January 7, 1987

Dear Task Force Member

As requested at the first meeting of the Cherokee County Task Force in Galena, Kansas, I am sending each task force member a copy of the Geological Survey's report on potential mining-related hazards in the Kansas portion of the Tri-State Mining District

The copied report is complete except for the plates (large maps) usually included in the back cover envelope They were too large to Xerox completely, so only the Galena portion of the Baxter Springs Quadrangle was reproduced for your information, since this is the area of immediate concern

Please call if you have any questions

Sincerely,

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A Study of Stability Problems and Hazard Evaluation of the Kansas Portion of The Tri-State Mining Area

By

J R McCauley, L L Brady, and F W Wilson

Kansas Geological Survey Open-File Report,83-2

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A STUDY OF STABILITY PROBLEMS AND HAZARD EVALUATION OF THE KANSAS PORTION OF THE TRI-STATE MINING AREA

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The Kansas portion of the Tri-State lead and zinc district was studied in order to compile on maps and report on the location and extent of past-mining activities and the resulting hazardous surface effects of mining Three maps of the study area have been prepared which show (1) extent of underground workings and mine shafts (2) hazardous mine openings including open mine shafts and mine collapses and (3) waste piles and tailings ponds In addition tabulations are included for all mine hazards as well as hazardous tailings ponds and large waste piles Information was acquired from old mine maps reports personal interviews aerial photo interpretation, and field work Hundreds of waste piles tailings ponds mines mine collapses and hazardous shafts have been found field checked mapped and tabulated Many of these features have been photographed and examples are included in the report Finally recommendations are made for alleviating mine hazards These include fencing filling and plugging

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Hazard Assessment Stability Problems

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FOREWORD

This report was prepared by the Kansas Geological Survey Environmental Geology and Geophysics Section Lawrence Kansas under USBM Contract number J0100131 The contract was initiated under the Minerals Environmental Technology Research Program It was administered under the technical direction of the Rolla Research Center with Waldemar M Dressel acting as Technical Project Officer Doyne W Teets was the contract administrator for the Bureau of Mines This report is a summary of the work recently completed as a part of this contract during the period September 19, 1980 to January 28 1983 This report was submitted by the authors on January 28 1983

CONTENTS

Page

TABLES

APPENDIX C TABLES

ILLUSTRATIONS

APPENDIX B ILLUSTRATIONS

PLATES

ACKNOWLEDGMENTS

The contributions of Carolyn LaFrance who assisted in the field work Esther Price who typed the manuscript and Darrell Drew who drafted and scribed the plates and figures and researched the many mine maps used in this study, are greatly appreciated

STUDY OF STABILITY PROBLEMS AND HAZARD EVALUATION OF THE KANSAS PORTION OF THE TRI-STATE MINING AREA

by

James R McCauley,[1] Lawrence L Brady,[2] Frank W Wilson[3]

ABSTRACT

The Kansas portion of the Tri-State lead and zinc district was studied in order to compile on maps and report on the location and extent of past-mining activities and the resulting hazardous surface effects of mining Three maps of the study area have been prepared which show (1) extent of underground workings and mine shafts (2) hazardous mine openings, including open mine shafts and mine collapses and (3) waste piles and tailings ponds In addition, tabulations are included for all mine hazards as well as hazardous tailings ponds and large waste piles Information was acquired from old mine maps reports personal interviews, aerial photo interpretation, and field work In all hundreds of waste piles and tailings ponds have been mapped 104 have been tabulated hundreds of mines have been mapped along with over 3500 shafts 910 hazardous mine openings have been found field checked mapped and tabulated including 6 adits 8 open pits 307 mine collapses and 589 hazardous shafts Approximately two-third of these hazards occur in and near Galena Kansas Many of these features have been photographed and examples are included in the report Finally recommendations are made for alleviating mine hazards These include fencing filling and plugging

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INTRODUCTION

Purpose of Study

The discovery of black jack on the Cook Forty in Galena in 1870 and the closing of the Swalley mine near Baxter Springs in 1970 marked the beginning and end of a hundred years of lead and zinc mining in the Kansas portion of the Tri-State mining district. During much of this time the Tri-State district of southwestern Missouri, southeastern Kansas, and northeastern Oklahoma was one of the world's major producers of lead and zinc. Today the mines are a thing of the past, however their vestiges are very much a part of everyday life for residents of this area. Whereas the dangers for miners ended with the closing of the last mine, the hazards faced by those living above ground continue to this day. Waste piles, mine shafts, and collapsed mines dot the landscape of the old Tri-State district, and additional areas overlie mines of unknown extent and safety. Over the years, mine collapses have caused extensive property damage and open mines and other mine hazards have claimed human lives. In an attempt to alleviate these hazards, the resident of extreme southeastern Kansas and adjacent parts of Missouri and Oklahoma sought federal help in the late 1970's and in 1979, congressmen Whittaker of Kansas, Taylor of Missouri, and Synar of Oklahoma expressed the concerns of their constituents in Washington, D.C., and requested the recommendations of the U.S. Bureau of Mines. Before taking corrective action, the Bureau of Mines proposed a thorough study of the Tri-State mining district to identify all mined areas and mine-related hazards and to make recommendations for remedial action. The Bureau of Mines chose cooperative agreements between itself and the state geological surveys of Kansas, Missouri, and Oklahoma to accomplish this task. This is a final report on the results of the Kansas portion of this study.

Objectives and Scope of Study

The objectives put forward for this study were: (1) to compile, on a single set or series of maps, the location and extent of past-mining activities and the resulting surface effects (underground and open-pit mine workings, shafts, ground subsidence, accumulations of mine waste and tailing ponds); (2) to identify hazardous areas with potential for future damage to people or property; and (3) to consider methods for providing protection of the public for existing and potentially hazardous conditions.

To meet these objectives, three sets of maps, using U.S. Geological Survey 7 1/2 minute quadrangles as bases, have been prepared for the study area and are included in this report. Plate I, Underground Mines and Shafts, shows the known extent of underground mine workings as well as the location of all known mine shafts. Plate II, Open Mine Shafts, Pits, and Subsidences, is essentially a mine hazards map and shows all open or collapsed mine shafts, all open-pit workings as well as the location and extent of mine cave-ins and subsidences. Plate III, Mine and Mill Waste (Piles and Ponds), depicts the remaining waste piles in the area as well as the extent of former waste piles which have been

quarried or reclaimed Tailings ponds are also shown To accompany these maps are tabulations of pertinent data describing the nature location condition dimensions and suggested remedial action for many of the mine features mapped Tabulations include Table C-1 Open Mine Shafts and Pits Table C-2, Subsidence Events and Table C-3 Mine and Mill Waste Finally methods are proposed for ameliorating the hazards which exist in the study area

Information Sources and Study Methods

Mine Maps

To compile the large amount of data required by this study several sources of information were used Since drilling and instrumented surveys were not a part of this study information concerning the location and extent of underground workings had to be taken from existing mine maps Some of those maps were privately owned or belonged to engineering concerns, a number were on file at the Kansas Geological Survey in the Mineral Resources Section still others were found in the published reports and articles concerning the Tri-State district

An extensive cataloging program, conducted by the U S Bureau of Mines and reported by Brichta (1) compiled exploration drilling records and mine workings maps for the Tri-State district Microfilm copies of this information were supplied by the Bureau to this investigation The maps showing mine workings were compiled on a half-section basis and covered most of the Kansas mining areas These maps were extremely helpful to this study The U S Bureau of Mines formerly maintained an office in the Tri-State district which contained a large number of mine maps and records produced by mining companies These maps, which are now housed in the Spiva Library at Missouri Southern State University in Joplin provided another valuable source of information Included in this set of maps were a number from the Galena area which were not found among the other map sources However maps are still lacking for some mining areas particularly those in and around Galena

All the mine maps had to be transferred and plotted on new maps having a scale of 1 24 000 This was accomplished by the use of a Bausch and Lomb zoom transfer scope (Model ZTH-4HP) In addition the maps held at Missouri Southern State University could not be removed from the premises These maps were traced photographically reduced and then transferred to project maps

Aerial Photography

Another major source of information for this study was aerial photography Photos dating back to 1938 were used in this study to map surface effects of mining and mine hazards and to trace their development over the years In all four dates of aerial photography were used 1938 1950 1973 and 1981 The 1938 and 1950 photos were black and white with a scale of 1 24,000 and were acquired by the Agricultural Stabilization and Conservation Service of the U S Department of Agriculture The 1950 photos were on hand at the Kansas Geological

Survey however the 1938 photos had to be procured from the National Archive and Records Service in Washington D C The 1973 photos were color-infrared transparencies acquired by high-flying NASA research aircraft at a scale of about 1 125 000 These were purcha ed from the Earth Resources Observation Systems (EROS) of the U S Geological Survey in Sioux Falls South Dakota In 1981 color photography was acquired especially for this study under subcontract with Anilas Inc of Salina Kansas This photography was flown in February at a time when the deciduous trees in the study area were without their leave thus allowing the search for mine hazards in forested areas The search for hazards was also aided by the large scale of this photography in comparison with the other sets of photos Flying at an altitude of about 1 500 meters (5 000 feet), color transparencies were acquired having a scale of 1 10,800 The coverage of this photography is outlined in Figure 1

All of the aerial photography used in this study was stereo-coverage and was interpreted using a Bausch and Lomb zoom 95 stereoscope together with a Richards 924-2XY light table Mining features were recorded on clear mylar transparencies and later transferred to the 1 24 000 project maps The aerial photography was useful for mapping all of the surface effects of mining under investigation in this study The 1938 and 1950 black and white photography was useful for mapping chat piles and tailings ponds which are easily interpreted because of their size and because many were still intact at the time of photography Since many mines were still in operation on these two sets of photos especially those from 1938 mine shafts could be located by identifying hoisting structures over their openings Mine cave-ins are also visible on the 1938 and 1950 photography These sets of photos together with the later photography were used to place time frames on the occurrence of the large mine collapses The scale, resolution and--in the case of the 1938 photos--quality, were such that the black and white photography could not be used to map small hazard such as open mine shafts and small areas of cave-in and subsidence Likewise the 1973 high-altitude photography, because of its large scale was useful primarily for mapping and dating large mine cave-ins

The 1981 photography proved to be invaluable in detecting mine-related hazards as they now exist in the study area The excellent resolution and sharpness of this photography together with its larger scale allowed the mapping of even the smallest mine hazards A high resolution zoom stereoscope aided in the identification of open uncollapsed mine shafts as small as 1 2 meters (4 feet) x 1 2 meters (4 feet) even when viewed through a canopy of trees

Field Work

To gain information on present conditions dimensions protective efforts and other tabulated information each mine hazard was visited in the field Required information was recorded and in many instances color slides and black and white photos were taken Many chat piles and tailings ponds were likewise inspected

To aid in the field work interpretive overlays made on the 1981 photography were used to make field maps of each square-mile section In addition to showing the waste piles and ponds mine shafts and cave-ins taken from the overlays roads streams fences abandoned rail lines, and other features useful in locating mine hazards were placed on these maps In this way hazards could be found and inspected without needless searching Because of the intense mining activity in the Galena area prints of the 1981 photo coverage were made to assist in this part of the field work A ground survey of mine hazards in a long orphaned mining district such as this study area unaided by aerial photography, would have been time-consuming and difficult due to the disrupted landscape the mining has produced and the vegetative over-growth that has flourished since mining was abandoned

Personal Interviews

Additional information concerning mine hazards was obtained from personal contacts with area residents landowners and city officials They were particularly helpful in providing the history of some mine cave-ins and in describing past cave-ins that have since been corrected and are no longer apparent Personal interviews with some landowners provided information on methods used to reclaim their land and close mine shafts In some instances former miners told of the conditions in underground mines and how some cave-ins occurred However discretion must be used in accepting stories relating to the underground mining in this area since much of what is related results from a strong oral tradition rather than actual experience in the mines For instance the notion that all the mines from northeast of Joplin Missouri, southwest to near Miami Oklahoma, are interconnected is still held by some residents More than once stories were related of men entering mines in Missouri and emerging in Oklahoma or vice-versa including one variation that described the trip being made by row boat

Description of Study Area

The study area for this investigation is shown in Figure 1 and includes virtually all of the Tri-State mining in the State of Kansas This study area is composed of the following U S Geological Survey 7 5 minute quadrangles in Kansas Crestline Baxter Springs and Neutral as well as the Kansas portions of Carl Junction Missouri-Kansas Joplin West Missouri-Kansas Peoria Oklahoma-Kansas Picher, Oklahoma-Kansas and Miami Northwest Oklahoma-Kansas

The study area in Figure 1 covers about 465 square kilometers (180 square miles) however, virtually all of the Tri-State mining activity is contained in the 310 square kilometers (120 square mile) covered by the aerial photography acquired for this project The study area includes portions of two physiographic provinces as defined by Schoewe (14 p 279-280) which are roughly separated by the Spring River To the east lies a small portion of the Ozark Plateau Province which occupies part of northeastern Oklahoma, northern Arkansas, and southern Missouri The Cherokee Lowlands portion of the Interior Plains make up the remaining part of the study area west of the Spring River

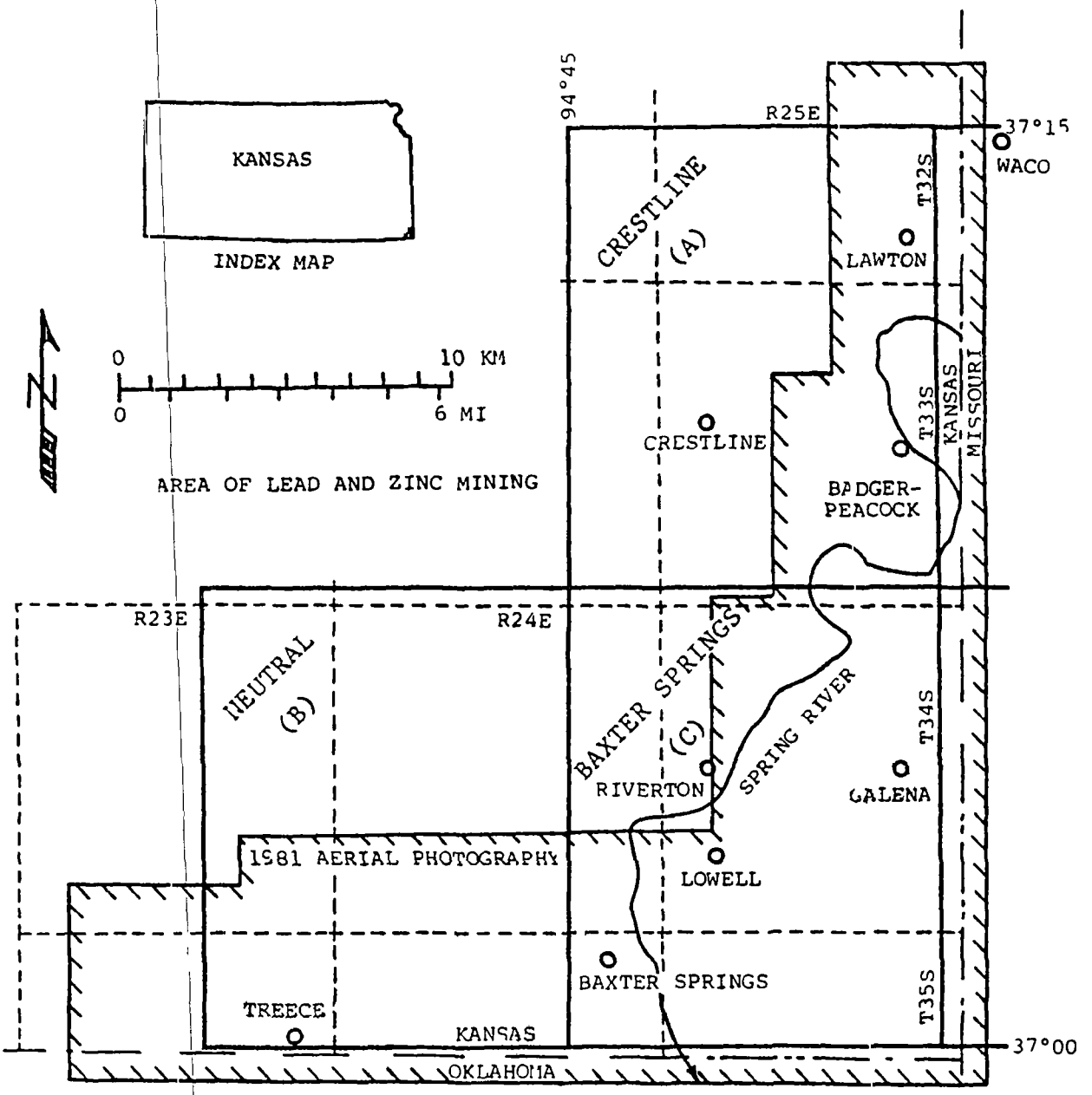

FIGURE 1 - Location map of Kansas Tri-State study area showing USGS quadrangles and areas of lead and zinc mining

The Ozark Plateau

The Ozark Plateau Province in Kansas is developed on cherty limestones of Mississippian age These are the oldest exposed rocks in the state of Kansas and contained the deposits of lead and zinc which were extensively mined in the Tri-State district (Table 1)

This region contains the highest elevation in the study area and more relief than the Cherokee Lowlands Being a plateau the interstream uplands are generally flat but have a slight slope to the northwest which approximates the regional dip of the rocks The stream valleys often have steep sides and gravel-filled bottoms Local relief exceeds 50 meters (170 feet) along Shoal Creek south of Galena The overall relief of the study area is over 82 meters (270 feet) ranging from the highest point in the study area 317 meters (1040 feet) near the three-corners area where Kansas adjoins Missouri and Oklahoma down to 235 meters (770 feet) where the Spring River leaves the state 8 kilometers (5 miles) to the west

Much of the Ozark Plateau portion of the study area is mantled by residual cherty gravel that has resulted from the weathering of the Mississippian limestones The soils of the area are often thin and rocky These together with the numerous steep slopes, combine to make much of this area unsuitable for cropland Deciduous hardwood forests cover most of the hillsides while the uplands contain large clearings devoted to livestock grazing Cropland is primarily restricted to the valley floors of Shoal Creek and the Spring River

Three communities are located in this part of the study area Riverton and Lowell are two unincorporated villages located near the confluence of the Spring River and Shoal Creek The city of Galena is located to the east along the Missouri state line on highways U S 66 and Kansas 26 The city is divided by westward-flowing Short Creek The portion of town north of the creek was formerly Empire City an early rival to the young city of Galena

Galena and Empire City were born out of the rush to exploit the rich diggings found along Short Creek in the 1870 s and grew quickly as additional ore deposits many occurring close to the surface were discovered By 1900 shortly after the peak in mining around the city of Galena, it had a population of 10 155 (3 p 61) Galena was also an important smelting center having a large smelter that operated into the mid-1970's Today lacking any mining industry Galena is largely a residential community of 3 588 (1980 U S census) However its history as a mining center is still very much in evidence Much of the city and adjoining areas are undermined and pockmarked by abandoned mine shafts prospects and mine cave-ins It is possible just by crossing a street or stepping out of a backyard to go from a residential neighborhood to a chat and boulder-strewn wasteland containing all the attendant hazards associated with abandoned underground mines

TABLE 1 - Generalized columnar section of the surficial rocks in the Tri-State district of Kansas (16 p 3)

System	Series	Stage	Geologic Unit	Avg thickness m (ft)	Description
Pennsylvanian	Middle Pennsylvanian	Desmoinesian	Krebs Formation	70 (225)	Shale light- to dark-gray and fine- to medium-grained sandstone contains coal, underclay, siltstone and some limestone locally
Mississippian	Upper Mississippian	Chesteran	Undifferentiated rocks of Chesteran age	35 (120)	Limestone shaly and calcareous shale contains some oolitic limestone and sandy shale
		Meramecian	Warsaw Limestone	35 (120)	Limestone, crinoidal contains much gray chert Base marked by glauconite-rich layer known locally as the J-bed Contains deposits of lead and zinc of commercial value
	Lower Mississippian	Osagian	Keokuk Limestone	40 (130)	Limestone medium to coarsely crystalline bluish-gray and gray chert contains oolitic limestone near top Cherty parts weather to characteristic reddish-brown color Contains deposits of lead and zinc of commercial value
			Fern Glen Limestone	51 (170)	Limestone Reeds Spring Limestone Member (upper unit) is cherty finely crystalline, bluish-gray Contains deposits of lead and zinc of commercial value St Joe Limestone Member (lower unit) is crinoidal dolomitic in part green

The Cherokee Lowlands

The portion of the study area west of the Spring River in the Cherokee Lowlands contrasts sharply with the Ozark Plateau to the east These lowlands are essentially an erosional plain developed on the soft shales silts and sandstones of the Cherokee Group (14 p 231) which is Pennsylvanian in age These rocks lie unconformably on the Mississippian rocks below The lowermost formation of the Cherokee Group the Krebs Formation (Table 1), occurs throughout the Cherokee Lowlands portion of the study area This region is physiographically more subdued than the Ozark Plateau, having gentle slopes and shallow stream valleys The only notable areas of topographic relief are isolated sandstone hills such as Blue Mound east of Treece which stand out as erosional remnants above the surrounding terrain The elevation of Blue Mound is 295 meters (970 feet) This is the highest point in the study area outside of the Ozark Plateau portion

The fine-grained friable rocks of the Krebs Formation have weathered to form deep fertile soils This together with gentle well-drained topography, results in much arable land in this part of the study area Areas of timber are restricted to the slopes of erosional remnants such as Blue Mound and the courses of the larger streams

Five communities are located in this part of the study area Crestline and Lawton are two unincorporated villages located in the northern portion Crestline on Kansas route 26 is 3 2 kilometers (2 miles) west of the nearest mining Lawton is 8 kilometers (5 miles) northeast of Crestline A small area of mining occurs 8 kilometers (5 miles) south of Lawton, while a larger area exists to the northeast and extends eastward into Missouri toward the town of Waco Melrose is another unincorporated village located 20 kilometers (12 miles) west of Baxter Springs An isolated mine occurs 3 2 kilometers (2 miles) south of Melrose near the Oklahoma state line This mine lies out of the study area but has no associated hazards

Baxter Springs and Treece are the two incorporated cities in this part of the study area Baxter Springs with a 1980 population of 4 762 is located on the west bank of the Spring River on U S highways 66 and 166 just north of the Oklahoma state line The city predates the discovery of lead and zinc ore in the area and owes its beginnings to the Texas cattle drives shortly before and following the Civil War becoming the first cowtown in Kansas Today Baxter Spring still serves the agricultural industry and is also a retail trade center for this corner of the state Mines do not occur within the city limits of Baxter Springs however they are present immediately to the west northwest and south and represent the northeastern-most extension of the Picher field Treece population 194 is about 10 kilometers (6 miles) west-southwest of Baxter Springs on the Oklahoma state line and is a former mining camp Treece is located within the Picher field and is surrounded on all sides by abandoned mine workings and is extensively undermined

Drainage

Most of the study area is drained by the Spring River and its tributaries including Shoal Creek Short Creek Turkey Creek and Center Creek which flow to the west out of the state of Missouri Cow Creek and Shawnee Creek enter the Spring River from the north and Brush Creek and Willow Creek flow southeasterly entering the Spring River in the vicinity of Baxter Springs The Spring River and Shoal Creek are impounded by dams between Lowell and Riverton Kansas The dam at Lowell was constructed by the Southwestern Power Company which later became a part of the Empire District Electric Power Company of Joplin Missouri This dam was built to generate hydroelectric power for use in the nearby mines (6, p 80) Spring River joins the Neosho River 26 kilometers (16 miles) south of Baxter Springs in the upper end of Grand Lake of the Cherokees in Oklahoma That part of the study area southwest of a line extending northwesterly from a point 5 kilometers (3 miles) southwest of Baxter Springs is drained by streams flowing into the Neosho River The most important of these is Tar Creek which leaves Kansas near Treece and drains much of the Picher field It joins the Neosho River near the town of Miami, Oklahoma

General Mining, Milling and Economic Geology

The quantity of zinc and lead produced from the mines of the Tri-State district of Oklahoma Kansas, and Missouri helped make the district one of the most important metal-mining areas in the world During the 100 years from 1850 until 1950 the Tri-State accounted for 50 percent of the U S production of zinc and 10 percent of the production of lead (6)

Important years when the major mining activity occurred in the district were between 1880 and 1955 (6 p 401)

The Kansas portion of the district has produced more than 2 9 million tons of zinc with an estimated value of 436 million dollars and 650 thousand tons of lead worth nearly 91 million dollars (9 18) The cumulative production of the Kansas ores based on the above data between 1876 and 1970 are shown in Figure 2 Distribution of the metal concentrates to various Kansas subdistricts of the Tri-State is summarized in Table 2

The general method of winning the Tri-State ores was by underground mining using room and pillar methods However the occurrence of ore bodies near the surface in the eastern part of the district resulted in some mining companies trying open-cut mining methods especially in the Galena area and in Missouri

North and west of the Galena field the Cherokee Group of shale sandstone and coal beds of Middle Pennsylvanian age overlie the ore-bearing carbonates of Mississippian age The Cherokee Group becomes progressively thicker away from the Galena area due to the regional northwest dip of the rocks and the increase in surface elevation in a

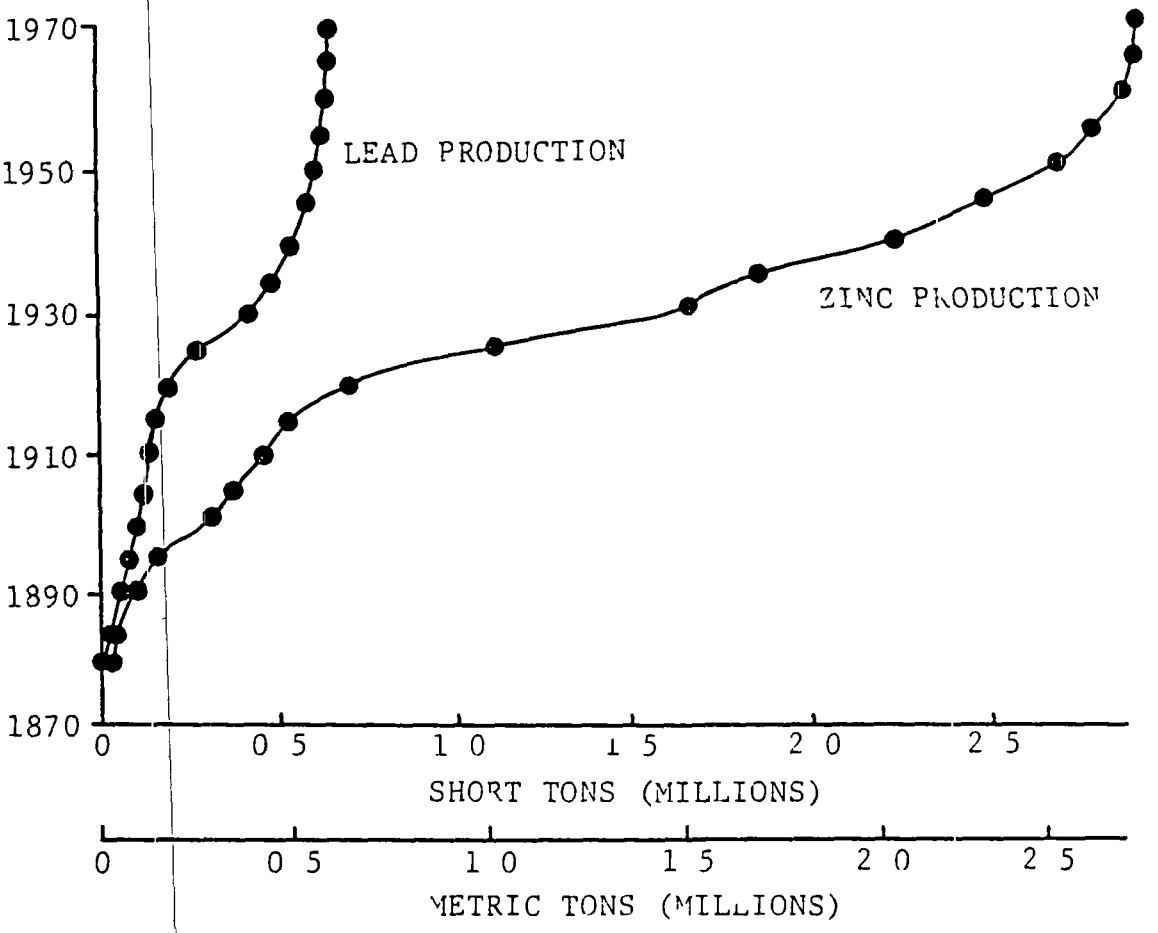

FIGURE 1 - Cumulative production of recoverable lead and zinc from mines in Kansas (data from 9 18) Figure from Ebanks (5 p 24)

TABLE 2 - Quantity of material treated from Kansas and average recovery of zinc and lead concentrates during 1911-1945[1]

Subdistrict	Material Treated		Concentrate Recovery %			
	Crude Ore (short tons)	Old Tailings	From Crude Ore		From Old Tailings	
			Zinc	Lead	Zinc	Lead
Badger-Peacock[2]	389 365	469,045	3 72	0 43	0 34	001
Baxter Springs - Blue Mound - Treece	56 718 899	25 205 717	5 42	88	0 97	01
Galena	4,597 884	183 218	3 37	59	76	04
Lawton - Waco[3]	5 708 831	2 015 900	4 79	02	1 09	-
Playter - Crestline[4]	1 490 700	32 500	2 70	1 26	1 65	-
Totals	68 905 679	47 906 380	5 17	0 79	96	01

[1]Data from Martin (9, p 1-2)
[2]1922-1924 included with Crestline District
[3]1911-1912 included with Badger-Peacock District
[4]1922-1924 included with Badger-Peacock District

west and north direction With the increase in Cherokee thickness the deeper mines were in the western part of the Tri-State with the Foley Mine being the deepest mine in the Tri-State district with a shaft at 146 meters (480 feet) of depth This mine was located 1 6 kilometers (one mile) north of Treece in the Picher field

Sphalerite and galena are the commercial ore minerals that were mined in the district McKnight (10 p 101) lists marcasite and pyrite as commonly occurring with the ores and the common gangue minerals include jasperoid dolomite, calcite and occasionally quartz or barite A detailed discussion of the mineralogy of the Tri-State district is covered in McKnight (10 p 101-124) and in Brockie (2 p 414 416-417)

Forms of the ore bodies have been described by Brockie (2) as assuming three basic shapes (1) irregular relatively narrow long ore runs of varying heights (2) circular runs and (3) flat-lying generally tabular bodies called sheet ground that cover large areas The most important type of ore body shape in the district was the elongated long runs

In addition to the zinc and lead produced in the Tri-State the district was also an important source of cadmium and germanium that were produced as a by-product of the zinc-lead smelting process The summary report on germanium by the U S Bureau of Mines (1c, p 927-929) describe the Eagle-Picher Industries Inc of Quapaw Oklahoma as the sole domestic producer of primary germanium The refined germanium is produced from stockpiles of old smelter residues from the zinc-mining operations in the Tri-State district

Cadmium is produced as a by-product metal from the smelting of zinc Mote (11 p 188) noted that the average content of cadmium from zinc concentrate in the Tri-State district was 0 35 percent No primary production of cadmium from zinc concentrate was listed by Mote (11) for Kansas However production of cadmium was listed for smelters in Bartlesville and Henryetta Oklahoma A similar figure for cadmium content is given by Martin (9 p 5) for Tri-State ore Martin (9) lists the zinc concentrates as usually containing 0 30 to 0 40 percent cadmium and that some of the cadmium is recovered at the smelters

In 1960, Shelton (17 p 291) listed cadmium production by two companie in Kansas--Sherwin-Williams Company at Coffeyville and the Eagle-Picher Company at Galena No estimate can be made of the cadmium metal obtained from the zinc smelting of Kansas zinc concentrates

The large piles of chat that accumulated from milling of the ore are a valuable commodity used for concrete aggregate road construction and as ballast on railroad beds Kansas chat is composed of small fragments or chips of flint or chert and limestone (15 p 154)

The quantity of chat used for construction purposes between 1924 and 1956 was estimated by Schoewe (15 p 424) at 19 million tons Value of the quantity of chat consumed was estimated by Schoewe (15) at

5 7 million dollars Nearly 13 million tons of the 19 million tons total was utilized between 1950 and 1956 Based on information reported to the U S Bureau of Mines by mineral producers there was an estimated 10 million tons of chat utilized since 1956 from the Kansas portion of the Tri State

Reserves of Zinc and Lead

An extensive estimate of reserves of zinc and lead in the Tri-State district was undertaken by the U S Bureau of Mines in the mid-1940 s (13) Their work was based on a thorough evaluation of the mines and over 68 thousand drill records for the district In addition consideration was given to all the known geological features and conditions of the district The results of the study were based on work completed by December 31, 1947 with a lower cut-off value for reserves of both 1 1/2 percent and two percent zinc and lead combined

Only the reserves with two percent metal values were considered in this report Minimum rock thickness considered for reserve considerations by Ruhl (13 p 7) was 7 1/2 foot face for 1 5 percent metal values and a six foot face for a 3 percent average metal value interval

Results of their study for reserves of zinc and lead ore for Kansas, with a two percent combined zinc and lead cutoff value show a recoverable value for Kansas of 7 546 700 tons of indicated reserves having recoverable average concentrate values of 4 57 percent zinc concentrate and 0 63 percent lead concentrate This corresponds to approximately 2 74 percent zinc and 0 50 percent lead In the inferred reserve category, Ruhl (13 p 16) shows 3,375,500 tons of inferred ore with 3 09 percent zinc concentrate and 1 09 percent lead concentrate This corresponds to a metal content of approximately 2 39 percent zinc and 0 84 percent lead No measured ore reserves were included in the study for Kansas, although Oklahoma and Missouri have reserves in the measured classification

At the time of calculation of these reserves, 2 670 800 tons of ore in all classes were under water in Kansas (13 p 17-18) This area includes part of the Galena Crestline and Lawton subdistricts

In 1964 McKnight (10 p 101) noted for the Picher field that The bulk of the remaining reserves in the field are marginal in grade and can be mined only so long as economic conditions remain favorable Abandonment of pumping in the Picher field due to economic slow-down would probably result in loss of the remaining low-grade reserves McKnight (10 p 101) further elaborated on this fact by describing the Picher field mine workings as being so extensive and interconnected that the cost of pumping them out again once flooded would be prohibitive when balanced against the tonnage and grade of the remaining reserves

The last operating mine in the Kansas portion of the Tri-State district was the Swalley Mine located just west of Baxter Springs that was operated by the Eagle-Picher Industries Inc This mine closed in

1970 and along with it the last pumpage of water from the mining district

The quantity of water required to be pumped from the field for mining was enormous Ruhl (13 p 27) describe the volume of water pumped in the Oklahoma-Kansas portion of the district alone as totaling over 36 million gallons a day in 1947 This volume of water was handled by 63 pumping plants with 28 of this total located in Kansas in the Picher field area

For a chemical quality study of water in abandoned zinc mines within the Picher field area (12 p 2), observations of water in a well located in the mine workings showed an average rise of 1 2 feet per month This was the observed average for a period of time from September 1975 to June 1977 In the same report D C Brockie then chief geologist with Eagle-Picher was quoted as saying that the abandoned mines were filling with highly mineralized water that by mid-1976 contained an estimated 100 000 acre-feet of water

Based on the reserve figures of Ruhl (13) for a two percent ore cutoff the metal remaining in 1947 was approximately 287 thousand tons of zinc and 67 thousand tons of lead Subsequent drilling of the Kansas portion of the district would have proved-up larger amounts of reserves than those calculated by the Bureau of Mines personnel However totals of zinc and lead extracted during the time period of 1948-70, as shown in the U S Bureau of Mines yearbooks show totals for Kansas as of over 297 thousand tons of zinc and nearly 80 thousand tons of lead

In summary reserves or at least resources of zinc and lead ore undoubtedly remain in the district even though they would be nearly depleted in the old mined areas It is questionable if the remaining resources in the old subdistricts will be mined in the Kansas part of the Tri-State district in any foreseeable future because of several factors

1) The ore is nearly depleted except for marginal low-grade ore that would require a large price increase in zinc for further consideration of mining

2) Dewatering would be necessary on a very large scale to resume mining in the old district

3) Quality of the water from dewatering or mining would require very costly clean-up before release into adjacent stream valleys under the new federal water-quality laws

Most present-day exploration for zinc and lead in Kansas is well on the margins of the old mining areas and if a new mine were to be developed it would probably be on the margins of the older field and would have little or no affect on reclamation of the previously mined areas

Land-Ownership Patterns in the Kansas Portion of the Tri-State Mining District

Essentially all of the surface and mineral rights to land in the Kansas portion of the Tri-State area are under private ownership Government ownership is limited to the highways and roads of the area and a few acres of city-owned land within and adjacent to the towns and cities in the district In the Kansas study area there are approximately 27 320 hectares (67,500 acres)

Excluding the roads and highways and land ownership within the city limits corporate ownership amounts to approximately six percent of the surface ownership and seven percent of the mineral rights ownership The largest corporate owner is the Gulf Oil Corporation with nearly 770 hectares (1900 acres) present within the study area in Township 33 and 34 South, Range 25 East Outside of the city boundaries local government land ownership consists of less than 80 hectares (200 acres)

Even among the properties with the mineral rights severed from the surface rights ownership by private individuals prevails Evaluation of Cherokee County records indicates that nearly 1450 hectares (3600 acres) of mineral rights were severed from the surface rights Of this total amount of severed mineral rights mining companies own partial mineral rights to nearly 160 hectares (400 acres) with an additional corporate ownership of 65 hectares (160 acres) The other severed mineral rights are owned by private individuals or estates

In general, any additional mining or reclamation of past mining abuses o the surface or subsurface can be completed by private agreements u ually dealing with individuals who presently own the land

Kansas Laws

Important laws that exist on the Kansas statute books that pertain to the problems of the open pits and open shafts are found in Chapter 19

Article 25, "Wells and Excavations allows for the protection of the general citizen by requiring the landowner to enclose fill or securely cover any abandoned wells pits mines, or other excavations that are not enclosed (Section 19-2504) Upon a citizen complaint in writing the owner has 20 days to properly protect the problem well or excavation (Section 19-2505)

Possible action for failure to comply with the request is discussed in Section 19-2505 that section provides for filing with the township trustee the complaint to the landowner The township trustee must make an investigation to determine if the well pit mine or excavation is dangerous If determined to be dangerous the trustee shall correct the problem by filling or covering and the cost for correction of the problem is assessed against the land by the county treasurer

Reimbursement of expenses for the problem correction costs are authorized in 19-2506 for the county commissioners to pay back the township trustee the expenses from the county s general fund

Sections 19-2504 2505 2506 became law in 1895 with modification in 1923

These laws exist in the Kansas statutes but their utilization is obviously very limited because of the numerous problem openings that still exist in the area Appendix A contains these Kansas statutes

Federal Laws

Federal laws that would apply to the problems associated with post-mining activities of the Tri-State are very limited Of direct interest are the hazardous problems associated with abandoned shafts, tunnels and entryway and surface impacts of underground and surface mines that are covered in portions of the Surface Mining Control and Reclamation Act of 1977 (PL95-87)

This law allows for abandoned mine reclamation through the establishment of a trust fund called the Abandoned Mine Reclamation Fund This fund is generated from fees paid in by surface and underground coal mines and is administered by the U S Secretary of the Interior The intent of the fund is for reclamation and restoration of land and water resources adversely affected by past coal mining and the protection of public health safety general welfare and property from extreme danger due to the adverse effects of coal mining

Where voids, open and abandoned tunnels shafts and entryways resulting from any previous mining operation constitute a hazard to public health or safety the Governor of the state can request approval of funds for reclamation of the problem This can be done under this law even when the problem was the result of mining for non-coal minerals (Section 409)

It is unlikely that such a request will be made in Kansas for reclamation of the lead-zinc problem area when an excess of 40,000 surface acres of disturbed and unreclaimed land resulting from coal mining remains in the state In addition, there are nearly 60 000 acres of old underground coal mines in the state some with pollution and subsidence problems In Kansas the Mined-Land Conservation and Reclamation Board is the regulatory group designated by the Governor to administer the state portion of the Abandoned Mine Reclamation Fund The stated intent of the Mined-Land Board is to utilize the money available in the Kansas fund to help solve the problems generated by coal mining with other mining considered only after the coal problems are resolved With potential annual income to the state of 150 to 350 thousand dollars reclamation of lands other than those mined for coal are unlikely under this Act (PL95-87)

Several other federal laws have strong impact on present mining including the Federal Water Pollution Control Act Amendments of 1972 and 1977 that regulate mining waste water and the Clean Air Act and its

amendments that set significant air standards for several air contaminants many of which would apply to mining and mineral processing None of these laws affect the abandoned zinc-lead mines of the Tri-State district

DESCRIPTION OF MINING AREAS

For the purposes of this study the Kansas Tri-State district is divided into the following seven areas Galena Badger-Peacock Crestline Lawton Waco Baxter Springs and Treece These mining areas are shown in Figure 1 adjacent to the town or mining camp after which they are named

Galena Area

The Galena area includes all the mining in T 34S , R 25E This area contains the oldest mining in the study area dating back to the 1870 s The character of the mining and mine hazards in Galena is unique to the study area This is due to the geologic occurrence of the lead and zinc ore and methods used to search for and extract it In Galena and surrounding areas the Mississippian cherty limestones which contained the ore occurred at the surface thus ore was mined from the grass roots down (7 p 108) The shallow nature of the deposits allowed small mining operations to prosper and from the beginning this portion of the Tri-State was known as a poor man s camp (6 p 68) The method of leasing and developing the deposits in the Galena vicinity is best described in the following portion of an article appearing in the Carterville Republican and Galena Republican newspaper of the time and quoted in Hay s (8 p 27) report on the Geology and Mineral Resources in Kansas

> In response to numerous inquiries from Eastern men who are not familiar with lead and zinc mining, leasing of mining lands, etc we here give the *modus operandi* pursued by most of the companies at work in this district An individual or company of men will lease a tract of land--40 80 or 160 acres--that they wish to mine for a term of 10, 15 or 20 years binding themselves to pay to the land-owner 5, 8 10 or 12 per cent , or any other per cent agreed upon of the gross product from said land as royalty The company then generally speaking plat the ground that they have leased that is they lay it off into lots 200 feet square which they sublease to miners at a royalty of 20 to 25 per cent of the gross product of zinc ore that is mined off of said lot by the miner and a royalty ranging from 25 to 55 per cent of the lead mined

The 61 meter (200 feet) square lots were mined by small crews often only two men, using hand tools and a simple hoisting device that was either man- or animal-powered Exploration was conducted by sinking a shaft usually 1 2 meter (4 feet) square and generally not more than 15 meters (50 feet) deep (6 p 41-42) Shafts were sunk until traces of ore were found then the miners continued their exploration efforts by drifting outward If a body of ore was found the miners began stoping to recover the ore (4 p 197-199) Pillars were left for support while the mine was being worked however if any ore was visible on their sides they were generally robbed (4 p 183) If drifts reached 91 meters (300 feet) in length or if ventilation became difficult addi-

tional shafts were sunk thus 3 or 4 mining lots often had 6 to 8 mine shafts (6 p 77-78)

If ore was not encountered when an exploratory shaft was sunk the miners moved to new ground and sunk another shaft This was the primary means of exploration until the churn drill became popular about 1900 (6 p 41) Drilling was easier less costly and able to reach deeper levels than shafting and was widely used in exploring the Kansas mining areas outside of Galena

The use of shafting as a means of exploration and the subdivision of leases into small subleased mining plots results in a high density of mine shafts in Galena when compared with outlying areas The shallow working, the habit of robbing pillars and the brecciated nature of the overburden resulted in a large number of mine cave-ins in Galena as well As a result Galena has an appearance and an attendant set of problems that differ from the remainder of the Kansas Tri-State

Badger-Peacock Area

The Badger-Peacock area is about 10 kilometers (6 miles) north of Galena near the Missouri state line in sections 13 23 and 24 in T 33S R 25E This area was developed in 1889 (2, p 403) in Mississippian rocks which crop out at the surface in the valley of the Spring River In 1913 deep drilling discovered ore at a depth of 91 meters (300 feet) 6 p 47) Mining occurs on both sides of the Spring River in this area with workings extending beneath the river as well Although once a mining camp Badger-Peacock is removed from any densely populated areas today

Crestline Area

The Crestline area is centered 4 kilometers (2 5 miles) east of the village of Crestline in sections 15 16, and 22 of T 33S , R 25E and is just west of Badger-Peacock In this area Cherokee shales provide a thin cover over the ore-bearing Mississippian rocks below

Lawton Area

The Lawton mining area is located just to the south of the village of Lawton in section 35 T 32S , R 25E with a small mine occurring in the next section to the south (section 2 T 33S R 25E) Cherokee rocks occur at the surface in this area This area was prospected in 1900 but it did not become prominent as a producing area until 1910 (9 p 9)

Waco Area

The town of Waco is in Missouri however the Waco mining area extends west across the state line into Kansas in sections 24 and 25 T 32S R 25E just to the northeast of the village of Lawton Cherokee rocks also occur at the surface in this area which became productive in 1917

Baxter Springs Area

This area contains all the mining north south and w st of Baxter Springs from the Spring River to the west about 6 4 kilometers (4 miles) This area occurs in T 34S and T 35S , R 24E and is the northeastern-most extension of the Picher field of the Tri-State distri t Although some of the mining is old much occurred in the 1930 s and 1940 s when the sheet ground southwest of Baxter Springs was developed The most recent mining in the Kansas Tri-State occurred in this area at the Swalley Mine 3 2 kilometers (2 miles) west of Baxter Springs The Cherokee rocks cover most of this area gradually increasing in thickness to the west

Treece Area

The Treece area includes all the mining from about 3 ' kilometers (2 miles) east of the city of Treece to the west This area is in the northwestern portion of the Picher field and surrounds the city of Treece on the east, north, and west The Miami trough a combination syncline and graben, trends northeasterly through this area down-dropping the ore-bearing Mississippian rocks as much as 91 meters (300 feet) in its center beneath a thick section of Cherokee rocks (10 p 74) As a result the deepest mines in the Tri-State district are found in this area Production in the Picher field began in Oklahoma and moved north reaching Kansas in 1917 (10 p 94) The years following World War I saw rapid expansion of the Picher field of Oklahoma and Kansas when it became the dominant producing area of the Tri-State district

The Baxter Springs and Treece areas in the Picher field, as well as the other mining areas lying outside of Galena, differ from it significantly in the manner in which the ore deposits were developed which in turn affects the appearance of these areas today and the type of hazards they contain Most of the area outside of Galena was originally privately-owned farmland with ownership patterns following public-land subdivisions that is, composed of square or rectangular portions of a mile-square section The most common unit of land ownership was the quarter section or 65 hectares (160 acres) The mineral rights to mine underlying ore were leased by the landowners who were paid a percentage royalty of the gross mineral sales from the tract The mining tracts that were leased generally paralleled the original land-ownership pattern with the most common unit being one-quarter mile square or 16 hectares (40 acres) These mining tracts were originally mined by numerous small mining companies who not only mined the tract but also milled their own ore in small mills also located on the mining tract This pattern continued until the 1930's when centralized milling became popular due to its greater efficiency and because miners in low-grade ores or small deposits could no longer afford to operate their own mills Centralized milling decreasing ore grades and rising mining costs in the 1930 s accelerated the emergence of large mining companies at the expense of the small operators (10 p 13 99)

The 16-hectare (40-acre) tracts mined in the Picher field and other areas outside of Galena though small are much larger than the 61-meter (200 feet) square plots mined in the Galena area Not only were the properties larger but the ore was generally found at deeper levels As a result mining outside of Galena was usually on a larger scale working larger deposits at greater depths with newer mining techniques and equipment The latter-day miners like their predecessors followed the ore and in many areas mined out huge rooms such as in the West Side Mine near Treece where one room reached 38 meters (125 feet) in height at a level 130 meters (428 feet) beneath the surface (6 p 95)

On the surface the most common feature of the Picher field and other areas outside of Galena are huge chat piles or, more commonly the remnant of huge chat piles that mark the locations of the abandoned mills Chat is a local term for the cherty waste rock resulting from the milling of Tri-State ore Orphaned tailings ponds are also a feature of the landscape outside of the Galena area Surface collapses are found here also however since the scale of the mining is larger in these areas the dimensions of the collapses are correspondingly larger The density of mine shafts is lower outside of Galena because of the larger mining tracts and because most of the areas were explored after drilling had replaced shafting as the primary means of searching for ore Fewer hazardous shafts likewise occur outside of Galena however the ones that are present both open and collapsed shafts are invariably larger in cross-section and deeper than their counte parts in Galena In addition these shafts, because they are more isolated and often overgrown with vegetation are more insidious

RESULTS

The findings of this investigation have been mapped on three plates for each of the three 7 1/2 minute quadrangles which are included in this report These three plates are designated Plate I A I-B I-C Plate II-A II-B II-C and Plate III-A III-B III-C A B and C refer to the Crestline Neutral and Baxter Springs quadrangles respectively Additional data have been gathered for most of the features mapped and appear in tabulations in the appendices The following is a discussion of the three accompanying sets of plates with emphasis on the mine-related hazards they portray Frequent references will also be made to Table 3 which tallies the number of shafts hazardous shafts open pits and adits in the different mining areas of the Kansas Tri-State For the purposes of this report the plates cover only the 7 1/2 minute U S Geological Survey quadrangles that are totally in Kansas namely Crestline, Neutral and Baxter Springs The narrow strips of Kansas falling on quadrangles that lie mostly in Missouri and Oklahoma are shown on the corresponding plates in the Missouri and Oklahoma reports, and features falling in these strips are tabulated in the reports of both bordering states

Plate I Underground Mines and Shafts

This plate is a compilation of all known underground workings and mine-shaft locations for the study area Known Kansas mine workings underlie approximately 900 hectares (2220 acres) Undermined area determinations for the various parts of the study area are listed in Table 4 As mentioned in the section entitled Information Sources and Study Methods, mine maps from a number of sources were used in the production of this map However mine maps are not available for some mining areas This is particularly true for Galena where mine maps were either not made or were lost over the years Some of the other old areas of mining such as Badger-Peacock have spotty information on the extent of mining Some old mines appear to have been sketched rather than accurately mapped since mine maps of different dates of the same mine sometimes show different outlines of underground mines With time the quality of mapping improved in the Tri-State and the best quality maps of Kansas mining are for those mines in the Picher field namely the Baxter Springs and Treece mining areas

Mines in the Picher field as well as mines elsewhere often operated on more than one level Maps for such mines even when prepared at small scales can become very complex due to the overlapping crenulated outlines of the various working levels The mine outlines shown on Plate I are therefore the outermost extent of all working regardless of the mining level Underground mining was conducted using room and pillar mining and many pillars and larger islands of unmined rock are shown on some detailed mine maps Most pillars are too small to show on Plate I In addition there is some doubt about their existence following the shut-down of the mines Only the larger unmined areas are shown on Plate I The transference of mine workings from detailed mine maps with scales as small as 1 120 to the maps in this report having a scale

of 1 24 000 necessitated some generalizations As a resul the extent of underground mining as shown on Plate I should be rega ded as approximate

The intense mining activity in the Galena vicinity ha resulted in a large number of mine features in a small area An attempt was made to show as much information as possible in the Galena area on Plate I-C however the scale of 1 24 000 negated showing it all In some cases mine shafts and other features are too closely spaced to portray with symbols These areas have been outlined on the plates and have annotations indicating the number of features contained in the outlined area To augment the plates in this report enlarged maps of the Galena area have been made to show certain mine features These maps were prepared for 7 sections 11 13 14, 15 22, 23 and 27 in T 34S R 25E at a scale of 1 12 000 and are included in Appendix B Enlarged maps of the Galena area showing only the known extent of the underground mining are presented in figures B-1 to B-7 Mines on these maps which appear incomplete actually reflect the incomplete coverage of this area with available mine maps and additional areas not shown as being mined may actually be undermined, but could not be found on any available maps

Mine-shaft locations in Plate I were compiled from two sources mine maps and the 1981 aerial photography As in the case of mine workings shaft locations are better portrayed on the mine maps prepared for the later mining areas namely Baxter Springs and Treece Mine shafts were mapped regardless of their purpose depth or present condition As can be seen in Plate I-C there are a large number of mine shafts mapped in Galena and the surrounding area Many of these shafts especially those in outlying areas are actually prospect shafts that were sunk in the early days of mining when shafting was the primary means of exploration For the purposes of this investigation which is primarily concerned with mapping hazards no distinction was made between prospect shafts and production shafts Without a complete knowledge of the extent of underground workings such distinction would be difficul to make Most of the shafts mapped in the Galena area and some of the other old mining areas were found using the 1981 aerial photography Many mine shafts in Galena are still open and these were easily detected Those that have been filled are also detectable because of small piles of debris surrounding the site of the shaft and because the filling material has compacted over the years creating a small depression at the site of the shaft

The 1981 photography was also used to corroborate the existance and location of many mine shafts shown on the various mine maps used in compiling Plate I Shaft locations in the Picher field and other areas outside of Galena were often found on both the mine maps and the aerial photography Their existence on the photography could be interpreted by a number of means In some cases as in Galena the shafts were still open or filled and slightly subsided in other cases the existence of a shaft could be determined by large boulder piles nearby composed of bull rock which was excavated in sinking the shaft Filled shaft sites could also be located by the presence of the concrete foundations

that once supported the hoisting apparatus in the shaft Other mine shafts which were more completely reclaimed could be found by the association of scars on the ground marking the former presence of waste piles In some instances mine shafts shown on mine maps could not be found on the aerial photography This usually was due to the shafts being completely covered over by large chat piles or being effectively reclaimed

As shown in Table 3 3 545 mine shafts have been mapped in the Kansas Tri-State This number should be considered approximate A large portion of these shafts occur in the Galena area

Plate II Open Shafts Pits and Subsidences

Plate II is essentially a compilation of all the mine hazards found in the Kansas Tri-State Included in these hazards are open mine shafts open pit mines and areas of mine collapse Nearly all of these features were found by study of the 1981 photography Older dates of photography were used to locate mine collapses and place time brackets on the date of their occurrence All these features were visited in the field where additional data were gathered which appears in the tabulations Photographs were taken of many of these features as well Hazardous mine shafts, adits and open-pit mines have been numbered within each square mile of the study area By referring to Table C-1 in Appendix C additional information can be found for each of these features under the appropriate township range section and assigned number Surface collapses are numbered separately in each section and are tabulated along with additional information in Table C-2 in Appendix C Mine hazards in the seven sections comprising the Galena area are mapped and numbered on 1 12 000 maps of each section which appear in Appendix B

As shown in Table 3, 589 hazardous open shafts were found in the study area A mine shaft was judged to be hazardous if it could cause injury or entrapment to a person especially an older person or a young child who falls into it Many mine shafts are filled or closed off at various depths The extent of potential injury to a person falling in generally increases with the depth of the shaft The depth at which a mine shaft was judged to become dangerous is about 3 meters (10 feet) Although a reasonably healthy adult may survive such a fall and be able to climb back out a small child or an elderly person may not be so fortunate Since many of these shafts are in isolated areas cries for help from their victims may go unanswered Many shafts contain water to various depths below the surface including some with water at or close to the surface If the water depth was more than 1 2 meters (4 feet) or enough to be over the head of a small child it was judged to be hazardous

Of the 589 hazardous shafts found 541 are collapsed hafts the remaining 43 are open but not collapsed (Table 3) Each type of shaft is shown with the same open mine shaft symbol unless it is collapsed to such an extent as to be shown enclosing the shaft symbol on the map Most shafts were originally cribbed with timbers or boards and shafts in the later mines often had concrete collars at their tops Over the years weather and decay have taken their toll on the shaft cribbing and

TABLE 3 - Summary of hazards in the Kansas Tri-State mining areas

Mining Area	Adits	Open Pits	Surface Collapses	Uncollapsed Open Shafts	Collapsed Open Shafts	Total Hazard Shafts	Total Hazards	Total Shafts
Waco	0	0	24	3	10	13	37	42
Lawton	0	0	9	0	5	5	14	33
Badger-Peacock	0	1	7	5	20	25	33	141
Crestline	0	0	5	0	15	15	20	23
Treece	0	0	17	18	62	80	97	189
Baxter Springs	0	0	36	11	63	74	110	151
Galena	6	7	209	11	366	377	599	2966
Totals	6	8	307	48	541	589	910	3545

TABLE 4 - Mining-affected areas in the Kansas Tri-State

Mining Area	Approximate area covered by mine and mill waste		Approximate area of known underground mining	
	Hectares	(Acres)	Hectares	(Acres)
Waco	61	(150)	35	(85)
Lawton	8	(19)	5	(11)
Badger-Peacock	11	(27)	16	(41)
Crestline	18	(45)	14	(34)
Treece	302	(747)	515	(1273)
Baxter Springs	182	(449)	215	(530)
Galena	361	(891)	100	(246)
Totals	943	(2328)	900	(2220)

only in a few mine shafts is it still intact The lack of support around the mine opening has allowed caving and collapse of the near-surface rocks and soil The result is a circular shaft opening with a diameter that is usually several times the dimensions of the original shaft Generally the larger the shaft opening at the surface the more apparent is the potential hazard to a person approaching on foot The hazard of an uncollapsed open shaft is not realized until a person is standing at the very edge of the shaft opening

In addition to the large number of open shafts found 6 adits or horizontal mine entrances were also found (Table 3) These are found in section 27, T 34S , R 25E just southwest of Galena Eight open pits were also mapped in the Kansas Tri-State Open-pit mining was not widespread in the Tri-State district but did occur in areas where ore was present close to the surface Mapping open-pit mines from aerial photos is difficult because they often have the same appearance as mine collapses In fact, in at least two instances, open-pit mining was a direct result of mine cave-ins In Galena in 1902 and in the Badger-Peacock area in 1910 large cave-ins occurred However these mines were too rich to be abandoned and continued to be worked in open-pit fashion (6 p 90) Today most open-pit mines are filled with water and their sides have weathered and slumped over the years giving them the appearance of the many mine cave-ins in the study area

A total of 307 (Table 3) subsidences have been mapped in the study area These features range in size from small depressions a few meters in diameter to huge collapses hundreds of meters across Surface collapses are particularly numerous in the Galena area where mining was shallow and pillars were routinely robbed Some instances of subsidence have occurred in the past and have been reclaimed or corrected and are no longe apparent These are shown with small triangles on Plate II Surface collapses that are still present are shown to their full extent where possible

The danger of surface depressions resulting from mine collapse varies considerably with the nature of the collapse In some cases slight subsidence has created shallow depressions on the surface that present no immediate danger Collapses that are more catastrophic in nature can create large holes in the ground that are often rubble-filled and partially flooded The hazard in these cave-ins is determined by their depth and the steepness of their slopes Perhaps the most hazardous cave-ins are those that have occurred over large rooms which are then open to the surface as a result of the collapse Regardless of the present personal danger posed by surface collapses subsidence of any form represents a history of instability and areas containing subsidences should all be considered susceptible to further collapse and therefore potentially hazardous At least three cave-ins occurred during the course of this study and after the acquisition of aerial photography in February of 1981 One of these number 4 in section 34 T 34S R 24E is just northwest of Baxter Springs and the other two numbers 79 and 80 in section 14 T 34S R 25E occurred on Galena city property very close to the Municipal Government Complex These collapses occurred in old mining areas and it thus appears that the passage of time has failed to bring stability to the underground mines

The totals for the various types of hazards found in the study area and mapped on Plate II are tallied in Table 3 The total number of shafts is mapped in Plate I are also shown In addition ubtotals of the various mine hazards are shown for the seven mining areas of the Kansas Tri-State which are briefly described in the introduction The following is a discussion of the magnitude and extent of mine hazards found in each of these seven areas

Waco

The Waco mining area straddles the Missouri state line northeast of the village of Lawton A small part of this area appears on Plate II-A on the Crestline, Kansas 7 1/2 minute quadrangle however most of the mine features and hazards are on the Carl Junction Missouri-Kansas quadrangle and thus appear in the Missouri report This area contains 13 hazardous shafts, all but 2 of which are collapsed (Table) They range in depth from 3 meters (10 feet) to nearly 30 meters (100 feet) in the case of shaft number 4 A total of 24 surface collapses also occur here, however, these are generally le s than 12 meters (40 feet) deep and most have chat bottoms with some containing water Some surface collapses occur along the state line and are used by local residents as trash dumps The state line road in this area has been rerouted to avoid these large holes and passes along their edges in both states Mining depths in this area range from 26 meters (85 feet) down to 100 meters (330 feet)

Lawton

The Lawton area lies just south of the village of Lawton and contains 14 mine hazards (Table 3), most of which occur in section 35 T 32S R 25E Nine of these hazards are surface collapses with depths ranging from less than 3 meters (10 feet) in the smaller collapses to 14 meters (45 feet) in the largest collapse (No 1) This large collapse at times has water in the bottom and is used as a local trash dump The five hazardous shafts in this area generally are less than 6 meters (20 feet) deep however, one (No 5) is about 9 meters (30 feet) deep to water

Badger-Peacock

The Badger-Peacock area occurs along the Spring River near the Missouri state line on the Crestline quadrangle A total of 33 hazards were found in this area Nine surface collapses were found all occurring east of the Spring River in its valley These collapses as well as a number of collapsed shafts that also occur in the valley are filled with water The largest body of water in this area is actually an open-pit mine (No 1) that began operation in 1910 after a mine collapse (6 p 90) According to the landowner the water in this mine is very deep--in places over 18 meters (60 feet)--and at least one drowning death has occurred here West of the Spring River in sections 23 24 and 25 T 33S R 25E , all the hazards are shafts all but four of which are collapsed These shafts are all less than 8 meters (25 feet) deep and most have water at the bottom An isolated uncollapsed shaft

is also located in section 11 T 33S R 25E This shaft when visited contained water to within 5 meters (15 feet) of the surface Mining depths in this area ranged from 27 meters (90 feet) down to 54 meters (176 feet)

Crestline

The Crestline area is in sections 15 16, and 22 in T 33S R 25E just to the east of the village of Crestline and on the quadrangle of the same name In all 20 mine hazards were found in this area five of which are surface collapses located in section 15 One of these collapses is very small, but the other four are up to 18 meters (60 feet) deep and numbers 3 and 4 are quite hazardous Collapse number 5 has had a ramp dug to its bottom and is used to water cattle The 20 collapsed shafts in the Crestline area are generally shallow (less than 6 meters (20 feet) or are filled with water to near the surface Two collapsed shafts numbers 7 and 8 in section 15 are very hazardous--measuring about 24 meters (80 feet) to water Shaft number 8 is near an east-west county road and as seen in Figure 3, is in a densely vegetated area Across the road in section 22 is another collapsed shaft (No 2) which is shown in Figure 4 This feature is about 18 meters (60 feet) deep and is used as a trash dump Its hazard is increased by its proximity to the road Crestline area mining depths range from 21 meters (70 feet) down to 64 meters (210 feet)

Treece

The Treece area begins about 4 kilometers (2 5 miles) east of the town of Treece and extends on west It is covered by the Neutral quadrangle in Plate II-B however a small strip near the state line is on the Miami northwest, Oklahoma-Kansas and the Picher Oklahoma-Kansas quadrangles and is covered by the Oklahoma report A total of 97 mine hazards were found in this area and most (79) are shafts (Table 3) Although there are only 17 surface collapses in this fairly large area of intense mining some of these are quite large The largest collapse in the Treece area occurs along the course of Tar Creek (No 1) in section 31 T 35S R 23E This collapse is 70 meters (230 feet) by 130 meters (430 feet) and is about 18 meters (60 feet) deep Figure 5 is a view taken from inside the collapse looking at the north wall where a steady flow of water falls over exposed Cherokee shales Deeper parts of the collapse are filled with water

Figure 6 is another large collapse which is number 2 in section 11 T 35S R 23E This collapse is about 55 meters (180 feet) in diameter and is filled with water to within 12 meters (40 feet) of the surface Its total depth is unknown, but mine workings are about 90 meters (300 feet) deep Another large collapse is number 1 in section 7 T 35S R 24E This oblong-shaped collapse is 46 meters (150 feet) by 90 meters (300 feet) and 18 meters (60 feet) deep It occurs within 90 meters (300 feet) of U S highway 69 and is over mine workings which are 90 meters (00 feet) deep Small shallow subsidences occur just to the southeast of this large collapse that may indicate its direction of growth

FIGURE 3 - Collapsed shaft in No 8 in sec 15, T 33S R 25E east of Crestline Kansas

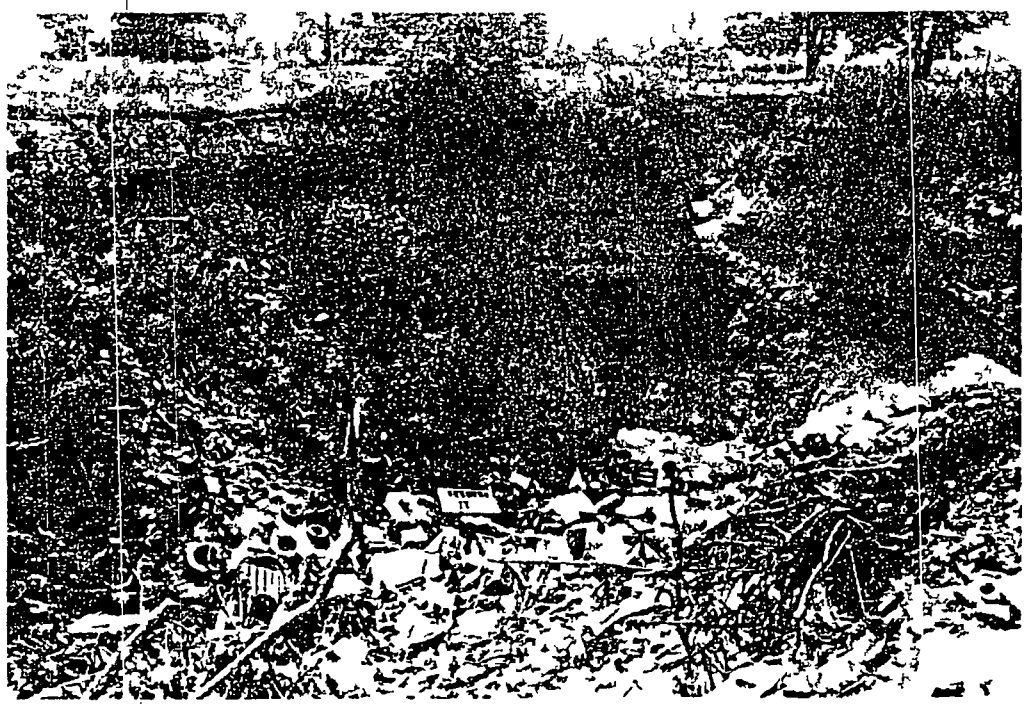

FIGURE 4 - Collapsed shaft No 2 in sec 22, T 33S R 25E east of Crestline Kansas

FIGURE 5 - View from inside surface collapse No 1 along Tar Creek in sec 2, T 35S R 23E northwest of Treece Kansas

FIGURE 6 - Surface collapse 2 in sec 11 T 35S R 23E northwest of Treece Kansas

The remainder of the 97 hazards in the Treece area are the 80 hazardous shafts which were found (Table 3) These shafts are a large percentage (42 percent) of the total number of shafts known to exist in the area (189 shafts) The depth of these shafts probably accounts for a large percentage of them being hazardous Sixty-two of the hazardous shafts are collapsed Some of these appear to have been filled at one time but further collapse and settlement of the fill has made them hazardous again These shafts are generally less than 9 meters (30 feet) deep and are thimble-shaped A large number of shafts are collapsed and appear to never have been filled These are often quite deep - usually having water in the bottom Depths have been estimated as high as 60 meters (200 feet) in some cases These collapsed shafts are usually funnel-shaped at the top with diameters often in the 6 meter (20 foot) to 12 meter (40 foot) range The diameters shrink with depth and the funnel-shaped walls of the collapse are very steep being composed of Cherokee shales Recent cave-ins found in the field indicate that many of these collapsed shafts are still growing outward

Figure 7 is a view of a typical deep collapsed shaft in this part of the study area This shaft is number 8 in section 12 T 35S R 23E It is about 9 meters (30 feet) in diameter at the top and is approximately 15 meters (50 feet) deep Like the other collapsed shafts in this area, this shaft is surrounded by brush and trees that conceal its potential hazard until it is closely approached

The remaining 18 hazardous shafts are open and uncollapsed and reach depths up to 60 meters (200 feet) These shafts are usually rectangular in cross-section with wood cribbing and often have concrete collars Figure 8 is shaft number 6 in section 2 T 35S R 23E on Plate II B This shaft is 1 5 meters (5 feet) by 2 1 meters (7 feet) and has wood cribbing up to the surface This shaft is surrounded by a small welded wire fence however, many shafts and surface collapses lack any protective barriers However no trespassing signs are a common feature along the section roads passing through these mining areas

Mine depths in the Treece area range from 52 meters (170 feet) down to 146 meters (480 feet) the deepest in the entire district Many mines are 90 meters (300 feet) or more in depth

Baxter Springs

The Baxter Springs mining area begins at the Spring River and extends about 6 4 kilometers (4 miles) west This area is plit between the Neutral Kansas and Baxter Springs Kansas quadrangle of Plates II-B and II-C with a small strip along the south that is on the Picher Oklahoma-Kansas and Peoria Oklahoma-Kansas quadrangles and is covered in the Oklahoma report A total of 110 mine hazards were found in this area 36 of which are surface collapses (Table 3) Included in this are a number of small shallow subsidences as well as some major cave-ins including what is probably the largest collapse in the entire Tri-State district

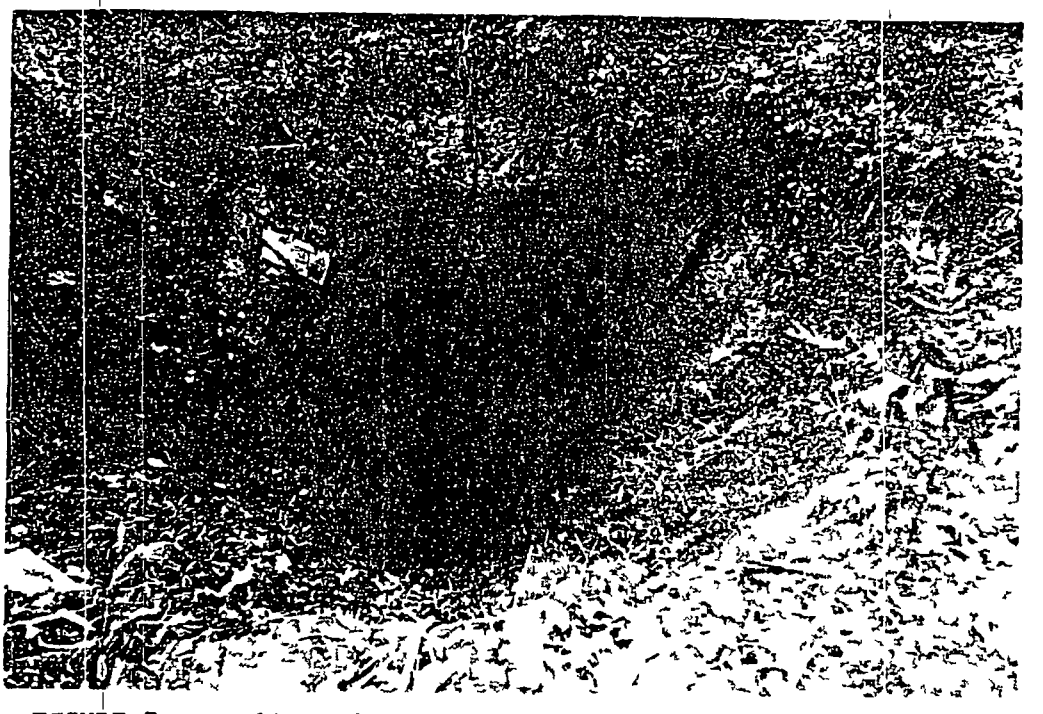

FIGURE 7 - Collapsed shaft No 8 in sec 12 T 35S R 23E north of Treece Kansas

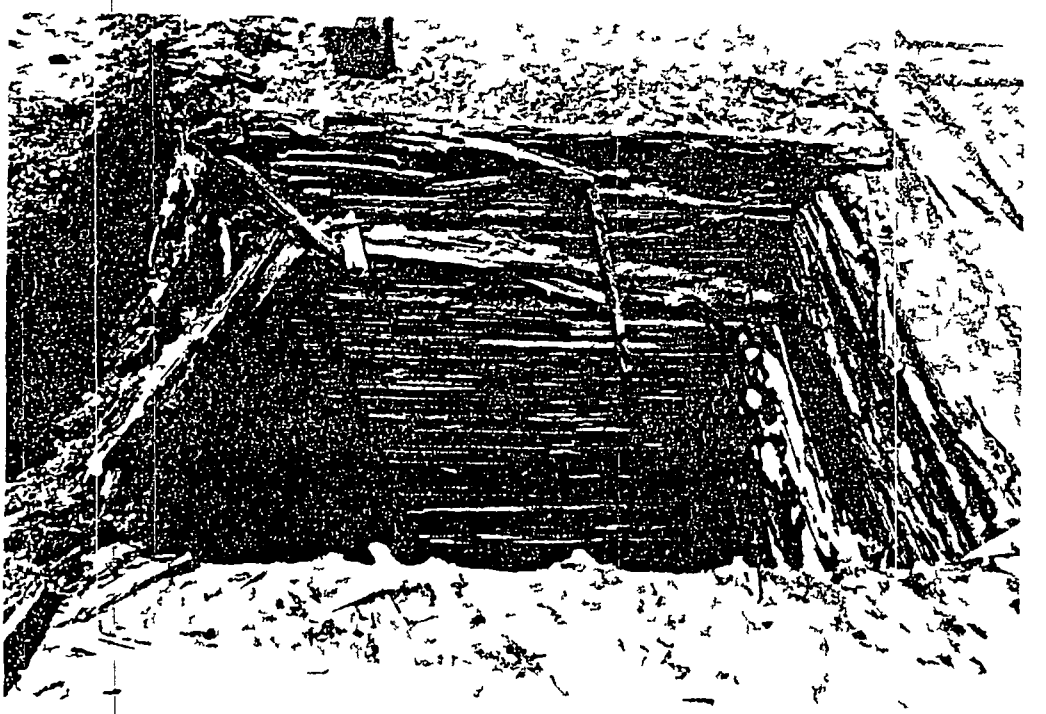

FIGURE 8 - Open uncollapsed shaft No 6 in sec 2 T 35S R 23E north of Treece, Kansas

This large collapse is number 10 in section 10 T 35S R 24E and part of it is shown in Figure 9 The feature measures 140 meters (450 feet) by 200 meters (650 feet) and about 30 meters (100 feet) deep Water of variable depth usually covers the bottom The irregular contact between Pennsylvanian shales of the Cherokee Group above and Mississippian limestones below can be seen about halfway up the far side of the collapse in Figure 9 The mining in this area was at a depth of 85 meters (280 feet) and was in the sheet ground-type ore deposits (10 p 100) Two more large collapses exist just to the north (No 9) and northwest (No 1) of collapse number 10 These two collapses are smaller in area, but are about the same depth as the larger collapse

Two large collapses are also found just to the west of Baxter Springs in section 11, T 35S R 24E Collapse number 1 is 40 meters (130 feet) by 107 meters (350 feet) in surface extent and about 24 meters (80 feet) deep Just to the south is another large collapse number 2 This collapse is 60 meters (200 feet) by 76 meters (250 feet) and is partially filled with water

Another large collapse, number 3 in section 2 T 35S R 24E has been used as a sanitary landfill by the city of Baxter Springs and was nearly full when visited in the field

A total of 151 shafts were found in the Baxter Springs area (Table 3) Of these, nearly half 74, were judged to be hazardous All but 11 of these were collapsed Of the 11 uncollapsed shafts in the Baxter Springs area, perhaps the most hazardous is shaft number 3 in section 35, T 34S, R 24E which is pictured in Figure 10 This shaft measures 2 meters (6 feet) by 2 meters (6 feet) in cross-section and is about 18 meters (60 feet) to water however, it is concealed in tree and has no protective barrier This shaft was found on the February, 1981 aerial photography but would have been impossible to detect on photography acquired during the spring or summer when the overhanging vegetation would have been leafed out

A total of 63 collapsed shafts were found in the Baxter Springs area and judged to be hazardous As in the Treece area some of these hazardous shafts are very deep with depths estimated as high as 60 meters (200 feet) in the case of shafts 10 and 11 in section 10 T 35S R 24E Since Cherokee silts and shales are the surface rock in the Baxter Springs area, collapsed shafts have the same funnel shape as those in the Treece area Shaft number 10 is shown in Figure 11 The top of this shaft is expanding and is gradually taking in the boulder pile in the background Figure 12 shows shaft number 3 in section 10 T 35S R 24E This shaft is about 6 meters (20 feet) across at the top and 46 meters (150 feet) to water The original shape of the shaft is suggested by the rectangular cross-section at depth

Mine workings in the Baxter Springs area range in depth from 30 meters (100 feet) down to 104 meters (340 feet) with many mines in the 60 meter (200 foot) to 90 meter (300 foot) range

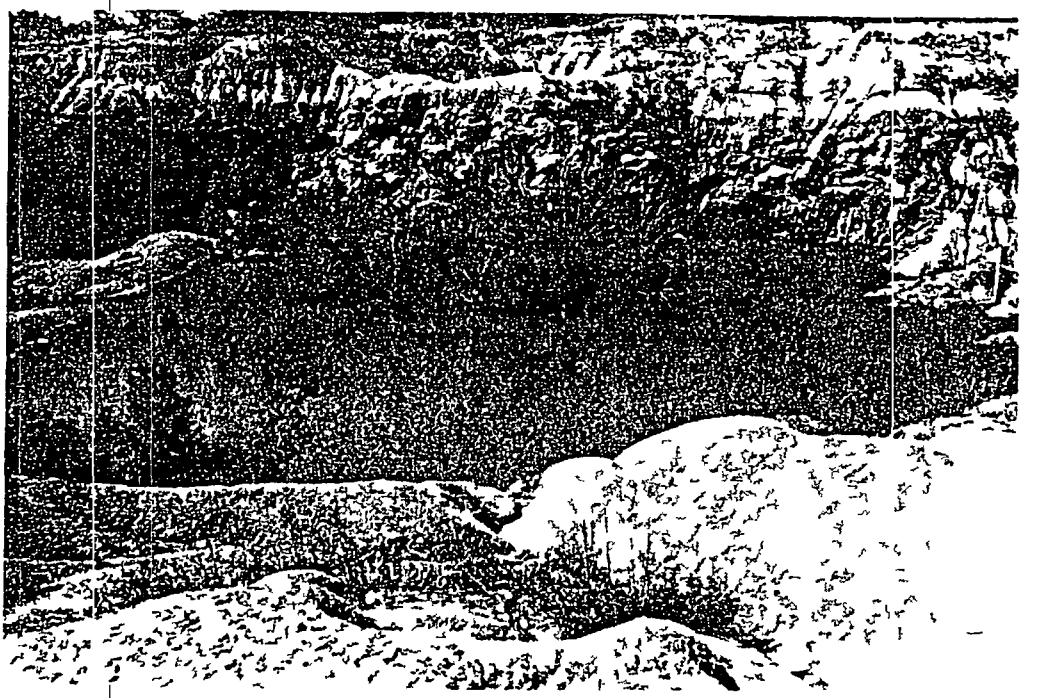

FIGURE 9 - Surface collapse No 10 in sec 10 T 35S R 24E southwest of Baxter Springs Kansas Collapse No 9 is in the background

FIGURE 10 - Open uncollapsed shaft No 3 in sec 35 T 34S R 24E northwest of Baxter Springs Kansas

FICURE 11 - Collapsing shaft No 10 in sec 10 T 35S R 24E southwest of Baxter Springs Kansas Note person in upper left-hand corner

FIGURE 12 - Collapsed shaft No 3 in sec 10 T 35S R 24E southwest of Baxter Springs Kansas

Galena

The Galena mining area occupies roughly the eastern half of T 35S R 25E Most of this area is on the Baxter Springs quadrangle of Plate II-C A small strip on the Missouri state line falls on the Joplin West Missouri-Kansas quadrangle and is included in the Missouri report A total of 599 mine hazards were found in the Galena area (Table 3) This represents nearly two-thirds of all the mine hazards found in the Kansas study area Most of the mine hazards in the Galena area are found in 7 sections 11 13 14 15 22 23 and 27 in T 34S R 25E The density of hazards in these sections is such that they cannot be shown and numbered on Plate II-C To adequately portray these hazards 1 12 000 maps of these 7 sections have been prepared and are shown in Figure B-8 through B-15 in Appendix B Even at this scale the hazardous shafts and surface collapses in section 14 had to be placed on separate maps figures B-10 and B-11 respectively

As mentioned in the description of the Galena mining area in the introduction a large number of mine hazards exist in this area because shafting was the primary means of exploration mining was restricted to 61 meter (200 foot) square lots each one containing a shaft the deposits were close to the surface, and ore-bearing pillars were routinely robbed The end result, a hundred years after the heyday of mining in Galena is 6 open adits 7 open pits 209 surface collapses and 377 hazardous shafts many of these within the Galena city limits

Much of the Galena mining is concentrated in a broad arc beginning near the Missouri state line east of Galena in sec 13 T 34S R 25E and extending northwest to the Short Creek bottoms near the Main Street bridge in section 14 then sweeping south and southwest through sections 22 23 and 27 and ending at the valley of Shoal Creek

One particularly bad spot in Galena is in the southwest quarter of section 13 and the southeast quarter of section 14 Once the site of the Southside Mine this area is today called Hell's Half Acre by many local residents Figure 13 is a wide-angle view of part of this area taken from atop a chat pile adjacent to Fourth Street and looking north The area is a moonscape of rubble piles collapsed mines and open mine shafts that typifies the present condition of most Galena mining areas One of the largest of the 209 surface collapses in the Galena area is shown in Figure 14 This view includes part of collapse numbers 68 and 71 in Figure B-11 of the Appendix These two collapses together are about 180 meters (600 feet) long and 18 meters (60 feet) deep Resistant masses of Mississippian cherty limestones are exposed in the walls of the collapse in Figure 14 These are buried beneath a mantle of cherty rubble that varies in thickness and readily weathers to form talus slopes on the sides of this and other collapses When the talus is not present horizontal drifts are sometimes exposed in the walls of these large collapses

In some cases as in Figure 15 (surface collapse number 75 section 14 Figure B-14) cave-ins have occurred where either an underground room was close to the surface or the spalling of the roof rock has brought

FIGURE 13 - Overview of Southside Mine area in Galena Kansas southeast sec 14 and southwest sec 13 T 34S R 25E

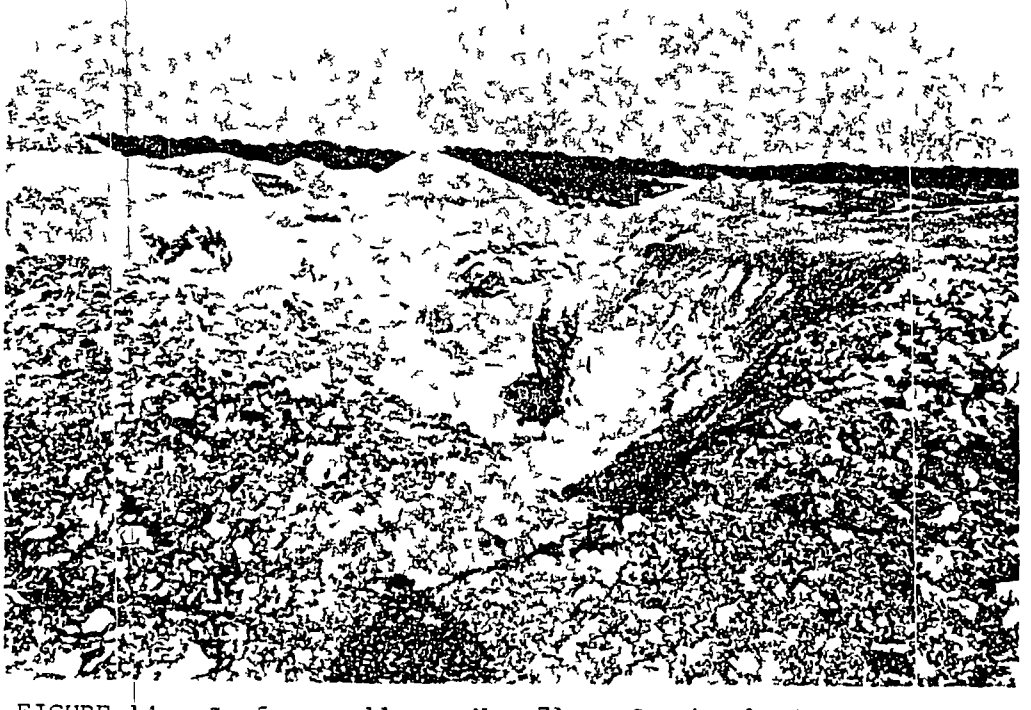

FIGURE 14 - Surface collapse No 71 in Southside Mine area sec 14 T 34S R 25E Galena, Kansas

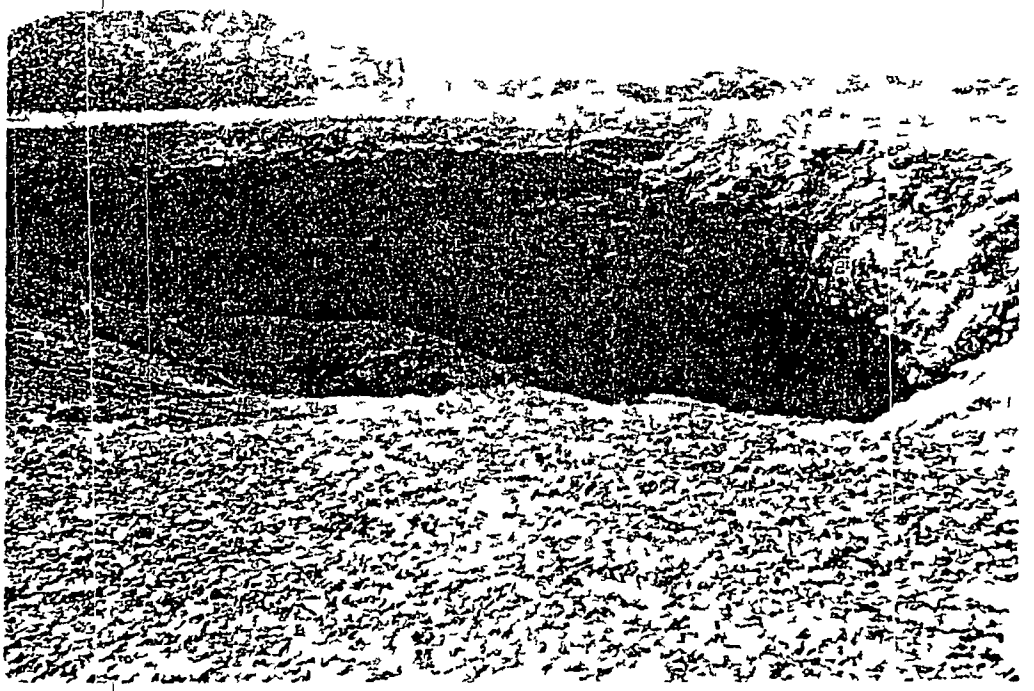

FIGURE 15 - Surface collapse No 75 and mine opening in sec 14 T 34S R 25E Galena Kansas

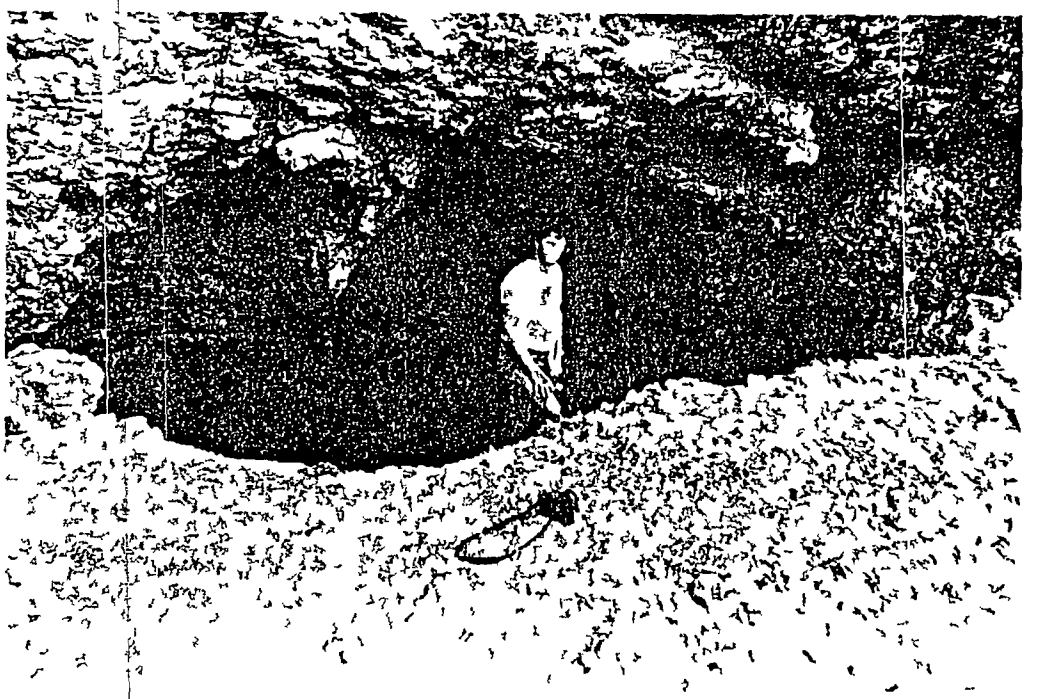

FIGURE 16 - Entrance to underground mine in surface collapse No 1 in sec 13, T 34S , R 25E , Galena, Kansas

the room close to the surface In either case part of the underground working are exposed to the surface Two such cave-ins were entered in the Southside Mine area in the company of Ralph Cure a life-long Galena resident who is familiar with its many mine hazards One mine was entered through surface collapse number 1 in section 13 (Figure B-9) This mine opening which is shown in Figure 16 leads downward and then eastward While underground the penetrations of mine shafts 10 11 and 12 could be seen through the ceiling Another mine wa entered through surface collapse number 37 in section 14 (Figure B-11) This mine claimed the life of a boyhood friend of Mr Cure's about 20 years ago At that time the mine according to Mr Cure, was deeper having since worked its way to the surface through a succession o roof falls When this mine was entered in the late summer of 1981 mine shafts numbers 108 109, and 110 (Figure B-10) could be seen penetrating what appeared from below to be a very thin roof At this time Mr Cure expressed surprise at how much higher the floor of this mine was in comparison to his last visit It appeared that a large part of the ceiling had fallen in fairly recently The mine was vacated at this point and no other mines were entered If deterioration and spalling of room ceilings is occurring in this mine room similar conditions are probably occurring in other mine rooms as well Thus despite the age of the Galena mine workings they have probably not reached stability and further mine cave-ins are a possibility

Whereas most of the surface collapses in the Southside Mine area are dry and generally less than 18 meters (60 feet) deep, surface collapses in the Short Creek valley of sections 14 and 15 usually contain water However, three of the largest water bodies in this area are actually open-pit mines Open-pit mines are numbered along with the shafts on the maps in this report and in Table C-1 in the Appendix The three large pits in the Short Creek valley are numbers 7 and 12 in section 14 (Figure B-10) and number 17 in section 15 (Figure B-12) Open-pit number 7 (section 14) is shown in Figure 17 This pit is filled with greenish-blue water of unknown depth Crane (4 p 189-190) states that open-pit mining in the Short Creek valley began in 1901 as the result of a mine cave-in A study of multidate aerial photography however shows that much of the open-pit mining was conducted in the 1940's

Water-filled surface collapses are also found in the northeast quarter of section 23 (Figure B-14) The largest of these is number 12 which is 76 meters (250 feet) by 91 meters (300 feet) appears to be quite deep and is known locally as the Blue Hole because of the vivid color of the water that fills it Few of the other surface collapses in the Galena area contain water

Six adits were found in the Galena area all of them are located in section 27 Figure 18 shows an adit (number 79 Figure B-1c) located near a county road southwest of Galena Most adits are partially flooded and none were entered

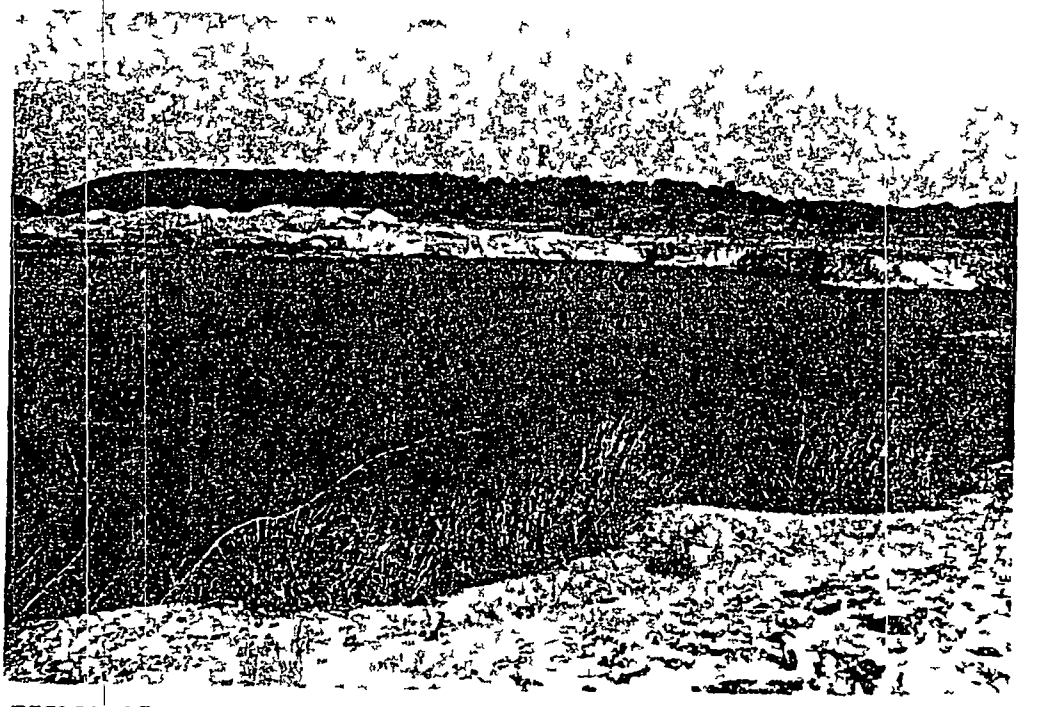

FIGURE 17 - Flooded open pit No 7 in Short Creek valley sec 14 T 34S R 25E Galena Kansas

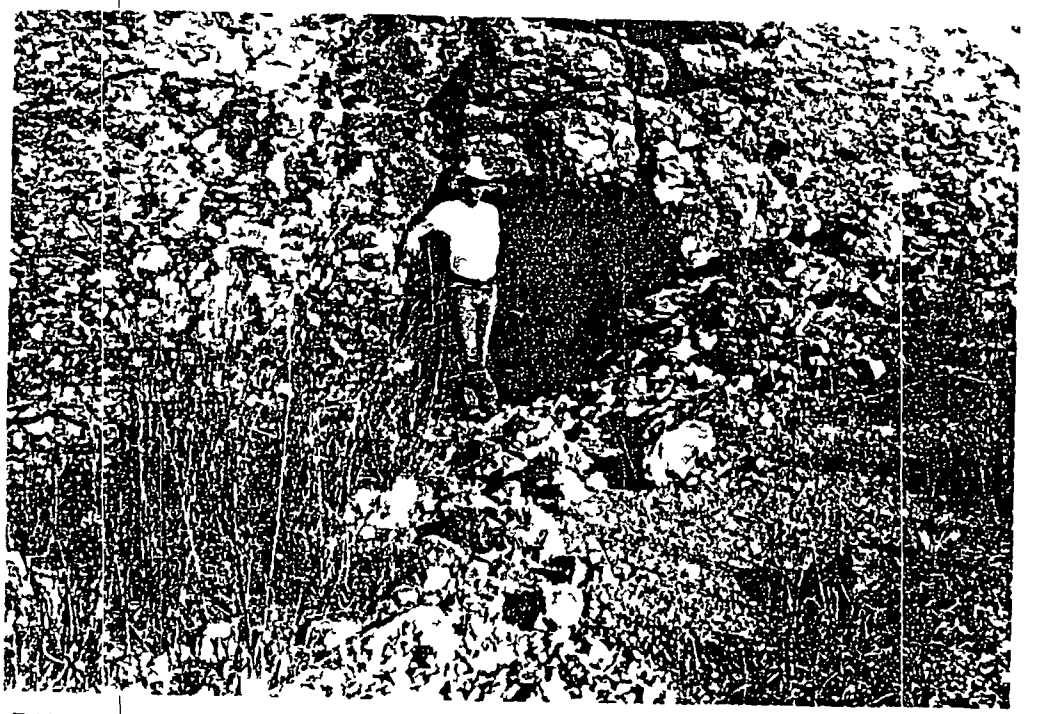

FIGURE 18 - Adit No 79 in sec 27 T 34S R 25E , southwest of Galena, Kansas

Of the 599 hazards in the Galena area 377 are hazardous shafts and out of these all but 11 are collapsed to some extent The paucity of uncollapsed shafts in this area can be explained by the age of the shafts and the rotting away of cribbing over the years and also by the widespread occurrence of unconsolidated cherty gravels that mantle most of the outcrops As a result, the 366 collapsed shafts in and around Galena have the characteristic appearance of inverted cones of loose cherty rubble at or near the angle of repose that narrow down to small square craggy shafts cut through cherty limestone bedrock An example of such a shaft from section 14 is shown in Figure 19 Another typical Galena collapsed shaft is shown in Figure 20 This shaft enters an underground room at a very shallow depth The loose rubbly slopes surrounding these shaft-openings make them very hazardous Since the material above the shaft is at or near the angle of repose a person walking along this slope may set off a small landslide of which he may inadvertantly become a part

According to mine maps, the working levels of most of the mines in the Galena area were shallow generally less than 33 meter (100 feet) deep However two mines south of Galena the Hartford Mine in the southeast quarter of section 26 T 34S R 25E and the Clermont Mine in the southeast quarter of section 34, T 34S , R 25E reached depths of 61 meters (185 feet) The Clermont Mine map also noted that ore was located at levels up to 30 meters (95 feet) deeper than those depicted Thus deeper mines may exist in the Galena area as claimed by some residents however it is difficult to document this with the mine maps that are available

The mine shafts found in the field are estimated to be as deep as 26 meter (80 feet) however, most are judged to be in the 10 meter (30 feet) to 16 meter (50 feet) depth range The shafts are about equally divided among those that are dry at the bottom and those which contain water The rough jagged nature of the rock comprising the walls of these shafts make them hazardous at any depth A fall into one of these shafts would seemingly result in as much injury from glancing off the walls as from final impact with the bottom

The hazardous nature of the many mine shafts and surface collapses in the Galena area is tempered somewhat by the lack of heavy vegetation in most mining areas The cherty rubble that blankets area of intense mining creates a substrate that is too sterile for most types of native vegetation As a result a person walking through these mining areas is usually afforded excellent visibility and can normally detect a mine hazard before it is too late However, one should not assume that all mine hazards are so well exposed Tall grasses grow in some areas where the mine waste is thin or absent and they can conceal open mine shafts Shaft 38 in section 13 (Figure B-9) is such a shaft Located in grass over 2 meters (6 feet) tall it is not apparent until one is standing at its very edge Similarly shafts 63 and 64 in section 14 (Figure B-10) are also hidden in tall grass Shaft 73 which is also in section 14 is an uncollapsed shaft in a grassy vacant lot It was difficult to find in the field despite the fact that it is located within 30 meters (90 feet) of Main Street in Galena

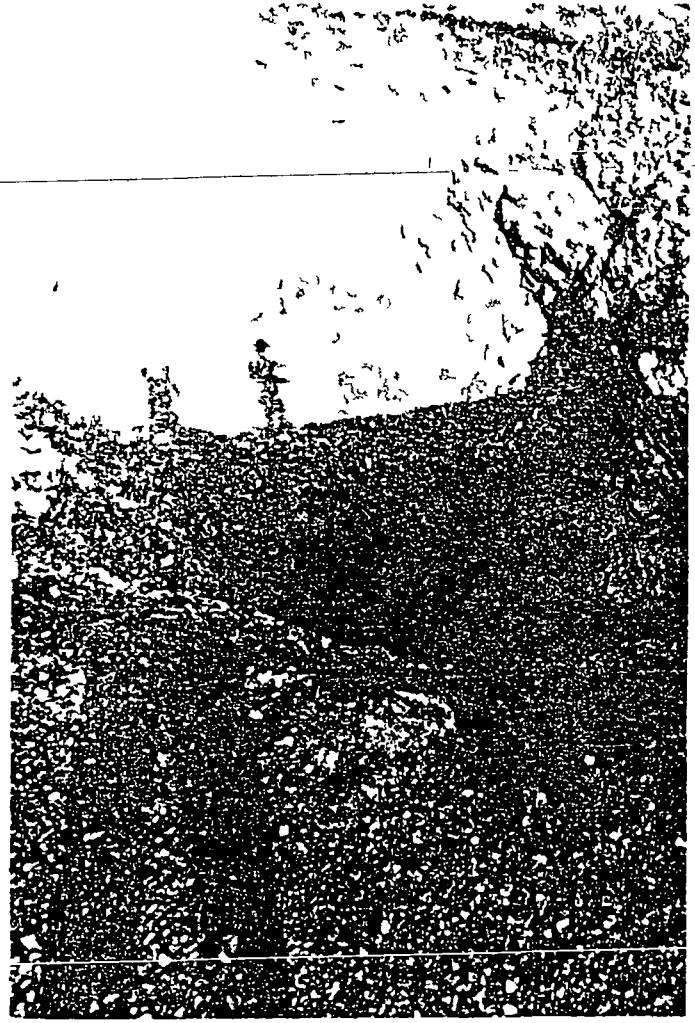

FIGURE 19 - Typical collapsed shaft in Galena Kansas area sec 14 T 34S R 25E

FIGURE 20 - Collapsed shaft and shallow mine room in Galena Kansas sec 14 T 34S R 25E

Plate III Mine and Mill Waste

Plate III shows waste sites and tailings ponds found in the study area Approximately 943 hectares (2328 acres) are covered by mine and mill waste in Kansas Waste-covered area determinations for the various parts of the study area are listed in Table 4 The larger chat piles and those tailings ponds which were judged to be potentially hazardous are numbered within each township and are tabulated in Table C-3 Chat Piles and Tailings Ponds in Appendix C This plate was prepared using the 1981 aerial photography acquired for this study Hundreds of waste piles were mapped These vary in size from the very small piles found near shallow shafts in the older mining areas around Galena to the remnants of huge chat piles left by centralized mills of the Treece and Baxter Springs areas The value of chat as an aggregate resource has resulted in quarrying and removal of much of the Tri-State chat over the years In fact, only a few of the large chat piles remain extant in the study area Plate III uses solid lines to show chat and waste piles existing in 1981 Chat-covered areas are depicted using a broken line These areas include the remnants of reclaimed chat piles and areas covered by mine waste Much of the Galena mining areas are covered by mine waste and over the years this material has been washed away filling some of the stream channels in the area

The chat piles of the Picher field in the Treece and Baxter Springs areas were originally huge conical hills of chat reaching 60 meters (180 feet) or more height The dashed lines in this area as shown in Plate III approximate the bases for these piles before their reclamation Many of these piles have been almost completely removed leaving only a thin mantle of chat In other instances small isolated piles of chat remain In still others the process of reclamation was still going on at the time of aerial photography These chat piles that were being actively quarried appear in Plate III having irregular scalloped outlines

Figure 21 is a view of part of the Treece area of mining This photo was taken from atop chat pile 16 in section 14 T 35S R 23E looking northwest It shows the truncated remnants of pile number 15 in the middle distance and part of what remains of chat pile 9 on the right Chat pile 6 which is nearly complete can be seen in the distance

Chat piles are generally not very hazardous As can be seen in the foreground of Figure 21 they can have slopes which approach the angle of repose However they can normally be climbed without fear of burial It is these steep slopes which make chat piles particularly attractive to owners of off-the-road vehicles who use areas of chat as playgrounds for their motorcycles and dune buggies Such use of chat piles should be done only with a good knowledge of the area and any hazards present

Chat piles can become hazardous in at least two ways One way occurs when the chat pile is being actively quarried Although the chat is generally unconsolidated at the surface after years of burial in

FIGURE 21 - Overview of chat pile remnants in sec 14 T 35S R 23E west of Treece Kansas

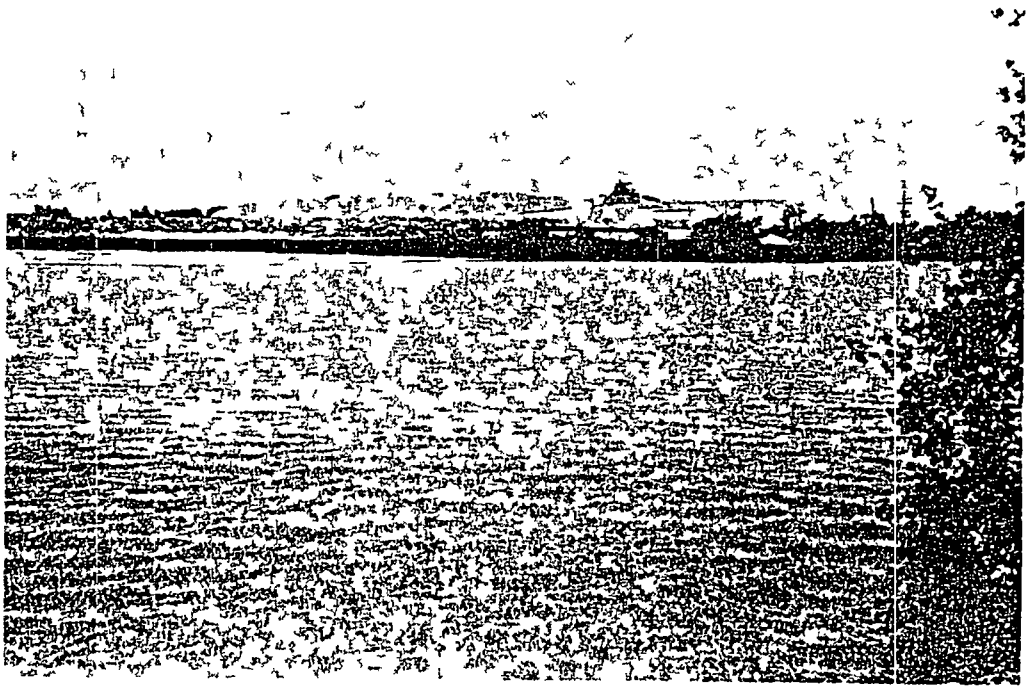

FIGURE 22 - Large tailings pond No 6 used in chat-reclaiming operation in sec 10 T 35S R 24E west of Baxter Springs Kansas

large piles the chat can become weakly cemented this cementation being caused by the interspersed limestone in the chat As a result when machinery begins removing chat from the pile the remaining chat is often capable of maintaining a near-vertical face Since the chat is only weakly cemented this steep face may pose a hazard to persons venturing near it both above and below Children digging into such a face run the risk of rapid burial Another way in which chat piles can become hazardous is by the collapse of mines or mine shafts beneath them The most dramatic such instance in the study area occurs in chat pile 3 in section 2 T 35S R 23E In the center of this pile is a collapsed shaft (No 7 Plate II-B same section) 13 meters (40 feet) in diameter but nearly 33 meters (100 feet) deep

Tailings ponds were a common feature of the Treece Baxter Springs and Waco mining areas Because of the subtleness of the topography in these areas tailings ponds were never very deep--most being less than 3 or 4 meters (9 to 12 feet) deep Today these ponds are in various states of preservation Most have had their embankments breached and no longer impound water These ponds are shown on Plate III by the use of a hachured line indicating the location of the embankment, the area behind this line remaining empty Other tailings ponds are of more significance and are potentially hazardous These are shown on Plate III with the same embankment symbol, but the ponds themselves are filled in with dashed lines and are assigned numbers which refer to information on the ponds in Table C-3 Chat Piles and Tailings Ponds in Appendix C

The potentially hazardous tailings ponds are of two types The first type is generally dry but lacks a cover of vegetation and is subject to wind erosion The fine-grained tailings in some of these ponds are slowly migrating with the prevailing winds An example is pond 8 in section 11 T 35S R 23E from which mill waste has been blown into 2 meter (6 foot) dunes to the north of the original pond In fact these dunes are burying shrubs and small trees in this area However the real hazard of these ponds is caused by very fine mill waste which does not form dunes but becomes airborne and is dispursed over large areas thus becoming an air pollutant and a possible health hazard

The second type of hazardous tailings ponds are those that still impound water however, the hazards associated with these ponds are not judged to be high The danger of catastrophic flooding resulting from the failure of a pond embankment does not exist in this study because of the small amount of vertical storage of the ponds and the low relief of the topography The potential hazard exists for those who use the ponds for swimming and other pursuits Although the ponds are not deep their bottoms are composed of fine-grained mill wastes that are saturated with water and behave much like quick-sand

The largest tailings ponds found in the study area that is the ones that contain the most water, are those that are still being used in chat reclaiming operations These ponds store water that is used to sort the chat into different sizes for different markets The largest

of these ponds is pond 6 section 10 T 35S R 24E which is shown in Figure 22 The remnants of chat pile 12 appear in the background along with the apparatus used for sorting chat

SUGGESTED METHODS FOR CLOSING MINE OPENINGS

Four general types of mine openings are present in the Kansas part of the Tri-State mining district many vertical square shafts numerous larger vertical rectangular production or hoist shafts a few horizontal adits and a number of large areas of roof caves-ins

Methods and materials are suggested to close or secure the openings in such a manner that they can be reopened if necessary It is recommended that shafts not be filled without plugs unless they are small dry and fill material is readily available nearby Chert tailings are a dwindling resource which should be utilized in the best possible manner The methods described are designed to be simple and to use a minimum of construction material (concrete reinforcing steel etc) and fill material

In the late 1950's, in connection with improvement of U S 66 highway one of the authors of this report then an engineering geologist with the State Department of Transportation, devised a plan to blast down the roof of a small section of a mine that extended under the highway just south of the present municipal building in Galena

A part of the roof had collapsed at the west end of the room and it was possible for the geologists to survey and map the location and volume of the room and estimate the roof thickness This was necessary to know for bid purposes

Under construction a small bulldozer pushed dumped fill into the room until clearance with the roof prevented further filling This was done to reduce the distance that the roof would fall and cushioning it to reduce seismic vibrations The roof was then drilled from the surface and shot down with a series of delays between the lines of holes to prevent vibration damage to adjacent buildings

Another section of the mine extends under U S 66 under Owl Creek near the west city limits It was decided not to attempt to blast it down because part of the room had an 80 foot floor-to-ceiling height It was feared that the hydraulic ram effect of the falling rock might collapse mine openings off the project right-of-way Instead the section of the pavement over the mine was heavily reinforced to act as a bridge if the roof did collapse from traffic vibration

In general there are few other places where blasting could be used without incurring possible liability and it is not recommended

On another highway improvement project immediately west of Baxter Springs, a 75 foot deep and 75 foot diameter cone-shaped collapse crater had formed over a vertical shaft extending into a large room at depth The volume of the surficial material which had collapsed into the hole was not sufficient to fill the shaft and the volume of the void was not known A sharply tapered pre-cast concrete pyramid was devised The base dimension of the pyramid was larger than the shaft The pyra-

mid was guided down the sloping sides of the crater and then lodged in the haft The crater was then filled with chat Little or no settlement has occurred in the approximately 20 years since filling As stated later this method is recommended for deeper cratered shafts

Vertical shafts are the most numerous and depending upon condition at or near the surface may be treated in two way If bedded rock is within a few feet of the surface the loose gravel or soil can be cleared away to allow a precast reinforced concrete slab to be placed on the bedrock surface the same method can be u ed for shafts with concrete collars in fair to good condition

Cratered shafts with timbered cribbing or no cribbing can be plugged with an inverted pyramid of concrete depending upon the shape of the opening at bedrock The base or top of the pyramid is designed to overlap the opening by about one foot on all sides

The nature and dimensions of most of the hazardous shafts below a depth of about 6 meters (20 feet) is difficult to determine by observation at the surface Since most of these shafts are collapsed at the top to some extent it is impossible to look directly down the shaft Shafts may either (1) dead end in solid bedrock, (2) enter rooms of various vertical and lateral extents, or (3) be bridged by rock falls or concrete foundations pushed into the shaft after cessation of mining In any of these three cases the shaft may be flooded with water to varying distances from the surface A survey of shafts at depth either by direct observation or a remote television system may be useful to determine the best method of shaft closure In case (1), backfilling would be recommended in case (2) a concrete plug would be advised and the shaft survey would determine the size and shape of the plug needed to close off the shaft at solid bedrock and in case (3) if the bridge is judged to be stable, the shaft may be backfilled if not plugging would be advised

Concrete plugs may either be cast in place over the shaft opening or precast and lowered into place The first method could be used in the Galena area Here solid bedrock is generally close o the surface Lightweight forms could be constructed and lowered into he shaft opening Because of the potential hazard of driving heavy equipment in this area, cement could be pumped some distance from a cement truck, which would remain on stable ground to the shaft opening Precast plugs could be used in the Picher field around Baxter Springs and Treece and other areas where solid bedrock lies some distance below the surface and the placement and filling of forms would be difficult A down-the-shaft survey would recommend the size of plug necessary and it could then be lowered in by crane The ground in these areas although collapsed in places is judged to be more stable than the ground in Galena and could support heavy equipment In either case a portable conveyor belt should be used to place backfill so that loaded trucks do not approach or dump directly into the hole

It is not necessary and probably would be dangerous to attempt to clear away loose material above bedrock because the tapered shape of

the plug will tend to guide it into the hole where it will wedge tighter as backfill material is applied Any minor settlement of backfill will act to increase the wedging action

Adits which are few in number will have to be treated individually depending on the size and shape of the horizontal opening A suggested method is to wedge concrete forms into the openings leaving a door in the center to allow access to the back or mine side of the form Holes should be drilled into the rock walls ceiling and floors of the opening and steel rebars grouted in to assure that the concrete is pinned to the sides of the opening After concrete is poured and cured and forms stripped a steel door frame and a door fabricated of closely-spaced welded steel strap should be bolted into the opening The door will allow access if needed and provide for ventilation and drainage An appropriate no-trespassing or warning sign should be attached to the door

Large collapse craters in urban areas or near road especially if filled with water should be fenced with six-foot high heavy-duty steel cyclone-type fencing with barbed-wire canted out on the top A gate should be installed for access Appropriate warning signs should be attached and replaced promptly if removed or vandalized The fences should be set back an appropriate distance from the edges of the hole to prevent its loss in case of future caving--distance to be judged by conditions of the walls and past observation

Cratered areas away from roads in rural areas can be enclosed with well constructed barbed-wire fences and locked gates No-trespassing and warning signs should be spaced every few hundred feet apart

An alternate suggestion for the area north of City Hall in Galena might be to fence around the cluster of shafts and collapse craters and provide wooden-fenced walkways similar to those built by the U S Park Service among the mud pits and geysers in Yellowstone Park Explanatory signs and pictures could be placed at intervals along the path The area could be locked at night or when unattended

An information center in conjunction with the walkway might be developed in City Hall which is closely adjacent If entry to the informational walkway was through City Hall some control to access would be possible

Displays stressing the historical importance of the first mines in Kansas and the development of the Short Creek District Galena and Empire City should attract passing tourists and visitor on nearby U S 66

It is probable that there still exist old photos pictures and maps of the exact area to the west of City Hall as well is representative photos and displays of other areas mills smelters equipment miners, and people of the area

Displays of actual mining equipment if available and explanations of its use in conjunction with displays of the district's rocks and minerals would be very informational

In addition to the historical displays panels might be made to explain the Bureau of Mines reclamation project its objective and sponsors Enlarged color photos and an automated slide show with explanatory sound tape could be inexpensively devised The effect of this would be to show the area and the project in a positive manner to the general public

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APPENDIX A

Kansas Statutes Pertaining to Abandoned Mine

Article 25 —WELLS AND EXCAVATIONS

Cross References to Related Sections

Experimental test and artesian wells see ch 42 art 5

19-2501 to 19-2503 [L 1913 ch 153 §§ 1 to 3 R S 1923 19 2501 to 19 2503 Repealed L 1963 ch 179 § 1 June 30]

19-2504 Enclosure filling or covering abandoned wells mines or excavations complaint notice That all unused and abandoned wells pits mines or other excavations situated upon land not enclosed upon complaint in writing being made by any citizen to the owner of the land or his agent whereon such well pit mine or other excavation is situated shall be enclosed or filled up or securely covered by such owner or agent within twenty days from the date of the service of said notice If the owner or agent of such land shall not reside in the county where said land lies then such notice shall be conspicuously posted upon said land for twenty days [L 1895 ch 360 § 1 May 27 R S 1923 19 2504]

Research and Practice Aids

Negligence⇨42
C J S Negligence § 78
Notice to landowner of abandoned wells etc Vernon s Kansas Forms § 1881

19-2505 Same enforcement, notice tax levy Upon the failure of the owner or his agent to comply with the provisions of section 1 [19 2504] of this act within the time mentioned in said section the party complaining may notify the township trustee of the township wherein such well pit mine or other excavation is situated by the filing with him of a copy of the notice served upon the owner of such land or his agent or posted as aforesaid with the date of service thereof endorsed thereon or if such notice was posted as aforesaid the date when such notice was posted and the fact that the residence of the landowner or his agent is unknown and thereupon the township trustee shall be required forthwith to make a personal investigation of said well pit mine or other excavation and if in his judgment the well pit mine or other excavation shall be dangerous he shall cause the same to be filled up or securely covered and any and all expense incurred therein shall be by him duly itemized verified and returned to the county clerk together with a description of the land on which such well pit mine or other excavation is situated who shall enter the same on the tax rolls of said county against the tract of land on which such well pit mine or excavation is situated and the same shall become and be a lien upon said premises and shall be collected by the county treasurer as other taxes and become a part of the general fund [L 1895 ch 360 § 2 May 27 R S 1923 19 2505]

Research and Practice Aids

Notice to county clerk of filling uncovered well or excavation Vernon s Kansas Forms § 1882

19 2506 Same payment of expense incurred by township trustee The board of county commissioners is hereby authorized to pay out of the general fund of the county such expense so as aforesaid incurred by said trustee upon the filing by him of an itemized and verified voucher therefor with the county clerk [L 1895 ch 360 § 3 May 27 R S 1923 19 2506]

APPENDIX B

Section Maps of the Galena Area Showing Underground Workings and Hazardous Mine Openings (Legend - see Plate II)

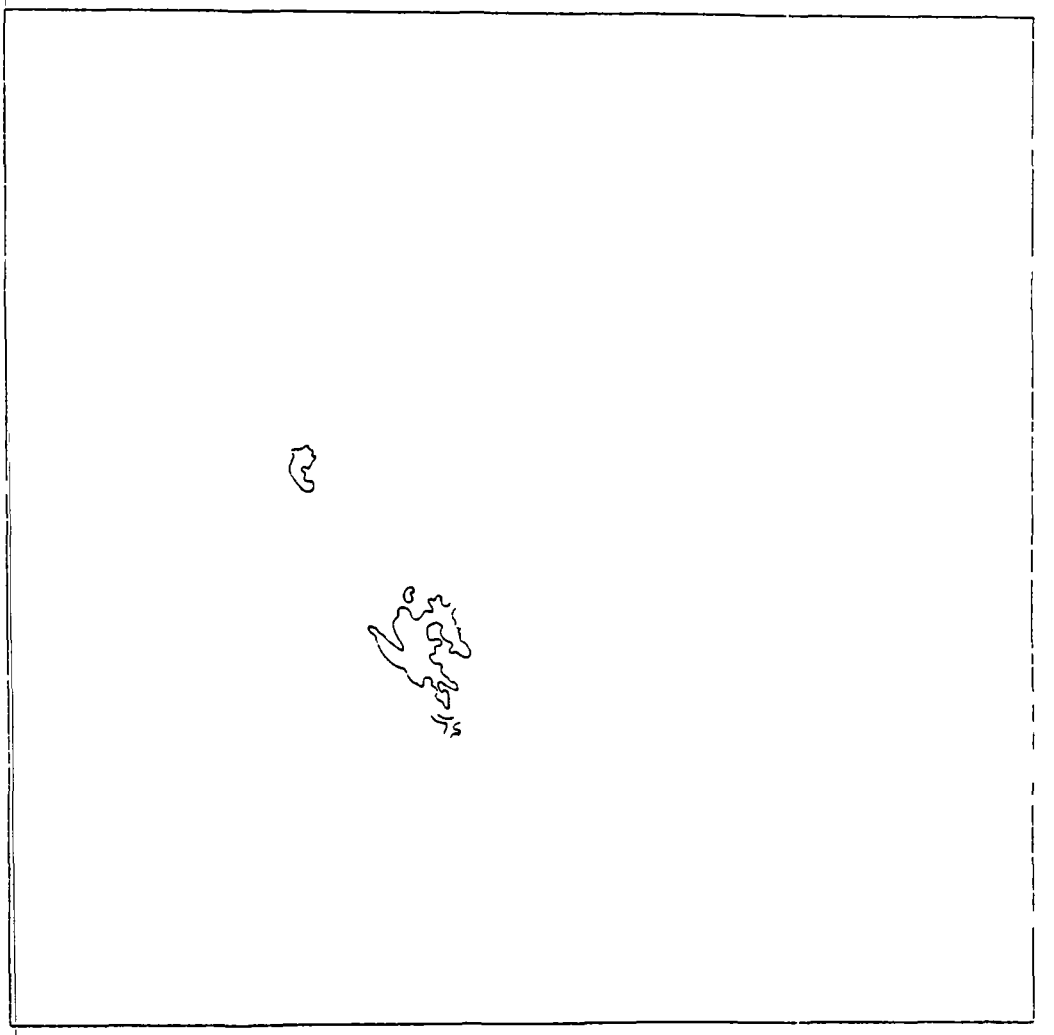

FIGURE B-1 - Known extent of underground workings in sec 11 T 34S R 25E (1 12,000)

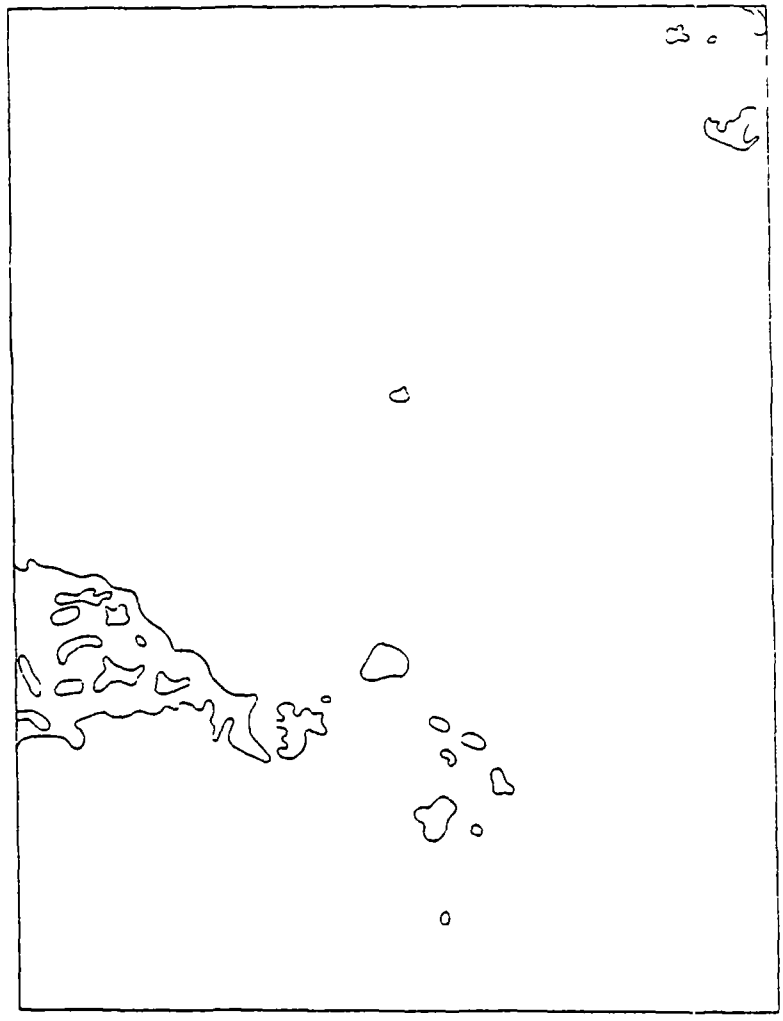

FIGURE B-2 - Known extent of underground working in sec 13, T 34S , R 25E (1 12,000)

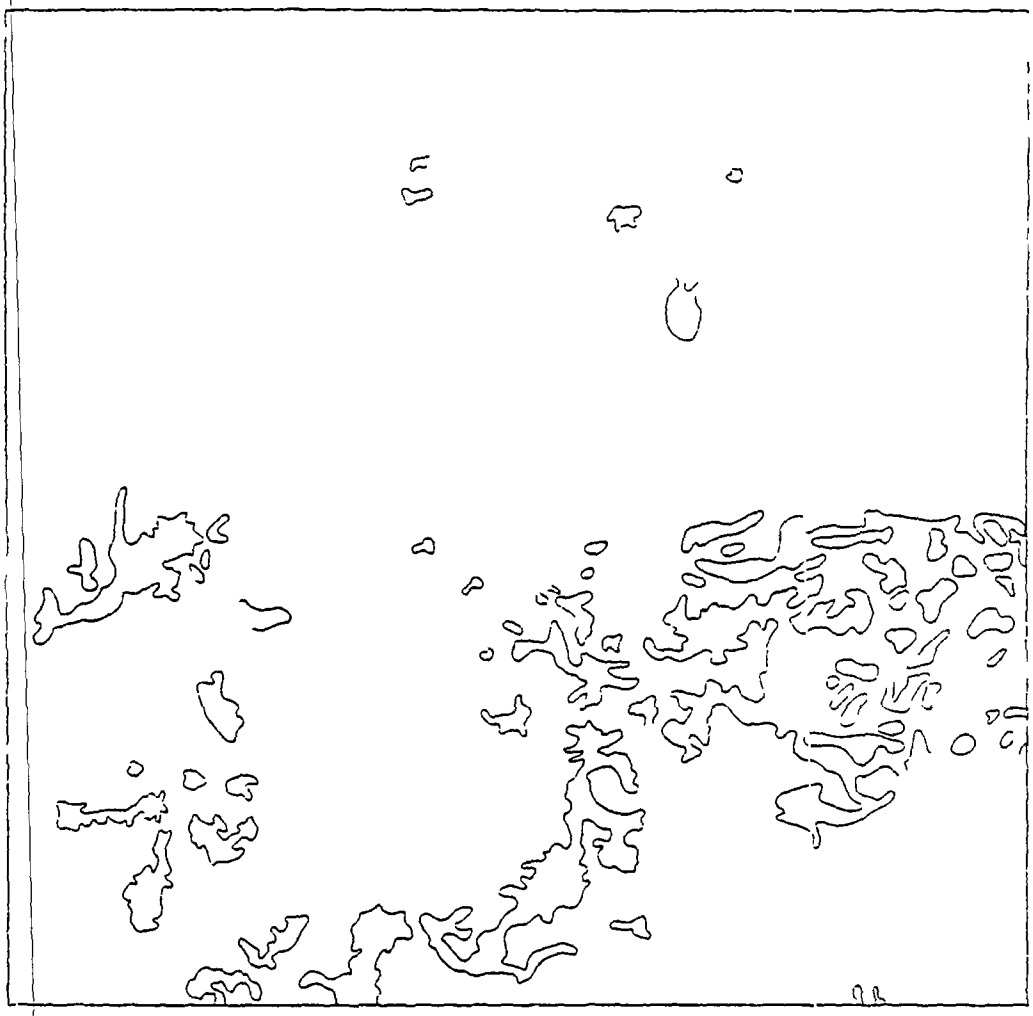

FIGURE B-3 - Known extent of underground workings in sec 14 T 34S R 25E (1 12 000)

FIGURE B-4 - Known extent of underground workings in sec 15 T 34S R 25E (1 12,000)

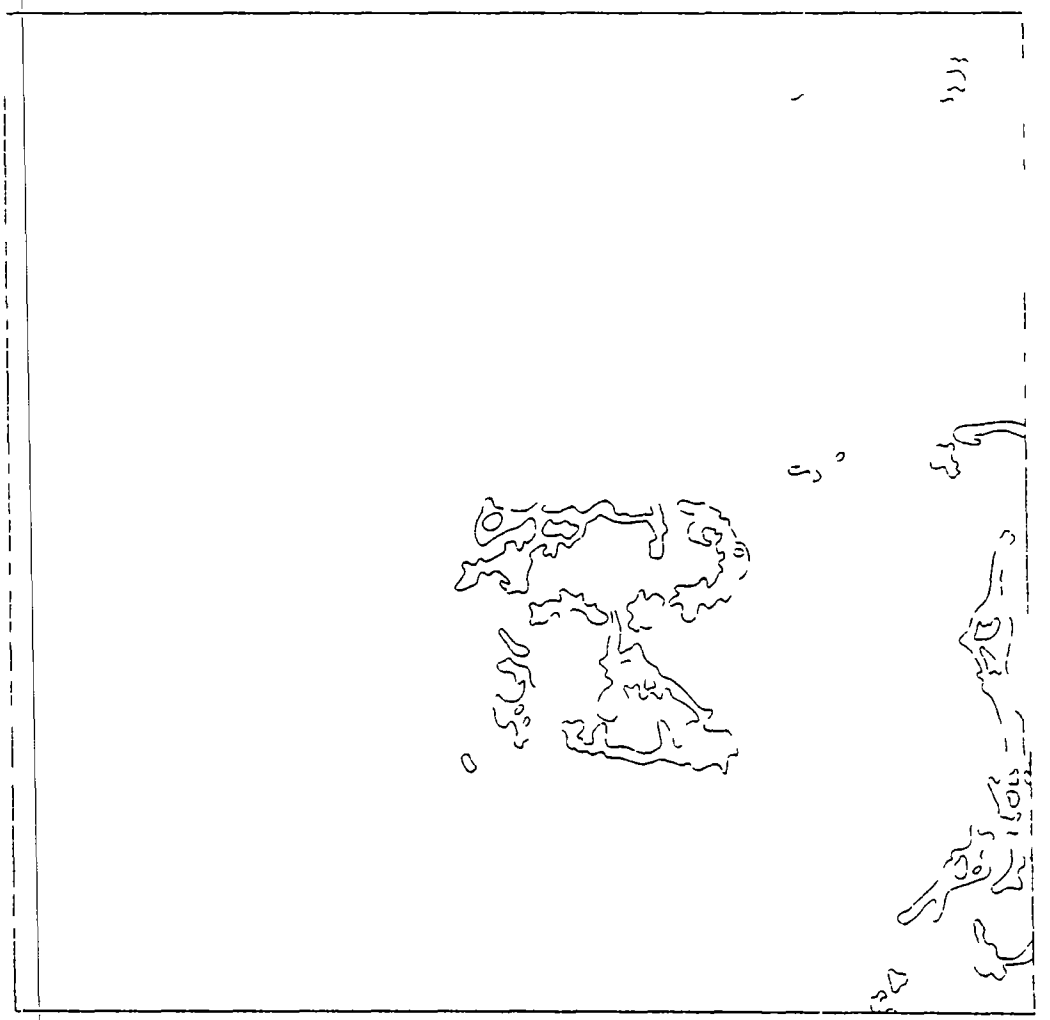

FIGURE B-5 - Known extent of underground workings in sec 22 T 34S R 25E (1 12,000)

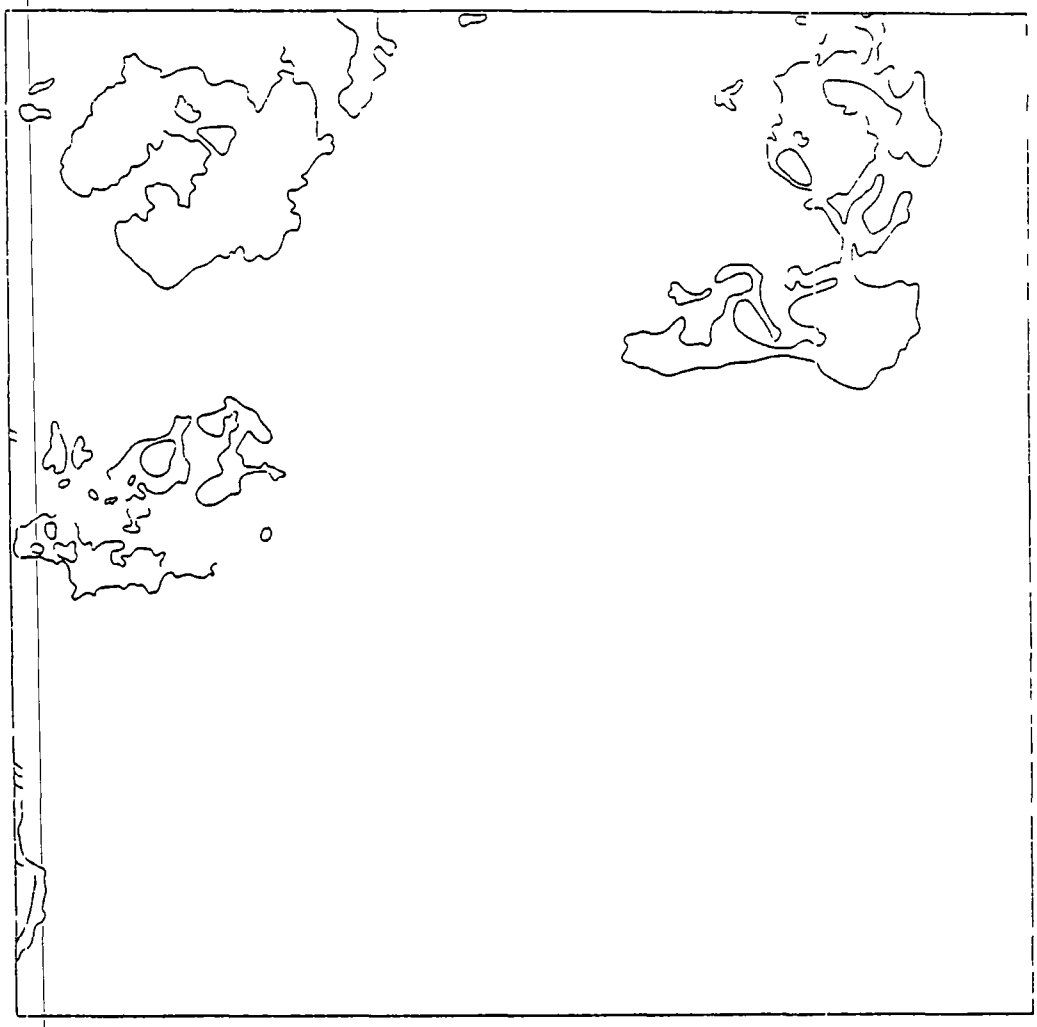

FIGURE B-6 - Known extent of underground workings in sec 23, T 34S R 25E (1 12 000)

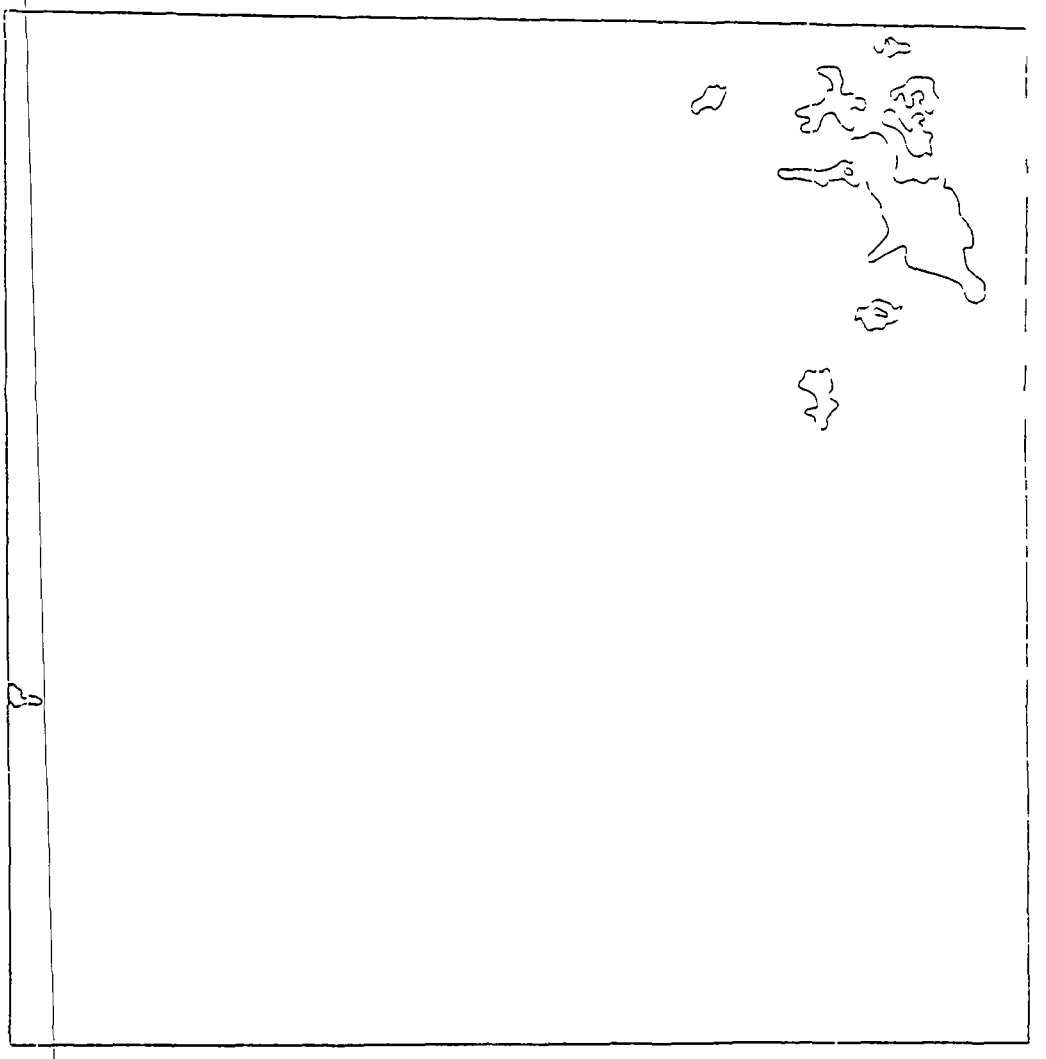

FIGURE B-7 - Known extent of underground workings in sec 27 T 34S , R 25E (1 12,000)

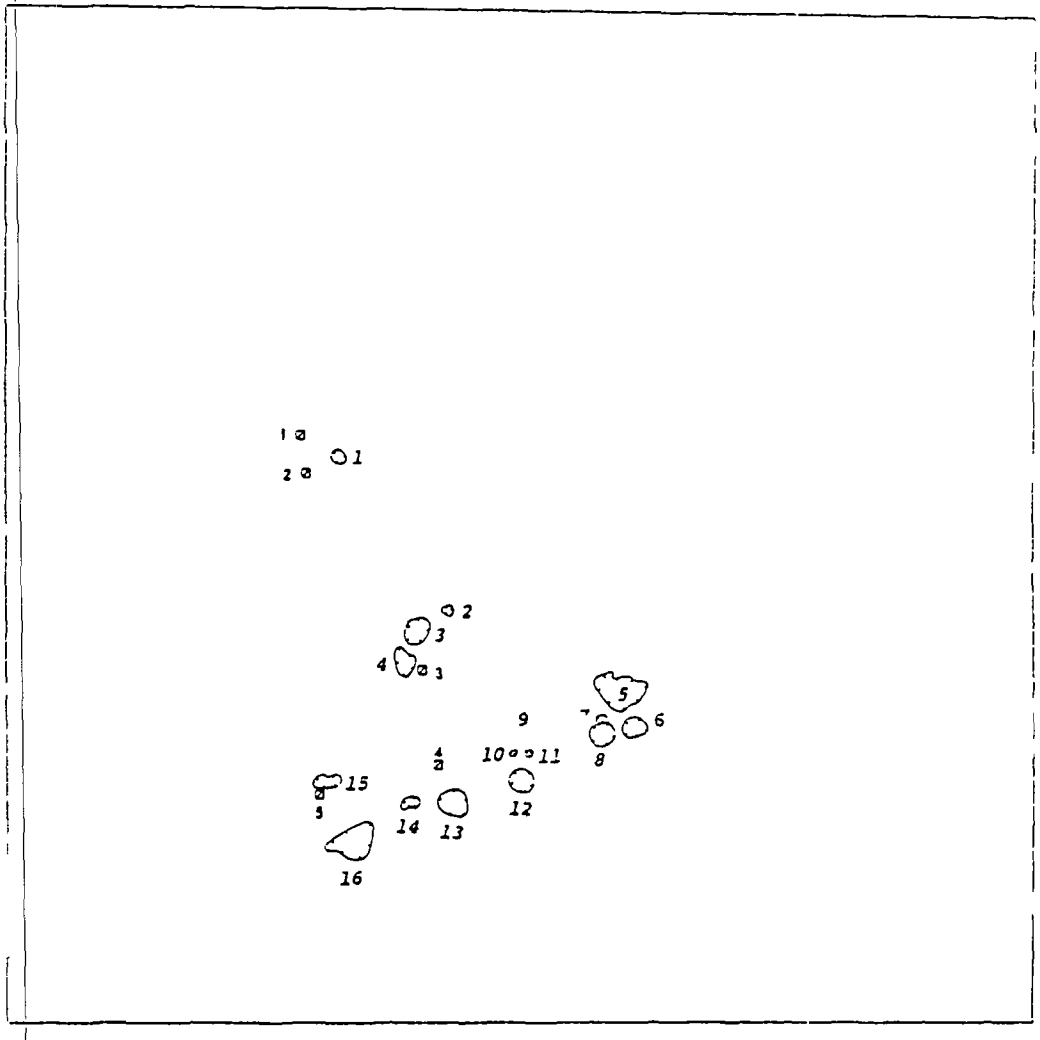

FIGURE B-8 - Hazardous mine openings in sec 11 T 34S R 25E (1 12 000)

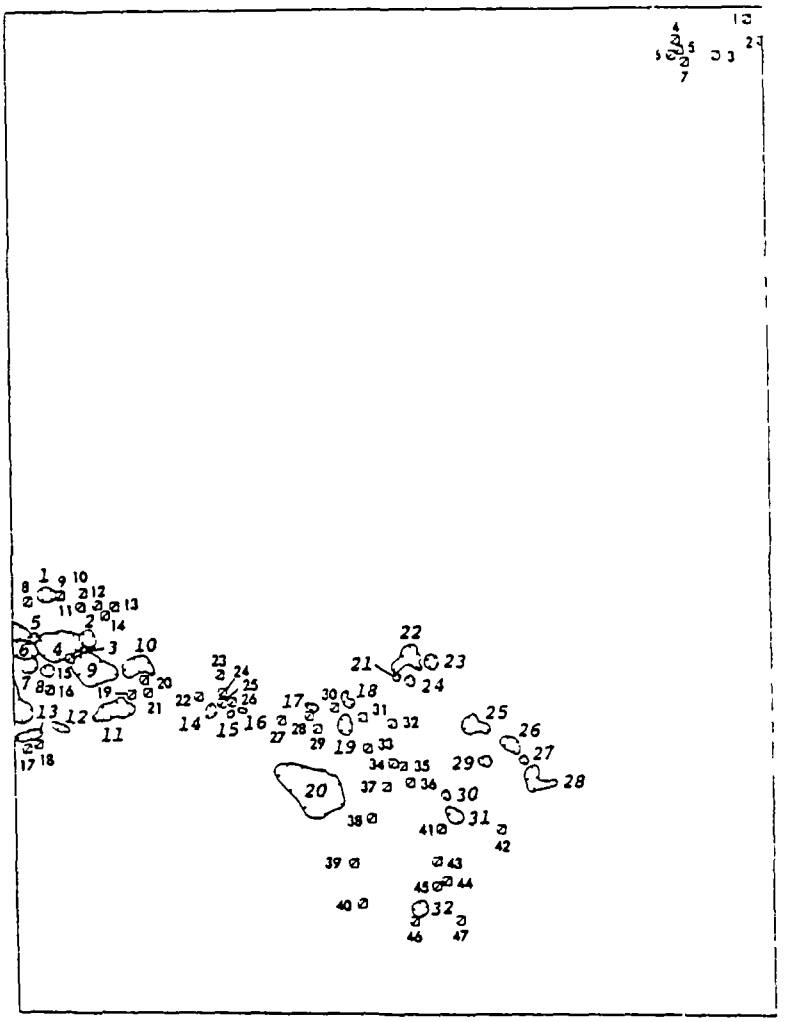

FIGURE B-9 - Hazardous mine openings in sec 13, T 34S , R 25E (1 12,000)

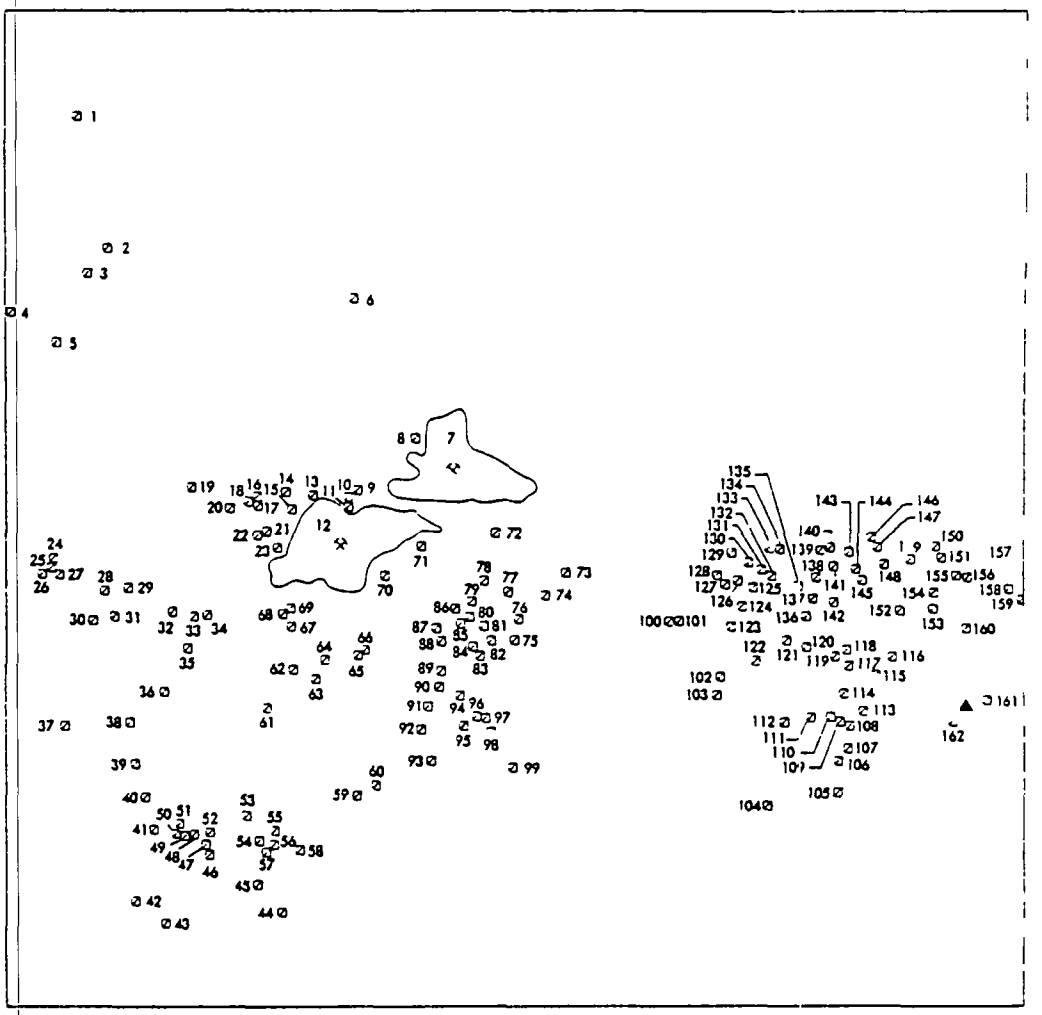

FIGURE B-10 - Hazardous shafts and open pits in sec 14 T 34S R 25E (1 12 000)

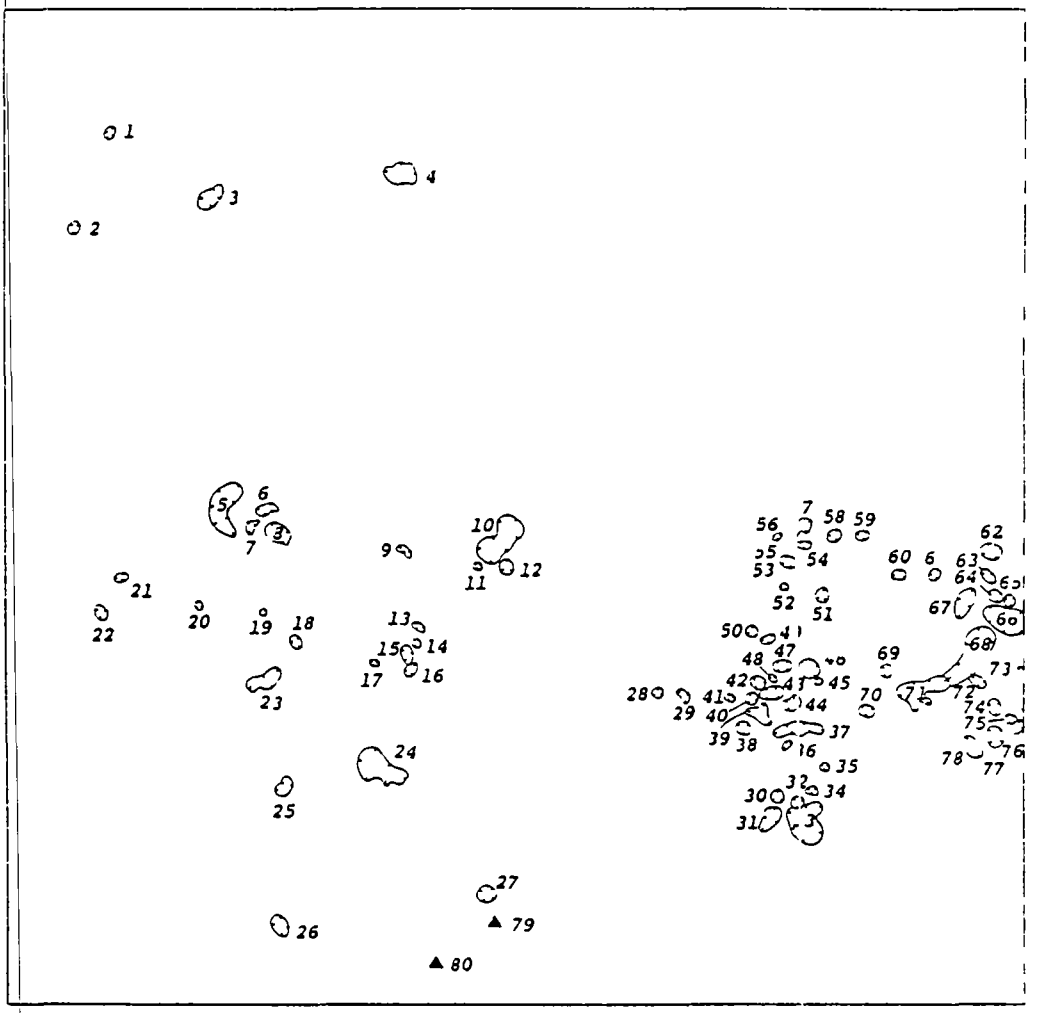

FIGURE B-11 - Surface collapses in sec 14, T 34S R 25E (1 12,000)

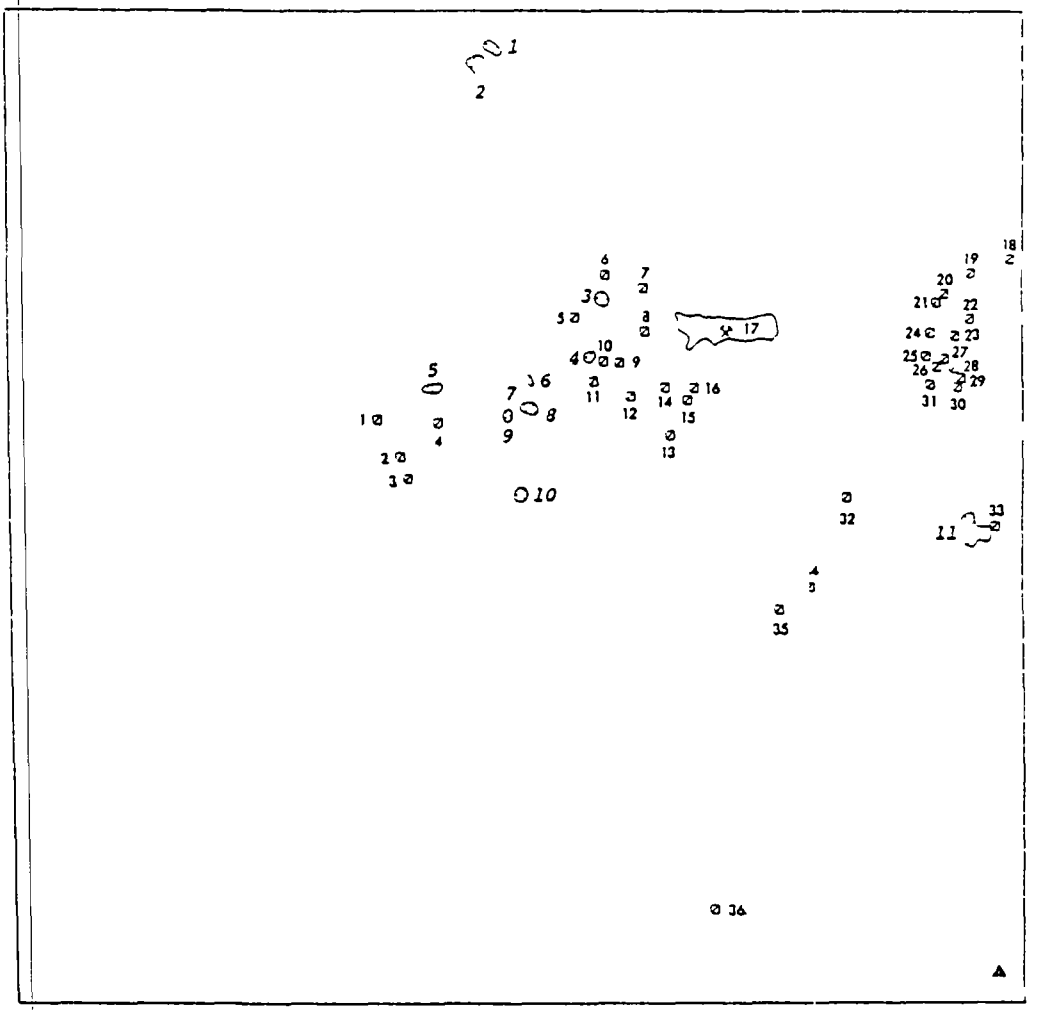

FIGURE B-12 - Hazardous mine openings in sec 15 T 34S R 25E (1 12 000)

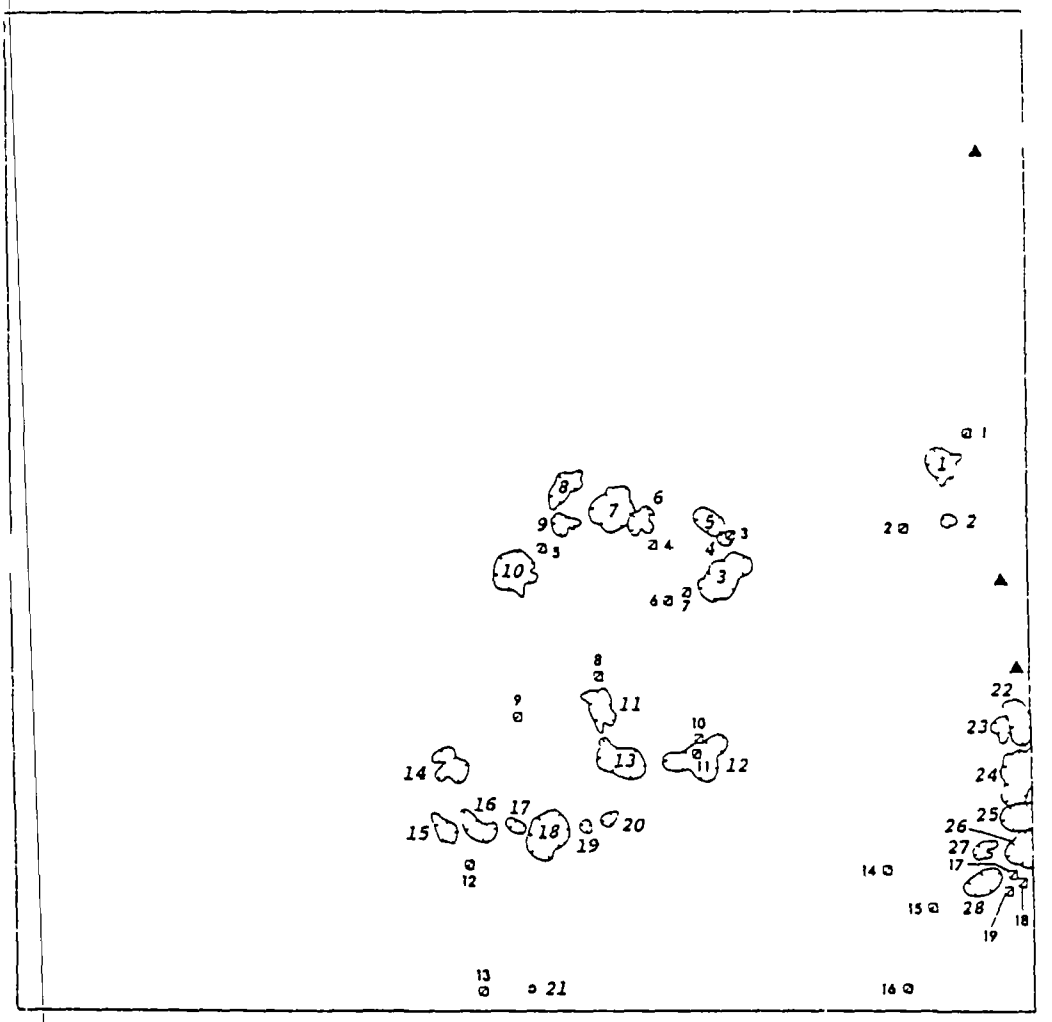

FIGURE B-13 - Hazardous mine openings in sec 22 T 34S R 25E (1 12,000)

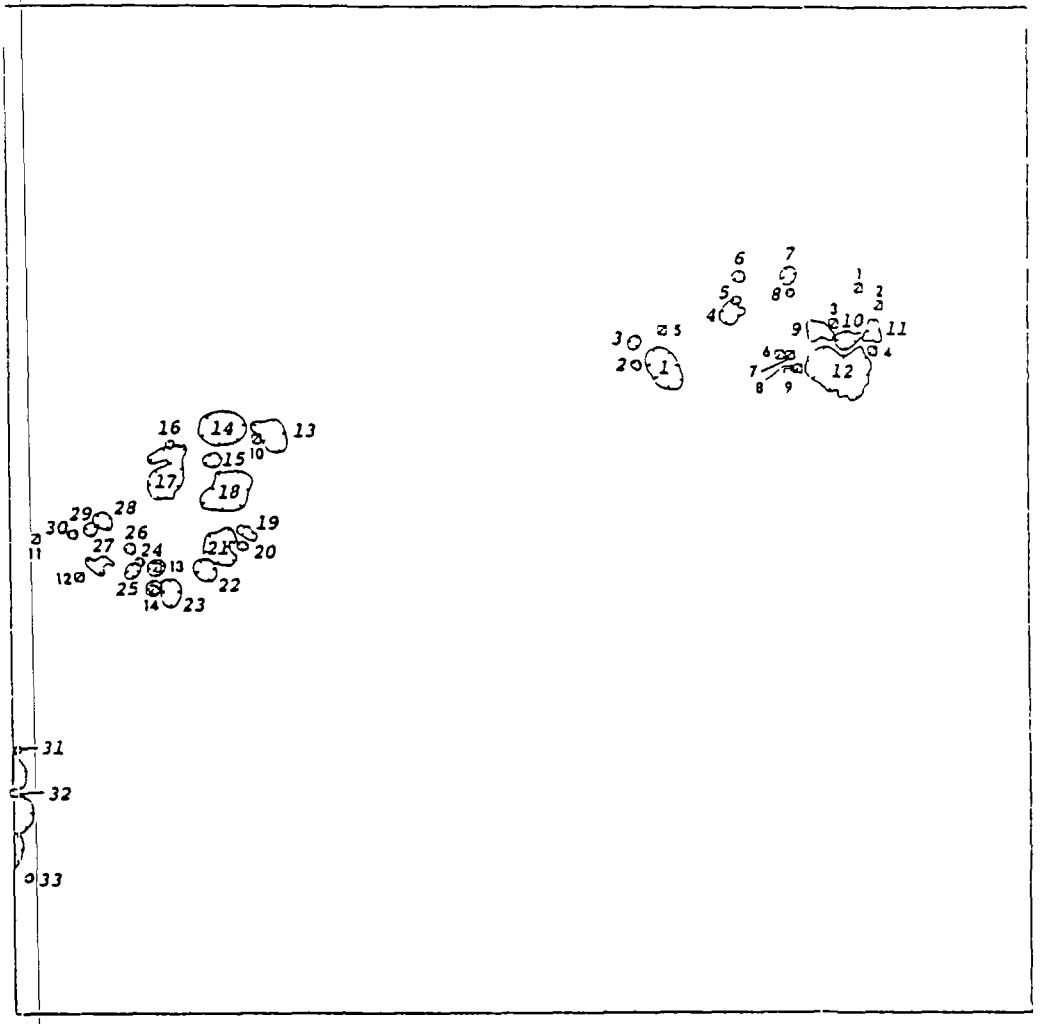

FIGURE B-14 - Hazardous mine openings in sec 23 T 34S R 25E (1 12,000)

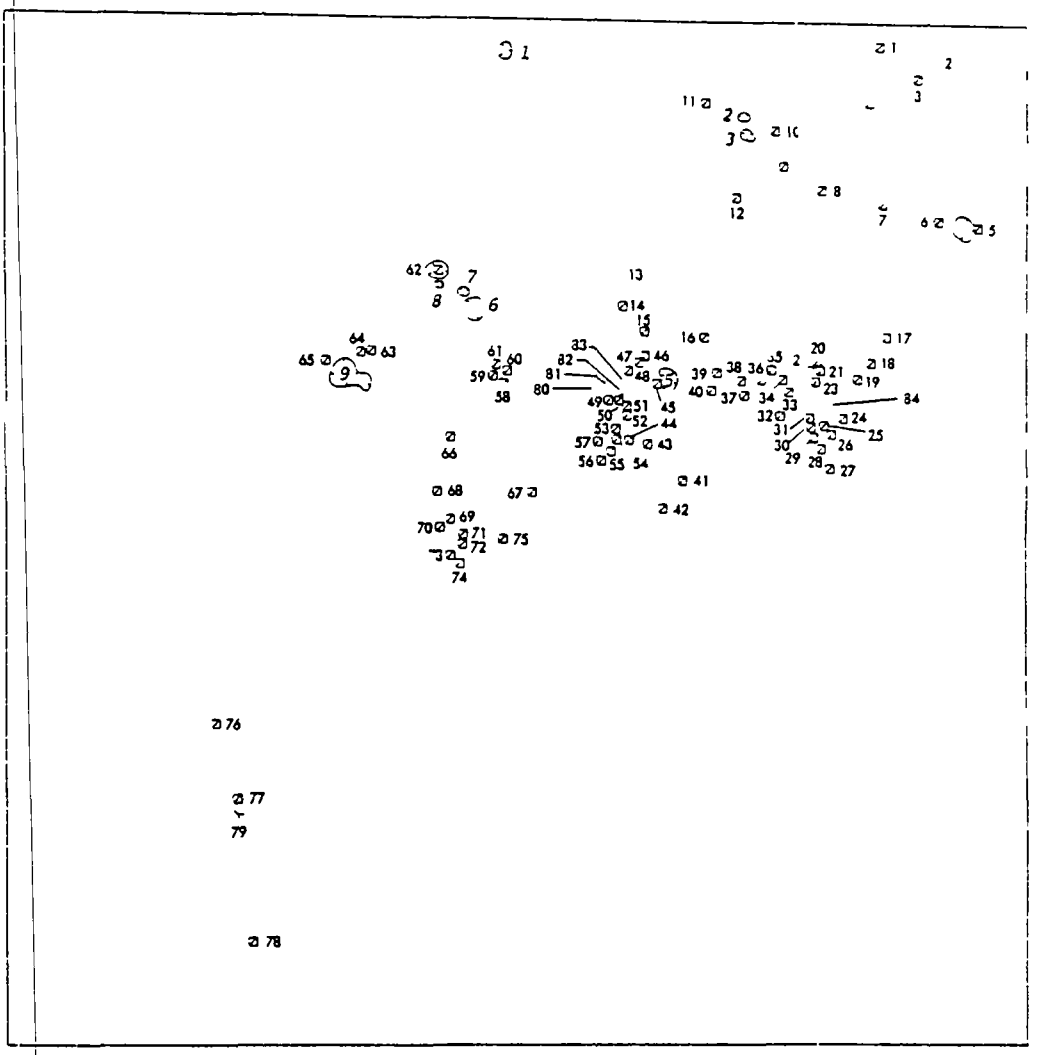

FIGURE B-15 - Hazardous mine openings in sec 27 T 34S R 25E (1 12,000)

APPENDIX C

Tabulations of Mine Hazards

TABLE C-1 - Open Mine Shafts Adits and Pits

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 32S R 25E sec 24	1	4123630N 355810E	Grasselli #1 Mine	Collapsed 25 ft dia water-filled in trees depth ? moderate hazard	Fencing
Do	2	4123370N, 355840E	do	Collapsed 25 ft dia water-filled depth ? partially filled with trash and brush moderate hazard	do
Do	3	4123250N, 355865E	do	Collapsed on northwest edge of surface collapse 20 ft dia - 30 ft to water when measured water level variable high hazard	do
Do	4	4123060N, 355875E	do	Collapsed 40 ft dia 20 ft deep partly filled with large concrete blocks moderate hazard	Filling
Do	5	4122655N 356400E	Butte-Kansas Mine	Collapsed, 40 ft dia 15 ft deep dry low hazard	do
Do	6	4122635N 356375E	do	Collapsed 30 ft dia 10 ft deep dry low hazard	do
Do	7	4122175N 356280E	do	Collapsed 50 ft dia 25 ft deep partly filled with trash and brush moderate hazard	do
T 32S R 25E sec 25	1	4122045N 356365E	Acme #1 Mine	Collapsed concrete slab falling in on east side 20 ft dia at top 5 ft x 5 ft at top of shaft 30 ft deep dry high hazard	Filling

[1] (UTM) Universal Transverse Mercator

TABLE C-1 - Open Mine Shafts Adits, and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 32S R 25E sec 25	2	4121635N 356355E	Barnesdall #3 Mine	Collapsed 25 ft dia at top some cribbing left large cottonwood over hole depth 100 ft to water high hazard	Plugging or fencing
Do	3	4121375N, 356355E	do	Collapsed, 60 ft dia mostly filled with water appears deep high hazard	Fencing
Do	4	4121250N, 356385E	?	Partly collapsed, slab in place 9 ft x 12 ft depth 100 ft to water no protection high hazard	Capping or plugging
Do	5	4121640N 356260E	Barnesdall #3 Mine	Uncollapsed 4 ft x 4 ft 30 ft to water hole partly covered by oak tree trunk	Plugging
Do	6	4120910N 355910E	?	Collapsed 15 ft dia 50 ft to water in trees fenced high hazard	do
T 32S R 25E sec 35	1	4119770N 354480E	HL&S Mine	Collapsed, 25 ft dia 20 ft deep water and junk at bottom moderate hazard	Filling
Do	2	4119760N 354600E	do	Collapsed 60 ft dia 20 ft deep dry low hazard	do
Do	3	4119580N 354500E	Robinson Mine	Collapsed, 20 ft dia 10 ft deep dry low hazard	do
Do	4	4119550N 354650E	do	do	do
Do	5	4119205N, 355135E	?	Collapsed, 8 ft dia 30 ft deep to water high hazard	Plugging

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 33S R 25E sec 11	1	4115980N 355140E	?	Open uncollapsed 8 x 16 ft concrete collar water at 15 ft moderate hazard	Capping
T 33S R 25E sec 13	1	4114505N 355615E	Arena Mine	Collapsed, 30 ft dia 15 ft deep dry low hazard	Filling
Do	2	4114230N 355840E	Cincinnati Mine	Collapsed 25 ft dia 10-15 ft deep dry low hazard	do
Do	3	4114150N, 355830E	do	Collapsed 25 ft dia 10-15 ft deep partially filled with trash low hazard	do
Do	4	4114070N 355790E	do	Collapsed 25 ft dia 10-15 ft deep dry low hazard	do
Do	5	4114160N 355455E	Spring River Mine (?)	Collapsed, 50 ft dia water-filled next to railroad trestle low hazard	do
Do	6	4114070N, 355345E	Thomas 'D Mine	Collapsed, 30 ft dia 10-15 ft deep, in trees low hazard	do
Do	7	4114020N, 355390E	do	Collapsed 20 ft dia water at 10 ft steep sides moderate hazard	do
Do	8	4114030N, 355495E	Spring River Mine (?)	Collapsed 25 ft dia water-filled moderate hazard depth ?	Filling or fencing
Do	9	4114020N 355555E	do	Collapsed 20 ft dia 10-15 ft deep dry low hazard	Filling
T 33S R 25E sec 15	1	4115320N 352145E	?	Collapsed 50 ft dia 15 ft deep water at bottom moderate hazard	Filling
Do	2	4115105N 352195E	Crestline Mines	Collapsed 30 ft dia 15 ft deep dry low hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15		Name	Size and Present Condition	Suggested Remedial Action
T 33S R 25E sec 15	3	4114720N	351975E	Crestline Mines	Collapsed 60 ft dia water-filled depth ? moderate hazard	Fencing
Do	4	4114760N	352435E	do	Collapsed, 15 ft dia 30 ft to water in trees no protection high hazzard	Plugging
Do	5	4114775N	352830E	Glendale Mine	Collapsed, 40 ft dia 10-15 ft deep water at bottom moderate hazard	Filling
Do	6	4114720N	352910E	do	Collapsed 25 ft dia 20 ft deep dry moderate hazard	do
Do	7	4114620N,	352895E	do	Collapsed, 20 ft dia 80-100 ft deep to water in trees partly covered by dead trees high hazzard	Plugging or Fencing
Do	8	4114090N	352830E	Crestline Mines	Collapsed 15 ft dia 80 ft deep to water in trees near road high hazard	do
T 33S R 25E sec 16	1	4114690N	351820E	Ellis Mine	Collapsed 30 ft dia 15 ft deep dry low hazard	Filling
T 33S R 25E sec 22	1	4114010N	352050E	Allie Moore Mines (?)	Collapsed 100 ft dia 20 ft deep partly filled with water moderate hazard	Fencing
Do	2	4113985N	352825E	do	110 x 150 ft 60 ft deep dry used as trash dump near county road moderate hazard	do

TABLE C-1 - Open Mine Shafts Adits, and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 33S R 25E sec 22	3	4113850N, 352025E	Allie Moore Mines (?)	Collapsed, 120 x 150 ft water-filled depth ? moderate hazard	Fencing
Do	4	4113585N, 352080E	?	Collapsed, 30 ft dia 10 ft deep partially filled with junk low hazard	Filling
Do	5	4113590N, 352085E	?	Collapsed, 15 ft dia 10 ft deep dry trees in bottom low hazard	do
Do	6	4113415N 353340E	?	Collapsed 25 ft dia 10 ft deep dry low hazard	do
T 33S R 25E sec 23	1	4113635N, 355160E	?	Collapsed 40 ft dia 20 ft deep partially filled with junk low hazard	Filling
Do	2	4113165N, 354790E	Haystack Mine	Collapsed, 30 ft dia 20 ft to water covered by trees and brush moderate hazard	do
Do	3	4113155N, 354885E	do	Collapsed 30 ft dia 25 ft to water dead trees over top moderate hazard	do
Do	4	4113130N 354825E	do	Collapsed 100 ft dia 20 ft deep dry low hazard	None
Do	5	4112880N, 354615E	Hubbard Mine (?)	Covered by brush depth ? high hazard	Plugging or filling
Do	6	4112850N 354585E	do	Open uncollapsed 5 x 5 ft wood timbers in place water at 10 ft water line still in place high hazard	Capping or filling
Do	7	4112815N 354605E	do	Open partly collapsed head frame still in place water at 10 ft high hazard	Plugging or filling

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site number	UTM[1] Coordinates Zone 15		Name	Size and Present Condition	Suggested Remedial Action
T 33S R 25E sec 24	1	4113950N	355550E	Badger-Peacock Mines	Open pit, filled with water steep rocky banks in places close to Spring River sometimes gets flooded good fishing 700 x 450 ft irregular shape depth ? reported by owner to be 90 ft deep	Owner has fenced off area is considering developing picnic area
Do	2	4113955N	355490E	do	Collapsed 10 ft dia water at 10 ft depth ? high hazard	Filling
Do	3	4113935N	355600E	Peacock Mine	Collapsed 10 ft dia 10 ft deep dry low hazard	do
Do	4	4113760N	355480E	Badger-Peacock Mines	Collapsed 20 ft dia water at 10 ft moderate hazard	do
Do	5	4113655N	355185E	do	Open uncollapsed 5 x 5 ft 20 ft to water cribbing to 4 ft above water high hazard	Plugging or filling
Do	6	4113570N	355225E	Rosebud or Red Rose Mine	Collapsed, 15 ft dia 10 ft deep dry low hazard	Filling
Do	7	4113055N	355585E	?	Collapsed 25 ft dia 10 ft deep dry low hazard	do
T 33S R 25E sec 25	1	4112115N	356195E	Chicago Mine (?)	Collapsed 20 ft dia 10 ft deep low hazard	Filling
Do	2	4112100N	356145E	do	Collapsed 30 ft across 15 ft deep trees and concrete filling hole low hazard	do

TABLE C-1 - Open Mine Shafts Adits, and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 33S R 25E, sec 24	1	4113950N 355550E	Badger-Peacock Mines	Open pit filled with water steep rocky banks in places close to Spring River sometimes gets flooded good fishing 700 x 450 ft irregular shape depth ? reported by owner to be 90 ft deep	Owner has fenced off area is considering developing picnic area
Do	2	4113955N 355490E	do	Collapsed 10 ft dia water at 10 ft depth ? high hazard	Filling
Do	3	4113935N 355600E	Peacock Mine	Collapsed 10 ft dia 10 ft deep dry low hazard	do
Do	4	4113760N 355480E	Badger-Peacock Mines	Collapsed 20 ft dia water at 10 ft moderate hazard	do
Do	5	4113655N 355185E	do	Open uncollapsed 5 x 5 ft to water cribbing to 4 ft above water high hazard	Plugging or filling
Do	6	4113570N 355225E	Rosebud or Red Rose Mine	Collapsed 15 ft dia 10 ft deep dry low hazard	Filling
Do	7	4113055N 355585E	?	Collapsed 25 ft dia 10 ft deep dry low hazard	do
T 33S R 25E sec 25	1	4112115N 356195E	Chicago Mine (?)	Collapsed 20 ft dia 10 ft deep low hazard	Filling
Do	2	4112100N 356145E	do	Collapsed 30 ft across 15 ft deep trees and concrete filling hole low hazard	do

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 23E sec 36	1	4101035N 335770E	Garrett Mine	Collapsed, 20 ft dia depth over 100 ft, high hazard	Fencing or plugging
T 34S , R 24E sec 26	1	4101745N 344560E	?	Collapsed, 25 ft dia 10 ft deep contains car body low hazard	Filling
Do	2	4101690N, 344635E	?	Collapsed 30 ft dia 10-15 ft deep contains trash low hazard	do
Do	3	4101580N 344220E	Little Otis Mine (?)	Collapsed 25 ft dia filled with water moderate hazard	do
Do	4	4101390N 343880E	HH&H Mine	2 collapsed shafts 20-25 ft dia south one water-filled with old hoisting frame collapsed over it north one 10-15 ft deep dry moderate hazard	do
Do	5	4101360N 343985E	do	Collapsed, 80 ft dia 10-15 ft deep contains water at times trash dump on east side moderate hazard	do
Do	6	4101325N 343890E	do	Collapsed 50 ft dia contains large slab of concrete water at 8 ft appears deep moderate hazard	do
Do	7	4101325N 343925E	do	Collapsed 20 ft dia 10-15 ft deep dry low hazard	do
Do	8	4101315N 343950E	do	Collapsed 40 ft dia 10-15 ft deep half filled with boulders low hazard	do

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S , R 24E , sec 26	9	4101315N, 344070E	?	Collapsed 75 ft dia 30 ft deep taking in boulder and chat pile moderate hazard	Filling
Do	10	4101285N 344080E	?	Collapsed 25 ft dia 10 ft deep partially filled with junk low hazard	do
Do	11	4101265N, 344115E	?	Collapsed 20 ft dia 15 ft deep to water not deep moderate hazard	do
T 34S R 24E sec 33	1	4099720N 340745E	Stoskopf Mine (?)	Collapsed 30 ft dia large concrete slab fallen into shaft depth 100-150 ft to water fenced off high hazard	Plugging
T 34S R 24E sec 34	1	4100930N, 343465E	Brugger Mine	Collapsed 40 ft dia 25 ft deep water at bottom moderate hazard	Fencing
Do	2	4100720N 343280E	do	Open uncollapsed 6 x 6 ft timbers in place 40-50 ft deep to water water flowing west high hazard	Plugging or capping
Do	3	4100670N 343170E	do	Collapsed 60 ft dia 25 ft deep dry growing trees low hazard	Filling
Do	4	4100655N, 343235E	do	Collapsed 25 ft dia 20 ft deep dry low hazard	do
Do	5	4100630N 343480E	do	Collapsed 60 ft dia 40 ft deep drift exposed on north side high hazard	Filling or fencing

TABLE C-1 - Open Mine Shafts Adits, and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 24E, sec 34	6	4100620N 343520E	Brugger Mine	Collapsed 40 ft dia 40 ft deep dry some trash high hazard	Filling or fencing
Do	7	4100565N, 343525E	do	Collapsed 35 ft dia 6-8 ft dia below 20 ft to water high hazard	do
Do	8	4100460N, 343500E	do	Open uncollapsed 6 x 6 ft depth 100 ft to water cribbing in place high hazard	Capping or plugging
T 34S R 24E sec 35	1	4100225N 344140E	Henshaw Heirs Mine	Collapsed 30 ft dia 100 ft deep formerly fenced fence is down high hazard	Plugging or fencing
Do	2	4100175N, 344080E	do	Collapsed, 40 ft dia 20 ft deep dry some trash low hazard	Filling
Do	3	4099855N, 344120E	M&H Mine	Open, uncollapsed cribbed 6 x 6 ft 60 ft deep to water among trees high hazard	Capping or plug-
Do	4	4099780N 344210E	do	Collapsed 20 ft dia partially blocked by concrete slab, depth 100 ft to water high hazard	Plugging or fencing
T 34S R 25E sec 2	1	4108200N, 354910E	Eureka Mine	Collapsed 15 ft dia 10 ft deep bottom wet low hazard	Filling
Do	2	4108180N 354840E	do	Collapsed 20 ft dia 15 ft deep wet bottom low hazard	do

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 2	3	4108120N, 354670E	Eureka Mine	Open uncollapsed 6 x 16 ft concrete collar 12 ft to water no protection high hazard	Capping or plugging
T 34S R 25E sec 3	1	4108260N 353215E	Gracie Mine	Collapsed, 5 ft dia 5 ft to water near road appears deep moderate hazard	Filling
T 34S R 25E sec 5	1	4107750N 349950E	Wilbur-Playter Mine (?)	Open pit 100 x 200 ft water level at 8 ft low hazard	None
Do	2	4107750N, 349950E	do	Open pit 40 x 80 ft dry low hazard	
T 34S R 25E sec 8	1	4106460N, 348995E	?	Open pit 90 x 180 ft 10-15 ft deep dry low hazard	None
T 34S , R 25E sec 10	1	4106385N 351985E	?	Open pit sloping sides 50 x 200 ft 20-30 ft deep half filled with water low hazard	Fencing
T 34S R 25E sec 11	1	4106790N, 353860E	Andrews Mine	Collapsed 20 ft dia 15 ft deep some junk low hazard	Filling
Do	2	4106725N, 353870E	do	Collapsed 25 ft dia 15 ft deep muddy low hazard	do
Do	3	4106410N 354050E	Crown Point Mine	Collapsed 20 ft dia 15 ft deep low hazard	do
Do	4	4106260N, 354075E	do	Collapsed 40 ft dia 20 ft deep to top of 4 x 5 ft cribbed shaft water to top of cribbing high hazard	Plugging

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E , sec 11	5	4106215N 353880E	Empire Mine (?)	Collapsed 15 ft dia 6 ft to water moderate hazard	Filling
T 34S R 25E , sec 12	1	4107030N 355735E	Buckeye Mine	Collapsed, 60 ft dia 15 ft deep some junk dry low hazard	do
Do	2	4106265N 356145E	?	Collapsed 20 ft dia 15 ft deep dry low hazard	do
Do	3	4105865N, 356140E	Cave (?) Springs	5 x 5 ft 10 ft deep dry low hazard	do
Do	4	4105810N 356180E	?	Collapsed 30 ft dia 20 ft deep dry moderate hazard	do
T 34S R 25E sec 13	1	4105775N, 356180E	?	Collapsed 50 ft dia at top 25 ft deep some trash moderate hazard	Filling
Do	2	4105780N 356205E	Boston Mine (?)	Collapsed 25 ft dia at top 8 ft dia below 50 ft deep high hazard	Plugging
Do	3	4105720N 356130E	?	Collapsed 25 ft dia at top narrows to 6 ft 50 ft deep to water high hazard	do
Do	4	4105750N, 356070E	?	Collapsed 15 ft dia at top narrows to 7 ft dia 30 ft deep to water high hazard	do
Do	5	4105730N 356075E	?	Collapsed 18 ft dia at top narrows to 6 ft 20 ft deep to water high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 13	6	4105725N 356060E	?	Collapsed 10 ft dia at top narrows to 6 ft dia 10 ft to water high hazard	Plugging
Do	7	4105710N 356080E	?	Collapsed, 6 ft dia 10 ft to water high hazard	do
Do	8	4104880N 355015E	Southside Mine	Collapsed 20 ft dia narrows to 6 ft dia 10 ft deep dry low hazard	Filling
Do	9	4104900N 355070E	do	Collapsed 15 ft dia at top narrows to 6 ft 40 ft deep dry high hazard	Plugging
Do	10	4104900N, 355105E	do	Collapsed 15 ft dia narrows to 6 ft 20 ft deep dry high hazard	do
Do	11	4104870N 355100E	do	Collapsed 10 ft dia narrows to 6 ft 30 ft deep dry high hazard	do
Do	12	4104875N, 355130E	do	Collapsed, 6 ft dia 30 ft deep dry, mine roof at 15 ft high hazard	do
Do	13	4104870N, 355150E	do	Collapsed 15 ft dia at top narrows to 6 ft dia 30 ft deep dry mine roof at 15 ft high hazard	do
Do	14	4104860N 355140E	do	Collapsed 15 ft dia enters mine room at shallow depth to west high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 13	15	4104790N 355080E	Southside Mine	Collapsed 25 ft dia narrows to 6 ft dia 30 ft deep dry high hazard	Plugging
Do	16	4104740N, 355050E	do	Collapsed 30 ft dia narrows to 8 ft 40 ft deep dry high hazard	do
Do	17	4104645N 355010E	do	Collapsed, 20 ft dia 20 ft deep dry moderate hazard	Filling
Do	18	4104655N 355030E	do	Collapsed, 20 ft dia at top narrows to 6 ft 40 ft deep dry high hazard	Plugging
Do	19	4104730N 355175E	do	Open uncollapsed 4 x 4 x 50 ft deep wood cribbing in place high hazard	do
Do	20	4104750N 355195E	do	Collapsed 12 ft dia narrows to 6 ft 50 ft deep dry high hazard	do
Do	21	4104730N 355200E	do	Collapsed 20 ft dia narrows to 6 ft 50 ft deep dry high hazard	do
Do	22	4104720N 355280E	do	Collapsed 15 ft dia narrows to 6 ft 40 ft deep to water enters mine room at 20 ft high hazard	do
Do	23	4104755N 355315E	do	Collapsed 15 ft dia at top 10 ft deep moderate hazard	Filling

TABLE C-1 - Open Mine Shafts Adits, and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E , sec 13	24	4104730N 355320E	Southside Mine	Collapsed 15 ft dia at top narrows to 6 ft 30 ft deep dry partially blocked by concrete slab high hazard	Plugging
Do	25	4104710N 355320E	do	Collapsed 10 ft dia mine roof at 15 ft depth 30 ft dry high hazard	do
Do	26	4104710N, 355330E	do	Collapsed 20 ft dia mine roof at 10 ft depth 30 ft dry high hazard	do
Do	27	4104685N, 355410E	?	Collapsed, 25 ft dia 15 ft deep dry moderate hazard	Filling
Do	28	4104685N 355455E	?	Collapsed 20 ft dia at top narrows to 8 ft 25 ft deep dry high hazard	Plugging
Do	29	4104665N, 355470E	?	Collapsed, 8 ft dia 30 ft deep dry high hazard	do
Do	30	4104700N, 355495E	?	Collapsed, 20 ft dia at top narrows to 6 ft 20 ft deep dry high hazard	Filling
Do	31	4104675N 355540E	?	Collapsed 25 ft dia narrows to 6 ft 30 ft deep to water high hazard	Plugging

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 13	32	4104670N 355590E	?	Collapsed, 20 ft dia at top narro s to 6 ft dia 30 ft deep dry high hazard	Plugging
Do	33	4104630N, 355550E	?	Collapsed 30 ft dia narrows to 6 ft dia 40 ft deep to water high hazard	do
Do	34	4104605N, 355590E	?	Collapsed 25 ft dia at top narrows to 6 ft dia 40 ft deep to water high hazard	do
Do	35	4104600N, 355605E	?	Collapsed 20 ft dia at top narrows to 6 ft dia 40 ft deep to water high hazard	do
Do	36	4104575N 355615E	?	Collapsed 6 ft dia 15 ft deep dry low hazard	Filling
Do	37	4104570N, 355580E	?	Collapsed 25 ft dia narrows to 6 ft dia 10 ft deep dry low hazard	do
Do	38	4104520N 355555E	?	Partially collapsed 6 ft dia 50 ft deep to water high grass very dangerous	Plugging
Do	39	4104445N 355525E	?	Collapsed, 15 ft dia narrows to 6 ft 20 ft deep dry high hazard	Filling
Do	40	4104380N 355535E	?	Collapsed 25 ft dia at top narrows to 4 x 10 ft 20 ft deep to water high hazard	Plugging

TABLE C-1 - Open Mine Shafts Adits, and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E, sec 13	41	4104495N 355665E	?	Collapsed 20 ft dia 15 ft deep dry moderate hazard	Filling
Do	42	4104495N, 355760E	?	Collapsed, 20 ft dia 30 ft to water 20 ft to cribbing high hazard	Plugging
Do	43	4104445N, 355655E	?	Collapsed, 30 ft dia at top narrows to 6 ft 25 ft to water moderate hazard	do
Do	44	4104415N 355670E	?	Collapsed 20 ft dia at top narrows to 6 ft 15 ft deep to water moderate hazard	do
Do	45	4104405N 355655E	?	do	do
Do	46	4104350N 355615E	?	Collapsed 20 ft dia at top narrows to 4 ft 15 ft to water cribbed to 4 ft above water moderate hazard	do
Do	47	4104345N 355690E	?	Collapsed 30 ft dia 10-15 ft deep dry low hazard	Filling
T 34S R 25E sec 14	1	4105675N 353485E	?	Collapsed, 25 ft dia 25 ft deep some trash moderate hazard	do
Do	2	4105460N 353535E	?	Collapsed 10 ft dia 10 ft deep contains truck bodies low hazard	do
Do	3	4105425N 353505E	Hoosier Mines	Collapsed 15 ft dia 15 ft deep dry moderate hazard	do

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 14	4	4105360N, 353385E	Hoosier Mines	Collapsed, 10 ft dia filled to 10 ft dry low hazard	Filling
Do	5	4105315N 353455E	do	Collapsed 10 ft dia 10 ft deep dry low hazard	do
Do	6	4105380N, 353935E	do	Collapsed 8 ft dia 15 ft deep to water moderate hazard	do
Do	7	4105120N 354085E	Windsor Mines	Open pit 500 x 750 ft mostly water-filled depth ? water within 20-30 ft of surface moderately high hazard	Fencing
Do	8	4105155N 354025E	do	Collapsed 6 ft dia 30 ft to water some of concrete collar present high hazard	Plugging
Do	9	4105075N, 353930E	Hoosier Mines	Collapsed, 10 ft dia narrows to 6 ft 20 ft to water high hazard	do
Do	10	4105060N, 353920E	do	Collapsed 10 ft dia at top narrows to 6 ft 20 ft to water high hazard	do
Do	11	4105050N 353915E	do	Collapsed 6 ft dia 20 ft to water high hazard	do
Do	12	4104990 353915E		Open pit 1000 x 550 ft depth ? mostly water-filled 10-20 ft from surface moderately high hazard	Fencing
Do	13	4105065N 353860E	Hoosier Mines	Collapsed 6 x 6 ft x 8 ft deep moderate hazard	Filling

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 14	14	4105070N, 353820E	Hoosier Mines	Collapsed 15 ft dia narrows to 5 ft 15 ft deep dry moderate hazard	Filling
Do	15	4105045N, 353830E	do	Collapsed 6 x 6 ft 10 ft deep moderate hazard	do
Do	16	4105065N 353770E	do	Collapsed 20 ft dia at top narrows to 6 ft dia 20 ft deep to water high hazard	Plugging
Do	17	4105050N 353770E	do	Collapsed 6 ft dia 20 ft deep to water high hazard	do
Do	18	4105055N, 353760E	do	Collapsed 15 ft dia narrows to 6 ft 10 ft deep dry moderate hazard	Filling
Do	19	4105080N, 353670E	do	Collapsed 15 ft dia at top narrows to 6 ft 10 ft deep to water moderate hazard	do
Do	20	4105045N, 353730E	do	Collapsed 15 ft dia at top narrows to 6 ft 10 ft to water high hazard	Plugging
Do	21	4105010N, 353780E	Illinois Lead & Zinc Mines	Collapsed 5 ft dia 8 ft to water high hazard	do
Do	22	4105005N, 353770E	do	do	do
Do	23	4104985N 353800E	?	Collapsed 10 ft dia at top narrows to 6 ft some cribbing water at 6 ft moderate hazard	Filling

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E, sec 14	24	4104970N, 353445E	Illinois Lead & Zinc Mines	Collapsed in chat pile 40 ft dia at top narrows to 10 ft depth 20 ft to water high hazard	Filling
Do	25	4104955N 353440E	do	Collapsed 20 ft dia 10 ft deep to water high hazard	do
Do	26	4104950N 353430E	do	Collapsed 15 ft dia narrows to 6 ft 20 ft deep to water cribbing at bottom high hazard	do
Do	27	4104950N, 353450E	do	Collapsed 15 ft dia 10 ft deep to water high hazard	do
Do	28	4104920N, 353525E	do	Collapsed, 5 ft dia 15 ft deep to water high hazard	do
Do	29	4104925N 353560E	do	Collapsed 5 ft dia 15 ft deep to water high hazard	do
Do	30	4104870N, 353505E	do	Collapsed 12 ft dia narrows to 6 ft 20 ft deep dry connects to collapse to east high hazard	do
Do	31	4104875N, 353540E	do	Collapsed 20 ft dia narrows to 6 ft 20 ft deep to water high hazard	do
Do	32	4104880N, 353630E	do	Collapsed 25 ft dia narrows to 6 ft 15 ft deep to water water at top of shaft moderate hazard	do
Do	33	4104875N 353670E	do	Collapsed 25 ft dia 10 ft deep to water moderate hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E, sec 14	34	4104875N 353690E	Illinois Lead & Zinc Mines	Collapsed 6-ft dia 15-ft deep to water high hazard	Filling
Do	35	4104825N 353660E	do	Collapsed, 10 ft dia narrows to 6 ft 15 ft deep dry some cribbing high hazard	do
Do	36	4104755N 353620E	do	Collapsed 20 ft dia at top 20 ft to water high hazard	do
Do	37	4104705N 353455E	do	Collapsed 20 ft dia narrows to 8 ft dia 30 ft deep dry high hazard	Plugging
Do	38	4104705N, 353560E	do	Collapsed 20 ft dia narrows to 8 ft 30 ft deep to water high hazard	do
Do	39	4104640N 353570E	Peacock Galena Mine	Collapsed 15 ft dia 30 ft to water high hazard	do
Do	40	4104585N 353585E	do	Collapsed 6 ft dia 35 ft deep to water high hazard	do
Do	41	4104535N 353600E	do	8 x 10 ft 10 ft deep chat-filled low hazard	Filling
Do	42	4104420N 353565E	?	Collapsed 18 ft dia narrows to 10 ft 30 ft deep dry high hazard	Plugging
Do	43	4104380N, 353615E	?	Collapsed 10 ft dia narrows to 6 ft dia 30 ft deep dry high hazard	do
Do	44	4104400N 353800E	?	Collapsed 8 ft dia 20 ft deep to water connects to mine collapse to south high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E , sec 14	45	4104445N 353765E	?	Collapsed 10 ft dia filled to 10 ft dry low hazard	Filling
Do	46	4104495N, 353685E	?	Collapsed, 6 ft dia 20 ft deep to water connects with mine room high hazard	Plugging
Do	47	4104510N 353680E	?	Collapsed, 40 ft dia opens to mine room water at depth of 20 ft high hazard	Filling
Do	48	4104525N, 353665E	?	Collapsed, 6 ft dia 30 ft deep to water high hazard	Plugging
Do	49	4104525N, 353650E	?	do	do
Do	50	4104530N 353635E	?	Collapsed 25 ft dia at top, narrows to 6 ft 30 ft deep to water high hazard	do
Do	51	4104545N 353640E	?	Collapsed, 30 ft dia narrows to 6 ft dia 30 ft deep to water high hazard	do
Do	52	4104535N 353685E	?	Collapsed 9 ft dia narrows to 5 ft dia 20 ft deep some cribbing in place high hazard	do
Do	53	4104555N 353745E	?	Collapsed 15 ft dia narrows to 4 x 4 ft cribbing which is washed out on south side 15 ft deep high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 14	54	4104515N 353770E	?	Open uncollapsed 5 x 5 ft concrete collar 30 ft deep high hazard	Capping or Plugging
Do	55	4104530N 353790E	?	Collapsed 20 ft dia narrows to 6 ft 30 ft deep dry high hazard	Plugging
Do	56	4104505N, 353790E	?	Collapsed 20 ft dia 10 ft deep dry low hazard	Filling
Do	57	4104495N 353775E	?	Collapsed 15 ft dia narrows to 6 ft 20 ft deep high hazard	Plugging
Do	58	4104500N 353830E	?	Collapsed 8 ft dia 20 ft deep dry high hazard	do
Do	59	4104585N, 353925E	?	Collapsed, 20 ft dia 10 ft deep dry low hazard	Filling
Do	60	4104600N, 353955E	?	Collapsed 6 ft dia 30 ft deep to water on edge of mine collapse high hazard	Plugging
Do	61	4104725N, 353780E	?	Collapsed 35 ft dia narrows to 10 ft dia 20 ft deep to water high hazard	Filling
Do	62	4104785N, 353825E	?	Collapsed, 20 ft dia narrows to 6 ft dia 10 ft deep to water high hazard	Plugging
Do	63	4104770N 353860E	?	Collapsed 6 ft dia 30 ft to water high grass very hazardous	do
Do	64	4104800N, 353875E	?	Collapsed, 6 ft dia 30 ft to water high grass very hazardous	do

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 14	65	4104810N, 353930E	?	Collapsed 20 ft dia narrows to 6 ft dia 25 ft deep to water high hazard	Plugging
Do	66	4104805N, 353940E	?	Collapsed 20 ft dia narrows to 6 ft dia 10 ft deep junk in hole moderate hazard	Filling
Do	67	4104855N 353820E	?	Collapsed 25 ft dia narrows to 6 ft 15 ft deep to trash and water moderate hazard	do
Do	68	4104875N, 353810E	?	Collapsed, 20 ft dia narrows to 6 ft 10 ft deep to water moderate hazard	do
Do	69	4104885N 353820E	?	Collapsed 5 ft dia 10 ft deep to water high hazard	do
Do	70	4104935N, 353975E	?	Collapsed 30 ft dia narrows to 6 ft dia 25 ft deep to water high hazard	do
Do	71	4104985N 354030E	?	Collapsed 6 ft dia 15 ft deep junk-filled moderate hazard	do
Do	72	4105000N 354150E	?	Collapsed 10 ft dia at top narrows to 6 ft 15 ft deep to water high hazard	Plugging

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 14	73	4104935N 354260E	Southside Mine	Open uncollapsed 6 x 6 ft 30 ft deep dry near main street in grass and weeds high hazard	Capping or plugging
Do	74	4104900N, 354225E	do	Collapsed 10 ft dia narrow to 6 ft dia 30 ft deep dry high hazard	Plugging
Do	75	4104830N 354175E	?	Collapsed 6 ft dia 80 ft to water high hazard	do
Do	76	4104860N, 354185E	?	Collapsed, 15 ft dia narrows to 6 ft dia 50 ft deep dry high hazard	do
Do	77	4104905N, 354165E	?	Collapsed 25 ft dia 30 ft deep dry high hazard	Filling
Do	78	4104925N, 354130E	?	Collapsed 5 ft dia 25 ft deep to water high hazard	Plugging
Do	79	4104890N 354110E	?	Collapsed 5 ft dia 40 ft to water high hazard	do
Do	80	4104865N 354105E	?	Collapsed 6 ft dia 20 ft deep enters room high hazard	do
Do	81	4104855N, 354130E	?	Collapsed 8 ft dia 50 ft deep dry high hazard	do
Do	82	4104830N 354140E	?	Collapsed 15 ft dia at top narrows to 6 ft dia 50 ft deep to water high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Age	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 14	83	4104805N, 354125E	?	Collapsed 20 ft dia at top narrows to 8 ft 50 ft deep dry high hazard	Plugging
Do	84	4104820N 354110E	?	Collapsed, 15 ft dia narrows to 8 ft dia 70 ft deep dry high hazard	do
Do	85	4104855N 354095E	?	Collapsed, 6 ft dia 20 ft deep dry enters room high hazard	do
Do	86	4104880N 354085E	?	Collapsed 6 ft dia 20 ft deep dry, high hazard	do
Do	87	4104850N, 354055E	?	Collapsed 7 ft dia 20 ft deep enters mine room high hazard	do
Do	88	4104830N, 354065E	?	Collapsed 30 ft dia narrows to 10 ft dia 80 ft deep dry high hazard	do
Do	89	4104785N 354060E	?	Collapsed 12 ft dia narrows to 6 ft dia 30 ft deep dry high hazard	do
Do	90	4104760N, 354060E	?	Collapsed 10 ft dia narrows to 6 ft dia 80 ft deep dry high hazard	do
Do	91	4104725N 354040E	?	Collapsed 15 ft dia narrows to 6 ft 50 ft deep to water high hazard	do
Do	92	4104685N 354030E	?	Collapsed 30 ft dia narrows to 6 ft dia 50 ft deep to water high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S , R 25E, sec 14	93	4104640N 354045E	Southside Mine	Collapsed, 25 ft dia 35 ft deep dry high hazard	Filling
Do	94	4104740N 354090E	?	Collapsed 8 ft dia at top narrows to 4 x 4 ft cribbed shaft 40 ft deep dry high hazard	Plugging
Do	95	4104690N, 354095E	?	Collapsed, 6 ft dia 20 ft deep dry high hazard	do
Do	96	4104710N 354115E	?	Collapsed 40 ft dia in chat pile narrows to 8 ft dia 80 ft deep washed out on east side receives runoff during rains high hazard	do
Do	97	4104700N 354130E	?	Collapsed 15 ft dia narrows to 10 ft dia 50 ft deep dry high hazard	do
Do	98	4104680N 354135E	?	Collapsed, 10 ft dia 50 ft deep dry high hazard	do
Do	99	4104625N, 354170E	Southside Mine (?)	Open, uncollapsed 6 x 5 ft 40 ft deep to water high hazard	Plugging or capping
Do	100	4104855N 354420E	do	Collapsed 6 ft dia 10 ft to top of mine room high hazard	Plugging
Do	101	4104855N 354435E	do	Collapsed 20 ft dia 10-15 ft deep dry moderate hazard	Filling

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 14	102	4104760N 354500E	Southside Mine	Collapsed 7 ft dia 20 ft deep dry high hazard	Plugging
Do	103	4104730N 354500E	do	Collapsed at top 12 ft dia uncollapsed below 4 x 4 ft cribbing 40 ft deep dry high hazard	do
Do	104	4104555N 354575E	do	Collapsed, on bridge between collapses 15 ft of roof rock within 75 ft of house high hazard	Filling or plugging
Do	105	4104575N, 354680E	do	Open 6 ft dia some cribbing partially collapsed 20 ft deep dry high hazard	Plugging
Do	106	4104630N 354690E	do	Open uncollapsed 4 x 6 ft cribbed 30 ft deep dry high hazard	do
Do	107	4104645N, 354705E	do	Collapsed, 15 x 40 ft at top 8 ft dia below 50 ft deep dry receives runoff during rains high hazard	do
Do	108	4104675N, 354705E	do	Collapsed 30 ft dia narrows to 8 ft enters mine room at about 20 ft dry thin roof high hazard	do
Do	109	4104685N 354695E	do	Collapsed 20 ft dia narrows to 6 ft enters mine room at 15 ft dry thin roof high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 14	110	4104695N, 354680E	Southside Mine	Collapsed 20 ft dia narrows to 5 ft enters mine room at 20 ft dry thin roof high hazard	Plugging
Do	111	4104700N 354645E	do	Collapsed 35 ft dia narrows to 7 ft 60 ft deep to water, high hazard	do
Do	112	4104685N, 354605E	do	Collapsed, 30 ft dia narrows to 4 ft dia triangular cribbing 60 ft to water high hazard	do
Do	113	4104705N 354730E	do	Collapsed, in east end of surface collapse opens to mine room at 15 ft high hazard	Filling
Do	114	4104735N 354695E	do	Open uncollapsed 4 x 5 ft cribbed 60 ft deep to water high hazard	Plugging
Do	115	4104760N 354755E	do	Collapsed 30 ft dia 50 ft deep to water in chat pile high hazard	Filling
Do	116	4104790N, 354780E	do	Collapsed 15 ft dia 25 ft deep in chat pile high hazard	Plugging
Do	117	4104775N 354710E	do	Collapsed 20 ft dia 60-70 ft to water high hazard	Filling or fencing
Do	118	4104800N 354705E	do	Collapsed 40 ft dia 10-15 ft deep partially filled with trash low hazard	Filling

TABLE C-1 - Open Mine Shafts Adits, and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 14	119	4104790N 354685E	Southside Mine	Collapsed 25 ft dia narrows to 10 ft dia 60-70 ft deep to water high hazard	Filling or plugging
Do	120	4104810N 354640E	do	Collapsed 20 ft dia narrows to 4 x 6 ft 40 ft deep dry high hazard	Plugging
Do	121	4104820N 354610E	do	Collapsed 6 ft dia 40 ft deep dry high hazard	do
Do	122	4104790N, 354560E	do	Collapsed 20 ft dia narrows to 4 ft dia 50 ft deep to water shaft opening buried beneath trash high hazard	do
Do	123	4104845N, 354525E	do	Collapsed 20 ft dia 15 ft deep dry moderate hazard	Filling
Do	124	4104880N, 354545E	do	Collapsed 20 ft dia 15 ft deep dry moderate hazard	do
Do	125	4104910N, 354560E	do	Collapsed 10 ft dia 15 ft deep dry high hazard	do
Do	126	4104920N, 354535E	do	Collapsed 6 ft dia 30 ft deep dry high hazard	Plugging
Do	127	4104910N 354515E	do	Collapsed 6 ft dia 50 ft deep dry high hazard	do
Do	128	4104930N, 354500E	do	Collapsed 10 ft dia 30 ft deep dry high hazard	Plugging or filling
Do	129	4104960N 354525E	do	Collapsed 12 ft dia 10 ft deep dry moderate hazard next to road	Filling

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 14	130	4104950N 354550E	Southside Mine	Collapsed 12 ft dia narrows to 6 ft dia 30 ft deep to water high hazard	Plugging
Do	131	4104935N 354570E	do	Collapsed 6 ft dia 20 ft deep dry high hazard	Plugging or filling
Do	132	4104925N, 354590E	do	Collapsed, 6 ft dia 40 ft deep to water high hazard	Plugging
Do	133	4104970N 354585E	do	Collapsed 8 ft dia 20 ft deep dry connects to shallow mine room high hazard	Filling
Do	134	4104970N 354600E	do	Collapsed 6 ft dia 20 ft deep dry connects to shallow mine room high hazard	do
Do	135	4104905N, 354625E	do	Collapsed 6 x 8 ft 30 ft deep high hazard	Plugging
Do	136	4104855N, 354635E	do	Collapsed 12 ft dia 10 ft deep dry low hazard	Filling
Do	137	4104885N 354650E	do	Collapsed 20 ft dia narrows to 5 ft 50 ft deep dry high hazard	Plugging
Do	138	4104920N 354655E	do	Collapsed 5 ft dia 40 ft deep dry high hazard	do
Do	139	4104965N 354665E	do	Collapsed 5 ft dia 40 ft deep dry enters mine room accessible through collapse #54 high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T-34S R-25E sec 14	140	4104970N 354680E	Southside Mine	Collapsed 6 ft dia 40 ft deep dry enters mine room accessible by surface collapse #54 high hazard	Plugging
Do	141	4104940N, 354685E	do	Collapsed 8 ft dia 60 ft deep dry high hazard	do
Do	142	4104880N 354685E	do	Collapsed 20 ft dia narrows to 6 ft dia 60 ft deep dry high hazard	do
Do	143	4104960N 354710E	do	Collapsed 6 ft dia 20 ft deep dry high hazard	do
Do	144	4104935N, 354720E	do	Collapsed, 20 ft dia narrows to 6 ft 50 ft deep dry high hazard	do
Do	145	4104920N 354730E	do	Collapsed 40 ft dia narrows to 10 ft 80 ft deep to water high hazard	Plugging or filling
Do	146	4104980N, 354745E	do	Collapsed 10 ft dia connects with mine collapse to east high hazard	Filling
Do	147	4104970N 354755E	do	Collapsed 15 ft dia narrows to 6 ft dia enters shallow mine room high hazard	Plugging
Do	148	4104935N, 354765E	do	Collapsed 20 ft dia at top narrows to 6 ft dia 50 ft deep dry high hazard	do
Do	149	4104950N 354810E	do	Collapsed 6 x 6 ft 30 ft deep dry enters mine room high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S , R 25E sec 14	150	4104970N 354850E	Southside Mine	Collapsed 8 ft dia 30 ft deep dry high hazard	Plugging
Do	151	4104950N 354860E	do	Collapsed 8 ft dia 40 ft deep dry high hazard	do
Do	152	4104865N, 354790E	do	Open uncollapsed 6 x 6 ft concrete collar 70 ft deep high hazard	Capping or plugging
Do	153	4104865N 354840E	do	Collapsed 25 ft dia narrows to 8 ft dia 80 ft deep dry high hazard	Plugging
Do	154	4104895N, 354845E	do	Collapsed 25 ft dia 20 ft deep dry high hazard	Filling
Do	155	4104920N 354880E	do	Collapsed, 12 ft dia 50 ft deep opens to mine room dry high hazard	Plugging
Do	156	4104920N 354900E	do	Collapsed 6 ft dia 50 ft deep dry enters mine room high hazard	do
Do	157	4104930N 354950E	do	Collapsed 5 ft dia 30 ft deep dry high hazard	do
Do	158	4104895N, 354960E	do	Collapsed 20 ft dia narrows to 6 ft dia enters mine room on north side high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 14	159	4104875N, 354985E	Southside Mine	Collapsed, 15 ft dia at top narrows to 5 x 5 ft some cribbing in place on edge of collapse 30 ft deep dry high hazard	Plugging
Do	160	4104835N, 354900E	do	Collapsed, 40 ft dia narrows to 10 ft 30 ft deep dry may have collapsed with cave-in to south, #68 high hazard	Filling
Do	161	4104715N 354925E	do	Collapsed 40 ft dia narrows to 7 ft 30 ft deep mud bottom in chat pile high hazard	Plugging
Do	162	4104680N, 354870E	do	Collapsed 7 ft dia 30 ft deep dry high hazard	do
T 34S R 25E , sec 15	1	4105210N, 352345E	?	Collapsed, 20 ft dia 20 ft deep dry moderate hazard	Filling
Do	2	4105150N 352380E	?	Collapsed 20 ft dia 10 ft deep partially filled with brush low hazard	do
Do	3	4105115N 352390E	?	Collapsed 15 ft dia 15 ft deep dry moderate hazard	do
Do	4	4105200N 352440E	?	Collapsed 20 ft dia 10 ft deep dry low hazard	Filling
Do	5	4105370N, 352660E	?	Collapsed 15 ft dia 15 ft deep dry moderate hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E, sec 15	6	4105435N 352710E	?	Collapsed, 4 ft dia 6 ft to water moderate hazard	Filling
Do	7	4105410N 352770E	?	Collapsed 4 ft dia water at 6 ft moderate hazard	do
Do	8	4105340N, 352770E	Enright Mine (?)	Collapsed, 15 ft dia 10 ft deep dry low hazard	do
Do	9	4105295N 352730E	?	Collapsed 5 ft dia 15 ft deep to water high hazard	do
Do	10	4105295N, 352700E	?	Collapsed 10 ft dia narrows to 5 ft dia 15 ft deep dry high hazard	do
Do	11	4105260N, 352690E	?	Collapsed 10 ft dia narrows to 4 ft dia 20 ft deep to water high hazard	Plugging
Do	12	4105240N 352750E	?	Collapsed 20 ft dia 12 ft deep dry moderate hazard	Filling
Do	13	4105180N 352810E	?	Collapsed 15 ft dia narrows to 5 ft dia 30 ft deep dry high hazard	Plugging
Do	14	4105250N, 352805E	?	Collapsed 35 ft dia partially filled with trash 15-20 ft deep dry low hazard	Filling
Do	15	4105235N 352845E	?	Collapsed 25 ft dia 15 ft deep dry junk in bottom low hazard	do
Do	16	4105250N, 352855E	?	Collapsed 10 ft dia 10 ft deep dry how hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E, sec 15	17	4105340N 352900E	Enright Mine (?)	Open and partially water-filled 110 ft wide 600 ft long depth ? moderate hazard Open pit	Filling or fencing
Do	18	4105450N 353355E	?	Collapsed 10 ft dia 10 ft deep filled with trash moderate hazard	Filling
Do	19	4105430N, 353290E	?	Open little collapse 6 x 6 ft 40 ft deep dry high hazard	Plugging
Do	20	4105395N 353250E	?	Collapsed 8 ft dia 40 ft to water drift exposed in northeast wall of shaft high hazard	do
Do	21	4105380N, 353240E	?	Collapsed 20 ft dia 15 ft deep opens to mine room on east side 12 ft roof high hazard	do
Do	22	4105355N 353290E	?	Collapsed 8 ft dia 40 ft deep dry high hazard	do
Do	23	4105330N 353260E	?	Collapsed 6 ft dia 20 ft deep dry enters mine room at 15 ft depth drifts lead east and west top ladder in hole high hazard	do
Do	24	4105330N 353225E	?	Collapsed 8 ft dia 40 ft deep dry high hazard	do
Do	25	4105295N 353220E	?	Collapsed opens into hillside near RR track ladder found near opening depth ? high hazard	do

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 15	26	4105280N 353235E	?	Collapsed 10 ft dia 15 ft deep moderate hazard	Filling
Do	27	4105290N 353245E	?	Collapsed 8 ft dia 10 ft deep dry moderate hazard	do
Do	28	4105275N 353260E	?	Collapsed, 5 ft dia 10 ft deep dry high hazard	do
Do	29	4105260N 353270E	?	Collapsed 5 ft dia 30 ft deep dry high hazard	Plugging
Do	30	4105250N 353270E	?	Collapsed 4 ft dia 20 ft deep dry high hazard	Filling
Do	31	4105250N 353225E	?	Collapsed 4 ft dia 6 ft deep to water near RR tracks moderate hazard	Plugging
Do	32	4105075N 353090E	?	Collapsed 20 ft dia 15 ft deep to water high hazard	Filling
Do	33	4105020N 353325E	?	Collapsed 4 ft dia 6 ft to water high hazard	Plugging
Do	34	4104935N 353030E	?	Collapsed 8 ft dia 20 ft to water high hazard	do
Do	35	4104900N 352980E	?	Collapsed 20 ft dia narrows to 5 ft station waggon partially blocking shaft opening 25 ft to water some concrete collapsing in hole high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 15	36	4104415N, 352870E	Scarlett Kid Mine	Collapsed, 50 ft dia 20 ft deep partially filled with trash and car bodies moderate hazard	Filling
T 34S R 25E , sec 22	1	4103565N 353265E	Williams Mines (?)	Collapsed partly closed opening is bridged by loose rock and dirt 50 ft to water high hazard	Plugging
Do	2	4103410N 353160E	New Century Mine	Open 4 x 4 ft wood cribbing in place filled with water to top depth ? moderate hazard	do do
Do	3	4103410N 352890E	New York Mine	Collapsed 10 ft dia at top narrows to 4 ft dia cribbed to within 10 ft of surface on side of cave-in 40 ft to water high hazard	do
Do	4	4103395N, 352765E	do	Collapsed 40 ft dia narrows to 8 ft 30 ft deep to water high hazard	do
Do	5	4103395N, 352590E	do	Collapsed 40 ft dia narrows to 5 ft dia 40 ft deep dry cribbing to within 20 ft of surface in chat pile high hazard	do
Do	6	4103300N 352785E	do	Collapsed 50 ft dia at top 40 ft deep to 5 ft dia shaft opening and water level high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 22	7	4103315N 352820E	New York Mine	Collapsed 40 ft dia at top narrows to 12 ft 40 ft deep to trash high hazard	Plugging
Do	8	4103185N 352675E	do	Open, uncollapsed 5 x 7 ft cribbed to top 30 ft deep high hazard	do
Do	9	4103125N 352540E	do	Collapsed 35 ft dia narrows to 10 ft 30 ft to water high hazard	do
Do	10	4103085N, 352830E	do	Collapsed 25 ft dia 6 ft deep water-filled moderate hazard	Filling
Do	11	4103060N, 352830E	do	Collapsed 25 ft dia narrows to 5 ft dia 20 ft to water high hazard on side of mine collapse	Plugging or filling
Do	12	4102890N, 352460E	New York Mine (?)	Collapsed 18 ft dia at top narrows to 4 ft 40 ft deep dry cribbed to 10 ft below surface high hazard	Plugging
Do	13	4102685N, 352480E	do	Collapsed 20 ft dia at top narrows to 10 ft dia 40 ft deep to water high hazard	do
Do	14	4102860N 353130E	New Century Mine	Collapsed 25 ft dia narrows to 5 x 5 ft cribbing 20 ft to water high hazard	do
Do	15	4102800N 353200E	do	Collapsed 30 ft dia at top narrows to 6 ft dia 50 ft deep to water high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 22	16	4102665N, 353155E	New Century Mine	Collapsed 15 ft dia at top narrows to 5 ft dia cribbing begins 15 ft below surface 30 ft deep dry high hazard	Plugging
Do	17	4102850N 353325E	do	Collapsed 25 ft dia narrows to 10 ft dia 30 ft deep to water high hazard	do
Do	18	4102840N 353340E	do	Collapsed 25 ft dia narrows to 6 ft 50 ft deep to water high hazard	do
Do	19	4102825N 353320E	do	Collapsed 40 x 50 ft at surface enters mine room at 30 ft depth water at 40 ft high hazard	Filling or fencing
T 34S R 25E sec 23	1	4103775N, 354715E	?	Collapsed 40 ft dia at surface narrows to 10 ft dia 20 ft to water high hazard	Plugging
Do	2	4103745N, 354750E	?	Collapsed 40 ft dia 20 ft deep dry junk at bottom low hazard	Filling
Do	3	4103720N 354675E	?	Collapsed 25 ft dia at top narrows to 5 x 7 ft cribbed shaft water at top of cribbing at depth of 15-25 ft high hazard	Plugging
Do	4	4103670N, 354740E	?	Collapsed 25 ft dia narrows to 6 ft dia water at 20 ft high hazard	Plugging or filling

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 23	5	4103710N, 354400E	Ohio Mine	Collapsed 20 ft dia 15 ft deep dry moderate hazard	Filling
Do	6	4103670N 354590E	?	Collapsed 50 ft dia narrows to 6 ft water at 20 ft joins shaft #7 high hazard	Plugging or filling
Do	7	4103665N 354605E	?	Collapsed, 50 ft dia narrows to 15 ft dia water at 20 ft shaft appears to enter mine room to south joins shaft #6 high hazard	do
Do	8	4103645N 354620E	?	Collapsed 25 ft dia filled with clear water no visible bottom high hazard	Plugging
Do	9	4103640N 354605E	?	Collapsed 20 ft dia trash and water-filled may be deep high hazard	Plugging or filling
Do	10	4103545N 353755E	?	Collapsed 20 ft dia narrows to 4 x 4 ft cribbed shaft high hazard	Plugging
Do	11	4103390N 353400E	?	Collapsed 30 ft dia narrows to 10 ft dia 50 ft to water high hazard	do
Do	12	4103330N, 353465E	West Virginian Mine and/or Central Mine	Collapsed 20 x 40 ft narrows to 20 ft dia enters mine on west side in tall grass and weeds high hazard	Filling or fencing

TABLE C-1 - Open Mine Shafts Adits, and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 23	13	4103340N 353590E	West Virginian Mine and/or Crystal Mine	Collapsed 100 ft dia narrows to 6 ft dia at depth of 40 ft opens to mine room on east side high hazard	Plugging
Do	14	4103305N 353585E	do	Collapsed 70 ft dia narrows to 10 ft dia 60 ft deep to water 1981 photos show only 15 ft deep further collapse occurred between photography and field check high hazard	do
T 34S R 25E , sec 25	1	4101015N, 355945E	?	Collapsed 20 ft dia 20 ft deep dry in woods (isolated) high hazard	Filling
T 34S R 25E sec 26	1	4101455N 354480E	Hartford Mine	Collapsed 10 ft dia depth 80 ft high hazard except it is enclosed by 6 ft chain link fence	None
Do	2	4101245N, 354550E	do	Collapsed 30 ft dia water at 15 ft high hazard	Filling or fencing
T 34S R 25E sec 27	1	4102585N, 353125E	Rochester Mine	Collapsed 15 ft dia 15 ft deep moderate hazard	Filling
Do	2	4102565N, 353205E	do	Collapsed 20 ft dia at top narrows to 6 ft 40 ft deep to water high hazard	Plugging
Do	3	4102540N, 353185E	do	Collapsed 15 ft dia narrows to 8 ft dia 30 ft deep to water high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 27	4	4102500N 353110E	Rochester Mine	Collapsed 6 ft dia 40 ft deep to water high hazard	Plugging
Do	5	4102300N 353275E	Weyland Mine	Collapsed 6 ft dia 20 ft deep dry high hazard	do
Do	6	4102310N 353215E	do	Collapsed 6 ft dia 40 ft deep to water under large concrete structure high hazard	do
Do	7	4102340N, 353130E	do	Collapsed 4 x 6 ft some cribbing depth - 30 ft to water high hazard	do
Do	8	4102360N, 353030E	do	Collapsed 20 ft dia 20 ft deep dry moderate hazard	Filling
Do	9	4102400N 352970E	do	Collapsed 6 ft dia 30 ft deep to water high hazard	Plugging
Do	10	4102455N 352960E	Rochester Mine	Collapsed 6 ft dia 20 ft deep dry high hazard	do
Do	11	4102505N 352850E	?	Collapsed 40 ft dia 80 ft deep partially closed off by trash dry high hazard	do
Do	12	4102350N, 352900E	?	Collapsed 12 ft dia narrows to 6 ft dia 80 ft deep dry high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E, sec 27	13	4102205N 352735E	?	Collapsed 25 ft dia narrows to 6 ft dia 60 ft deep to water high hazard	Plugging
Do	14	4102180N, 352715E	?	Collapsed 10 ft dia 50 ft deep to water drift exposed east side of shaft high hazard	do
Do	15	4102140N 352745E	?	Collapsed 8 ft dia 30 ft deep to water high hazard	do
Do	16	4102130N 352845E	?	Collapsed 6 ft dia 50 ft to water high hazard	do
Do	17	4102125N, 353130E	?	Open uncollapsed 5 x 5 ft 20 ft deep to water high hazard	do
Do	18	4102090N, 353105E	Boston Mine (?)	Collapsed, 6 ft dia 30 ft deep to water enters mine room high hazard	do
Do	19	4102060N 353085E	Boston Mine	Collapsed 6 ft dia 10 ft deep to water high hazard	do
Do	20	4102090N, 353025E	do	Collapsed 6 ft dia 50 ft deep to water high hazard	do
Do	21	4102075N, 353025E	do	Collapsed some cribbing 2 x 3 ft 50 ft deep to water high hazard	do
Do	22	4102075N 353010E	do	Collapsed 8 ft dia 40 ft deep to water high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 27	23	4102060N 353020E	Boston Mine	Collapsed 6 ft dia 30 ft deep dry high hazard	Plugging
Do	24	4102000N 353060E	do	Collapsed, 6 ft dia 20 ft deep dry high hazard	Plugging or filling
Do	25	4101990N 353030E	do	Collapsed 5 ft dia 30 ft deep dry high hazard	Plugging
Do	26	4101980N 353045E	do	Collapsed 20 x 30 ft enters mine room to east depth ? high hazard	Filling or fencing
Do	27	4101920N 353040E	do	Collapsed, 5 ft dia 30 ft deep dry high hazard	Plugging
Do	28	4101950N 353025E	do	Collapsed, 5 ft dia 25 ft deep to water high hazard	do
Do	29	4101970N 353015E	do	Collapsed 5 ft dia 20 ft deep to water high hazard	do
Do	30	4101985N, 353010E	do	Collapsed 5 ft dia 20 ft deep to water high hazard	do
Do	31	4101995N 353010E	do	Collapsed 5 ft dia 10 ft deep to water moderate hazard	Filling
Do	32	4102000N 352960E	do	Collapsed 6 ft dia 30 ft to water high hazard	Plugging

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 27	33	4102045N 352975E	Boston Mine	Collapsed 6 ft dia 50 ft deep to water high hazard	Plugging
Do	34	4102060N, 352970E	do	Collapsed 8 ft dia 60 ft deep dry high hazard	do
Do	35	4102075N 352950E	do	Collapsed 6 ft dia 60 ft deep to water high hazard	do
Do	36	4102065N 352935E	?	Collapsed 6 ft dia 60 ft deep to water high hazard	do
Do	37	4102035N, 352910E	?	Collapsed 6 ft dia 30 ft deep to water high hazard	do
Do	38	4102060N 352900E	?	Collapsed 8 ft dia 40 ft deep dry high hazard	do
Do	39	4102080N, 352865E	?	Collapsed 10 ft dia 20 ft deep dry high hazard	Filling
Do	40	4102045N 352855E	?	Collapsed 20 ft dia at top narrows to 6 ft dia 30 ft deep high hazard	Plugging
Do	41	4101900N 352810E	?	Collapsed 6 ft dia water-filled appears to be deep moderate hazard	do
Do	42	4101855N 352775E	?	Collapsed 6 ft dia water-filled appears to be deep moderate hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 27	43	4101960N, 352750E	?	Collapsed 4 ft dia water-filled does not appear to be deep low hazard	Filling
Do	44	4101970N, 352720E	?	Collapsed 6 ft dia 30 ft deep to water high hazard	Plugging
Do	45	4102055N, 352770E	?	Collapsed 6 ft dia 20 ft deep to water high hazard	do
Do	46	4102100N 352750E	?	Collapsed 20 ft dia narrows to 6 ft dia 30 ft deep to water high hazard	do
Do	47	4102090N 352740E	?	Collapsed 20 ft dia narrows to 6 ft 30 ft deep dry high hazard	do
Do	48	4102075N, 352725E	?	Collapsed 6 ft dia 20 ft to water high hazard	do
Do	49	4102035N, 352690E	?	Collapsed 6 ft dia 20 ft deep dry high hazard	do
Do	50	4102035N, 352710E	?	Collapsed 6 ft dia 20 ft deep to water high hazard	do
Do	51	4102025 352720E	?	Collapsed 10 x 20 ft enters mine room at shallow depth maybe roof-collapse high hazard	Filling or fencing
Do	52	4102010N, 352720E	?	Collapsed 5 ft dia enters mine room at depth of 10 ft high hazard	Plugging

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E , sec 27	53	4101985N, 352705E	?	Collapsed, 6 ft dia 20 ft deep dry high hazard	Plugging
Do	54	4101970N, 352705E	?	Collapsed 6 ft dia 30 ft deep dry high hazard	do
Do	55	4101950N 352690E	?	Collapsed 6 ft dia 30 ft deep dry enters mine room high hazard	do
Do	56	4101935N 352680E	?	Collapsed 6 ft dia 50 ft deep to water high hazard	do
Do	57	4101965N 352675E	?	Collapsed 6 ft dia 50 ft deep dry high hazard	do
Do	58	4102065N 352525E	?	Collapsed, 30 ft dia at top narrows to 6 ft dia 25 ft deep to water high hazard	do
Do	59	4102075N, 352505E	?	Collapsed 25 ft dia narrows to 6 ft dia high hazard	do
Do	60	4102085N 352530E	?	Collapsed 20 ft dia narrows to 6 ft dia some cribbing in place 20 ft deep to water high hazard	do
Do	61	4102090N, 352510E	?	Collapsed 40 x 60 ft at top narrows to 6 x 10 ft 20 ft to water which appears to be deep high hazard	do

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	are	Size and Present Condition	Suggested Remedial Action
T 34S , R 25E , sec 27	62	4102240N, 352425E	?	Collapsed 90 ft dia narrows to 5 x 5 ft shaft opening at depth of 40 ft contains trash water-filled to top of shaft high hazard	Plugging
Do	63	4102115N, 352310E	?	Collapsed 70 ft dia narrows to 20 ft dia at top of exposed mine room 30 ft to water near road high hazard	Filling or fencing
Do	64	4102110N 352295E	?	Collapsed 20 ft dia narrows to 5 ft dia 30 ft deep to water cribbing in place to within 20 ft of surface high hazard	Plugging
Do	65	4102100N, 352240E	?	Collapsed 15 ft dia 10 ft deep dry moderate hazard	Filling
Do	66	4101970N 352435E	?	Collapsed, 5 ft dia 40 ft deep dry cribbed to 10 ft of surface high hazard	Plugging
Do	67	4101880N, 352565E	?	Collapsed, 12 ft dia narrows to 6 ft dia 60 ft deep to water high hazard	do
Do	68	4101885N, 352415E	?	Open 5 x 5 ft cribbed in chat pile 35 ft deep to water high hazard	do
Do	69	4101845N, 352435E	?	Collapsed 20 ft dia narrows to 8 ft dia 35 ft deep to water high hazard	do

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S., R 25E., sec 27	70	4101830N 352425E	?	Collapsed, 8 ft dia 10 ft deep dry moderate hazard	Filling
Do	71	4101820N, 352460E	?	Collapsed 6 ft dia 60 ft deep to water high hazard	Plugging
Do	72	4101800N 352460E	?	Collapsed 8 ft dia 50 ft deep to water high hazard	do
Do	73	4101780N, 352440E	?	Collapsed 6 ft dia 40 ft deep to water high hazard	do
Do	74	4101770N 352450E	?	Collapsed 8 ft dia 5 ft deep to water high hazard	do
Do	75	4101815N, 352525E	?	Collapsed 5 x 5 ft wood cribbing in place and in poor condition 5 ft deep to water high hazard	do
Do	76	4101520N 352065E	Andayer Mine (?)	Open 5 x 5 ft cribbing in poor condition 5 ft deep to water depth (?) high hazard	do
Do	77	4101405N, 352100E	?	Collapsed 6 ft dia 20 ft deep dry high hazard	do
Do	78	4101175N, 352125E	?	Collapsed 12 ft dia 8 ft deep to water moderate hazard	Filling
Do	79	4101370N, 352100E	?	6 x 6 ft length (?) partially flooded high hazard Adit	Sealing

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E , sec 27	80	4102050N, 352670E	?	5 x 5 ft length (?) partially flooded high hazard Adit	Sealing
Do	81	4102040N 352690E	?	do	do
Do	82	4102035N, 352710E	?	do	do
Do	83	4102055N 352715E	?	do	do
Do	84	4102025N 353035E	Boston Mine	do	do
T 34S R 25E , sec 28	1	4101520N 351580E	Andayer Mine	Open slight collapse 5 x 5 ft cribbing in fairly good condition high hazard	Plugging
Do	2	4101480N, 351570E	Andayer Mine (?)	Collapsed 25 ft dia at top 18 ft deep to water high hazard	Filling or plugging
Do	3	4101460N, 351570E	Andayer Mine	Collapsed 40 ft dia 16 ft deep to water drift exposed in shaft wall heading northeast high hazard	do
Do	4	4101460N, 351595E	do	Collapsed, 20 ft dia 18 ft deep dry moderate hazard	Filling
Do	5	4101435N, 351600E	do	Collapsed slightly 5 x 5 ft no cribbing in place 30 ft deep to water high hazard	Plugging
T 34S R 25E sec 33	1	4100810N, 351380E	?	Collapsed 12 ft dia 20 ft deep dry between 2 homes a ladder made of old tires was placed in shaft for escape by owner high hazard	Filling

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 34	1	4099815N 352980E	Boska Mine	Collapsed 30 ft dia at top narrows to 15 ft dia shaft opening partially blocked by large concrete slab depth 100 ft dry high hazard	Plugging
Do	2	4099525N, 353035E	Clermont Mine	Collapsed 40 ft dia 20 ft deep dry low hazard	Filling
T35S R 23E sec 2	1	4098610N, 334835E	Northern Mine	Collapsed 50 ft dia 50-60 ft to water high hazard	Plugging or fencing
Do	2	4098610N 334775E	do	Collapsed 20 ft dia 20 ft deep dry trees growing inside low hazard	Filling
Do	3	4098535N 334740E	Muncie Mine	Collapsed 20 ft dia 15 ft deep dry concrete fallen in hole low hazard	do
Do	4	4098390N, 334210E	Big John Mine	Open uncollapsed 5 x 5 ft wood cribbing 60 ft to water high hazard	Plugging
Do	5	4098300N, 334010E	do	Collapsed 15 ft dia water-filled depth ? high hazard	Filling or plug-
Do	6	4098490N, 335370E	Southern Mine	Open uncollapsed 5 x 7 ft wood cribbing protected by small welded wire fence 50 ft deep to water high hazard	Plugging

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15		Name	Size and Present Condition	Suggested Remedial Action
T 35S , R 23E , sec 2	7	4098480N	335250E	Semple Mine	Collapsed, 40 ft dia in large chat pile cribbing to within 15 ft of surface 100 ft deep to water high hazard	Plugging fencing
Do	8	4098415N	335360E	Southern Mine	Collapsed 15 ft dia blocked by large concrete blocks but still partly open moderate hazard	Plugging
Do	9	4098315N	334960E	Muncie Mine	Collapsed 15 ft dia opening blocked by concrete rubble depth 100 ft to water high hazard	do
Do	10	4098280N	335040E	do	Open uncollapsed 5 x 6 ft concrete collar intact wood cribbing at 15 ft depth 100 ft to water high hazard	Plugging or capping
Do	11	4098230N	335110E	Semple Mine	Collapsed 50 ft dia concrete slab falling in on south side partially fenced off but fence is down in places high hazard	Plugging
T 35S R 23E sec 3	1	4099455N	332980E	Stebbins Mine	Open uncollapsed 6 x 12 ft concrete collar intact cribbing is rotted and in poor condition no protection high hazard	Capping or plugging

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 23E sec 3	2	4099160N 333060E	Stebbins Mine	Collapsed 30 ft dia 100 ft deep to water in trees high hazard	Plugging
Do	3	4099155N, 333105E	Lucky Jew Mine	Collapsed 40 ft dia 20 ft to water high hazard	Filling
Do	4	4099065N 333680E	Mark Twain Mine	Open uncollapsed 5 x 6 ft, concrete collar intact brush piled over top 100 ft deep to water no protection high hazard	Plugging
Do	5	4098680N, 333305E	Lucky Jew Mine	Collapsed, 20 ft dia 20 ft deep dry partly trash-filled moderate hazard	Filling
Do	6	4098680N 333605E	do	Open uncollapsed 5 x 6 ft wood cribbing pulling away from sides of shaft 80 ft deep to water no protection high hazard	Plugging
T 35S , R 23E , sec 10	1	4097510N 333815E	Big John Mine	Collapsed 45 ft dia water-filled deep high hazard	Fencing
Do	2	4096880N, 333660E	Jarrett Mine	Open 5 x 7 ft cribbed 100 ft to water partially covered by car body high hazard	Plugging
Do	3	4096840, 332675E	A D Chubb Mine	Collapsed 40 ft dia partly filled with water fenced low hazard	Filling

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 23E, sec 10	4	4096770N, 332615E	A D Chubb Mine	Collapsed, 30 ft dia partly water-filled low hazard	Filling
Do	5	4096680N 333740E	Jarrett Mine	Collapsed 20 ft dia filled with large concrete blocks may be braced 6 ft deep fenced moderate hazard	Filling
Do	6	4097395N, 333460E	Big John Mine	Open uncollapsed 4 x 8 ft cribbed partially covered by loose planks 50 ft deep to water in brush high hazard	Plugging
T 35S R 23E sec 11	1	4098080N, 334250E	do	Collapsed 50 ft dia adjacent to a western branch of Tar Creek shaft opening is 8 ft dia partially covered by large boulder when creek flows it is diverted to shaft and goes underground high hazard	do
Do	2	4098060N, 335180E	Big Elk Mine	Collapsed 20 ft dia water-filled moderate hazard	Fencing or filling
Do	3	4097915N, 334560E	Black Eagle Mine	Collapsed 20 ft dia contains caved concrete water-filled depth ? high hazard	Plugging or fencing

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 23E sec 11	4	4097815N 334915E	Tar Creek Mine	Collapsed, 20 ft dia water-filled appears deep moderate hazard	Plugging or fencing
Do	5	4097775N, 334860E	do	Open uncollapsed 5 x 7 ft concrete collar in place 80 ft deep dry fenced off high hazard	Plugging
Do	6	4097665N, 334740E	Tulsa Quapaw Mine	Collapsed, 35 ft dia 40 ft deep to water high hazard	Plugging or fencing
Do	7	4097480N 334010E	Robinson Mine	Collapsed 30 ft dia 80 ft deep dry high hazard	Plugging
Do	8	4097480N, 334780E	Tulsa Quapaw Mine	Collapsed 6 x 12 ft concrete collar undermined 50 ft deep to water high hazard	do
Do	9	4097460N, 334870E	do	Collapsed, 15 ft dia 15 ft deep dry low hazard	Filling
Do	10	4097440N 335310E	Fox Mine	Open collapsed 10 x 6 ft concrete collar on southeast edge of large mine cave-in 40 ft deep to water high hazard	Plugging
Do	11	4097390N 334805E	Tulsa Quapaw Mine	Collapsed 20 ft dia 10 ft deep dry low hazard	Filling
Do	12	4097395N, 334585E	Robinson Mine	Collapsed, 35 ft dia 30 ft deep to water high hazard	Plugging

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T-35S- R-23E- sec 11	13	4097390N 334470E	Robinson Mine	Collapsed partially some of concrete collar still in place but is undermined 9 x 12 ft 80 ft deep to water high hazard	Plugging
Do	14	4097190N, 334115E	King Brand Mine	Collapsed, 25 ft dia 50 ft deep to water high hazard	do
Do	15	4097180N 334175E	King Brand Mine	Collapsed 25 ft dia 10 ft deep dry low hazard	Filling
Do	16	4097220N 334955E	Tulsa Quapaw Wade Mine	Collapsed 25 ft dia 60 ft deep to water high hazard	Plugging
Do	17	4097215N 335015E	do	Collapsed 25 ft dia 60 ft deep to water in trees and brush high hazard	do
Do	18	4097080N, 334780E	do	Collapsed 35 ft dia 30 ft deep to water high hazard	do
Do	19	4097100N, 334465E	King Brand Mine	Collapsed 20 ft dia caved under concrete slab on north side 30 ft deep to water high hazard	do
Do	20	4096980N 334205E	do	Collapsed 25 ft dia 15 ft deep in trees moderate hazard	Filling
Do	21	4096815N 333965E	Longacre Mine	Collapsed 40 ft dia mostly filled with water not deep moderate hazard	do

TABLE C-1 - Open Mine Shafts Adits, and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 23E , sec 11	22	4096820N, 334505E	DeArmand Mine	Open, uncollapsed, 5 x 7 ft 20 ft deep high hazard	Plugging or capping
Do	23	4096720N, 334260E	do	Collapsed 50 ft dia water-filled moderate hazard	Fencing or Filling
Do	24	4096705N, 334210E	Longacre Mine	Collapsed, 25 ft dia water-filled not deep moderate hazard	Filling
Do	25	4096605N, 334450E	do	Collapsed 50 ft dia water-filled not deep moderate hazard	do
Do	26	4096610N, 334680E	Bendelari Mine	Collapsed 35 ft dia water-filled deep high hazard	Plugging
Do	27	4098090N, 334000E	Big John Mine	Open uncollapsed concrete collar in place 80 ft deep to water some cribbing collapsed partial collapse on west side high hazard	do
T 35S R 23E , sec 12	1	4097760N, 336210E	K E Jarrett Mine	Collapsed, concrete foundation fallen in 50 ft deep, dry high hazard	Plugging
Do	2	4097430 , 336115E	do	Collapsed 30 ft dia 40 ft deep to water in trees high hazard	do
Do	3	4097465N, 336380E	do	Collapsed cribbing pulled away from sides contains some trash 50 ft deep to water high hazard	do

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 23E sec 12	4	4097465N 336730E	K E Jarrett Mine	Collapsed 80 ft dia water-filled deep high hazard	Plugging or fencing
Do	5	4097425N, 336815E	do	Collapsed 20 ft dia water-filled moderate hazard	do
Do	6	4097200N 336620E	Webber Mine	Collapsed, 70 ft dia water-filled to near top deep high hazard	do
Do	7	4097070N, 335925E	Kansouri Mine	Collapsed 80 ft dia 50 ft deep to water in sumac high hazard	do
Do	8	4096945, 335880E	do	Collapsed, 20 ft dia 50 ft deep to trash-covered bottom dry high hazard	do
T 35S R 23E , sec 13	1	4096390N 336380E	Blue Diamond Mine	Collapsed 45 ft dia water-filled with some trash appears deep moderate hazard	Plugging or fencing
Do	2	4096280N, 336580E	do	Collapsed, 45 ft dia water-filled appears deep contains trash moderate hazard	do
Do	3	4096235N, 336945E	New Blue Diamond Mine	Collapsed 20 ft dia 30 ft deep undercut on south and west side high hazard	Filling
Do	4	4096255N, 336540E	Blue Diamond Mine	Collapsed 50 ft dia water-filled appears deep moderate hazard	Plugging or fencing
Do	5	4096215N, 336280E	do	Collapsed 60 ft dia 25 ft deep dry overgrown with trees low hazard	Filling

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 23E sec 13	6	4096250N, 335560E	Chubb Mine	Possible collapsing shaft-depression in chert 20 ft dia 5 ft deep no immediate hazard	Observation
T 35S , R 23E sec 14	1	4096405N, 334150E	Boska Mine	Collapsed 50 ft dia in chat pile 20 ft deep sometimes filled with water moderate hazard	Filling
Do	2	4096300N 334180E	do	Collapsed, 15 ft dia 10 ft deep dry low hazard	do
Do	3	4096290N, 334535E	Mid-Continent/Lawyers Mine	Collapsed 20 ft dia water-filled to 10 ft of surface appears deep high hazard	Plugging
Do	4	4096225N, 334535E	do	Collapsed, 20 ft dia filled with water to near surface appears deep moderate hazard	do
Do	5	4096320N, 335220E	Wilbur Mine	Open uncollapsed 6 x 6 ft wood cribbing in place 50 ft deep to water high hazard	do
Do	6	4096225N, 335210E	do	Open uncollapsed 5 x 6 ft concrete collar and wood cribbing in place 30 ft deep to water high hazard	Plugging or capping
T 35S R 23E sec 15	1	4096475N, 333715E	Jarrett Mine	Collapsed water-filled in trees moderate hazard	Filling

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Area	Size and Present Condition	Suggested Remedial Action
T 35S R 23E , sec 15	2	4096460N 333605E	Jarrett Mine	Collapsed 25 ft dia 40 ft deep to water fenced high hazard	Plugging
Do	3	4096345N, 333415E	do	Open uncollapsed 6 x 7 ft wood cribbing in place 50 ft deep to water high hazard	do
T 35S R 24E sec 2	1	4099335N, 343725E	Homestake Mine	Collapsed, 30 ft dia at surface narrows to 10 ft dia 80 ft deep dry no protection used as trash dump high hazard	do
Do	2	4099285N, 343695E	do	Collapsed, 100 ft dia filled with turquois-colored water appears deep moderate hazard	Fencing
Do	3	4099265N, 344090E	Clara Jane Mine	Collapsed, 35 ft dia filled with water appears deep moderate hazard	Plugging or fencing
Do	4	4099240N, 344440E	Racetrack Mine	Collapsed, 45 ft dia 20 ft deep dry contains some brush moderate hazard	Filling
Do	5	4099195N 344000E	Clara Jane Mine	Collapsed 35 ft dia water-filled appears deep moderate hazard	Plugging or fencing
Do	6	4098865N 344245E	do	Collapsed 15 ft dia 40 ft deep dry in brush high hazard	Plugging
Do	7	4098780N 343830E	Dines Hartley Mine	Collapsed 40 ft dia 15 deep dry contains large concrete foundations collapsed in hole moderate hazard	Filling

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 24E, sec 3	1	4098670N, 343430N	Liza Jane Mine	Open uncollapsed 6 x 8 ft concrete collar in place deep high hazard	Capping or plugging
Do	2	4098645N, 343320E	do	Collapsed 20 ft dia bridged with concrete blocks and filled in past but still subsiding potentially hazardous	Observation
Do	3	4098440N, 343045E	Hartley Mine	Collapsed 10 ft dia 20 ft deep dry foundations caved in moderate hazard	Filling
Do	4	4098050N, 342535E	English O' Mine	Open, uncollapsed, 8 x 8 ft, concrete collar in place, no protection high hazard	Capping or plugging
Do	5	4098025N, 342620E	do	Collapsed, 40 ft dia water-filled approx 10 ft deep moderate hazard	Filling or fencing
Do	6	4098320N, 343345E	Hartley Mine	Open uncollapsed partly open junk over top concrete collar in place 20 ft deep dry high hazard	Capping or filling
T 35S R 24E, sec 6	1	4098120N, 337240E	Mullen Mine	Collapsed 25 ft dia 10 deep filled with trash moderate hazard	Filling
T 35S R 24E sec 7	1	4098055N, 337255E	Foley Mine	Open, uncollapsed old truck body blocking hole fenced high hazard	Plugging

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S , R 24E sec 7	2	4097285N 337170E	Foley Mine	Collapsed 60 ft dia mostly filled with water and junk moderate hazard	Fencing
T 35S R 24E , sec 10	1	4097870N 342540E	Clark Mine	Collapsed 15 x 25 ft 15 ft deep dry low hazard	Filling
Do	2	4097215N, 342630E	Clark or Cherokee Mine	Collapsed, 25 ft dia 150 ft deep to water high hazard	Plugging
Do	3	4097130N, 342640E	Iron Mountain Mine	Collapsed, 20 ft dia 150 ft deep to water partly fenced	do
Do	4	4097105N 341940E	do	Collapsed, 25 ft dia 20 ft deep may be bridged by concrete in trees high hazard	Plugging or filling
Do	5	4097040N, 342090E	do	Collapsed, 20 ft dia overgrown in trees 150 ft deep to water high hazard	Plugging
Do	6	4096820N 342555E	do	Open uncollapsed concrete collar and cribbing in place partly blocked b concrete 100 ft deep to water high hazard	do
Do	7	4096730N 342580E	Peru Mine	Collapsed, 30 ft dia 20 ft deep dry between 2 large cave-ins low hazard	Filling

TABLE C-1 - Open Mine Shafts Adits, and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 24E sec 10	8	4096725N 342685E	Peru Mine	Collapsed wood cribbing over top of shaft concrete collar caved in 20 ft dia 50 ft deep dry high hazard	Plugging
Do	9	4096715N, 342360E	do	Collapsed 45 ft dia 15 to 20 ft deep occasionally water-filled moderately water-filled moderate hazard	Filling
Do	10	4096710N, 342255E	Euterpe Mine	Collapsed 45 ft dia still caving taking in boulder pile to north, hole partially blocked by tree 200 ft deep to water high hazard	Plugging
Do	11	4096710N, 342205E	do	Collapsed 100 ft dia fenced with warning signs 200 ft deep to water high hazard	Plugging
Do	12	4096635N 342245E	do	Collapsed 70 x 120 ft water-filled appears deep moderate hazard	Plugging or fencing
Do	13	4096665N 342305E	do	Collapsed 60 ft dia water-filled to near surface appears deep moderate hazard	Plugging or fencing
Do	14	4096540N 342380E	Peru Mine	Collapsed 20 x 8 ft partly fenced 200 ft deep dry high hazard	Plugging
Do	15	4096480N, 342235E	Euterpe Mine	Collapsed 70 ft dia filled with water to near surface depth ? moderate hazard	Plugging or fencing

TABLE C-1 - Open Mine Shafts, Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 24E sec 11	1	4097770N 344500E	Sonny Boy Mine	Collapsed 30 ft dia at surface 80 ft deep dry appears to have been filled on 1981 photography collapse occurred after that date high hazard	Plugging
Do	2	4097640N, 344605E	Hartley Grantham Mine	Collapsed 15 ft dia in trees eroded on east side 100 ft deep to water high hazard	do
Do	3	4097620N, 344515E	do	Collapsed 20 ft dia concrete foundation falling in hole 30 ft deep dry high hazard	do
T 35S R 24E sec 12	1	4096350N, 345705E	Commonwealth No 3 Mine	Collapsed 20 ft dia mostly filled with water moderate hazard	Plugging
Do	2	4096350N, 345775E	do	Collapsed 50 ft dia 15 ft deep to water contains junk and old concrete foundations may be bridged high hazard	do
Do	3	4096295N, 345755E	do	Collapsed 15 ft deep 3 ft deep to water depth ? moderate hazard	Plugging or filling
Do	4	4096300N 345715E	do	Open uncollapsed round wood timbers used for cribbing still in place 10 ft deep to water in grass and weeds high hazard	Plugging

TABLE C-1 - Open Mine Shafts, Adits, and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	are	Size and Present Condition	Suggested Remedial Action
T 35S R 24E sec 13	1	4096235N, 345875E	Harrington Mine	Collapsed 15 ft dia concrete slab fallen in dry 10 ft deep low hazard	Filling
Do	2	4096200N, 345860E	do	Collapsed 50 ft dia wood hoisting frame and concrete fallen into shaft filled with water to near surface moderate hazard	Plugging or fencing
Do	3	4096055N 345910E	do	Collapsed, 25 x 35 ft filled with water to near surface some trash, water-murky depth ? moderate hazard	Filling or fencing
Do	4	4096000N, 345740E	do	Collapsed 40-50 ft dia water-filled depth ? appears deep moderate hazard	Fencing or filling
Do	5	4096050N, 345205E	Wade Mine (Commonwealth No 2)	Collapsed 20 ft dia water-filled depth ? moderate hazard	do
Do	6	4095995N, 345190E	do	Collapsed, 180 x 250 ft 60 ft deep dry o overgrown with trees near U S 66 and State Line Road high hazard	Fencing Guardrails
Do	7	4095960N, 345280E	do	Open uncollapsed shaft 5 x 5 ft depth 100 ft to water rotten wood cribbing in place on 3 sides high hazard	Capping or plugging

TABLE C-1 - Open Mine Shafts Adits, and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 24E, sec 13	8	4095950N, 345340E	Wade Mine (Commonwealth No 2)	Collapsed 100 ft dia 50 ft deep to shaft opening 10 ft dia total depth? on State Line adjacent to road high hazard	Fencing--Guardrails
T 35S R 24E sec 16	1	4096335N, 341360E	Bunker Hill Mine	Collapsed, 40 ft dia mostly filled with water depth ? moderate hazard	Fencing or plugging
Do	2	4096320N, 341310E	do	Collapsed 50 ft dia water-filled deep moderate hazard	do
Do	3	4096170N, 341645E	Lucky O K Mine	Open 5 x 7 ft 150 ft deep to water high hazard	Capping or plugging
Do	4	4096125N, 341590E	do	Collapsed dozed shut 20 ft deep dry overgrown in trees low hazard	Filling
Do	5	4096115N, 341545E	do	Collapsed 25 ft dia 250-300 ft deep to water in trees high hazard	Plugging
Do	6	4096145N 341395E	Bunker Hill Mine	Collapsed 40 ft dia filled to varying heights with water deep high hazard	do
T 35S R 24E sec 17	1	4096175N, 339815E	John Stoskopf Mine	Collapsed 25 ft dia 20 ft deep filled with trees and brush moderate hazard	Filling

TABLE C-1 - Open Mine Shafts Adits and Pits--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 24E sec 18	1	4096400N 337700E	Blue Mound Mine	Collapsed 20 ft dia concrete slab overhanging shaft opening fenced in trees 150-200 ft deep to water high hazard	Plugging
Do	2	4096315N, 337325E	do	Collapsed hoisting frame still in place grown up in trees and vines 30 ft deep dry high hazard	Plugging or filling
Do	3	4096310N, 337385E	do	Open uncollapsed 5 x 7 ft wood cribbing in place covered by car body 50 ft deep to water high hazard	Plugging

TABLE C-2 - Subsidence Events

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 32S R 25E Sec 24	1	4123330N, 355840E	Pre-1938	80 ft dia water-filled no protection moderate hazard	Fencing
Do	2	4123290N 355840E	do	150 ft dia water-filled flooded moderate hazard	do
Do	3	4123250N 355880E	1938-1950	150 ft dia 20 ft deep collapsed shaft on west side flooded to 15 ft of surface shaft not visible when flooded high hazard	do
Do	4	4123120N 355890E	Pre-1938	200 ft dia 20 ft deep dry-mud bottom low hazard	do
Do	5	4123050N, 355920E	do	50 ft dia 15 ft deep dry low hazard	do
Do	6	4122760N, 356160E	do	220 ft dia 35 ft deep mud-bottom moderate nazard	do
Do	7	4122790N 356280E	do	200 ft dia 35 ft deep mostly dry holds water occasionally moderate hazard	do
Do	8	4122740N 356410E	do	200 x 450 ft 30 ft deep chat in bottom low to moderate hazard	do
Do	9	4122660N 356280E	do	400 x 200 ft 40 ft deep dry moderate hazard	do

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TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 32S R 25E Sec 24	10	4122560N 356390E	Pre-1938	450 x 200 ft 20 ft deep some water 5 ft deep present - collapsing piers on northeast side near Stateline Road low hazard	Fencing warning signs
Do	11	4122400N, 356460E	do	200 x 400 ft 30 ft deep some water in bottom surrounded by trees near Stateline Road	do
T 32S R 25E Sec 25	1	4122040N 356270E	1938-1950	200 ft dia 25 ft deep dry chat in bottom slight hazard	None
Do	2	4122050N, 356400E	do	110 x 150 ft 40 ft deep Dry piers collapsing on northwest side slight hazard	do
Do	3	4121990N 356360E	Pre-1938	175 x 250 ft 40 ft deep moderate hazard water-mud bottom and car bodies	Fencing
Do	4	4121850N, 356350E	do	250 ft dia 35 ft deep water bottom moderate hazard	do
Do	5	4121660N 356450E	West end-1938-1950 East end-Pre-1938	400 x 250 ft 35 ft deep chat bottom slight to moderate hazard	do
Do	6	4121560N, 356370E	1950-1973	160 ft dia 35 ft deep chat bottom slight hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 32S R 25E , Sec 25	7	4121550N 356220E	1950-1973	160 x 220 ft 15 ft deep chat and water at bottom slight hazard	None
Do	8	4121450N, 356375E	1938-1950 (?)	Small 22 ft dia shallow (5 ft) dry little hazard.	do
Do	9	4121430N, 356375E	do	10 ft dia 5 ft deep dry little hazard	do
Do	10	4121410N, 356380E	do	20 ft dia 5 ft deep dry little hazard	do
Do	11	4121335N, 356410E	1950-1973	50 ft dia shallow depth water-filled to within 3 ft of surface moderate hazard	Fencing
Do	12	4121275N 356440E	Pre-1938	250 ft dia 40 ft deep dry - used for trash dump especially along east side of Stateline Road	Warning signs along road fencing
Do	13	4121215N, 356470E	do	90 ft dia 30 ft deep dry trash dump along Stateline Road on west side	Warning signs fencing
T 32S R 25E , Sec 35	1	4119795N, 354660E	Pre-1938	150 x 275 ft 45 ft deep moderate hazard used as trash dump some water at bottom	Fencing
Do	2	4119550N 354695E	do	200 ft dia 35 ft deep dry in trees moderate hazard	do
Do	3	4119570N, 354610E	do	90 x 200 ft 40 ft deep water at bottom in trees moderate hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 32S , R 25E Sec 35	4	4119550N, 354530E	Pre-1938	100 ft dia 40 ft deep water to 20 ft from surface moderate hazard	Fencing
Do	5	4119495N, 354610E	do	120 x 300 ft 20 ft deep dry in trees moderate hazard	do
Do	6	4119470N, 354565E	do	60 x 90 ft 20 ft deep dry low hazard	do
Do	7	4119370N, 354475E	do	40 ft dia 10 ft deep dry low hazard	None
Do	8	4119325N 354480E	do	90 x 150 ft shallow dry low hazard	do
T 33S R 25E Sec 2	1	4118540N, 354990E	Pre-1938	5 ft dia 6 ft deep water-filled low hazard	None
T 33S R 25E Sec 13	1	4114190N 355830E	Pre-1938	220 x 60 ft 6 ft to water near railroad track	Fencing
Do	2	4114060N 355760E	do	50 x 90 ft 10 to 15 ft deep just west of shaft some water in bottom with some trees and trash not especially hazardous	None
Do	3	4114015N, 355560E	do	15 to 20 ft dia shallow, 5 to 6 ft dry no danger	do
Do	4	4114010N, 355565E	do	do	do
Do	5	4114005N, 355570E	do	do	do
Do	6	4114010N, 355830E	do	180 x 260 ft water at 5 ft water-filled fairly deep	Fencing

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 33S R 25E Sec 15	1	4114880N 352750E	Pre-1938	200 ft dia 30 to 40 ft deep dry trees low hazard	None
Do	2	4114835N 352840E	1950-1973	30 ft dia shallow water-filled low hazard	do
Do	3	4114645N 352950E	Pre-1938	40 ft dia 40 to 50 ft deep dry steep walls high hazard	Fencing
Do	4	4114625N, 352915E	1938-1973	do	do
Do	5	4114505N 352850E	Pre-1938	160 ft dia 40 ft deep some water at bottom ramp cut into southeast side used to water cattle moderate hazard	do
T 33S R 25E Sec 24	1	4113885N 355630E	Pre-1938	Small,25 ft dia 10 to 15 ft deep dry	None
T 34S R 24E Sec 26	1	4101395N 344020E	Pre-1938	Small 25 ft dia 8 ft deep dry dirt bottom low hazard	Filling
Do	2	4101370N 344040E	do	90 ft dia 15 to 20 ft deep trash dump flooded at times low hazard	do
Do	3	4101355N 344070E	do	60 ft dia 15 ft deep dry some trash low hazard	do
Do	4	4101370N 343970E	do	20 ft dia shallow dry low hazard	do
Do	5	4101385N, 343915E	do	20 ft dia shallow contains oily water low hazard	do
Do	6	4101355N 343920E	do	12 ft dia 6 ft deep dry low hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 24E Sec 26	7	4101350N 343935E	Pre-1938	50 ft dia 15 ft deep dry near railroad tracks low hazard	Filling
Do	8	4101300N 343960E	do	90 ft dia 25 ft deep dry within 25 ft of railroad tracks may endanger track in future moderate hazard	Filling for erosion abatement
T 34S R 24E Sec 34	1	4101010N 343420E	1938-1950	60 ft dia 10 ft deep water at bottom low hazard	None
Do	2	4100975N, 343450E	do	60 ft dia 10 ft deep some trees low hazard	Filling
Do	3	4100940N 343450E	do	50 ft dia 10 to 15 ft deep grown-up in trees some water in bottom low hazard	do
Do	4	4100655N, 343195E	Pre-1973	40 ft dia 15 to 20 ft deep dry trees growing low hazard	None
Do	5	4100640N, 343215E	1938-1950	40 ft dia 15 to 20 ft deep dry trees in bottom low hazard	do
Do	6	4100670N, 343420E	do	10 ft dia 5 ft deep dry filled with brush low hazard	do
Do	7	4100655N, 343510E	1981	30 ft dia 30 ft to water recent collapse under cottonwood tree , 12 ft trunk bridging hole steep sides high hazard area is fenced	Fencing

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 11	1	4106755N, 353925E	Pre-1938	70 ft dia 10 ft deep dry shallow low hazard	Filling
Do	2	4106510N 354090E	do	55 ft dia water-filled not more than 10 to 15 ft deep low hazard	Fencing
Do	3	4106475N, 354040E	do	120 ft dia 15 to 20 ft deep chat walls dry low hazard	None
Do	4	4106425N 354025E	do	160 ft dia 10 to 15 ft deep some water low hazard	do
Do	5	4106370N, 354360E	do	180 x 270 ft 10 to 15 ft deep dry shallow low hazard	do
Do	6	4106315N, 354385E	do	130 ft dia 10 to 15 ft deep dry shallow low hazard	do
Do	7	4106330N, 354330E	1938-1950	45 ft dia 10 ft deep dry shallow low hazard	do
Do	8	4106315N, 354330E	Pre-1938	110 ft dia 10 to 15 ft deep dry shallow low hazard	do
Do	9	4106300N 354205E	Pre-1973	40 ft dia 10 ft deep low hazard	do
Do	10	4106275N 354195E	1938-1950	30 x 60 ft 10 ft deep dry low hazard	do
Do	11	4106275N, 354215E	do	40 ft dia 10 ft deep dry low hazard	do
Do	12	4106230N 354200E	1938-1950	140 ft dia 10 to 15 ft deep water-filled when visited low hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E , Sec 11	13	4106195N 354095E	Pre-1938	140 ft dia 15 to 20 ft deep some water low hazard	do
Do	14	4106200N 354025E	do	60 ft dia 5 ft deep dry shallow low hazard	do
Do	15	4106235N, 353890E	do	60 x 160 ft 10 to 20 ft deep water-filled low hazard	do
Do	16	4106140N, 353935E	do	200 ft dia 30 to 40 ft deep may be an open pit partly water-filled clear blue water steep talus slopes very close to major county road	Guard rails filling with surrounding material
T 34S R 25E , Sec 12	1	4107065N, 355700E	Pre-1938	60 x 120 ft 20 ft deep dry may not be due to collapse some waste material nearb	None
Do	2	4106330N, 355660E	do	200 ft dia 30 ft deep water at bottom partly water-filled partial chat pile to north	Fencing
T 34S R 25E Sec 13	1	4104895N, 355045E	Pre-1938	60 ft dia 10 to 20 ft deep steep on east and south sides opens underground on east side moderately high hazard	Filling
Do	2	4104825N, 355110E	do	70 ft dia 10 ft deep dry shallow some junk low hazard	None

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 13	3	4104805N, 355105E	Pre-1938	40 ft dia 5 to 10 ft deep dry shallow low hazard	None
Do	4	4104810N 355065E	do	150 x 200 ft 30 ft deep dry talus slopes low hazard	do
Do	5	4104825N, 355025E	do	50 ft dia 10 ft deep dry shallow low hazard	do
Do	6	4104810N 355005E	do	100 x 150 ft 30 ft deep dry talus slopes low hazard	do
Do	7	4104780N, 355015E	do	90 ft dia 10 to 15 ft deep dry talus slopes low hazard	do
Do	8	4104770N 355045E	do	60 ft dia 10 to 15 ft deep shallow talus slope low hazard	do
Do	9	4104770N, 355120E	do	200 x 150 ft 30 ft deep dry steep on southeast side moderate hazard	Filling
Do	10	4104775N, 355180E	do	150 x 90 ft 10 to 20 ft deep part-filled with chat open to underground on south side moderate hazard	do
Do	11	4104705N, 355145E	do	90 x 180 ft 40 ft deep open to underground on east side drifts in walls on north side dry, steep slopes moderate-high hazard	Fencing
Do	12	4104675N, 355065E	do	30 x 90 ft 10 ft deep dry shallow low hazard	None

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 13	13	4104670N 355010E	Pre-1938	40 x 180 ft 20 to 30 ft deep east end active caving steep on low end moderate hazard	Fencing
Do	14	4104700N, 355300E	Pre-1950	60 x 40 ft 40 ft to water opens underground on north side with drift to east partly water-filled deep steep sides high hazard	Filling--near-by chat pile
Do	15	4104690N, 355330E	do	25 ft dia 15 to 20 ft deep opens underground on south side roof 10 ft thick north of chat pile moderate to high hazard	Filling
Do	16	4104700N, 355350E	do	20 x 25 ft 6 ft deep dry shallow low hazard	None
Do	17	4104700N 355460E	do	25 x 40 ft 5 to 10 ft deep dry shallow low hazard	do
Do	18	4104705N 355520E	do	50 x 90 ft 10 to 15 ft deep dry shallow low hazard	do
Do	19	4104670N, 355515E	do	80 x 110 ft 15 to 20 ft deep opens underground north side roof 10 to 15 ft thick dry some steep slopes moderate to high hazard	Fencing filling
Do	20	4104565N, 355460E	Pre-1938	400 x 220 ft 20 to 30 ft to water partly filled by water (depth ?) high hazard	None

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E , Sec 13	21	4104745N, 355600E	Pre-1950	50 ft dia 10 ft deep dry shallow low hazard	None
Do	22	4104775N, 355625E	do	100 ft dia 10 ft deep dry shallow low hazard	do
Do	23	4104765N, 355655E	do	80 ft dia 10 to 15 ft deep dry shallow some trash	do
Do	24	4104740W, 355625E	do	50 ft dia 10 ft deep dry shallow low hazard	do
Do	25	4104660N 355720E	do	90 ft dia 10 to 15 ft deep dry shallow low hazard	do
Do	26	4104625N, 355775E	do	90 ft dia 10 to 15 ft deep dry shallow low hazard	do
Do	27	4104600N, 355795E	do	50 ft dia 5 to 10 ft deep dry shallow low hazard	do
Do	28	4104570N, 355810E	do	130 x 60 ft 5 to 10 ft deep dry shallow low hazard	do
Do	29	4104600N, 355735E	do	60 ft dia 5 ft deep dry shallow low hazard	do
Do	30	4104550N, 355670E	do	40 ft dia 10 ft deep dry shallow low hazard	do
Do	31	4104520N, 355685E	do	60 x 100 ft 10 to 15 ft deep shallow low hazard	do
Do	32	4104370N 355625E	Pre-1938	100 ft dia partly water-filled at 15 ft possibly 10 ft deeper moderate hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 14	1	4105645N 353545E	Pre-1938	50 ft dia 20 ft deep dry some trash low hazard fenced off	None
Do	2	4105490N, 353485E	do	150 ft dia 20 ft deep dry contains chat and rubble low hazard	do
Do	3	4105540N 353705E	do	200 x 160 ft 15 to 20 ft deep dry contains chat and some trash low hazard	do
Do	4	4105570N 354010E	do	120 x 180 ft 25 ft deep dry partly chat- and rubble-filled near two city streets moderate hazard	Fencing or barricades
Do	5	4105045N, 353710E	do	270 x 150 ft water-filled 25 to 30 ft deep blue-clear bottom visible steep rocky sides moderate hazard	Filling with nearby material
Do	6	4105040N 353785E	do	60 ft dia 10 to 15 ft deep enters underground on north side mostly dry moderate hazard	Filling
Do	7	4105010N 353760E	do	50 x 70 ft about 20 ft deep mostly water-filled green-murky bottom not visible moderate hazard	do
Do	8	4105005N 353805E	do	120 ft dia about 25 to 30 ft deep water-filled green-murky steep sides moderate hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 14	9	4104970N 354010E	Pre-1938	50 ft dia 15 ft deep some water at bottom some trash low hazard	Filling
Do	10	4104985N 354160E	do	300 x 150 ft 15 to 20 ft to water water depth (?) about 20 to 30 ft deep steep rocky sides near railroad moderate hazard	Fill or fence
Do	11	4104945N 354125E	do	50 ft dia 10 ft deep dry rubble slopes low hazard	None
Do	12	4104940N 354170E	do	90 ft dia 10 to 20 ft deep dry rubble slopes low hazard	do
Do	13	4104850N 354030E	do	40 ft dia 10 ft deep connects with #14 via arch dry moderate hazard near railroad	Filling
Do	14	4104820N 354025E	do	50 ft dia 10 ft deep connects with #13 via arch dry rubble slopes moderate hazard	do
Do	15	4104805N 354010E	do	100 x 60 ft 10 ft deep enters underground on east side dry chat slopes moderate hazard	do
Do	16	4104775N 354015E	do	70 x 90 ft 20 ft deep enters underground on east side dry some steep sides moderate-high hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 14	17	4104790N 353955E	Pre-1938	50 x 30 ft 5 to 10 ft deep dry occurs in chat low hazard	Observation filling
Do	18	4104825N, 353830E	do	40 ft dia 10 to 15 ft deep water at bottom chat-rubble slopes low hazard near railroad	Filling
Do	19	4104875N, 353775E	do	25 ft dia about 20 ft deep water-filled moderate hazard	do
Do	20	4104890N, 353675E	do	35 ft dia about 20 ft deep (?) water-filled green and murky moderate hazard	do
Do	21	4104935N 353550E	do	50 x 100 ft 15 to 20 ft deep water-filled opens underground on west side steep sides moderate hazard	do
Do	22	4104880N, 353520E	do	60 ft dia 20 to 30 ft deep enters underground on northwest side water at bottom steep sides moderate-high hazard near railroad	Fencing filling
Do	23	4104765 353780E	do	60 x 100 ft 20 ft deep partly water-filled some steep slopes moderate hazard	Filling
Do	24	4104625N, 353960E	do	250 x 160 ft 40 to 50 ft deep partly water-filled - clear blue some trash steep sides moderate-high hazard	Fencing

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 14	25	4104590N, 353805E	Pre-1938	100 ft dia 15 to 20 ft deep dry chat slopes shallow low hazard	None
Do	26	4104370N, 353795E	do	100 x 60 ft 20 ft deep some water trash opens underground on north side overhang near Sonic Drive-In moderate-high hazard	Fencing filling
Do	27	4104410N, 354130E	do	80 x 110 ft 20 to 30 ft deep Pigeon Hole enters underground on northeast and east side water in bottom collapse in process of being filled with trash by city moderate-high hazard	do
Do	28	4104735N, 354405E	do	50 ft dia 15 ft deep trash-filled dry close to houses low hazard	Filling
Do	29	4104725N, 354450E	do	50 x 80 ft 15 ft deep dry some trees close to houses low hazard	do
Do	30	4104565N, 354590E	do	60 ft dia 10 to 15 ft deep dry talus slopes shallow low hazard	do
Do	31	4104530N, 354585E	do	100 x 150 ft 50 to 60 ft deep dry steep slopes close to houses and street high hazard	Guard rails fencing filling

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 14	32	4104555N 354625E	Pre-1938	60 ft dia 10 ft deep dry chat slopes low hazard	Filling
Do	33	4104525N 354635E	do	225 ft dia 50 to 60 ft deep dry steep slopes adjacent to 4th Street in Galena high hazard	Guard rails fencing filling
Do	34	4104575N 354645E	do	60 ft dia 10 ft deep in chat pile low hazard	Observation filling
Do	35	4104610N 354670E	do	40 ft dia 5 to 10 ft deep dry in chat low hazard	do
Do	36	4104645N 354610E	do	40 ft dia 10 ft deep dry chat slopes low hazard	Filling
Do	37	4104670N 354630E	do	60 x 300 ft 20 ft deep dry enters underground on east end rubble slopes steep east end moderate hazard	do
Do	38	4104670N 354540E	do	60 ft dia 10 ft deep dry shallow low hazard	do
Do	39	4104695N 354570E	do	200 x 100 ft 10 to 15 ft deep dry shallow low hazard	do
Do	40	4104720N 354555E	do	60 ft dia 10 ft deep dry shallow low hazard	None
Do	41	4104725N 354520E	Pre-1973	30 x 40 ft 10 ft deep dry shallow low hazard	do
Do	42	4104750N 354565E	Pre-1938	60 ft dia 10 ft deep dry shallow low hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 14	43	4104730N 354585E	Pre-1938	90 x 150 ft 10 to 15 ft deep dry shallow low hazard	None
Do	44	4104710N 354620E	do	60 ft dia 10 ft deep dry shallow low hazard	do
Do	45	4104745N 354660E	do	40 ft dia 5 ft deep dry shallow low hazard	do
Do	46	4104770N 354645E	do	100 ft dia 10 to 15 ft deep dry shallow low hazard	do
Do	47	4104775N, 354605E	do	60 x 100 ft 10 ft deep dry shallow low hazard	do
Do	48	4104755N 354585E	do	20 ft dia 5 ft deep dry shallow low hazard	
Do	49	4104815N, 354580E	do	40 x 80 ft 10 ft deep dry shallow trash low hazard	do
Do	50	4104830N 354555E	do	60 ft dia 10 ft deep dry shallow low hazard	do
Do	51	4104885N 354670E	do	50 x 100 ft 50 to 60 ft deep enters underground on south side 30 ft ceiling dry steep rocky sides high hazard	Fencing filling
Do	52	4104900N 354610E	do	30 ft dia 20 ft deep enters underground on west side dry steep sides high hazard	None
Do	53	4104940N 354615E	do	60 x 110 ft 5 to 10 ft deep dry shallow low hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 14	54	4104970N 354640E	Pre-1938	40 x 90 ft 20 ft deep enters underground on east side dry moderate hazard	Filling
Do	55	4104970N 354610E	1938-1950	30 ft dia 5 ft deep dry shallow low hazard	None
Do	56	4104980N, 354600E	do	do	do
Do	57	4104995N, 354640E	Pre-1938	60 x 150 ft 20 ft deep dry some steep sides moderate hazard	Fencing filling
Do	58	4104980N, 354690E	do	50 ft dia 20 ft deep dry some steep slopes moderate hazard	Filling
Do	59	4104980N, 354735E	do	40 x 50 ft 15 ft deep dry some steep slopes low-moderate hazard	do
Do	60	4104920N, 354790E	do	30 x 90 ft 5 to 10 ft deep dry trash low hazard	None
Do	61	4104920N, 354850E	do	40 x 90 ft 20 ft deep dry some steep slopes moderate hazard	Filling
Do	62	4104955N, 354945E	do	60 x 110 ft 20 to 25 ft deep dry talus slopes low hazard	None
Do	63	4104910N, 354940E	do	50 x 100 ft 10 to 15 ft deep dry shallow low hazard	do
Do	64	4104880N 354950E	do	90 ft dia 10 to 15 ft deep dry shallow low hazard	do
Do	65	4104875N 354975E	do	60 ft dia 10 to 15 ft deep dry shallow low hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 14	66	4104845N 354960E	Pre-1938	120 x 280 ft 25 to 30 ft deep dry talus slopes low-moderate hazard	Filling
Do	67	4104870N 354900E	do	100 x 150 ft 30 ft deep dry opens underground at north and south end moderate-high hazard	do
Do	68	4104785N, 354915E	do	350 x 120 ft 50 ft deep some steep slopes some talus slopes dry moderate-high hazard	Fencing filling
Do	69	4104765N, 354775E	do	70 ft dia 15 to 20 ft deep talus sides low hazard dry	None
Do	70	4104700N 354740E	1938-1950	60 x 100 ft 20 ft deep enters underground on west side dry chat-filled some steep slopes moderate hazard	Filling
Do	71	4104735N, 354825E	Pre-1938	100 x 300 ft 50 ft deep dry talus slopes some steep slopes moderate hazard	Fencing filling
Do	72	4104740N, 354920E	do	90 x 50 ft dry some steep slopes moderate hazard	Filling
Do	73	4104720N 354990E	do	80 x 100 ft 30 ft deep dry steep sides undercut on northeast side high hazard	do
Do	74	4104700N 354945E	do	100 x 60 ft 30 ft deep dry steep sides moderate-high hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E , Sec 14	75	4104680N 354970E	Pre-1938	40 x 90 ft 20 ft deep arch connection to collapse on northeast side dry steep slopes moderate hazard	Filling
Do	76	4104665N 354980E	do	40 x 60 ft 20 ft deep dry some steep slopes moderate hazard	do
Do	77	4104650N 354945E	do	90 ft dia 20 ft deep enters underground on north side chat slopes some steep slopes moderate hazard	do
Do	78	4104635N, 354910E	do	130 x 60 ft 20 to 25 ft deep dry chat slope some steep rocky recent caving moderate-high hazard	do
Do	79	4104364N 354136E	1981	Small collapse northeast of City Hall along entrance road in Galena currently filled	None
Do	80	4104303N, 354045E	do	Small collapse near Galena fire station entrance currently filled	do
T 34S R 25E Sec 15	1	4105800N 352535E	1938-1950	25 x 80 ft 20 ft deep may be open pit water-filled adjacent to road and railroad moderate hazard	Guard rails or filling
Do	2	4105775N, 352510E	1950-1973	100 x 100 ft 30 to 40 ft deep may be open pit water-filled adjacent to road moderate hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 15	3	4105400N 352710E	Pre-1938	90 ft dia water within 10 ft of surface moderate hazard	Filling
Do	4	4105310N 352685E	do	60 ft dia 100 ft deep dry low hazard	None
Do	5	4105260N, 352430E	1938-1950	20 x 100 ft 10 ft deep dry shallow low hazard	do
Do	6	4105265N, 352590E	Pre-1938	50 ft dia 20 ft deep dry low hazard	do
Do	7	4105245N, 352575E	1938-1950	50 ft dia 15 ft deep dry low hazard	do
Do	8	4105220N 352585E	do	70 ft dia 10 to 15 ft deep dry low hazard	do
Do	9	4105210N 352555E	do	70 ft dia 25 ft deep low hazard	do
Do	10	4105080N 352570E	do	70 ft dia 10 to 15 ft deep dry low hazard	do
Do	11	4105020N 353285E	Pre-1938	160 x 180 ft water about 30 ft deep water near top (depth ?) moderate hazard	Filling
T 34S R 25E Sec 22	1	4103515N 353225E	Pre-1938	160 ft dia 20 ft deep dry low hazard	Filling
Do	2	4103420N 353235E	do	60 ft dia 15 to 20 ft deep water-filled low-moderate hazard	do
Do	3	4103340N, 352875E	do	150 x 300 ft 30 ft deep dry used for trash dump moderate hazard	Fencing filling
Do	4	4103400N 352880E	do	90 ft dia 20 ft deep dry cone-shaped high hazard	Covering filling

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E , Sec 22	5	4103425N 352860E	Pre-1938	90 x 180 ft 30 ft deep dry talus sides moderate hazard	Filling
Do	6	4103430N 352745E	do	150 ft dia 15 to 20 ft deep dry chat talus sides low hazard	do
Do	7	4103450N, 352705E	do	250 ft dia 30 ft deep opens to underground on west side dry talus slopes moderate hazard	do
Do	8	4103495N, 352625E	do	160 x 180 ft 20 ft deep dry to muddy bottom talus slopes low hazard	do
Do	9	4103425N, 352625E	do	100 x 120 ft 20 ft deep dry talus slopes low hazard	do
Do	10	4103355 , 352540E	Pre-1950	200 ft dia 15 to 20 ft deep some water at bottom ditch flows in from east--may act as swallow hole moderate hazard	do
Do	11	4103135N, 352670E	Pre-1938	130 x 200 ft 20 ft deep dry rubble and chat at bottom low hazard	do
Do	12	4103050N, 352825E	do	200 x 350 ft 30 ft deep contains collapsed shaft on north side that is 20 ft deeper dry talus slopes high hazard	Plugging and filling
Do	13	4103050N 352705E	do	150 x 275 ft 30 ft deep dry talus slopes some trash low hazard	Filling

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S, R 25E, Sec 22	14	4103050N, 352430E	Pre-1950	200 ft dia 10 ft deep dry shallow low hazard	Filling
Do	15	4102945N, 352425E	Pre-1950	130 ft dia 10 ft deep dry shallow low hazard	do
Do	16	4102945N 352480E	do	100 x 250 ft 10 ft deep dry shallow low hazard	do
Do	17	4102950N, 352540E	do	90 x 130 ft 10 ft deep dry shallow low hazard	do
Do	18	4102940N 352585E	Pre-1938	200 ft dia 40 ft deep water at bottom talus slopes west north and east rock cliff on south side moderate hazard	Fencing or filling
Do	19	4102950N, 352650E	do	60 ft dia 10 ft deep dry trash dump low hazard	Filling
Do	20	4102955N 352685E	do	do	do
Do	21	4102685N, 352560E	Pre-1950	20 ft dia less than 10 ft deep dry low hazard	do
Do	22	4103100N 353340E	Pre-1938	225 x 90 ft 20 ft deep dry trash close to road on east side, moderate hazard	Guard rails filling
Do	23	4103085N, 353315E	do	90 ft dia 10 ft deep dry shallow low hazard	Filling
Do	24	4103020N, 353350E	do	200 x 270 ft 25 ft deep dry talus slopes moderate hazard	do
Do	25	4102945N, 353355E	do	180 x 270 ft 30 ft deep dry, talus slopes, some trash, close to road on southeast side moderate hazard	Guard rails filling

TABLE C-2 - Subsidence Events-Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E Sec 22	26	4102890N, 353340E	Pre-1938	180 ft dia 40 ft deep opens to underground on south side 20 to 30 ft ceiling dry steep sides close to road on southeast side high hazard	Guard rails filling
Do	27	4102885N, 353280E	1938-1950	100 x 150 ft 20 ft deep much talus slight underground opening on side moderate hazard	Filling
Do	28	4102835N 353280E	Pre-1938	100 x 200 ft 25 ft deep talus slopes opens to underground on south side steep on south side moderate hazard	do
T 34S R 25E Sec 23	1	4103645N, 354400E	Pre-1938	170 x 270 ft about 60 ft deep 30 ft deep to ater no protection talus and steep slopes adjacent to homes on west and north moderate-high hazard	Filling or fencing
Do	2	4103655N, 354360E	do	40 ft across 20 ft deep dry shallow some junk low hazard	Filling
Do	3	4103690N 354355E	Pre-1950	40 ft dia 20 ft deep dry junk-filled low hazard	do
Do	4	4103735N 354515E	Pre-1938	100 ft dia 30 ft deep dry brush and talus close to homes on west and north low-moderate hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E , Sec 23	5	4103755N 354525E	1938-1950	40 ft dia 15 ft deep dry conical low hazard	Filling
Do	6	4103795N, 354530E	do	50 ft dia 25 ft deep conical dry low hazard	do
Do	7	4103790N, 354705E	Pre-1938	80 ft dia 10 to 15 ft deep dry shallow low hazard	do
Do	8	4103770N 354605E	do	40 ft dia 10 ft deep dry shallow low hazard	do
Do	9	4103705N, 354655E	do	100 ft dia clear blue water 30 to 40 ft deep in part of hole - acts as swallow hole moderate hazard	do
Do	10	4103690N, 354695E	do	60 x 100 ft filled with blue water about 30 to 40 ft deep steep rocky sides high hazard	Fencing filling
Do	11	4103705N, 354740E	do	60 x 100 ft 15 to 20 ft deep some water at bottom not deep rocky cliffs moderate hazard	Filling
Do	12	4103640N, 354685E	do	250 x 300 ft deep Blue Hole mostly filled with water - depth estimated at 50 ft steep sides high hazard	Fencing filling
Do	13	4103550N, 353775E	do	150 x 200 ft 40 ft deep dry talus slopes moderate hazard	Filling
Do	14	4103550N, 353700E	do	200 x 250 ft 80 ft deep dry talus slopes moderate hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E, Sec 23	15	4103510N, 353680E	Pre-1938	90 ft dia 30 ft deep dry talus slopes low hazard	Filling
Do	16	4103540N, 353615E	do	90 ft dia 15 ft deep chat slopes conical dry low hazard	do
Do	17	4103495N, 353615E	do	200 x 300 ft 30 ft deep dry talus slopes some junk low hazard	do
Do	18	4103460N, 353710E	do	200 x 300 ft 40 ft deep dry chat talus slopes moderate hazard	do
Do	19	4103390N, 353740E	do	60 x 120 ft 25 to 30 ft deep dry talus slopes some junk low hazard	do
Do	20	4103375N, 353730E	do	50 ft dia 15 ft deep dry conical low hazard	do
Do	21	4103370N, 353695E	do	200 ft dia 25 to 30 ft deep dry talus slopes low hazard	do
Do	22	4103335N, 353670E	1938-1950	110 x 130 ft 20 ft deep, dry chat slopes low hazard	do
Do	23	4103330N, 353615E	Pre-1938	100 x 150 ft 30 ft deep enters mine on south side (ceiling 20 ft thick) dry chat slope on north, steep and rocky on south moderate-high hazard	Fencing filling
Do	24	4103350N, 353565E	do	30 ft dia 10 ft deep dry shallow low hazard	Filling
Do	25	4103335N, 353555E	do	60 ft dia 10 ft deep dry shallow low hazard	

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S R 25E , Sec 23	26	4103370N, 353550E	Pre-1938	40 ft dia 5 ft deep shallow low hazard	Filling
Do	27	4103345N 353505E	Pre-1950 Pre-1981	50 x 100 ft 20 ft deep filled after 1950 then collapsed again dry some junk low hazard	do
Do	28	4103415N, 353510E	Pre-1950	60 ft dia 10 ft deep wet bottom shallow low hazard	do
Do	29	4103405N, 353485E	1938-1950	50 ft dia 10 ft deep dry conical talus slopes low hazard	do
Do	30	4103395N 353460E	Pre-1950	60 ft dia 10 ft deep dry conical talus slopes low hazard	do
Do	31	4103055N, 353365E	Pre-1938	40 ft dia 5 ft deep dry low hazard	do
Do	32	4102985N, 353360E	do	40 ft dia 30 ft deep dry steep sides moderate hazard	do
Do	33	4102850N 353385E	1938-1950	30 ft dia 6 ft deep junk-filled close to road moderate-low hazard	Filling guard rails
T 34S R 25E Sec 27	1	4102590N 352530E	Pre-1950	60 ft dia 10 to 15 ft deep dry some trash shallow low hazard	Filling
Do	2	4102475N, 352910E	Pre-1938	20 ft dia 10 ft deep dry talus conical low hazard	do
Do	3	4102450N, 352915E	do	25 ft dia 10 to 15 ft deep dry conical low hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 34S , R 25E , Sec 27	4	4102290N, 353255E	Pre-1938	90 ft dia 20 ft to water steep sides enters underground on south side high hazard	Fencing or filling
Do	5	4102000N, 352785E	do	60 x 120 ft 20 ft deep partly filled with talus opens to underground on northeast side moderate-high hazard	Filling
Do	6	4102180N, 352475E	Pre-1950	100 ft dia 35 ft deep dry chat sides moderate hazard	do
Do	7	4102205N 352460E	do	50 ft dia 10 ft deep dry shallow low hazard	do
Do	8	4102215N, 352420E	do	30 x 40 ft 10 ft deep dry some trash low hazard	do
Do	9	4102075N, 352270E	Pre-1938	140 x 160 ft 15 ft deep water at bottom acts as swallow hole for creek flowing in from west low hazard	do
T 35S R 23E Sec 2	1	4098210N, 334940E	1950-1973	220 x 430 ft 50 to 60 ft deep water at northeast and southwest end waterfall north side close to road--occurs along course of Tar Creek moderate-high hazard	Fencing
T 35S R 23E Sec 10	1	4097430N, 333390E	1938-1950	Small old drill hole probably 4 ft dia shallow dry low hazard	Filling

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15		Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 35S R 23E , Sec 10	2	4097410N	333390E	1938-1950	Small drill hole 4 ft dia dry shallow low hazard	Filling
Do	3	4097400N	333660E	Pre-1950	20 ft dia shallow water-filled low hazard	do
T 35S R 23E , Sec 11	1	4098070N	334280E	1950-1973	15 ft dia shallow water-filled low hazard	Filling
Do	2	4097450N,	335260E	do	180 ft dia 40 ft to water appears deeper steep, vertical walls high hazard	Fencing
Do	3	4097390N,	335175E	Pre-1950	25 ft dia shallow sloping sides water-filled low hazard	Fencing
T 35S R 23E , Sec 12	1	4097340N,	336720E	1950-1973	60 ft dia approx 50 ft deep steep-walled water-filled high hazard	Fencing
Do	2	4097300N,	336580E	1938-1950	200 x 150 ft shallow not especially hazardous at present actually is 3 coelesced subsidences water-filled low hazard	Should be watched for further subsidence
Do	3	4097235N,	336610E	1950-1973	30 ft dia 15 ft deep just north of collapsed shaft dry moderate hazard	Fencing
T 35S R 23E Sec 13	1	4096435N	336310E	1938-1950	40 ft dia 10 ft deep trash and some water low hazard	Filling

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 35S R 23E Sec 13	2	4096425N, 336335E	Pre-1938	50 ft dia 15 ft deep contains trash and some water moderate hazard	Filling
Do	3	4096410N 336295E	1951-1973	30 ft dia less than 10 ft deep contains trash occasional water low hazard	do
Do	4	4096145N, 336880E	1938-1950	140 ft dia 60 ft to water no protection close to State Line Road surrounded by trees and high grass floating trash high hazard	Fencing
T 35S R 24E Sec 2	1	4099360N, 343660E	do	200 ft dia 60 ft deep some water at bottom 200 ft from highway moderate-high hazard	do
do	2	4099320N 344530E	Pre-1938	20 ft dia 10 ft deep small in trees low hazard	None
Do	3	4098560N, 343830E	do	60 x 120 ft 30 ft deep used as landfill mostly filled with chat and trash originally larger low hazard	Continue filling restricted development
T 35S R 24E Sec 3	1	4098410N 343080E	1938-1950	6 ft dia shallow water-filled low hazard	None
Do	2	4098400N 343060E	do	6 ft dia shallow water-filled low hazard	do
Do	3	4098185N 343525E	do	15 ft dia 6 ft deep water-filled low hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 35S , R 24E Sec 7	1	4096650N 337175E	1950-1973	150 x 300 ft 60 ft deep fenced off some water at bottom still caving along sides--will get larger moderate hazard	Fencing--fences may have to be moved out
Do	2	4096605N, 337235E	do	60 ft dia shallow along old mine road water-filled low hazard	Observation
Do	3	4096585N, 337210E	do	20 ft dia 10 ft deep along old mine road water-filled low hazard	Fencing
T 35S R 24E Sec 10	1	4096780N, 342520E	Pre-1938	300 ft dia 80 to 100 ft deep steep rocky sides area fenced brown water at bottom depth varies high hazard	Fencing
Do	2	4096775N, 342335E	Pre-1973	One of 7 small collapses 5-25 ft in dia and less than 10 ft deep in center of SW 1/4 most are water-filled close to the surface low hazard	Not especially dangerous but should be watched
Do	3	4096735N, 342315E	do	do	do
Do	4	4096740N 342335E	do	do	do
Do	5	4096740N 342350E	do	do	do
Do	6	4096690N 342320E	do	do	do
Do	7	4096690N, 342310E	do	do	do
Do	8	4096800N 342290E	do	do	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 35S R 24E Sec 10	9	4096700N 342610E	1938-1950	170 x 300 ft about 40 ft deep just north of larger collapse in fenced and posted area no protection sometimes holds water moderate hazard	Fencing
Do	10	4096620N, 342600E	1938-1950	450 x 650 ft 100 ft deep steep-walled rocky largest in district some water at bottom varies in depth and color--red-brown to yellow some drifts visible in walls high hazard	Fencing
Do	11	4096650N 342730E	do	40 ft dia (depth ?) filled with brush low hazard	Filling
T 35S R 24E Sec 11	1	4097700N, 344530E	Pre-1938	130 x 350 ft 80 ft deep some water at bottom may connect to mine on northeast side trees growing at bottom on east side area fenced collapse not fenced high hazard	Fencing
Do	2	4097575N, 344580E	do	200 x 250 ft 30 ft to water 60 to 80 ft deep stocked with carp high hazard	do

TABLE C-2 - Subsidence Events--Continued

Location	Site Number	UTM Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T 35S R 24E Sec 11	3	4097065N 344900E	1950-1973	15 ft dia less than 10 ft deep small shallow dry may not be mine collapse--could be mine prospect low hazard	None
T 35S R 24E Sec 12	1	4096330N, 345720E	Pre-1938	40 ft dia 15 ft deep junk-filled low hazard	Filling

TABLE C-3 - Chat Piles and Tailings Ponds

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 32S R 25E sec 24	1	4123050N, 356000E	Grasselli Mine No 1	Tailings pond area 5 2 acres, embankments are breached drains into surface collapse on west side susceptible to wind erosion	Revegetation
Do	2	4122440N, 355900E	High Five Land	Tailings pond, area 9 acres embankments are breached dry possible air polluter some run-off enters tributary of Cow Creek	do
Do	3	4122400N, 356240E	Butte-Kansas Mine	Low chat pile, 300 ft dia, 80 ft high	Reclamation - use to fill nearby hazards
T 32S R 25E sec 25	4	4121450N, 355870E	Hurlbut Acme No 2 Mine	Tailings pond area 15 acres runoff may reach tributary of Cow Creek possible air polluter	Revegetation
T 33S R 25E sec 23	1	4113520N, 355110E	Badger Mine	Chat Pile 250 x 120 ft contains boulders 30 ft high	Reclamation
T 34S , R 24E sec 33	1	4100110N, 340890E	Paxson Mine	Tailings pond area 7 2 acres, embankments mostly intact partially filled with mineralized iron-stained water	Reclamation
Do	2	4100000N, 341165E	Paxson Mine and Swalley Mine	Tailings pond area 5 7 acres embankment mostly intact partially filled with mineralized iron-stained water	do

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TABLE C-3 - Chat Piles and Tailings Ponds--Continued

Location	Site Number	UTM1 Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 24E sec 35	3	4100300N, 343680E	Stoskopf Mine	Tailings pond area 1 8 acres still in use in chat reclaiming operation using mine water to wash and sort chat contains iron-stained tail water	None
Do	4	4100130N, 343770E	Brewster Mine	Irregular-shaped remnants of chat pile being actively reclaimed	do
T 34S R 25E sec 12	1	4106975N 355790E	Buckeye Mine	Chat pile 150 ft dia 20 ft high partially reclaimed	Reclamation
Do	2	4106450N, 355720E	?	Chat pile, 150 x 250 ft on a hillside up to 20 ft high	Reclamation
T 34S R 25E sec 11	3	4106430N 354470E	do	Tailings pond area 0 9 acres low embankment contains small amount of water, no hazard to downstream areas	None
Do	4	4106460N, 354300E	Empire Mine	Chat pile irregularly shaped mostly reclaimed	Reclamation
Do	5	4106250N, 353940E	do	Chat pile about 400 ft dia 10-15 ft high has been leveled off during reclamation	do
Do	6	4106180N, 353915E	do	Chat pile 90 x 220 ft contains some coarse material partially vegetated	Use to fill adjacent open pit

TABLE C-3 - Chat Piles and Tailings Ponds--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 11	7	4106100N 353900E	Empire Mine	Chat pile 130 x 360 ft contains some coarse material partially vegetated	Use to fill adjacent open pit
T 34S R 25E sec 13	8	4105600N, 356160E	Merchants Mining Co	Chat pile 150 ft dia 20-30 ft high partially reclaimed on NE side	Reclamation or shaft filling
T 34S R 25E sec 14	9	4105650N, 354500E	Elenita Zinc Co	Chat pile 180 ft dia on hillside variable height	Reclamation
T 34S R 25E sec 15	10	4105660N, 352640E	Henry Weyman Bonanza Mining Co	Chat pile 300 ft dia 40 ft high partially reclaimed on N side	do
Do	11	4105510N 352670E	do	Chat pile 90 ft dia next to Short Creek	do
Do	12	4105490N 353340E	do	Chat pile 300 x 450 ft 20 ft high	do
Do	13	4105340N, 352950E	do	Chat and boulder pile irregular shap surrounds open pit	Use to fill pit or nearby shafts
Do	14	4105130N, 352540E	do	Chat pile, 100 ft dia, 20 ft high, mostly reclaimed	Reclamation
Do	15	4105110N 353090E	do	Chat pile, 180 ft dia 30 ft high	do
Do	16	4105050N, 353140E	do	Chat pile 150 ft dia partially reclaimed	do
Do	17	4104980N, 353090E	do	Chat pile 60 x 150 ft mostly reclaimed	do
Do	18	4104950N 353250E	do	Chat pile 150 x 240 ft 30 ft high	do

TABLE C-3 - Chat Piles and Tailings Ponds--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E sec 14	19	4105140N, 353990E	Hoosier Mining Co and Windsor Mining Co	Chat pile irregular shape adjacent to open pit partially reclaimed	Reclamation
Do	20	4105130N, 354225E	Windsor Mining Co	Chat pile 180 x 450 ft partially reclaimed	do
Do	21	4104960N, 353675E	Illinois Lead & Zinc Co	Chat pile 100 x 350 ft partially reclaimed	do
Do	22	4104910N, 353765E	do	Chat pile 120 x 180 ft partially reclaimed	do
Do	23	4104890N 354030E	Eagle-Picher Galena Leases	Chat pile 200 x 400 ft contains large amount of coarse rubble	Use for filling nearby hazardous shafts
Do	24	4104640N, 353720E	Illinois Lead & Zinc Co	Chat pile 120 x 300 ft 20 ft high	Reclamation
Do	25	4104530N, 354800E	Southside Mine	Chat pile, 300 ft dia 70-80 ft high largest chat pile in Galena area	do
T 34S R 25E , sec 13	26	4104650N, 355350E	Illinois Lead & Zinc Co	Chat pile 180 x 275 ft contains some coarse material and trash partially quarried	do
Do	27	4104525N, 355730E	Connor Investment Co	Chat pile 250 ft dia 10-15 ft high partially reclaimed	do
Do	28	4104280N 355640E	do	Chat pile 125 x 270 ft 10-15 ft high partially quarried	do

TABLE C-3 - Chat Piles and Tailings Ponds--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E , sec 22	29	4104020N, 353060E	Kansas-Missouri Land & Mining Co	Chat pile 280 x 450 ft mostly reclaimed	Reclamation
T 34S R 25E sec 23	30	4103630N 354710E	Mary A Stone	Chat pile irregularly shaped adjacent to large cave-in--The Blue Hole contains coarse material	Use for filling nearby hazardous shafts
Do	31	4103560N, 353650E	Alice Kreller	Chat pile 100 x 200 ft 20 ft high adjacent to cave-ins	Reclamation
Do	32	4103360N, 353630E	D C Milliken	Chat pile 150 x 270 ft adjacent to cave-ins partially reclaimed has steep faces on north side	do
T 34S R 25E sec 22	33	4103550N, 352710E	Kansas-Missouri Land & Mining Co	Chat pile, irregular outline partly reclaimed	do
Do	34	4103550N, 352340E	Gertrude R Bradbury	Chat pile 350 ft dia 20-30 ft high	do
Do	35	4103470N, 352300E	do	Chat pile 100 x 200 ft partly reclaimed	do
T 34S R 25E sec 23	36	4102830N 353480E	New Century Mine	Crescent-shaped remnant of 400 ft dia chat pile being actively reclaimed at time of aerial photography	do

TABLE C-3 - Chat Piles and Tailings Ponds--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 34S R 25E , sec 27	37	4102500N 353135E	Rochester Mine	Chat pile 120 x 300 ft on valley wall mostly reclaimed	Reclamation
Do	38	4102340N, 352460E	H Weyman	Chat pile 120 x 300 ft partially reclaimed on north side steep slopes	do
Do	39	4102240N 352515E	H Weyman and/or Connor Investment Co	Chat pile 200 x 270 ft mostly reclaimed	do
Do	40	4102210N 352920E	Harry Schultz	Chat pile 100 x 180 ft partially reclaimed	do
Do	41	4102260N 353060E	Weyland Mine	Chat pile irregular remnants of large chat pile mostly reclaimed	do
Do	42	4102090N, 353175E	Boston Mine (?)	Chat pile mostly reclaimed 100 x 180 ft	do
Do	43	4102030N 352310E	Connor Investment	Chat pile 150 ft dia partially reclaimed	do
Do	44	4102010N, 352820E	Harry Schultz	Chat pile 220 dia 20-30 ft high	do
Do	45	4101890N, 352920E	do	Chat pile 200 ft dia 10-15 ft high	do
Do	46	4101920N 352625E	do	Chat pile 150 ft dia 20 ft high	do
T 34S R 25E sec 28	47	4101360N 351530E	Andayer Mine (?)	Chat pile 150 x 300 ft 20-30 ft high partially reclaimed on south side	do
T 34S R 25E sec 34	48	4099430N, 353030E	Clermont Mine	Chat pile 350 x 450 ft 30-40 ft high	do

TABLE C-3 - Chat Piles and Tailings Ponds--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 23E sec 2	1	4098580N, 334090E	Big John Mine	Tailings pond dry area 2 8 acres filled with fine material susceptible to wind erosion	Revegetation
Do	2	4098380N, 334060E	do	Chat pile 650 ft dia partially reclaimed on east side	Reclamation
Do	3	4098410N 335280E	Semple Mine & Southern Mine	Chat pile irregular remnants of much larger chat pile high hazard contains collapsed shaft (No 7) and near-vertical faces	do
T 35S R 23E , sec 11	4	4097530N 334480E	Robinson Mine	Chat pile remnant 1000 ft dia adjacent to Tar Creek	do
Do	5	4097350N 335270E	Fox Mine	Tailings pond area 1 1 acres partially filled with greenish water	do
Do	6	4097010N, 334530E	DeArmand Mine	Tailings pond area 1 6 acres between chat pile and Tar Creek holds some water	Draining--revegetation
Do	7	4096940N, 334390E	do	Chat pile, 400 x 550 ft 80 ft high mostl intact	Reclamation
Do	8	4096840N 334880E	Bendelari Mine	Tailings pond area 21 7 acres dry embankments breached wind erosion hazard dune field has formed at north end	Revegetation
Do	9	4096770N, 335180E	do	Chat pile remnants mostly reclaimed contains some steep faces	Reclamation

TABLE C-3 - Chat Piles and Tailings Ponds--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 23E , sec 11	10	4096690N 334440E	DeArmand Mine	Tailings pond area 4 6 acres dry contains fine material susceptible to wind erosion	Revegetation
T 35S R 23E sec 14	11	4096200N 334340E	Mid-Continent/Lawyers Mine	Tailings pond area 2 6 acres dry part is revegetated northern part is being actively eroded by wind	Reclamation and revegetation
Do	12	4096290N 334370E	do	Tailings pond area 1 4 acres dry contains fine wind-blown material	Revegetation
Do	13	4096330N, 334570E	do	Tailings pond area 0 4 acres contains small amount of water	do
Do	14	4096430N, 334720E	Wilbur Mine	Tailings pond area 4 5 acres dry breached embankments susceptible to wind erosion	do
Do	15	4096420N, 335020E	do	Chat pile remnant 750 ft dia 30-40 ft high	Reclamation
Do	16	4096320N, 335240E	do	Remnants of large chat pile 80 ft high mostly reclaimed to hazard	do
T 35S R 23E sec 12	17	4096580N 335480E	Cherokee Mine	Tailings pond area 2 3 acres dry susceptible to wind erosion	Revegetation
Do	18	4096760N, 335680E	do	Tailings pond area 4 3 acres contains clear water shallow	None

TABLE C-3 - Chat Piles and Tailings Ponds--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 23E sec 12	19	4096680N 335800E	Cherokee Mine	Tailings pond area 0 9 acres contains clear shallow water	None
Do	20	4096710N, 336070E	do	Chat pile area 1 9 acres	Reclamation
Do	21	4096730N, 336140E	do	Tailings pond area 0 6 acres shallow	Draining revegetation
Do	22	4096850N, 336650E	Webber Mine	Tailings pond area 10 3 acres dry embankments are breached fine material is susceptible to wind erosion and has been carried by water to the west	Revegetation
Do	23	4096630N, 336760E	do	Chat pile remnants contains some steep faces	Reclamation
T 35S R 23E sec 13	24	4096430N 336680E	New Blue Diamond Mine	Tailings pond area 2 2 acres partially revegetated contains shallow clear water	Revegetation
Do	25	4096370N, 336640E	do	Tailings pond area 0 2 acres contains shallow water	do
Do	26	4096290N, 336650E	do	Tailings pond area 0 3 acres contains shallow water	do
Do	27	4096350N 336570E	Blue Diamond Mine	Chat pile remnant 500 ft dia susceptible to wind erosion material being blown across road to the north	do
Do	28	4096330N 336440E	do	Tailings pond area 2 acres contains shallow water partially vegetated	Draining revegetation

TABLE C-3 - Chat Piles and Tailings Ponds--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 24E , sec 3	1	4098625N, 343450E	Liza Jane Mine	Tailings pond 0 5 acres low embankment contains shallow water may be used to water livestock low hazard	None
T 35S R 24E sec 11	2	4097760N 345010E	Beck No 3 Mine	Chat pile 400 x 600 ft 20-25 ft high	Reclamation
Do	3	4097750N 344880E	do	Tailings pond 5 5 acres does not retain water contains fine material susceptible to wind transport	Revegetation
T 35S R 24E sec 10	4	4097625N, 343470E	Ballard Mine	Tailings pond, 50 x 730 ft only partially filled part of large chat reclamation operation	None
Do	5	4097650N, 343425E	do	Tailings pond area 5 8 acres composed of saturated fine material from chat reclamation operation	do
Do	6	4097840N, 343430E	do	Tailings pond area 8 5 acres partially filled with greenish-blue water part of chat reclamation operation	do
Do	7	4097880N, 343320E	do	Small tailings pond containing greenish water part of chat reclamation operation breached and connects with pond #6	do

TABLE C-3 - Chat Piles and Tailings Ponds--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 24E sec 10	8	4097830N 343240E	Ballard Mine	Tailings pond area 2 3 acres contains greenish-blue water part of chat reclamation operation	None
Do	9	4097800N, 343125E	Shanks Mine	Tailings pond area 0 7 acres partially filled iron stained	Reclamation
Do	10	4097700N 342600E	Clark Mine	Tailings pond area 3 7 acres partially filled with clear shallow water	Revegetation
Do	11	4097600N, 342680E	Clark Mine/ Slaughter Mine/ Ballard Mine	Chat pile irregularly shaped remnant of large pile	Reclamation
Do	12	4097550N, 343150E	Ballard Mine/ Shanks Mine	Chat pile irregularly shaped remnant of a large pile at the site of Ballard Mill now being reclaimed for chat	Continued reclamation
Do	13	4097100N, 343230E	Ballard Mine	Tailings pond area 8 7 acres small amount of water in east end remainder composed of dry fine material susceptible to wind erosion	Revegetation
T 35S R 24E sec 7	14	4097040N 337140E	Barr Mine	Dry tailings pond, area 1 6 acres filled with fine material susceptible to wind erosion	do

TABLE C-3 - Chat Piles and Tailings Ponds--Continued

Location	Site Number	UTM[1] Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T 35S R 24E , sec 7	15	4096950N, 337275E	Barr Mine	Chat pile 550 ft dia partially reclaimed	Reclamation
Do	16	4096550N 337600E	West Side Mine	Chat pile 720 x 550 ft on southeast side of Blue Mound partially reclaimed site of chat reclamation operation	do
Do	17	4096510N 337430E	Barr Mine	Tailings pond area 0 9 acres partially filled with greenish water	Draining and reclamation
T 35S R 24E sec 18	18	4096220N, 337400E	Blue Mound Mine	Tailings pond area 1 7 acres shallow with clear water	Draining and revegetation
T 35S R 24E sec 13	19	4096110N, 345230E	Wade Commonwealth #2 Mine	Chat pile 400 ft dia partially reclaimed on west side	Reclamation

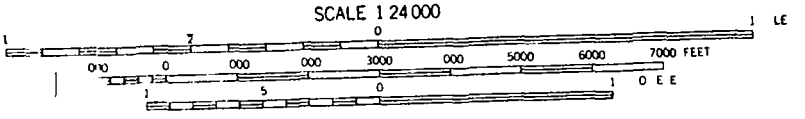
PLATE I-C UNDERGROUND MINES AND SHAFTS

EXPLANATION

APPROXIMATE EXTENT OF UNDERGROUND MINING

MINE SHAFT

AREA OF CLOSELY SPACED MINE SHAFTS (NUMBER INDICATES QUANTITY)



MODIFIED AFTER U S GEOLOGICAL SURVEY BASE MAPS

BAXTER SPRINGS KANSAS QUADRANGLE 1959

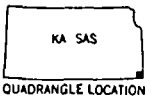
PHOTOREVISED 1978

DRAFTED BY DARRELL L DREW 1983

PLATE I-C UNDERGROUND MINES AND SHAFTS

BAXTER SPRINGS QUADRANGLE KANSAS

BY JAMES R MCCAULEY 1983



QUADRANGLE LOCATION

KANSAS GEOLOGICAL SURVEY THE UNIVERSITY OF KANSAS

LAWRENCE KANSAS

PREPARED UNDER U S BUREAU OF MINES

CONTRACT NO J0100131

PLATE I-C

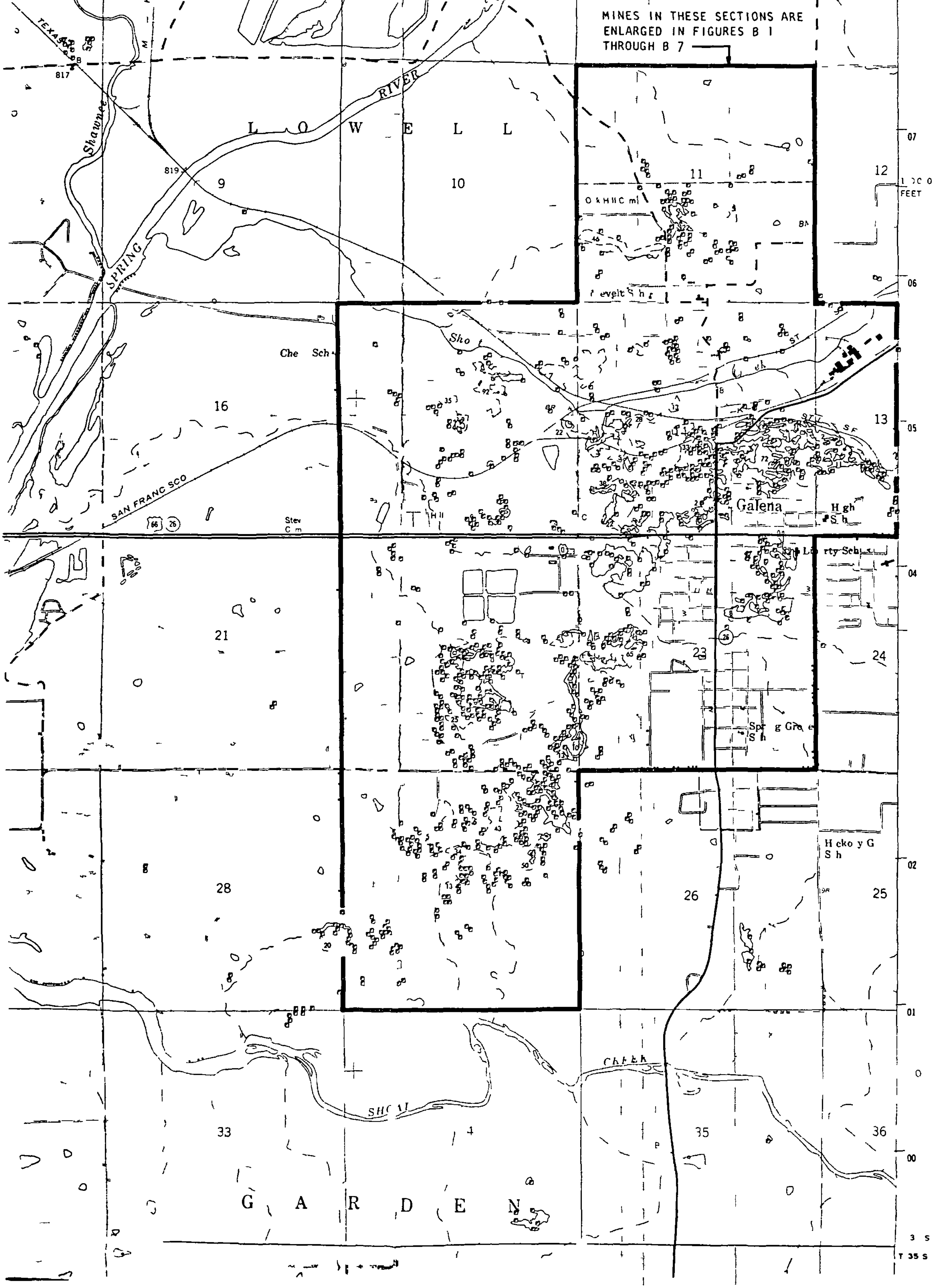

MINES IN THESE SECTIONS ARE ENLARGED IN FIGURES B 1 THROUGH B 7
L O W E L L
G A R D E N
RIVER
SPRING
Shawnee
SAN FRANC SCO
SHOAL
CREEK
Galena
Che Sch
9
10
11
12
13
16
21
23
24
25
26
28
33
35
36
817
819
08
07
06
05
04
02
01
00
T 35 S

PLATE II-C OPEN SHAFTS, PITS AND SUBSIDENCES

EXPLANATION

OPEN SHAFT (NUMBER REFERS TO INFORMATION IN TABLE C 1)

LARGE COLLAPSED SHAFT

OPEN PIT MINE

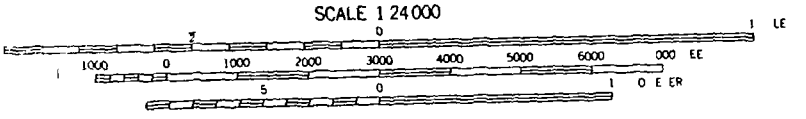
MINE SUBSIDENCE (NUMBER REFERS TO INFORMATION IN TABLE C 2)

SMALL MINE SUBSIDENCE

REPORT OF PAST MINE SUBSIDENCE

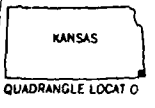
ADIT

AREA OF CLOSELY SPACED MINE HAZARDS



MODIFIED AFTER U S GEOLOGICAL SURVEY BASE MAPS
BAXTER SPRINGS KANSAS QUADRANGLE 1959
PHOTOREVISED 1978
DRAFTED BY DARRELL L DREW 1983

PLATE II-C OPEN SHAFTS PITS AND SUB-SIDENCES BAXTER SPRINGS QUADRANGLE KANSAS
BY JAMES R MCCAULEY 1983



QUADRANGLE LOCAT O

KANSAS GEOLOGICAL SURVEY THE UNIVERSITY OF KANSAS
LAWRENCE KANSAS
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CONTRACT NO J0100131

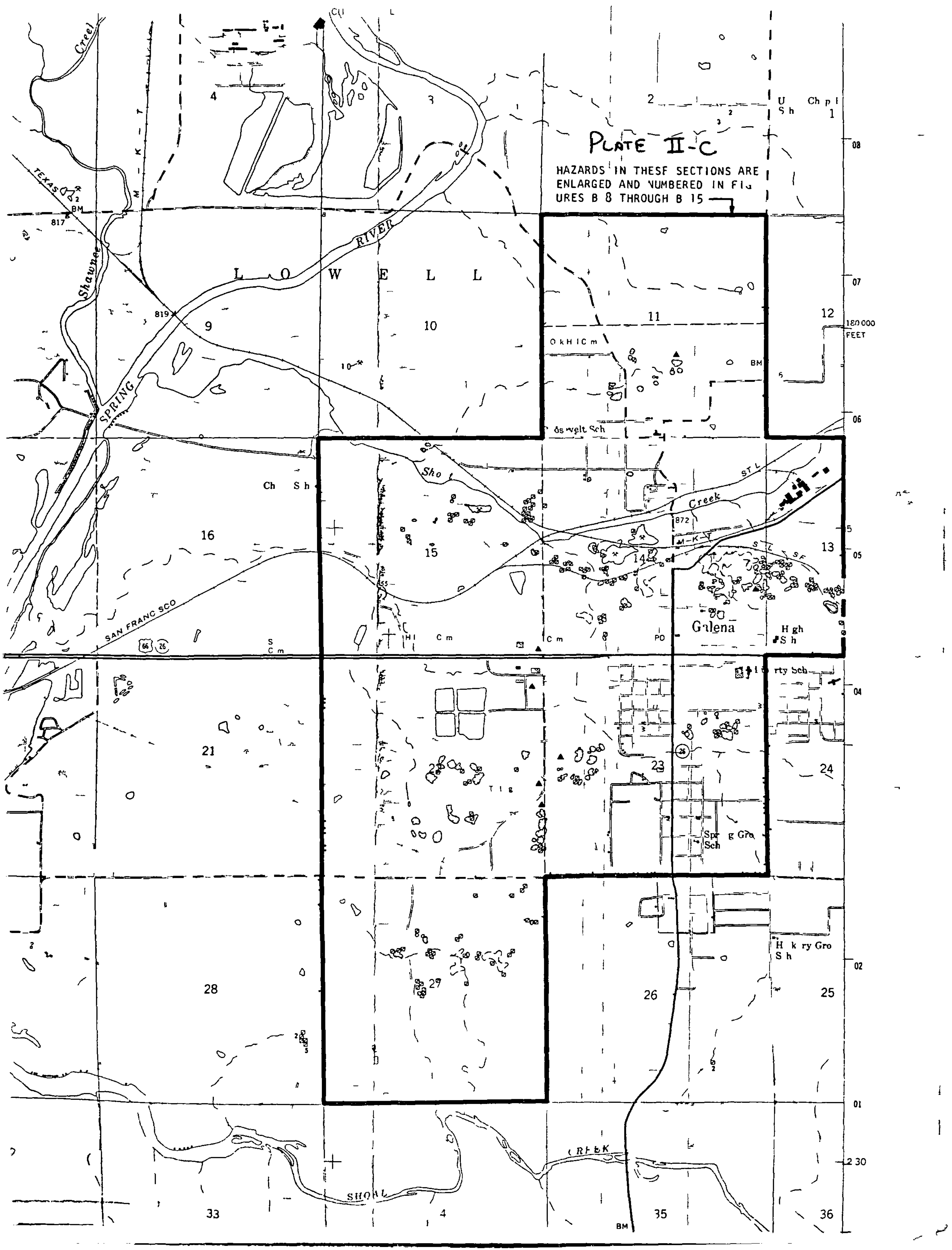
PLATE II-C
HAZARDS IN THESE SECTIONS ARE ENLARGED AND NUMBERED IN FIGURES B 8 THROUGH B 15
L O W E L L
SPRING RIVER
Shawnee Creek
Short Creek
SHOAL CREEK
SAN FRANCISCO
TEXAS
Galena
Oswelt Sch
180 000 FEET
4
3
2
1
9
10
11
12
16
15
14
13
21
22
23
24
28
27
26
25
33
4
35
36

PLATE III-C MINE AND MILL WASTE

EXPLANATIOI

2 CHAT AND WASTE PILES (NUMBER REFERS TO INFORMATION IN TABLE C 3)

CHAT COVERED AREA

EMBANKMENT OF FORMER TAILINGS POND

7 TAILINGS POND (NUMBER REFERS TO INFORMATION IN TABLE C 3)

SCALE 1 24000

000 0 1000 2000 3000 4000 5000 6000 000 EE

1 5 0 1 0 ETER

MODIFIED AFTER U S GEOLOGICAL SURVEY BASE MAPS
BAXTER SPRINGS KANSAS QUADRANGLE 1959
PHOTOREVISED 1978
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PLATE III-C MINE AND MILL WASTE BAXTER SPRINGS QUADRANGLE KANSAS

BY JAMES R MCCAULEY 1983

QUADRANGLE LOCATION

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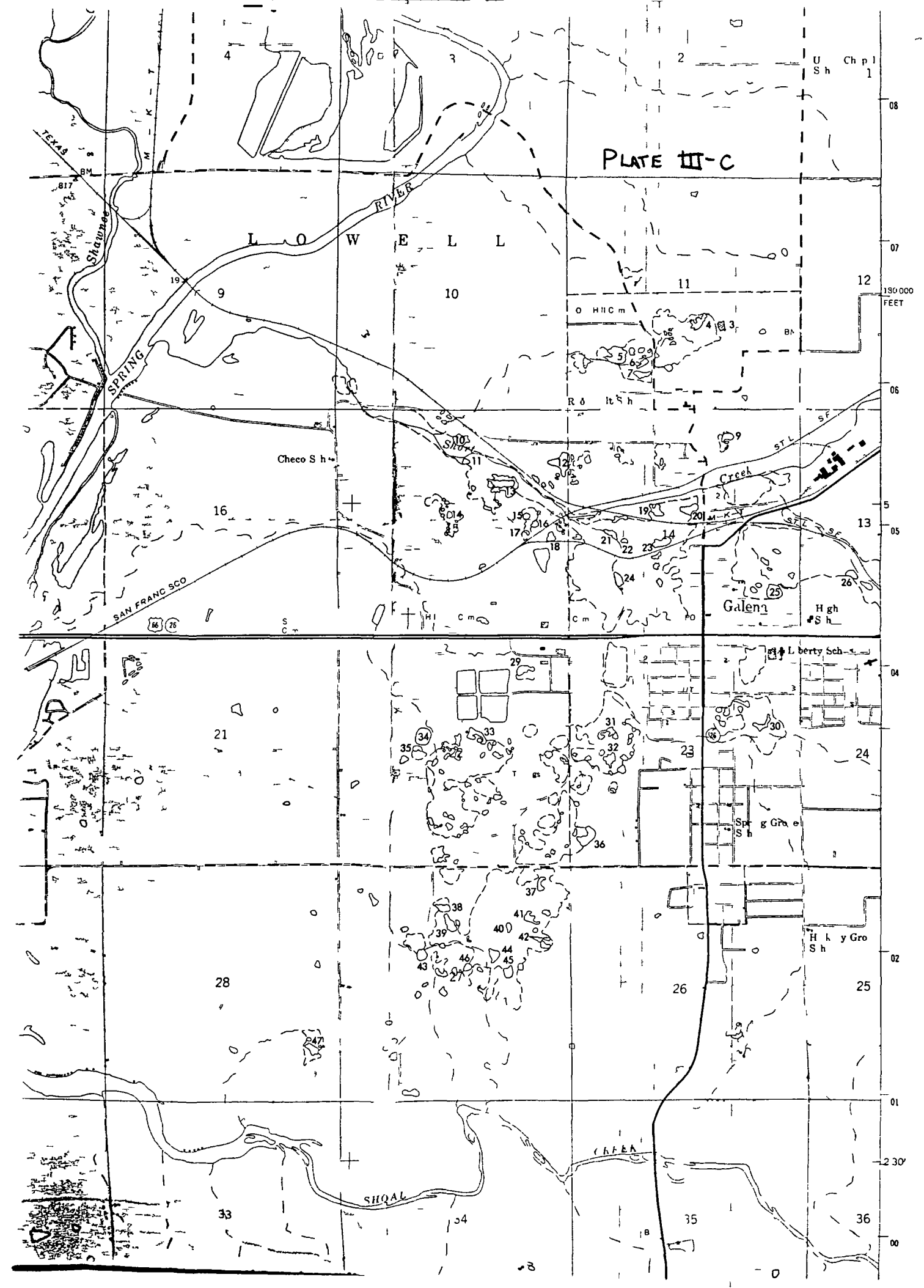
PLATE III-C
L O W E L L
RIVER
SPRING
Shawnee
TEXAS
Checo S h
SAN FRANC SCO
Galena
H gh
S h
Creek
SHOAL
CREEK
Sp g Gro e
S h
H k y Gro
S h
L berty Sch
U Ch p l
S h
130 000
FEET