

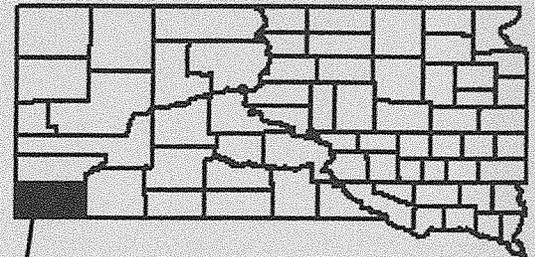
FLOOD INSURANCE STUDY



FALL RIVER COUNTY, SOUTH DAKOTA AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
EDGEMONT, CITY OF	460026
FALL RIVER COUNTY, UNINCORPORATED AREAS	460238
HOT SPRINGS, CITY OF	460027
*OELRICHS, TOWN OF	460028

* NON-FLOODPRONE



Fall River County

December 18, 2007



Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
46047CV000A

**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.

Selected Flood Insurance Rate Map panels for the community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g., floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

<u>Old Zone</u>	<u>New Zone</u>
A1 through A30	AE
B	X
C	X

Part or all of this Flood Insurance Study may be revised and republished at any time. In addition, part of this Flood Insurance Study may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the Flood Insurance Study. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current Flood Insurance Study components.

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**FLOOD INSURANCE STUDY
FALL RIVER COUNTY, SOUTH DAKOTA AND INCORPORATED AREAS**

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic areas of Fall River County, South Dakota including: the Cities of Edgemont and Hot Springs, and the unincorporated areas of Fall River County (referred to collectively herein as Fall River County), South Dakota, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

Please note that the Town of Oelrichs is non-floodprone.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than 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 FIS report are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

This countywide FIS has been prepared by combining data from the Cities Edgemont and Hot Springs and by incorporating information prepared by the U.S. Army Corps of Engineers (USACE), Omaha District, for the Federal Emergency Management Agency (FEMA), under Interagency Agreement No. EMW-95-E-4759, Project Order No.6. This study, which included the analysis of a reach of Fall River in the unincorporated areas of the county which was not previously published, was completed in 1998. Information on the authority and acknowledgements for each jurisdiction included in this countywide FIS, as compiled from their previously printed individual FIS reports (References 1-2) is shown below.

City of Edgemont

The hydrologic and hydraulic analyses were performed by Howard Needles Tammen & Bergendoff, for the Federal Insurance Administration (FIA), Under Contract No. H-4548. This work, which was completed in July 1978, covered all significant flooding sources affecting the City of Edgemont.

For this countywide FIS, limits of detailed study are summarized in Table 2, "Limits of Detailed Study".

Table 2, "Limits of Detailed Study"

<u>Stream Name</u>	<u>Limit of Detailed Study</u>
Cold Brook Creek	From the confluence with Fall River to approximately 300 feet upstream of Tillotson Street.
Cottonwood Creek	From approximately 550 feet downstream of Tennessee Valley Authority Road to 1.45 miles upstream of its mouth.
Fall River	From the confluence with the Cheyenne River (approximately 1.7 miles downstream of U.S. Route 18) upstream to approximately 0.25 miles upstream of Battle Mountain Avenue.
Unnamed Tributary to Fall River	From the confluence with Fall River upstream approximately 0.5 mile to the Hot Springs corporate limit.

Flooding along Cheyenne River within the City of Edgemont was studied by approximate methods.

2.2 Community Description

The City of Edgemont is in west-central Fall River County in southwestern South Dakota, approximately 80 miles southwest of Rapid City and 13 miles east of the Wyoming border. The 2000 U.S. Census reported the population of Fall River County to be 7,453 and the City of Edgemont to be 867 (Reference 4).

Climatic conditions in Edgemont are typified by extreme temperatures and persistent winds. Monthly mean temperatures for January range from 2 degrees Fahrenheit (°F) to 27°F, and monthly mean temperatures for July range from 61°F to 90°F. The mean annual temperature in Edgemont is 46°F. Seventy-five percent of all precipitation occurs during the growing season, May and June, and the average rainfall is from 16 to 18 inches. Snowfall averages from 20 to 60 inches.

The City of Hot Springs is located in Fall River County in southwest South Dakota. It is approximately 50 miles south of Rapid City along the southern edge of the Black Hills. The average summer and winter temperatures in Hot Springs are 63.1°F and 29°F respectively. The average annual precipitation is 20.3 inches. The 2000 U.S. Census reported the population of the City of Hot Springs as 4,129 (Reference 5).

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 each community.

In order to define discharge-frequency data for Cottonwood Creek, several methods of analysis were used. A regional relationship developed by the U.S. Geological Survey (USGS) in which basin characteristics (including drainage basin area and elevations) are related to stream-flow characteristics was the principal method used (Reference 6). Another method was used to check the results of the above mentioned method. This method was the application of regional relationships as outlined in an earlier USGS Water-Supply Paper 1679 (Reference 7). The 0.2-percent-annual-chance peak discharge flow was extrapolated from a plot of the calculated values using logarithmic probability paper.

The USACE developed discharge-frequency estimates throughout the Middle Cheyenne-Spring (Reference 8) watershed using a combination of statistical discharge frequency analysis and rainfall-runoff modeling. Construction of Cold Brook Dam and Cottonwood Springs Dam resulted in changes to the hydrologic characteristics of the watershed. To provide the most accurate possible hydrologic analysis, the USACE HEC-1 program (Reference 9) was used to develop a hydrologic model for both original and "pre-reservoir" conditions and existing, or "with reservoir" conditions.

In order to develop existing conditions discharge frequency estimates at the gage location in Hot Springs, a log-Pearson Type III statistical analysis was performed on the total period of record because hydrologic conditions have changed in the basin due to the construction of the dams (Reference 10). Several combinations of years of record were analyzed in order to develop a discharge-frequency estimate that would be representative of the total discharge population. Periods of record from 1938-1953, before construction of Cold Brook Dam; 1953-1994, the period of record before the Cold Brook Dam was in place; 1969-1994, the period of record before the Cottonwood Springs Dam was in place; and 1938-1994, the total period of record at the time of the hydrologic analysis. In order to evaluate the resulting discharge-frequency relationships, they were compared to results from previous analyses. Previous analyses involving Fall River include: 1) the original study of Fall River for flood control projects (Reference 11); 2) the USGS Report PB-239 831 containing analyzed flood data for Eastern and Western Regions in South Dakota (Reference 12); 3) USGS Report 85-4217 using flow records from 1953 to 1983 to calculate flood frequency estimates (Reference 13); and 4) the USACE Black Hills Regional Study (Reference 14).

The total period of record from 1938 to 1994 is the basis for the natural condition discharge-frequency relationships. Even though this period includes years when the two dams were in place, the dams do not significantly impact flows due to the low inflows to the reservoirs. The HEC-1 model was used to modify the natural

Table 3, "Summary of Discharges"

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cubic feet per second)			
		10-Percent- Annual-Chance	2-Percent- Annual-Chance	1-Percent- Annual-Chance	0.2-Percent- Annual-Chance
Cold Brook Creek Below Cold Brook Dam	1.2	190	220	510	1,240
Cottonwood Creet At Edgemont	199	2,306	6,010	8,280	17,000
Fall River At confluence with Cheyenne River Above Highway 385 (near section "D") Above Highway 385 (near section "I") Just upstream of U.S. Highway 18 Bypass	NA NA NA NA	1,640 1,580 1,510 1,410	4,000 3,830 3,620 3,320	5,590 5,310 4,970 4,480	10,600 10,280 9,880 9,310
Unnamed Tributary to Fall River At confluence with Fall River	9.7	900	1,980	2,550	4,280

NA = data not available

Table 4, "Manning's "n" Values"

<u>Stream Name</u>	<u>Roughness Coefficients</u>	
	<u>Channel</u>	<u>Over banks</u>
Cold Brook Creek,	0.035 to 0.100	0.035 to 0.100
Cottonwood Creek	0.055	0.070
Fall River	0.030 to 0.068	0.040 to 0.085
Unnamed Tributary to Fall River	0.040 to 0.050	0.050 to 0.090

Flood elevations are commonly raised by ice jams during spring thaws. However, the hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS reports and FIRMs was NGVD29. With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS report and on the FIRM have been converted to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the NGVD29 and NAVD88, or to obtain current elevation, description, and/or location information for benchmarks shown on this map, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

NGS Information Services
 NOAA, N/NGS12
 National Geodetic Survey
 SSMC-3, #9202
 1315 East-West Highway
 Silver Spring, Maryland 20910-3282
 (301) 713-3242
 (301) 713-4172 (fax)

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

plus any adjacent floodplain areas, that must be kept free of encroachment so that the base flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways for Fall River, Unnamed Tributary to Fall river, and Cold Brook Creek were defined by specifying left and right bank obstructions. The Fall River floodway from the downstream study limit to the confluence with Cold Brook Creek is essentially confined to the channel. In the case of Cold Brook Creek where there is no longer a clearly defined channel, the floodway follows the channel alignment based on the USGS quadrangle map of the area and the 1982 cross sections.

As shown on the FIRMs, the floodway boundaries were computed at cross sections. Between cross sections, the boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 5, "Floodway Data"). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are close together or collinear, only the floodway boundary has been shown.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water surface elevation of the base flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

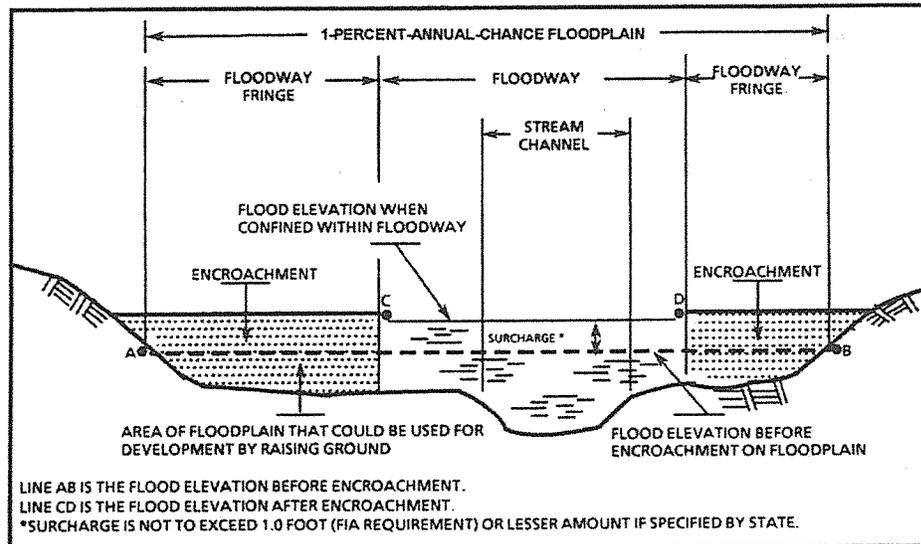


Figure 1, "Floodway Schematic"

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE (1)	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY NAVD	WITHOUT FLOODWAY NAVD	WITH FLOODWAY NAVD	INCREASE (FT.)
Fall River								
A	400	118	1199	4.7	3,046.8	3,046.8	3,047.8	1.0
B	3,650	65	396	14.0	3,079.8	3,079.8	3,079.8	0.0
C	7,250	131	934	6.0	3,111.9	3,111.9	3,111.9	0.0
D	9,350	89	559	9.5	3,188.0	3,188.0	3,188.0	0.0
E	11,700	71	397	13.4	3,210.1	3,210.1	3,210.1	0.0
F	14,000	266	4718	1.1	3,246.4	3,246.4	3,246.4	0.0
G	15,200	89	444	12.0	3,246.3	3,246.3	3,246.3	0.0
H	18,410	87	416	12.4	3,278.8	3,278.8	3,278.8	0.0
I	24,450	97	731	6.8	3,338.4	3,338.4	3,338.5	0.1
J	28,530	70	398	12.5	3,371.4	3,371.4	3,371.4	0.0
K	30,380	114	682	7.3	3,383.9	3,383.9	3,384.3	0.4
L	32,150	77	441	10.2	3,396.5	3,396.5	3,396.5	0.0
M	33,430	104	525	8.5	3,405.9	3,405.9	3,405.9	0.0
N	35,000	105	566	7.9	3,415.3	3,415.3	3,415.3	0.0
O	35,930	136	501	9.0	3,421.4	3,421.4	3,421.4	0.0
P	37,370	62	337	13.3	3,430.1	3,430.1	3,430.1	0.0
Q	39,400	83	379	11.8	3,444.9	3,444.9	3,444.9	0.0
R	41,840	194	569	7.9	3,476.5	3,476.5	3,476.5	0.0

(1) Feet above confluence with Cheyenne River.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
FALL RIVER COUNTY, SD
 AND INCORPORATED AREAS

FLOODWAY DATA

FALL RIVER

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 1-percent-annual-chance floodplains that are determined in the FIS report by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base (1-percent-annual-chance) flood elevations (BFEs) or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report by detailed methods. Whole foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile (sq. mi.), and areas protected from the base flood by levees. No BFEs or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The FIRMs are 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 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole foot BFEs or average depths. Insurance agents use zones and BFEs 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 1- and 0.2-percent-annual-chance floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The countywide FIRMs present flooding information for the entire geographic area of Fall River County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. These countywide FIRMs also include flood-hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community are presented in Table 6, "Community Map History."

7.0 OTHER STUDIES

This FIS report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the NFIP.

8.0 LOCATION 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 80225-0267.

9.0 BIBLIOGRAPHY AND REFERENCES

1. Federal Emergency Management Agency, Flood Insurance Study, City of Edgemont, South Dakota, Fall River County, Washington D.C., June 1980.
2. Federal Emergency Management Agency, Flood Insurance Study, City of Hot Springs, South Dakota, Fall River County, Washington D.C., March 17, 2002.
3. U.S. Army Corps of Engineers, Omaha District, Fall River Hydrology Fall River at Hot Springs, SD, Omaha, Nebraska, January 1997.
4. U.S. Census Bureau Website, http://factfinder.census.gov/servlet/SAFFPopulation?_event=Search&_name=edgemont&_state=04000US46&_county=edgemont&_cityTown=edgemont&_zip=&_sse=on&_lang=en&pctxt=fph, last accessed March 2006.
5. U.S. Census Bureau Website, http://factfinder.census.gov/servlet/SAFFPopulation?_event=Search&_geo_id=16000US4618300&_geoContext=01000US%7C04000US46%7C16000US4618300&_street=&_county=hot+springs&_cityTown=hot+springs&_state=04000US46&_zip=&_lang=en&_sse=on&_ActiveGeoDiv=geoSelect&_useEV=&pctxt=fph&pgsl=160&_submenuId=population_0&_ds_name=null&_ci_nbr=null&_qr_name=null&_reg=null%3Anull&_keyword=&_industry=, last accessed March 2006.
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8. U.S. Environmental Protection website, http://cfpub1.epa.gov/surf/huc.cfm?huc_code=10120109, last accessed May 2006.
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