RAINFALL FREQUENCY TABLES

The following rainfall frequency tables cover a majority of the situations encountered in design of conservation practices in Iowa. They are based upon information contained in U.S. Weather Bureau Technical Papers No. 40 and 49; Hydrometeorological Report 51; USDA-NRCS, National Engineering Handbook, Section 4, Hydrology; and USDA-NRCS, Technical Release 60. It is intended that these tables be used in conjunction with the Iowa Standards and Specifications for Conservation Practices and other appropriate design criteria.

Hydrologic Design Criteria

The hydrologic design criteria for detention structures are one of the following: A1, A2, A3, B, and C. Two considerations are given in classifying a detention structure; the hazard classification and the product (effective height of a dam times the storage).

With regard to hazard classification, **class (a) or "low" hazard** dams are structures located in areas where damages from a failure would be limited to loss of the dam, loss of livestock, damages to farm out-buildings, agricultural land, and lesser used roads, and where loss of human life is considered unlikely. **Class (b) or "significant" hazard** dams are structures located in areas where failure may damage industrial or commercial buildings, moderately traveled roads or railroads, interrupt major utility services, but without substantial risk of loss of human life. **Class (c) or "high" hazard dams** are structures located in areas where failure may create a serious threat of loss of human life or result in serious damage to residential, industrial or commercial areas, important public utilities, public buildings, or major transportation facilities.

Class (a) or "low hazard" structures are further broken down into 3 classes based upon their product (the effective height of a dam times the storage). The classes are:

A1 = product less than 3,000. Use this design class for NHCP-378 structures, not TR-60 structures.

A2 = product 3,000 to 30,000 (TR-60)

A3 = product greater than 30,000 (TR-60)

QUICK RETURN FLOW BY COUNTY
See NEH, Part 630, Hydrology, Chapter 21

COUNTY	C.S.M.*
ADAIR	4
ADAMS	4
ALLAMAKEE	4
APPANOOSE	4
AUDUBON	3.5
BENTON	4
BLACK HAWK	4
BOONE	4
BREMER	4
BUCHANAN	4
BUENA VISTA	3
BUTLER	4
CALHOUN	3.5
CARROLL	3.5
CASS	3.5
CEDAR	4
CERRO GORDO	4
CHEROKEE	2.5
CHICKASAW	4
CLARKE	4
CLAY	3
CLAYTON	4
CLINTON	4
CRAWFORD	3
DALLAS	4
DAVIS	4
DECATUR	4
DELAWARE	4
DES MOINES	4
DICKINSON	3
DUBUQUE	4
EMMET	3.5
FAYETTE	4
FLOYD	4
FRANKLIN	4
FREMONT	3
GREENE	4
GRUNDY	4
GUTHRIE	4
HAMILTON	4
HANCOCK	4
HARDIN	4
HARRISON	2.5
HENRY	4
HOWARD	4
HUMBOLDT	4
IDA	3
IOWA	4
JACKSON	4
JASPER	4

COUNTY	C.S.M.*
JEFFERSON	4
JOHNSON	4
JONES	4
KEOKUK	4
KOSSUTH	4
LEE	4
LINN	4
LOUISA	4
LUCAS	4
LYON	2
MADISON	4
MAHASKA	4
MARION	4
MARSHALL	4
MILLS	3
MITCHELL	4
MONONA	2.5
MONROE	4
MONTGOMERY	3.5
MUSCATINE	4
OBRIEN	2.5
OSCEOLA	2.5
PAGE	3.5
PALO ALTO	3.5
PLYMOUTH	2
POCAHONTAS	3.5
POLK	4
POTTAWATTAMIE	3
POWESHIEK	4
RINGGOLD	4
SAC	3
SCOTT	4
SHELBY	3
SIOUX	2
STORY	4
TAMA	4
TAYLOR	4
UNION	4
VAN BUREN	4
WAPELLO	4
WARREN	4
WASHINGTON	4
WAYNE	4
WEBSTER	4
WINNEBAGO	4
WINNESHIEK	4
WOODBURY	2
WORTH	4
WRIGHT	4

* C.S.M. = cu.ft/sec/sq.mi.

6-HOUR RAINFALL DEPTHS FOR IOWA (inches)

COUNTY	5-Yr	10-Yr	25-Yr	50-Yr	Class "a" AS & 100-Yr	Class "a" FB&Class "b" AS	Class b" FB	Class "c" AS	Class "c" FB/PMP
ADAIR	3.1	3.7	4.2	4.7	5.3	7.8	13.7	10.7	26.6
ADAMS	3.2	3.7	4.3	4.8	5.3	7.9	13.8	10.8	26.7
ALLAMAKEE	2.8	3.3	3.7	4.2	4.6	7.1	12.9	10.0	25.3
APPANOOSE	3.1	3.7	4.3	4.7	5.2	7.8	13.9	10.9	27.0
AUDUBON	3.1	3.6	4.2	4.7	5.2	7.7	13.6	10.6	26.3
BENTON	3.0	3.5	4.0	4.4	4.9	7.4	13.4	10.4	26.3
BLACK HAWK	2.9	3.4	3.9	4.4	4.8	7.3	13.3	10.3	25.9
BOONE	3.1	3.6	4.1	4.6	5.1	7.6	13.5	10.6	26.2
BREMER	2.9	3.4	3.8	4.3	4.8	7.3	13.2	10.2	25.7
BUCHANAN	2.9	3.4	3.9	4.3	4.8	7.3	13.3	10.3	25.9
BUENA VISTA	2.9	3.4	3.9	4.5	4.9	7.4	13.2	10.3	25.5
BUTLER	2.9	3.4	3.9	4.4	4.8	7.3	13.2	10.3	25.8
CALHOUN	3.0	3.5	4.0	4.6	5.0	7.5	13.4	10.4	25.9
CARROLL	3.1	3.6	4.1	4.6	5.1	7.6	13.5	10.5	26.2
CASS	3.1	3.6	4.2	4.7	5.3	7.8	13.7	10.7	26.5
CEDAR	2.9	3.4	3.9	4.4	4.8	7.4	13.4	10.5	26.5
CERRO GORDO	2.9	3.4	3.9	4.4	4.8	7.3	13.1	10.2	25.4
CHEROKEE	2.9	3.4	3.9	4.4	4.9	7.4	13.1	10.2	25.5
CHICKASAW	2.9	3.3	3.8	4.3	4.7	7.2	13.0	10.1	25.5
CLARKE	3.2	3.7	4.3	4.8	5.3	7.8	13.9	10.9	26.8
CLAY	2.9	3.3	3.9	4.4	4.8	7.3	13.0	10.1	25.3
CLAYTON	2.9	3.3	3.8	4.2	4.7	7.2	13.1	10.1	25.6
CLINTON	2.9	3.4	3.9	4.3	4.7	7.3	13.3	10.4	26.5
CRAWFORD	3.0	3.5	4.1	4.6	5.1	7.5	13.4	10.5	26.1
DALLAS	3.1	3.6	4.2	4.7	5.1	7.7	13.6	10.7	26.4
DAVIS	3.1	3.6	4.2	4.7	5.2	7.8	13.9	10.9	27.0
DECATUR	3.2	3.7	4.3	4.8	5.3	7.9	13.9	11.0	26.9
DELAWARE	2.9	3.3	3.8	4.3	4.7	7.3	13.3	10.3	25.8
DES MOINES	3.1	3.5	4.1	4.5	4.9	7.6	13.7	10.7	26.9
DICKINSON	2.8	3.3	3.8	4.4	4.7	7.2	12.9	10.0	25.2
DUBUQUE	2.8	3.3	3.8	4.2	4.7	7.2	13.2	10.3	25.8
EMMET	2.8	3.3	3.8	4.4	4.8	7.2	12.9	10.0	25.2
FAYETTE	2.9	3.3	3.8	4.3	4.7	7.2	13.1	10.1	25.6
FLOYD	2.9	3.4	3.8	4.3	4.8	7.2	13.0	10.2	25.5
FRANKLIN	2.9	3.4	3.9	4.4	4.9	7.4	13.3	10.3	25.8
FREMONT	3.2	3.7	4.3	4.8	5.3	7.9	13.8	10.9	26.7
GREENE	3.1	3.6	4.1	4.6	5.1	7.6	13.5	10.5	26.2
GRUNDY	2.9	3.5	3.9	4.4	4.9	7.4	13.4	10.4	26.0
GUTHRIE	3.1	3.6	4.2	4.7	5.2	7.7	13.6	10.7	26.4
HAMILTON	3.0	3.5	4.0	4.5	5.0	7.5	13.4	10.4	26.0
HANCOCK	2.9	3.4	3.9	4.4	4.9	7.3	13.1	10.2	25.4
HARDIN	3.0	3.5	4.0	4.5	4.9	7.4	13.4	10.4	26.0
HARRISON	3.0	3.5	4.1	4.6	5.1	7.6	13.5	10.5	26.3
HENRY	3.1	3.5	4.1	4.5	5.0	7.7	13.7	10.7	26.9
HOWARD	2.8	3.3	3.7	4.2	4.7	7.1	12.9	10.1	25.3
HUMBOLDT	3.0	3.4	4.0	4.5	4.9	7.4	13.2	10.3	25.6
IDA	2.9	3.5	4.0	4.5	4.9	7.4	13.3	10.3	25.8

6-HOUR RAINFALL DEPTHS FOR IOWA (inches)

COUNTY	5-Yr	10-Yr	25-Yr	50-Yr	Class "a" AS & 100-Yr	Class "a" FB&Class "b" AS	Class b" FB	Class "c" AS	Class "c" FB/PMP
IOWA	3.0	3.5	4.0	4.5	4.9	7.4	13.5	10.5	26.5
JACKSON	2.8	3.3	3.8	4.2	4.7	7.2	13.3	10.3	26.3
JASPER	3.0	3.6	4.1	4.6	5.1	7.6	13.6	10.7	26.4
JEFFERSON	3.1	3.6	4.1	4.6	5.1	7.7	13.7	10.7	26.9
JOHNSON	3.0	3.5	4.0	4.4	4.9	7.4	13.5	10.5	26.5
JONES	2.9	3.4	3.9	4.3	4.8	7.3	13.3	10.4	26.3
KEOKUK	3.1	3.6	4.1	4.6	5.0	7.6	13.7	10.7	26.7
KOSSUTH	2.9	3.4	3.9	4.4	4.8	7.3	13.0	10.2	25.3
LEE	3.1	3.6	4.1	4.6	5.1	7.7	13.8	10.8	27.0
LINN	2.9	3.4	3.9	4.4	4.8	7.4	13.4	10.4	26.3
LOUISA	3.0	3.5	4.0	4.5	4.9	7.6	13.6	10.6	26.7
LUCAS	3.1	3.7	4.2	4.7	5.2	7.8	13.9	10.9	26.8
LYON	2.7	3.2	3.7	4.3	4.7	7.2	12.9	10.0	25.1
MADISON	3.1	3.7	4.2	4.7	5.3	7.8	13.7	10.8	26.6
MAHASKA	3.1	3.6	4.1	4.6	5.1	7.7	13.7	10.7	26.8
MARION	3.1	3.6	4.2	4.7	5.1	7.7	13.7	10.7	26.8
MARSHALL	3.1	3.5	4.0	4.5	5.0	7.5	13.5	10.5	26.2
MILLS	3.1	3.6	4.2	4.8	5.3	7.8	13.7	10.8	26.6
MITCHELL	2.8	3.3	3.7	4.3	4.7	7.2	12.9	10.1	25.3
MONONA	2.9	3.5	4.0	4.6	5.0	7.5	13.4	10.4	26.0
MONROE	3.1	3.6	4.2	4.7	5.2	7.8	13.8	10.8	26.9
MONTGOMERY	3.1	3.7	4.3	4.8	5.3	7.8	13.8	10.8	26.7
MUSCATINE	3.1	3.4	4.0	4.4	4.9	7.5	13.5	10.5	26.6
OBRIEN	2.9	3.3	3.8	4.4	4.8	7.2	13.0	10.1	25.3
OSCEOLA	2.8	3.3	3.7	4.3	4.7	7.2	12.9	10.0	25.2
PAGE	3.2	3.7	4.3	4.8	5.4	7.9	13.9	10.9	26.8
PALO ALTO	2.9	3.4	3.9	4.4	4.9	7.3	13.1	10.1	25.4
PLYMOUTH	2.9	3.4	3.9	4.4	4.8	7.3	13.1	10.2	25.5
POCAHONTAS	2.9	3.4	4.0	4.5	4.9	7.4	13.3	10.3	25.5
POLK	3.1	3.6	4.1	4.6	5.1	7.6	13.6	10.7	26.4
POTTAWATTAMIE	3.1	3.6	4.2	4.7	5.2	7.7	13.6	10.7	26.5
POWESHIEK	3.0	3.5	4.0	4.5	5.0	7.6	13.5	10.6	26.5
RINGGOLD	3.2	3.7	4.3	4.8	5.4	8.0	13.9	10.9	26.9
SAC	3.0	3.5	4.0	4.5	5.0	7.5	13.3	10.3	25.8
SCOTT	2.9	3.4	3.9	4.3	4.7	7.4	13.4	10.5	26.6
SHELBY	3.1	3.6	4.1	4.7	5.2	7.6	13.5	10.6	26.2
SIOUX	2.8	3.3	3.8	4.3	4.7	7.2	12.9	10.1	25.3
STORY	3.1	3.6	4.1	4.6	5.1	7.5	13.5	10.5	26.2
TAMA	3.0	3.5	4.0	4.5	4.9	7.4	13.4	10.5	26.2
TAYLOR	3.2	3.7	4.3	4.8	5.4	8.0	13.9	10.9	26.8
UNION	3.2	3.7	4.3	4.8	5.3	7.9	13.9	10.9	26.8
VAN BUREN	3.1	3.6	4.2	4.6	5.1	7.8	13.8	10.9	27.0
WAPELLO	3.1	3.6	4.2	4.6	5.1	7.8	13.7	10.8	26.9
WARREN	3.1	3.6	4.2	4.7	5.2	7.8	13.7	10.8	26.6
WASHINGTON	3.0	3.5	4.1	4.5	4.9	7.6	13.6	10.6	26.7
WAYNE	3.2	3.7	4.3	4.8	5.3	7.9	13.9	10.9	27.0
WEBSTER	3.0	3.5	4.0	4.5	5.0	7.5	13.4	10.4	25.9

6-HOUR RAINFALL DEPTHS FOR IOWA (inches)

COUNTY	5-Yr	10-Yr	25-Yr	50-Yr	Class "a" AS & 100-Yr	Class "a" FB&Class "b" AS	Class "b" FB	Class "c" AS	Class "c" FB/PMP
WINNEBAGO	2.8	3.3	3.8	4.4	4.7	7.2	13.0	10.1	25.2
WINNESHIEK	2.8	3.3	3.7	4.2	4.6	7.1	12.9	10.0	25.3
WOODBURY	2.9	3.4	3.9	4.5	4.9	7.4	13.2	10.3	25.8
WORTH	2.8	3.3	3.8	4.3	4.7	7.2	13.0	10.1	25.2
WRIGHT	2.9	3.4	4.0	4.5	4.9	7.4	13.3	10.3	25.6

24-HOUR RAINFALL DEPTHS BY COUNTY (inches)

COUNTY	2 Yrs	5 Yrs	10 Yrs	25 Yrs	50 Yrs	100 Yrs
ADAIR	3.2	4.1	4.8	5.6	6.2	6.8
ADAMS	3.2	4.2	4.8	5.6	6.3	6.9
ALLAMAKEE	3.0	3.8	4.3	5.0	5.5	6.2
APPANOOSE	3.3	4.2	4.9	5.6	6.2	6.9
AUDUBON	3.1	4.0	4.7	5.4	6.1	6.7
BENTON	3.1	4.0	4.6	5.3	5.8	6.5
BLACK HAWK	3.1	3.9	4.5	5.2	5.8	6.5
BOONE	3.0	4.0	4.7	5.4	6.0	6.6
BREMER	3.1	3.9	4.5	5.2	5.7	6.4
BUCHANAN	3.1	3.9	4.5	5.2	5.7	6.4
BUENA VISTA	3.0	3.8	4.4	5.1	5.8	6.4
BUTLER	3.1	3.9	4.5	5.2	5.8	6.5
CALHOUN	3.1	3.9	4.5	5.3	5.9	6.5
CARROLL	3.1	4.0	4.6	5.3	6.0	6.6
CASS	3.1	4.1	4.8	5.5	6.2	6.8
CEDAR	3.1	4.0	4.5	5.2	5.7	6.5
CERRO GORDO	3.0	3.9	4.5	5.2	5.7	6.4
CHEROKEE	3.0	3.8	4.4	5.1	5.8	6.3
CHICKASAW	3.0	3.9	4.4	5.1	5.7	6.4
CLARKE	3.2	4.2	4.9	5.6	6.3	6.9
CLAY	3.0	3.8	4.4	5.1	5.7	6.3
CLAYTON	3.1	3.8	4.4	5.1	5.6	6.3
CLINTON	3.1	3.9	4.5	5.1	5.6	6.4
CRAWFORD	3.0	3.9	4.5	5.3	6.0	6.6
DALLAS	3.2	4.1	4.7	5.5	6.1	6.7
DAVIS	3.3	4.2	4.8	5.6	6.2	6.8
DECATUR	3.3	4.2	4.9	5.7	6.4	7.0
DELAWARE	3.1	3.9	4.5	5.1	5.7	6.4
DES MOINES	3.2	4.1	4.7	5.4	5.9	6.7
DICKINSON	2.9	3.7	4.3	5.0	5.6	6.2
DUBUQUE	3.1	3.9	4.4	5.1	5.6	6.3
EMMET	3.0	3.8	4.4	5.0	5.7	6.3
FAYETTE	3.0	3.9	4.4	5.1	5.6	6.4

24-HOUR RAINFALL DEPTHS BY COUNTY (inches)

COUNTY	2 Yrs	5 Yrs	10 Yrs	25 Yrs	50 Yrs	100 Yrs
FLOYD	3.0	3.9	4.5	5.2	5.7	6.4
FRANKLIN	3.1	3.9	4.5	5.2	5.8	6.5
FREMONT	3.2	4.1	4.8	5.6	6.3	6.9
GREENE	3.1	4.0	4.6	5.4	6.0	6.6
GRUNDY	3.1	4.0	4.6	5.3	5.8	6.5
GUTHRIE	3.1	4.1	4.7	5.5	6.1	6.7
HAMILTON	3.1	4.0	4.6	5.3	5.9	6.6
HANCOCK	3.0	3.9	4.5	5.2	5.7	6.4
HARDIN	3.1	4.0	4.6	5.3	5.9	6.6
HARRISON	3.0	3.9	4.6	5.3	6.0	6.6
HENRY	3.2	4.1	4.7	5.4	6.0	6.7
HOWARD	3.0	3.8	4.4	5.1	5.6	6.3
HUMBOLDT	3.1	3.9	4.5	5.2	5.8	6.5
IDA	3.0	3.8	4.5	5.2	5.9	6.4
IOWA	3.2	4.1	4.7	5.3	5.9	6.6
JACKSON	3.1	3.9	4.4	5.0	5.6	6.4
JASPER	3.2	4.1	4.7	5.5	6.0	6.7
JEFFERSON	3.2	4.2	4.8	5.4	6.0	6.8
JOHNSON	3.2	4.0	4.6	5.3	5.8	6.6
JONES	3.1	3.9	4.5	5.1	5.7	6.4
KEOKUK	3.2	4.1	4.7	5.4	6.0	6.7
KOSSUTH	3.0	3.8	4.4	5.1	5.7	6.4
LEE	3.3	4.2	4.8	5.4	6.0	6.8
LINN	3.1	4.0	4.6	5.2	5.8	6.5
LOUISA	3.2	4.1	4.7	5.4	5.9	6.6
LUCAS	3.2	4.2	4.8	5.6	6.2	6.9
LYON	2.8	3.6	4.2	4.9	5.5	6.1
MADISON	3.2	4.1	4.8	5.6	6.2	6.8
MAHASKA	3.2	4.1	4.8	5.5	6.1	6.8
MARION	3.2	4.1	4.8	5.5	6.1	6.8
MARSHALL	3.2	4.0	4.7	5.4	5.9	6.6
MILLS	3.1	4.1	4.8	5.5	6.2	6.8
MITCHELL	3.0	3.8	4.4	5.1	5.6	6.3
MONONA	3.0	3.8	4.5	5.2	5.9	6.5
MONROE	3.3	4.2	4.8	5.6	6.2	6.8
MONTGOMERY	3.2	4.1	4.8	5.6	6.3	6.8
MUSCATINE	3.2	4.0	4.6	5.2	5.8	6.5
OBRIEN	2.9	3.7	4.3	5.0	5.7	6.2
OSCEOLA	2.9	3.7	4.3	4.9	5.6	6.2
PAGE	3.2	4.2	4.9	5.7	6.4	6.9
PALO ALTO	3.0	3.8	4.4	5.1	5.7	6.4
PLYMOUTH	2.9	3.7	4.3	5.0	5.7	6.2
POCAHONTAS	3.0	3.9	4.5	5.2	5.8	6.4
POLK	3.2	4.1	4.7	5.5	6.1	6.7
POTTAWATTAMIE	3.1	4.0	4.7	5.4	6.1	6.7

24-HOUR RAINFALL DEPTHS BY COUNTY (inches)

COUNTY	2 Yrs	5 Yrs	10 Yrs	25 Yrs	50 Yrs	100 Yrs
POWESHIEK	3.2	4.1	4.7	5.4	6.0	6.7
RED RIVER	4.0	5.0	6.7	7.5	8.8	9.6
RINGGOLD	3.2	4.2	4.9	5.7	6.4	7.0
SAC	3.0	3.9	4.5	5.2	5.9	6.5
SCOTT	3.1	4.0	4.5	5.1	5.7	6.4
SHELBY	3.1	4.0	4.6	5.4	6.1	6.7
SIOUX	2.9	3.6	4.2	4.9	5.6	6.1
STORY	3.1	4.0	4.7	5.4	6.0	6.6
TAMA	3.1	4.0	4.6	5.3	5.9	6.6
TAYLOR	3.2	4.2	4.9	5.7	6.4	7.0
UNION	3.2	4.2	4.9	5.6	6.3	6.9
VAN BUREN	3.3	4.2	4.8	5.5	6.1	6.8
WAPELLO	3.2	4.2	4.8	5.5	6.1	6.8
WARREN	3.2	4.2	4.8	5.6	6.2	6.8
WASHINGTON	3.2	4.1	4.7	5.4	5.9	6.7
WAYNE	3.3	4.2	4.9	5.7	6.3	6.9
WEBSTER	3.1	4.0	4.6	5.3	5.9	6.6
WINNEBAGO	3.0	3.8	4.4	5.1	5.7	6.4
WINNESHIEK	3.0	3.8	4.4	5.1	5.6	6.3
WOODBURY	2.9	3.8	4.4	5.1	5.8	6.3
WORTH	3.0	3.8	4.4	5.1	5.7	6.4
WRIGHT	3.1	3.9	4.5	5.2	5.8	6.5

5 POINT RAINFALL DISTRIBUTION AND FREEBOARD RAINFALL DEPTHS

Technical Release 60 (TR-60), Earth Dams and Reservoirs, dated July 2005, requires both a 6-hour and a 24-hour storm be routed for the freeboard storm. The most critical result is to be used to check the discharge capacity and the integrity of the auxiliary spillway.

The stability, or auxiliary, design hydrograph will continue to use the 6-hour duration storm for velocities and maximum stresses on the auxiliary spillway.

Technical Release 60 allows the user to choose between two rainfall distributions for the 24-hour storm. These are called a Type B distribution and a 5 Point distribution. The SITES routings in Iowa will be completed using the 5 Point distribution for the 24-hour storm.

The following table lists the values for each of the five hydrograph points to be used with the 24-hour distribution. In addition, the freeboard storm rainfall depth is shown for each hazard class by county. The data in this table is to be used when doing freeboard design routings for TR-60 structures using the SITES program.

COUNTY	Point 1	Point 2	Point 3	Point 4	Point 5	A2 Hazard Class (Less than 30,000 Product) Rainfall (in)	A2 Hazard Class (Greater than 30,000 Product) Rainfall (in)	A3-B Hazard Class Rainfall (in)	C Hazard Class Rainfall (in)
ADAIR	0.0	0.025	0.837	0.975	1.0	9.9	13.5	17.1	32.6
ADAMS	0.0	0.024	0.838	0.976	1.0	10.0	13.6	17.3	32.8
ALLAMAKEE	0.0	0.027	0.844	0.973	1.0	9.2	12.7	16.2	31.0
APPANOOSE	0.0	0.023	0.835	0.977	1.0	10.0	13.7	17.3	33.0
AUDUBON	0.0	0.025	0.842	0.975	1.0	9.8	13.3	16.9	32.2
BENTON	0.0	0.025	0.841	0.975	1.0	9.6	13.2	16.7	32.0
BLACK HAWK	0.0	0.027	0.839	0.973	1.0	9.5	13.1	16.6	31.7
BOONE	0.0	0.023	0.842	0.977	1.0	9.7	13.2	16.8	32.0
BREMER	0.0	0.024	0.837	0.976	1.0	9.5	13.0	16.5	31.5
BUCHANAN	0.0	0.025	0.842	0.975	1.0	9.5	13.0	16.5	31.6
BUENA VISTA	0.0	0.027	0.837	0.973	1.0	9.4	12.9	16.4	31.5
BUTLER	0.0	0.030	0.840	0.970	1.0	9.5	13.0	16.5	31.6
CALHOUN	0.0	0.027	0.838	0.973	1.0	9.5	13.1	16.6	31.7
CARROLL	0.0	0.027	0.842	0.973	1.0	9.6	13.2	16.8	32.0
CASS	0.0	0.026	0.842	0.974	1.0	9.9	13.5	17.1	32.5
CEDAR	0.0	0.025	0.844	0.975	1.0	9.6	13.2	16.7	32.1
CERRO GORDO	0.0	0.027	0.838	0.973	1.0	9.4	12.8	16.3	31.2
CHICKASAW	0.0	0.024	0.840	0.976	1.0	9.3	12.8	16.3	31.3
CHEROKEE	0.0	0.028	0.844	0.972	1.0	9.3	12.8	16.2	31.0
CLARKE	0.0	0.023	0.837	0.977	1.0	10.0	13.6	17.3	32.8
CLAY	0.0	0.030	0.840	0.970	1.0	9.3	12.8	16.3	31.2
CLAYTON	0.0	0.024	0.847	0.976	1.0	9.3	12.7	16.2	31.0
CLINTON	0.0	0.027	0.845	0.973	1.0	9.5	13.1	16.6	32.0

5 POINT RAINFALL DISTRIBUTION AND FREEBOARD RAINFALL DEPTHS

COUNTY	Point 1	Point 2	Point 3	Point 4	Point 5	A2 Hazard Class (Less than 30,000 Product) Rainfall (in)	A2 Hazard Class (Greater than 30,000 Product) Rainfall (in)	A3-B Hazard Class Rainfall (in)	C Hazard Class Rainfall (in)
CRAWFORD	0.0	0.031	0.843	0.969	1.0	9.6	13.1	16.7	31.8
DALLAS	0.0	0.023	0.837	0.977	1.0	9.8	13.4	17.0	32.3
DAVIS	0.0	0.023	0.838	0.977	1.0	10.0	13.6	17.3	33.0
DECATUR	0.0	0.023	0.835	0.977	1.0	10.1	13.7	17.4	33.0
DELAWARE	0.0	0.028	0.842	0.972	1.0	9.4	12.9	16.5	31.6
DES MOINES	0.0	0.026	0.838	0.974	1.0	9.9	13.5	17.2	33.0
DICKINSON	0.0	0.029	0.842	0.971	1.0	9.2	12.7	16.2	31.0
DUBUQUE	0.0	0.027	0.843	0.973	1.0	9.4	12.9	16.4	31.5
EMMET	0.0	0.029	0.842	0.971	1.0	9.3	12.7	16.2	31.0
FAYETTE	0.0	0.027	0.845	0.973	1.0	9.3	12.8	16.3	31.2
FLOYD	0.0	0.029	0.840	0.971	1.0	9.4	12.9	16.4	31.3
FRANKLIN	0.0	0.027	0.840	0.973	1.0	9.5	13.0	16.5	31.5
FREMONT	0.0	0.024	0.834	0.976	1.0	10.0	13.6	17.3	32.8
GREENE	0.0	0.027	0.841	0.973	1.0	9.7	13.2	16.8	32.0
GRUNDY	0.0	0.028	0.840	0.972	1.0	9.6	13.1	16.7	31.8
GUTHRIE	0.0	0.028	0.842	0.972	1.0	9.8	13.4	16.9	32.3
HAMILTON	0.0	0.028	0.840	0.972	1.0	9.6	13.1	16.7	31.8
HANCOCK	0.0	0.032	0.841	0.968	1.0	9.4	12.9	16.4	31.4
HARDIN	0.0	0.027	0.844	0.973	1.0	9.6	13.1	16.6	31.7
HARRISON	0.0	0.027	0.842	0.973	1.0	9.6	13.2	16.8	32.0
HENRY	0.0	0.023	0.838	0.977	1.0	9.8	13.5	17.1	32.8
HOWARD	0.0	0.029	0.842	0.971	1.0	9.3	12.7	16.2	31.0
HUMBOLDT	0.0	0.029	0.844	0.971	1.0	9.5	13.0	16.5	31.4
IDA	0.0	0.030	0.841	0.970	1.0	9.5	13.0	16.6	31.7
IOWA	0.0	0.023	0.841	0.977	1.0	9.7	13.3	16.9	32.3
JACKSON	0.0	0.024	0.849	0.976	1.0	9.4	12.9	16.4	31.5
JASPER	0.0	0.025	0.842	0.975	1.0	9.8	13.3	16.9	32.2
JEFFERSON	0.0	0.021	0.838	0.979	1.0	9.9	13.5	17.2	32.8
JOHNSON	0.0	0.023	0.841	0.977	1.0	9.6	13.2	16.8	32.2
JONES	0.0	0.024	0.847	0.976	1.0	9.5	13.0	16.6	31.7
KEOKUK	0.0	0.023	0.844	0.977	1.0	9.8	13.4	17.0	32.4
KOSSUTH	0.0	0.030	0.845	0.970	1.0	9.3	12.8	16.3	31.2
LEE	0.0	0.023	0.838	0.977	1.0	9.9	13.6	17.3	33.0
LINN	0.0	0.027	0.845	0.973	1.0	9.6	13.1	16.7	32.0
LOUISA	0.0	0.025	0.843	0.975	1.0	9.8	13.4	17.0	32.5
LUCAS	0.0	0.023	0.837	0.977	1.0	10.0	13.6	17.3	32.8
LYON	0.0	0.028	0.837	0.972	1.0	9.0	12.5	16.0	30.9
MADISON	0.0	0.026	0.842	0.974	1.0	9.9	13.5	17.1	32.5

5 POINT RAINFALL DISTRIBUTION AND FREEBOARD RAINFALL DEPTHS

COUNTY	Point 1	Point 2	Point 3	Point 4	Point 5	A2 Hazard Class (Less than 30,000 Product) Rainfall (in)	A2 Hazard Class (Greater than 30,000 Product) Rainfall (in)	A3-B Hazard Class Rainfall (in)	C Hazard Class Rainfall (in)
MAHASKA	0.0	0.022	0.840	0.978	1.0	9.8	13.4	17.1	32.5
MARION	0.0	0.023	0.842	0.977	1.0	9.9	13.5	17.1	32.5
MARSHALL	0.0	0.023	0.842	0.977	1.0	9.7	13.2	16.8	32.0
MILLS	0.0	0.026	0.836	0.974	1.0	9.9	13.5	17.2	32.7
MITCHELL	0.0	0.027	0.840	0.973	1.0	9.3	12.7	16.2	31.0
MONONA	0.0	0.027	0.842	0.973	1.0	9.5	13.0	16.6	31.7
MONROE	0.0	0.024	0.836	0.976	1.0	10.0	13.6	17.3	32.9
MONTGOMERY	0.0	0.023	0.839	0.977	1.0	9.9	13.5	17.2	32.6
MUSCATINE	0.0	0.023	0.841	0.977	1.0	9.7	13.3	16.9	32.4
O'BRIEN	0.0	0.029	0.840	0.971	1.0	9.2	12.7	16.2	31.2
OSCEOLA	0.0	0.031	0.837	0.969	1.0	9.1	12.6	16.1	31.0
PAGE	0.0	0.027	0.836	0.973	1.0	10.0	13.7	17.3	33.0
PALO ALTO	0.0	0.030	0.842	0.970	1.0	9.3	12.8	16.3	31.3
PLYMOUTH	0.0	0.030	0.839	0.970	1.0	9.2	12.8	16.3	31.4
POCAHONTAS	0.0	0.029	0.841	0.971	1.0	9.5	13.0	16.5	31.5
POLK	0.0	0.025	0.842	0.975	1.0	9.8	13.4	16.9	32.3
POTTAWATTAMIE	0.0	0.026	0.838	0.974	1.0	9.8	13.4	17.0	32.5
POWESHIEK	0.0	0.026	0.844	0.974	1.0	9.7	13.3	16.9	32.3
RINGGOLD	0.0	0.023	0.832	0.977	1.0	10.1	13.7	17.4	33.0
SAC	0.0	0.028	0.836	0.972	1.0	9.5	13.1	16.6	31.8
SCOTT	0.0	0.025	0.844	0.975	1.0	9.5	13.1	16.7	32.1
SHELBY	0.0	0.029	0.838	0.971	1.0	9.7	13.3	17.0	32.4
SIOUX	0.0	0.027	0.840	0.973	1.0	9.1	12.6	16.1	31.0
STORY	0.0	0.024	0.845	0.976	1.0	9.7	13.2	16.8	31.9
TAMA	0.0	0.023	0.839	0.977	1.0	9.6	13.2	16.8	32.0
TAYLOR	0.0	0.023	0.832	0.977	1.0	10.1	13.7	17.4	33.0
UNION	0.0	0.023	0.836	0.977	1.0	10.0	13.6	17.2	32.7
VAN BUREN	0.0	0.023	0.835	0.977	1.0	9.9	13.6	17.3	33.0
WAPELLO	0.0	0.021	0.835	0.979	1.0	9.9	13.6	17.2	32.8
WARREN	0.0	0.021	0.837	0.979	1.0	9.9	13.5	17.1	32.6
WASHINGTON	0.0	0.023	0.844	0.977	1.0	9.7	13.3	17.0	32.4
WAYNE	0.0	0.023	0.838	0.977	1.0	10.1	13.7	17.4	33.0
WEBSTER	0.0	0.028	0.836	0.972	1.0	9.6	13.1	16.7	31.8
WINNEBAGO	0.0	0.027	0.840	0.973	1.0	9.3	12.8	16.2	31.0
WINNESHIEK	0.0	0.027	0.844	0.973	1.0	9.2	12.7	16.2	31.0
WOODBURY	0.0	0.028	0.839	0.972	1.0	9.3	12.9	16.4	31.6
WORTH	0.0	0.027	0.840	0.973	1.0	9.3	12.8	16.2	31.0
WRIGHT	0.0	0.027	0.840	0.973	1.0	9.5	13.0	16.5	31.5

10-DAY RAINFALL (inches)

COUNTY	25-yr 10-day	50-yr 10-day	100-yr 10-day
ADAIR	9.5	10.7	11.5
ADAMS	9.5	10.7	11.7
ALLAMAKEE	9.3	10.6	11.4
APPANOOSE	10.0	11.7	12.3
AUDUBON	9.3	10.2	11.3
BENTON	9.6	11.2	11.7
BLACK HAWK	9.5	10.9	11.6
BOONE	9.5	10.8	11.5
BREMER	9.3	10.9	11.6
BUCHANAN	9.5	10.9	11.6
BUENA VISTA	8.8	9.8	10.8
BUTLER	9.4	10.9	11.6
CALHOUN	9.2	10.2	11.0
CARROLL	9.2	10.2	11.0
CASS	9.5	10.5	11.4
CEDAR	9.5	11.2	11.7
CERRO GORDO	9.3	10.7	11.4
CHEROKEE	8.7	9.5	10.5
CHICKASAW	9.3	10.8	11.5
CLARKE	9.8	11.4	12.0
CLAY	8.7	9.7	10.7
CLAYTON	9.3	10.8	11.4
CLINTON	9.5	10.9	11.5
CRAWFORD	9.0	9.8	10.8
DALLAS	9.5	10.9	11.7
DAVIS	10.0	11.7	12.3
DECATUR	9.9	11.5	12.2
DELAWARE	9.5	10.9	11.5
DES MOINES	9.9	11.5	12.0
DICKINSON	8.6	9.7	10.6
DUBUQUE	9.4	10.9	11.4
EMMET	8.8	9.8	10.8
FAYETTE	9.3	10.8	11.5
FLOYD	9.3	10.8	11.5
FRANKLIN	9.4	10.8	11.5
FREMONT	9.3	10.2	11.4
GREENE	9.3	10.5	11.4
GRUNDY	9.5	11.0	11.6
GUTHRIE	9.5	10.5	11.4
HAMILTON	9.4	10.8	11.5
HANCOCK	9.3	10.6	11.4
HARDIN	9.5	10.9	11.6
HARRISON	9.0	9.8	10.6
HENRY	9.9	11.5	11.9
HOWARD	9.3	10.7	11.4
HUMBOLDT	9.3	10.4	11.2
IDA	8.7	9.7	10.7
IOWA	9.7	11.3	11.8
JACKSON	9.4	10.9	11.4
JASPER	9.7	11.3	11.8

COUNTY	25-yr 10-day	50-yr 10-day	100-yr 10-day
JEFFERSON	9.9	11.5	12.0
JOHNSON	9.7	11.3	11.8
JONES	9.5	11.0	11.6
KEOKUK	9.8	11.4	11.8
KOSSUTH	9.2	10.4	11.2
LEE	10.0	11.7	12.4
LINN	9.6	11.1	11.7
LOUISA	9.8	11.4	11.8
LUCAS	9.9	11.5	12.0
LYON	8.2	9.0	10.1
MADISON	9.6	11.0	11.8
MAHASKA	9.8	11.4	11.8
MARION	9.8	11.4	11.9
MARSHALL	9.6	11.2	11.7
MILLS	9.3	10.2	11.3
MITCHELL	9.3	10.7	11.4
MONONA	8.7	9.5	10.5
MONROE	9.9	11.6	12.1
MONTGOMERY	9.5	10.5	11.4
MUSCATINE	9.7	11.3	11.8
OBRIEN	8.5	9.5	10.5
OSCEOLA	8.5	9.4	10.4
PAGE	9.5	10.5	11.5
PALO ALTO	8.9	9.9	10.9
PLYMOUTH	8.5	9.3	10.3
POCAHONTAS	9.1	10.0	11.0
POLK	9.6	11.2	11.8
POTTAWATTAMIE	9.1	10.0	10.9
POWESHIEK	9.7	11.3	11.8
RINGGOLD	9.7	11.2	12.0
SAC	9.0	9.9	10.9
SCOTT	9.5	11.0	11.6
SHELBY	9.1	10.0	11.0
SIOUX	8.2	9.2	10.2
STORY	9.5	11.2	11.7
TAMA	9.6	11.2	11.7
TAYLOR	9.6	10.8	11.8
UNION	9.7	11.0	11.8
VAN BUREN	10.0	11.7	12.3
WAPELLO	9.9	11.6	12.1
WARREN	9.7	11.3	11.9
WASHINGTON	9.8	11.3	11.8
WAYNE	10.0	11.6	12.3
WEBSTER	9.3	10.5	11.4
WINNEBAGO	9.2	10.5	11.3
WINNESHIEK	9.3	10.7	11.4
WOODBURY	8.5	9.4	10.4
WORTH	9.2	10.6	11.4
WRIGHT	9.3	10.7	11.4