                    NSEL
                    CALC LR6-ID = -1
                    Q STOP
```

```
                    IDEDIT LR6 LINE
/*
ELIMINATE LR6 LR7 NOKEEPEDGE POLY
RES G GE 32 AND G LE 39 AND AREA LT 404700

N
N
/*
/*      LR6 TO LR7 END
/*
KILL FOX
RENAME LR7 FOX
DISSOLVE FOX LR7 BGD-CODE POLY
                    ADDITEM LR7.PAT LR7.PAT SMALLFLAG 1 1 I
INFO
          SEL LR7.PAT
REDEFINE
17,B,1,1,I
18,G,2,2,I

20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
/* ******************************************************************
/* ******************************************************************
/*
/* NOW PROCESS THE UNCONSOLIDATED SERIES
/*
/* ******************************************************************
/* ******************************************************************
/*
RENAME LR7 S2
/*
/*         S2 TO S3      QES TO QA
/*
/* SMALL POLYGONS OF SATURATED LOESS ARE MERGED WITH ADJACENT
/* POLYGONS OF RIVER ALLUVIUM
/*
/*         THESE ARE NOT IN A SETTING DEFINED BY BEDROCK,
/*         SO THE VALUE OF B NEED NOT BE THE SAME FOR THE 2 POLYS
/*
                                          BUILD S2 LINE
                                     ADDITEM S2.AAT S2.AAT LP-BGD 4 4 I
                                     ADDITEM S2.AAT S2.AAT RP-BGD 4 4 I
                                          INFO
                                          SEL S2.AAT
                                          REDEFINE
```

```
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        SEL S2.PAT
                                        SORT S2#
                                        CALC S2-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS S2 0
                                        IDEDIT S2 POLY
                                        INFO
                                        SEL S2.AAT
                                        SORT S2#
                                        CALC S2-ID = $RECNO
                                        Q STOP
                                        IDEDIT S2 LINE
/*
                    INFO
                    SEL S2.AAT
                    RELATE S2.PAT BY LPOLY# LINK

                    CALC LP-BGD = $1BGD-CODE
                    RELATE S2.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL S2.AAT
                    RES LP-G = 52 AND RP-G = 55
                    ASEL LP-G = 55 AND RP-G = 52
                    NSEL
                    CALC S2-ID = -1
                    Q STOP
                    IDEDIT S2 LINE
/*
ELIMINATE S2 S3 NOKEEPEDGE POLY
RES G LE 52 AND AREA LT 404700

N
N
/*     KEEP S2 UNCHANGED
/*
KILL FOX
RENAME S3 FOX
DISSOLVE FOX S3 BGD-CODE POLY
                    ADDITEM S3.PAT S3.PAT SMALLFLAG 1 1 I
INFO
          SEL S3.PAT
REDEFINE
17,B,1,1,I
```

```
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
/* **********************************************************************
/*
/*      S3 TO S4     QES TO RF
/*
/* MERGE SMALL POLYS SATURATED LOESS WITH
/* ADJACENT POLYS OF ROCKY FLATS GROUPING
/*
/*        THE SETTING IS INDEPENDENT OF BEDROCK, SO THE
/*        VALUE OF B NEED NOT BE THE SAME FOR THE 2 POLYS
/*
                                        BUILD S3 LINE
                                   ADDITEM S3.AAT S3.AAT LP-BGD 4 4 I
                                   ADDITEM S3.AAT S3.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL S3.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I

                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        SEL S3.PAT
                                        SORT S3#
                                        CALC S3-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS S3 0
                                        IDEDIT S3 POLY
                                        INFO
                                        SEL S3.AAT
                                        SORT S3#
                                        CALC S3-ID = $RECNO
                                        Q STOP
                                        IDEDIT S3 LINE
/*
                    INFO
                    SEL S3.AAT
                    RELATE S3.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE S3.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
```

```
                    SEL S3.AAT
                    RES LP-G = 52 AND RP-G = 57
                    ASEL LP-G = 57 AND RP-G = 52
                    NSEL
                    CALC S3-ID = -1
                    Q STOP
                    IDEDIT S3 LINE
/*
ELIMINATE S3 S4 NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 52

N
N
/*
/*
/*
DATE
/*
KILL FOX
RENAME S4 FOX
DISSOLVE FOX S4 BGD-CODE POLY
                    ADDITEM S4.PAT S4.PAT SMALLFLAG 1 1 I
INFO
          SEL S4.PAT
REDEFINE
17,B,1,1,I
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700

CALC SMALLFLAG = 1
Q STOP
/* **********************************************************************
/*
/*        S4 TO S5     RF TO QA
/*
/* MERGE SMALL POLYGONS OF ROCKY FLATS GROUPING WITH
/* ADJACENT POLYGONS OF RIVER ALLUVIUM
/*
/*        SETTING IS INDEPENDENT OF BEDROCK, SO THE
/*        VALUE OF B NEED NOT BE THE SAME FOR THE 2 POLYS
/*
                                        BUILD S4 LINE
                                   ADDITEM S4.AAT S4.AAT LP-BGD 4 4 I
                                   ADDITEM S4.AAT S4.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL S4.AAT
                                        REDEFINE
```

```
                                            29,LP-B,1,1,I
                                            30,LP-G,2,2,I
                                            32,LP-D,1,1,I
                                            33,RP-B,1,1,I
                                            34,RP-G,2,2,I
                                            36,RP-D,1,1,I

                                            SEL S4.PAT
                                            SORT S4#
                                            CALC S4-ID = $RECNO - 1
                                            Q STOP
                                            CREATELABELS S4 0
                                            IDEDIT S4 POLY
                                            INFO
                                            SEL S4.AAT
                                            SORT S4#
                                            CALC S4-ID = $RECNO
                                            Q STOP
                                            IDEDIT S4 LINE
/*
                    INFO
                    SEL S4.AAT
                    RELATE S4.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE S4.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL S4.AAT
                    RES LP-G = 57 AND RP-G = 55
                    ASEL LP-G = 55 AND RP-G = 57
                    NSEL
                    CALC S4-ID = -1
                    Q STOP
                    IDEDIT S4 LINE
/*
ELIMINATE S4 S5 NOKEEPEDGE POLY

RES G LE 57 AND AREA LT 404700

N
N
/*      KEEP S4 UNCHANGED
/*
KILL FOX
RENAME S5 FOX
DISSOLVE FOX S5 BGD-CODE POLY
                    ADDITEM S5.PAT S5.PAT SMALLFLAG 1 1 I
INFO
          SEL S5.PAT
REDEFINE
17,B,1,1,I
```

```
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
/* **********************************************************************
/*
/*      S5 TO S6      RF TO QES
/*
/* MERGE SMALL POLYGONS OF ROCKY FLATS GROUPING WITH
/* ADJACENT POLYGONS OF SATURATED LOESS
/*
/*         SETTING IS INDEPENDENT OF BEDROCK, SO THE VALUE
/*         OF B NEED NOT BE THE SAME FOR THE 2 POLYS
/*
                                       BUILD S5 LINE
                                  ADDITEM S5.AAT S5.AAT LP-BGD 4 4 I
                                  ADDITEM S5.AAT S5.AAT RP-BGD 4 4 I
                                       INFO
                                       SEL S5.AAT
                                       REDEFINE
                                       29,LP-B,1,1,I
                                       30,LP-G,2,2,I
                                       32,LP-D,1,1,I
                                       33,RP-B,1,1,I
                                       34,RP-G,2,2,I
                                       36,RP-D,1,1,I

                                       SEL S5.PAT
                                       SORT S5#
                                       CALC S5-ID = $RECNO - 1
                                       Q STOP
                                       CREATELABELS S5 0
                                       IDEDIT S5 POLY
                                       INFO
                                       SEL S5.AAT
                                       SORT S5#

                                       CALC S5-ID = $RECNO
                                       Q STOP
                                       IDEDIT S5 LINE
/*
                   INFO
                   SEL S5.AAT
                   RELATE S5.PAT BY LPOLY# LINK
                   CALC LP-BGD = $1BGD-CODE
                   RELATE S5.PAT BY RPOLY# LINK
                   CALC RP-BGD = $1BGD-CODE
```

```
                    SEL S5.AAT
                    RES LP-G = 57 AND RP-G = 52
                    ASEL LP-G = 52 AND RP-G = 57
                    NSEL
                    CALC S5-ID = -1
                    Q STOP
                    IDEDIT S5 LINE
/*
ELIMINATE S5 S6 NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 57

N
N
/*
/*
DATE
/*
/* ******************************************************************
/* ******************************************************************
/*
/* RENAME COVERS AND REPEAT THE SEQUENCE
/* S2-S3-S4-S5-S6
/* ON A COVER THAT HAS BEEN DISOLVED
/*
RENAME S2 XS2
RENAME S3 XS3
RENAME S4 XS4
RENAME S5 XS5
RENAME S6 XS6
DISSOLVE XS6 S2 BGD-CODE POLY
/*
/* ******************************************************************
/* ******************************************************************
/*
/*       S2 TO S3      QES TO QA
/*
/* SMALL POLYGONS OF SATURATED LOESS ARE MERGED WITH ADJACENT
/* POLYGONS OF RIVER ALLUVIUM
/*
/*       THESE ARE NOT IN A SETTING DEFINED BY BEDROCK,
/*       SO THE VALUE OF B NEED NOT BE THE SAME FOR THE 2 POLYS
/*
                                        BUILD S2 LINE

                                   ADDITEM S2.AAT S2.AAT LP-BGD 4 4 I
                                   ADDITEM S2.AAT S2.AAT RP-BGD 4 4 I
                    ADDITEM S2.PAT S2.PAT SMALLFLAG 1 1 I
                                        INFO
                                        SEL S2.AAT
                                        REDEFINE
```

```
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

          SEL S2.PAT
REDEFINE
17,B,1,1,I
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
                                        SEL S2.PAT
                                        SORT S2#
                                        CALC S2-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS S2 0
                                        IDEDIT S2 POLY
                                        INFO
                                        SEL S2.AAT
                                        SORT S2#
                                        CALC S2-ID = $RECNO
                                        Q STOP
                                        IDEDIT S2 LINE
/*
                    INFO
                    SEL S2.AAT
                    RELATE S2.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE S2.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL S2.AAT
                    RES LP-G = 52 AND RP-G = 55
                    ASEL LP-G = 55 AND RP-G = 52
                    NSEL
                    CALC S2-ID = -1
                    Q STOP
                    IDEDIT S2 LINE
/*
ELIMINATE S2 S3 NOKEEPEDGE POLY
RES G LE 52 AND AREA LT 404700

N

N
/*     KEEP S2 UNCHANGED
```

```
/*
/* ************************************************************************
/*
/*      S3 TO S4     QES TO RF
/*
/* MERGE SMALL POLYS SATURATED LOESS WITH
/* ADJACENT POLYS OF ROCKY FLATS GROUPING
/*
/*       THE SETTING IS INDEPENDENT OF BEDROCK, SO THE
/*       VALUE OF B NEED NOT BE THE SAME FOR THE 2 POLYS
/*
                                        BUILD S3 LINE
                                   ADDITEM S3.AAT S3.AAT LP-BGD 4 4 I
                                   ADDITEM S3.AAT S3.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL S3.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        SEL S3.PAT
                                        SORT S3#
                                        CALC S3-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS S3 0
                                        IDEDIT S3 POLY
                                        INFO
                                        SEL S3.AAT
                                        SORT S3#
                                        CALC S3-ID = $RECNO
                                        Q STOP
                                        IDEDIT S3 LINE
/*
                    INFO
                    SEL S3.AAT
                    RELATE S3.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE S3.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL S3.AAT
                    RES LP-G = 52 AND RP-G = 57
                    ASEL LP-G = 57 AND RP-G = 52
                    NSEL
                    CALC S3-ID = -1
                    Q STOP
                    IDEDIT S3 LINE
```

```
/*

ELIMINATE S3 S4 NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 52

N
N
/*
/*
/*
DATE
/*
/* *********************************************************************
/*
/*        S4 TO S5     RF TO QA
/*
/* MERGE SMALL POLYGONS OF ROCKY FLATS GROUPING WITH
/* ADJACENT POLYGONS OF RIVER ALLUVIUM
/*
/*        SETTING IS INDEPENDENT OF BEDROCK, SO THE
/*        VALUE OF B NEED NOT BE THE SAME FOR THE 2 POLYS
/*
                                                 BUILD S4 LINE
                                            ADDITEM S4.AAT S4.AAT LP-BGD 4 4 I
                                            ADDITEM S4.AAT S4.AAT RP-BGD 4 4 I
                                                 INFO
                                                 SEL S4.AAT
                                                 REDEFINE
                                                 29,LP-B,1,1,I
                                                 30,LP-G,2,2,I
                                                 32,LP-D,1,1,I
                                                 33,RP-B,1,1,I
                                                 34,RP-G,2,2,I
                                                 36,RP-D,1,1,I

                                                 SEL S4.PAT
                                                 SORT S4#
                                                 CALC S4-ID = $RECNO - 1
                                                 Q STOP
                                                 CREATELABELS S4 0
                                                 IDEDIT S4 POLY
                                                 INFO
                                                 SEL S4.AAT
                                                 SORT S4#
                                                 CALC S4-ID = $RECNO
                                                 Q STOP
                                                 IDEDIT S4 LINE
/*
                    INFO
                    SEL S4.AAT
```

```
                    RELATE S4.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE S4.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL S4.AAT

                    RES LP-G = 57 AND RP-G = 55
                    ASEL LP-G = 55 AND RP-G = 57
                    NSEL
                    CALC S4-ID = -1
                    Q STOP
                    IDEDIT S4 LINE
/*
ELIMINATE S4 S5 NOKEEPEDGE POLY
RES G LE 57 AND AREA LT 404700

N
N
/*      KEEP S4 UNCHANGED
/*
/* ***********************************************************************
/*
/*      S5 TO S6      RF TO QES
/*
/* MERGE SMALL POLYGONS OF ROCKY FLATS GROUPING WITH
/* ADJACENT POLYGONS OF SATURATED LOESS
/*
/*         SETTING IS INDEPENDENT OF BEDROCK, SO THE VALUE
/*         OF B NEED NOT BE THE SAME FOR THE 2 POLYS
/*
                                        BUILD S5 LINE
                                   ADDITEM S5.AAT S5.AAT LP-BGD 4 4 I
                                   ADDITEM S5.AAT S5.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL S5.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        SEL S5.PAT
                                        SORT S5#
                                        CALC S5-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS S5 0
                                        IDEDIT S5 POLY
                                        INFO
```

```
                                        SEL S5.AAT
                                        SORT S5#
                                        CALC S5-ID = $RECNO
                                        Q STOP
                                        IDEDIT S5 LINE
/*
                    INFO
                    SEL S5.AAT
                    RELATE S5.PAT BY LPOLY# LINK

                    CALC LP-BGD = $1BGD-CODE
                    RELATE S5.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL S5.AAT
                    RES LP-G = 57 AND RP-G = 52
                    ASEL LP-G = 52 AND RP-G = 57
                    NSEL
                    CALC S5-ID = -1
                    Q STOP
                    IDEDIT S5 LINE
/*
ELIMINATE S5 S6 NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 57

N
N
/*
/*
DATE
/*
KILL FOX
RENAME S6 FOX
DISSOLVE FOX S6 BGD-CODE POLY
                    ADDITEM S6.PAT S6.PAT SMALLFLAG 1 1 I
INFO
          SEL S6.PAT
REDEFINE
17,B,1,1,I
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
/* *******************************************************************
/*
/* *******************************************************************
/*
/* *******************************************************************
```

```
/*
/* NOW COMPLETE THE PROCESS WITH THE LESS-DESIRABLE CHANGES
/* FROM MORE-VULNERABLE TO LESS-VULNERABLE IN THE SESEQUENCE
/* S7-S8-LR8-LR9
/* THESE ARE EXECUTED ONLY ONCE
/*
/* ****************************************************************
/*
/* ****************************************************************
/*
/* ****************************************************************
/*
/*     S6 TO S7     QA TO QES

/*
/* MERGE SMALL POLYGONS OF RIVER ALLUVIUM WITH ADJACENT
/* POLYGONS OF SATURATED LOESS
/*
/*        SETTING IS INDEPENDENT OF BEDROCK, SO THE VALUE
/*        OF B NEED NOT BE THE SAME FOR THE 2 POLYS
/*
                                          BUILD S6 LINE
                                     ADDITEM S6.AAT S6.AAT LP-BGD 4 4 I
                                     ADDITEM S6.AAT S6.AAT RP-BGD 4 4 I
                                          INFO
                                          SEL S6.AAT
                                          REDEFINE
                                          29,LP-B,1,1,I
                                          30,LP-G,2,2,I
                                          32,LP-D,1,1,I
                                          33,RP-B,1,1,I
                                          34,RP-G,2,2,I
                                          36,RP-D,1,1,I

                                          SEL S6.PAT
                                          SORT S6#
                                          CALC S6-ID = $RECNO - 1
                                          Q STOP
                                          CREATELABELS S6 0
                                          IDEDIT S6 POLY
                                          INFO
                                          SEL S6.AAT
                                          SORT S6#
                                          CALC S6-ID = $RECNO
                                          Q STOP
                                          IDEDIT S6 LINE
/*
                    INFO
                    SEL S6.AAT
                    RELATE S6.PAT BY LPOLY# LINK
```

```
                    CALC LP-BGD = $1BGD-CODE
                    RELATE S6.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL S6.AAT
                    RES LP-G = 52 AND RP-G = 55
                    ASEL LP-G = 55 AND RP-G = 52
                    NSEL
                    CALC S6-ID = -1
                    Q STOP
                    IDEDIT S6 LINE
/*
ELIMINATE S6 S7 NOKEEPEDGE POLY
RES G  = 55 AND AREA LT 404700

N
N
/*     KEEP S6 UNCHANGED

/*
/* ************************************************************************
/*
/*     S7 TO S8     QA TO RF
/*
/* MERGE SMALL POLYGONS OF RIVER ALLUVIUM WITH ADJACENT POLYGONS
/* OF ROCKY FLATS GROUPING
/*
/*        SETTING IS INDEPENDENT OF BEDROCK, SO THE VALUES OF
/*        B DON'T NEED TO BE THE SAME FOR 2 POLYS TO MERGE
/*
                                        BUILD S7 LINE
                                   ADDITEM S7.AAT S7.AAT LP-BGD 4 4 I
                                   ADDITEM S7.AAT S7.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL S7.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        SEL S7.PAT
                                        SORT S7#
                                        CALC S7-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS S7 0
                                        IDEDIT S7 POLY
                                        INFO
                                        SEL S7.AAT
```

```
                                        SORT S7#
                                        CALC S7-ID = $RECNO
                                        Q STOP
                                        IDEDIT S7 LINE
/*
                    INFO
                    SEL S7.AAT
                    RELATE S7.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE S7.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL S7.AAT
                    RES LP-G = 57 AND RP-G = 55
                    ASEL LP-G = 55 AND RP-G = 57
                    NSEL
                    CALC S7-ID = -1
                    Q STOP
                    IDEDIT S7 LINE
/*
ELIMINATE S7 S8 NOKEEPEDGE POLY
RES AREA LT 404700 AND G = 55


N
N
/*
/*
/*
KILL FOX
RENAME S8 FOX
DISSOLVE FOX S8 BGD-CODE POLY
                    ADDITEM S8.PAT S8.PAT SMALLFLAG 1 1 I
INFO
          SEL S8.PAT
REDEFINE
17,B,1,1,I
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
/* *****************************************************************
/* *****************************************************************
/* *****************************************************************
/*
/*
/* DEAL WITH THE REMAINING SMALL POLYGONS BY MERGING THEM WITH
/* ADJACENT POLYGONS THAT ARE INCREASINGLY DISSIMILAR IN
```

```
/* SATURATED OR UNSATURATED MEDIA
/*
/* SMALL POLYGONS ARE DEALT WITH FOR ALL MEDIA TYPES
/*        BEDROCK TO ROCKY FLATS
/*        BEDROCK TO SATURATED LOESS
/*        BEDROCK TO RIVER ALLUVIUM
/*        BEDROCK OVERLAIN BY UNSATURATED LOESS TO SATURATED LOESS
/*        BEDROCK OVERLAIN BY UNSATURATED LOESS TO ROCKY FLATS
/*        BEDROCK OVERLAIN BY UNSATURATED LOESS TO RIVER ALLUVIUM
/* THEN REVERSE THE FLOW FOR EACH OF THESE
/*
/*
/* ***********************************************************************
/*
/* TO MINIMIZE THE AREA OVER WHICH VULNERABILITY IS DESCRIBED
/* AS LOWER THAN INDICATED (BECAUSE THE SMALL AREA IS MERGED
/* WITH ONE OF LOWER VULNERABILITY), THE SMALL POLYGONS OF
/* BEDROCK ARE FIRST MERGED WITH ADJACENT POLYGONS OF
/* UNCONSOLIDATED AQUIFERS.
/*
/* LR2 TO LR4 HAS BEEN RELOCATED TO FOLLOW S1
/*
/* LR5 TO LR7 HAS BEEN RELOCATED TO FOLLOW S2
/*
/*   *****************************************************************

/*   *****************************************************************
/*
RENAME S8 LR7
/*
/*     LR7 TO LR8 BEGIN     RF QES QA TO QES/BR
/*
/* ANY REMAINING ROCKY FLATS, SATURATED LOESS, AND RIVER ALLUVIUM
/* IS MERGED WITH ADJACENT POLYGONS OF UNSATURATED LOESS OVER BEDROCK
/*
                                               BUILD LR7 LINE
                                          ADDITEM LR7.AAT LR7.AAT LP-BGD 4 4 I
                                          ADDITEM LR7.AAT LR7.AAT RP-BGD 4 4 I
                                               INFO
                                               SEL LR7.AAT
                                               REDEFINE
                                               29,LP-B,1,1,I
                                               30,LP-G,2,2,I
                                               32,LP-D,1,1,I
                                               33,RP-B,1,1,I
                                               34,RP-G,2,2,I
                                               36,RP-D,1,1,I

                                               SEL LR7.PAT
                                               SORT LR7#
```

```
                                        CALC LR7-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LR7 0
                                        IDEDIT LR7 POLY
                                        INFO
                                        SEL LR7.AAT
                                        SORT LR7#
                                        CALC LR7-ID = $RECNO
                                        Q STOP
                                        IDEDIT LR7 LINE
/*
                    INFO
                    SEL LR7.AAT
                    RELATE LR7.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LR7.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL LR7.AAT
     RES LP-G GE 52 AND LP-G LE 57 AND RP-G GE 32 AND RP-G LE 39
     ASEL LP-G GE 32 AND LP-G LE 39 AND RP-G GE 52 AND RP-G LE 57
                    NSEL
                    CALC LR7-ID = -1
                    Q STOP
                    IDEDIT LR7 LINE
/*
ELIMINATE LR7 LR8 NOKEEPEDGE POLY
RES G GE 52 AND G LE 57 AND AREA LT 404700

N

N
/*
/* KEEP LR7 AS IS
/*
/*    LR7 TO LR8 END
/*
/* *************************************************************************
/*
/*    LR8 TO LR9 START     RF QES QA TO BR
/*
/* ANY REMAINING ROCKY FLATS, SATURATED LOESS, AND RIVER ALLUVIUM
/* IS MERGED WITH ADJACENT POLYGONS OF BEDROCK
/*
                                        BUILD LR8 LINE
                                   ADDITEM LR8.AAT LR8.AAT LP-BGD 4 4 I
                                   ADDITEM LR8.AAT LR8.AAT RP-BGD 4 4 I
                                        INFO
                                        SEL LR8.AAT
                                        REDEFINE
                                        29,LP-B,1,1,I
```

```
                                        30,LP-G,2,2,I
                                        32,LP-D,1,1,I
                                        33,RP-B,1,1,I
                                        34,RP-G,2,2,I
                                        36,RP-D,1,1,I

                                        SEL LR8.PAT
                                        SORT LR8#
                                        CALC LR8-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS LR8 0
                                        IDEDIT LR8 POLY
                                        INFO
                                        SEL LR8.AAT
                                        SORT LR8#
                                        CALC LR8-ID = $RECNO
                                        Q STOP
                                        IDEDIT LR8 LINE
/*
                    INFO
                    SEL LR8.AAT
                    RELATE LR8.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LR8.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    SEL LR8.AAT
     RES LP-G GE 52 AND LP-G LE 57 AND RP-G LE 29 AND RP-G NE 15
     ASEL LP-G LE 29 AND LP-G NE 15 AND RP-G GE 52 AND RP-G LE 57
   ASEL LP-G = 14 AND RP-G = 59
   ASEL LP-G = 59 AND RP-G = 14
                    NSEL
                    CALC LR8-ID = -1
                    Q STOP

                    IDEDIT LR8 LINE
/*
ELIMINATE LR8 LR9 NOKEEPEDGE POLY
RES G GE 52 AND G LE 59 AND AREA LT 404700

N
N
/*
/* LEAVE LR8 AS IS
/*
/*    LR8 TO LR9 END
/* ************************************************************************
/*
/* NOW DO HOUSEKEEPING WITH LR9
/*
                                        BUILD LR9 LINE
```

```
                                    ADDITEM LR9.AAT LR9.AAT LP-BGD 4 4 I
                                    ADDITEM LR9.AAT LR9.AAT RP-BGD 4 4 I
                                         INFO
                                         SEL LR9.AAT
                                         REDEFINE
                                         29,LP-B,1,1,I
                                         30,LP-G,2,2,I
                                         32,LP-D,1,1,I
                                         33,RP-B,1,1,I
                                         34,RP-G,2,2,I
                                         36,RP-D,1,1,I

                                         SEL LR9.PAT
                                         SORT LR9#
                                         CALC LR9-ID = $RECNO - 1
                                         Q STOP
                                         CREATELABELS LR9 0
                                         IDEDIT LR9 POLY
                                         INFO
                                         SEL LR9.AAT
                                         SORT LR9#
                                         CALC LR9-ID = $RECNO
                                         Q STOP
                                         IDEDIT LR9 LINE
/*
                    INFO
                    SEL LR9.AAT
                    RELATE LR9.PAT BY LPOLY# LINK
                    CALC LP-BGD = $1BGD-CODE
                    RELATE LR9.PAT BY RPOLY# LINK
                    CALC RP-BGD = $1BGD-CODE
                    Q STOP
/*
/* **************************************************************
/*
/* NOW BE SURE THE FINAL COVER HAS GEOHYDROLOGIC SETTING VALUE FOR B
/* AND DISSOLVE IT TO GET IT AS SIMPLE AS POSSIBLE

/*
COPY LR9 BIGA
INFO
SEL BIGA.PAT
CALC B = 0
RES G GE 18 AND G LE 39
RES G NE 22 AND G NE 23 AND G NE 32 AND G NE 33
  CALC B = 5
ASEL
RES G = 13 OR G = 22 OR G = 23 OR G = 32 OR G = 33
  CALC B = 4
ASEL
```

```
RES G = 14
  CALC B = 2
ASEL
RES G = 59
  CALC B = 3
ASEL
RES G = 52 OR G = 57
  CALC B = 6
ASEL
RES G = 55
  CALC B = 7
ASEL
RES G = 15
  CALC B = 1
Q STOP
DISSOLVE BIGA BIGB BGD-CODE POLY
ADDITEM BIGB.PAT BIGB.PAT SMALLFLAG 1 1 I
/*
/* **********************************************************
/*
/* GENERATE A FILE OF SIMPLE STATISTICS FOR SPECIFIED COVERS
/*
INFO
SEL BIGB.PAT
REDEFINE
17,B,1,1,I
18,G,2,2,I
20,D,1,1,I

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL X3.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XX3.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XS1.PAT

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL S2.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XS2.PAT
```

```
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XS3.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XS4.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XS5.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL S6.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL S7.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XLR1.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XLR2.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XLR3.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XLR4.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XLR5.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XLR6.PAT
CALC SMALLFLAG = 0

RES AREA LT 404700
CALC SMALLFLAG = 1
SEL LR7.PAT
CALC SMALLFLAG = 0
```

```
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL LR8.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL LR9.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
STATISTICS BIGB.PAT BIGB.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS X3.PAT X3.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XX3.PAT XX3.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XS1.PAT XS1.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XS2.PAT XS2.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS S2.PAT S2.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XS3.PAT XS3.STAT BGD-CODE
SUM AREA
```

```
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XS4.PAT XS4.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XS5.PAT XS5.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS S6.PAT S6.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS S7.PAT S7.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XLR1.PAT XLR1.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XLR2.PAT XLR2.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XLR3.PAT XLR3.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XLR4.PAT XLR4.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
```

```
MIN AREA SMALLFLAG
END
STATISTICS XLR5.PAT XLR5.STAT BGD-CODE

SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XLR6.PAT XLR6.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS LR7.PAT LR7.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS LR8.PAT LR8.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS LR9.PAT LR9.STAT BGD-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
INFO
SEL BIGB.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT BIGB.STAT
PRINT
SEL X3.STAT
REDEFINE
1,B,1,1,I
```

```
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047

SORT B,G,D
OUTPUT X3.STAT
PRINT
SEL XX3.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT XX3.STAT
PRINT
SEL XS1.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT XS1.STAT
PRINT
SEL S2.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT S2.STAT
PRINT
```

```
SEL XS2.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D

OUTPUT XS2.STAT
PRINT
SEL XS3.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT XS3.STAT
PRINT
SEL XS4.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT XS4.STAT
PRINT
SEL XS5.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
```

```
SORT B,G,D
OUTPUT XS5.STAT
PRINT
SEL S6.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT S6.STAT

PRINT
SEL S7.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1;I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT S7.STAT
PRINT
SEL XLR1.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT XLR1.STAT
PRINT
SEL XLR2.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
```

```
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT XLR2.STAT
PRINT
SEL XLR3.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT XLR3.STAT
PRINT

SEL XLR4.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT XLR4.STAT
PRINT
SEL XLR5.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT XLR5.STAT
PRINT
SEL XLR6.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
```

```
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT XLR6.STAT
PRINT
SEL LR7.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT LR7.STAT
PRINT
SEL LR8.STAT

REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT LR8.STAT
PRINT
SEL LR9.STAT
REDEFINE
1,B,1,1,I
2,G,2,2,I
4,D,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT B,G,D
OUTPUT LR9.STAT
PRINT
Q STOP
```

```
INDEXITEM X3.PAT G
INDEXITEM XX3.PAT G
INDEXITEM XS1.PAT G
INDEXITEM S1.PAT G
INDEXITEM XS2.PAT G
INDEXITEM S2.PAT G
INDEXITEM S6.PAT G
INDEXITEM BIGB.PAT G
INDEXITEM LR7.PAT G
INDEXITEM LR8.PAT G
INDEXITEM LR9.PAT G
DATE
Q
A *>INFO
XEROX XX3.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX XLR1.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX XLR2.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX XLR3.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX XS1.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX XLR4.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX XLR5.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX XLR6.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX X3.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX XS2.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX XS3.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX XS4.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX XS5.STAT -AT XREG -PRINT 2 -SPACING 0

XEROX S2.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX S6.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX S7.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX LR7.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX LR8.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX LR9.STAT -AT XREG -PRINT 2 -SPACING 0
XEROX BIGB.STAT -AT XREG -PRINT 2 -SPACING 0
COMO -E
LOGOUT
```

```
/*      COMMAND FILE 9--GROUP SIMILAR SOIL ASSOCIATIONS
/*
/*
/*      FILE NAME IS SOITOSSOI.COMI
/*
DELETE SOITOSSOI.COMO
COMO SOITOSSOI.COMO
/*
/*THIS IS FILE SOITOSSOI.COMO GENERATED BY EXECUTING SOITOSSOI.COMI
/*DATE
/*
/*      THIS COMI CALCULATES A VALUE FOR S-CODE FROM THE SOI-CODE
/*      AND DISSOLVES THE COVER ON S-CODE.
/*
/*      THE COVER SSOI OF GROUPED SOIL ASSOCIATIONS IS GENERATED
/*      IF THE COVER IS ALREADY THERE, IT IS KILLED.
/*
/*      S-CODE IS ADDED AS AN ITEM IN SSOI.PAT
/*
/*
/*      NUMBERS ASSIGNED TO S-CODE ARE ARBITRARY
/*
ARC
KILL DSOI ALL
KILL SSOI ALL
KILL TSOI ALL
/*
/* ELIMINATE THE AREAS IDENTIFIED AS WATER
/*
ELIMINATE SOI DSOI KEEPEDGE POLY
RES SOI-CODE = 2222

N
N
/*
/* GROUP THE SOIL ASSOCIATIONS
/*
COPY DSOI TSOI
ADDITEM TSOI.PAT TSOI.PAT S-CODE 1 1 I
INFO
REM
  SEL TSOI.PAT
REM
REM                           S-CODE = 1 = MOUNTAINS - FRONT RANGE
REM
  RES SOI-CODE = 021 OR SOI-CODE = 159 OR SOI-CODE = 191 OR SOI-CODE = 232
  CALC S-CODE = 1
REM
REM                           S-CODE = 2 = MOUNTAINS - SOUTHERN
REM
```

```
  ASEL
  RES SOI-CODE = 193 OR SOI-CODE = 339
  CALC S-CODE = 2

REM
REM                            S-CODE = 3 = MOUNTAINS - SOUTHWESTERN
REM
  ASEL
  RES SOI-CODE = 192
  CALC S-CODE = 3
REM
REM                            S-CODE = 4 = MAJOR STREAMS
REM
     ASEL
     RES SOI-CODE = 180  OR SOI-CODE = 229
     CALC S-CODE = 4
REM
REM                            S-CODE = 5 = PLAINS - NEAR MOUNTAIN FRONT
REM
  ASEL
  RES SOI-CODE = 156 OR SOI-CODE = 158 OR SOI-CODE = 162
  ASEL SOI-CODE = 163 OR SOI-CODE = 185 OR SOI-CODE = 231
  CALC S-CODE = 5
REM
REM                       S-CODE = 6 = PLAINS - MOUNTAINS TO SOUTH PLATTE
REM
  ASEL
  RES SOI-CODE = 168 OR SOI-CODE = 186 OR SOI-CODE = 190
  ASEL SOI-CODE = 230
  CALC S-CODE = 6
REM
REM                          S-CODE = 7 = PLAINS - EASTERN
REM
     ASEL
     RES SOI-CODE = 164 OR SOI-CODE = 165 OR SOI-CODE = 169
     ASEL SOI-CODE = 176 OR SOI-CODE = 208 OR SOI-CODE = 226
     CALC S-CODE = 7
REM
REM                          S-CODE = 8 = PLAINS - NORTHWESTERN
REM
     ASEL
     RES SOI-CODE = 173
     CALC S-CODE = 8
REM
REM                                                       CHECK
REM
REM TEST TO SEE IF ALL POLYS HAVE A S-CODE
  ASEL
    RES S-CODE LE 0
     LIST
```

```
Q STOP
DISSOLVE TSOI SSOI S-CODE POLY
/* GENERATE A FILE OF SIMPLE STATISTICS FOR THE SPECIFIED SSOI
STATISTICS SSOI.PAT SSOI.STAT S-CODE
SUM AREA
MAX AREA
MIN AREA

END
INFO
SEL SSOI.STAT
CALC SUM-AREA = SUM-AREA / 4047
CALC MAX-AREA = MAX-AREA / 4047
CALC MIN-AREA = MIN-AREA / 4047
SORT S-CODE
OUTPUT SSOI.STAT
PRINT
Q STOP
Q
A *>INFO
XEROX SSOI.STAT -AT XREG -PRINT 2 -SPACING 0
COMO -E
LOGOUT
```

```
/*      COMMAND FILE 10--OVERLAY SOIL-MEDIA COVER ON COVER OF AQUIFER MEDIA
        AND UNSATURATED MEDIA
/*
/*
/*
/*      FILE NAME IS AGDS.COMI
DELETE AGDS.COMO
COMO AGDS.COMO
DATE
/*
/* FILE NAME IS AGDS.COMO CREATED BY EXECUTING AGDS.COMI
/*
/*      THIS AML INTERSECTS (USING IDENTITY) COVERS
/*      AGD AND S TO CREATE COVER AGDS
/*      THE ITEM 'CODE' IS ADDED AS A 6-DIGIT INTEGER
/*      THE VALUES ASSIGNED TO CODE ARE
/*           AGGDSL
/*              A FOR AREA = GEOHYDROLOGIC SETTING AREA (1-7)
/*              G FOR GEOLOGY = 2-DIGIT VALUE OF G
/*              D FOR DEPTH TO WATER (1-4,6)
/*              S FOR SOIL (1-8)
/*              L FOR SLOPE OF LAND SURFACE (1-3)
/*
/*
ARC
KILL AGDS ALL
IDENTITY AGD S AGDS POLY 1
DATE
ADDITEM AGDS.PAT AGDS.PAT CODE 6 6 I
INFO
SEL AGDS.PAT
REDEFINE
38,A,1,1,I
39,G,2,2,I
41,D,1,1,I
42,S,1,1,I
43,L,1,1,I

CALC L = 9
CALC S = S-CODE
CALC D = D-CODE
CALC G = G-CODE
CALC A = B-CODE
Q STOP
/*
COMO -E
LOGOUT
```

```
/*      COMMAND FILE 11--ELIMINATE SMALL POLYGONS RESULTING FROM OVERLAY OF
/*      SOIL-MEDIA COVER (COMMAND FILE 10)
/*
/*
/*      FILE NAME IS CLEANUP.COMI
DELETE CLEANUP.COMO
COMO CLEANUP.COMO
/*      COMO FILE NAMED CLEANUP.COMO FOR EXECUTION OF CLEANUP.COMI
/*
DATE
ARC
/*
/* CLEAR THE DECKS
/*
KILL S0 ALL
KILL S1 ALL
KILL S2 ALL
KILL S3 ALL
KILL S4 ALL
KILL S5 ALL
KILL S6 ALL
KILL S7 ALL
KILL S8 ALL
KILL S9 ALL
/*
/* ********************************************************************
/* ********************************************************************
/*
/* REASSIGNS VALUE OF S TO BE CONSISTENT WITH THE ASSUMPTION THAT
/* THE VALUE OF S MAY NOT BE ZERO AND THE VALUE OF S IS ASSIGNED
/* A DUMMY VALUE IN WATER AREAS
/*
/* AND PROCESS TO ELIMINATE SMALL POLYGONS
/*
/* MAJOR SEGMENTS ARE DIVIDED BY ONE OR MORE LINE OF ASTERISKS
/*
/* ********************************************************************
/* ********************************************************************
/*
COPY AGDS S0
INFO
SEL S0.PAT
REM
REM ASSIGN DUMMY VALUE OF 9 TO S IN WATER AREAS
REM
  RES G = 15
  CALC S = 9
REM
REM WHERE S = 0, ASSIGN A VALUE OF S TYPICAL FOR THE VALUE OF G
REM
```

```
  ASEL
  RES G = 14 AND S = 0
  CALC S = 1

REM
  ASEL
  RES G = 13 AND S = 0
  CALC S = 5
REM
  ASEL
  RES G = 24 AND S = 0
  CALC S = 5
REM
  ASEL
  RES G = 29 AND S = 0
  CALC S = 7
REM
  ASEL
  RES G = 38 AND S = 0
  CALC S = 7
REM
  ASEL
  RES G = 52 AND S = 0
  CALC S = 7
REM
  ASEL
  RES G = 55 AND S = 0
  CALC S = 4
REM
Q STOP
DISSOLVE S0 S1 CODE POLY
                    /*
                    /*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD S1 LINE
                    ADDITEM S1.AAT S1.AAT LP-CODE 6 6 I
                    ADDITEM S1.AAT S1.AAT RP-CODE 6 6 I
                    ADDITEM S1.PAT S1.PAT SMALLFLAG 1 1 I
                    INFO
                    SEL S1.AAT
                    REDEFINE
                      29,LP-A,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,LP-S,1,1,I
                      34,LP-L,1,1,I
                      35,RP-A,1,1,I
                      36,RP-G,2,2,I
                      38,RP-D,1,1,I
```

```
                     39,RP-S,1,1,I
                     40,RP-L,1,1,I

          SEL S1.PAT
REDEFINE
17,A,1,1,I
18,G,2,2,I

20,D,1,1,I
21,S,1,1,I
22,L,1,1,I

                     SEL S1.PAT
                     SORT S1#
                     CALC S1-ID = $RECNO - 1
                   Q STOP
                   CREATELABELS S1 0
                   IDEDIT S1 POLY
                   INFO
                     SEL S1.AAT
                     SORT S1#
                     CALC S1-ID = $RECNO
                RELATE S1.PAT BY LPOLY# LINK
                CALC LP-CODE = $1CODE
                RELATE S1.PAT BY RPOLY# LINK
                CALC RP-CODE = $1CODE
                   Q STOP
                   IDEDIT S1 LINE
/*
/* ******************************************************************
/*
/*     S1 TO S2     THESE APPEAR TO BE REASONABLE CHANGES IN VALUE OF S
/*                  THE CHANGE IS TO A BROADER RANGE AND IS CONSISTENT
/*                  WITH THE DESCRIPTIONS
/*
/*     S=1 BECOMES S=3
/*     S=2 BECOMES S=3
/*     S=6 BECOMES S=5
/*     S=7 BECOMES S=6
/*     S=8 BECOMES S=4
/*
`              INFO
                                          SEL S1.PAT
                                          SORT S1#
                                          CALC S1-ID = $RECNO - 1
                                          Q STOP
                                          CREATELABELS S1 0
                                          IDEDIT S1 POLY
                                          INFO
                                          SEL S1.AAT
```

```
                                        SORT S1#
                                        CALC S1-ID = $RECNO
                                        Q STOP
                                        IDEDIT S1 LINE
                    INFO
                    SEL S1.AAT
                    RELATE S1.PAT BY LPOLY# LINK
                    CALC LP-CODE = $1CODE
                    RELATE S1.PAT BY RPOLY# LINK
                    CALC RP-CODE = $1CODE
          RES LP-S = 1 AND RP-S = 3

          ASEL LP-S = 3 AND RP-S = 1
          ASEL LP-S = 2 AND RP-S = 3
          ASEL LP-S = 3 AND RP-S = 2
          ASEL LP-S = 6 AND RP-S = 5
          ASEL LP-S = 5 AND RP-S = 6
          ASEL LP-S = 7 AND RP-S = 6
          ASEL LP-S = 6 AND RP-S = 7
          ASEL LP-S = 8 AND RP-S = 4
          ASEL LP-S = 4 AND RP-S = 8
          RES LP-A = RP-A AND LP-G = RP-G AND LP-D = RP-D
                    NSEL
                    CALC S1-ID = -1
                    Q STOP
                    IDEDIT S1 LINE
/*
ELIMINATE S1 S2 NOKEEPEDGE POLY
RES ( S = 1 OR S = 2 OR S = 6 OR S = 7 OR S = 8 ) AND AREA LT 404700

N
N
/*     KEEP S1 UNCHANGED
/*
KILL FOX
RENAME S2 FOX
DISSOLVE FOX S2 CODE POLY
                    /*
                    /*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD S2 LINE
                    ADDITEM S2.AAT S2.AAT LP-CODE 6 6 I
                    ADDITEM S2.AAT S2.AAT RP-CODE 6 6 I
                    ADDITEM S2.PAT S2.PAT SMALLFLAG 1 1 I
                    INFO
                    SEL S2.AAT
                    REDEFINE
                      29,LP-A,1,1,I
                      30,LP-G,2,2,I
```

```
                  32,LP-D,1,1,I
                  33,LP-S,1,1,I
                  34,LP-L,1,1,I
                  35,RP-A,1,1,I
                  36,RP-G,2,2,I
                  38,RP-D,1,1,I
                  39,RP-S,1,1,I
                  40,RP-L,1,1,I

        SEL S2.PAT
REDEFINE
17,A,1,1,I
18,G,2,2,I
20,D,1,1,I
21,S,1,1,I

22,L,1,1,I

                  SEL S2.PAT
                  SORT S2#
                  CALC S2-ID = $RECNO - 1
                Q STOP
                CREATELABELS S2 0
                IDEDIT S2 POLY
                INFO
                  SEL S2.AAT
                  SORT S2#
                  CALC S2-ID = $RECNO
             RELATE S2.PAT BY LPOLY# LINK
             CALC LP-CODE = $1CODE
             RELATE S2.PAT BY RPOLY# LINK
             CALC RP-CODE = $1CODE
                Q STOP
                IDEDIT S2 LINE
/* ***********************************************************************
/*
/*     S2 TO S3     THESE CHANGES ARE NOT THE FIRST CHOICE, BUT
/*                  ARE CONSISTENT WITH THE DESCRIPTIONS OF THE GROUPS
/*
/*     S=1 BECOMES S=2
/*     S=5 BECOMES S=1
/*     S=6 BECOMES S=1
/*     S=7 BECOMES S=5
/*
            INFO
                                SEL S2.PAT
                                SORT S2#
                                CALC S2-ID = $RECNO - 1
                                Q STOP
                                CREATELABELS S2 0
```

```
                                       IDEDIT S2 POLY
                                       INFO
                                       SEL S2.AAT
                                       SORT S2#
                                       CALC S2-ID = $RECNO
                                       Q STOP
                                       IDEDIT S2 LINE
                    INFO
                    SEL S2.AAT
                    RELATE S2.PAT BY LPOLY# LINK
                    CALC LP-CODE = $1CODE
                    RELATE S2.PAT BY RPOLY# LINK
                    CALC RP-CODE = $1CODE
          RES LP-S = 1 AND RP-S = 2
          ASEL LP-S = 2 AND RP-S = 1
          ASEL LP-S = 5 AND RP-S = 1
          ASEL LP-S = 1 AND RP-S = 5
          ASEL LP-S = 6 AND RP-S = 1
          ASEL LP-S = 1 AND RP-S = 6

          ASEL LP-S = 7 AND RP-S = 5
          ASEL LP-S = 5 AND RP-S = 7
          RES LP-A = RP-A AND LP-G = RP-G AND LP-D = RP-D
                    NSEL
                    CALC S2-ID = -1
                    Q STOP
                    IDEDIT S2 LINE
/*
ELIMINATE S2 S3 NOKEEPEDGE POLY
RES ( S = 1 OR S = 5 OR S = 6 OR S = 7 ) AND AREA LT 404700

N
N
/*     KEEP S2 UNCHANGED
/*
KILL FOX
RENAME S3 FOX
DISSOLVE FOX S3 CODE POLY
                    /*
                    /*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD S3 LINE
                    ADDITEM S3.AAT S3.AAT LP-CODE 6 6 I
                    ADDITEM S3.AAT S3.AAT RP-CODE 6 6 I
                    ADDITEM S3.PAT S3.PAT SMALLFLAG 1 1 I
                    INFO
                    SEL S3.AAT
                    REDEFINE
                      29,LP-A,1,1,I
```

```
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,LP-S,1,1,I
                      34,LP-L,1,1,I
                      35,RP-A,1,1,I
                      36,RP-G,2,2,I
                      38,RP-D,1,1,I
                      39,RP-S,1,1,I
                      40,RP-L,1,1,I

          SEL S3.PAT
REDEFINE
17,A,1,1,I
18,G,2,2,I
20,D,1,1,I
21,S,1,1,I
22,L,1,1,I

                      SEL S3.PAT
                      SORT S3#
                      CALC S3-ID = $RECNO - 1
                    Q STOP
                    CREATELABELS S3 0

                    IDEDIT S3 POLY
                    INFO
                      SEL S3.AAT
                      SORT S3#
                      CALC S3-ID = $RECNO
                 RELATE S3.PAT BY LPOLY# LINK
                 CALC LP-CODE = $1CODE
                 RELATE S3.PAT BY RPOLY# LINK
                 CALC RP-CODE = $1CODE
                    Q STOP
                    IDEDIT S3 LINE
/* ***********************************************************************
/*
/*     S3 TO S4 THESE ARE ON A PAR WITH THE LAST SERIES BUT
/*              ARE DONE SEPARATELY BECAUSE THEY INVOLVE
/*              THE SAME SOIL GROUPS
/*
/*     S=1 BECOMES S=4
/*     S=5 BECOMES S=4
/*     S=6 BECOMES S=4
/*     S=7 BECOMES S=4
/*
               INFO
                                            SEL S3.PAT
                                            SORT S3#
                                            CALC S3-ID = $RECNO - 1
```

```
                                        Q STOP
                                        CREATELABELS S3 0
                                        IDEDIT S3 POLY
                                        INFO
                                        SEL S3.AAT
                                        SORT S3#
                                        CALC S3-ID = $RECNO
                                        Q STOP
                                        IDEDIT S3 LINE
                    INFO
                    SEL S3.AAT
                    RELATE S3.PAT BY LPOLY# LINK
                    CALC LP-CODE = $1CODE
                    RELATE S3.PAT BY RPOLY# LINK
                    CALC RP-CODE = $1CODE
          RES LP-S = 1 AND RP-S = 4
          ASEL LP-S = 4 AND RP-S = 1
          ASEL LP-S = 5 AND RP-S = 4
          ASEL LP-S = 4 AND RP-S = 5
          ASEL LP-S = 6 AND RP-S = 4
          ASEL LP-S = 4 AND RP-S = 6
          ASEL LP-S = 7 AND RP-S = 4
          ASEL LP-S = 4 AND RP-S = 7
          RES LP-A = RP-A AND LP-G = RP-G AND LP-D = RP-D
                    NSEL
                    CALC S3-ID = -1
                    Q STOP

                    IDEDIT S3 LINE
/*
ELIMINATE S3 S4 NOKEEPEDGE POLY
RES ( S = 1 OR S = 5 OR S = 6 OR S = 7 ) AND AREA LT 404700

N
N
/*     KEEP S3 UNCHANGED
/*
KILL FOX
RENAME S4 FOX
DISSOLVE FOX S4 CODE POLY
                    /*
                    /*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD S4 LINE
                    ADDITEM S4.AAT S4.AAT LP-CODE 6 6 I
                    ADDITEM S4.AAT S4.AAT RP-CODE 6 6 I
                    ADDITEM S4.PAT S4.PAT SMALLFLAG 1 1 I
                    INFO
                    SEL S4.AAT
```

```
                    REDEFINE
                      29,LP-A,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,LP-S,1,1,I
                      34,LP-L,1,1,I
                      35,RP-A,1,1,I
                      36,RP-G,2,2,I
                      38,RP-D,1,1,I
                      39,RP-S,1,1,I
                      40,RP-L,1,1,I

          SEL S4.PAT
REDEFINE
17,A,1,1,I
18,G,2,2,I
20,D,1,1,I
21,S,1,1,I
22,L,1,1,I

                      SEL S4.PAT
                      SORT S4#
                      CALC S4-ID = $RECNO - 1
                    Q STOP
                    CREATELABELS S4 0
                    IDEDIT S4 POLY
                    INFO
                      SEL S4.AAT
                      SORT S4#
                      CALC S4-ID = $RECNO
                 RELATE S4.PAT BY LPOLY# LINK

                 CALC LP-CODE = $1CODE
                 RELATE S4.PAT BY RPOLY# LINK
                 CALC RP-CODE = $1CODE
                    Q STOP
                    IDEDIT S4 LINE
/* ***********************************************************************
/*
/*      S4 TO S5      THESE ARE LESS DESIRABLE CHANGES, BUT ARE
/*                    TO A GROUP OF EQUAL OR HIGHER VULNERABILITY RANGE
/*
/*      S=2 BECOMES S=1
/*      S=3 BECOMES S=1
/*      S=4 BECOMES S=1
/*      S=7 BECOMES S=1
/*
               INFO
                                            SEL S4.PAT
                                            SORT S4#
```

```
                                        CALC S4-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS S4 0
                                        IDEDIT S4 POLY
                                        INFO
                                        SEL S4.AAT
                                        SORT S4#
                                        CALC S4-ID = $RECNO
                                        Q STOP
                                        IDEDIT S4 LINE
                    INFO
                    SEL S4.AAT
                    RELATE S4.PAT BY LPOLY# LINK
                    CALC LP-CODE = $1CODE
                    RELATE S4.PAT BY RPOLY# LINK
                    CALC RP-CODE = $1CODE
          RES LP-S = 2 AND RP-S = 1
          ASEL LP-S = 1 AND RP-S = 2
          ASEL LP-S = 3 AND RP-S = 1
          ASEL LP-S = 1 AND RP-S = 3
          ASEL LP-S = 4 AND RP-S = 1
          ASEL LP-S = 1 AND RP-S = 4
          ASEL LP-S = 7 AND RP-S = 1
          ASEL LP-S = 1 AND RP-S = 7
          RES LP-A = RP-A AND LP-G = RP-G AND LP-D = RP-D
                    NSEL
                    CALC S4-ID = -1
                    Q STOP
                    IDEDIT S4 LINE
/*
ELIMINATE S4 S5 NOKEEPEDGE POLY
RES ( S = 2 OR S = 3 OR S = 4 OR S = 7 ) AND AREA LT 404700

N
N

/*     KEEP S4 UNCHANGED
/*
KILL FOX
RENAME S5 FOX
DISSOLVE FOX S5 CODE POLY
                    /*
                    /*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD S5 LINE
                    ADDITEM S5.AAT S5.AAT LP-CODE 6 6 I
                    ADDITEM S5.AAT S5.AAT RP-CODE 6 6 I
                    ADDITEM S5.PAT S5.PAT SMALLFLAG 1 1 I
                    INFO
```

```
                    SEL S5.AAT
                    REDEFINE
                      29,LP-A,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,LP-S,1,1,I
                      34,LP-L,1,1,I
                      35,RP-A,1,1,I
                      36,RP-G,2,2,I
                      38,RP-D,1,1,I
                      39,RP-S,1,1,I
                      40,RP-L,1,1,I

          SEL S5.PAT
REDEFINE
17,A,1,1,I
18,G,2,2,I
20,D,1,1,I
21,S,1,1,I
22,L,1,1,I

                      SEL S5.PAT
                      SORT S5#
                      CALC S5-ID = $RECNO - 1
                    Q STOP
                    CREATELABELS S5 0
                    IDEDIT S5 POLY
                    INFO
                      SEL S5.AAT
                      SORT S5#
                      CALC S5-ID = $RECNO
                 RELATE S5.PAT BY LPOLY# LINK
                 CALC LP-CODE = $1CODE
                 RELATE S5.PAT BY RPOLY# LINK
                 CALC RP-CODE = $1CODE
                    Q STOP
                    IDEDIT S5 LINE
/* ***********************************************************************
/*

/*      S5 TO S6      THESE ARE AS APPROPRIATE AS THE CHANGES FROM S4 TO S5
/*                    THEY ARE SEPARATE BECAUSE THEY INVOLVE THE SAME GROUPS
/*
/*      S=3 BECOMES S=2
/*      S=4 BECOMES S=8
/*      S=7 BECOMES S=8
/*
               INFO
                                            SEL S5.PAT
                                            SORT S5#
```

```
                                        CALC S5-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS S5 0
                                        IDEDIT S5 POLY
                                        INFO
                                        SEL S5.AAT
                                        SORT S5#
                                        CALC S5-ID = $RECNO
                                        Q STOP
                                        IDEDIT S5 LINE
                    INFO
                    SEL S5.AAT
                    RELATE S5.PAT BY LPOLY# LINK
                    CALC LP-CODE = $1CODE
                    RELATE S5.PAT BY RPOLY# LINK
                    CALC RP-CODE = $1CODE
          RES LP-S = 3 AND RP-S = 2
          ASEL LP-S = 2 AND RP-S = 3
          ASEL LP-S = 4 AND RP-S = 8
          ASEL LP-S = 8 AND RP-S = 4
          ASEL LP-S = 7 AND RP-S = 8
          ASEL LP-S = 8 AND RP-S = 7
          RES LP-A = RP-A AND LP-G = RP-G AND LP-D = RP-D
                    NSEL
                    CALC S5-ID = -1
                    Q STOP
                    IDEDIT S5 LINE
/*
ELIMINATE S5 S6 NOKEEPEDGE POLY
RES ( S = 3 OR S = 4 OR S = 7 ) AND AREA LT 404700

N
N
/*     KEEP S5 UNCHANGED
/*
KILL FOX
RENAME S6 FOX
DISSOLVE FOX S6 CODE POLY
                    /*
                    /*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD S6 LINE

                    ADDITEM S6.AAT S6.AAT LP-CODE 6 6 I
                    ADDITEM S6.AAT S6.AAT RP-CODE 6 6 I
                    ADDITEM S6.PAT S6.PAT SMALLFLAG 1 1 I
                    INFO
                    SEL S6.AAT
                    REDEFINE
```

```
                    29,LP-A,1,1,I
                    30,LP-G,2,2,I
                    32,LP-D,1,1,I
                    33,LP-S,1,1,I
                    34,LP-L,1,1,I
                    35,RP-A,1,1,I
                    36,RP-G,2,2,I
                    38,RP-D,1,1,I
                    39,RP-S,1,1,I
                    40,RP-L,1,1,I

          SEL S6.PAT
REDEFINE
17,A,1,1,I
18,G,2,2,I
20,D,1,1,I
21,S,1,1,I
22,L,1,1,I

                    SEL S6.PAT
                    SORT S6#
                    CALC S6-ID = $RECNO - 1
                  Q STOP
                  CREATELABELS S6 0
                  IDEDIT S6 POLY
                  INFO
                    SEL S6.AAT
                    SORT S6#
                    CALC S6-ID = $RECNO
                RELATE S6.PAT BY LPOLY# LINK
                CALC LP-CODE = $1CODE
                RELATE S6.PAT BY RPOLY# LINK
                CALC RP-CODE = $1CODE
                  Q STOP
                  IDEDIT S6 LINE
/* ***********************************************************************
/*
/*     S6 TO S7     THESE ARE CHANGES TO A SOIL GROUP THAT IS
/*                  DESCRIBED AS HAVING A LOWER VULNERABILITY RANGE
/*                  THE CHANGE IS MADE SOLELY FOR THE CONVENIENCE
/*                  OF NOT DEALING WITH POLYGONS LESS THAN 100 ACRES IN AREA
/*
/*     S=1 BECOMES S=5
/*     S=4 BECOMES S=5
/*
            INFO
                                  SEL S6.PAT

                                  SORT S6#
```

```
                                        CALC S6-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS S6 0
                                        IDEDIT S6 POLY
                                        INFO
                                        SEL S6.AAT
                                        SORT S6#
                                        CALC S6-ID = $RECNO
                                        Q STOP
                                        IDEDIT S6 LINE
                    INFO
                    SEL S6.AAT
                    RELATE S6.PAT BY LPOLY# LINK
                    CALC LP-CODE = $1CODE
                    RELATE S6.PAT BY RPOLY# LINK
                    CALC RP-CODE = $1CODE
          RES ( LP-S = 1 OR LP-S = 4 ) AND RP-S = 5
          ASEL LP-S = 5 AND ( RP-S =  1 OR RP-S = 4 )
          RES LP-A = RP-A AND LP-G = RP-G AND LP-D = RP-D
                    NSEL
                    CALC S6-ID = -1
                    Q STOP
                    IDEDIT S6 LINE
/*
ELIMINATE S6 S7 NOKEEPEDGE POLY
RES ( S = 1 OR S = 4 ) AND AREA LT 404700

N
N
/*      KEEP S6 UNCHANGED
/*
KILL FOX
RENAME S7 FOX
DISSOLVE FOX S7 CODE POLY
                    /*
                    /*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD S7 LINE
                    ADDITEM S7.AAT S7.AAT LP-CODE 6 6 I
                    ADDITEM S7.AAT S7.AAT RP-CODE 6 6 I
                    ADDITEM S7.PAT S7.PAT SMALLFLAG 1 1 I
                    INFO
                    SEL S7.AAT
                    REDEFINE
                      29,LP-A,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,LP-S,1,1,I
                      34,LP-L,1,1,I
```

```
                    35,RP-A,1,1,I
                    36,RP-G,2,2,I

                    38,RP-D,1,1,I
                    39,RP-S,1,1,I
                    40,RP-L,1,1,I

          SEL S7.PAT
REDEFINE
17,A,1,1,I
18,G,2,2,I
20,D,1,1,I
21,S,1,1,I
22,L,1,1,I

                    SEL S7.PAT
                    SORT S7#
                    CALC S7-ID = $RECNO - 1
                  Q STOP
                  CREATELABELS S7 0
                  IDEDIT S7 POLY
                  INFO
                    SEL S7.AAT
                    SORT S7#
                    CALC S7-ID = $RECNO
               RELATE S7.PAT BY LPOLY# LINK
               CALC LP-CODE = $1CODE
               RELATE S7.PAT BY RPOLY# LINK
               CALC RP-CODE = $1CODE
                  Q STOP
                  IDEDIT S7 LINE
/* *****************************************************************************
/*
/*      S7 TO S8      THESE CHANGES ARE SIMILAR TO THE LAST ONES
/*                    THEY ARE SEPARATE BECAUSE THEY INVOLVE THE SAME GROUPS
/*
/*      S=1 BECOMES S=6
/*      S=4 BECOMES S=6
/*      S=5 BECOMES S=6
/*
              INFO
                                    SEL S7.PAT
                                    SORT S7#
                                    CALC S7-ID = $RECNO - 1
                                    Q STOP
                                    CREATELABELS S7 0
                                    IDEDIT S7 POLY
                                    INFO
                                    SEL S7.AAT
                                    SORT S7#
```

```
                                        CALC S7-ID = $RECNO
                                        Q STOP
                                        IDEDIT S7 LINE
                    INFO
                    SEL S7.AAT
                    RELATE S7.PAT BY LPOLY# LINK

                    CALC LP-CODE = $1CODE
                    RELATE S7.PAT BY RPOLY# LINK
                    CALC RP-CODE = $1CODE
          RES ( LP-S = 1 OR LP-S = 4 OR LP-S = 5 ) AND RP-S = 6
          ASEL LP-S = 6 AND ( RP-S =  1 OR RP-S = 4 OR RP-S = 5 )
          RES LP-A = RP-A AND LP-G = RP-G AND LP-D = RP-D
                    NSEL
                    CALC S7-ID = -1
                    Q STOP
                    IDEDIT S7 LINE
/*
ELIMINATE S7 S8 NOKEEPEDGE POLY
RES ( S = 1 OR S = 4 OR S = 5 ) AND AREA LT 404700

N
N
/*     KEEP S7 UNCHANGED
/*
KILL FOX
RENAME S8 FOX
DISSOLVE FOX S8 CODE POLY
                    /*
                    /*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD S8 LINE
                    ADDITEM S8.AAT S8.AAT LP-CODE 6 6 I
                    ADDITEM S8.AAT S8.AAT RP-CODE 6 6 I
                    ADDITEM S8.PAT S8.PAT SMALLFLAG 1 1 I
                    INFO
                    SEL S8.AAT
                    REDEFINE
                      29,LP-A,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,LP-S,1,1,I
                      34,LP-L,1,1,I
                      35,RP-A,1,1,I
                      36,RP-G,2,2,I
                      38,RP-D,1,1,I
                      39,RP-S,1,1,I
                      40,RP-L,1,1,I
```

```
          SEL S8.PAT
REDEFINE
17,A,1,1,I
18,G,2,2,I
20,D,1,1,I
21,S,1,1,I
22,L,1,1,I

                      SEL S8.PAT
                      SORT S8#

                      CALC S8-ID = $RECNO - 1
                    Q STOP
                    CREATELABELS S8 0
                    IDEDIT S8 POLY
                    INFO
                      SEL S8.AAT
                      SORT S8#
                      CALC S8-ID = $RECNO
                 RELATE S8.PAT BY LPOLY# LINK
                 CALC LP-CODE = $1CODE
                 RELATE S8.PAT BY RPOLY# LINK
                 CALC RP-CODE = $1CODE
                    Q STOP
                    IDEDIT S8 LINE
/* ***********************************************************************
/*
/*     S8 TO S9     THESE CHANGES ARE SIMILAR TO THE LAST ONES
/*                  THEY ARE SEPARATE BECAUSE THEY INVOLVE THE SAME GROUPS
/*
/*     S=1 BECOMES S=7
/*     S=4 BECOMES S=7
/*     S=5 BECOMES S=7
/*     S=6 BECOMES S=7
/*     S=8 BECOMES S=7
/*
               INFO
                                        SEL S8.PAT
                                        SORT S8#
                                        CALC S8-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS S8 0
                                        IDEDIT S8 POLY
                                        INFO
                                        SEL S8.AAT
                                        SORT S8#
                                        CALC S8-ID = $RECNO
                                        Q STOP
                                        IDEDIT S8 LINE
                    INFO
```

```
                    SEL S8.AAT
                    RELATE S8.PAT BY LPOLY# LINK
                    CALC LP-CODE = $1CODE
                    RELATE S8.PAT BY RPOLY# LINK
                    CALC RP-CODE = $1CODE
          RES ( LP-S = 1 OR LP-S = 4 OR LP-S = 5 ) AND RP-S = 7
          ASEL LP-S = 7 AND ( RP-S =  1 OR RP-S = 4 OR RP-S = 5 )
          ASEL ( LP-S = 6 OR LP-S = 8 ) AND RP-S = 7
          ASEL LP-S = 7 AND ( RP-S = 6 OR RP-S = 8 )
          RES LP-A = RP-A AND LP-G = RP-G AND LP-D = RP-D
                    NSEL
                    CALC S8-ID = -1
                    Q STOP
                    IDEDIT S8 LINE

/*
ELIMINATE S8 S9 NOKEEPEDGE POLY
RES ( S = 1 OR S = 4 OR S = 5 OR S = 6 OR S = 8 ) AND AREA LT 404700

N
N
/*     KEEP S8 UNCHANGED
/*
KILL FOX
RENAME S9 FOX
DISSOLVE FOX S9 CODE POLY
                    /*
                    /*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD S9 LINE
                    ADDITEM S9.AAT S9.AAT LP-CODE 6 6 I
                    ADDITEM S9.AAT S9.AAT RP-CODE 6 6 I
                    ADDITEM S9.PAT S9.PAT SMALLFLAG 1 1 I
                    INFO
                    SEL S9.AAT
                    REDEFINE
                      29,LP-A,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,LP-S,1,1,I
                      34,LP-L,1,1,I
                      35,RP-A,1,1,I
                      36,RP-G,2,2,I
                      38,RP-D,1,1,I
                      39,RP-S,1,1,I
                      40,RP-L,1,1,I

          SEL S9.PAT
REDEFINE
```

```
17,A,1,1,I
18,G,2,2,I
20,D,1,1,I
21,S,1,1,I
22,L,1,1,I

                          SEL S9.PAT
                          SORT S9#
                          CALC S9-ID = $RECNO - 1
                        Q STOP
                        CREATELABELS S9 0
                        IDEDIT S9 POLY
                        INFO
                          SEL S9.AAT
                          SORT S9#
                          CALC S9-ID = $RECNO
                     RELATE S9.PAT BY LPOLY# LINK
                     CALC LP-CODE = $1CODE

                     RELATE S9.PAT BY RPOLY# LINK
                     CALC RP-CODE = $1CODE
                        Q STOP
                        IDEDIT S9 LINE
/* ***********************************************************************
/*
/* ***********************************************************************
/*
/* ***********************************************************************
/*
/* GENERATE A FILE OF SIMPLE STATISTICS FOR SPECIFIED COVERS
/*
INFO
SEL S1.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL S2.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL S3.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL S4.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL S5.PAT
CALC SMALLFLAG = 0
```

```
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL S6.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL S7.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL S8.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL S9.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
STATISTICS S1.PAT S1.STAT CODE
SUM AREA
SUM AREA SMALLFLAG

MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS S2.PAT S2.STAT CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS S3.PAT S3.STAT CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS S4.PAT S4.STAT CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS S5.PAT S5.STAT CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
```

```
STATISTICS S6.PAT S6.STAT CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS S7.PAT S7.STAT CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS S8.PAT S8.STAT CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS S9.PAT S9.STAT CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
INFO
SEL S1.STAT

REDEFINE
1,A,1,1,I
2,G,2,2,I
4,D,1,1,I
5,S,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT A,G,D
OUTPUT S1.STAT
PRINT
SORT S,A,G,D
PRINT
SEL S2.STAT
REDEFINE
1,A,1,1,I
2,G,2,2,I
4,D,1,1,I
5,S,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
```

```
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT A,G,D
OUTPUT S2.STAT
PRINT
SORT S,A,G,D
PRINT
SEL S3.STAT
REDEFINE
1,A,1,1,I
2,G,2,2,I
4,D,1,1,I
5,S,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT A,G,D
OUTPUT S3.STAT
PRINT
SORT S,A,G,D
PRINT
SEL S4.STAT
REDEFINE
1,A,1,1,I
2,G,2,2,I
4,D,1,1,I
5,S,1,1,I


CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT A,G,D
OUTPUT S4.STAT
PRINT
SORT S,A,G,D
PRINT
SEL S5.STAT
REDEFINE
1,A,1,1,I
2,G,2,2,I
4,D,1,1,I
5,S,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
```

```
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT A,G,D
OUTPUT S5.STAT
PRINT
SORT S,A,G,D
PRINT
SEL S6.STAT
REDEFINE
1,A,1,1,I
2,G,2,2,I
4,D,1,1,I
5,S,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT A,G,D
OUTPUT S6.STAT
PRINT
SORT S,A,G,D
PRINT
SEL S7.STAT
REDEFINE
1,A,1,1,I
2,G,2,2,I
4,D,1,1,I
5,S,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047

SORT A,G,D
OUTPUT S7.STAT
PRINT
SORT S,A,G,D
PRINT
SEL S8.STAT
REDEFINE
1,A,1,1,I
2,G,2,2,I
4,D,1,1,I
5,S,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
```

```
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT A,G,D
OUTPUT S8.STAT
PRINT
SORT S,A,G,D
PRINT
SEL S9.STAT
REDEFINE
1,A,1,1,I
2,G,2,2,I
4,D,1,1,I
5,S,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT A,G,D
OUTPUT S9.STAT
PRINT
SORT S,A,G,D
PRINT
Q STOP
DATE
Q
A *>INFO
XEROX S1.STAT -AT XREG PRINT 2 -SPACING 0
XEROX S2.STAT -AT XREG PRINT 2 -SPACING 0
XEROX S3.STAT -AT XREG PRINT 2 -SPACING 0
XEROX S4.STAT -AT XREG PRINT 2 -SPACING 0
XEROX S5.STAT -AT XREG PRINT 2 -SPACING 0
XEROX S6.STAT -AT XREG PRINT 2 -SPACING 0
XEROX S7.STAT -AT XREG PRINT 2 -SPACING 0
XEROX S8.STAT -AT XREG PRINT 2 -SPACING 0
XEROX S9.STAT -AT XREG PRINT 2 -SPACING 0
COMO -E
LOGOUT
 -E
LOGOUT
```

```
/*      COMMAND FILE 12--PROCESS 1:24,000 DEM DATA
/*
/*
/*      1:24,000 DEM DATA IS FILTERED 10 TIMES AND THE
/*      CONTOURS CHECKED AGAINST THE UNFILTERED CONTOURS.
/*      THE SLOPES POLYGONS ARE THEN PRODUCED USING THE
/*      LATTICEPOLY COMMAND AND THE FOLLOWING DRASTIC
/*      SLOPE TABLE:
/*      $RECNO   TEXT        PERCENT_SLOPE SLOPE-CLASS SYMBOL
/*           1   0.0-2.0            2.000       1           2
/*           2   2.1-6.0            6.000       2           3
/*           3   6.1-12.0          12.000       6           4
/*           4   12.1-18.0         18.000       8           6
/*           5   >18.1        99999984.000     10           7
/*
/*
ARC
COMO DEM24.COMO
FILTER DEM1235.LAT DEM1235.10.LAT LOW 10
LATTICECONTOUR DEM1235.LAT G1235.CON 25 1500
LATTICECONTOUR DEM1235.10.LAT G1235.10.CON 25 1500
LATTICEPOLY DEM1235.10.LAT DRS1235.10.SLP SLOPE DRASTIC-SLOPE-TABLE
BUILD DRS1235.10.SLP POLY
Q
COMO -E
```

```
/*     COMMAND FILE 13--ELIMINATE POLYGONS SMALLER THAN 25 ACRES
/*
/*
/*     THE INFO ELIMINATE COMMAND WAS TESTED TO ELIMINATE POLYGONS
/*     SMALLER THAN 25 ACRES.  IT WOULD NOT PROCESS TO COMPLETION
/*     BUT INSTEAD WOULD END WITH AN ERROR CONDITION.  THIS
/*     PROCEDURE WAS USED TO PROGRESSIVELY DISSOLVE THE SMALL
/*     POLYGONS INTO THE LARGER POLYGON SURROUNDING IT.  IF THE
/*     ELIMINATE CAN PROCESS TO COMPLETION, IT IS THE PREFERRED METHOD.
/*
/*
COMO DISSOLVE.COMO
ARC
INFO
SEL DRS1235.10.SLP.PAT
RES FOR AREA LT 101175 AND SLOPE-CODE = 1
CALC SLOPE-CODE = 2
Q STOP
DISSOLVE DRS1235.10.SLP DRS1235.10.DIS SLOPE-CODE POLY
INFO
SEL DRS1235.10.DIS.PAT
RES FOR AREA LT 101175 AND SLOPE-CODE = 2
CALC SLOPE-CODE = 6
Q STOP
DISSOLVE DRS1235.10.DIS DRS1235.10.DIS2 SLOPE-CODE POLY
KILL DRS1235.10.DIS
INFO
SEL DRS1235.10.DIS2.PAT
RES FOR AREA LT 101175 AND SLOPE-CODE = 6
CALC SLOPE-CODE = 8
Q STOP
DISSOLVE DRS1235.10.DIS2 DRS1235.10.DIS3 SLOPE-CODE POLY
KILL DRS1235.10.DIS2
INFO
SEL DRS1235.10.DIS3.PAT
RES FOR AREA LT 101175 AND SLOPE-CODE NE 0
CALC SLOPE-CODE = 10
Q STOP
DISSOLVE DRS1235.10.DIS3 DRS1235.10.DIS4 SLOPE-CODE POLY
KILL DRS1235.10.DIS3
INFO
SEL DRS1235.10.DIS4.PAT
RES FOR AREA LT 101175 AND SLOPE-CODE NE 0
CALC SLOPE-CODE = 8
Q STOP
DISSOLVE DRS1235.10.DIS4 DRS1235.10.DIS5 SLOPE-CODE POLY
KILL DRS1235.10.DIS4
INFO
SEL DRS1235.10.DIS5.PAT
RES FOR AREA LT 101175 AND SLOPE-CODE NE 0
```

```
CALC SLOPE-CODE = 6
Q STOP
DISSOLVE DRS1235.10.DIS5 DRS1235.10.DIS6 SLOPE-CODE POLY

KILL DRS1235.10.DIS5
INFO
SEL DRS1235.10.DIS6.PAT
RES FOR AREA LT 101175 AND SLOPE-CODE NE 0
CALC SLOPE-CODE = 2
Q STOP
DISSOLVE DRS1235.10.DIS6 DRS1235.10.DIS7 SLOPE-CODE POLY
KILL DRS1235.10.DIS6
INFO
SEL DRS1235.10.DIS7.PAT
RES FOR AREA LT 101175 AND SLOPE-CODE NE 0
CALC SLOPE-CODE = 1
Q STOP
DISSOLVE DRS1235.10.DIS7 DRS1235.10.DIS8 SLOPE-CODE POLY
KILL DRS1235.10.DIS7
COPY DRS1235.10.DIS8 STURNER>DRS.SLP>DRS1235.10
Q
COMO -E
```

```
/*      COMMAND FILE 14--SMOOTH THE POLYGON LINES
/*
/*
/*      BECAUSE OF THE LATTICE NATURE OF THE DEM DATA, THE SLOPE
/*      POLYGONS FOLLOW A STAIRSTEP PATTERN.  THE SPLINE WAS USED
/*      TO SMOOTH THE LINES.  A LARGE GRAIN WAS CHOSEN INITIALLY
/*      TO MAKE THE LINES FOLLOW THE BROAD PATTERN.  IT WAS FOLLOWED
/*      BY A SPLINE WITH A SMALL GRAIN TO SMOOTH OUT THE REMAINING
/*      ROUGH EDGES.
/*
/*
COMO SPLINE.COMO
ARC
ARCEDIT
EDITC DRS1235.10
MAPE DRASTIC>QUADS>Q1235>CLIP1235
EDITF ARCS
SEL ALL
GRAIN 125
SPLINE
GRAIN 25
SPLINE
SAVE DRS1235.10.SPL
Q
CLEAN DRS1235.10.SPL
BUILD DRS1235.10.SPL POLY
Q
COMO -E
```

COMMAND FILE 15--PRODUCE COMMAND FILE 16

```
/*
/*
 PROGRAM NAME: LAT.PG                                                8/14/1990
  10000  PROGRAM SECTION ONE
  10001 REM ****************************************************
  10002 REM  INFO PROGRAM TO PRODUCE A COMMAND INPUT FILE USING
  10003 REM  DATA VALUES BASED ON THE BOX BND FILE
  10004 REM
  10005 REM  EACH BOX SURROUNDING A QUAD REQUIRING USE OF A
  10006 REM  1:250,000 DEM USED THE PROGRAM TO PRODUCE THE
  10007 REM  COMMAND INPUT FILE FOR PROCESSING OF THE DEM DATA.
  10008 REM
  10009 REM  SANDY TURNER - COLORADO DISTRICT - 1989
  10010 REM ****************************************************
  10011 PRI 'PROJECT COVER BOX1236 BOX1236.DS STURNER>UTMTODS'
  10012 PRI 'BUILD BOX1236.DS'
  10013 PRI 'LATTICECLIP STURNER>DEM.250>DENVER.E.LAT BOX1236.DS G1236.LAT'
  10014 PRI 'VIP G1236.LAT G1236.VIP 100'
  10015 PRI 'PROJECT COVER G1236.VIP G1236.UTM STURNER>DSTOUTM'
  10016 PRI 'ARCTIN G1236.UTM G1236.TIN POINT'
  10017 PRI 'TINLATTICE G1236.TIN BOX1236.LAT LINEAR'
  10018 SEL BOX1236.BND
  10019 FO $NUM1,3,I
  10020 FO $NUM2,3,I
  10021 CALC $NUM1 = ( XMAX - XMIN ) / 30 + 1
  10022 CALC $NUM2 = ( YMAX - YMIN ) / 30 + 1
  10023 PRI $NUM1,$NUM2
  10024 PRI XMIN,YMIN
  10025 PRI '30 30'
  10026 PRI 'KILL BOX1236.DS'
  10027 PRI 'KILL G1236.TIN'
  10028 PRI 'KILL G1236.UTM'
  10029 PRI 'KILL G1236.VIP'
  10030 PRI 'DELETE G1236.LAT'
  10031 PRI 'LATTICECONTOUR BOX1236.LAT G1236.CON 25 1500'
  10032 PRI 'CLIP G1236.CON DRASTIC>QUADS>Q1236>CLIP1236 CON1236.CLP LINE'
  10033 PRI 'KILL G1236.CON'
  10034 PRI 'FILTER BOX1236.LAT BOX1236.50.LAT LOW 50'
  10035 PRI 'LATTICECONTOUR BOX1236.50.LAT G1236.50.CON 25 1500'
  10036 PRI 'CLIP G1236.50.CON DRASTIC>QUADS>Q1236>CLIP1236 CON1236.50.CLP LINE'
  10037 PRI 'KILL G1236.50.CON'
  10038 PRI 'LATTICEPOLY BOX1236.50.LAT DRS1236.50.SLP SLOPE DRASTIC-SLOPE-TABLE'
  10039 PRI 'BUILD DRS1236.50.SLP POLY'
```

```
/*      COMMAND FILE 16--PROCESS 1:250,000 DEM DATA
/*
/*
/*      THE 1:250,000 DEM DATA IS PROJECTED AND THEN CLIPPED.
/*      ALL DATA WITHIN THE BOX IS SELECTED WITH A VIP AND THEN
/*      TINLATTICE IS USED TO PRODUCE A LATTICE THAT IS AT THE
/*      SAME SPACING AS THE 1:24,000 DEM DATA.  THIS DATA IS THEN
/*      FILTERED AND CONTOURED.  THE FINAL COVER IS USED TO
/*      PRODUCE A SLOPE MAP USING LATTICEPOLY AND THE FOLLOWING
/*      DRASTIC SLOPE TABLE:
/*      $RECNO   TEXT         PERCENT_SLOPE SLOPE-CLASS SYMBOL
/*           1   0.0-2.0             2.000       1           2
/*           2   2.1-6.0             6.000       2           3
/*           3   6.1-12.0           12.000       6           4
/*           4   12.1-18.0          18.000       8           6
/*           5   >18.1         99999984.000     10           7
/*
/*
 PROJECT COVER BOX1236 BOX1236.DS STURNER>UTMTODS
 BUILD BOX1236.DS
 LATTICECLIP STURNER>DEM.250>DENVER.E.LAT BOX1236.DS G1236.LAT
 VIP G1236.LAT G1236.VIP 100
 PROJECT COVER G1236.VIP G1236.UTM STURNER>DSTOUTM
 ARCTIN G1236.UTM G1236.TIN POINT
 TINLATTICE G1236.TIN BOX1236.LAT LINEAR
 434 522
  509,716.500  4398950.000
 30 30
 KILL BOX1236.DS
 KILL G1236.TIN
 KILL G1236.UTM
 KILL G1236.VIP
 DELETE G1236.LAT
 LATTICECONTOUR BOX1236.LAT G1236.CON 25 1500
 CLIP G1236.CON DRASTIC>QUADS>Q1236>CLIP1236 CON1236.CLP LINE
 KILL G1236.CON
 FILTER BOX1236.LAT BOX1236.50.LAT LOW 50
 LATTICECONTOUR BOX1236.50.LAT G1236.50.CON 25 1500
 CLIP G1236.50.CON DRASTIC>QUADS>Q1236>CLIP1236 CON1236.50.CLP LINE
 KILL G1236.50.CON
 LATTICEPOLY BOX1236.50.LAT DRS1236.50.SLP SLOPE DRASTIC-SLOPE-TABLE
 BUILD DRS1236.50.SLP POLY
```

```
/*      COMMAND FILE 17--ELIMINATE SMALL POLYGONS ON SLOPE COVER
/*
/*
/*      FILE NAME IS SMALLSLOPE.COMI
DELETE SMALLSLOPE.COMO
COMO SMALLSLOPE.COMO
/*      COMO FILE NAMED SMALLSLOPE.COMO FOR EXECUTION OF SMALLSLOPE.COMI
/*
DATE
ARC
/*
/* CLEAR THE DECKS
/*
KILL L0 ALL
KILL L1 ALL
KILL L2 ALL
KILL L3 ALL
KILL L4 ALL
KILL L5 ALL
KILL L6 ALL
/*
/* ********************************************************************
/* ********************************************************************
/*
/* REASSIGNS VALUE OF SLOPE-CODE TO IGNOR THE SOURCE OF THE DATA
/*
/* AND PROCESS TO ELIMINATE SMALL POLYGONS
/*
/* MAJOR SEGMENTS ARE DIVIDED BY ONE OR MORE LINE OF ASTERISKS
/*
/* ********************************************************************
/* ********************************************************************
/*
COPY SLO L0
INFO
SEL L0.PAT
REM
REM GROUP CODES FROM THE DEMS AND THE DTMS
REM
  ASEL
  RES SLOPE-CODE = 3 OR SLOPE-CODE = 1
  CALC SLOPE-CODE = 3
REM
  ASEL
  RES SLOPE-CODE = 4 OR SLOPE-CODE = 6
  CALC SLOPE-CODE = 2
REM
  ASEL
  RES SLOPE-CODE = 5 OR SLOPE-CODE = 10
  CALC SLOPE-CODE = 1
```

```
REM
Q STOP
/*

DISSOLVE L0 L1 SLOPE-CODE POLY
/*
/*
**********************************************************************
/*
                    /*
                    /*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD L1 LINE
                    ADDITEM L1.AAT L1.AAT LP-SLOPE-CODE 6 6 I
                    ADDITEM L1.AAT L1.AAT RP-SLOPE-CODE 6 6 I
                    ADDITEM L1.PAT L1.PAT SMALLFLAG 1 1 I
                    INFO
                      SEL L1.PAT
                      SORT L1#
                      CALC L1-ID = $RECNO - 1
                    Q STOP
                    CREATELABELS L1 0
                    IDEDIT L1 POLY
                    INFO
                      SEL L1.AAT
                      SORT L1#
                      CALC L1-ID = $RECNO
                 RELATE L1.PAT BY LPOLY# LINK
                 CALC LP-SLOPE-CODE = $1SLOPE-CODE
                 RELATE L1.PAT BY RPOLY# LINK
                 CALC RP-SLOPE-CODE = $1SLOPE-CODE
                    Q STOP
                    IDEDIT L1 LINE
/*
/* *******************************************************************
/*
/*      L1 TO L2      MOVE FROM STEEP TO INTERMEDIATE SLOPE
/*
/*      L1 BECOMES L2
/*
               INFO
                                        SEL L1.PAT
                                        SORT L1#
                                        CALC L1-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS L1 0
                                        IDEDIT L1 POLY
                                        INFO
                                        SEL L1.AAT
```

```
                                        SORT L1#
                                        CALC L1-ID = $RECNO
                                        Q STOP
                                        IDEDIT L1 LINE
                    INFO
                    SEL L1.AAT
                    RELATE L1.PAT BY LPOLY# LINK

                    CALC LP-SLOPE-CODE = $1SLOPE-CODE
                    RELATE L1.PAT BY RPOLY# LINK
                    CALC RP-SLOPE-CODE = $1SLOPE-CODE
          RES LP-SLOPE-CODE = 1 AND RP-SLOPE-CODE = 2
          ASEL LP-SLOPE-CODE = 2 AND RP-SLOPE-CODE = 1
                    NSEL
                    CALC L1-ID = -1
                    Q STOP
                    IDEDIT L1 LINE
/*
ELIMINATE L1 L2 NOKEEPEDGE POLY
RES SLOPE-CODE = 1 AND AREA LT 404700

N
N
/*      KEEP L1 UNCHANGED
/*
KILL FOX
RENAME L2 FOX
DISSOLVE FOX L2 SLOPE-CODE POLY
                    /*
                    /*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD L2 LINE
                    ADDITEM L2.AAT L2.AAT LP-SLOPE-CODE 6 6 I
                    ADDITEM L2.AAT L2.AAT RP-SLOPE-CODE 6 6 I
                    ADDITEM L2.PAT L2.PAT SMALLFLAG 1 1 I
                    INFO
                                    SEL L2.PAT
                      SORT L2#
                      CALC L2-ID = $RECNO - 1
                    Q STOP
                    CREATELABELS L2 0
                    IDEDIT L2 POLY
                    INFO
                      SEL L2.AAT
                      SORT L2#
                      CALC L2-ID = $RECNO
                 RELATE L2.PAT BY LPOLY# LINK
                 CALC LP-SLOPE-CODE = $1SLOPE-CODE
                 RELATE L2.PAT BY RPOLY# LINK
```

```
                    CALC RP-SLOPE-CODE = $1SLOPE-CODE
                       Q STOP
                       IDEDIT L2 LINE
/* ***********************************************************************
/*
/*      L2 TO L3
/*
/*      L=2 BECOMES L=3
/*
                INFO
                                         SEL L2.PAT

                                         SORT L2#
                                         CALC L2-ID = $RECNO - 1
                                         Q STOP
                                         CREATELABELS L2 0
                                         IDEDIT L2 POLY
                                         INFO
                                         SEL L2.AAT
                                         SORT L2#
                                         CALC L2-ID = $RECNO
                                         Q STOP
                                         IDEDIT L2 LINE
                     INFO
                     SEL L2.AAT
                     RELATE L2.PAT BY LPOLY# LINK
                     CALC LP-SLOPE-CODE = $1SLOPE-CODE
                     RELATE L2.PAT BY RPOLY# LINK
                     CALC RP-SLOPE-CODE = $1SLOPE-CODE
          RES LP-SLOPE-CODE = 3 AND RP-SLOPE-CODE = 2
          ASEL LP-SLOPE-CODE = 2 AND RP-SLOPE-CODE = 3
                     NSEL
                     CALC L2-ID = -1
                     Q STOP
                     IDEDIT L2 LINE
/*
ELIMINATE L2 L3 NOKEEPEDGE POLY
RES SLOPE-CODE = 2 AND AREA LT 404700

N
N
/*      KEEP L2 UNCHANGED
/*
KILL FOX
RENAME L3 FOX
DISSOLVE FOX L3 SLOPE-CODE POLY
                     /*
                     /*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                     /*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                     /*
```

```
               BUILD L3 LINE
               ADDITEM L3.AAT L3.AAT LP-SLOPE-CODE 6 6 I
               ADDITEM L3.AAT L3.AAT RP-SLOPE-CODE 6 6 I
               ADDITEM L3.PAT L3.PAT SMALLFLAG 1 1 I
               INFO
                               SEL L3.PAT
                 SORT L3#
                 CALC L3-ID = $RECNO - 1
               Q STOP
               CREATELABELS L3 0
               IDEDIT L3 POLY
               INFO
                 SEL L3.AAT
                 SORT L3#
                 CALC L3-ID = $RECNO

            RELATE L3.PAT BY LPOLY# LINK
            CALC LP-SLOPE-CODE = $1SLOPE-CODE
            RELATE L3.PAT BY RPOLY# LINK
            CALC RP-SLOPE-CODE = $1SLOPE-CODE
               Q STOP
               IDEDIT L3 LINE
/* **********************************************************************
/*
/*     L3 TO L4
/*
/*     L=3 BECOMES L=2
/*
          INFO
                                   SEL L3.PAT
                                   SORT L3#
                                   CALC L3-ID = $RECNO - 1
                                   Q STOP
                                   CREATELABELS L3 0
                                   IDEDIT L3 POLY
                                   INFO
                                   SEL L3.AAT
                                   SORT L3#
                                   CALC L3-ID = $RECNO
                                   Q STOP
                                   IDEDIT L3 LINE
               INFO
               SEL L3.AAT
               RELATE L3.PAT BY LPOLY# LINK
               CALC LP-SLOPE-CODE = $1SLOPE-CODE
               RELATE L3.PAT BY RPOLY# LINK
               CALC RP-SLOPE-CODE = $1SLOPE-CODE
        RES LP-SLOPE-CODE = 3 AND RP-SLOPE-CODE = 2
        ASEL LP-SLOPE-CODE = 2 AND RP-SLOPE-CODE = 3
               NSEL
```

```
                        CALC L3-ID = -1
                        Q STOP
                        IDEDIT L3 LINE
/*
ELIMINATE L3 L4 NOKEEPEDGE POLY
RES SLOPE-CODE = 3 AND AREA LT 404700

N
N
/*      KEEP L3 UNCHANGED
/*
KILL FOX
RENAME L4 FOX
DISSOLVE FOX L4 SLOPE-CODE POLY
                        /*
                        /*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                        /*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                        /*
                        BUILD L4 LINE

                        ADDITEM L4.AAT L4.AAT LP-SLOPE-CODE 6 6 I
                        ADDITEM L4.AAT L4.AAT RP-SLOPE-CODE 6 6 I
                        ADDITEM L4.PAT L4.PAT SMALLFLAG 1 1 I
                        INFO
                                        SEL L4.PAT
                          SORT L4#
                          CALC L4-ID = $RECNO - 1
                        Q STOP
                        CREATELABELS L4 0
                        IDEDIT L4 POLY
                        INFO
                          SEL L4.AAT
                          SORT L4#
                          CALC L4-ID = $RECNO
                    RELATE L4.PAT BY LPOLY# LINK
                    CALC LP-SLOPE-CODE = $1SLOPE-CODE
                    RELATE L4.PAT BY RPOLY# LINK
                    CALC RP-SLOPE-CODE = $1SLOPE-CODE
                        Q STOP
                        IDEDIT L4 LINE
/* **********************************************************************
/*
/*      L4 TO L5
/*
/*      L=2 BECOMES L=1
/*
                  INFO
                                             SEL L4.PAT
                                             SORT L4#
                                             CALC L4-ID = $RECNO - 1
```

```
                                        Q STOP
                                        CREATELABELS L4 0
                                        IDEDIT L4 POLY
                                        INFO
                                        SEL L4.AAT
                                        SORT L4#
                                        CALC L4-ID = $RECNO
                                        Q STOP
                                        IDEDIT L4 LINE
                    INFO
                    SEL L4.AAT
                    RELATE L4.PAT BY LPOLY# LINK
                    CALC LP-SLOPE-CODE = $1SLOPE-CODE
                    RELATE L4.PAT BY RPOLY# LINK
                    CALC RP-SLOPE-CODE = $1SLOPE-CODE
          RES LP-SLOPE-CODE = 1 AND RP-SLOPE-CODE = 2
          ASEL LP-SLOPE-CODE = 2 AND RP-SLOPE-CODE = 1
                    NSEL
                    CALC L4-ID = -1
                    Q STOP
                    IDEDIT L4 LINE
/*
ELIMINATE L4 L5 NOKEEPEDGE POLY

RES SLOPE-CODE = 2 AND AREA LT 404700

N
N
/*      KEEP L4 UNCHANGED
/*
KILL FOX
RENAME L5 FOX
DISSOLVE FOX L5 SLOPE-CODE POLY
                    /*
                    /*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD L5 LINE
                    ADDITEM L5.AAT L5.AAT LP-SLOPE-CODE 6 6 I
                    ADDITEM L5.AAT L5.AAT RP-SLOPE-CODE 6 6 I
                    ADDITEM L5.PAT L5.PAT SMALLFLAG 1 1 I
                    INFO
                                  SEL L5.PAT
                      SORT L5#
                      CALC L5-ID = $RECNO - 1
                    Q STOP
                    CREATELABELS L5 0
                    IDEDIT L5 POLY
                    INFO
                      SEL L5.AAT
```

```
                    SORT L5#
                    CALC L5-ID = $RECNO
               RELATE L5.PAT BY LPOLY# LINK
               CALC LP-SLOPE-CODE = $1SLOPE-CODE
               RELATE L5.PAT BY RPOLY# LINK
               CALC RP-SLOPE-CODE = $1SLOPE-CODE
                  Q STOP
                  IDEDIT L5 LINE
/* *********************************************************************
/* *********************************************************************
/*
/* *********************************************************************
/*
/* *********************************************************************
/*
/* GENERATE A FILE OF SIMPLE STATISTICS FOR SPECIFIED COVERS
/*
INFO
SEL L1.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL L2.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL L3.PAT

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL L4.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL L5.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
STATISTICS L1.PAT L1.STAT SLOPE-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS L2.PAT L2.STAT SLOPE-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
```

```
MIN AREA SMALLFLAG
END
STATISTICS L3.PAT L3.STAT SLOPE-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS L4.PAT L4.STAT SLOPE-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS L5.PAT L5.STAT SLOPE-CODE
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
INFO
SEL L1.STAT
CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT SLOPE-CODE
OUTPUT L1.STAT
PRINT
SEL L2.STAT
CALC SUM-AREA = SUM-AREA / 4047

CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT SLOPE-CODE
OUTPUT L2.STAT
PRINT
SEL L3.STAT
CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT SLOPE-CODE
OUTPUT L3.STAT
PRINT
SEL L4.STAT
CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
```

```
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT SLOPE-CODE
OUTPUT L4.STAT
PRINT
SEL L5.STAT
CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
SORT SLOPE-CODE
OUTPUT L5.STAT
PRINT
Q STOP
DATE
Q
A *>INFO
XEROX L1.STAT -AT XREG PRINT 2 -SPACING 0
XEROX L3.STAT -AT XREG PRINT 2 -SPACING 0
XEROX L5.STAT -AT XREG PRINT 2 -SPACING 0
COMO -E
LOGOUT
```

```
/*      COMMAND FILE 18--OVERLAY SLOPE COVER ON COVER OF AQUIFER MEDIA,
/*      UNSATURATED MEDIA, AND SOIL MEDIA
/*
/*
/*      FILE NAME IS AGDSL.COMI
DELETE AGDSL.COMO
COMO AGDSL.COMO
DATE
/*
/*      FILE NAME IS AGDSL.COMO CREATED BY EXECUTING AGDSL.COMI
/*
/*      THIS AML INTERSECTS (USING IDENTITY) COVERS
/*      AGDS AND L TO CREATE COVER AGDSL
/*      THE ITEM 'CODE' IS ADDED AS A 6-DIGIT INTEGER
/*      THE VALUES ASSIGNED TO CODE ARE
/*           AGGDSL
/*              A FOR AREA = GEOHYDROLOGIC SETTING AREA (1-7)
/*              G FOR GEOLOGY = 2-DIGIT VALUE OF G
/*              D FOR DEPTH TO WATER (1-4,6)
/*              S FOR SOIL (1-8)
/*              L FOR SLOPE OF LAND SURFACE (1-3)
/*
/*
ARC
KILL AGDSL ALL
COPY L5 SLOPE
IDENTITY AGDS SLOPE AGDSL POLY 1
DATE
CALC L = SLOPE-CODE
Q STOP
/*
COMO -E
LOGOUT
#
```

```
/*      COMMAND FILE 19--ELIMINATE SMALL POLYGONS RESULTING FROM OVERLAY OF
/*      SLOPE COVER (COMMAND FILE 18)
/*
/*
/*      FILE NAME IS XAGDSL.COMI
DELETE XAGDSL.COMO
COMO XAGDSL.COMO
/*      COMO FILE NAMED XAGDSL.COMO FOR EXECUTION OF XAGDSL.COMI
/*
DATE
ARC
/*
/* CLEAR THE DECKS
/*
KILL RAT ALL
KILL XLL0 ALL
KILL XLL1 ALL
KILL XLL2 ALL
KILL XLL3 ALL
KILL XLL4 ALL
KILL XLL5 ALL
/*
/* *******************************************************************
/* *******************************************************************
/*
/* REASSIGN VALUES OF L TO
/* ELIMINATE SMALL POLYGONS
/*
/* MAJOR SEGMENTS ARE DIVIDED BY ONE OR MORE LINE OF ASTERISKS
/*
/* *******************************************************************
/* *******************************************************************
/*
COPY FIRSTAGDSL XLL0
INFO
SEL XLL0.PAT
CALC L = SLOPE-CODE
RES SLOPE-CODE = 0 AND AREA GE 0 AND G LE 14
CALC L = 1
  ASEL
  RES SLOPE-CODE = 0 AND AREA GE 0 AND G GT 14
  CALC L = 3
Q STOP
DISSOLVE XLL0 XLL1 CODE POLY
/*
/* *******************************************************************
/*
                    /*
                    /*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS
```

```
                    /*
                    BUILD XLL1 LINE
                    ADDITEM XLL1.AAT XLL1.AAT LP-CODE 6 6 I

                    ADDITEM XLL1.AAT XLL1.AAT RP-CODE 6 6 I
                    ADDITEM XLL1.PAT XLL1.PAT SMALLFLAG 1 1 I
                    INFO
                              SEL XLL1.AAT
                    REDEFINE
                      29,LP-A,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,LP-S,1,1,I
                      34,LP-L,1,1,I
                      35,RP-A,1,1,I
                      36,RP-G,2,2,I
                      38,RP-D,1,1,I
                      39,RP-S,1,1,I
                      40,RP-L,1,1,I

          SEL XLL1.PAT
REDEFINE
17,A,1,1,I
18,G,2,2,I
20,D,1,1,I
21,S,1,1,I
22,L,1,1,I

                      SEL XLL1.PAT
                      SORT XLL1#
                      CALC XLL1-ID = $RECNO - 1
                    Q STOP
                    CREATELABELS XLL1 0
                    IDEDIT XLL1 POLY
                    INFO
                      SEL XLL1.AAT
                      SORT XLL1#
                      CALC XLL1-ID = $RECNO
                 RELATE XLL1.PAT BY LPOLY# LINK
                 CALC LP-L = $1L
                 RELATE XLL1.PAT BY RPOLY# LINK
                 CALC RP-L = $1L
                    Q STOP
                    IDEDIT XLL1 LINE
/*
/* *******************************************************************
/*
/*     XLL1 TO XLL2     MOVE FROM STEEP TO INTERMEDIATE SLOPE
/*
/*     XLL1 BECOMES XLL2
```

```
/*
               INFO
                                        SEL XLL1.PAT
                                        SORT XLL1#
                                        CALC XLL1-ID = $RECNO - 1
                                        Q STOP
                                        CREATELABELS XLL1 0

                                        IDEDIT XLL1 POLY
                                        INFO
                                        SEL XLL1.AAT
                                        SORT XLL1#
                                        CALC XLL1-ID = $RECNO
                                        Q STOP
                                        IDEDIT XLL1 LINE
                    INFO
                    SEL XLL1.AAT
                    RELATE XLL1.PAT BY LPOLY# LINK
                    CALC LP-L = $1L
                    RELATE XLL1.PAT BY RPOLY# LINK
                    CALC RP-L = $1L
          RES LP-L = 1 AND RP-L = 2
          ASEL LP-L = 2 AND RP-L = 1
          RES LP-A = RP-A AND LP-G = RP-G AND LP-D = RP-D AND LP-S = RP-S
                    NSEL
                    CALC XLL1-ID = -1
                    Q STOP
                    IDEDIT XLL1 LINE
/*
ELIMINATE XLL1 XLL2 NOKEEPEDGE POLY
RES L = 1 AND AREA LT 404700

N
N
/*     KEEP XLL1 UNCHANGED
/*
KILL RAT
RENAME XLL2 RAT
DISSOLVE RAT XLL2 CODE POLY
                    /*
                    /*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD XLL2 LINE
                    ADDITEM XLL2.AAT XLL2.AAT LP-CODE 6 6 I
                    ADDITEM XLL2.AAT XLL2.AAT RP-CODE 6 6 I
                    ADDITEM XLL2.PAT XLL2.PAT SMALLFLAG 1 1 I
                    INFO
                              SEL XLL2.AAT
                    REDEFINE
```

```
                    29,LP-A,1,1,I
                    30,LP-G,2,2,I
                    32,LP-D,1,1,I
                    33,LP-S,1,1,I
                    34,LP-L,1,1,I
                    35,RP-A,1,1,I
                    36,RP-G,2,2,I
                    38,RP-D,1,1,I
                    39,RP-S,1,1,I
                    40,RP-L,1,1,I


          SEL XLL2.PAT
REDEFINE
17,A,1,1,I
18,G,2,2,I
20,D,1,1,I
21,S,1,1,I
22,L,1,1,I

                                 SEL XLL2.PAT
                    SORT XLL2#
                    CALC XLL2-ID = $RECNO - 1
                  Q STOP
                  CREATELABELS XLL2 0
                  IDEDIT XLL2 POLY
                  INFO
                    SEL XLL2.AAT
                    SORT XLL2#
                    CALC XLL2-ID = $RECNO
               RELATE XLL2.PAT BY LPOLY# LINK
               CALC LP-L = $1L
               RELATE XLL2.PAT BY RPOLY# LINK
               CALC RP-L = $1L
                  Q STOP
                  IDEDIT XLL2 LINE
/* *************************************************************************
/*
/*     XLL2 TO XLL3
/*
/*     XLL=2 BECOMES XLL=3
/*
             INFO
                                     SEL XLL2.PAT
                                     SORT XLL2#
                                     CALC XLL2-ID = $RECNO - 1
                                     Q STOP
                                     CREATELABELS XLL2 0
                                     IDEDIT XLL2 POLY
                                     INFO
```

```
                                        SEL XLL2.AAT
                                        SORT XLL2#
                                        CALC XLL2-ID = $RECNO
                                        Q STOP
                                        IDEDIT XLL2 LINE
                    INFO
                    SEL XLL2.AAT
                    RELATE XLL2.PAT BY LPOLY# LINK
                    CALC LP-L = $1L
                    RELATE XLL2.PAT BY RPOLY# LINK
                    CALC RP-L = $1L
          RES LP-L = 3 AND RP-L = 2
          ASEL LP-L = 2 AND RP-L = 3
          RES LP-A = RP-A AND LP-G = RP-G AND LP-D = RP-D AND LP-S = RP-S
                    NSEL

                    CALC XLL2-ID = -1
                    Q STOP
                    IDEDIT XLL2 LINE
/*
ELIMINATE XLL2 XLL3 NOKEEPEDGE POLY
RES L = 2 AND AREA LT 404700

N
N
/*     KEEP XLL2 UNCHANGED
/*
KILL RAT
RENAME XLL3 RAT
DISSOLVE RAT XLL3 CODE POLY
                    /*
                    /*     BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*     TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD XLL3 LINE
                    ADDITEM XLL3.AAT XLL3.AAT LP-CODE 6 6 I
                    ADDITEM XLL3.AAT XLL3.AAT RP-CODE 6 6 I
                    ADDITEM XLL3.PAT XLL3.PAT SMALLFLAG 1 1 I
                    INFO
                              SEL XLL3.AAT
                    REDEFINE
                      29,LP-A,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,LP-S,1,1,I
                      34,LP-L,1,1,I
                      35,RP-A,1,1,I
                      36,RP-G,2,2,I
                      38,RP-D,1,1,I
                      39,RP-S,1,1,I
```

```
                    40,RP-L,1,1,I

          SEL XLL3.PAT
REDEFINE
17,A,1,1,I
18,G,2,2,I
20,D,1,1,I
21,S,1,1,I
22,L,1,1,I

                                  SEL XLL3.PAT
                    SORT XLL3#
                    CALC XLL3-ID = $RECNO - 1
                  Q STOP
                  CREATELABELS XLL3 0
                  IDEDIT XLL3 POLY
                  INFO
                    SEL XLL3.AAT
                    SORT XLL3#

                    CALC XLL3-ID = $RECNO
               RELATE XLL3.PAT BY LPOLY# LINK
               CALC LP-L = $1L
               RELATE XLL3.PAT BY RPOLY# LINK
               CALC RP-L = $1L
                  Q STOP
                  IDEDIT XLL3 LINE
/* *************************************************************************
/*
/*     XLL3 TO XLL4
/*
/*     XLL=3 BECOMES XLL=2
/*
              INFO
                                      SEL XLL3.PAT
                                      SORT XLL3#
                                      CALC XLL3-ID = $RECNO - 1
                                      Q STOP
                                      CREATELABELS XLL3 0
                                      IDEDIT XLL3 POLY
                                      INFO
                                      SEL XLL3.AAT
                                      SORT XLL3#
                                      CALC XLL3-ID = $RECNO
                                      Q STOP
                                      IDEDIT XLL3 LINE
                  INFO
                  SEL XLL3.AAT
                  RELATE XLL3.PAT BY LPOLY# LINK
                  CALC LP-L = $1L
```

```
                    RELATE XLL3.PAT BY RPOLY# LINK
                    CALC RP-L = $1L
          RES LP-L = 3 AND RP-L = 2
          ASEL LP-L = 2 AND RP-L = 3
          RES LP-A = RP-A AND LP-G = RP-G AND LP-D = RP-D AND LP-S = RP-S
                    NSEL
                    CALC XLL3-ID = -1
                    Q STOP
                    IDEDIT XLL3 LINE
/*
ELIMINATE XLL3 XLL4 NOKEEPEDGE POLY
RES L = 3 AND AREA LT 404700

N
N
/*      KEEP XLL3 UNCHANGED
/*
KILL RAT
RENAME XLL4 RAT
DISSOLVE RAT XLL4 CODE POLY
                    /*
                    /*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS

                    /*
                    BUILD XLL4 LINE
                    ADDITEM XLL4.AAT XLL4.AAT LP-CODE 6 6 I
                    ADDITEM XLL4.AAT XLL4.AAT RP-CODE 6 6 I
                    ADDITEM XLL4.PAT XLL4.PAT SMALLFLAG 1 1 I
                    INFO
                              SEL XLL4.AAT
                    REDEFINE
                      29,LP-A,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,LP-S,1,1,I
                      34,LP-L,1,1,I
                      35,RP-A,1,1,I
                      36,RP-G,2,2,I
                      38,RP-D,1,1,I
                      39,RP-S,1,1,I
                      40,RP-L,1,1,I

          SEL XLL4.PAT
REDEFINE
17,A,1,1,I
18,G,2,2,I
20,D,1,1,I
21,S,1,1,I
22,L,1,1,I
```

```
                                        SEL XLL4.PAT
                          SORT XLL4#
                          CALC XLL4-ID = $RECNO - 1
                        Q STOP
                        CREATELABELS XLL4 0
                        IDEDIT XLL4 POLY
                        INFO
                          SEL XLL4.AAT
                          SORT XLL4#
                          CALC XLL4-ID = $RECNO
                     RELATE XLL4.PAT BY LPOLY# LINK
                     CALC LP-L = $1L
                     RELATE XLL4.PAT BY RPOLY# LINK
                     CALC RP-L = $1L
                        Q STOP
                        IDEDIT XLL4 LINE
/* **********************************************************************
/*
/*     XLL4 TO XLL5
/*
/*     XLL=2 BECOMES XLL=1
/*
                   INFO
                                            SEL XLL4.PAT
                                            SORT XLL4#
                                            CALC XLL4-ID = $RECNO - 1

                                            Q STOP
                                            CREATELABELS XLL4 0
                                            IDEDIT XLL4 POLY
                                            INFO
                                            SEL XLL4.AAT
                                            SORT XLL4#
                                            CALC XLL4-ID = $RECNO
                                            Q STOP
                                            IDEDIT XLL4 LINE
                        INFO
                        SEL XLL4.AAT
                        RELATE XLL4.PAT BY LPOLY# LINK
                        CALC LP-L = $1L
                        RELATE XLL4.PAT BY RPOLY# LINK
                        CALC RP-L = $1L
             RES LP-L = 1 AND RP-L = 2
             ASEL LP-L = 2 AND RP-L = 1
             RES LP-A = RP-A AND LP-G = RP-G AND LP-D = RP-D AND LP-S = RP-S
                        NSEL
                        CALC XLL4-ID = -1
                        Q STOP
                        IDEDIT XLL4 LINE
```

```
/*
ELIMINATE XLL4 XLL5 NOKEEPEDGE POLY
RES L = 2 AND AREA LT 404700

N
N
/*      KEEP XLL4 UNCHANGED
/*
KILL RAT
RENAME XLL5 RAT
DISSOLVE RAT XLL5 CODE POLY
                    /*
                    /*      BUILD LINE TOPOLOGY AND ADD THE NECESSARY ITEMS
                    /*      TO THE AAT FILE, INCLUDING REDEFINED ITEMS
                    /*
                    BUILD XLL5 LINE
                    ADDITEM XLL5.AAT XLL5.AAT LP-CODE 6 6 I
                    ADDITEM XLL5.AAT XLL5.AAT RP-CODE 6 6 I
                    ADDITEM XLL5.PAT XLL5.PAT SMALLFLAG 1 1 I
                    INFO
                              SEL XLL5.AAT
                    REDEFINE
                      29,LP-A,1,1,I
                      30,LP-G,2,2,I
                      32,LP-D,1,1,I
                      33,LP-S,1,1,I
                      34,LP-L,1,1,I
                      35,RP-A,1,1,I
                      36,RP-G,2,2,I
                      38,RP-D,1,1,I
                      39,RP-S,1,1,I

                      40,RP-L,1,1,I

          SEL XLL5.PAT
REDEFINE
17,A,1,1,I
18,G,2,2,I
20,D,1,1,I
21,S,1,1,I
22,L,1,1,I

                                    SEL XLL5.PAT
                      SORT XLL5#
                      CALC XLL5-ID = $RECNO - 1
                    Q STOP
                    CREATELABELS XLL5 0
                    IDEDIT XLL5 POLY
                    INFO
                      SEL XLL5.AAT
```

```
                    SORT XLL5#
                    CALC XLL5-ID = $RECNO
               RELATE XLL5.PAT BY LPOLY# LINK
               CALC LP-L = $1L
               RELATE XLL5.PAT BY RPOLY# LINK
               CALC RP-L = $1L
                  Q STOP
                  IDEDIT XLL5 LINE
/* *************************************************************************
/* *************************************************************************
/*
/* *************************************************************************
/*
/* *************************************************************************
/*
/* GENERATE A FILE OF SIMPLE STATISTICS FOR SPECIFIED COVERS
/*
INFO
SEL XLL1.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XLL2.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XLL3.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XLL4.PAT
CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
SEL XLL5.PAT

CALC SMALLFLAG = 0
RES AREA LT 404700
CALC SMALLFLAG = 1
Q STOP
STATISTICS XLL1.PAT XLL1.STAT L
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XLL2.PAT XLL2.STAT L
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
```

```
MIN AREA SMALLFLAG
END
STATISTICS XLL3.PAT XLL3.STAT L
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XLL4.PAT XLL4.STAT L
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
STATISTICS XLL5.PAT XLL5.STAT L
SUM AREA
SUM AREA SMALLFLAG
MAX AREA SMALLFLAG
MIN AREA SMALLFLAG
END
INFO
SEL XLL1.STAT
REDEFINE
1,A,1,1,I
2,G,2,2,I
4,D,1,1,I
5,S,1,1,I
6,L,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
OUTPUT XLL1.STAT
SORT A,G,D,S,L
PRINT
SORT L,A,G,D,S
PRINT
SEL XLL2.STAT

REDEFINE
1,A,1,1,I
2,G,2,2,I
4,D,1,1,I
5,S,1,1,I
6,L,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
```

```
CALC MIN-W-AREA = MIN-W-AREA / 4047
OUTPUT XLL2.STAT
SORT A,G,D,S,L
PRINT
SORT L,A,G,D,S
PRINT
SEL XLL3.STAT
REDEFINE
1,A,1,1,I
2,G,2,2,I
4,D,1,1,I
5,S,1,1,I
6,L,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
OUTPUT XLL3.STAT
SORT A,G,D,S,L
PRINT
SORT L,A,G,D,S
PRINT
SEL XLL4.STAT
REDEFINE
1,A,1,1,I
2,G,2,2,I
4,D,1,1,I
5,S,1,1,I
6,L,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
OUTPUT XLL4.STAT
SORT A,G,D,S,L
PRINT
SORT L,A,G,D,S
PRINT
SEL XLL5.STAT
REDEFINE
1,A,1,1,I

2,G,2,2,I
4,D,1,1,I
5,S,1,1,I
6,L,1,1,I

CALC SUM-AREA = SUM-AREA / 4047
```

```
CALC SUM-W-AREA = SUM-W-AREA / 4047
CALC MAX-W-AREA = MAX-W-AREA / 4047
CALC MIN-W-AREA = MIN-W-AREA / 4047
OUTPUT XLL5.STAT
SORT A,G,D,S,L
PRINT
SORT L,A,G,D,S
PRINT
Q STOP
DATE
Q
A *>INFO
XEROX XLL1.STAT -AT XREG -PRINT 2 -
SPACING 0
XEROX XLL2.STAT -AT XREG -PRINT 2 -
SPACING 0
XEROX XLL3.STAT -AT XREG -PRINT 2 -
SPACING 0
XEROX XLL4.STAT -AT XREG -PRINT 2 -
SPACING 0
XEROX XLL5.STAT -AT XREG -PRINT 2 -
SPACING 0
COMO -E
LOGOUT
```


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