1991

Flood Insurance Study, City of Bountiful, Utah, Davis County

Federal Emergency Management Agency

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NOTICE TO FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.
FLOOD INSURANCE STUDY
CITY OF BOUNTIFUL, DAVIS COUNTY, UTAH

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study revises and updates a previous Flood Insurance Study/Flood Insurance Rate Map for City of Bountiful, Davis County, Utah. This information will be used by the City of Bountiful to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP). The information will also be used by local and regional planners to further promote sound land use and floodplain development.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for the original study were performed by the U.S. Army Corps of Engineers (COE), Sacramento District, for the Federal Insurance Administration, under Interagency Agreement No. IAA-H-16-75, Project Order No. 17. This work, which was completed in August 1976, covered all significant flooding sources affecting the City of Bountiful.

The hydrologic and hydraulic analyses for this study were performed by the COE, Omaha District, for the Federal Emergency Management Agency (FEMA), under Interagency Agreement No. EMW-94-E-1506. This study was completed in August 1988.

1.3 Coordination

During the original study, direct contacts were made with the City Manager, City Engineer, City Planning Director, local Chamber of Commerce, and the University of Utah Library.

An initial coordination meeting for the original Flood Insurance Study was held on December 4, 1974. Information on study procedures, data required, and floodways and their determinations was presented. The meeting was attended by representatives of the Federal Housing Administration; Federal Insurance Administration; State of Utah; City of Bountiful; and the COE, Sacramento District (the study contractor).

On August 2, 1976, an intermediate coordination meeting was attended by representatives of the Federal Insurance Administration, Federal Highway Administration, Utah Department of Transportation, City of Bountiful, and the study contractor. Technical data relative to the study were reviewed in the meeting. Questions on flow values used in the study were raised by the representatives of the city and the Utah Department of Highways but could not be resolved during the meeting. In a letter dated July 13, 1977, the Federal Insurance Administration directed that the Flood Insurance Report be completed using flow values originally determined in the hydrologic analyses made for the study by the study contractor.

The results of the original study were reviewed at a final coordination meeting held in the city's council chambers on September 21, 1977. The meeting was attended by members of the city council; the Mayor; the City Planner, Manager, Engineer, Attorney, and Treasurer: representatives of the Federal Insurance Administration and the Sacramento District COE, and South Division; the local press; and several residents. There were no adverse comments regarding the study.

On August 5, 1983, an initial coordination meeting was held at the Bountiful City Office Building to determine which streams in the community were affected by mudflow and mud flood hazards, and what historical data for mudflow and mud flooding in Bountiful were available. The meeting was attended by representatives of the City of Bountiful, FEMA Region 8, the COE Omaha District, and the Hydrologic Engineering Center, Davis, California.

On November 9, 1987, an intermediate coordination meeting was held in the Bountiful City Office Building to present the preliminary results of the mudflow portion of the study to the community. This meeting was attended by representatives of the City of Bountiful, Davis County, FEMA Region 8, and the COE Omaha District. Some minor revisions were incorporated into the final study results because of input from participants at this meeting.

On April 7, 1988, a second intermediate coordination meeting was held in the Bountiful City Office Building to present the preliminary results of the total study to the community. This meeting was attended by representatives of the City of Bountiful, Davis County, FEMA Region 8, and the COE Omaha District.

The results of the study were reviewed at the final Consultation and Coordination Officer meeting held on April 10, 1991, and attended by representatives of the City of Bountiful and FEMA. All questions raised at that meeting have been addressed in this study.

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2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated areas of the City of Bountiful, Davis County, Utah. The area of study is shown on the Vicinity Map (Figure 1).

The limits of detailed and approximate study in the City of Bountiful were determined by the Federal Insurance Administration after consultation with the community and the study contractor.

Approximate analyses were used to study those areas having low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the City of Bountiful.

2.2 Community Description

For most of its history, the City of Bountiful has had an economy based primarily on agriculture. In recent years, the city has become an increasingly popular residential area for people who work in Salt Lake City and Ogden and at various military bases within commuting distances, but who prefer to live in the quiet, less hurried atmosphere of a small community. However, agriculture is still important in the economy of Bountiful, and it has developed as the business and professional center of south Davis County and cannot be strictly considered a developing bedroom community. The population of Bountiful was 41,691 in 1980, a 49.7 percent increase over the 1970 population of 27,853 (Reference 1).

Bountiful is approximately 4 miles north of Salt Lake City and 30 miles south of Ogden, the two largest cities in Utah. The city is in the southeast corner of Davis County, which is in north-central Utah. Bountiful borders Centerville on the north, west Bountiful and Woods Cross on the west, and an unincorporated area known as Val Verde on the south. Great Salt Lake lies a short distance to the east, and the Sessions Mountains, a subrange of the Wasatch cordillera, rise immediately to the east. The city lies in an extensive area of fertile, arable land on a series of terraces and benches left by the prehistoric recession of Lake Bonneville.

The floodplains of the streams under study abound with residential and commercial structures. A hospital and associated professional buildings are located along Barton Creek, which crosses the downtown section of Bountiful. The city hall, public library, and a number of commercial buildings are located along Mill Creek, and there are schools and shopping centers along Stone Creek. Numerous city streets, State Highways 131 and 106, and various public utilities either cross or are located in floodplain areas. In general, the west and west-central sections of the city are developed for commercial and some light industrial uses, and the northern, eastern, and southern sections are devoted to residential uses. Continuing development in the city is expected, and pressure leading to intensified floodplain use will undoubtedly accompany such development.

Bountiful is served by Interstate Highway 15 and U.S. Highways 89 and 91, and is at the junction of State Highways 131 and 106. A large, well-defined channel of transportation is provided by the Union Pacific and Denver and Rio Grande Western Railroads. Passenger and air freight services from many major carriers are available at Salt Lake City International Airport.

Dry Hollow No. 2 is an intermittent stream which originates approximately 1 mile northeast of the Bountiful city limits at an elevation of 6,800 feet National Geodetic Vertical Datum of 1929 (NGVD). It flows in a northwesterly direction and empties into the marshlands along the Farmington Bay of the Great Salt Lake at an elevation of about 4,200 feet NGVD. It has a large, deep channel above the canyon mouth, and a smaller well-defined channel through the developed areas of Bountiful. Streambed slopes range from over 1,500 feet per mile in the upper basin to 420 feet per mile near the downstream study limit.

Stone Creek is a perennial stream which has a well-defined channel through the City of Bountiful. It originates about 3 miles east of Bountiful at an elevation of about 8,600 feet NGVD. It flows in a northwesterly direction and empties into the marshlands along the Farmington Bay of the Great Salt Lake at an elevation of about 4,200 feet NGVD. It has a large, deep channel above the canyon mouth, and a smaller well-defined channel through the developed areas of Bountiful. Streambed slopes on Stone Creek vary from over 1,500 feet per mile in the upper basin to 400 feet per mile in the lower basin near the mouth, with an overall stream slope of 550 feet per mile.

The North Fork Stone Creek is a right bank tributary of Stone Creek that originates approximately 2 miles northeast of Bountiful at an elevation of 7,600 feet NGVD. The North Fork Stone Creek flows in a northwesterly direction to its confluence with Stone Creek just upstream of 400 East Street. Streambed slopes on the North Fork Stone Creek range from over 1,000 feet per mile in the upper basin to 400 feet per mile in the lower basin near the mouth, with an overall stream slope of 900 feet per mile.

Barton Creek originates approximately four miles east of Bountiful at an elevation of about 8,700 feet NGVD and flows in a northwesterly direction through Bountiful. Barton Creek empties into the marshlands along the Farmington Bay of the Great Salt Lake at an elevation of about 4,200 feet NGVD. It has a large, deep channel above the canyon mouth, and a smaller well-defined channel through the developed areas of Bountiful. Streambed slopes on Barton Creek vary from over 1,000 feet per mile in the upper basin to 100 feet per mile in the lower basin near the mouth, with an overall basin slope of 500 feet per mile.

Mill Creek originates about five miles east of Bountiful at an elevation of approximately 9,200 feet NGVD. It flows in a...
northwesterly direction through Bountiful. Mill Creek empties into the marshlands along the Farmington Bay of the Great Salt Lake at an elevation of about 4,200 feet MSL. It has an average, deep channel above the canyon mouth, and a smaller well-defined channel through the developed area of Bountiful. Streamed slopes on Mill Creek vary from over 900 feet per mile in the upper basin to 100 feet per mile in the lower basin near the mouth, with an overall basin slope of 450 feet per mile.

The extremely steep slopes on the easternmost edge of the Bountiful corporate limit are not conducive to development or agricultural uses. Below the steep mountain sides of the Wasatch Front, the topography flatters to the foothills and then to the lakeplain. As the slopes flatten traveling west from the mountains, the land use changes to agricultural, then to moderately dense developed city, and finally back to agricultural or swampy areas along the edge of the Great Salt Lake. Orchard fruits are grown on the relatively steep undeveloped lakeplain areas. Much of the swampy area along the eastern edge of Bountiful is part of the Farmington Bay National Wildlife Refuge.

The native vegetation consists mainly of salt grass and wire grass on the low terraces and bottom lands. Sage brush and brushy oak grow on the higher terraces and as far up as approximately 7,500 feet. Above that elevation are plain forests of aspen, fir, pine, and spruce.

The climate in Bountiful is classified as temperate semi-arid. Average annual precipitation varies from approximately 14 inches per year in the city to 40 inches per year in the headwaters areas. Winter time precipitation usually occurs as snow, and a snow pack usually accumulates in the higher elevations. Consecutive cloudburst storms that produce intense, short-duration rainfall can be expected from mid-April through September, but they most frequently occur in spring and fall. In the lower elevations, temperatures range from winter lows around 9 degrees Fahrenheit to summer highs around 100 degrees Fahrenheit.

### 2.3 Principal Flood Problems

Recent records show that flooding occurred in Bountiful in 1948, 1950, 1952, 1953, 1955, 1958, 1968, 1969, and 1983. The maximum floods of record for Mill and Stone Creeks occurred in April and May 1952. On April 28, 1952, a peak flood discharge of 182 cubic feet per second (cfs) was recorded on Mill Creek. On May 5, 1952, an estimated discharge of 82 cfs was recorded on Stone Creek. There are no gauge records on Barton Creek, but it is assumed that a large flood flow probably occurred in May of 1952. Some of these flood events probably could be classified as mudflows or mud floods at different points in the basin. Except for the 1983 event, no specific information is available regarding mudflows or mud flooding in Bountiful (Reference 3).

Mudflows and mud floods can form in two different ways. In almost all flood events, floodwaters can scour significant amounts of material from the streambed, causing the floodwaters to be heavily laden with sediment and debris. In the Great Salt Lake area, however, the sediment and debris load exceeds 20 percent solids by volume it is termed a mud flood; if the sediment and debris load exceeds 45 percent solids by volume it is termed a mudflow. Mudflows and mud floods also result directly from shallow landslides caused when the water content of the soil is increased sufficiently to permit flow. Below the canyon mouth, the velocities decrease and the material is deposited in a fan shape over the more gently inclined slopes. In some cases, as the mudflows proceed downstream, some of the heavier solids will fall out of suspension and the flow evolves from a mudflow to a mud flood and finally to a water flood.

Following widespread flooding along the Wasatch Front in the 1930s, a special commission concluded that the mudflows and mud flooding were caused by a depletion of plant cover due to overgrazing and management fires on headwater lands. As a result, soil and sediment stabilization measures were instituted. The absence of large mudflows after the revegetation and soil stabilization measures were instituted indicates that there was then a significant mudflow hazard. However, in the spring of 1983, widespread landslides and mudflows caused an estimated $250 million in damage in the State of Utah. Along a 30-mile stretch of the Wasatch Front, 92 significant landslides sent mudflows down on residential areas. More than 1,000 landslides occurred along the Wasatch Plateau. The destruction was so extensive that 22 of Utah's 28 counties were declared national disaster areas (Reference 3).

There is evidence of a prehistoric debris flow that reached the mouth of the Ward Creek Canyon (Stone Creek) as did a debris flow in the Spring of 1983 (Reference 3).

There is no historical evidence of debris flows or debris floods in Holbrook Canyon (Barton Creek); however, the presence of a large partly-detached landslide in the canyon points to a high potential for mudflows and mud flooding (Reference 3).

Young alluvial fan deposits identified beyond the canyon mouth on Mill Creek suggest a history of recurrent debris floods. Debris flows reached the main channel during the Spring of 1983 without extending beyond the canyon mouth (Reference 3).

### 2.4 Flood Protection Measures

From 1933 to 1939, much of the land in the upper basins of the streams studied in detail for this study were contour trenched and seeded by the Civilian Conservation Corps.

The channels of all the streams studied for this report have been modified to some degree from their natural state, especially in developed areas. Most of these channel changes were designed to...
carry frequent flows and do not provide protection from the 100-year flood.

Debris basins have been constructed on all of the streams studied for this report. The debris basins have varying degrees of effectiveness depending on their designs.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1 and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, MINIMUM period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedance) in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community.

This study was conducted specifically to identify the flood hazards associated with mudflow and mudflowing. A major portion of the study effort was expended on the development of a method to define mudflow hazards. The mudflow hazard identification method was developed by the CORE Hydrologic Engineering Center at Davis, California, in conjunction with the University of Utah and the CORE Omaha District.

For this Flood Insurance Study, the basic hydrology was taken directly from a hydrology report prepared for the Federal Insurance Administration in October 1979 (Reference 4). The discharge-frequency relationships for each stream were developed for the snowmelt flood events, as well as for the rainfall flood events.

These two distributions were statistically combined to give a discharge-frequency curve for the combined snowmelt-rainfall event.

The runoff records of 16 gaging stations in the general vicinity of the study area were searched for the yearly peak flows caused by snowmelt and the yearly peak flows caused by rainfall.

For each gaging station, the 10-, 50-, 100-, and 500-year frequency discharges were developed for both snowmelt and rainfall events from U.S. Water Resources Council methods (Reference 5).

The stepwise regression approach was used in developing a total of eight regression equations for all four frequencies and the two types of flood events. Drainage area was found to be the key independent variable in the regression equations. The regression equations representing the snowmelt flood events resulted in a good correlation coefficient, but the regression equations for the rainfall flood events provided poor correlation and were unacceptable. It was necessary to use a watershed model to simulate rainfall flood events.

The Storm Water Management Model (SWMM) developed by the U.S. Environmental Protection Agency was used to simulate rainfall flood events (Reference 6). A total of 16 streams were simulated by the SWMM model to yield hydrographs for 10-, 50-, and 100-year frequency storms. Through the use of the stepwise regression approach, regression equations were developed to predict the 10-, 50-, and 100-year frequency discharges at two locations; for example, at the canyon mouth and at a location downstream of the developed area. The 500-year frequency discharge is obtained by extrapolation of the 10-, 50-, and 100-year frequency discharges.

In summary, the discharge-frequency distribution curve for a stream for snowmelt events was determined from an analysis of the gaging station records of the related regression equations. The discharge-frequency distribution curve of the rainfall events was evaluated from the results of the SWMM model simulation or the related regression equations. These two independent events were statistically combined to yield a discharge-frequency distribution for the combined event. The resulting discharges were used in this study with two modifications. The first modification was to include the available data from the 1983 flood event in the hydrologic analysis. A second modification was needed to simulate the effect of potential high sediment loads in the floodwaters. It was determined in this study that floodwaters in the streams studied could contain up to 45 percent solids, including sediment, rocks, and debris (Reference 7). To account for the potential for high sediment and debris load the discharges were increased by a "bulking factor." Flows were increased by multiplying the basic discharges by a "bulking factor" of 1.82.

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The flood discharges were also routed through the debris basins on Stone, Barton and Mill Creeks to determine the affects that the debris basins have on peak flood flows.

As part of this study, a mudflow hydrograph was required to determine the extent of the mudflow hazard. A methodology for calculating a mudflow hydrograph was developed as part of this study by the Hydrologic Engineering Center in conjunction with the University of Utah. The mudflow hydrograph methodology uses observed mudflow volumes along the Wasatch Front to develop a total mudflow volume potential versus drainage area curve. Using the drainage area, a mudflow volume was determined for each stream. The mudflow volume was then used as input to a one-dimensional routing model with a dambreak upstream boundary condition. The one-dimensional model provided a mudflow hydrograph for use in determining mudflow depths on boundaries.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

The mudflow depths and boundaries were calculated using a two-dimensional finite element computer model developed specifically for this study by the Hydrologic Engineering Center and the University of Utah (Reference 7). The basic inputs required for the two-dimensional model are: an inflow mudflow hydrograph; a finite element grid network; a representation of the ground topography of the alluvial fan; mudflow fluid properties; and initial mudflow depths and velocities. Topography for the two-dimensional model was taken from topographic mapping which was developed from aerial photographs flown in April 1982 (Reference 8). The mudflow fluid property values used for input into the two-dimensional model were selected using available data. The fluid property required by the model included the plastic viscosity, the Bingham yield strength, and the unit weight of the fluid. The values selected were 10 lb/sec/ft², 20 lb/ft², and 125 lb/ft³ respectively. These selected fluid property values were of the same order of magnitude as those used for the one-dimensional mudflow modeling that was done on the North Fork of the Toutle River in Washington (Reference 9). These values also agree with values measured by Thomas C. Pierson during a smaller Rudd Creek mudflow event which occurred about six days after the main event in 1983 (Reference 10). The initial mudflow depths were calculated at normal depth in using the resistance equation for mudflow from the one-dimensional model.

Within the Davis County study area little data were available with which the two-dimensional mudflow model could be calibrated. However, some data were available on the Rudd Creek 1983 mudflow events which included one main event followed by several smaller events. The data available on these events included:

1. An aerial photograph of the total inundation region.
2. A surveyed volume of the mudflow deposit of approximately 90,000 yd³. (This was the total mudflow volume for all of the 1983 events on Rudd Creek.)
3. A mudflow front speed on the alluvial fan of approximately the speed that a man could walk.
4. Observed mudflow depths that ranged from approximately 20 feet within the canyon and 12 feet at the apex of the alluvial fan (Reference 9) to approximately 2 or 3 feet at the front.

Attempts were made to duplicate the Rudd Creek 1983 mudflow events using the two-dimensional mudflow model. The results of these attempts were checked against the available data on the Rudd Creek mudflow events and the duplication served as a rough calibration of the two-dimensional mudflow model.

The mudflow volumes used in this study represent the total average potential mud volumes available for the respective drainage areas in question. Because of a lack of historical data, it is difficult to assign a probability to a mudflow. Therefore, mudflow depths have not been shown. Additional information regarding the mudflow methodology used to develop the flood boundaries may be obtained from the ODH, Omaha District.

The hydraulic analyses for this study were based on unobstructed flood. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the NGVD.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a rational standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream
studied by detailed methods, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1" = 1,400 with a contour interval of 2 feet.

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zone A); and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary is shown on the Flood Insurance Rate Map (Exhibit 2.)

Because of the limitations of the engineering methods used in this study, only the 100-year flood boundaries are shown. The shaded X Zones indicate 100-year flooding which is less than one foot deep, rather than 500-year flooding.

This Flood Insurance Study attempts to identify the entire area which may be subject to mudflows and mud flooding from those streams studied. Because of the effects of topography, floodplain development, and local obstructions, the path of mudflows and mud flooding on alluvial fans can vary from one flood event to another. In addition, areas which may appear "high" relative to adjacent areas may indeed be subject to flood hazards of the same depth, if a localized obstruction changes the course of the mudflow or mud flood such that it does not follow the lowest flow path through the area.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights.

No floodways were computed for flooding sources studied by detailed methods in the City of Bountiful due to the approximate nature of the methodology used for the mudflow areas.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

Barton, Mill, and Stone Creeks were included in the USF Flood Plain Information report for Bountiful, West Bountiful, and Woods Cross, Utah dated December, 1969 (Reference 2).
All the streams studied for this report were studied in detail for water flooding for a Flood Insurance Study for the City of Bountiful dated March, 1978.

Differences in flood boundaries between the Flood Plain Information Report, the Flood Insurance Report, and this study are attributable to updated hydrologic information and the addition of mud flood and mudflow hazard delineation.

8.0 LOCATIONS OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, Denver Federal Center, Building 710, Box 25267, Denver, Colorado 80225-2567.

9.0 BIBLIOGRAPHY AND REFERENCES


8. Davis County, Utah, Topographic Mapping, Davis County, Utah, Scale 1:12,400, Contour Interval 2 Feet, Aero-Graphics, Inc., Salt Lake City, Utah, from aerial photography flown in April 1982.
