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Health Studies on ROCKY FLATS

PHASE I: HISTORICAL PUBLIC EXPOSURES

PROJECT TASK 7

R E P O R T

Demographic & Land Use Reconstruction of the Area Surrounding the Rocky Flats Plant

APRIL 1994

ChemRisk

Colorado Department of Public Health and Environment

Prepared by ChemRisk for the Colorado Department of Public Health and Environment

PROJECT TASK 7 REPORT
DEMOGRAPHIC & LAND USE RECONSTRUCTION OF THE AREA SURROUNDING THE ROCKY FLATS PLANT

APRIL 1994

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1.0 INTRODUCTION

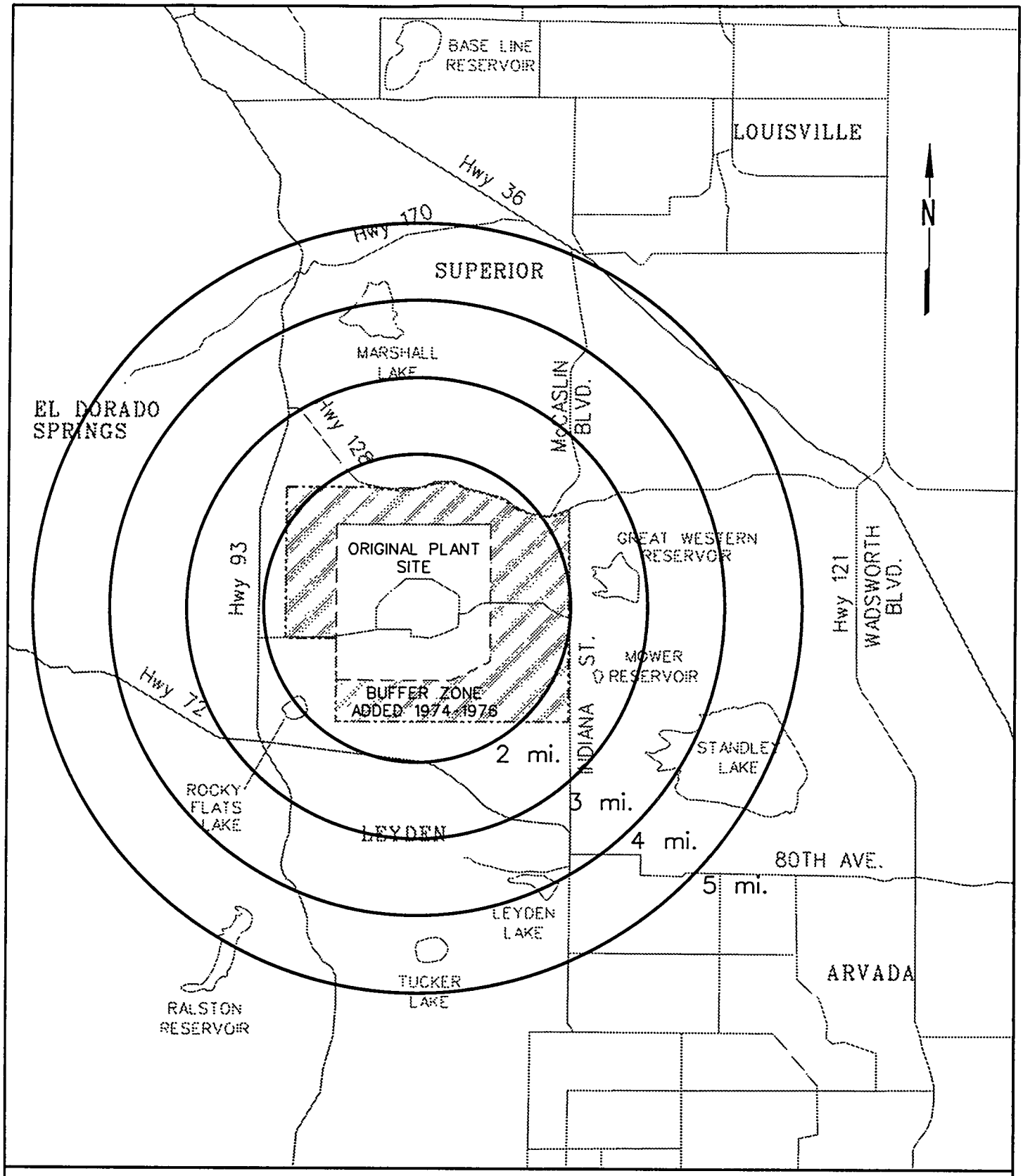
A key factor in dose reconstruction involves the historical characterization of demography and land use in the area of interest. The purpose of Task 7 of the Toxicologic Review and Dose Reconstruction Project was to identify the locations of persons/populations who might have been impacted by potential releases of chemicals and radionuclides from the Rocky Flats plant during the period of plant activities from 1950 to present. In addition to population characterization, land uses in the surrounding area were investigated to identify the potential exposure pathways required to estimate doses to off-site populations.

The Task 7 Plan (ChemRisk, 1991) presented a global, staged approach to characterizing demography and land use within 50 miles of the Rocky Flats plant, a typical distance used in radiological dose assessment. In the Task 7 Plan, common sources of population and land use information, including census data and county agricultural statistics, were cited as potential sources of population and land use data for the area surrounding the Rocky Flats plant.

A major step in this staged approach was to define historical locations of residents and land uses that could be maximally impacted by releases from the plant site. Therefore, the Task 7 study focused on the area within five miles of the plant, referred to as the study area for Task 7. Specifically, extensive interviews with long-term landowners and ranch managers and detailed searches for information on land use, emphasizing agricultural land use, were conducted.

Figure 1-1 shows the five-mile-radius study area for Task 7. Between 1951 and approximately 1974, the Rocky Flats plant included only about one square mile at the center of the study area. Between 1974 and 1976, the federal government purchased additional land surrounding the original plant boundary. This additional land became part of the Rocky Flats plant, and is referred to as the "buffer zone". The buffer zone is shown in Figure 1-1.

Historical statistics on land use and populations were not as readily available for rural areas as for the Denver Metropolitan area, for example. Therefore, multiple sources of information were researched and data were collected to describe as accurately as possible the demography and land use of the area within a five-mile radius. Typically, data prior to 1970 were difficult to locate or unavailable. For example, no census block group data were available for the study area in 1950 or 1960 due to the low population density during those time periods. Available population and land use data were primarily county-wide, however, some population data were available at the municipality level. Therefore, specific population and land use information for the sections of Jefferson and Boulder Counties within the five-mile radius required that several sources of information be utilized in order to construct the most accurate representation.



0' SCALE 9,240'

SCALE: 1"=1.75 Miles

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FIGURE 1-1
THE DEMOGRAPHY AND LAND USE STUDY AREA

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This report summarizes all research and data collection activities completed as part of Task 7. All sources of demographic and land use information that were reviewed as part of Task 7 are described, with the most useful sources discussed in some detail. All population and land use data collected for this study are currently catalogued in the repository documents cited in this report. Results characterizing the historical population and agricultural land use for the area within a five-mile radius of the plant are summarized in three sets of population and land use maps.

Actual population and land use for the study area between 1950 and 1990 were very difficult to estimate due to limitations of available information. The estimates in this report were derived using best available data and professional judgement. Estimates have not been rigorously reviewed for consistency with all data sources.

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2.0 INFORMATION SOURCES

In order to reconstruct the demography and land use in the area adjacent to the Rocky Flats plant within the five-mile-radius study area, various data were collected from several sources. The description of those sources and their relative value for demographic reconstruction is presented in this section.

2.1 Land Use

Land use information for specific areas within Jefferson and Boulder Counties was not generally available, except on a county-wide level. Because the study area included only a small portion of north Jefferson County and the southern border of Boulder County, the assumption that county-wide data reflected actual land use in the five-mile study area may not have been valid. Therefore, personal interviews with long-term landowners were conducted and historical topographical maps of United States Geological Survey (USGS) quadrangles were reviewed to get an indication of historical land use in the study area and to identify other potential sources of land use information.

2.1.1 Interviews with Landowners

Personal interviews with several long-term landowners, ranch managers, and residents were conducted in mid-1991. These interviews were initiated with a survey to identify, to the best of the respondents' knowledge, the land uses that existed within the five-mile-radius study area between 1950 and 1990. A copy of the survey and detailed summaries of the interviews can be found in Appendix A. These interviews represent the most useful information on historical land uses, although they do not characterize the entire study area. The interviews provided specific information on residences and land uses primarily in the southeastern and western portions of the area within a five-mile radius of the plant site.

In some cases, respondents differed on the exact locations of certain agricultural activities, or could not recall the exact time period in which the specific agricultural operations occurred. Therefore, some actual uses and time periods shown on the agricultural land use maps presented in Section 3 are only approximations based on information gathered during the interviews. Table 2-1 lists the persons interviewed regarding land use in the five-mile-radius study area.

TABLE 2-1

LANDOWNERS INTERVIEWED

Name	Summary of Information Provided
Mrs. Bini Abbott Arvada, CO	Owned land in area since 1960. Identified landowners and land uses in the study area.
Mr. & Mrs. Karl Brauch Arvada, CO	Owned land in area since 1939. Cattle operation until 1982.
Mr. Albert Hogan Boulder, CO	Leased Church Ranch land for cattle operation prior to 1950.
Mr. & Mrs. Ed Hogan Boulder, CO	Family has owned land in area since 1890. Lived or worked land since 1940.
Mr. John Lutz Golden, CO	Lindsay Ranch manager.
Mr. Charles Church McKay Westminster, CO	Descendent of Marcus Church. Operates portion of Church Ranch.
Mr. Joe Meininger Broomfield, CO	Church Ranch manager since 1942.
Mr. Roland Vacher Golden, CO	Owns and farms land in area. Familiar with wheat production. Committeeman with Agricultural Stabilization Conservation Service (ASCS) from 1950 to mid 1980s.
Mrs. Jean Woodis Arvada, CO	Former dairy operator (1948-1974). Family has owned land since 1913.

2.1.2 Topographical Quadrangle Maps

Due to the need for historical information for the entire study area, historical 7.5-minute topographical maps for the six quadrangles within a five-mile radius of the plant were also reviewed to obtain land use information. The quadrangle maps show the location of dwellings, barns, places of employment, schools, churches, parks, and surface water features.

During the period of plant operations from approximately 1950 to present, as few as three and as many as five revisions of the maps for each of the six quadrangles were conducted by the USGS. Figure 2-1 identifies the years during the study period for which maps are available for each of the six quadrangles. The topographical maps were provided by the Colorado School of Mines Map Library, and copies of all maps reviewed can be found in Repository Document PO-965 (USGS, 1939-1980). Figure 2-2 illustrates the relationship between the six quadrangles, Rocky Flats Plant and county boundaries, and the one-square mile land sections referred to in property legal descriptions.

Aerial photographs, which are the basis for USGS topographical maps, are supposed to be updated every 10 to 15 years. The usual process for map updating is inspection of aerial photographs and verification of a handwritten, preliminary map by a ground survey team, followed by field checks on some areas by a third party. Maps reviewed as part of this study include several types. A photo-revised map reflects field checks of particular areas with new information printed in purple. A photo-inspected map is produced when inspection of aerials shows that not enough changes have occurred to justify recreating the map through the process described above. A photo-reprinted map is not inspected; only the print date is changed. Consequently, the extent of revision can affect the accuracy of the map (USGS, 1991).

Land sections in each quadrangle were systematically reviewed to quantify the number of dwellings or places of employment, barns or warehouses, surface water features, industrial activity such as mines, and traffic routes. Appendix B presents the results of the map review, presented chronologically by quadrangle. Certain limitations in identifying land uses existed with the quadrangle maps. Each quadrangle map was updated throughout the period, but generally revisions were completed for different years for each quadrangle (see Figure 2-1). Since the photorevised quadrangle maps are not always field checked by a third party, some of the object identification could have been misinterpreted. Figures 4-5 through 4-8 in this report depict the location of residences and schools from the published quadrangle maps for years closest to the four census years of the study period.

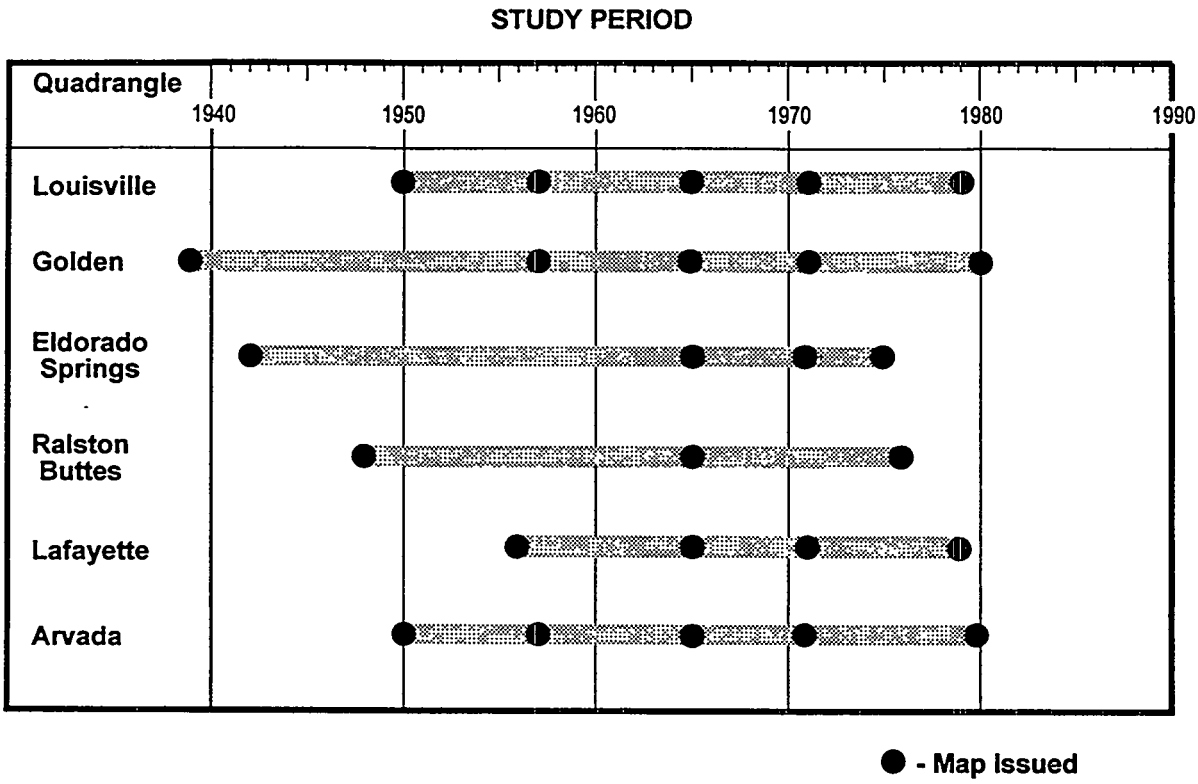

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FIGURE 2-1
HISTORICAL TOPOGRAPHICAL MAPS OF STUDY AREA

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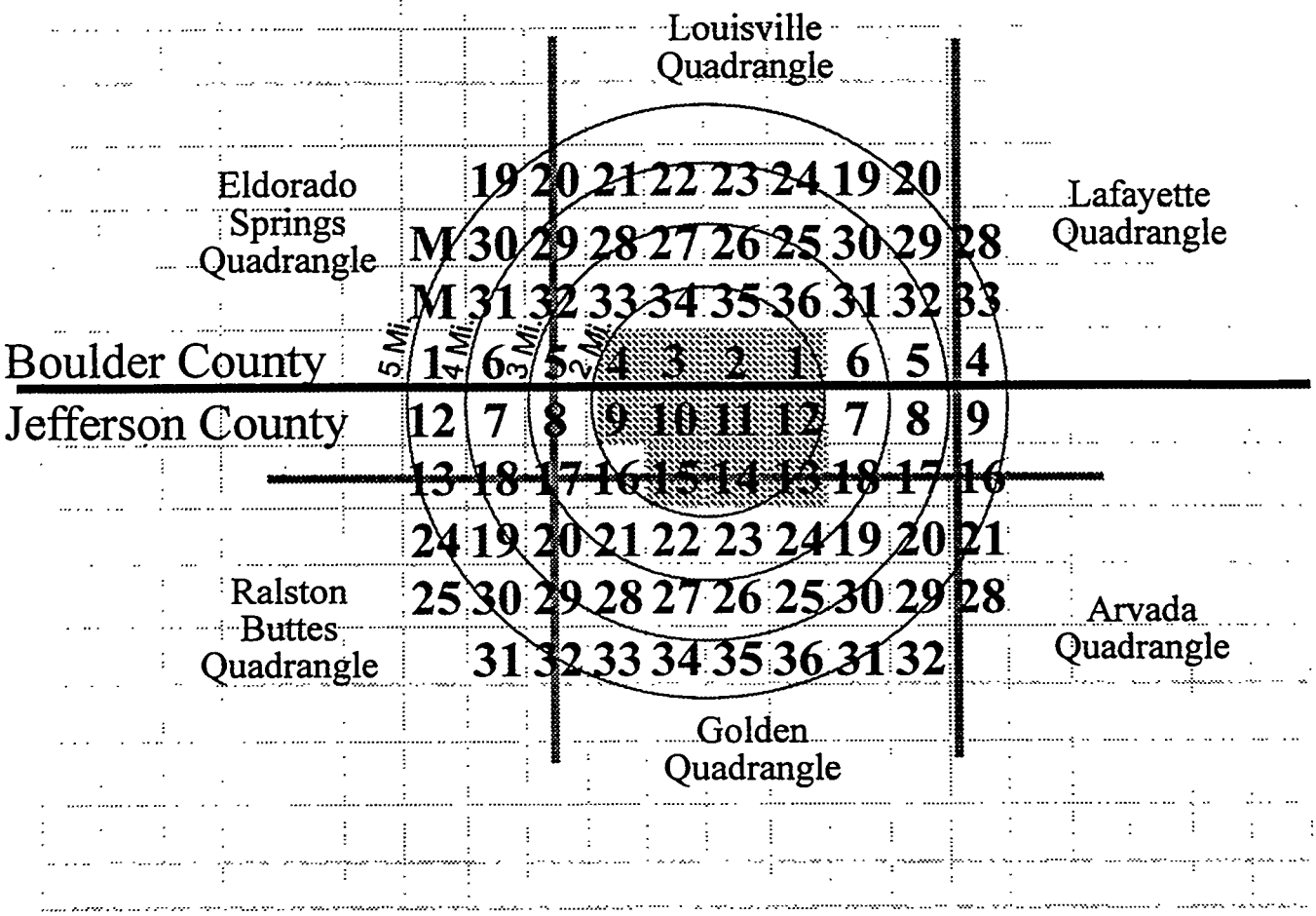

LEGEND

▬▬	QUADRANGLE BOUNDARIES
31	SECTION NUMBER
▒	ROCKY FLATS PLANT PROPERTY (POST 1974)

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FIGURE 2-2
TOPOGRAPHICAL
MAP KEY
ROCKY FLATS PLANT

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2.1.3 Land-Ownership Records

The original sale of land to the U.S. Government for the Rocky Flats Plant in 1951 was researched to determine original land-ownership and neighboring landowners. This information was useful for identifying land uses of the site prior to acquisition, and additional historical residents of the study area.

As discussed in Section 1, additional land surrounding the original property acquired in 1951 was purchased by the U.S. Government between 1974 and 1976. This land is referred to as the buffer zone. To determine land ownership and land use of the buffer zone prior to acquisition, deed books at the Jefferson County Assessor's Office were reviewed to locate the specific deeds of sale.

2.1.4 Other Sources of Land Use Data

Due to the lack of land use information specific to the sections of Jefferson and Boulder Counties within the five-mile radius, a search for additional sources of land use information was conducted. The search produced the following potential sources of land use data:

<u>County Assessor Files</u>

Additional land use information was obtained from the Jefferson and Boulder County Assessor's Offices. A land use inventory identifying land uses within a five-mile radius of the plant by section, township, range, and acreage was printed from county assessor records. The resulting printout shows the current (1990) use of the land by county land use codes. The classification of land by the assessor's office is used for taxing purposes and in some cases has not been updated recently. The land use classifications include grazing, hay meadow, dryland farm, agribusiness, commercial, industrial, residential, mineral reserve, vacant, and exempt (usually publicly held properties). Many of the land uses classified for tax purposes have not changed over time. This source of information can be useful for cross-checking identified historical and current land uses described in the interviews. However, the assessors' data did not prove to be very accurate in describing acreages and dates of ownership for the 1950s and 1960s, or current land uses. Results of the land use database searches from both Boulder and Jefferson Counties are located in Repository Documents PO-962 (Boulder County, 1991) and PO-963 (Jefferson County, 1991a).

County and Local Governments

Jefferson County, Boulder County, and local municipality records were reviewed to identify land uses within the five-mile radius. Each county and municipality in the 50 mile radius of the plant was contacted about the imminent collection of information on land use, zoning, annexation, recreational use, population, water sources, agriculture use, and growth trends in their respective jurisdiction. Again, most municipal and county land use information addresses only incorporated areas or is county-wide, which is not useful in the demographic characterization of the specific area within a five-mile radius. Most of the study area is unincorporated. Records of correspondence with counties and municipalities are included in Repository Document PO-967 (Kathol, 1991). The request letter and contact list can be found in Appendix C.

Some historical data on grazing land and other non-irrigated land north of the plant was provided in the Boulder County Comprehensive Plan (1983) and from conversations with the Boulder County Open Space Planner (Wheeler, 1991).

Agricultural Sources

The Colorado State University (CSU) Agronomy Department (Eckles, 1991) and the CSU Agricultural Economics Department (Spencer, 1991) were consulted to determine possible sources of information on crop production and consumption in the region and export/ consumption ratios of local products. The Colorado Crop and Livestock Reporting Services provide estimates on crop and livestock production by county on an annual basis but do not provide information on a more detailed level. Actual crop and livestock production specific to the five-mile radius was unavailable.

Another source of agricultural information is the Colorado Census of Agriculture (USDOC, 1950-1987). The Census of Agriculture provided data on crops and livestock produced county-wide in Jefferson and Boulder Counties. However, specific information was not available for the five-mile study area. The study area is a relatively insignificant portion of overall Jefferson and Boulder County agricultural production.

The Agricultural Stabilization and Conservation Service (ASCS) for Boulder and Jefferson Counties was also contacted to identify agricultural land uses in the study area (Williams, 1991 and Vacher, 1991). The Jefferson County ASCS is combined with the Boulder County office. This ASCS office has maps showing the acreages and crop production of farms in the area surrounding the plant. The oldest maps (aerial photographs) available were for 1978 and 1983.

Recreational Sources

Fishing information was available for each county from the Colorado Division of Wildlife (Polisky, Weber and Satterfield, 1990). Specific data in the five-mile radius around the plant have not been collected. Broad-based habitat information was available from 1968 stream and lake surveys, which included sampling for fish, water chemistry, insect life, and flow, but did not include any statistics on the numbers of fish caught (creel data). Creel data were not available prior to the 1980s. From the mid 1980s on, there were creel data for Standley Lake, Arvada Reservoir, Ralston Reservoir, Boulder Creek, and Clear Creek.

Hunting information was available from a Colorado Division of Wildlife Annual Report titled *Colorado Big Game Harvest*, which has been published annually throughout the study period. The report describes all game harvested by county and game management unit. Specific harvest data for part of the five-mile radius around Rocky Flats is available for Game Management Unit 29 (Schoonveld, 1992). The report includes information on game harvests, number of hunters, and recreational visitor days.

In addition to the *Colorado Big Game Harvest* information, several habitat studies have been completed in the Rocky Flats area (Alldredge, 1990); pertinent results of these studies are summarized in Section 3.3.

Information on historical water usage for Great Western Reservoir, Standley Lake, and Mower Reservoir has been collected (Schnoor, 1991; Tipton and Kalmbach, 1989; and State of Colorado, 1973) and is briefly summarized in Section 3.3.

Aerial Photography

Several sources of aerial photography were reviewed to identify land uses in the area, including the Landis aerial photos from 1973 and from 1978 to the present. The aerial photos covered the area to the north, east, and south of the plant, including photos of the plant. Rural residential areas, waterways, cultivated land, mining activity, and industrial and commercial developments were all discernible in the 1:1200 scale photos. Individual residential units could not be accurately counted at the 1:1200 scale. All Landis aerial photos can be blown up to a 1:200 scale (Chad, 1991). These photos are available for cross-referencing with information obtained from the personal interviews.

Jefferson County Planning Department also had a number of aerial photographs at scales of 1:200 and 1:500 for the 1970s, and 1:1000 for 1950, 1980s, and 1990 for portions of the area within a five-mile radius. Residences are not discernible at the 1:1000 scale, which was the only scale

available for years other than the 1970s. Although topographical quadrangle maps are shown at a scale of 1:24,000, they are professionally interpreted.

2.2 Population

Population data for the study area were obtained primarily from U.S. Census data (USDOC, 1950-1990). Reports obtained included selected Population and Housing Characteristics for 1950, 1960, 1970, 1980, and 1990 for the Denver/Boulder Standard Metropolitan Statistical Area (SMSA) census tracts within the five-mile radius of the Rocky Flats plant. Additional sources of population data reviewed include local government and suburban phone directories.

2.2.1 U.S. Bureau of Census Statistics

In 1950, populations of counties were identified by minor civil divisions, which correspond somewhat to census tracts of later years. These divisions identified population in a more detailed manner than later census tract estimates. Population data obtained from the 1960 Census included only tract data for the study area. This data does not accurately represent the study area due to the large geographical area included in the census tracts. Census block data are available for the 1970 and 1980 Census of Population and Housing Characteristics for the Denver/Boulder SMSA and Selected Areas. Block data encompasses most of the eastern portion of the study area, adjacent to the Denver SMSA, for these years.

In the 1990 Census, block data are available for the entire United States. For the 1990 population estimates, data were used from the U.S. Census Bureau automated geographic data base, known as the TIGER (Topologically Integrated Geographic Encoding and Referencing) System, that allows production of various geographical products using 1990 Census block data.

The specific locations of persons are difficult to identify in the rural areas, therefore cross-checks with USGS topographical quadrangle maps may be used to identify the locations of residences and population centers. Quadrangle maps show the locations of individual residences and major population centers. Because historical census tracts typically include areas outside the five-mile radius, it was necessary to make best estimates on the size of the population that actually lived within the study area. This was done for the years 1950 and 1960, for which block data were not available.

2.2.2 Other Sources of Population Data

If additional research on historical populations in the study area is required, sources such as annexation information from local governments and old Jefferson and Boulder County records can be reviewed.

Local Governments

Local government annexation maps and land use maps identify new subdivisions or employment centers which were located in the study area throughout the study period. Building permits are another source of information which will require researching archived files. This source is available, if necessary, to produce more accurate population counts for specific areas within a five-mile radius of Rocky Flats plant.

Directories

Other sources of information available to estimate study area population include historical suburban phone directories for the suburban areas around Denver City located in the Denver Public Library's Western History Section. The directories identify a few residences, primarily in the southeastern portion of the study area nearest to the plant, for years between 1952 and 1964 when directories were published.

3.0 HISTORICAL LAND USE

Land uses in the vicinity of the Rocky Flats plant are generally of a rural agricultural character. Most of the area within the five-mile radius is agricultural land with interspersed industrial uses and some residential development. The prevalent agricultural uses for the period 1950 through the present include the following: grazing of livestock, primarily cattle, hay production, wheat production, some corn, barley, and rye production, and some dairy farms. The land in the area would not be considered prime agricultural land due to the rocky, shallow, soil conditions. Other uses include: some clay, sand, and gravel mining, mini-farms or smaller acreage ranchettes with horses and other farm animals such as chickens, pigs, sheep, etc., rural residences, suburban residences, mountain and county parkland or open space, recreational, irrigation, and municipal water supplies, and some industrial manufacturing uses.

3.1 Land Use Interviews

Nine individuals, including land owners and ranch managers within a five-mile radius of the Rocky Flats plant, were interviewed for their knowledge of land use, additional landowners, and residents. The purpose of the interviews was to identify typical agricultural practices during the study period specific to the five-mile study area. Appendix A includes a copy of the survey questions and summaries of each interview, including the individual responses to the survey questions and any additional information provided by those interviewed. Copies of the completed questionnaires and land use maps, and notes taken during interviews, are contained in Repository Document PO-967 (Kathol, 1991). The following sections summarize the historical land use information provided by each respondent.

3.1.1 Land Use Interviews - Outside Buffer Zone

The following individuals were interviewed for their knowledge of historical land use activities outside the buffer zone, but within a five-mile radius of the Rocky Flats plant.

<u>Ed Hogan</u>

The Hogan family has owned property in the area since 1890. Ed Hogan has lived on the 600 acres his family owns, off and on since 1940. Key aspects of the Hogan land use interview were:

- Farm animals were raised and consumed throughout the period 1950 to 1990.
- A large garden was maintained most years from 1950 to present.
- Fished and hunted deer occasionally from 1950 to present.

- Consumed water from a groundwater well.

- Adjacent property owners to the north and east of the Hogan property were the Van Vleets, who used the land for summer grazing.

- Most of the land in the study area has historically been used for grazing and some wheat production.

Roland Vacher

Although Mr. Vacher does not live within the five-mile radius of the plant, he still owns 300 acres and farms 558 acres in the area. Key aspects of the Vacher interview included:

- Wheat production since 1941; most of the grain is sold at elevators in Denver and shipped out of the area for processing.

- Vacher was an elected committeeman with the Jefferson County Agricultural Stabilization Conservation Service (ASCS) from 1950 into the early 1980s.

- The major crop produced in the area was dryland wheat.

- Other wheat producers in the study area include:

  - The T.G. Nies Ranch, until the land was sold to Jefferson County Airport.
  - The Ketner Ranch just north of Standley Lake, until it was developed into a residential subdivision, Countryside Estates.
  - The Brauch property near Alkire and 100th from 1950 through the mid-1980s.
  - The McKay (Church) land just west of Indiana and north of 96th was in wheat production throughout the study period.
  - Some irrigated farms in the area just southeast of Superior.

- Suggested contacting the Denver Milk Producers (now Western Dairy Co-op) for information on historical dairies in the area.

Bini Abbott

Bini Abbot and her husband have lived on their property since 1960. The former owners, the Moores, grew winter wheat on the property. Key aspects of Abbott interview were:

- Only farm animals are horses and donkeys.
- Grow hay for feed and for sale.
- Had a garden in the past and consumed the vegetables during the growing season.
- Two water wells (30 feet deep and 155 feet deep) were used for everything including drinking water.
- Do not fish or hunt locally.

Mrs. Abbott is very familiar with the area and was able to provide additional names of landowners and past and current land uses.

- Most of the properties are small acreage (2 to 12 acres) ranchettes.
- Larger landowners in the area are the Brauchs, the Ladwigs and the Woodises.

Charles Church McKay

Charles McKay is one of the two descendants of Marcus Church, one of the original owners of the land on which the Rocky Flats plant was built. The first parcel was sold in 1950, and additional acreage was sold in 1974. Mr. McKay never lived within the five-mile radius, however the Church family has grazed cattle and grown hay and wheat in the area for the past 40 years. Key points of the Church land use interview included:

- Grazing rights existed on certain parts of the plant lands including much of the buffer zone.
- A maximum of 200 head of cattle grazed on the land within the five-mile radius, and some were consumed by the Church family.
- Consumed two to three fish per year from Rocky Flats Lake (Smart Reservoir).

- Perry S. McKay, the brother of Charles McKay, also owns land in the five-mile radius.

- Potential contacts who have either owned land in the five-mile radius or lived in the area as foremen on ranches, or lessees include:

  - Albert and Leo Hogan purchased Church Ranch steers and heifers and leased land from the McKays.
  - Joe Meininger, the Church Ranch manager, plowed ground and would know when the land was in wheat.
  - Wayne Harkness grew up in area and raised Angus cattle.
  - John Lutz was the Lindsay Ranch manager.
  - John Boyle sold land to Jefferson Center Project.
  - Howard Lacy and Bruce Nickerson are Jefferson Center Developers.

Karl Brauch

Although Mr. and Mrs. Brauch were not interviewed personally, they returned a questionnaire. The Brauchs have lived at their current address for 52 years. Land use information from the Brauch interview included the following key points:

- Maintained herd of 100 herefords from 1942 through 1982; retired in 1982.

- Approximately 50 percent of their meat intake came from their cattle from 1942 to 1982; cattle grazed on the ranch pasture grasses.

- Currently lease their land as pasture for 78 head of cattle.

- Did not have a garden.

- Used their groundwater well for drinking and all other uses.

- Do not hunt or fish locally.

Jean Woodis

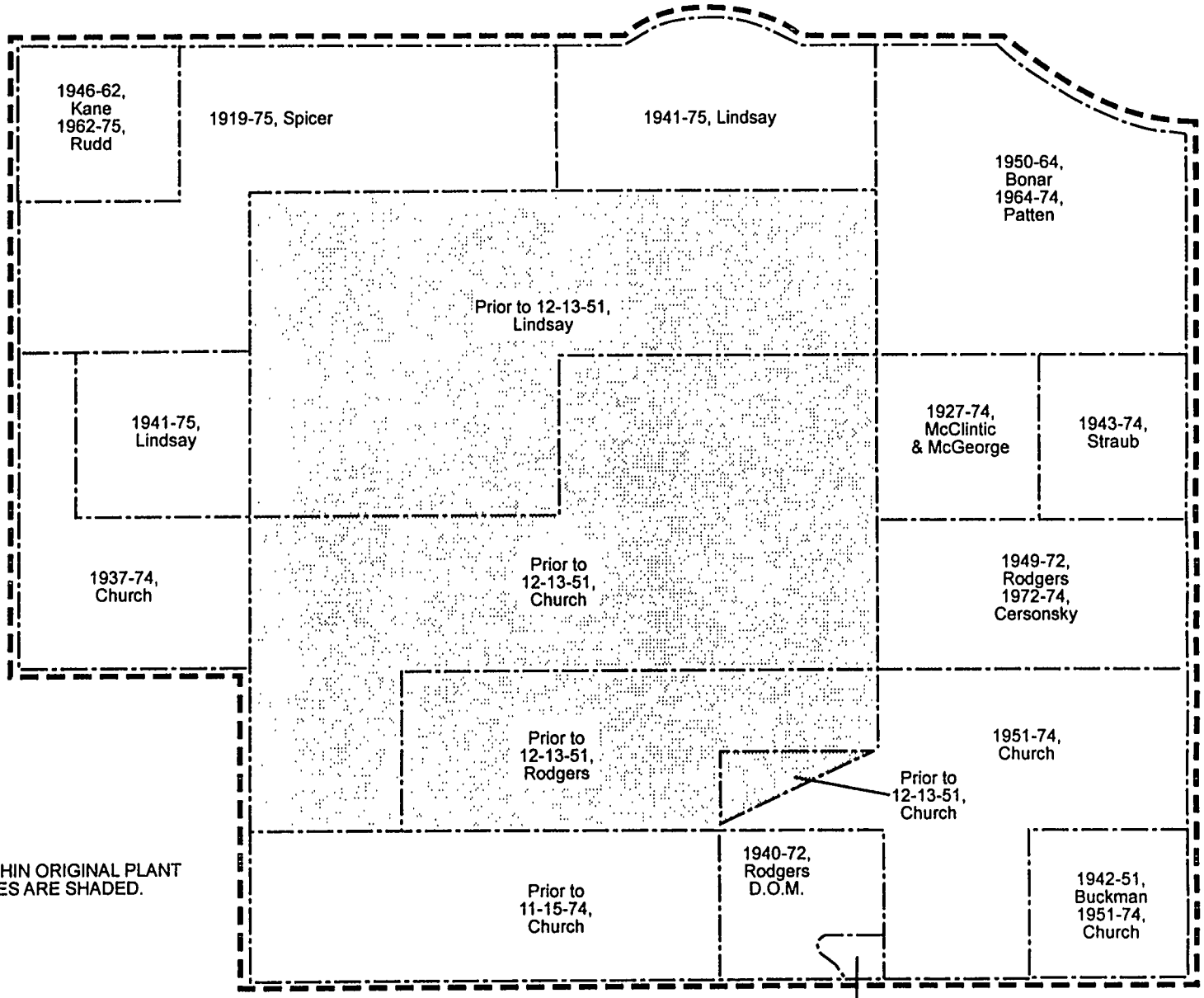
The family of Mrs. Jean Woodis (the Zehnders) has owned land within the five-mile radius since 1913. Mrs. Woodis has lived on the 79 acres (now 39 acres) since 1948. Information provided on these operations and other land uses include:

- Operated a dairy farm (ranged from 50-100 cows) from before 1950 until 1974.
- Started a cow/calf operation (50 head) in 1974.
- Sold milk to the Denver Milk Producers, which supplied milk to the Denver Metropolitan area.
- Sold cattle in the Denver market.
- Both dairy cows and beef cattle grazed on the Woodis property, but also were fed hay bought from various producers (generally from outside the five-mile radius).
- Consumed both beef and dairy products primarily from animals grown on the farm.
- Have grown a garden throughout the period and have consumed the vegetables.
- Have three wells (two old and one new); two wells are used for drinking water, one well is for livestock.
- Identified a number of former dairies and owners within the five-mile radius.

3.1.2 Land Use Interviews - Within Buffer Zone

Deed books and legal descriptions of both the original purchase in 1951 and the expansion of the buffer zone in 1974-76 were reviewed at the Jefferson County Clerk and Recorder Office to identify potential land uses within the current buffer zone boundary before the included land was purchased by the U.S. Government in 1951 and in 1974-76. Figure 3-1 illustrates areas and dates of prior ownership of land within the Rocky Flats plant boundary. Copies of the actual deed legal descriptions from both the original purchase in 1951 and the 1974-76 purchases can be found in Repository Document PO-964 (Jefferson County, 1991b).

In addition to the deed search to determine land ownership within the buffer zone, several individuals were specifically interviewed to determine historical uses of land. These interviews are summarized below.



NOTE:
AREAS WITHIN ORIGINAL PLANT BOUNDARIES ARE SHADED.

LEGEND
- CURRENT PLANT BOUNDARY
- PROPERTY BOUNDARY

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FIGURE 3-1
PROPERTIES ACQUIRED FOR THE ROCKY FLATS PLANT SITE

RckTsk7/3-1 Rev: 03/30/94

TABLE 3-1

DEEDS OF SALE FOR BUFFER ZONE LAND

Date	Owner	Acres
12-13-51	George Lindsay Katherine Church Frank Rodgers	960 1200 400 2560
6-6-74	H. Sol Cersonsky	318
6-7-74	D.O.M. Acres (a limited partnership)	142
6-21-74	Anne Straub	160
7-3-74	A. Reamer Patten (Colorado Investment Services, Inc.)	446
9-6-74	McClintic & McGeorge (of Virginia)	151
11-15-74	Anne Church	1451
11-20-74	Robert Young	18
1-15-75	Sam and Bette Rudd and Robert Pierce	160
1-30-75	Harold Spicer and Kenneth and Dorothy Wilshusen	619
2-25-75	Susan Lindsay	513
6-21-76	Public Service Co. of Colorado	28
7-23-76	Adolph Coors Company	2

Charles Church McKay

- Marcus F. Church sold approximately 2880 acres to the Atomic Energy Commission (AEC) in 1950; AEC did not allow any of this land to be grazed or put into crop production.

- Indicated land outside the original plant boundary which was grazed or in crop production (See Section 3.2).

Albert Hogan

- Leased land around the Church ranch from 1950 to present.

- Grazed under 200 head of cattle which were sold in major markets.

- Has not produced hay, wheat or other crops, or had a garden.

Joe Meininger

- Started working in the area in 1942, but has never lived on the property.

- Identified 100 acres of irrigated crop land and 300 acres of dryland, west of Indiana St., that was in wheat, corn, or barley throughout the study period. The corn and barley were used as feed for the cattle, and the wheat was often sold in town.

- Indicated 110 acres of dryland wheat on Highway 72.

- Indicated 1500 acres of land between the southern plant boundary and Highway 72 that has always been used for grazing.

- Suggested contacting the following people: Karl Brauch, Jean Woodis, Bini Abbott, Ed Ladwig, John Lutz, John Boyle, Ranson, Bill and Ed Hogan.

John Lutz

- Lindsay Ranch Manager; grazes cattle from plant boundary to Highway 128.

- Land west and north of the plant has always been used for grazing (160 head of cattle).

- A 160-acre tract within the plant boundary was used for hay production until 1950; hay fed to the ranch cattle; calves were sold in Longmont.

- In recent years they have started grazing north of Highway 128, since land became Boulder County Open Space.

3.2 Agricultural Land Use

Figures 3-2 through 3-5 graphically present all agricultural land use information provided by landowners for all portions of the study area covered in the interviews. Agricultural land use was emphasized because historically it has been the predominant land use, and because it represents plausible exposure pathways.

The only major differences in agricultural land use from 1950 to 1980 are that dairies were not operating after the mid-1970s, and the southern portion of the buffer zone was no longer grazed after acquisition of that land by the U.S. Government in 1974-76. Much of the grazing land and other non-irrigated land north of the plant was purchased by Boulder County for use as open space. Boulder County continues to lease this land for grazing, which has historically been the principal use of the land (Wheeler, 1991).

3.3 Other Land Use

Some information on land uses other than agriculture was collected in the land use interviews, from USGS quadrangle map review, and from other sources including contact with government agencies.

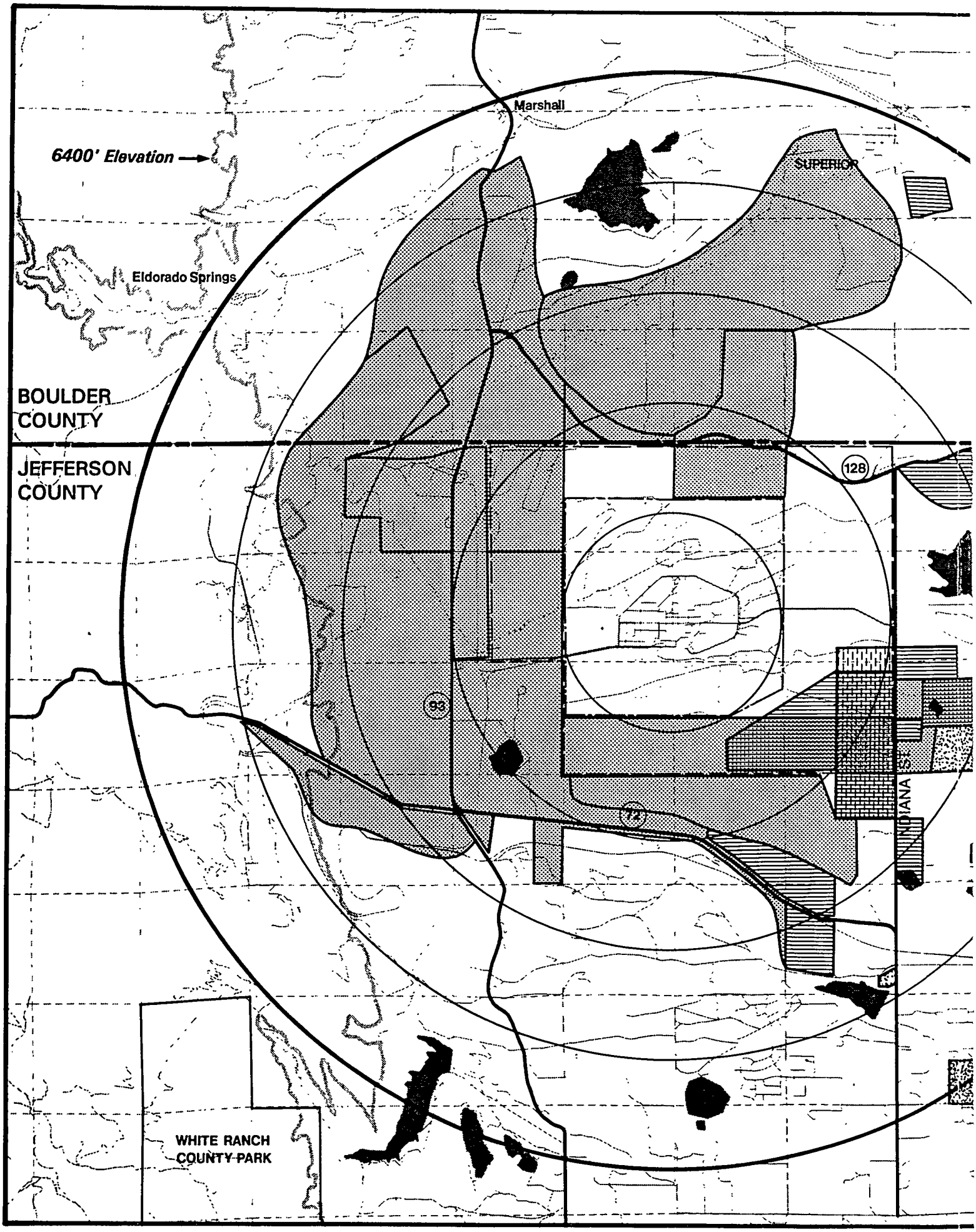
3.3.1 Results from Land Use Interviews

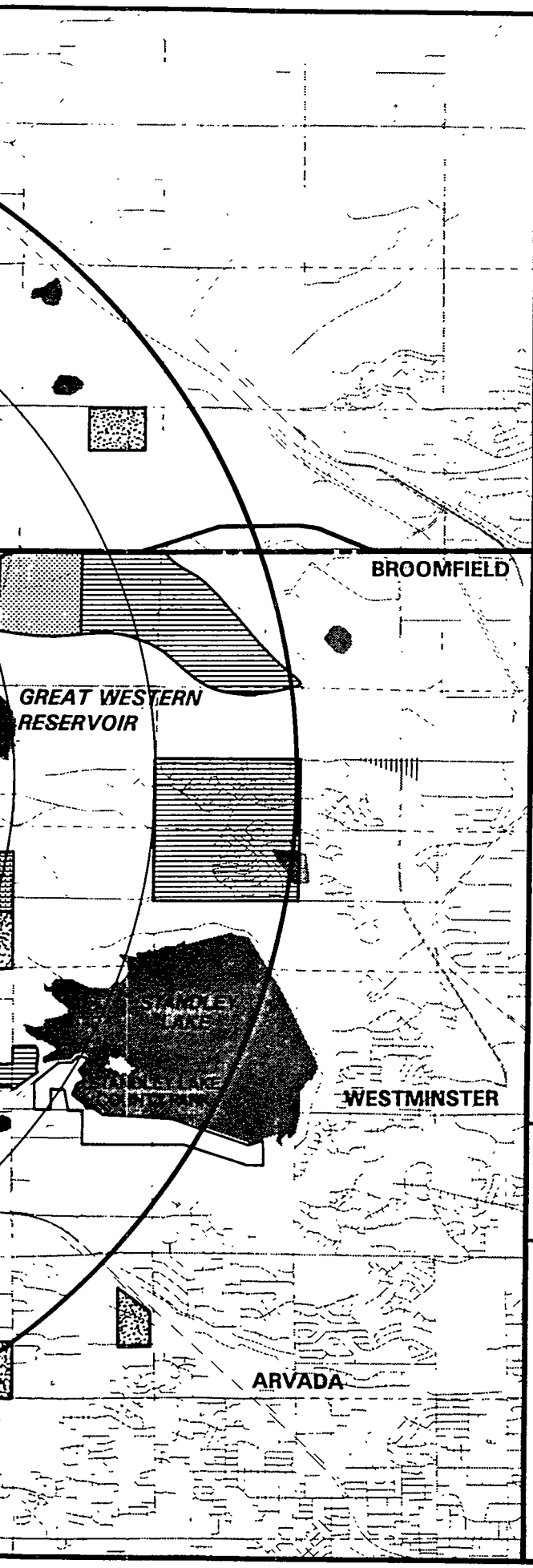
Information obtained from the land use interviews for land uses other than agriculture are summarized below:

- Some residents fished and hunted deer for personal consumption within the study area from 1950 to the present.

- Some of the residents within the study area consumed water from ground water wells.

- The area around Alkire and Standley Lake is designated bald eagle habitat.


Marshall
6400' Elevation
SUPERIOR
Eldorado Springs
BOULDER COUNTY
JEFFERSON COUNTY
128
93
72
INDIANA ST.
WHITE RANCH COUNTY PARK



LEGEND

PREDOMINANT LAND USES

- GRAZING AND HAY
- HAY
- CROPLAND (Wheat or other crops)
- DAIRY

——— ORIGINAL PLANT BOUNDARY (1951 - 1974)

—·—·— ROCKY FLATS PLANT BOUNDARY (1974 - Present)

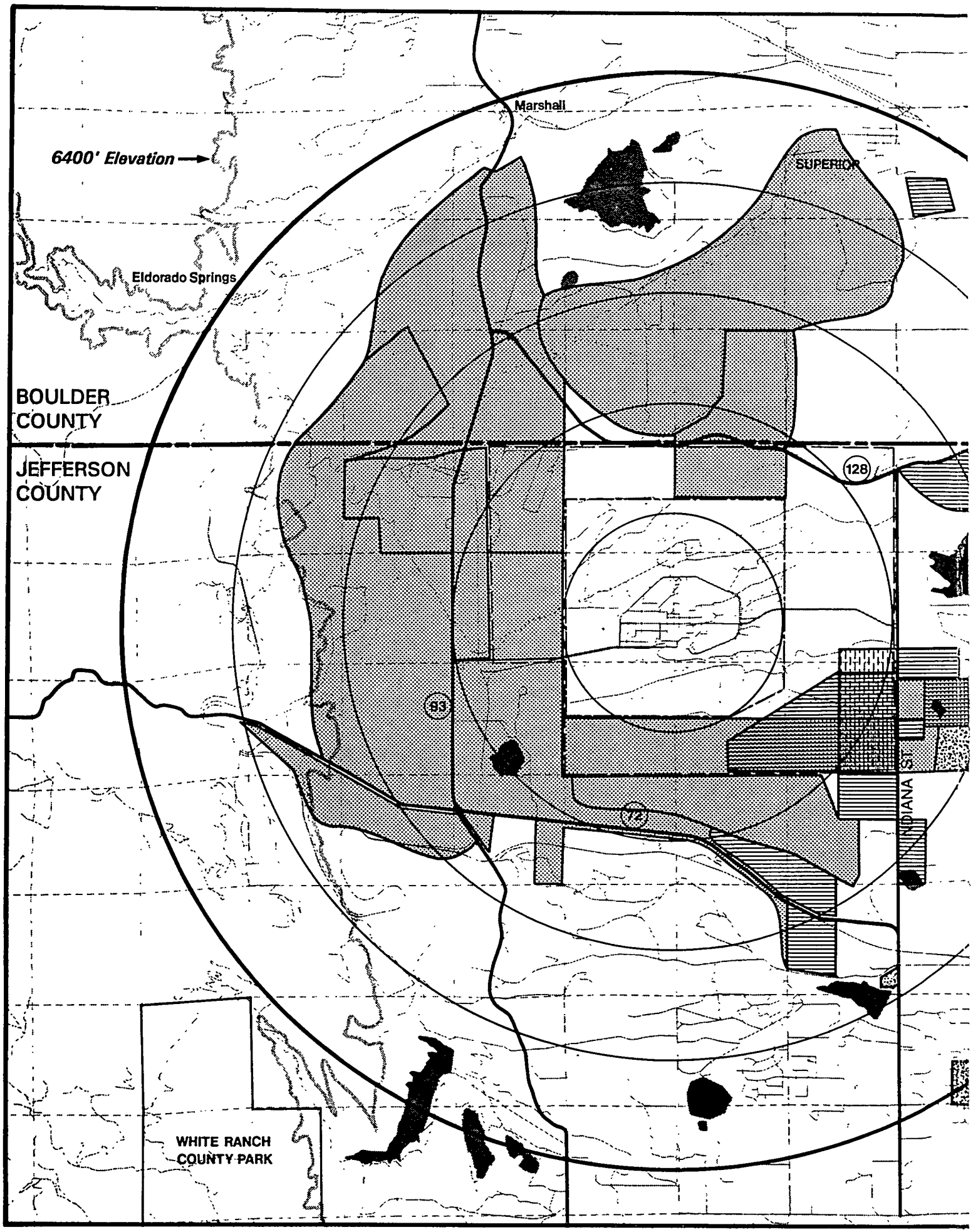
Divisions within a particular land use area indicate landholdings.
Multiple patterns indicate rotating or multiple uses.

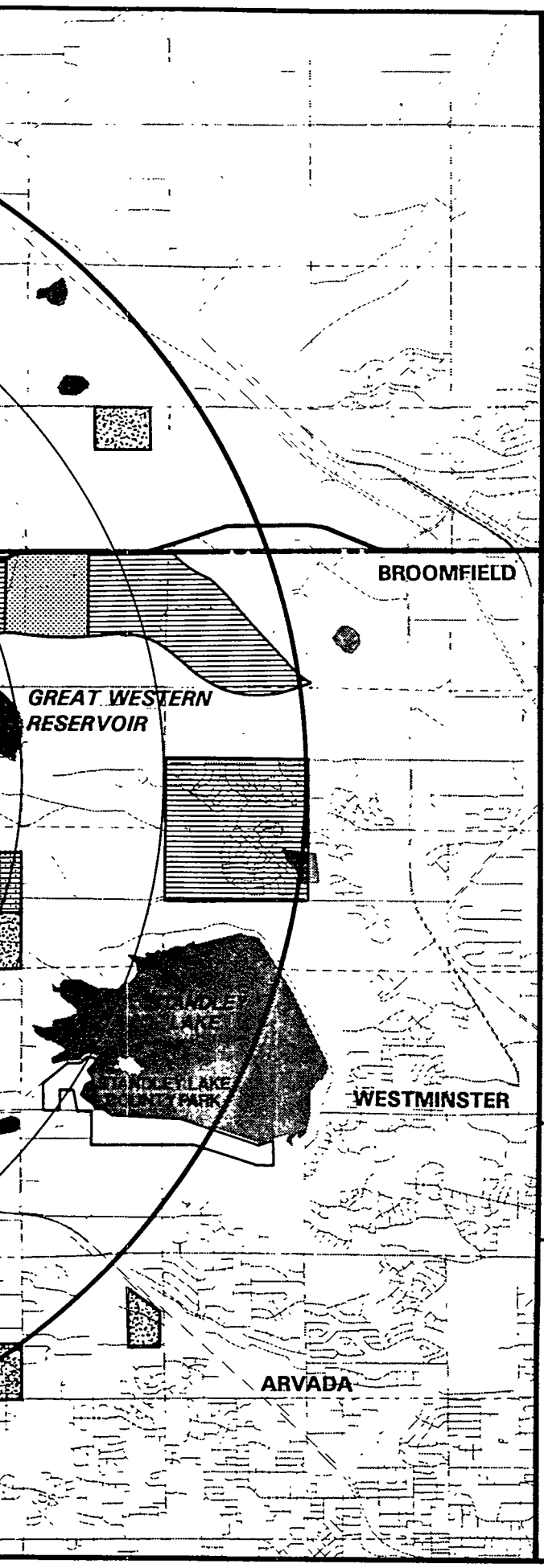
CIRCLES ARE AT ONE MILE INTERVALS FROM PLANT CENTER

0 1 2 3
MILES

N

FIGURE 3-2
AGRICULTURAL LAND USES - 1950


Marshall
6400' Elevation
SUPERIOR
Eldorado Springs
BOULDER COUNTY
JEFFERSON COUNTY
128
93
72
INDIANA ST
WHITE RANCH COUNTY PARK



LEGEND

PREDOMINANT LAND USES

- GRAZING AND HAY
- HAY
- CROPLAND (Wheat or other crops)
- DAIRY

—·——— ORIGINAL PLANT BOUNDARY (1951 - 1974)

——— ROCKY FLATS PLANT BOUNDARY (1974 - Present)

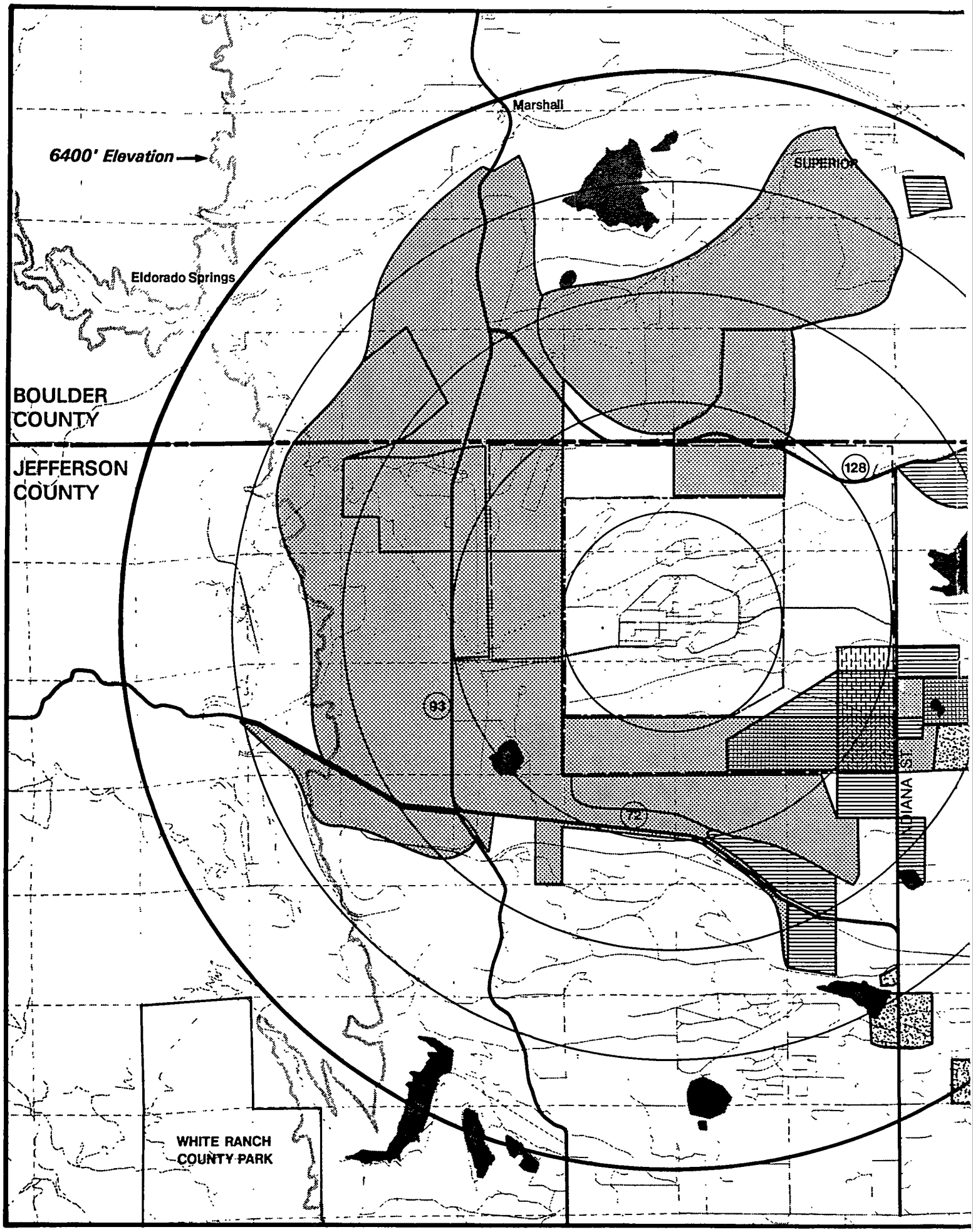
Divisions within a particular land use area indicate landholdings.
Multiple patterns indicate rotating or multiple uses.

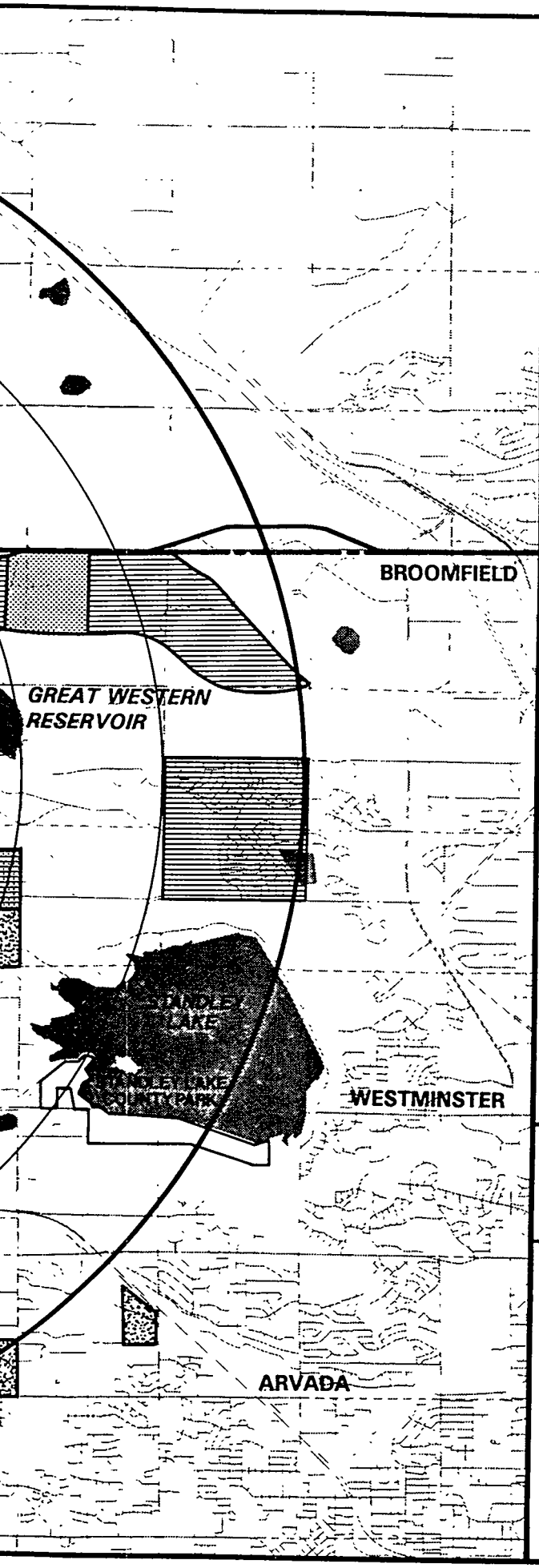
CIRCLES ARE AT ONE MILE INTERVALS FROM PLANT CENTER

0 1 2 3
MILES

N

FIGURE 3-3
AGRICULTURAL LAND USES - 1960


Marshall
6400' Elevation
SUPERIOR
Eldorado Springs
BOULDER COUNTY
JEFFERSON COUNTY
128
93
72
INDIANA ST
WHITE RANCH COUNTY PARK



LEGEND

PREDOMINANT LAND USES

- GRAZING AND HAY
- HAY
- CROPLAND (Wheat or other crops)
- DAIRY

—·—·— ORIGINAL PLANT BOUNDARY (1951 - 1974)

— — — ROCKY FLATS PLANT BOUNDARY (1974 - Present)

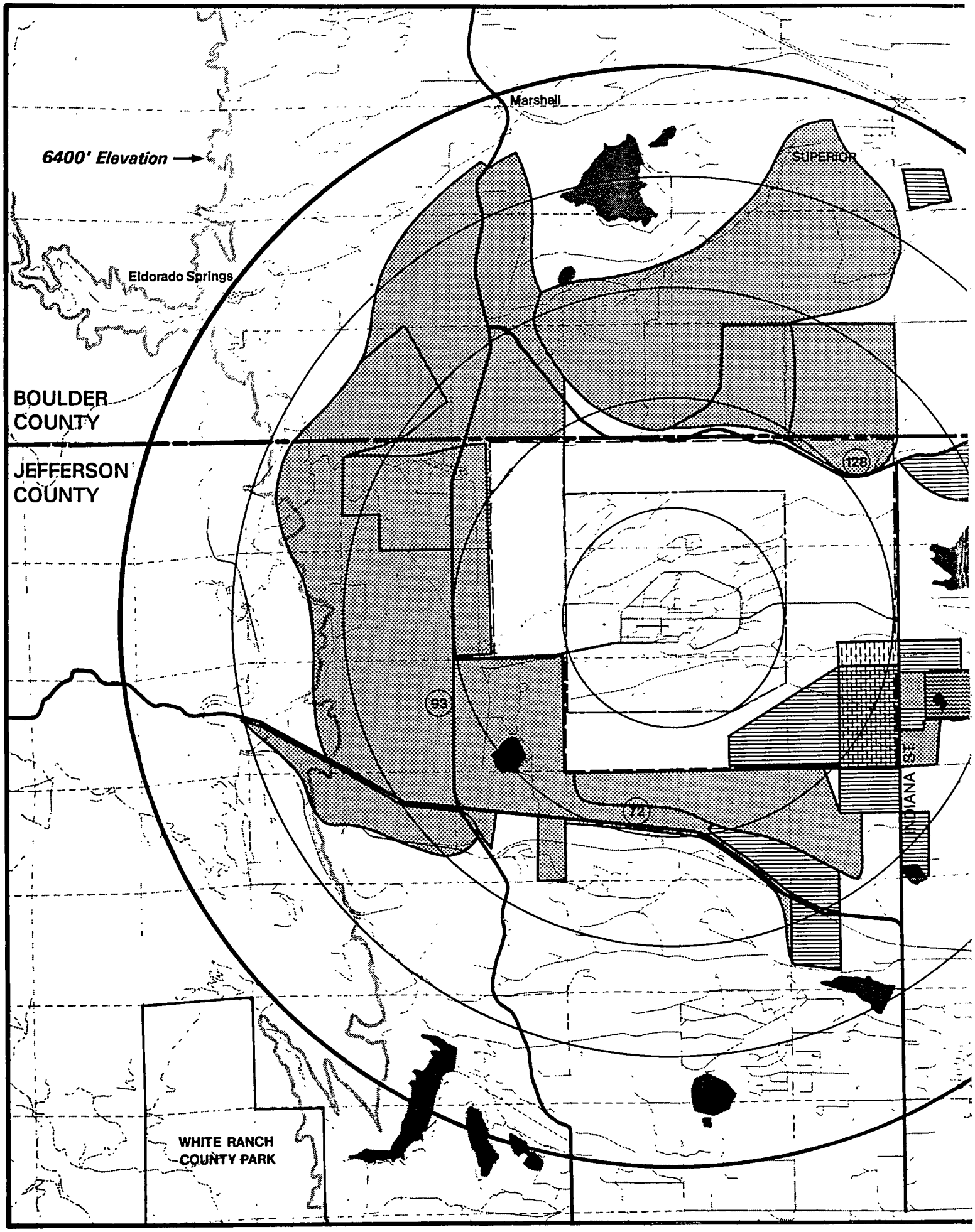
Divisions within a particular land use area indicate landholdings.
Multiple patterns indicate rotating or multiple uses.

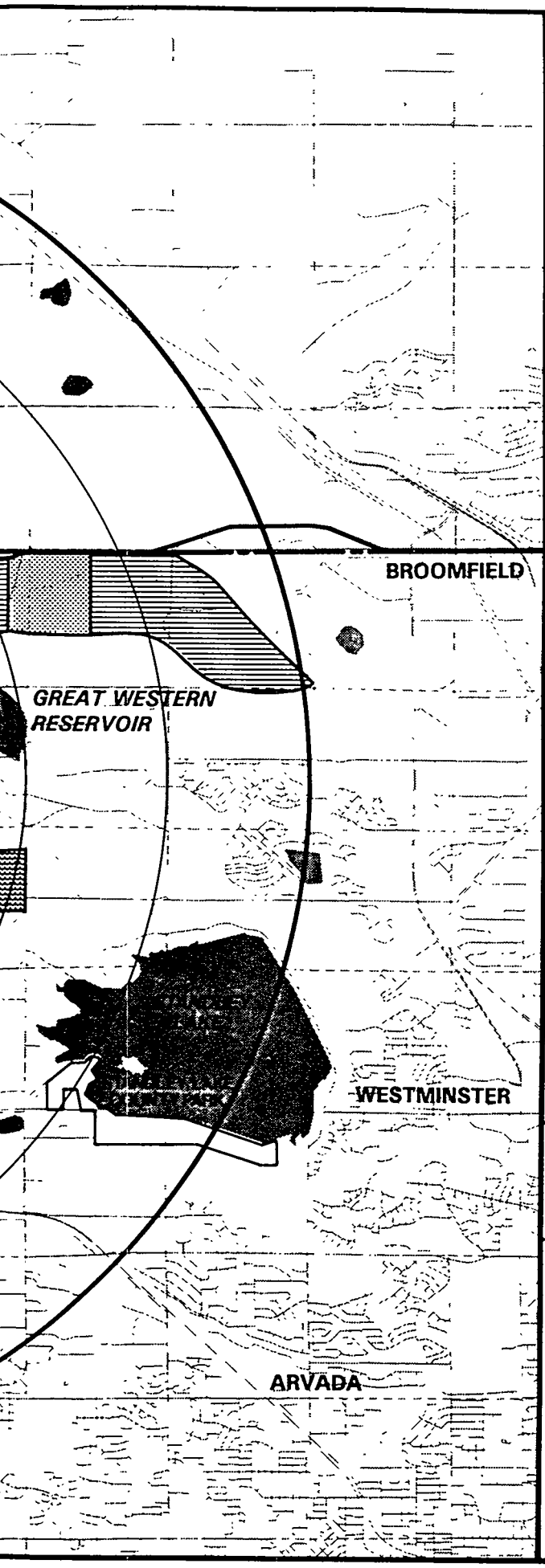
CIRCLES ARE AT ONE MILE INTERVALS FROM PLANT CENTER

0 1 2 3
MILES

N

FIGURE 3-4
AGRICULTURAL LAND USES - 1970


Marshall
6400' Elevation
SUPERIOR
Eldorado Springs
BOULDER COUNTY
JEFFERSON COUNTY
128
93
72
INDIANA ST
WHITE RANCH COUNTY PARK



LEGEND

PREDOMINANT LAND USES

- GRAZING AND HAY
- HAY
- CROPLAND (Wheat or other crops)
- DAIRY

------ ORIGINAL PLANT BOUNDARY (1951 - 1974)

------ ROCKY FLATS PLANT BOUNDARY (1974 - Present)

Divisions within a particular land use area indicate landholdings.
Multiple patterns indicate rotating or multiple uses.

CIRCLES ARE AT ONE MILE INTERVALS FROM PLANT CENTER

0 1 2 3
MILES

N

FIGURE 3-5
AGRICULTURAL LAND USES - 1980

- Along the south side of Highway 72, within the study area, are located the Great Western Inorganics and Thoro Chem Superfund Site, and the former Tosco Oil and Gas site, later the proposed site for the Jefferson Center Planned Unit Development (PUD) offices.

3.3.2 Results of Analysis of USGS Quadrangle Maps

As discussed in Section 2.1.2, maps of land sections in each USGS topographic quadrangle within the study area were reviewed to quantify the number of dwellings or places of employment, barns or warehouses, surface water features, industrial activities such as mines, and traffic routes.

Appendix B presents the result of map review, chronologically by quadrangle. To simplify the review process, a compass direction of NW, NE, SE, or SW was added to the land section number to define relative direction from the plant within the five-mile-radius study area. As shown in Figure 2-2, four sections designated as 19 are within the five-mile study area because the complete numbering system includes a range, township, and section number. Since only two sections are numbered 7, a direction code of E, W, N or S was included to define location within the study area.

Appendix B can be referred to for specific information related to historical land use.

3.3.3 Habitat Studies

Several habitat studies have been completed in the Rocky Flats area. Results show that most deer in the area tend to stay within the plant boundary. Of the tagged deer followed in one study, only two deer left the site. It appears that there is not a measurable game harvest within the study area (Alldredge, 1990).

3.3.4 Historical Water Use

Information on historical water usage for Great Western Reservoir was collected. Great Western was constructed in 1904 and used for irrigation until 1955. Since 1955, the treated water has been the City of Broomfield's municipal water supply. Public access to Great Western has been limited since at least 1971. Recreational activities such as fishing and boating have not been permitted. Presently, the area is fenced and posted to exclude the public (Schnoor, 1991).

Standley Lake was constructed between 1907 and 1912. From 1914 to 1966, water from Standley Lake was used only for irrigation. In 1966, the water was first used for drinking by the City of Westminster. Presently, the cities of Westminster, Northglenn, and Thornton own two-

thirds of the water rights. Water used for domestic purposes is conventionally treated. The other third is transported via irrigation ditches to agricultural areas northeast of Standley Lake between Broomfield and Fort Lupton (Tipton and Kalmbach, 1989).

Water from Mower Reservoir was first used for irrigation in 1872. The current uses of the water are agricultural, stock watering, domestic lawn watering, and irrigation of 80 acres. Mower Reservoir water has never been treated (State of Colorado, 1973).

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4.0 HISTORICAL POPULATION

Population was estimated for the period 1950 through 1990 based primarily on U.S. Department of Commerce, Bureau of the Census data. Because of limitations of census data for rural areas such as the area within five miles of the Rocky Flats plant, other information sources used included historical topographical quadrangle maps, local growth rates, household size data, and geographical and local historical data.

4.1 U.S. Bureau of Census Population Statistics

Most of the study area was located on the fringe of the Denver SMSA throughout the period 1950-1990. Population in the Denver SMSA has increased throughout the period, putting more development pressure on areas near the foothills. The population within five miles of the Rocky Flats plant primarily consists of rural residents. Since population data in low-density areas are consolidated into geographically large tracts for enumeration purposes, population distribution is difficult to estimate for small, low-density areas.

In addition, the format of census data has changed throughout the study period. Various reporting units include county, city, census tract, minor civil division, enumeration district, and census block. For the purposes of this study, the most detailed data format available for each census year was used to identify population within the area. In every census year, the geographical boundaries of some census units (tracts, blocks, etc.) were changed, especially in response to growth within a unit. Therefore, it is difficult to accurately determine changes in the study area population over time.

In 1950, the study area was divided into minor civil divisions, which were slightly more detailed than census tract data. Census tracts have an upper population limit of 4000 if they are not divided into enumeration districts or blocks. In 1960, census data were provided by census tracts, which represented areas extending well beyond the study area.

As populations in portions of the study area further increased, more specific population data were presented by census block. Census block information did not become available until 1970 in the area, and was available for only the eastern portion of the study area. In addition to limited census block information, enumeration districts also provided a more detailed look at population in the area in the 1970 and 1980 census years. It was not until 1980 that census block statistics became available for a large portion of the study area. However, census data for the western half of the study area still were only available in census tract and enumeration district formats, which represented an area from the Jefferson County/Boulder County line to the city limits of Golden. For the 1990 census, the entire United States was divided into blocks.

Table 4-1 illustrates the difficulty in assigning tract population to smaller areas when no block groups exist. The table presents population statistics for each minor civil division or census tract even partially included in the study area. In this table, the entire census unit population is presented, with no adjustments, from block data or topographical maps.

Minor census divisions or census tracts with large portions located outside the study area are indicated in the Table by an asterisk. For example, census tract 98 in 1960 is geographically much larger than the study area, and no block data exist for 1960. Therefore, the 1960 total population in the five mile vicinity of Rocky Flats in 1960 is grossly inflated if the entire tract population is included. Population in tracts 98.20, 98.21 and 98.15 for 1990 includes growth in incorporated areas outside the 5-mile study area, also inflating the total population in 1990.

Because of the difficulty in estimating historical population within the study area using census data alone, a best estimate approach was taken using a combination of available statistical information and professional judgement for the census years 1950 through 1980. In addition to the most detailed level of U.S. Census of Population data available for each census year (USDOC, 1950-1980), three other information sources were used to estimate population: 1) USGS 7.5-minute quadrangle maps showing residential units, for the years closest to each census year, 2) annualized growth rates, projected from local area growth rates and overall population increases in the area, and 3) professional judgement using topographical information, geographical limitations, and historical information.

Figures 4-1 through 4-5 present the estimated numbers of persons living within a five-mile radius of the Rocky Flats plant for the years 1950, 1960, 1970, 1980, and 1990. For the years 1950 through 1980, a map of the study area showing the five concentric rings at one-mile intervals was manually overlaid on the 1950 minor civil divisions-election precinct map, the 1960 census tract map, and the 1970 and 1980 census block maps. In most cases, the concentric rings of the study area did not coincide with the census defined areas, therefore assumptions regarding the population within each segment of the study area were devised.

In some cases where no detailed census information was available for a study area segment, topographical maps were used to identify clusters of residences or sole family farms. A household size factor was then applied to the total number of residences based on historical household size statistics.

In cases where no information was available for an area, but population within that area during a previous decade was shown, a growth factor was applied and the previous population figure was compounded.

TABLE 4-1

U.S. CENSUS STATISTICS FOR MINOR CIVIL DIVISIONS AND CENSUS TRACTS LOCATED PARTIALLY OR COMPLETELY WITHIN THE STUDY AREA 1950-1990

Date	County	Division	Population
1950	Jefferson	13	364
		19	521
		1	934
		26	723
		11	1,072
		12	933
		14	90
	Boulder	27	97
		28	250
		7	465
	1950 TOTAL		**5,449**
		Tract	
1960	Jefferson	(98*)	*8,885*
	Boulder	7	6,534
		8	1,859
		11	4,677
	1960 TOTAL		**21,955**
1970	Jefferson	98.02	1,461
		(98.03*)	*2,543*
		(98.08*)	*2,248*
	Boulder	125.06	6,486
		127.04	492
		131.02	159
	1970 TOTAL		**12,389**
1980	Jefferson	98.13	1,094
		98.15	750
		98.03	2,025
		(98.08*)	*2,092*
	Boulder	125.10	3,787
		127.04	519
		131.02	174
	1980 TOTAL		**10,441**
1990	Jefferson	98.20	10,438
		(98.21*)	*8,042*
		98.15	2,725
		98.19	7,666
		(98.08*)	*3,560*
	Boulder	125.10	4,385
		127.04	509
		131.02	2,960
	1990 TOTAL		**40,285**

* Large portions of this census unit are located outside the study area.

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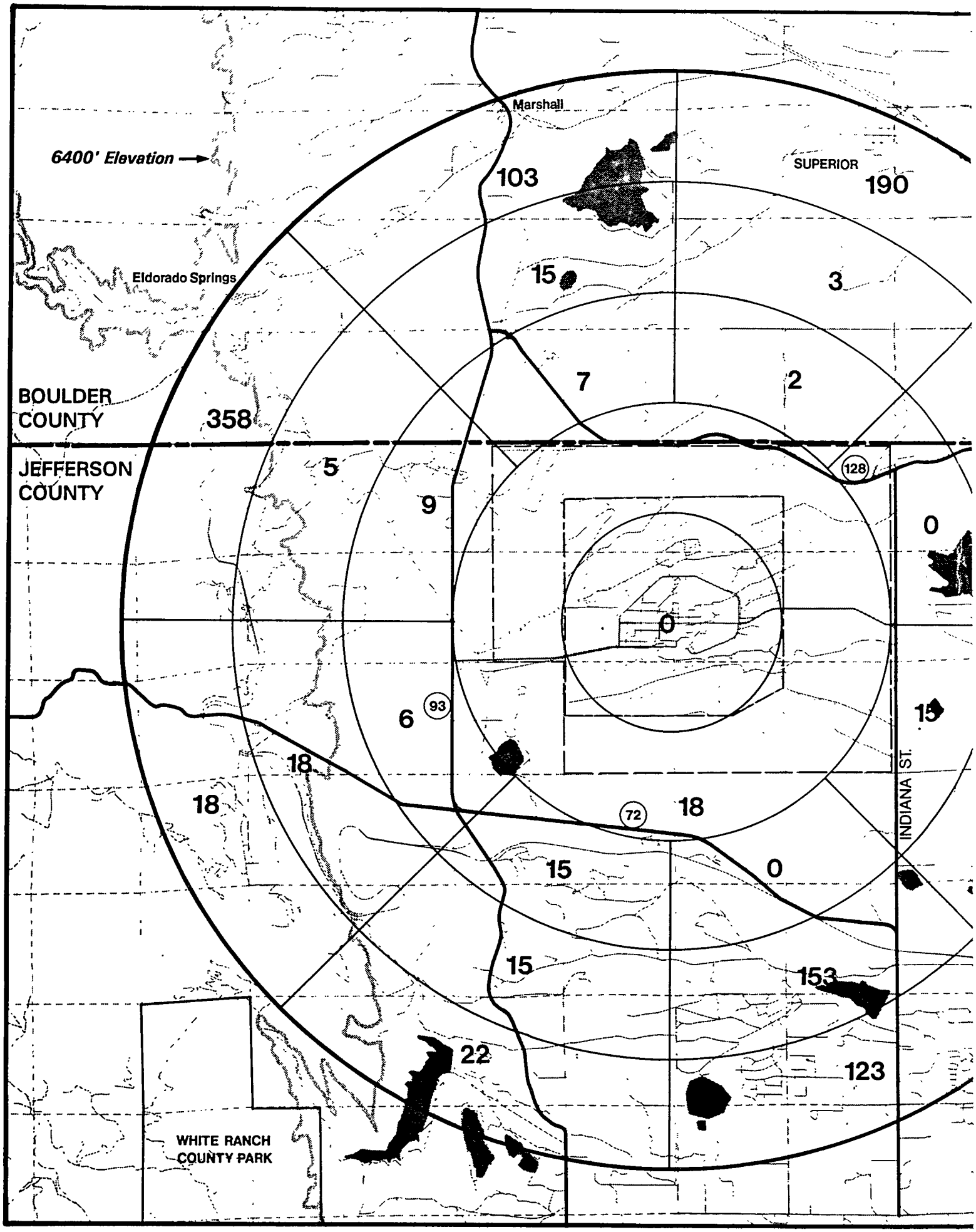
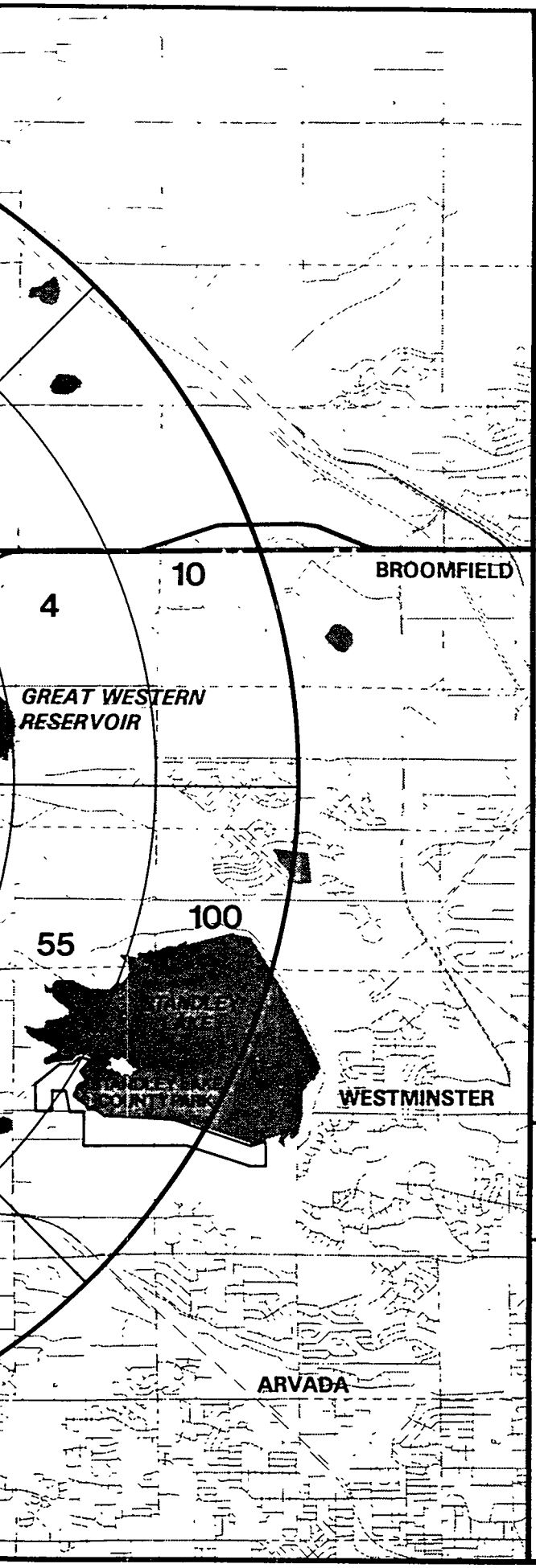

Marshall
6400' Elevation
SUPERIOR
103
190
Eldorado Springs
15
3
7
2
BOULDER COUNTY
358
JEFFERSON COUNTY
5
128
9
0
0
6
93
15
18
18
72
18
INDIANA ST.
15
0
15
153
22
123
WHITE RANCH COUNTY PARK



LEGEND

ORIGINAL PLANT BOUNDARY (1951 - 1974)

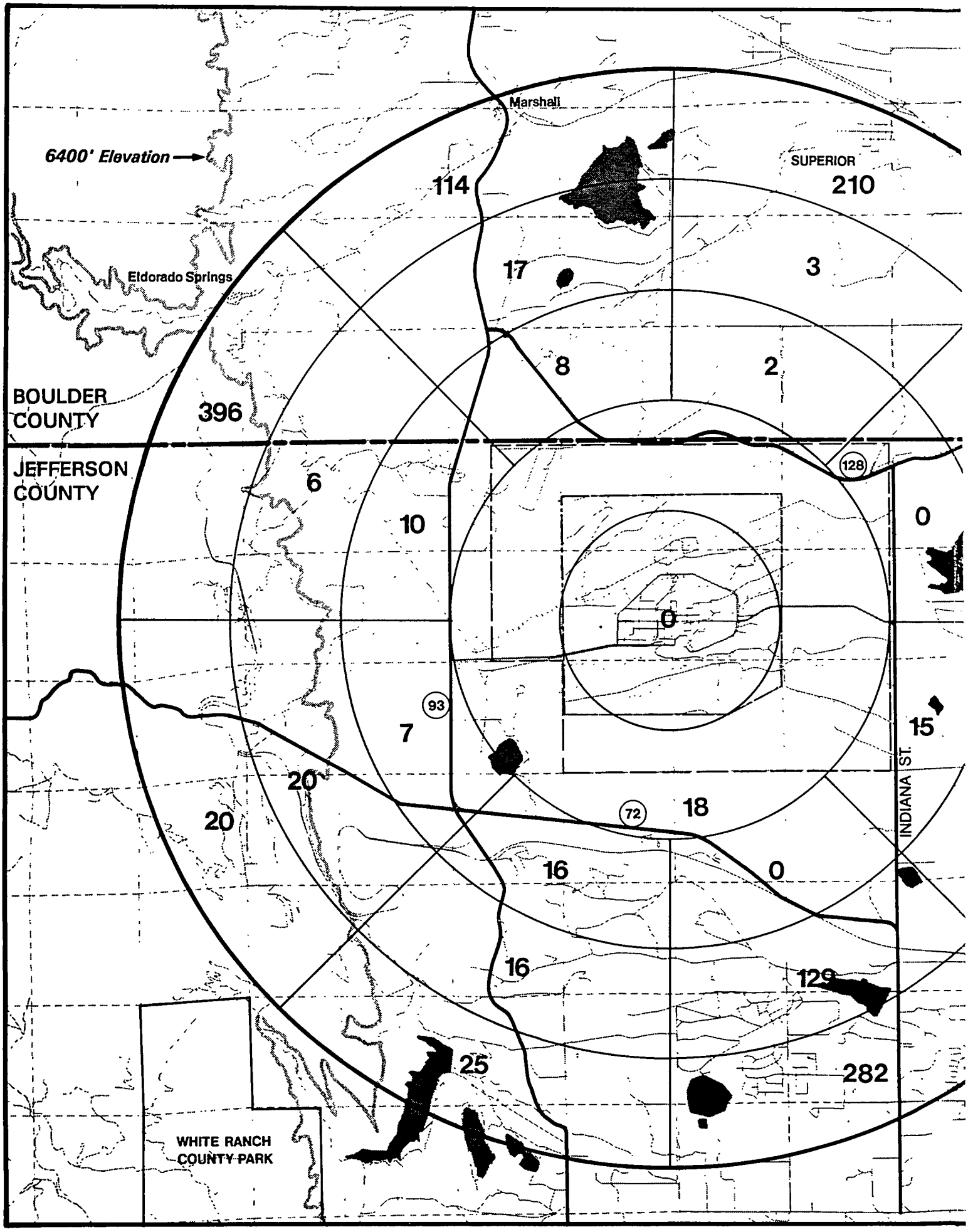
ROCKY FLATS PLANT BOUNDARY (1974 - Present)

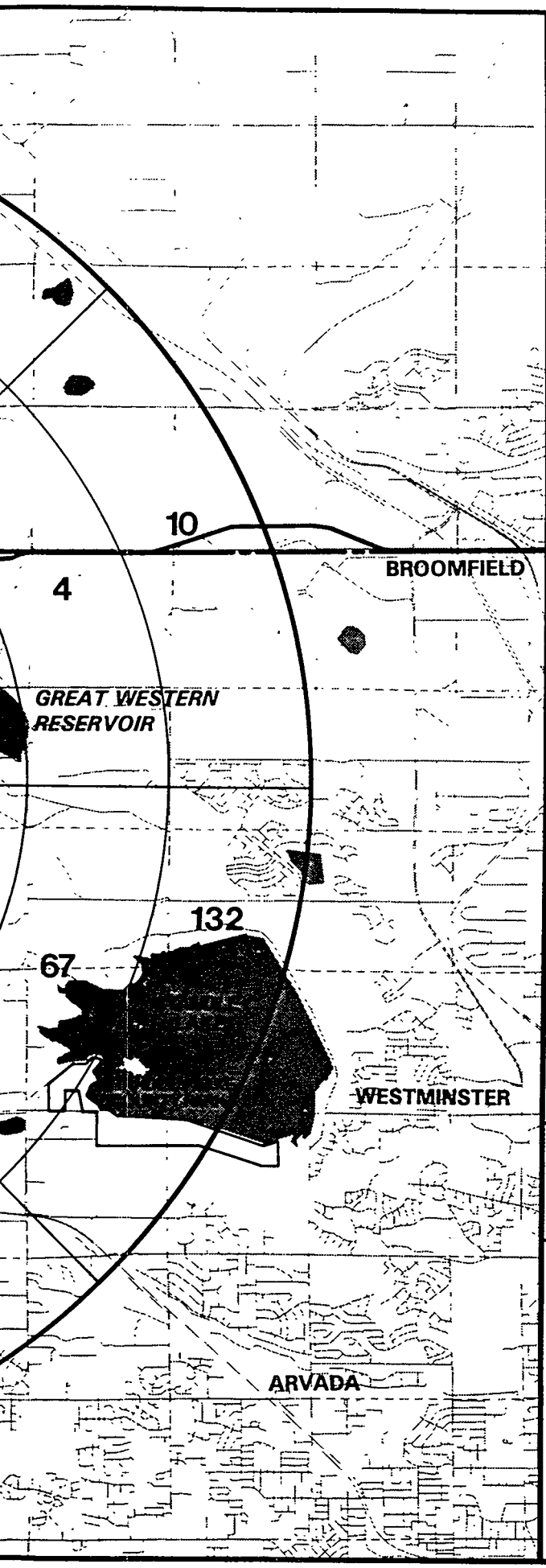
CIRCLES ARE AT ONE MILE INTERVALS FROM PLANT CENTER

0 1 2 3
MILES

N

FIGURE 4-1
ESTIMATED 1950 POPULATION


Marshall
6400' Elevation
SUPERIOR
114
210
Eldorado Springs
17
3
8
2
BOULDER COUNTY
396
JEFFERSON COUNTY
128
6
10
0
0
93
7
15
20
20
72
18
INDIANA ST.
16
0
16
129
25
282
WHITE RANCH COUNTY PARK



LEGEND

—·—·— ORIGINAL PLANT BOUNDARY (1951 - 1974)

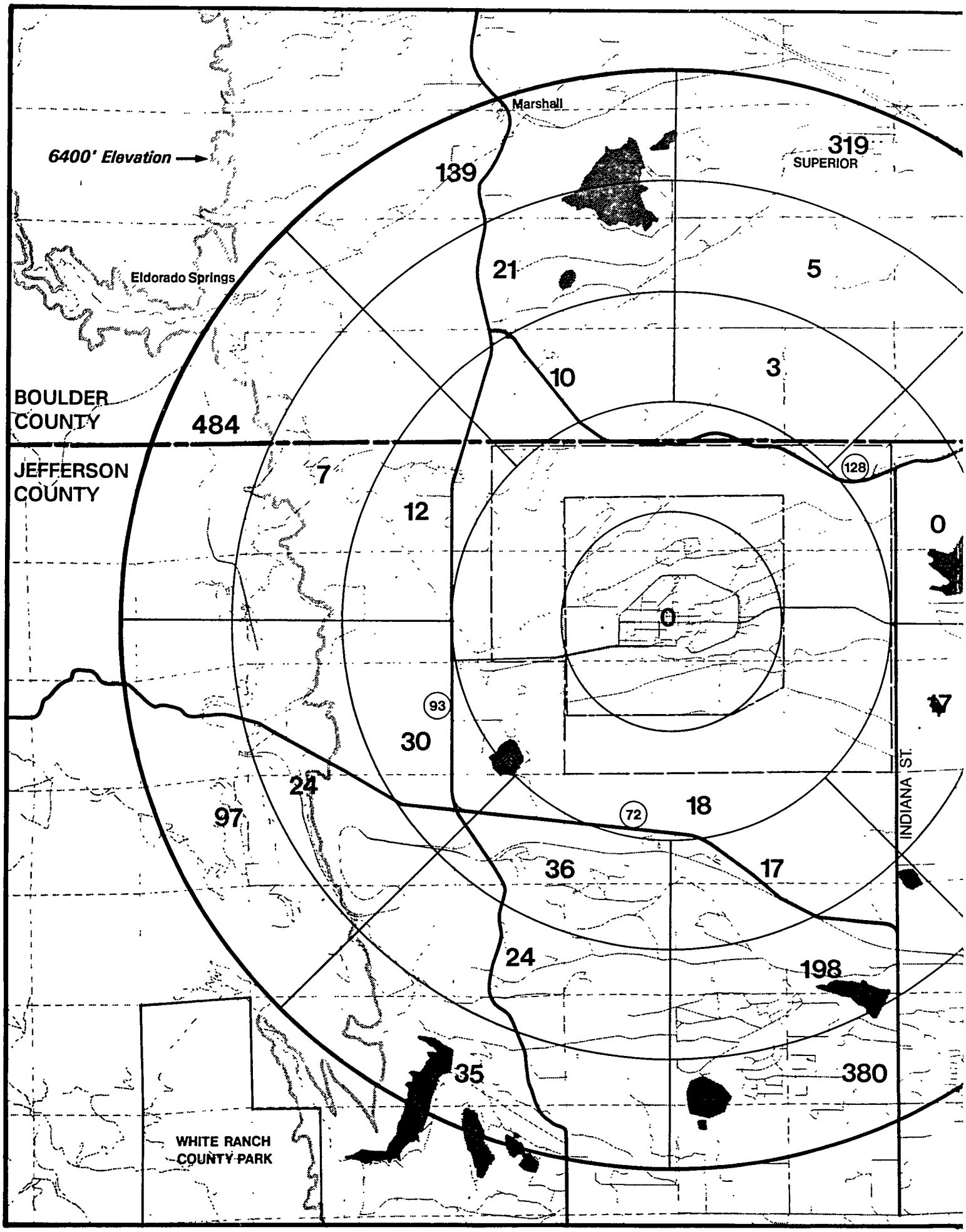
— — — ROCKY FLATS PLANT BOUNDARY (1974 - Present)

CIRCLES ARE AT ONE MILE INTERVALS FROM PLANT CENTER

0 1 2 3
MILES

N

FIGURE 4-2
ESTIMATED 1960 POPULATION


Marshall
6400' Elevation
319
SUPERIOR
139
21
5
Eldorado Springs
10
3
BOULDER
COUNTY
484
JEFFERSON
COUNTY
7
12
128
0
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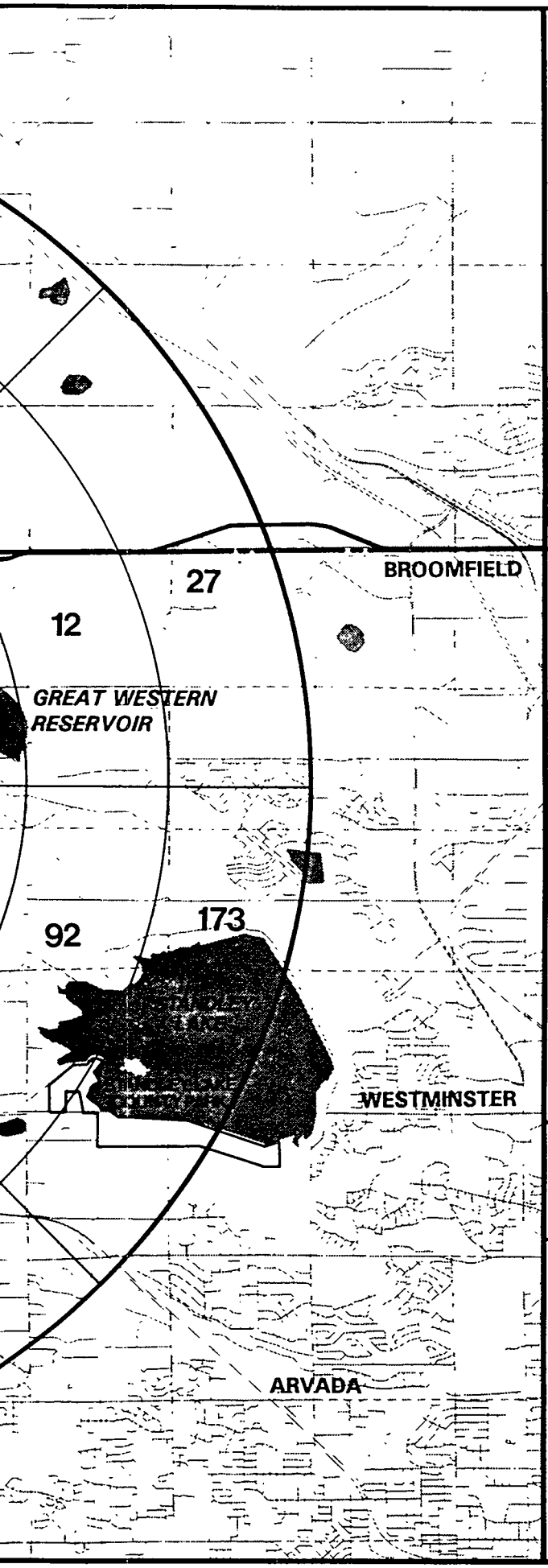
93
30
17
24
97
72
18
INDIANA ST.
36
17
24
198
35
380
WHITE RANCH
COUNTY PARK



LEGEND

—·—·— ORIGINAL PLANT BOUNDARY (1951 - 1974)

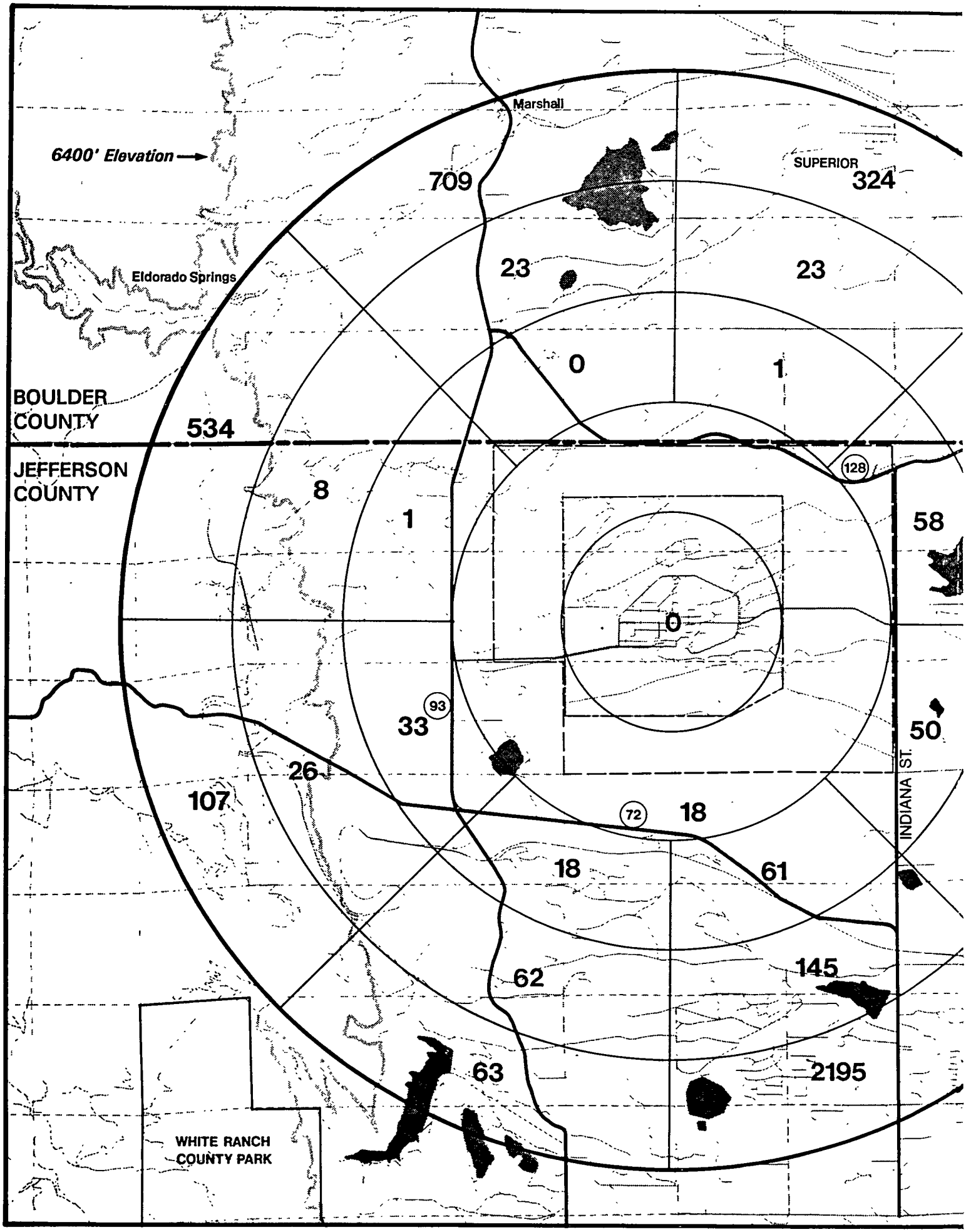
— — — ROCKY FLATS PLANT BOUNDARY (1974 - Present)

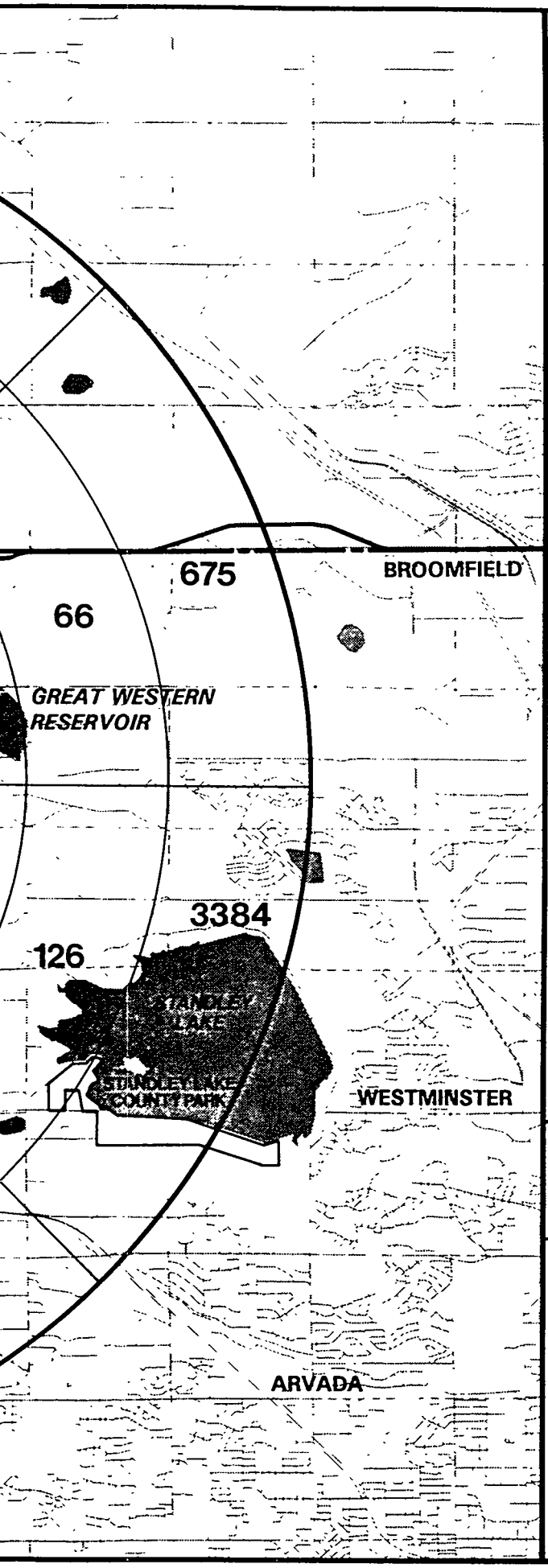
CIRCLES ARE AT ONE MILE INTERVALS FROM PLANT CENTER

0 1 2 3
MILES

N

FIGURE 4-3
ESTIMATED 1970 POPULATION


Marshall
6400' Elevation
SUPERIOR
324
709
23
23
Eldorado Springs
0
1
BOULDER
COUNTY
534
JEFFERSON
COUNTY
128
8
1
58
0
93
33
50
26
107
72
18
INDIANA ST.
18
61
145
62
63
2195
WHITE RANCH
COUNTY PARK



LEGEND

—·—·— ORIGINAL PLANT BOUNDARY (1951 - 1974)

— — — ROCKY FLATS PLANT BOUNDARY (1974 - Present)

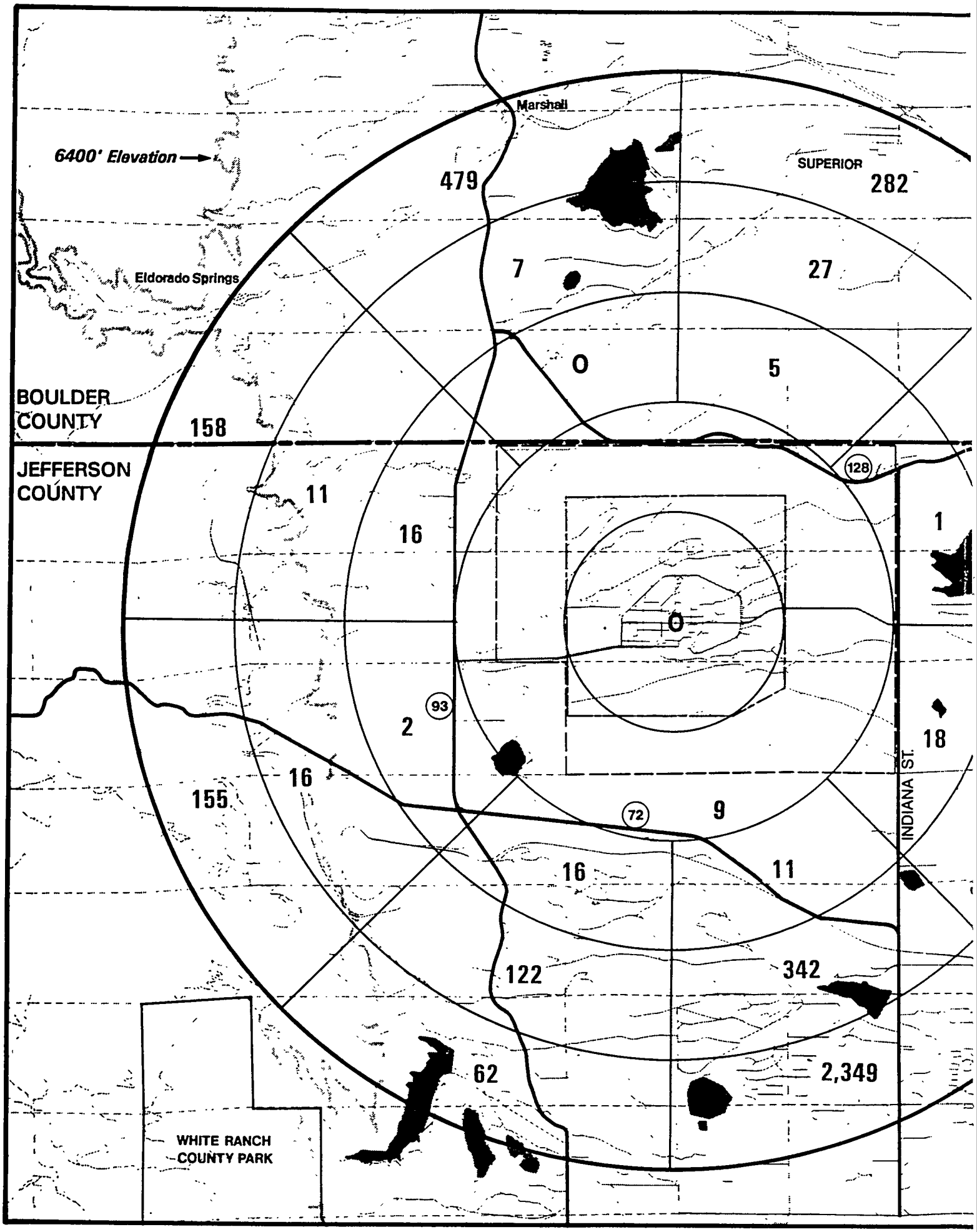
CIRCLES ARE AT ONE MILE INTERVALS FROM PLANT CENTER

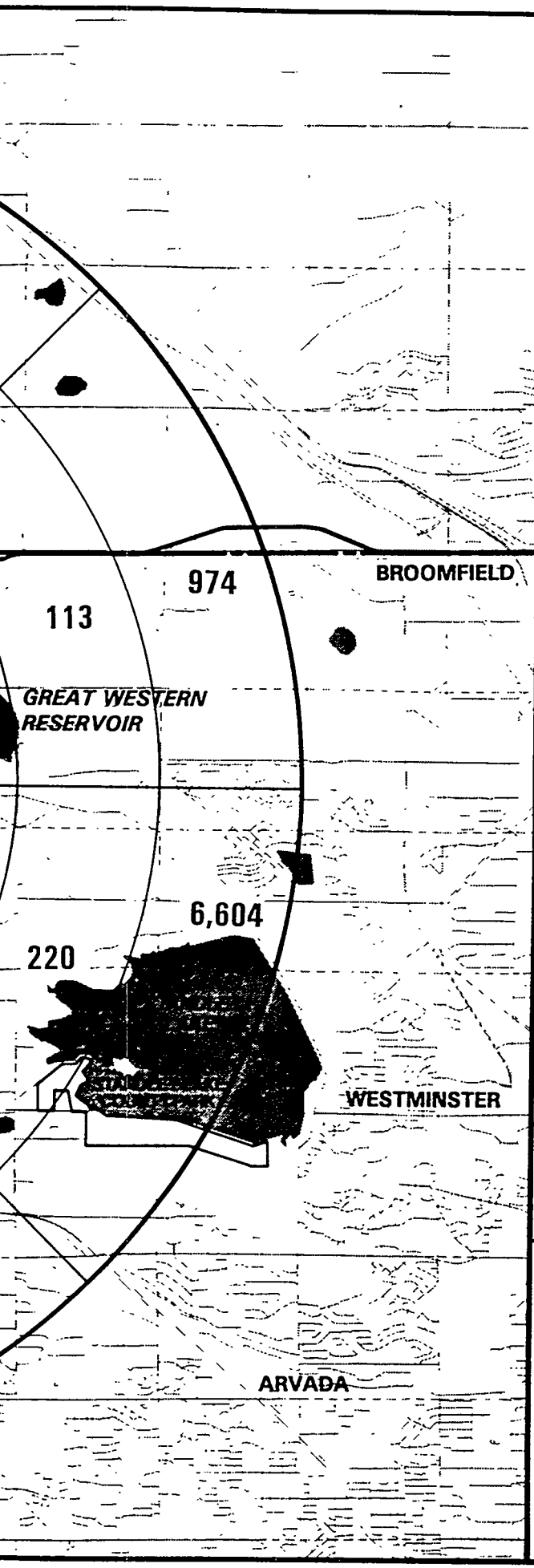
0 1 2 3
MILES

N

FIGURE 4-4

ESTIMATED 1980 POPULATION


Marshall
6400' Elevation
SUPERIOR
282
479
7
27
Eldorado Springs
0
5
BOULDER COUNTY
158
JEFFERSON COUNTY
128
11
16
1
0
93
2
18
INDIANA ST.
16
155
72
9
16
11
122
342
62
2,349
WHITE RANCH COUNTY PARK



LEGEND

—·—·— ORIGINAL PLANT BOUNDARY (1951 - 1974)

— — — ROCKY FLATS PLANT BOUNDARY (1974 - Present)

CIRCLES ARE AT ONE MILE INTERVALS FROM PLANT CENTER

0 1 2 3
MILES

N

FIGURE 4-5
ESTIMATED 1990 POPULATION

In other cases where specific information from census statistics was not available, an arbitrary allocation of census tract population was distributed within the study area segment, based on geographical limitations and historical information, personal interviews, or professional judgement.

The 1950-1980 population estimates shown in Figures 4-1 through 4-4 have not been closely cross-checked with all available population data, including the USGS topographic maps. These estimates are preliminary and are likely to have large margins of error.

For the 1990 population estimates, a computerized Geographic Information System (GIS) was used to develop a map of the study area, with TIGER System census block data overlaid (Geoquest, 1993). The total population of each segment of the study area was determined by totaling the population of all of the blocks within each segment. Where census block boundaries did not coincide with study area boundaries, an allocation of the population was made according to the percentage of the census block geographically within the study area. In other words, if 75 percent of the census block fell within a study area segment, then 75 percent of the population of that census block was allocated to that segment. Over 460 census blocks fell either partially or completely within the five-mile-radius study area. The 1990 population estimates are considered fairly accurate, because of the level of detail available and relative ease in handling the 1990 census data.

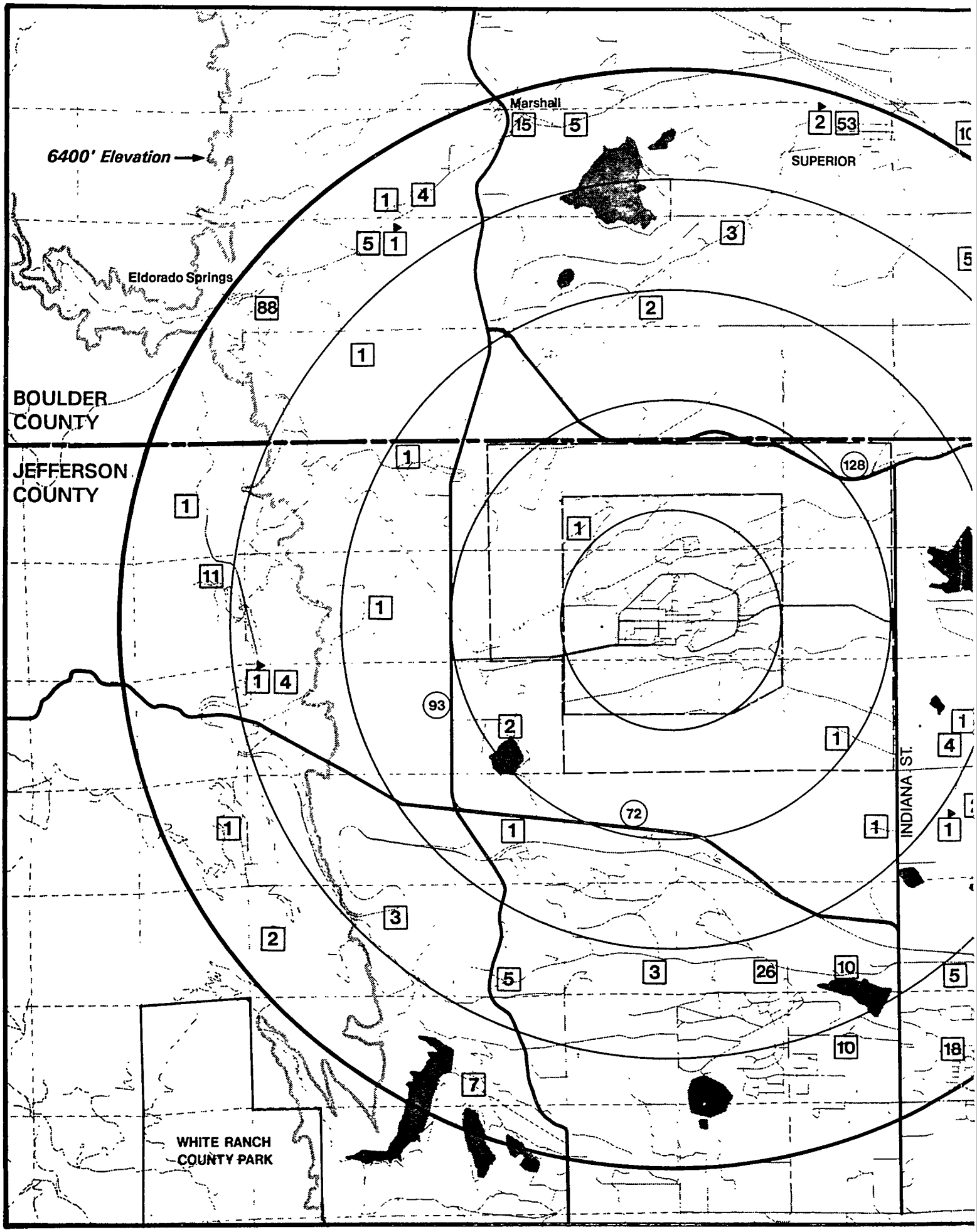
Throughout the years 1950-1990, the five-mile-radius study area around the Rocky Flats plant has changed little, except for the eastern area near the incorporated cities of Westminster, Arvada, Broomfield, Lafayette, and Louisville. The study area around the plant has retained its rural character, except for two high-density subdivisions, Countryside and Walnut Creek, on the eastern boundary, and some higher density residential areas in the southeastern quarter of the study area. The Countryside subdivision was platted from 1974 through July of 1975 by Witkin Homes, Jack Witkin, President. Walnut Creek was platted in March of 1970 by Walnut Creek Development, Thomas G. Bonar, President (Reed, 1992).

4.2 Analysis of Topographical Quadrangle Maps

Because of the limited availability of detailed Census Bureau statistics for the study area, another source of information was used to provide an indication of the population in rural areas. USGS topographical quadrangle maps were reviewed to determine the historical numbers and locations of residences, in an effort separate from the development of population estimates presented in Figures 4-1 through 4-5. Topographical maps were not reviewed for years after 1980 due to the availability of detailed 1990 census block data. As discussed in Section 2.1.2, Appendix B documents the topographical map review process. Appendix B also includes land use information derived from the topographical maps, including the presence of surface water features, streets,

schools, churches, cemeteries, industrial facilities, and railroad stations within each section of land.

Figure 4-6 through 4-9 present the numbers and approximate locations of dwellings and schools for 1950 through 1980, as indicated on the USGS maps. It is important to note that population estimates that might be derived from Figure 4-6 through 4-9, for instance by multiplying a likely number of persons per household by the number of residences in an area, may not agree with the estimates derived from census data and presented in Figures 4-1 through 4-4. Further refinement of estimates would be required to resolve these discrepancies. Census data, USGS quadrangle maps, annexation maps, and county records could be reviewed in more detail, and additional residents interviewed, in any future demographic reconstruction efforts.


Marshall
15
5
2
53
SUPERIOR
6400' Elevation
1
4
5
1
3
Eldorado Springs
88
2
1
BOULDER COUNTY
JEFFERSON COUNTY
1
128
1
1
11
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4
93
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4
INDIANA ST.
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18
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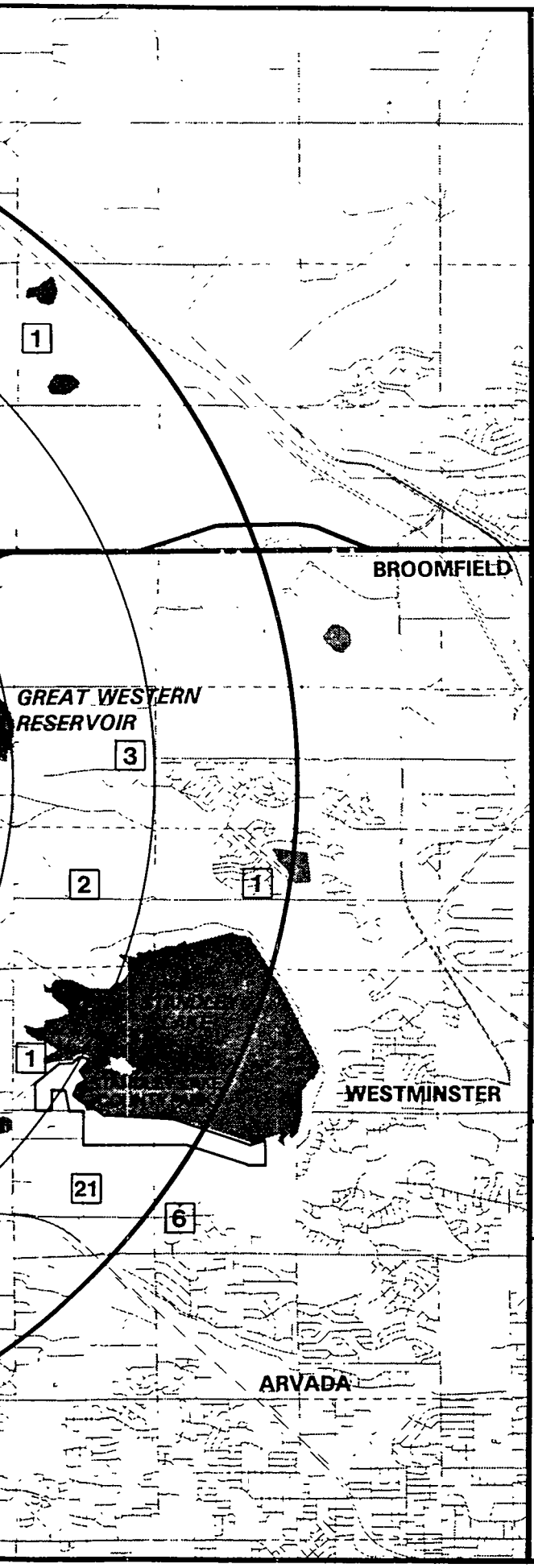
WHITE RANCH COUNTY PARK



LEGEND

DWELLINGS AND SCHOOLS

[1] NUMBER AND APPROXIMATE LOCATION OF DWELLINGS (See notes below)

[1] NUMBER OF SCHOOLS (Indicates number only, not location in section)

—·—·— ORIGINAL PLANT BOUNDARY (1951 - 1974)

— — — — ROCKY FLATS PLANT BOUNDARY (1974 - Present)

Numbers and locations of dwellings were derived using quadrangles for the following years: Golden - 1939
Louisville - 1950
Eldorado Springs - 1942
Ralston Buttes - 1948
Lafayette - 1956
Arvada - 1950

The presence of two numbered squares within a section indicates that the section was divided between two reference quadrangles, and a number and approximate location of dwellings is shown for the portion of the section appearing in each quad.

The location of a square containing the number of dwellings in a section is generally reflective of the location of the majority of dwellings in that section. However, if the distribution of dwellings in a section is not localized, the square location is approximately centered between the extremes. If the distribution is generalized within the section, the square is centered.

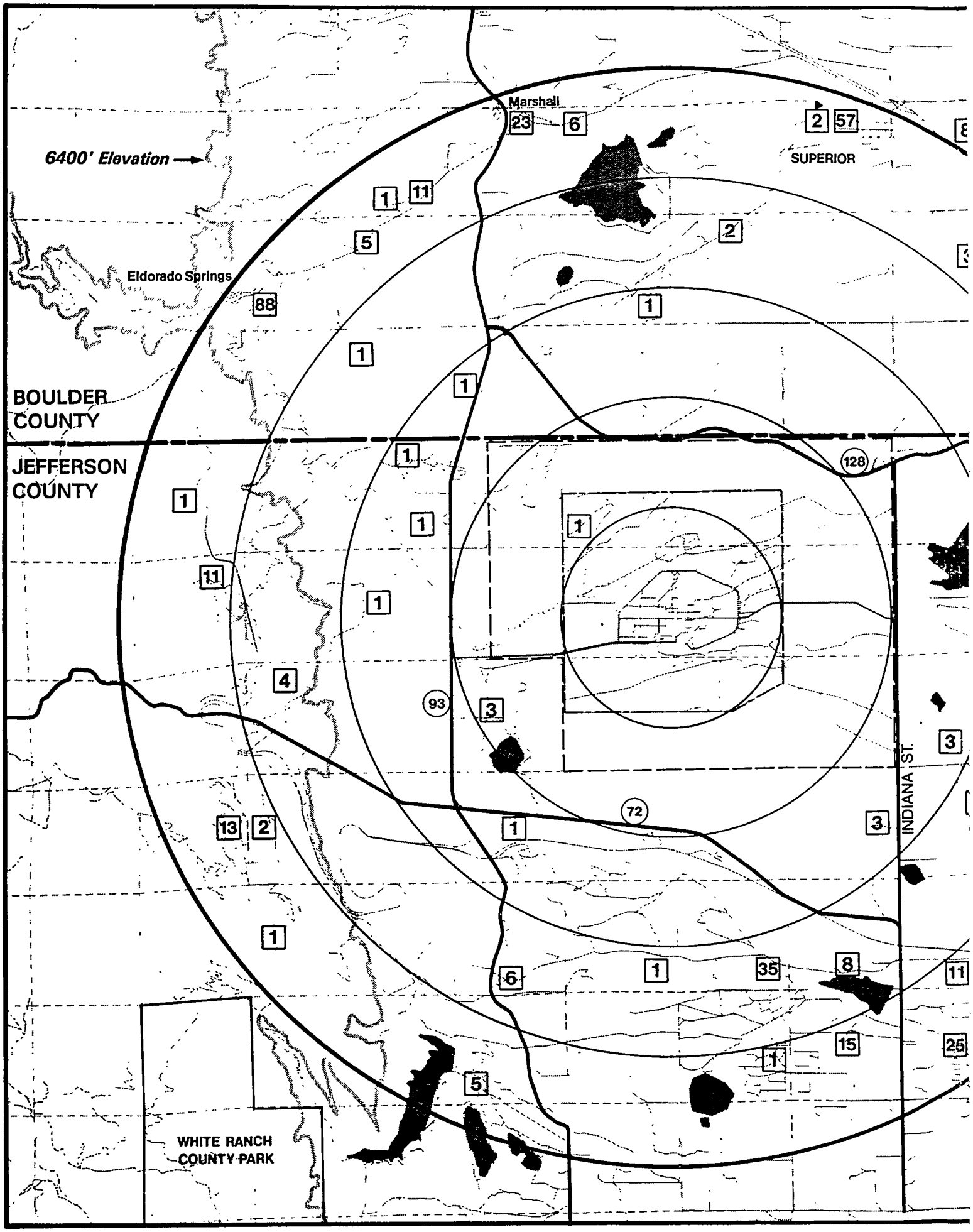
CIRCLES ARE AT ONE MILE INTERVALS FROM PLANT CENTER

0 1 2 3
MILES

N

FIGURE 4-6

RESIDENTIAL DWELLINGS AND SCHOOLS - 1950


6400' Elevation
Marshall
23
6
2
57
SUPERIOR
1
11
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2
Eldorado Springs
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1
BOULDER COUNTY
JEFFERSON COUNTY
1
128
1
1
1
11
1
1
4
93
3
3
INDIANA ST.
72
13
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6
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35
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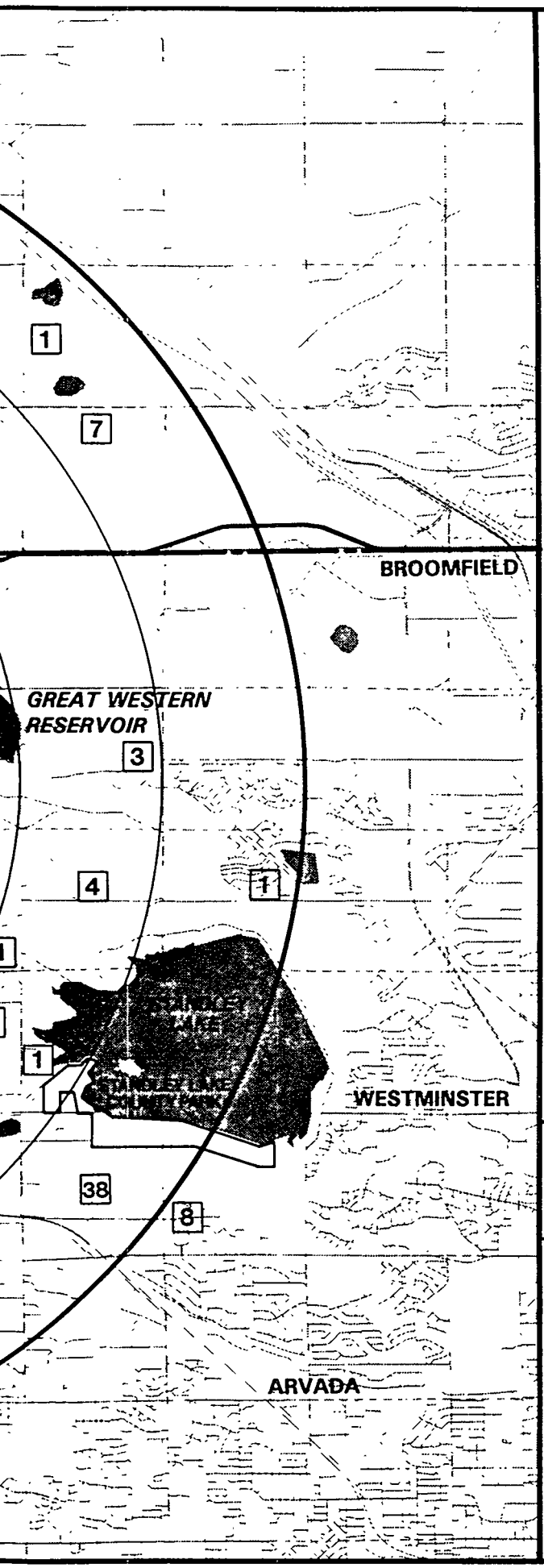
11
15
25
1
5
WHITE RANCH COUNTY PARK



LEGEND

DWELLINGS AND SCHOOLS

[1] NUMBER AND APPROXIMATE LOCATION OF DWELLINGS (See notes below)

[1] NUMBER OF SCHOOLS (Indicates number only, not location in section)

——·—— ORIGINAL PLANT BOUNDARY (1951 - 1974)

— — — — ROCKY FLATS PLANT BOUNDARY (1974 - Present)

Numbers and locations of dwellings were derived using quadrangles for the following years: Golden - 1957
Louisville - 1957
Eldorado Springs - 1942
Ralston Buttes - 1965
Lafayette - 1956
Arvada - 1957

The presence of two numbered squares within a section indicates that the section was divided between two reference quadrangles, and a number and approximate location of dwellings is shown for the portion of the section appearing in each quad.

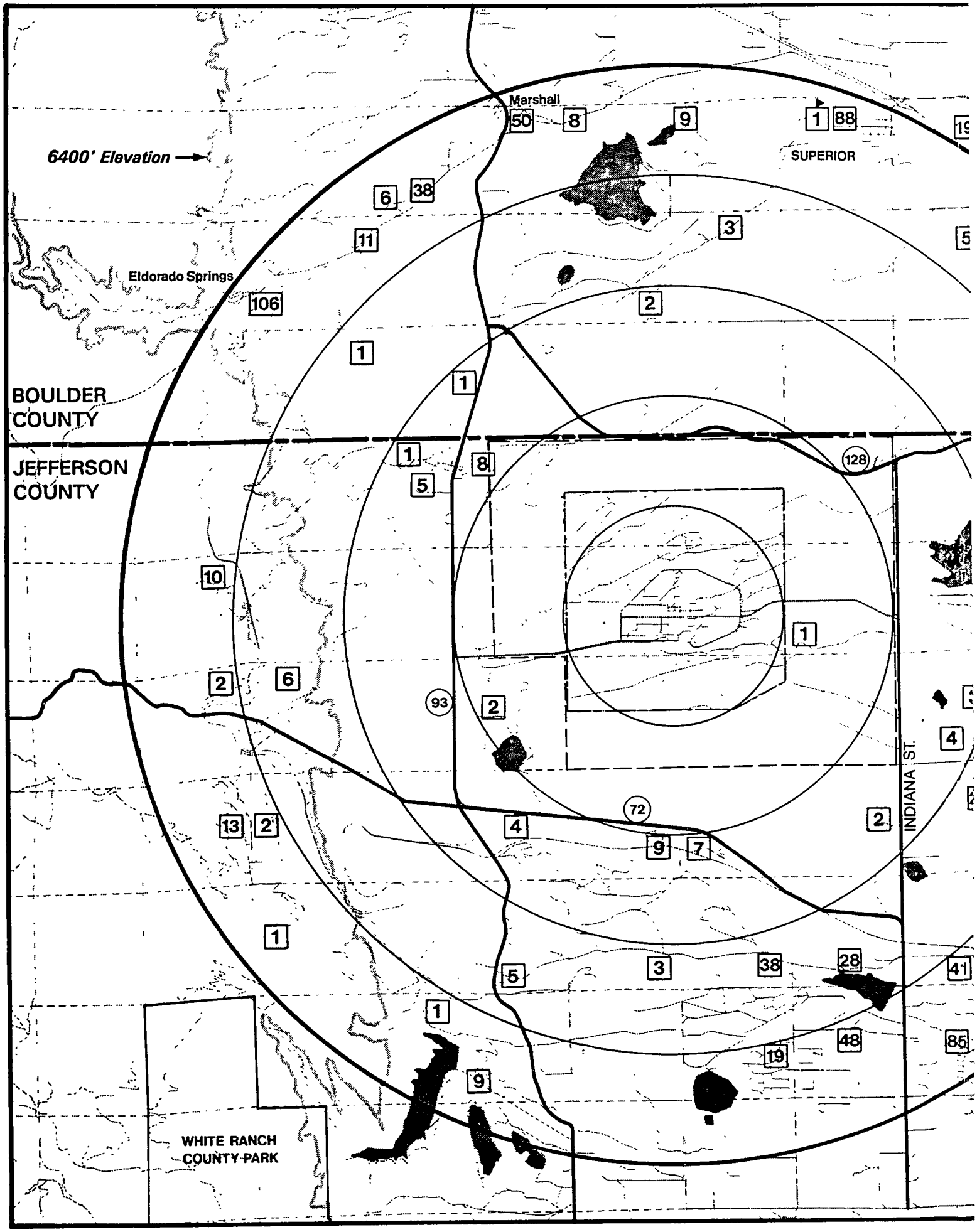
The location of a square containing the number of dwellings in a section is generally reflective of the location of the majority of dwellings in that section. However, if the distribution of dwellings in a section is not localized, the square location is approximately centered between the extremes. If the distribution is generalized within the section, the square is centered.

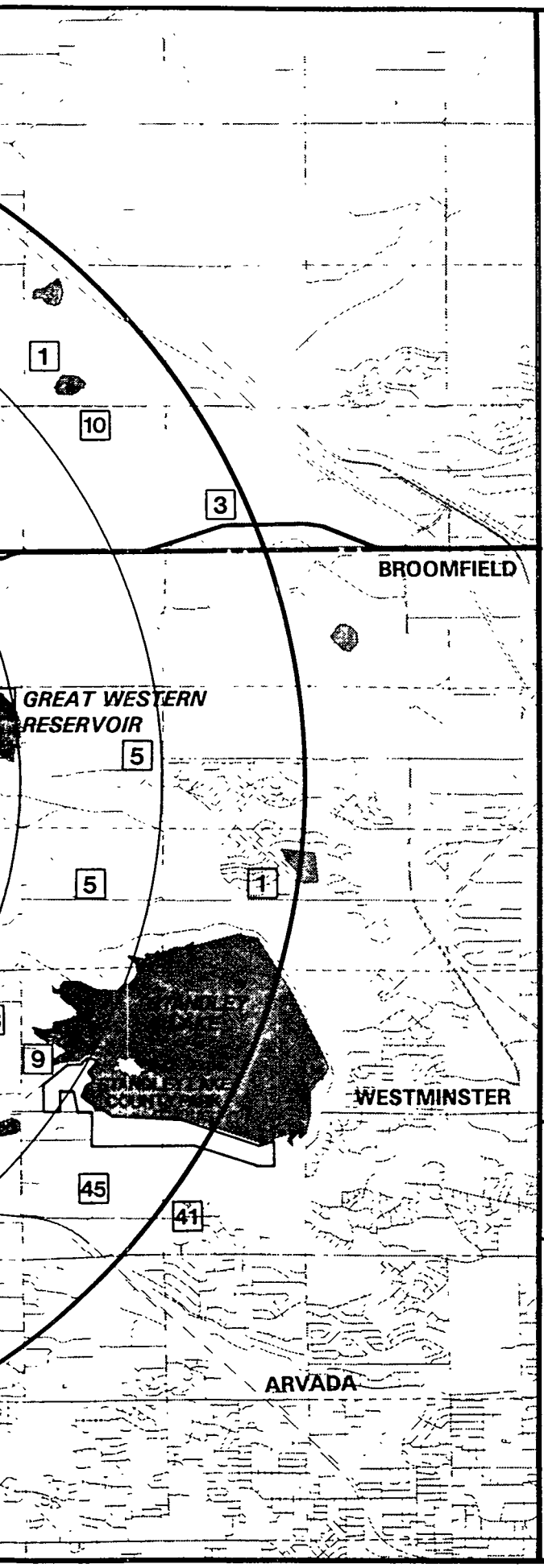
CIRCLES ARE AT ONE MILE INTERVALS FROM PLANT CENTER

0 1 2 3
MILES

N

FIGURE 4-7
RESIDENTIAL DWELLINGS AND SCHOOLS - 1960


6400' Elevation
Marshall
SUPERIOR
Eldorado Springs
BOULDER COUNTY
JEFFERSON COUNTY
INDIANA ST.
WHITE RANCH COUNTY PARK
128
93
72



LEGEND

DWELLINGS AND SCHOOLS

[1] NUMBER AND APPROXIMATE LOCATION OF DWELLINGS (See notes below)

[1] NUMBER OF SCHOOLS (Indicates number only, not location in section)

—·—·— ORIGINAL PLANT BOUNDARY (1951 - 1974)

— — — ROCKY FLATS PLANT BOUNDARY (1974 - Present)

Numbers and locations of dwellings were derived using quadrangles for the following years: Golden - 1971
Louisville - 1971
Eldorado Springs - 1971
Ralston Buttes - 1965
Lafayette - 1971
Arvada - 1971

The presence of two numbered squares within a section indicates that the section was divided between two reference quadrangles, and a number and approximate location of dwellings is shown for the portion of the section appearing in each quad.

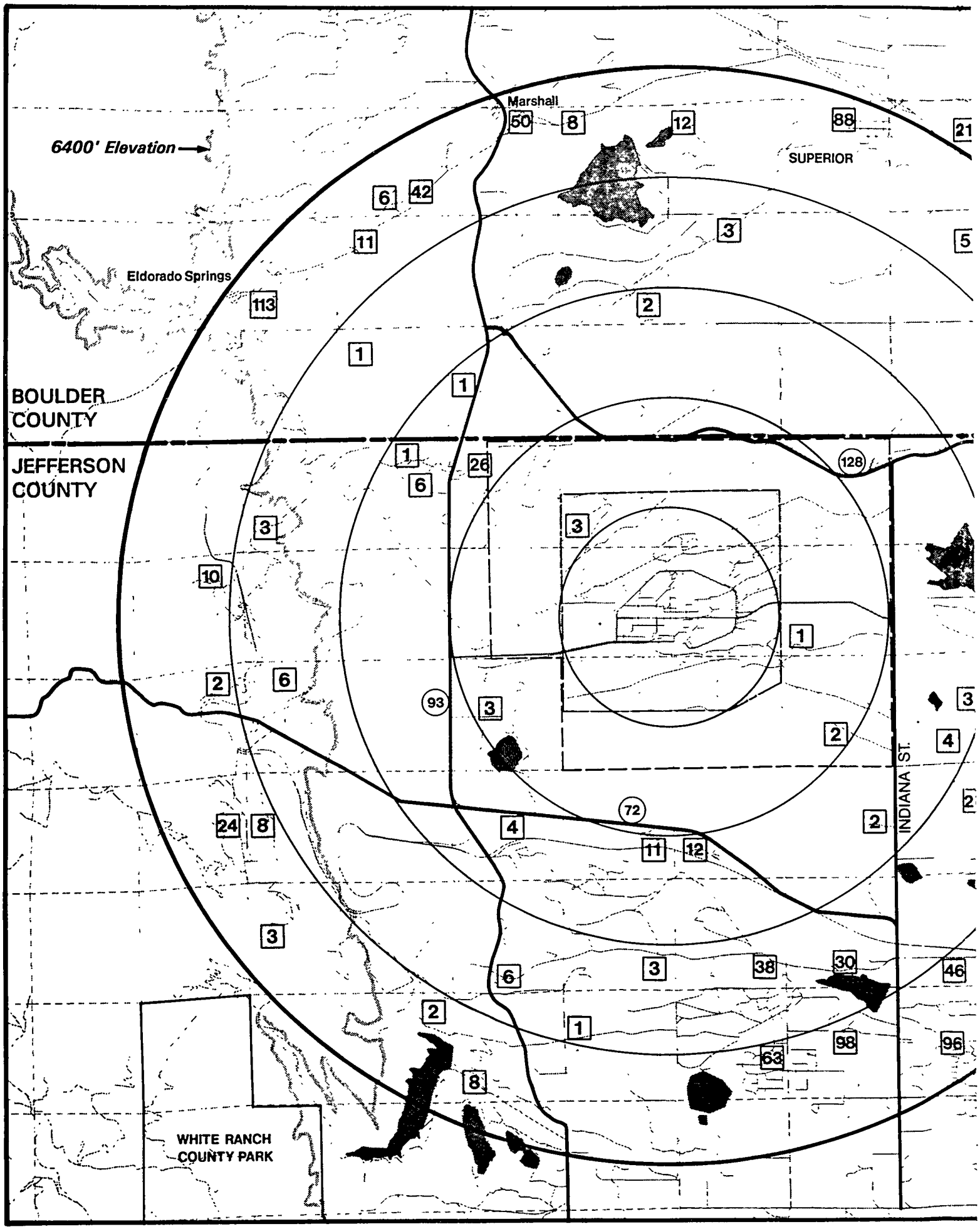
The location of a square containing the number of dwellings in a section is generally reflective of the location of the majority of dwellings in that section. However, if the distribution of dwellings in a section is not localized, the square location is approximately centered between the extremes. If the distribution is generalized within the section, the square is centered.

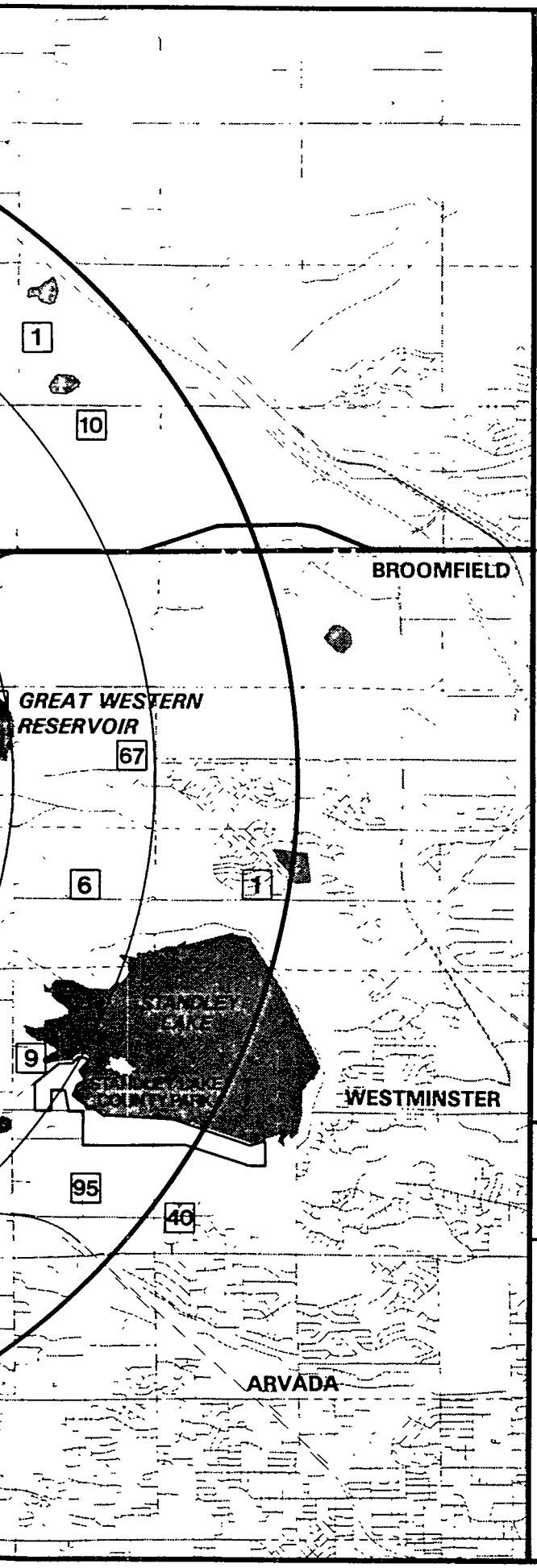
CIRCLES ARE AT ONE MILE INTERVALS FROM PLANT CENTER

0 1 2 3
MILES

N

FIGURE 4-8
RESIDENTIAL DWELLINGS AND SCHOOLS - 1970


6400' Elevation
Marshall
SUPERIOR
Eldorado Springs
BOULDER COUNTY
JEFFERSON COUNTY
INDIANA ST.
WHITE RANCH COUNTY PARK
128
93
72



LEGEND

DWELLINGS AND SCHOOLS

[1] NUMBER AND APPROXIMATE LOCATION OF DWELLINGS (See notes below)

[1] NUMBER OF SCHOOLS (Indicates number only, not location in section)

——·—·— ORIGINAL PLANT BOUNDARY (1951 - 1974)

— — — — ROCKY FLATS PLANT BOUNDARY (1974 - Present)

Numbers and locations of dwellings were derived using quadrangles for the following years: Golden - 1980
Louisville - 1979
Eldorado Springs - 1975
Ralston Buttes - 1976
Lafayette - 1979
Arvada - 1980

The presence of two numbered squares within a section indicates that the section was divided between two reference quadrangles, and a number and approximate location of dwellings is shown for the portion of the section appearing in each quad.

The location of a square containing the number of dwellings in a section is generally reflective of the location of the majority of dwellings in that section. However, if the distribution of dwellings in a section is not localized, the square location is approximately centered between the extremes. If the distribution is generalized within the section, the square is centered.

CIRCLES ARE AT ONE MILE INTERVALS FROM PLANT CENTER

0 1 2 3
MILES

N

FIGURE 4-9
RESIDENTIAL DWELLINGS AND SCHOOLS - 1980

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APPENDIX A

LAND USE QUESTIONNAIRE
AND
RESPONSE SUMMARIES

APPENDIX A
LAND USE QUESTIONNAIRE

The following questionnaire was mailed in March of 1991 to long term owners of land surrounding the Rocky Flats Plant identified by Mrs. Bini Abbott. A county topographical map of the area within a five-mile radius of the plant was included with each questionnaire. Residents were asked to respond to each question and to identify areas on the map for which they had information. Landowners responded in writing or during personal interviews with ChemRisk staff.

QUESTIONNAIRE FOR NEARBY RESIDENTS OF ROCKY FLATS

NAME(S)_____ DATE _____

ADDRESS_____ INTERVIEWER _____

PHONE _____

1. How long have you lived at the current address? In the vicinity of Rocky Flats? What was your previous address?

2. Do you know who lived here (or owned the land) before you? Do you know how we could contact them?

3. What has your occupation been between 1950 and 1990?

4. Do you have any farm animals (cows, pigs, chickens, sheep)? How many of each?

5. Have you had any farm animals since 1950? From when to when?

6. Did you or anyone else drink their milk or eat their meat? If yes, did you drink milk and eat meat from other sources (e.g.,store bought)? What percentage of each (home grown vs. store bought)?

7. Did the cows graze on your property? Nearby property? Was the cow feed grown on your property? Nearby property? Purchased locally?

8. Do you have a garden? What type of vegetables do you grow? [Looking for root (potato,carrot), stalky (celery, wild asparagus), and leafy (lettuce)]. What is the growing season here? How many of each vegetable do you grow per season? If you do not grow a garden now, did you ever have a garden between 1950 and the present?

9. Is there a ground water well on your property? Nearby? How is it used (e.g, for drinking, farm animals, water garden)? Do you tap water from surface water sources?

10. Do you hunt or fish locally? What animals/fish? Where? Do you eat what you hunt or catch?

11. Do you have any information on what the land around the Rocky Flats Plant, now called the Buffer Zone, was used for prior to 1974?

RESPONSES TO QUESTIONNAIRE

Between March 4 and March 20, 1991, several individuals within the five-mile radius of the Rocky Flats plant were interviewed and given a written survey. The survey identified farming and ranching practices of the landowners throughout the period in which they lived on or farmed their land within the five-mile radius. In general, land surrounding the plant within the five mile radius was used for grazing of livestock, primarily cattle, hay production, wheat production, and dairy farming. Other uses included smaller acreage ranchettes with horses and other farm animals such as chickens, pigs, sheep etc., and sand, gravel, and aggregate mining. The following notes outline the information received from each respondent.

<u>General Land Use</u>
Ed and Robyn Hogan
Boulder, CO
March 5, 1991

The Hogan family has owned property in the area since 1890. Ed Hogan has live on the 600 acres he and his family currently own off and on since 1940. Ed Hogan worked at the Rocky Flats plant from 1960 to 1967. The Hogans had all varieties of farm animals throughout the period 1950 to 1990, including chickens, cattle, horses, goats, pigs, etc. Most of the farm animals were consumed as food sources from 1950 to the current time. The Hogans also had enough dairy cows to satisfy the family needs in the 1950s and 1960s. The family tended a large garden most of the years from 1950 to the present. Vegetables were consumed during the growing season and canned for use during the winter months. Mr. Hogan has also fished and hunted deer on his land from 1950 to the present.

Adjacent property owners to the north and east of the Hogan property were the Van Vleets. The Van Vleets used the property primarily for summer grazing. The property is owned by Boulder County Open Space now and is leased to ranchers for grazing.

The Hogans noted that most of the land in the area has historically been used for grazing and some wheat production. The land around their property is so rocky that it cannot be cultivated; their garden space has been built up with soil from off the property. The Hogans consume water from their ground water well.

Mr. Roland Vacher
Golden, CO
March 5, 1991

Mr. Vacher does not live within the five-mile radius of the plant, therefore he did not fill out a survey questionnaire. However, Mr. Vacher has lived in the area of the plant all of his life, owns 300 acres and farms 558 acres within the five-mile radius. His property has been in wheat production since 1941. In 1961, Mr. Vacher sold two parcels (103 and 155 acres) on which he

still grows wheat. Most of the grain is sold at elevators in Denver and shipped out of the area for processing etc.

Mr. Vacher was an elected committeeman with the Jefferson County Agricultural Stabilization Conservation Service (ASCS) from 1950 into the early 1980s. He made decisions on approving and implementing government farm programs in Jefferson County. Mr. Vacher was quite familiar with the farm activity in the five-mile radius area. According to Mr. Vacher, the major crop produced in the area was dryland wheat. The T.G. Nies ranch produced wheat until the land was sold to Jefferson County Airport District, currently some of this land is still leased for wheat production. The Ketner Ranch, just north of Standley Lake, was also in wheat production until it was developed into a residential subdivision (Countryside Estates). The Brauch property near Alkire and 100th was also used for wheat production from 1950 through the mid-1980s. The McKays (Church) had land just west of Indiana and north of 96th in wheat production throughout the period. There were also some irrigated farms in the area just southeast of Superior within the five-mile radius of the plant. Mr. Vacher suggested contacting the Denver Milk Producers (now Western Dairy) for information on the history of dairies in the area.

Bini Abbott
Arvada, CO
March 7,1991

Bini Abbot and her husband have lived on their property since 1960 (31 years). The former owners (Moore) grew winter wheat on the property. The only farm animals the Abbotts have are horses and donkeys. They grow hay for feed and for sale. They have also grown a garden in the past and consumed the vegetables during the growing season. The Abbotts have had two wells. One was abandoned in 1983, it was 30 feet deep at the time of abandonment. The new well is 155 feet deep and is used for everything including drinking water. The Abbotts do not fish or hunt locally.

Mrs. Abbott is very familiar with the area and was able to give me the names of the surrounding landowners and some of the past and current land uses. These are detailed on the Abbott map. Most of the properties are small acreage (2 to 12 acres) ranchettes. The larger landowners in the area are the Brauchs, the Ladwigs and the Woodises. Jean Woodis formerly owned the Zehnder dairy on the corner of 96th and Alkire.

Along Highway 72 there is the Great Western Inorganics and Thoro Chem superfund site (south side) and the former Tosco Oil and Gas site which was later the proposed Jefferson Center Planned Unit Development (PUD) offices. The area around Alkire and Standley Lake is designated Bald Eagle habitat.

Charles McKay
Westminster, CO
March 8, 1991

Charles McKay is one of the two descendants of Marcus Church, the original owner of the land on which the Rocky Flats plant was built. The first parcel was sold in 1950 for $50/acre, with an additional acreage sold in 1974. The McKay family retained mineral rights on 335 acres of the original parcel, primarily clay and gravel, and have grazing rights on certain parts of the plant lands including much of the buffer zone. The Church family brought a law suit against the government concerning contamination of land and related effects on land values. The suit was finally settled in 1985. According to Mr. McKay, the area involved in the lawsuit was designated the "magic circle". No growth could occur in this area for 10 years (until the law suit was settled) due to restrictions put on the land by CDH and the Jefferson County Health Department. Perry S. McKay, the brother of Charles McKay, also owns land in the five-mile radius.

Mr. McKay never lived within the five-mile radius, however the McKay family has grazed cattle and grown hay and wheat in the area for the past 40 years. During the period a maximum of 200 head of cattle grazed on land within the five-mile radius. Some of these cattle were typically consumed by the family. Mr. McKay also fishes in the area (Rocky Flats Lake/Smart Reservoir) and consumes 2 to 3 fish per year.

Mr. McKay gave us a number of potential contacts who have either owned land in the five-mile radius or lived in the area as foremen on ranches or lessees. These include the following:

> Albert and Leo Hogan purchased Church Ranch steers and heifers and leased land from the McKay's.
>
> Joe Meininger, Church Ranch manager. Worked for Church ranch for 58 years. Plowed ground, would know when land was in wheat.
>
> Wayne Harkness. Raised in area, raised angus cattle.
>
> John Lutz, Lindsay Ranch manager.
>
> John Boyle sold 3800 acres of land to Howard Lacy for Jefferson Center in 1989-90.
>
> Howard Lacy/Bruce Nickerson. Jefferson Center Developer/project manager. Jefferson Center is a proposed 16,000 acre commercial, industrial and residential development.

Karl Brauch
Arvada, CO
March 6, 1991

Although Mr. and Mrs. Brauch were not interviewed personally, they returned a questionnaire. The Brauchs have lived at their current address for 52 years. From 1942 through 1982 the Brauchs had 100 herefords on their ranch. In 1982 they retired and currently lease their land for pasture for 78 head of cattle. The Brauchs consumed approximately 50 percent of their own meat throughout the period 1942 to 1982. Their cattle grazed on the ranch pasture grasses. The Brauchs did not have a garden, but used their ground water for drinking and all other uses. The Brauchs do not hunt or fish locally.

Jean Woodis
Arvada, CO
March 20, 1991

The family of Mrs. Jean Woodis (formerly Zehnder) has owned land within the five-mile radius since 1913. Mrs. Woodis has lived on the 79 acres (now 39 acres) since 1948. The Zehnders operated a dairy farm from before 1950 until 1974. Milk was sold to the Denver Milk Producers, who supplied milk to the Denver Metro area. Generally the dairy had between 50 and 100 cows. In 1974, they sold the dairy cows (100) and started a cow/calf operation (50 head). The cattle were sold in the Denver market. Both dairy cows and beef cattle grazed on the Woodis property, but also were fed hay bought from various producers (generally from outside the five-mile radius). The family consumed both beef and dairy products primarily from animals grown on the farm. From 1950 to 1954 Mrs. Woodis also raised chickens. The Woodises have grown a garden throughout the period and have consumed their vegetables. They have 3 wells; two old wells and a new well drilled in 1984. Two wells are used for drinking water, and one well is for livestock.

Mrs. Woodis was able to identify a number of former dairies and their owners within the five-mile radius. The dairies are identified on the land use map. Mrs. Woodis also suggested calling Western Dairy for historical information on dairies in the study area.

Buffer Zone Land Use

Charles McKay
Church Ranch
Broomfield, CO 80021
July 9, 1991

Land uses in areas surrounding the Rocky Flats Plant:

Katherine E. Church and Marcus F.Church, and Church Trustee sold approximately 2880 acres to AEC in 1950. R70/T2 Sections 10, 11, 12, and north half of Sections 13, 14, 15. From 1950 on AEC did not allow any of this land to be grazed or put into crop production.

Land grazed by Church ranch from 1950 on included the following:

1. West half of West half of Section 9 - 150 acres. Other portion (335 acres) of Section 9 was grazed up until Charlie McKay sold it in 1974. He still retains mineral rights to this 335 acres.

2. Section 16 minus 100 acres (Smart Res.) - 550 acres.

3. Cross-hatched section of Sections 21, 22, 23 (Perry McKay land)

4. South half Sections 13, 14, 15 grazed up until 1974 sale.

5. Southwest half Section 18 grazed until approximate 278 acres lost in lawsuit in 1983 or 1985. Grazed until 1984 or 1986? Hogan's ran cow/calf operation on this land for generations.

Land in wheat production during period.

1. Range 70, Township 2, Section 18 (Buckman Place) 78.5 acres on Northwest half of section.

2. Section 24 - 180 acres Northeast Quarter Section.

3. Section 23 - 127 acres Southeast Quarter Section (very rocky, poor soil). Stopped farming this acreage in 1981.

4. Section 13 - East half of East half - DOE sometimes lets this hayground be cut.

Albert Hogan
Boulder CO 80303

The Hogans leased land around the Church ranch. They do not own land in the study area. From 1950 on, they have strictly grazed the land they have leased. Most of the land was pasture. They have not produced hay, wheat, etc. or had a garden. Usually the number of cattle they grazed was under 200 head. The cattle were sold in major markets. Albert Hogan does not know anyone who had a garden or sold hay or wheat locally.

Joe Meininger
Church Ranch Manager
Broomfield, CO 80021

Joe started working in the area in 1942. He identified 100 acres of irrigated cropland and 300 acres of dryland, west of Indiana St. that was in wheat, corn, or barley through the period. The corn and barley was used as feed for the cattle. The wheat was often sold in town. There were also 110 acres of dryland wheat on Hwy 72 and 1500 acres of land between southern plant boundary and Hwy 72 that has always been used for grazing. The hay, corn, or barley was always fed to the Church Ranch cattle. Joe has not lived on the property, has not had a garden, and does not hunt.

In his return letter Joe suggested talking to the following people (most of whom have been contacted): Karl Brauch, Jean Woodis, Bini Abbott, Ed Ladwig, John Lutz, John Boyle, Ransons, Bill and Ed Hogan.

John Lutz
Lindsay Ranch Manager
Golden, CO 80401

Land west and north of the plant has always been used for grazing (160 head of cattle). A 160-acre tract within the plant boundary was used for hay production up until the plant started operating. All hay produced was fed to the ranch cattle. The calves were sold to a feedlot in Longmont. Lindsay Ranch grazes cattle from the plant boundary to Hwy 128. In recent years they have started grazing north of Hwy 128 (when land became Boulder County Open Space).

APPENDIX B

TOPOGRAPHICAL QUADRANGLE MAP ANALYSIS

APPENDIX B
Topographical Quadrangle
Map Analysis

Quadrangle	LOUISVILLE 1950 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
2 mile radius	3	1 (0)	SW	unimproved dirt	
	16W	2 (1)	S	unimproved dirt	
	9W				
3 mile radius	18 E	1 (1)	SE	unimproved dirt	
4 mile radius	8 E	3 (1)	E	Simms	
	27 N	2 (1)	SE	unimproved dirt	
	26 N	3 (3)	NE/W	imp/unimp dirt	
	24 N (Superior)	53 (2)	NE	improved dirt	2 & 1
	17 E	2 (1)	SE	unimproved dirt	
	30 NE	5 (2)	E	S. 88th St.	
	23 N				
	22 N	5 (0)	NW	Hwy 170	
5 mile radius	19 NE	10 (2)	N & E	Alkire & Dillon	
	29 NE	1 (2)	W	S. 88th St.	
	32 NE				
	21nw(Marshall)	15 (0)	NE	Hwys 170 & 93	
	20NW	4 (0)	SE	Hwy 398	

Quadrangle	LOUISVILLE 1957 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
2 mile radius	3	1 (0)	SW	unimproved dirt	
	4				
	5W	1 (1)	SE		
	16W	3 (1)	center	unimproved dirt	
3 mile radius	18 E	1 (1)	SE	unimproved dirt	
	33NW	1 (1)	NW	Hwy 93	
4 mile radius	8E	3 (5)	E	Simms	
	27 N	2 (1)	SE	unimproved dirt	
	26 N	2 (3)	NE/W	unimproved dirt	
	24 N (Superior)	57 (10)	NE	improved dirt	2 & 1
	17 E	4 (3)	W/E	unimproved dirt	
	30 NE	3 (5)	E	S. 88th St.	
	23 N				
	22 N	6 (0)	NW	Hwy 170	
5 mile radius	19 NE	8 (16)	N and E	Dillon & Alkire	
	29 NE	1 (2)	W	S. 88th St.	
	32 NE	7 (0)	N	Coalton Drive	
	21nw(Marshall)	23 (1)	NE		
	20 NW	11 (0)	SE	Hwy 398	

Quadrangle	LOUISVILLE 1965 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
2 mile radius	3	0 (3)	SW	unimproved dirt	
	4	5 (4)	NW	Hwy 93	
	5W	3 (0)	SE		
	11				
	12				
	14				
	16W	0 (2)	center	by claypit	
3 mile radius	6E				
	7E				
	18 E	1 (3)	SE	unimproved dirt	
	33N	1 (1)	NW	Hwy 93	
4 mile radius	8E	2 (4)	NE/E	Simms	
	27 N	1 (1)	SE		
	26 N	2 (2)	N	unimproved dirt	
	24 N (Superior)	64 (10)	NE		2 &1
	28NW				
	17 E	5 (6)	E and W		
	30 NE	3 (4)	E	88th	
	23 N				
	22 N	7 (0)	NW		
5 mile radius	19 NE	9 (10)	N and E		
	29 NE	1 (3)	W	88th	
	32 NE	4 (3)	N	Hwy 128	
	21nw(Marshall)	38 (1)	NE & NW	Hwys 398 & 170	
	20 NW	28 (0)	SE	Hwy 398	

Quadrangle	LOUISVILLE 1971 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
2 mile radius	3	0 (3)	SW	unimproved dirt	
	4	8 (4)	NW	Hwy. 93	
	5W	5 (0)	W	off Hwy. 93	
	11				
	12	1 (0)	SW	unimproved dirt	
	14				
	16W	2 (2)	NW&cntr.	W. gate & claypit	
3 mile radius	6E				
	7E	1 (0)	NE	NE shoreline	
	18 E	3 (3)	E	unimpr. & Alkire	
	33N	1 (1)	NW	93	
4 mile radius	8E	5 (4)	NE&SE	light duty roads	
	27 N	2 (1)	SE		
	26 N	3 (3)	N		
	24 N (Superior)	88 (8)	NE		1 & 1
	28NW				
	17 E	5 (5)	W/E		
	30 NE	5 (4)	N/E		
	23 N	9 (2)	center	unimproved dirt	
	22 N	8 (0)	NW	Hwy. 170	
5 mile radius	19 NE	19 (10)	N and E		
	29 NE	1 (3)	SW		
	32 NE	10 (2)	N		
	21nw(Marshall)	50 (1)	NW&NE		
	20 NW	38 (0)	SE	Hwy. 398	

Quadrangle	LOUISVILLE 1979 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
2 mile radius	3	0 (3)	SW	plant property	
	11				
	12	1 (0)	SW	unimpr off Indiana	
	14				
	16W	3 (2)	W & cntr.	w. gate road/claypit	
	4W	26 (4)	N	impr betw 93 & 128	
	5W	6 (1)	W	off Hwy. 93	
	13E	2 (0)	S	unimpr off Indiana	
3 mile radius	6E				
	7E	1 (0)	NE	G.Western shore	
	18 E	3 (3)	SE	Alkire	
	33N	1 (1)	W	Hwy. 93	
4 mile radius	8E(Westminst)	67 (4)	NE&SE	impr off 8:9 border	
	27 N	2 (1)	SE	along Coal Creek	
	26 N	3 (3)	N	along Coal Creek	
	24 N (Superior)	88 (8)	N		
	28NW	0 (2)	SW	unimpr off Hwy. 93	
	17 E	6 (5)	W and E	Alkire/17:16 border	
	30 NE	5 (4)	N and E	Alkire/unimpr off Alk	
	23 N	12 (1)	NW	unimpr off Hwy. 170	
	22 N	8 (0)	NW	off Hwy. 170	
5 mile radius	19 NE	21 (10)	N and E	Alk/Dillon/Superior	
	29 NE	1 (3)	W	Alkire	
	32 NE	10 (3)	N	W. 128th	
	21nw(Marshall)	50 (1)	NW & NE	Hwy.398/Marshall	
	20NW	42 (0)	SE	Hwy.398	

Quadrangle	GOLDEN 1939 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
3 mile radius	16W				
	13E	1 (0)		unimproved dirt	
	18SE	4 (0)		unimproved dirt	
	24SE	1 (0)		unimpr	
	21SW	1 (0)		unimpr	
4 mile radius	20SE	1 (0)		unimpr	
	19SE	2 (0)		96 & Alkire/unimpr	Wagner School
	28SW	5 (0)		W. 82nd	
	27S	3 (0)		W. 82nd	
	26S (Leyden)	26 (2)		W. 82nd	1
	25S	10 (0)		W. 82nd	
5 mile radius	30SE	5 (3RR stations)		RR tracks/unimpr	
	29SE (Thompson)	21 (0)		W. 82nd	Denver View School
	31SE	18 (0)		Hwy.72/unimpr	Ralston Church
	36S	10 (0)		Hwy.72/W.72nd	
	33S	7 (0)		unimpr off Hwy.93	
	32SW				
6 mile radius	16SE			Hwy. 72	Ralston School

Quadrangle	GOLDEN 1957 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
3 mile radius	16W	flume			
	13E	0 (1)		96th & Indiana	
	18SE	3 (6)		96th & Indiana/Alkire	
	24SE	3 (4)		unimpr off Indiana	
	21SW	1 (1)		unimpr off Hwy.93	
4 mile radius	20SE	1 (1)		W.88th off Alkire	
	19SE	4 (4)		unimpr/W.88th	
	28SW	6 (9)		unimpr off Hwy.93	
	27S	1 (1)		W. 82nd	
	26S (Leyden)	35 (0)		W. 82nd	
	25S	8 (8)		Hwy.72/unimpr	
5 mile radius	30SE	11 (3)		W.82nd/Ind, Alk	
	29SE (Thompson)	38 (20)		W.82nd/ W.80th	
	31SE	25 (25)		Indiana/W.72nd	
	36S	15 (16)		Indiana/W.72nd	
	33S	5 (4)		unimpr off Hwy.93	
	35S	1 (1)		Tucker Lake	
	32SW				

Quadrangle	GOLDEN 1965 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
3 mile radius	16 W				
	13 E	0 (0)			
	18SE	3 (6)		Indiana/Alkire	
	23SE				
	24SE	3 (4)		off Indiana	
	21SW	2 (2)		off Hw93/off Hw72 by lake	
4 mile radius	20SE	2 (2)		off Alkire	
	19SE	15 (5)		U.Twin Lk/Alkire	
	28SW	4 (10)		off Hw 93/off W82nd	
	27S	1 (3)		W. 82nd	
	26S (Leyden)	33 (2)		W. 82nd	
	25S	18 (17)		W.82/Indiana/Hw72	
5 mile radius	30SE	29 (3)		W. 82nd	
	29SE (Thompson)	42 (22)		W. 82nd/W. 80th	
	31SE	46 (36)		Ind/Alk/W.72nd	
	36S	13 (15)		Ind/W. 72nd	
	33S	4 (6)		off Hwy. 93	
	34S	0 (1)		unimpr off Hwy. 93	
	35S	2 (2)		Tucker Lake	
	32SW				

Quadrangle	GOLDEN 1971 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
3 mile radius	16W				
	13E	0 (0)			
	18SE	4 (3)		Indiana/Alkire	
	24SE	2 (3)		off Indiana	
	23SE	7 (0)		off Hw. 72	
	22SE	9 (0)		off Hw. 72	
	21SW	4 (2)		off Hw.93/off 72by lake	
4 mile radius	20SE	9 (2)		off Alkire and W.88th	
	19SE	23 (5)		Alkire/U.Twin Lake	
	28SW	5 (9)		off W.82/off Hw.93	
	27S	3 (2)		W. 82nd	
	26S (Leyden)	38 (2)		W. 82nd	
	25S	28 (15)		off W.82/Hw.72/Ind	
5 mile radius	30SE	41 (2)		W.82nd/off W.88th	
	29SE (Thompson)	45 (22)		W.80/W.82/unimpr	
	31SE	85 (33)		Ind/W.72/W. 78th	
	36S	48 (15)		Indiana/off Quaker	
	33S	9 (1)		off Hw.93	
	35S	19 (2)		off Quaker/Tuc. Lk.	
	32SW	1 (0)		off Hwy. 93	

Quadrangle	GOLDEN 1980 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
3 mile radius	16W				
	13E				
	18SE	4 (7)	SW & SE	Indiana/Alkire	
	24SE	2 (3)	E	off Indiana	
	22S	11 (0)	SE	off Hwy.72	
	23S	12 (0)	SW	off Hwy.72	
	21SW	4 (2)	N and S	off 93/72 by lake	
4 mile radius	20SE	9 (2)	SW	88th and Alkire	
	19SE	23 (5)	NE & S	96&Alk/U.Twin Lk.	
	28SW	6 (9)	S	off 82nd/off Hwy.93	
	27S	3 (2)	SE	W. 82nd	
	26S (Leyden)	38 (2)	SE	W. 82nd	
	25S	30 (18)	NE,E,S	82nd./Hw72/Indiana	
5 mile radius	30SE	46 (9)	S	82nd/88th	
	29se(Thompsn)	95 (26)	all	80th/82nd/88th	
	31SE	96 (33)	N &SW	Ind/72nd/78th	
	36S	98 (15)	NE &SW	Indiana/Quaker	
	33S	8 (4)	SW	off Hwy.93	
	35S	63 (2)	E	Quaker/Tucker Lk.	
	32SW	2 (0)	NE	off Hwy.93	
	34S	1 (0)	W	off Hw93/off Quaker	

Quadrangle	ELDORADO SPR 1942 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
3 mile radius	8W	1 (0)		unimpr off Hw.72	
	5W	1 (0)		unimpr off Hw.93	
	32NW	1 (0)		unimpr off Hw.398	
4 mile radius	18SW	4 (0)		Hw72/unimp off72	Plainview School
5 mile radius	29NW	5 (0)		Hw.398	Hawthorne School
	13W				
	12W(Plainview)	11 (0)		unimpr off RR track	
	1W	1 (0)		far off Hw.93	
	30nw(EldSpr)	88 (6)		off Hw.398	
	20NW	1 (0)		unimpr off Hw.398	
	31	1 (0)		S.Bldr. Div. Canal	

Quadrangle	ELDORADO SPR 1965 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
3 mile radius	8W	0(1)		unimpr off Hw.72	
	5W	1 (1)		unimpr off Hw.93	
	32NW	1 (2)		unimpr off Hw.398	
4 mile radius	18SW	4 (3)		Hw72/unimp off72	
5 mile radius	29NW	10 (1)		Hw.398	
	13W	0 (0)			
	12W(Plainview)	9 (2)		unimpr off RR track	
	1W			far off Hw.93	
	30nw(EldSpr)	100 (6)		off Hw.398	
	20NW	5 (0)		unimpr off Hw.398	
	31			S.Bldr. Div. Canal	

Quadrangle	ELDORADO SPR 1971 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
3 mile radius	8W	0 (1)		lt duty off Hw.72	
	5W	1 (1)		off Hw.93	
	32NW	1 (2)		unimpr off Hw.398	
4 mile radius	18SW	5 (4)		Hw. 72/lt duty off 72	
5 mile radius	29NW	11 (1)		Hw. 398	
	13W	2 (0)		Hw. 72	
	12W(Plainview)	10 (2)		off Dnv&RioGr	
	1W				
	30nw(EldSpr)	106 (6)		end of Hw. 398	
	20NW	6 (0)		lt.duty off Hw.398	

Quadrangle	ELDORADO SPR 1975 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
3 mile radius	8W	0 (1)	W	unimpr off 72	
	5W	1 (1)	N	unimpr off 93	
4 mile radius	18SW	6 (3)	W &NE	unimpr off 72	
	32NW	1 (2)	NW	unimpr off 398	
	6W	3 (0)		by claypits	
5 mile radius	29NW	11 (1)	NW	Hwy.398	
	13W	2 (0)	NE	Hwy. 72	
	12W(Plainview)	10 (2)	NE	impr off 72	
	1W				
	30nw(EldSpr)	113 (6)	SW	Hwy.398	
	20NW	6 (0)	S	lt.duty off Hw 398	
	31NW				

Quadrangle	RALSTON BUTTE 1948 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
4 mile radius	19SW 20SW				
5 mile radius	24SW 29SW 30SW	1 (0) 3 (0) 2 (0)		unimpr dirt off 72 unimpr dirt off 72 unimpr way off 72	

Quadrangle	RALSTON BUTTE 1965 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
4 mile radius	20SW				
5 mile radius	19SW 29SW 24SW 30SW	2 (0) 13 (0) 1 (0)		impr dirt off Hw.72 unimpr off impr Ralston Creek	

Quadrangle	RALSTON BUTTE 1976 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
4 mile radius	20SW		SW		
5 mile radius	19SW	8 (0)	W	impr off Hwy.72	
	29SW		W		
	24SW	28 (0)	E	impr off Hwy.72	
	30SW	3 (0)	NW& SW	impr off Hwy.72	
	32SE				
	18W				

Quadrangle	LAFAYETTE 1956 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
5 mile radius	28NE	0 (3)		along RR tracks	
	33NE				
	4E				
	9E				
	16E	1 (2)		W. 100th	

Quadrangle	LAFAYETTE 1965 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
5 mile radius	28NE				
	33NE	3 (2)			
	4E				
	9E			W. 108th Ave. shown	
	16E	2 (1)		W. 100th	

Quadrangle	LAFAYETTE 1971 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
5 mile radius	28NE				
	33NE	3 (7)		W. 120th Ave.	
	4E				
	9E				
	16E	1 (2)		W. 100th	

Quadrangle	LAFAYETTE 1979 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
5 mile radius	28NE				
	33NE	0 (9)	S	W. 120th	
	4E				
	9E			streets w/no dwells	
	16E	1 (2)	E	W. 100th	

Quadrangle	ARVADA 1950 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
5 mile radius	21SE 28SE	6 (0)		off Cornell Ave., S.section	
Quadrangle	ARVADA 1957 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
5 mile radius	21SE 28SE	8 (6)		now W. 80th, S.section	
Quadrangle	ARVADA 1965 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
5 mile radius	21SE 28SE	35 (3)		W.80 is med.duty, S.section	

Quadrangle	ARVADA 1971 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
5 mile radius	21SE 28SE	41 (3)		W. 80th, S.section	

Quadrangle	ARVADA 1980 Section No.	Dwellings (barns)	Section Quarter	Streets with dwellings	Schools and Churches
5 mile radius	21SE 28SE	40 (1) 4 (0) 4 (1)	SW E SE	W. 80th	

Quadrangle	LOUISVILLE 1950 Section No.	Surface Waters	Industry	Geographical
2 mile radius	3 16W 9W		Capitol Mine	93 is med. duty road
3 mile radius	18 E			
4 mile radius	8 E 27 N 26 N 24 N (Superior) 17 E 30 NE 23 N 22 N	Zang's Ditch Marshall Lake	Pluto No. 2 Mine 2 aban'd mines Cracker Jack No. 2 Mine	100th Ave. is impr dirt
5 mile radius	19 NE 29 NE 32 NE 21nw(Marshall) 20NW			Superior Cemetary Coalton Dr is impr dirt

Quadrangle	LOUISVILLE 1957 Section No.	Surface Waters	Industry	Geographical
2 mile radius	3 4 5W 16W		clay pit Capitol Mine, clay pit	
3 mile radius	18 E 33NW			
4 mile radius	8E 27 N 26 N 24 N (Superior) 17 E 30 NE 23 N 22 N	Aqueduct	Broom. Filtration Plant Pluto , New Gorham Mines S. Gorham Mine pumping station	
5 mile radius	19 NE 29 NE 32 NE 21nw(Marshall) 20 NW		4 mines	Superior Cemetary grave

Quadrangle	LOUISVILLE 1965 Section No.	Surface Waters	Industry	Geographical
2 mile radius	3 4 5W 11 12 14 16W		3 gravel pits gravel pit clay pit	Indiana St. (med. duty)
3 mile radius	6E 7E 18 E 33N	Gr.Western R.	gravel pit	Hwy128 is med. duty
4 mile radius	8E 27 N 26 N 24 N (Superior) 28NW 17 E 30 NE 23 N 22 N		pumping station gravel pit 9 lg. warehouses landing area off Hwy 93 no S. Gorham pump stn., gravel pit	
5 mile radius	19 NE 29 NE 32 NE 21nw(Marshall) 20 NW		JeffCo. Airport shown	Dillon is med. duty

Quadrangle LOUISVILLE 1971 Section No.	Surface Waters	Industry	Geographical
2 mile radius	3 4 5W 11 12 14 16W	3 gravel pits gravel pit	
3 mile radius	6E 7E 18 E 33N		W. 120th
4 mile radius	8E 27 N 26 N 24 N (Superior) 28NW 17 E 30 NE 23 N 22 N	gravel pit warehouses gone landing area	
5 mile radius	19 NE 29 NE 32 NE 21nw(Marshall) 20 NW		

Quadrangle	LOUISVILLE 1979 Section No.	Surface Waters	Industry	Geographical
2 mile radius	3 11 12 14 16W 4W 5W 13E		3 gravel pits gravel pit	
3 mile radius	6E 7E 18 E 33N		W.120th	
4 mile radius	8E(Westminst) 27 N 26 N 24 N (Superior) 28NW 17 E 30 NE 23 N 22 N		Westminster Corp. Boundary	
5 mile radius	19 NE 29 NE 32 NE 21nw(Marshall) 20NW		Louisville Corp. Boundary	

Quadrangle	GOLDEN 1939 Section No.	Surface Waters	Industry	Geographical
3 mile radius	16W	Rocky Flats Lake/Smart Ditch		
	13E			
	18SE			
	24SE			
	21SW	S.Boulder canal to Ralston Res.		
4 mile radius	20SE	Standley Lake		
	19SE			
	28SW			
	27S			
	26S (Leyden)	Leyden Lake		
	25S			
5 mile radius	30SE		Denver &Salt Lake Intermtn. RR	
	29SE (Thompson)			
	31SE			
	36S			
	33S			
	32SW	Ralston Reservoir		
6 mile radius	6SE			

Quadrangle	GOLDEN 1957 Section No.	Surface Waters	Industry	Geographical
3 mile radius	16W 13E 18SE 24SE 21SW		clay pit	
4 mile radius	20SE 19SE 28SW 27S 26S (Leyden) 25S	spring	2 clay pits	
5 mile radius	30SE 29SE (Thompson) 31SE 36S 33S 35S 32SW		Denver&Rio Grande Western RR	

Quadrangle	GOLDEN 1965 Section No.	Surface Waters	Industry	Geographical
3 mile radius	16 W			
	13 E			
	18SE			
	23SE		gravel pit	
	24SE			
	21SW		2 clay pits	
4 mile radius	20SE			
	19SE			
	28SW	well		
	27S			
	26S (Leyden)			
	25S	water tank		
5 mile radius	30SE			
	29SE (Thompson)			
	31SE			
	36S			
	33S			
	34S			
	35S			
	32SW		quarry	

Quadrangle	GOLDEN 1971 Section No.	Surface Waters	Industry	Geographical
3 mile radius	16W 13E 18SE 24SE 23SE 22SE 21SW		gravel pit substation	
4 mile radius	20SE 19SE 28SW 27S 26S (Leyden) 25S			
5 mile radius	30SE 29SE (Thompson) 31SE 36S 33S 35S 32SW			

Quadrangle	GOLDEN 1980 Section No.	Surface Waters	Industry	Geographical
3 mile radius	16W 13E 18SE 24SE 22S 23S 21SW	Rocky Flats Lake		
4 mile radius	20SE 19SE 28SW 27S 26S (Leyden) 25S			
5 mile radius	30SE 29se(Thompsn) 31SE 36S 33S 35S 32SW 34S	Standley Lake Country Park		Arv&Wstm Corp Boundari

Quadrangle ELDORADO SPR 1942 Section No.	Surface Waters	Industry	Geographical
3 mile radius 8W 5W 32NW			
4 mile radius 18SW			
5 mile radius 29NW 13W 12W(Plainview) 1W 30nw(EldSpr) 20NW 31		CoalCreek RR Stn.	

Quadrangle	ELDORADO SPR 1965 Section No.	Surface Waters	Industry	Geographical
3 mile radius	8W 5W 32NW			
4 mile radius	18SW			
5 mile radius	29NW 13W 12W(Plainview) 1W 30nw(EldSpr) 20NW 31		3 clay pits 2 clay pits	

Quadrangle	ELDORADO SPR 1971 Section No.	Surface Waters	Industry	Geographical
3 mile radius	8W 5W 32NW			
4 mile radius	18SW			
5 mile radius	29NW 13W 12W(Plainview) 1W 30nw(EldSpr) 20NW		5 clay pits 2 clay pits	

Quadrangle	ELDORADO SPR 1975 Section No.	Surface Waters	Industry	Geographical
3 mile radius	8W 5W			
4 mile radius	18SW 32NW 6W			
5 mile radius	29NW 13W 12W(Plainview) 1W 30nw(EldSpr) 20NW 31NW		claypits 2 claypits	

Quadrangle RALSTON BUTTE 1948	Section No.	Surface Waters	Industry	Geographical
4 mile radius	19SW 20SW		Dnv&Salt LakeRR ArenaSiding Stn.	
5 mile radius	24SW 29SW 30SW		Fireclay Stn.	

Quadrangle RALSTON BUTTE 1965	Section No.	Surface Waters	Industry	Geographical
4 mile radius	20SW	spring		
5 mile radius	19SW 29SW 24SW 30SW	spring	2 clay pits clay pit and mine	

Quadrangle	RALSTON BUTTE 1976 Section No.	Surface Waters	Industry	Geographical
4 mile radius	20SW	spring		
5 mile radius	19SW			
	29SW	spring	2 claypits & mine	
	24SW			
	30SW			
	32SE		mine	
	18W		mine	

Quadrangle	LAFAYETTE 1956 Section No.	Surface Waters	Industry	Geographical
5 mile radius	28NE		Monarch Mine	
	33NE		gravel pit	
	4E	Upper Church Ditch/aqueduct to Broomfield		
	9E	Walnut Creek		
	16E	Ketner Res/Church Ditch		

Quadrangle	LAFAYETTE 1965 Section No.	Surface Waters	Industry	Geographical
5 mile radius	28NE		mine dump	
	33NE		gravel pit	
	4E	2 water tanks	JeffCo Airport	
	9E			
	16E			

Quadrangle	LAFAYETTE 1971 Section No.	Surface Waters	Industry	Geographical
5 mile radius	28NE 33NE 4E 9E 16E		JeffCo Airport larger	

Quadrangle	LAFAYETTE 1979 Section No.	Surface Waters	Industry	Geographical
5 mile radius	28NE 33NE 4E 9E 16E		mine dump JeffCo airport	

Quadrangle	ARVADA 1950 Section No.	Surface Waters	Industry	Geographical
5 mile radius	21SE 28SE	Standley Lake		
Quadrangle	ARVADA 1957 Section No.	Surface Waters	Industry	Geographical
5 mile radius	21SE 28SE			
Quadrangle	ARVADA 1965 Section No.	Surface Waters	Industry	Geographical
5 mile radius	21SE 28SE	Standley is bigger		

Quadrangle	ARVADA 1971 Section No.	Surface Waters	Industry	Geographical
5 mile radius	21SE 28SE			

Quadrangle	ARVADA 1980 Section No.	Surface Waters	Industry	Geographical
5 mile radius	21SE 28SE	Standley Lake Country Park		

APPENDIX C

INFORMATION REQUEST LETTER
AND
LIST OF PERSONS CONTACTED

November 8, 1990

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Dear 2~:

ChemRisk, the risk assessment division of McLaren/Hart Engineering is currently contracted with The Colorado Department of Health (CDH), to conduct a toxicological review and dose reconstruction study of the Rocky Flats Nuclear Weapons Facility. One of the tasks associated with the contract includes a reconstruction of the demographic characteristics and land uses in the area surrounding the Rocky Flats plant from 1952, when the plant began operations to the current time (1990).

Pertinent information to be collected for the study will include population within a 50 mile radius of the plant, age distribution of the population (0 to < 2 years, 2 to < 13 years, 13 to < 21 years, and 21 to 70 years), land uses and land use changes surrounding the plant, population migration rates, identification of sensitive receptors (schools, day care centers, hospitals and HMO's, nursing homes, parks, etc.), agricultural production (crop and livestock), gave harvest levels, and drinking water sources. Information will be collected at a minimum for each census year, if possible every 5 years from 1950 to 1990.

Population, age distribution, and migration statistics will be obtained from the U.S. Census Bureau for 1950, 1960, 1970, 1980 and 1990. However, more detailed data for years between the decennial census years is not available from census sources. Therefore, it is necessary to solicit city and county assistance in collecting land use information and more detailed demographic data for each community and unincorporated area within a 50 mile radius of the plant.

At this time, I would like to determine which of the following data your office has available:

1. Land use maps for 1950, 1960, 1970, 1980 and 1990 and years in between (identify which years).

2. Zoning maps for 1950, 1960, 1970, 1980 and 1990 and years in between (identify which years).

3. Population estimates for 1955, 1965, 1975, 1985, or years in between census years (identify which years).

4. Population by age distribution between census years (identify which years).

5. Information on time periods in which major changes in land use, population, economic development occurred during the period, (1950 - 1990).

0202ALR4

6. Total city/county acreage for census years.

7. Acres annexed between census years (identify which years).

8. Number of housing units within jurisdiction between census years (identify which years).

9. Household size between census years (identify which years).

10. Aerial photography of jurisdiction 1950, 1960, 1970, 1980, 1990 and/or years between census years.

11. Locations of sensitive receptors throughout the period.

12. Number of acres of agricultural land within jurisdiction.

13. Agricultural statistics (crop and livestock production).

14. Location of fishing and hunting areas.

15. Location of drinking water sources including wells (public or private, agricultural and depth), natural springs and surface waters (reservoirs, canals).

I would appreciate your response regarding the availability of the data requested as soon as possible. Actual collection of the data will not begin until January of 1991. I will be making follow up phone calls after I have received your response. Thank you for your cooperation.

Sincerely,

Jennifer Kathol

LIST OF PERSONS CONTACTED

Name	Organization
Alldredge, Bill	Dept. of Radiology, Colorado State University (CSU)
Bean, Brent	City of Lafayette Planning Dept.
Billingsley, Graham	Boulder County Planning Dept.
Boss, Jackie	Colorado Division of Wildlife, Librarian
Chad	Landis Photography of Denver
Coney, Rob	Adams County
Dugan, Jim	City of Aurora Planning Dept.
Eckles, Jim	Dept. of Agronomy, CSU
Fernandez, John	City of Boulder Planning Dept.
Ferris, Steve	City of Sheridan Planning Dept.
Fox, Fred	Town of Superior
Fraley, Les	Dept. of Radiology, CSU
French, Peggy	City of Federal Heights Planning Dept.
Gidley, Glen	City of Wheatridge Planning Dept.
Goodenough, Neil	City of Commerce City Planning Dept.
Gray, Frank	City/County of Denver Planning Dept.
Harrison, Craig	Harrison Resources
Hayden, Gin	Business Research Division, Colorado University (CU)
Hearn, Chuck	City of Golden Planning Dept.
Mangione, J.	City of Boulder, Long Range Planner
Mugler, Larry	Denver Regional Council of Governments (DRCOG)
Murray, David	City of Thornton Planning Dept.
Nicki	USGS Map Sales, Denver
Nielson, Brent	City of Westminster Planning Dept.

Name	Organization
Oglesby, Kirk	City of Broomfield Planning Dept.
Payne, Jon	City of Littleton Planning Dept.
Piatt, Sue	Denver Regional Council of Governments (DRCOG)
Picasso, Becky	Colorado Dept. of Local Government
Polisky, Greg	Colorado Division of Wildlife, Stream Biologist
Reed, Doug	Jefferson County Planning Department
Reynolds, Reid	Colorado Dept. of Local Government, State Demographer
Rodriguez, Pat	U.S. Dept. of Commerce, U.S. Census Bureau
Rolain, Rhonda	City of Arvada Planning Dept.
Satterfield, Jim	Colorado Division of Wildlife, Lake Biologist
Sayre, Jim	City of Brighton Planning Dept.
Schoonveld, Gene	Colorado Division of Wildlife
Schroder, Steve	City of Greenwood Village Planning Dept.
Seiber, Phil	Arapahoe County Planning Dept.
Sewald, Kathy	Jefferson County Assessor's Office
Shrup, Don	Colorado Division of Wildlife, Aquatic Biologist
Spencer, Bill	Agricultural Economics, CSU
Starling, Jerry	City of Northglenn Planning Dept.
Weber, Dave	Colorado Division of Wildlife
Wheeler, Delani	Boulder County Open Space
Williams, Ardy	Jefferson and Boulder County ASCS Office
Williamson, Jack	Jefferson County Planning Dept.
Wood, Paul	City of Louisville Planning Dept.

APPENDIX D

RESOLUTION OF COMMENTS ON THE DRAFT TASK 7 REPORT

APPENDIX D

Resolution of Comments on the Draft Task 7 Report

Comment 1. The discussion on population could be expanded to explain to the lay-person the differences between the various sources of population data. What are the characteristics of each, what are their shortcoming?

Response 1. Information presented in the Task 7 report has been expanded to further explain the information sources that were used and the methods that were used to generate historical population estimates. In the course of these discussions, information sources that were used are described in some detail. Information sources that were not used are noted, but are not described in detail.

Comment 2. How large are the census tracts that are relied upon for some of the years of data presented in Table 4-1? A figure showing their boundaries for each census year would help the reader picture the extent of inaccuracy associated with the population totals presented in the table.

Response 2. Copies of maps showing how boundaries of census divisions have changed over the years are presented in Figured D-1 through D-4. Because of the poor quality of the copies, these maps were not included in the text of the Task 7 report, but are presented here to illustrate the variation in sizes of census tracts relative to the Task 7 study area.

The 1950 census included civil divisions which were fairly small geographically—comparable to recent census tract sizes. Portions of 10 of these civil divisions fell within the Task 7 study area. In the 1960 census, tract 98 was very large, about three times the size of the study area. Tract 98 covered about 75 percent of the study area, which also included portions of four other tracts in Boulder County. Since no block groups existed, 1960 population estimates for the study area were most likely overestimated. In the 1970 census, tract 98 was split up into smaller blocks, four of which fell within the study area. The uncertainty of population estimates likely decreased as a result. In the 1980 census, the trend towards splitting up of tracts into smaller blocks continued, especially in the areas to the southeast of the Rocky Flats plant. In the 1990 census, tracts 98.20, 21, and 15 were smaller than previous divisions, but included incorporated areas outside the 5-mile area. Block data from the 1990 census are available from the U.S. Census Bureau's TIGER system, and were accessed in generating the 1990 population estimates as described in this report.

Comment 3. The Health Department of others have repeatedly published information that states the population in the five-mile radium was somewhere around 9,000 people in 1990. This appears to conflict with data provided in the Task 7 report. One reason is that the term "study area" is not clearly defined. The text implies a five-mile radium for the study area, but Table 4-1 gives data for census tracts much larger than that (as footnoted). This is confusing and potentially misleading. For example, the preliminary 1990 population figure presented in Table 4-1 is 40,000 people. This is a big difference, and there is no discussion in the text of how to interpret the census data.

Response 3. The study area has been more clearly defined in the text and in an added Figure 1-1. The fact that some Table 4-1 values include data for census tracts that lie largely outside of the study area has been more clearly indicated in the table and in related text.

Comment 4. The difference between estimates given in the tables and those shown on the figures is not well explained. Just to see how Figure 4-1 (1960) population numbers compare to the numbers in Table 4-1, we added up the population numbers presented on the figure within the study area and it came to around 1,500 people. The total population figure for the "study area" provided in Table 4-1 for 1960 was 21,955. Although the table is footnoted to indicate that a later geographic area is covered, the text does not make clear how the population estimates on the maps were extrapolated from census data provided in the table.

Response 4. The fact that some Table 4-1 values include data for census tracts that lie largely outside of the study area has been more clearly indicated in the table and in related text. The text in Section 4 was expanded to further describe the methods that were used to analyze the available information and develop the estimates of historical population in the study area that are presented in this report.

Comment 5. An expanded explanation should be included in the text to indicate how the population numbers on Figure 4-1 through 4-4 were developed from census block data, what the potential "margin of error" may be.

Response 5. The text in Section 4 was expanded to further describe the methods that were used to analyze the available information and develop the estimates of historical population in the study area that are presented in this report. This discussion includes the estimates produced by ChemRisk project staff as well as the

processing of 1990 census data files that was performed by Geoquest, Inc. of Denver to support preparation of the new Figure 4-5 (1990 population estimates).

Comment 6. The Land Use section (Section 3.0) deals primarily with agricultural land use, and provides no discussion of other uses such as residential housing, businesses, schools, parks, etc. The land use figures show the amount and type of agricultural land present in the study area but the remaining lands are not similarly identified. Some indication of residential areas and densities, commercial, recreational, and public land uses should be presented for each decade.

Response 6. A new section (Section 3.3) was added to summarize information that was collected concerning land uses other than agriculture.

Comment 7. The interviews with landowners focused on agricultural land use as well. Although it is noted that some of the interviewees have knowledge of other types of land uses, these are not discussed in the text. The concentration on agricultural land uses may lead the reader to believe that the primary exposure pathways of concern in the 5 mile radius are limited to agricultural land use. Non-farming residents, schools, and recreational activities should also be discussed.

Response 7. As noted above, a new section (Section 3.3) was added to summarize information that was collected concerning land uses other than agriculture. Information from interviews of landowners is specifically summarized in Section 3.3.1.

Comment 8. Section 3.2 talks about the "Buffer Zone". What does that term mean and what area is covered? (For those that are new to Rocky Flats jargon).

Response 8. The buffer zone has been more clearly defined in several places in the text of the Task 7 report and is illustrated in a new Figure 1-1. Figure 3-1 was revised to more clearly indicate the boundaries of parcels of land that were acquired by the U.S. government for the original Rocky Flats site and for the buffer zone.

Comment 9. Figure 4-5 through 4-8 provide information on residential dwelling and schools within the study area. These figures are not discussed in the Land Use section of the report. Except for the notations on the maps themselves, there is no

explanation of how they were put together. Some of the population numbers indicated in Figures 4-1 through 4-4 do not logically correspond to the numbers of residential dwellings indicated on Figure 4-5 through 4-8.

For example, for 1980 a population of 2,195 is shown in the most southeastern 5-mile radius section on Figure 4-4. Only 303 residences are shown in the corresponding section of Figure 4-8, which would be 7.24 persons per household, a very unrealistic average. In the Standley Lake 5-mile sector on Figure 4-4, a population of 3,3,84 is shown, yet only 96 residences are indicated on Figure 4-8. How can these discrepancies be resolved?

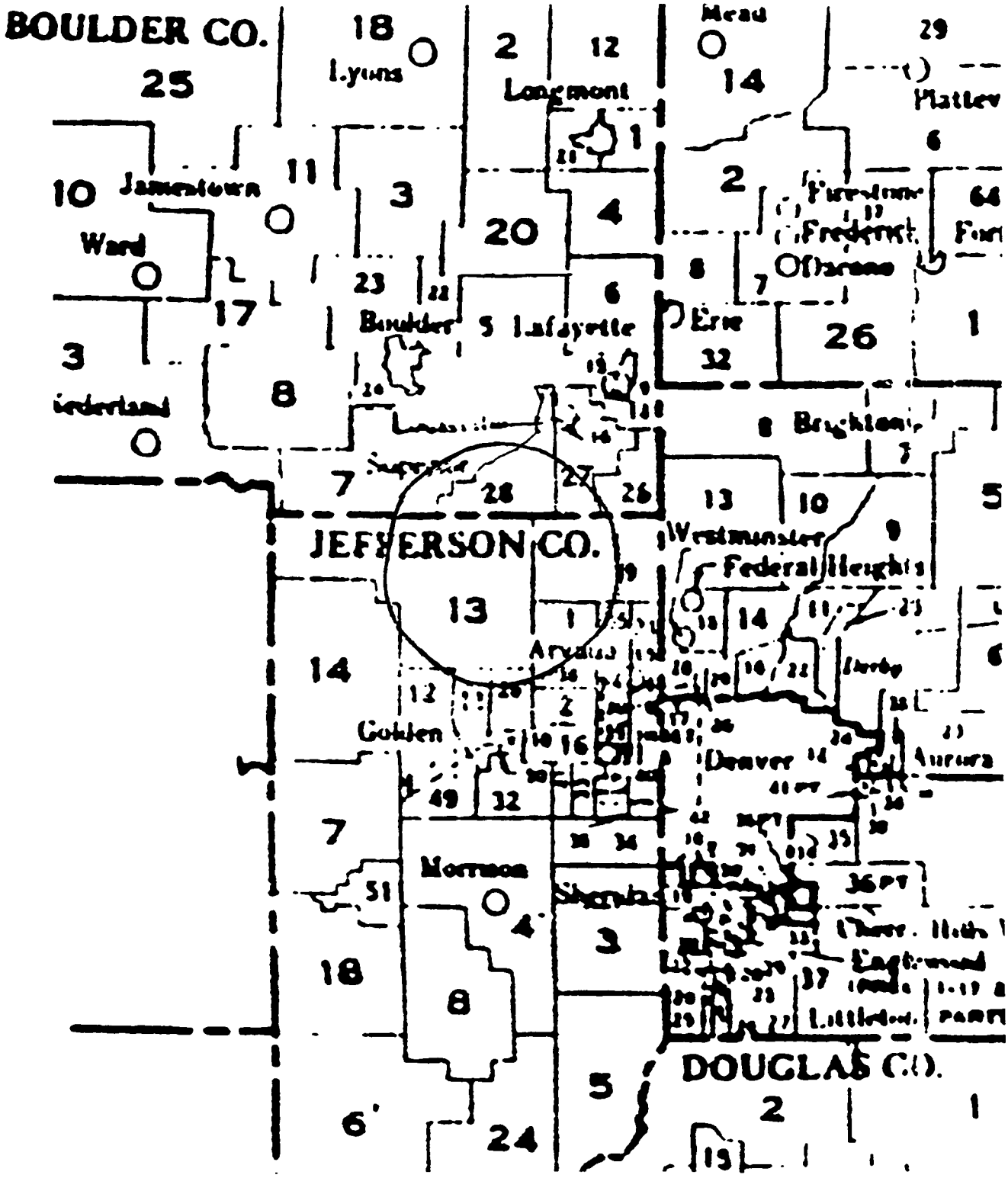
Response 9. *Discussion of the referenced figures (now Figures 4-6 through 4-9) was added to Section 4.2, "Analysis of Topographical Quadrangle Maps." A statement concerning possible inconsistencies between these preliminary estimates and estimates derived by other methods was also added to Section 4.2. A more extensive investigation of the available data would be necessary to reconcile the differences between the different information sources and estimation methods that were identified in the Phase I study.*

Comment 10. If Figures 4-5 through 4-8 show cumulative land use data obtained for each time period, why do schools appear and disappear depending on the date of the figure? Five schools are indicated for 1950 and none are shown for 1980. With the growth in population, it's hard to believe that they were all closed.

Response 10. *The disappearance of schools from one set of USGS maps to later sets likely reflects consolidation of small, rural schools into a smaller number of larger, regional schools.*

Comment 11. Appendix B obviously took a lot of work to prepare. Some additional discussion of the data presented in this table and the relationship to the data shown on Figures 4-5 through 4-8 would make it more useful to the reader.

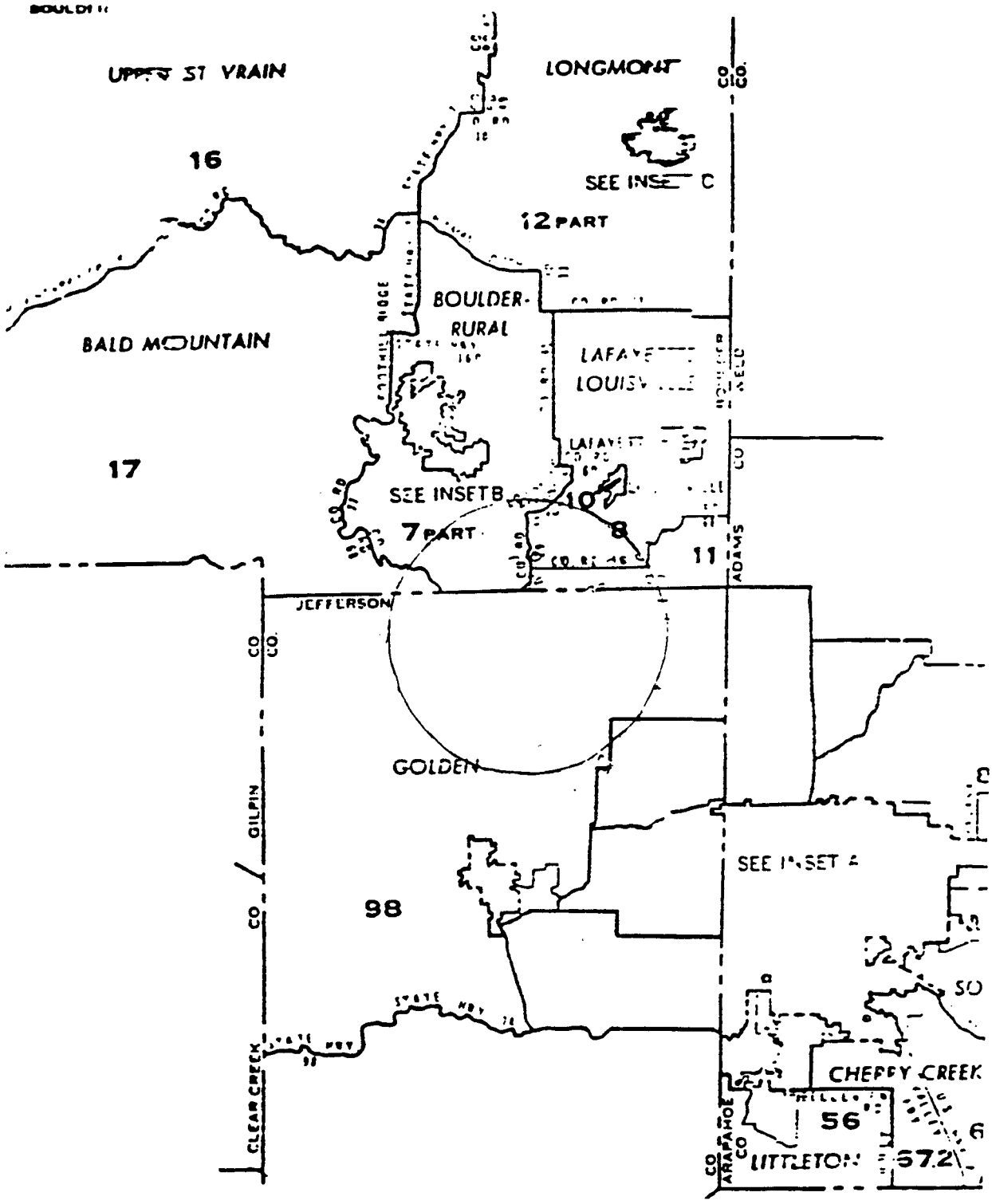
Response 11. *Appendix B is discussed in Section 3.3.2, "Results of Analysis of USGS Quadrangle Maps," and in Section 4.2, "Analysis of Topographical Quadrangle Maps."*



The circle represents a 5-mile radius from the center of the Rocky Flats plant.

ChemRisk
A Division of McLaren/Hart

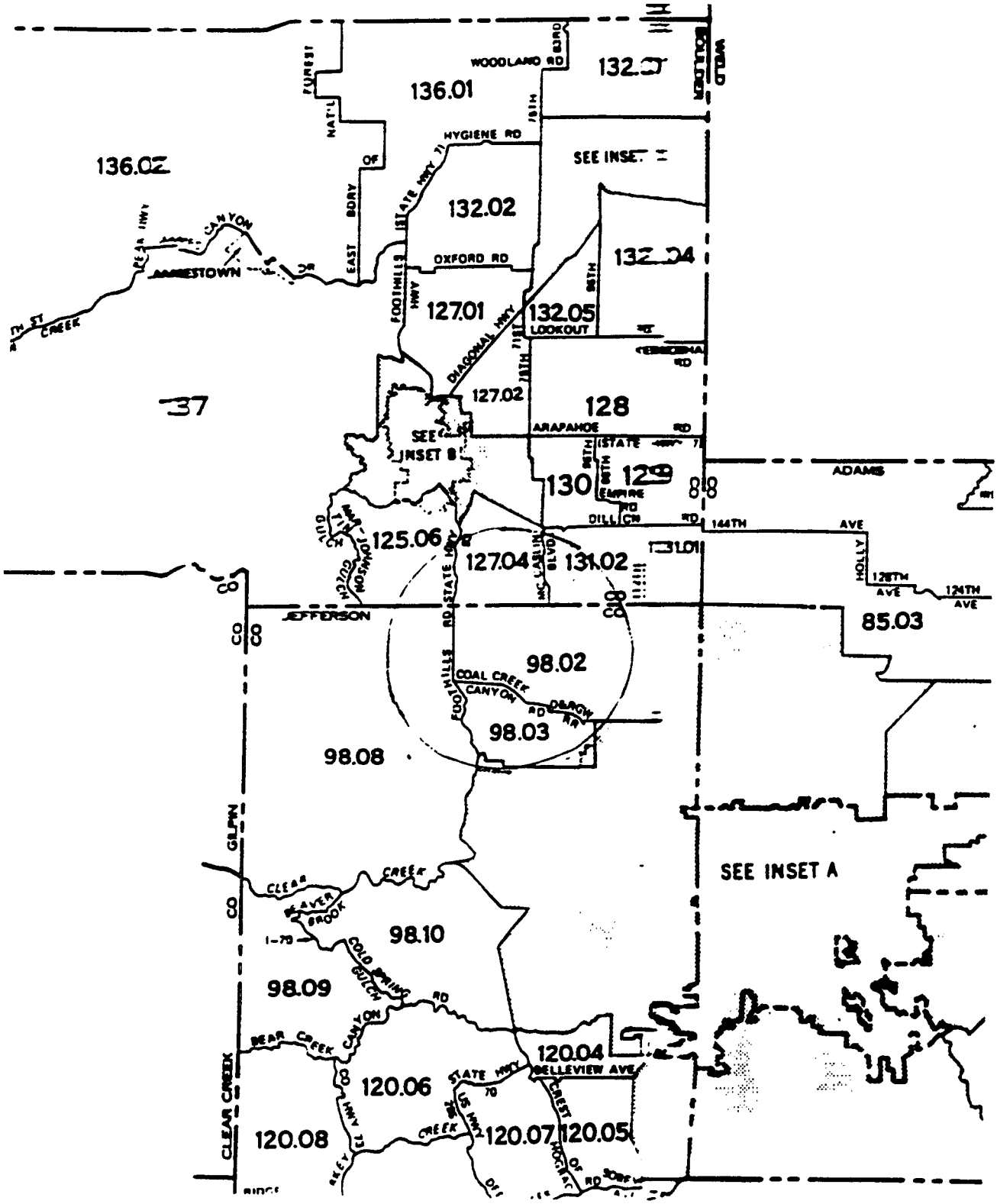
FIGURE D-1
1950 CENSUS DIVISIONS IN OR NEAR THE TASK 7 STUDY AREA



The circle represents a 5-mile radius from the center of the Rocky Flats plant.

ChemRisk
A Division of McLaren/Hart

FIGURE D-2
1960 CENSUS DIVISIONS IN OR NEAR THE TASK 7 STUDY AREA



The circle represents a 5-mile radius from the center of the Rocky Flats plant.

ChemRisk
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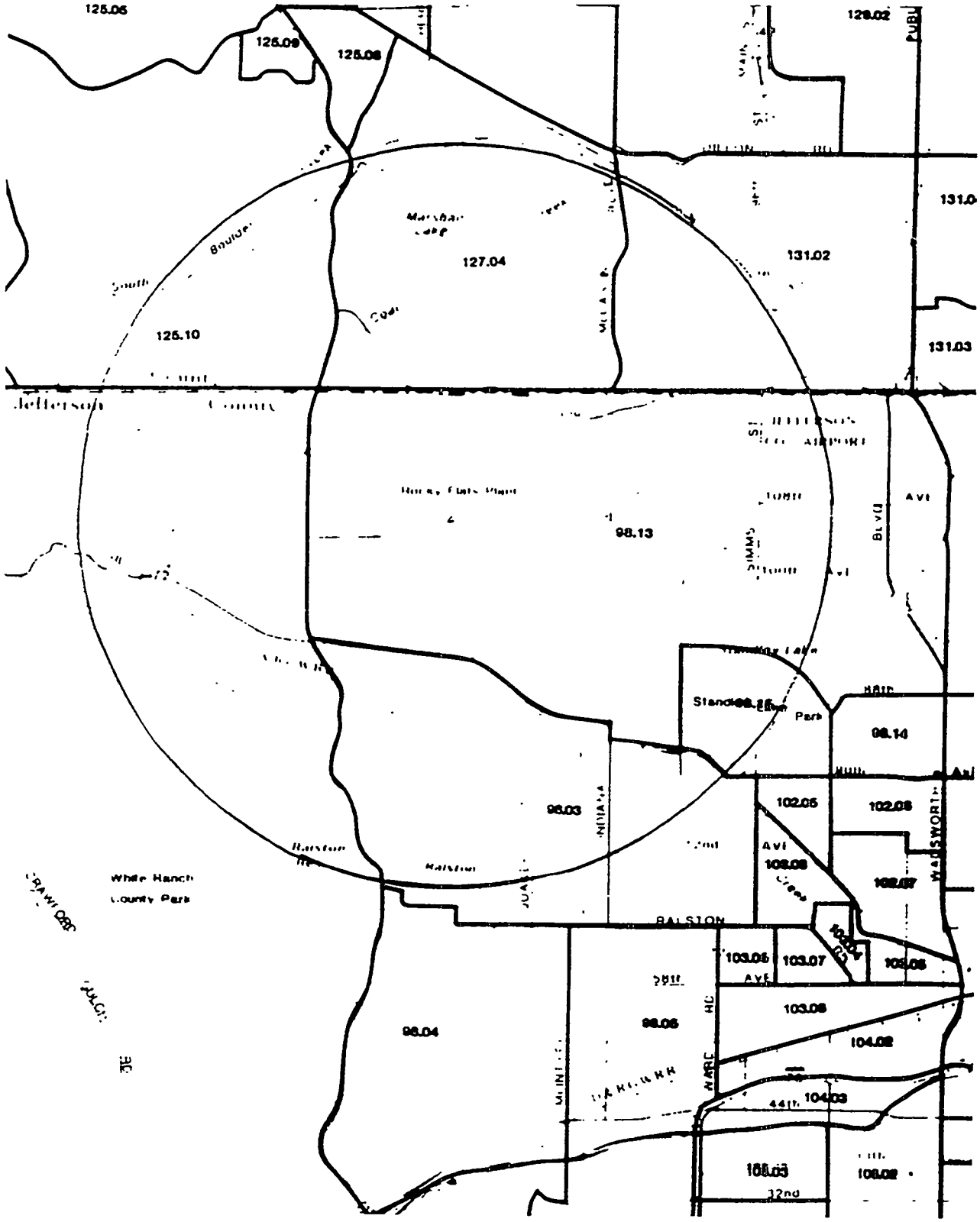
FIGURE D-3
1970 CENSUS DIVISIONS IN OR NEAR THE TASK 7 STUDY AREA



The circle represents a 5-mile radius from the center of the Rocky Flats plant.

ChemRisk
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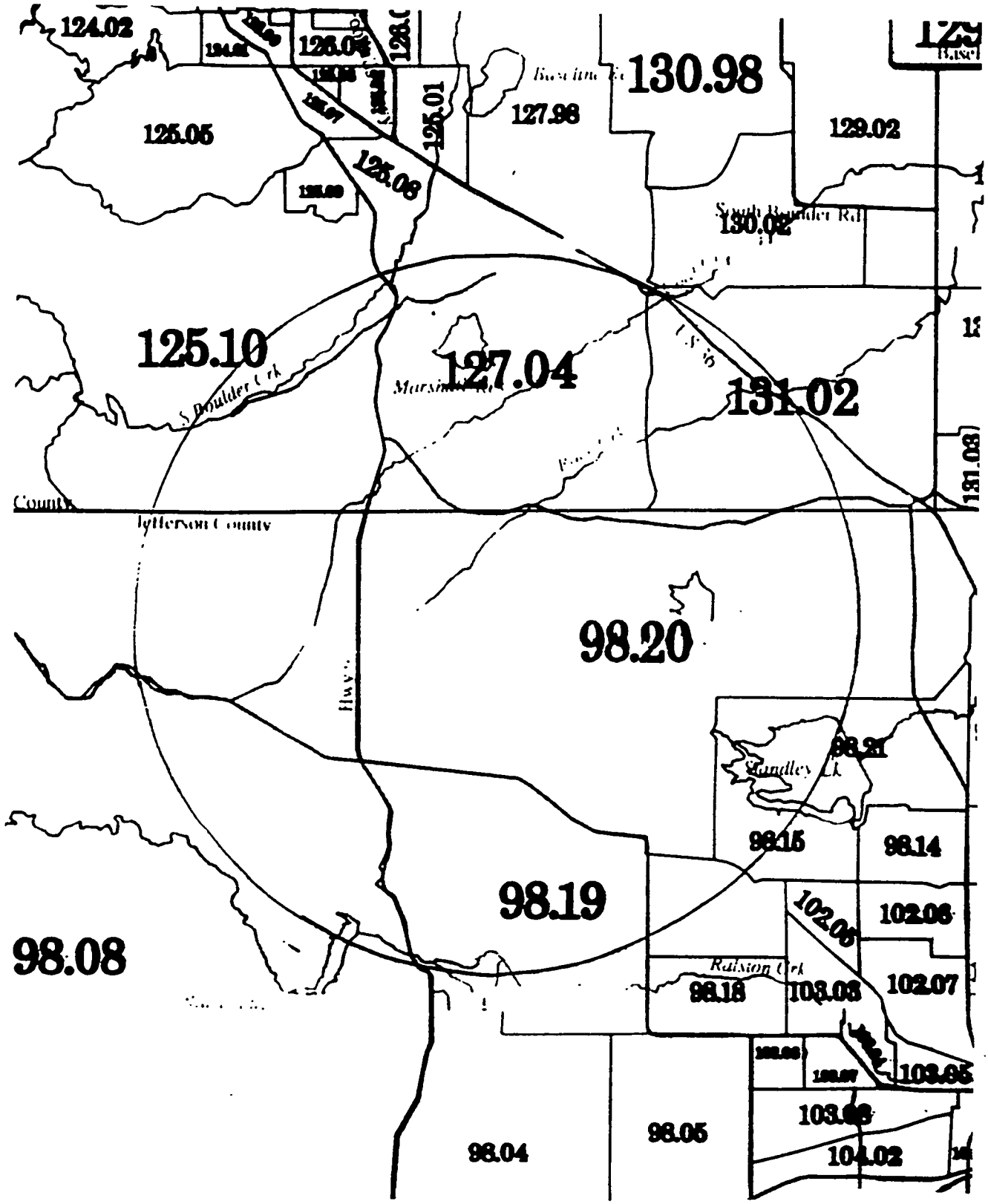
FIGURE D-4
1980 CENSUS DIVISIONS IN OR NEAR THE TASK 7 STUDY AREA



The circle represents a 5-mile radius from the center of the Rocky Flats plant.

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FIGURE D-5
1990 CENSUS DIVISIONS IN OR NEAR THE TASK 7 STUDY AREA

Colorado Department of Health
Health Studies on Rocky Flats, A-3
4300 Cherry Creek Drive South
Denver, CO 80220
(303) 692-2640 or 692-2700