GOVERNO DO ESTADO

CEARÁ

AVANÇANDO NAS MUDANÇAS

GOVERNO DO ESTADO DO CEARÁ
SECRETARIA DOS RECURSOS HÍDRICOS

COMPANHIA DE GESTÃO DOS RECURSOS HÍDRICOS COGERH
PROJETO DE DESENVOLVIMENTO URBANO E GESTÃO DOS RECURSOS HÍDRICOS DO ESTADO DO CEARÁ PROURB/CE

PROJETO EXECUTIVO DA BARRAGEM SOUZA NO MUNICÍPIO DE CANINDÉ

TOMO II
ESTUDOS BÁSICOS

VOLUME III
ESTUDOS HIDROLÓGICOS

CONCREMAT

FORTALEZA
DEZEMBRO DE 1996

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PROJETO EXECUTIVO DA BARRAGEM SOUZA

TOMO II

RELATÓRIO GERAL

ESTUDOS BÁSICOS

VOLUME III

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FORTALEZA
DEZEMBRO/96

CONCREMAT
ENGENHARIA E TECNOLOGIA S.A.

PROJETO EXECUTIVO DA BARRAGEM SOUZA

CANINDÉ - CEARÁ

ESTUDOS HIDROLÓGICOS

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ÍNDICE

3 - ESTUDOS HIDROLÓGICOS

3.1 - Introdução

O presente documento se constitui no relatório dos estudos hidrológicos na bacia do rio Juriti, visando as definições do projeto da barragem do Açude Público Souza, no município de Canindé, Estado do Ceará

A bacia hidrográfica do rio Juriti, no local do barramento, possui uma área de 220 Km^2 A extensão do rio Juriti, da sua nascente, até o local do barramento, é de aproximadamente 21 Km, com desnível geométrico em torno de 238 metros

Para delimitação e planimetragem da bacia hidrográfica, realizada neste estudo, foi utilizada as cartas planialtimétricas, escala 1 100 000, elaboradas pela SUDENE (CANINDÉ - FOLHA - SB 24 V B - 111 E QUIXADÁ - FOLHA - SB 24 - V - B - VI)

Na determinação das curvas "COTA x ÁREA x VOLUME", utilizou-se a planta topográfica planialtimétrica na escala 1 10 000, com curvas de nível equidistantes de 1 metro

Ao longo dos estudos foram utilizados dados, produtos e critérios já desenvolvidos pelo Plano Estadual de Recursos Hídricos do Estado do Ceará (PERH-CE) O referido estudo, de abrangência regional, permite dispor de informações já tratadas do local de barramento e de uma normatização de dados e metodologias que facilitam amplamente este trabalho

3.2 - Caracterização Física e Morfológica da Bacia Hidrográfica do Reservatório da Barragem Souza.

O boqueirão do "Souza" se localiza no rio Juriti, tributário do rio Canindé, pertencente à bacia do rio Curu, ao sudeste do município de Canindé, região denominada Sertão de Canindé no Estado do Ceará O mapa da **Figura 1** apresenta esta localização

A bacia hidrológica correspondente ao ponto de controle do boqueirão denominado Souza pertence a alta bacia do rio Canindé, suas vertentes se localizam nas escarpas ocidentais da serra da Baturité

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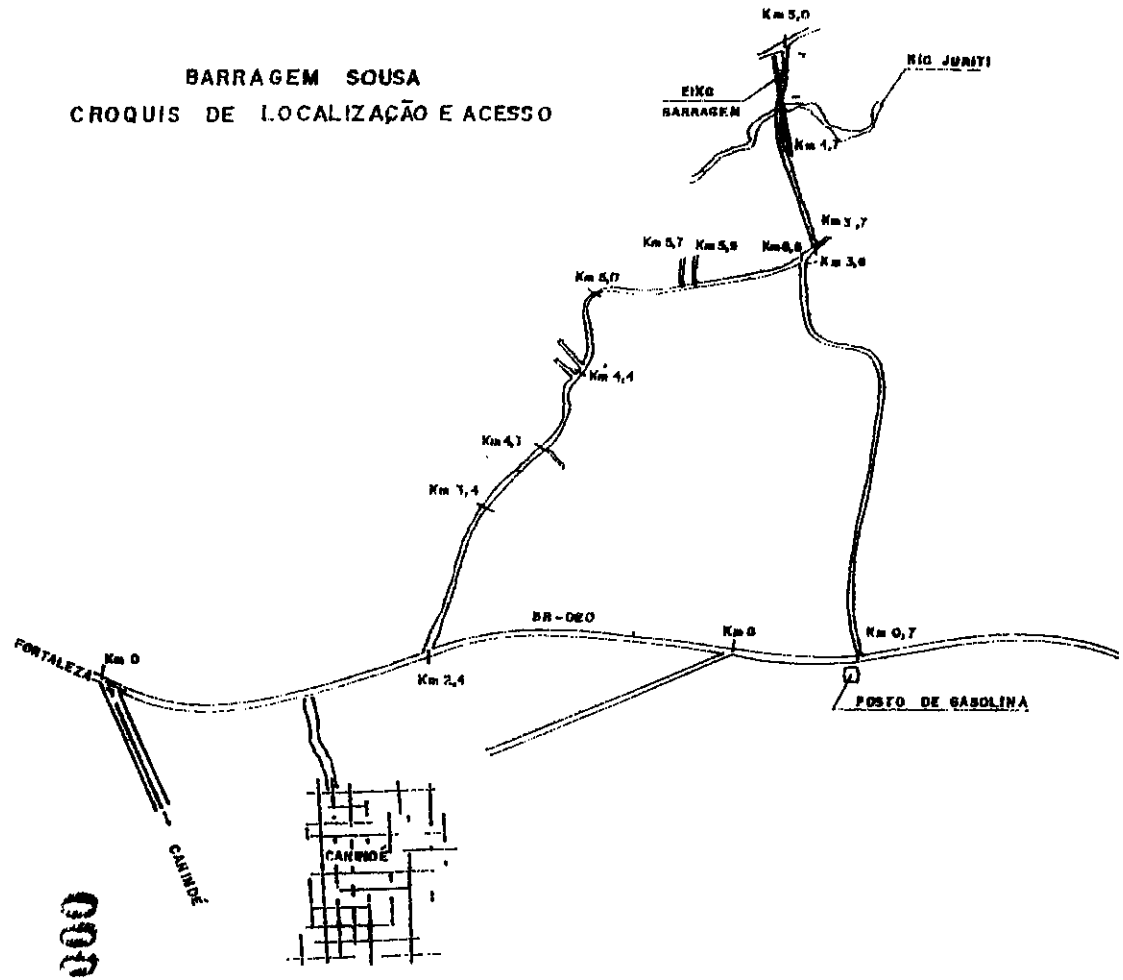
BARRAGEM SOUSA
CROQUIS DE LOCALIZAÇÃO E ACESSO



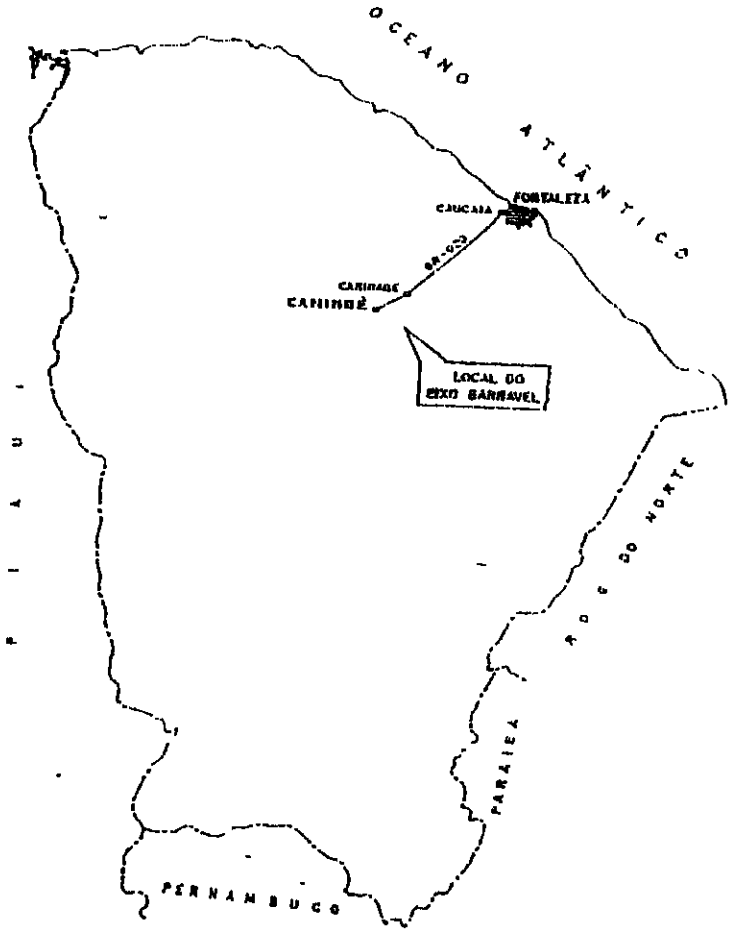


FIGURA 1
MAPA DE LOCALIZAÇÃO E ACESSO

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No local o barramento drena uma área de 219,3 Km2 A extensão do rio Juriti até o local do barramento é de aproximadamente 21 Km, com um desnível geométrico da ordem de 238 metros. a bacia é formada de terrenos cristalinos, com declividade média dominante e pronunciada nas nascentes (8 a 10%), consequentemente com uma razoável aptidão para a formação de picos de cheia de considerável vazão instantânea e pequena duração

Neste local. a bacia apresenta os seguintes parâmetros

Área (A)	219,3 Km^2
Comprimento do Thalveg	21 Km
Altitude Média	250 m
Perímetro (P)	36 Km
Índice de Compacidade (Ic)	0,68

Ic = (0,28 x P)/ $\sqrt{A}$ = (0,28 x 36)/ $\sqrt{220}$ = 0,68

Os riachos que conformam este sistema nascem nas escarpas da serra de Baturité, acompanhando um extenso sistema de canyons paralelos, para logo após ter vencido o primeiro trecho de bacia, convergir de forma radial no rio Juriti Assim, esta rede de drenagem configura as características morfológicas mais importantes da bacia, tendo riachos com várias confluências, convergindo em forma de leque alguns quilômetros a montante do local identificado para o barramento

Outra caraterística morfológica decorre do comportamento das declividades destes cursos de água, que se apresentam uma região superior com declividades da ordem de 8-10% para passar na média e baixa bacia a declividades da ordem de 1-3 %

3.2.1 - Vegetação

A vegetação nativa predominante é constituída de mata xerófila de alta densidade, característica da caatinga, muitas das quais perdem sua folhagem durante a estação seca e a recobram exuberante as primeiras precipitações Verifica-se a grande ocorrência da aroeira, unha de gato, sabiá, jurema branca, jurema preta, marmeleiro, mofumbo e mandacaru

As faixas, que formam o fundo dos vales, notadamente na porção inferior da bacia do rio Juriti, a jusante do boqueirão se abrem em extensas áreas planas (baixios), onde ocorrem as principais culturas da região

A vegetação mais rica aparece no topo da serra de Baturité, com ocorrência de espécies vegetais mais desenvolvidas, tais como, o Pau Branco, Ipê, Cedro, Sabiá e Aroeira, em grande parte componente da Área de Preservação Ambiental (APA - Baturite)

Já nas partes mais baixas a vegetação é mais rala e muito depredada, aparecendo predominantemente a vegetação arbustiva secundária e espécimes tais como o sabiá, Catingueira, Jurema, Aroeira, Marmeleiro, Mofumbo e Mandacaru

3.2.2 - Fatores Pedológicos e Uso da Terra

Os solos da região são em geral de pouca profundidade, recobertos por vegetação arbustiva, onde se desenvolve uma pequena agricultura de subsistência e a pecuária extensiva.

3.2.3 - Fatores Geomorfológicos

Os solos na região da barragem são predominantemente oriundos do intemperismo do complexo cristalino, (gnaisses migmatíticas), posicionados no pré-cambriano, caracterizados por relevo mais movimentado, chegando a ondulado forte em áreas com abundância de afloramento rochosos São encontradas expressivas áreas com recobrimentos de seixos rolados, predominando os solos basicamente arenosos e/ ou areno argilosos

Nas encostas encontramos um relevo ondulado a forte ondulado, com áreas restritas de topografia mais suave, ocorrendo comumente afloramento de rochas

Os solos no alto vale do rio Canindé, no qual deságua o Juriti, são rasos na sua quase totalidade, com a vegetação arbórea - arbustiva apresentando característica de "Caatinga"

Ao longo do rio encontramos a presença de solos aluviais, constituídos de uma faixa estreita de sedimentos oriundos do transporte fluvial, com relevo plano e de boa qualidade

O rio Juriti e seus afluentes apresentam um padrão de drenagem dentrítico, com ramificações irregulares do curso em toda sua extensão, aliás uma característica do sistema drenante das cabeceiras do vale do rio Curu e do rio Canindé, drenos principais do sistema hidrográfico focalizado

Os sedimentos quaternários que ocorrem com pouca representatividade na área são representados pelos aluviões do rio Juriti, capeando rochas do cristalino

A área apresenta pouca variedade petrográfica, abrangendo rochas sedimentares e metamórficas, com predominância das metamórficas (migmatitos e gnaisses)

Situada na parte sul do vale do Curu a região engloba a feição morfológica denominada Planalto Sertanejo

3.3 - Caracterização Climática

3.3.1 - Climatologia

Na região de locação e de influência da barragem, é ,dominante praticamente um único tipo climático, ou seja, quente e semi-árido, com estação chuvosa ocorrendo no outono e temperatura superior a 18°C no mês mais frio, correspondente, ao tipo BSH de Koppen

A temperatura média anual é da ordem de 27°C nas partes mais elevadas da bacia, com amplitude térmica média anual pequena, de 2 a 3°C, situando-se o período mais quente na primavera (Outubro a Novembro), que é a época mais seca, e a mais fresca no outono (Março e Abril) que corresponde à época chuvosa

A umidade relativa média anula situa-se na faixa de 65%, aumentando na fase chuvosa para 70%

3.3.2 - Regime Pluviométrico

A precipitação média calculada na bacia é de 660 mm A ***Figura 3*** mostra um quadro comparativo dos 10 postos pluviométricos apresentando a distribuição mensal, os valores médios anuais, os coeficientes de variação da precipitação e o número de anos de dados disponíveis nos respectivos postos pluviométricos O regime de ocorrência de dias chuvosos para o município de Canindé pode ser observado na ***Tabela 1***

Nas proximidades de Canindé o regime pluviométrico é moderado e típico da região semi-árida, ocorrendo chuvas mais intensas na Serra de Baturité ***Figura 2***

O Trimestre mais úmido corresponde aos meses de Fevereiro, Março e Abril, com média de 443mm

Os postos pluviométricos existentes na bacia fazem parte da rede pluviométrica pertencente a SUDENE Estes postos dispõem de dados coletados mediante pluviómetros convencionais no período 1913 - 1988

Estes dados foram sujeitos à analise de consistência durante o PERH, que consistiu na aplicação da metodologia do "Vetor Regional" para identificação de erros e preenchimento de falhas

O posto com maior influência na bacia é o do Açude Salão com coordenadas geográficas 4º 25' e 39º 20', com precipitação média anual em torno de 644 mm

Foram utilizados, os dados de chuva máxima de um dia, do posto Salão, para obtenção das chuvas correspondentes às frequências consideradas na determinação das descargas máximas a serem esperadas no local do açude

As séries integrais do posto mencionado, contendo os valores das médias mensais e anuais e máximas diárias anuais, encontram-se nas ***Tabelas 1 e 2***

3.3.3 - Caracterização da Chuva Sobre a Bacia

O estudo das variações da precipitação anual próxima ao local da barragem foi feito utilizando os dados da estação pluviométrica Salão Os dados são relativos ao período de 1917 a 1985 e encontram-se apresentados na ***Tabela 2***

TABELA 1

FREQUÊNCIA DE PELO MENOS n DIAS COM OCORRÊNCIA DE CHUVA

POSTO	MÊS	NÚMERO DE DIAS									
		1	2	4	8	12	15	18	20	22	25
2881734	JAN	29,2	27.7	21,5	10,8	1,5	1.5	1.5	0,0	0,0	0,0
	FEV	29,2	29,2	26,1	20,0	15,4	10,8	7,7	4,6	0,0	0,0
	MAR	30,8	30,8	29,2	26,1	23,1	13.9	10,8	6,2	4,6	1.5
	ABR	29.2	29.2	27.7	26,1	20,0	12,3	9,2	6,2	1,5	0,0
	MAI	30.8	29.2	23.1	12.3	7,7	4,6	1,5	0,0	0,0	0,0
	JUN	26.1	20.0	15.4	4,6	1,5	0,0	0,0	0,0	0,0	0,0
	JUL	15.4	12.3	9,2	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	AGO	10,8	6,2	1,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	SET	3.1	0.0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	OUT	4,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	NOV	7.7	3,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	DEZ	16.9	13,9	4,6	1,5	0,0	0,0	0,0	0,0	0,0	0,0

Fonte PERH - Plano Estadual de Recursos Hídricos

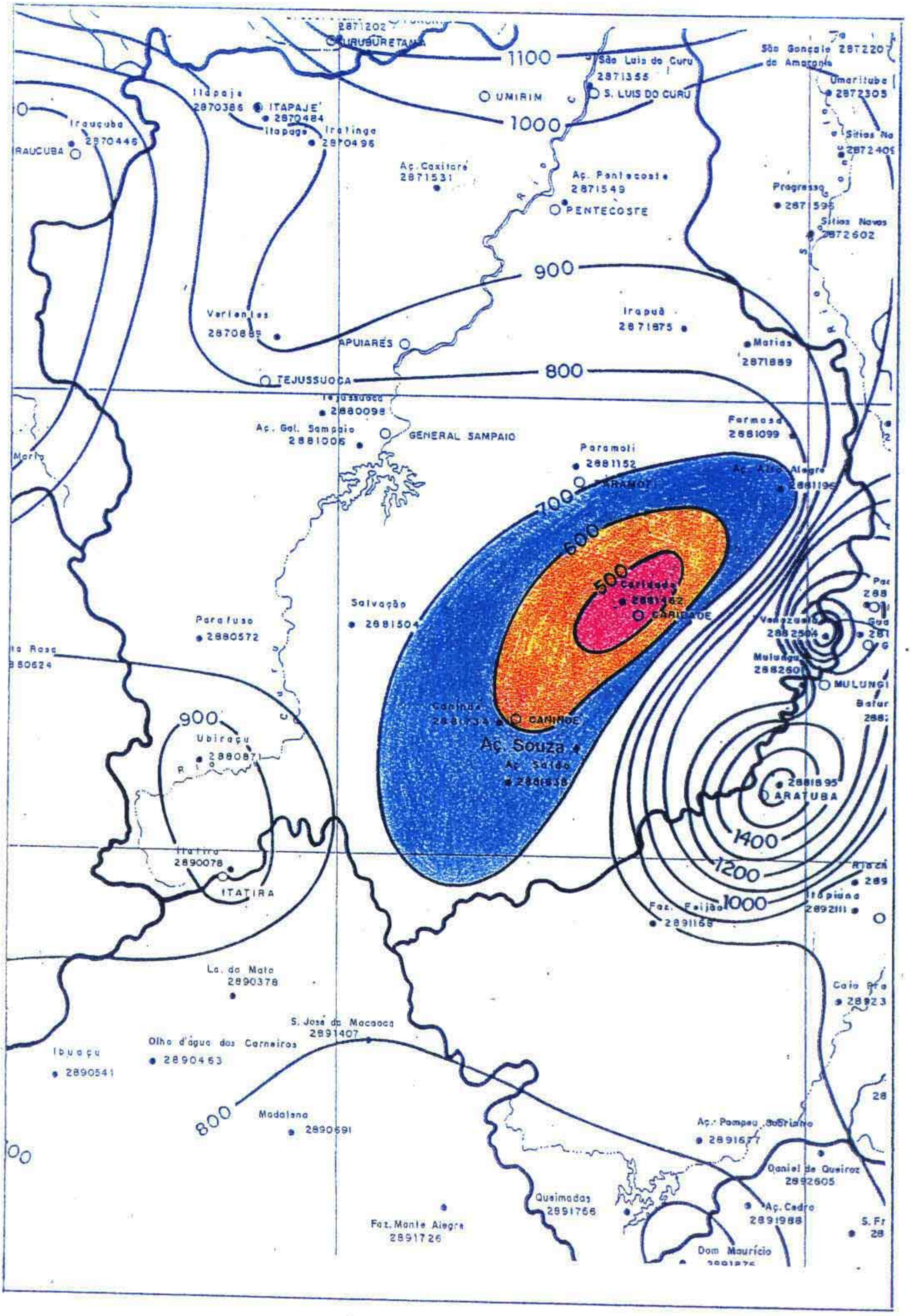

FIGURA - 2 ISOIETAS

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Figura 3 - Distribuição Mensal da Precipitação Média, Máxima, Mínima e Desvio Padrão

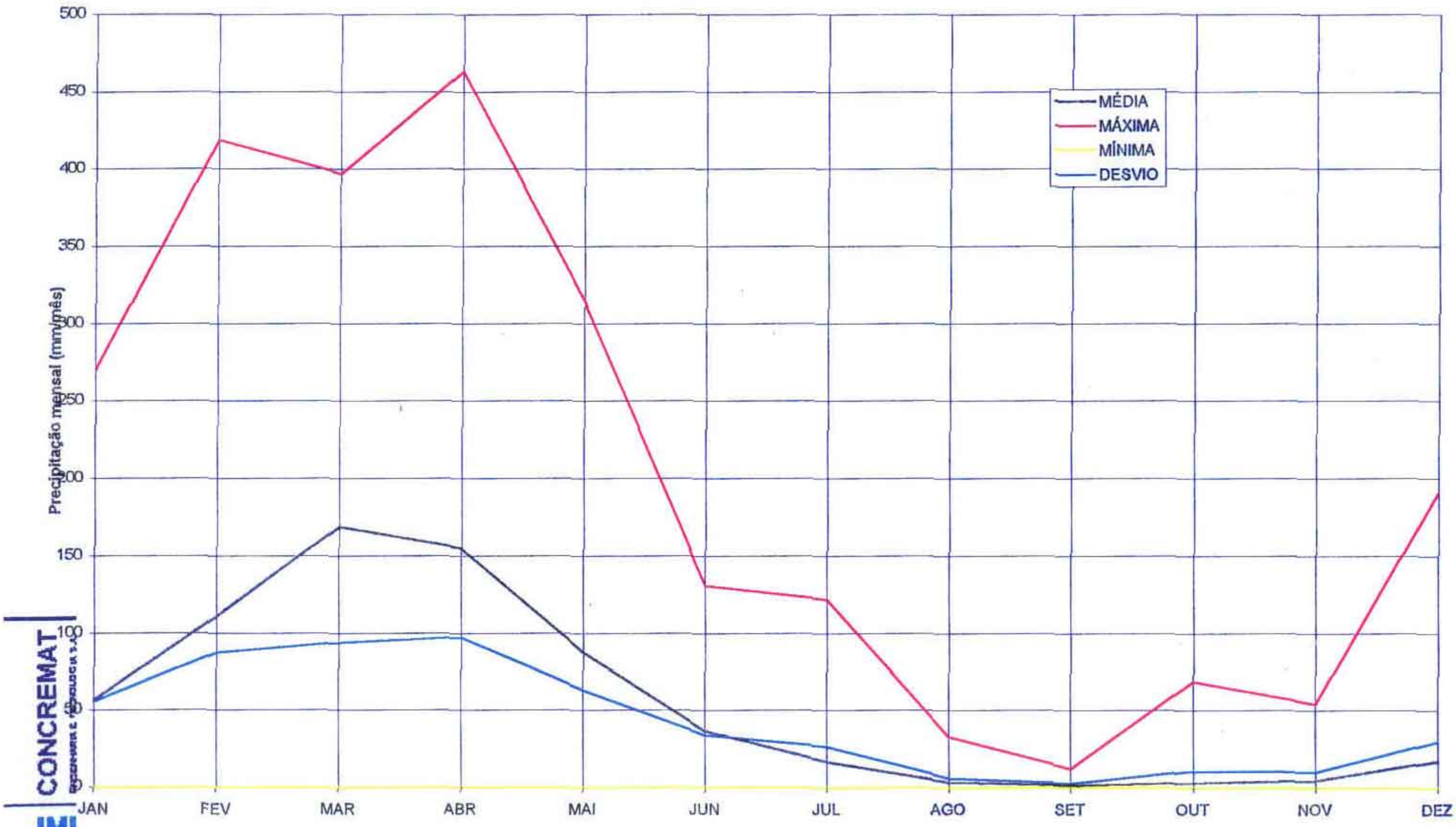

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TABELA 02

SUDENE/DPG/PRN/HME *** BANCO DE DADOS HIDROCLIMATOLOGICOS DO NORDESTE ***

* SISTEMA DE PLUVIOMETRIA *

PLUVIOMETRIA MENSAL

EDIÇÃO EM 15/0290 POSTO -

SALÃO AC ESTADO - CEARÁ LATITUDE 04-25 NÚMERO - 21881838

MUNICÍPIO - CANINDÉ LONGITUDE 39-19

COD.NAC. - 00439015 INSTALADO EM 1912 P/DNOCS ALTITUDE 200M

ANO	JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ	TOTAL
1916	-	-	-	-	-	90,4	0,0	0,0	0,0	0,0	0,0	33,4	-
1917	165,7	214,8	378,3	86,8	171,6	68,3	0,3	0,0	0,0	0,0	22,3	8,4	1116,5
1918	71,2	23,8	89,8	22,7	28,6	11,8	0,0	13,5	0,0	0,0	0,0	44,3	305,7
1919	13,3	29,5	9,0	0,2	19,3	0,0	0,0	6,0	0,0	0,0	0,0	0,0	77,3
1920	5,5	30,7	306,1	300,2	94,6	18,1	15,7	9,0	0,0	0,0	0,0	78,4	858,3
1921	59,3	266,1	274,2	265,0	151,1	35,9	61,3	0,0	0,0	0,0	2,0	0,0	1114,9
1922	5,0	49,5	114,0	506,1	188,3	131,8	43,9	15,0	0,0	0,0	30,0	9,0	1092,6
1923	59,6	224,9	60,2	81,0	121,5	40,8	34,9	0,0	0,0	0,0	0,0	0,0	622,9
1924	214,9	523,9	443,4	515,2	173,5	58,3	18,9	0,0	0,0	10,3	0,0	34,7	1993,1
1925	59,3	94,1	175,5	247,1	67,7	0,0	0,0	0,0	0,0	0,0	0,0	3,0	646,7
1926	81,6	206,3	458,4	306,8	214,4	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1267,5
1927	73,7	156,6	112,6	170,5	77,9	0,0	0,0	0,0	0,0	0,0	0,0	0,0	591,3
1928	94,2D	4,8D	152,8D	226,4D	3,0	16,3	8,7	0,0	0,0	2,5	0,0	7,9	516,6
1929	55,4	237,8	191,8	129,3	76,7	5,8	67,7	0,0	18,4	0,0	0,0	23,7	806,7
1930	122,2	65,3	187,6	102,5	6,5	41,6	0,0	8,0	0,0	0,0	0,0	14,0	547,7
1931	149,1	92,0	124,0	149,6	56,3	0,0	0,0	0,0	0,0	0,0	0,0	2,4	572,4
1932	14,3	127,9	58,7	23,6	7,4	4,7	0,0	0,0	18,0	0,0	0,0	3,5	258,1
1933	91,0	84,2	101,0	237,4	32,7	0,0	0,0	0,0	0,0	0,0	0,0	7,0	553,3
1934	24,.0	349,0	218,0	195,4	117,0	23,0	0,0	0,0	0,0	0,0	12,0	11,7	860,1
1935	29,7	241,3	159,5	222,6	130,8	72,5	5,5	5,5	0,0	0,0	0,0	2,2	869,5
1936	25,6	121,3	56,2	51,7	61,0	68,0	0,0	0,0	0,0	0,0	0,2	3,0	385,0
1937	0,0	156,0	62,0	195,0	59,5	74,0	8,0	0,0	0,0	0,0	0,0	2,5	557,0
1938	22,5	14,1	277,5	112,5	96,0	24,5	12,0	0,0	3,0	0,0	0,0	0,0	562,1
1939	5,0	150,0	224,1	127,1	37,3	14,8	14,6	0,0	10,0	68,5	4,0	4,0	659,4
1940	68,1	113,3	144,9	193,2	222,4	35,0	41,9	9,0	0,0	0,0	0,0	0,0	827,8
1941	4,0	84,0	200,4	137,0	26,7	8,0	8,0	0,0	0,0	0,0	0,0	16,0	484,1
1942	16,0	70,0	57,0	108,0	18,0	16,0	0,0	0,0	0,0	4,0	12,0	0,0	301,0
1943	87,5	50,0	42,5	105,7	34,4	4,0	24,7	0,0	0,0	0,0	0,0	14,5	363,3
1944	66,0	10,0	240,0	35,1	97,0	0,0	0,0	0,0	0,0D	0,0	1,0	16,8	465,9
1945	123,0	172,7D	116,0D	282,5D	113,0D	22,0D	6,0D	0,0D	0,0	2,5D	0,0D	100,0D	937,7
1946	238,0	84,5	101,0	81,5	29,5	9,5	0,0	0,0	0,0D	0,0	14,2	33,2	591,4
1947	36,3D	188,3D	389,2D	81,9D	87,6D	70,9D	90,3D	4,0D	0,0	0,0D	43,1D	17,9D	1009,5D
1948	12,0	42,6	150,3	84,0	107,9	22,7	18,7	0,0	0,0	0,0	0,0	2,4	440,6
1949	16,4	87,3	196,8	147,0	36,6	0,0	0,0	0,0	0,0	0,0	54,2	0,0	538,3
1950	12,3	56,0	234,3	424,0	134,2	45,0	0,0	0,0	0,0	0,0	0,0	21,0	926,8
1951	20,0	10,0	113,0	87,0	6,0	97,0	14,2	0,0	0,0	0,0	2,0	44,7	393,9
1952	30,7	35,6	106,0	112,6	58,4	6,2	0,0	0,0	0,0	3,5	0,0	35,0	388,0
1953	5,5	41,8	93,1	154,6	50,9	17,9	19,0	0,0	0,0	0,0	30,8	3,2	416,8
1954	4,8	175,5	59,3	56,1	95,1	1,0	0,0	0,0	0,0	0,0	1,2	0,0	393,0
	JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ	TOTAL

D - TOTAL MENSAL SOMENTE E,F,G - VALOR ESTIMADO H - VALOR HOMOGENEIZADO * VALOR DUVIDOSO

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CONTINUAÇÃO

SUDENE/DPG/PRN/HME

*** BANCO DE DADOS HIDROCLIMATOLOGICOS DO NORDESTE ***
* SISTEMA DE PLUVIOMETRIA *
PLUVIOMETRIA MENSAL

EDIÇÃO EM 15/0290

POSTO - SALÃO AC
NÚMERO - 21881838
COD.NAC - 00439015

ESTADO - CEARÁ
MUNICÍPIO - CANINDÉ
INSTALADO EM 1912 P/DNOCS

LATITUDE 04-25
LONGITUDE 39-19
ALTITUDE 200M

ANO	JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ	TOTAL
1955	38,0	50,0	84,0	17,0	0,0	16,0	0,0	0,0	0,0	0,0	0,0	0,0	205,0
1956	0,0	91,0	205,0	130,0	0,0	0,0D	0,0	0,0	0,0D	0,0	0,0	0,0D	426,0
1957	44,0	17,0	201,0	274,0	14,0	0,0	0,0	0,0	0,0	0,0	0,0	4,3	554,3
1958	0,0	0,0	0,0	20,0	65,0	10,0	0,0	0,0	0,0	0,0	0,0	0,0	95,0
1959	23,0	180,0	59,0	70,0	39,0	96,0	0,0	0,0	0,0	0,0	0,0	0,0	467,8
1960	0,0	23,0	300,0	96,0	58,0	10,0	0,0	0,0	0,0	0,0	0,0	0,0	487,0
1961	73,0	272,0	284,0	145,0	98,0	14,0	0,0	0,0	0,0	0,0	0,0	7,4	893,4
1962	67,2	83,4	199,0	116,7	68,6	0,0	0,0	0,0	0,0	0,0	0,8	8,5	544,2
1963	134,4	80,1	222,8	101,3	26,6	0,0	0,0	0,0	0,0	0,0	39,9	141,8	746,9
1964	259,5	222,9	141,6	324,5	61,6	32,5	70,4	0,0	0,0	0,0	0,0	0,0	1133,0
1965	78,6	3,0	138,0	79,0	104,0	21,3	0,0	0,0	0,0	0,0	0,0	0,0	423,9
1966	0,0	70,9	35,4	134,1	83,0	3,0	25,5	0,0	0,0	0,0	0,0	6,5	358,4
1967	15,0	197,8	207,0	200,0	82,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	702,4
1968	27,0	72,0	359,2	276,2	260,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	994,4
1969	61,5	49,4	106,2	205,0	30,9	43,3	102,1	44,4	0,0	0,0	0,0	0,0	642,8
1970	83,0	46,1	230,7	74,3	62,7	39,4	0,0	0,0	0,0	5,4	0,0	0,0	541,6
1971	103,1	110,5	164,0	148,7	104,3	46,0	80,0	11,2	0,0	-	0,4	4,2	-
1972	21,5	33,5	5,6	38,2	7,0	32,0	2,5	5,0	0,0	0,0	0,0	20,0	165,3
1973	53,2	128,2	193,2	96,7	92,9	57,9	24,2	2,2	0,0	0,0	0,0	18,6	667,7
1974	203,6	129,5	291,6	356,8	243,6	36,3	13,8	0,0	1,8	21,5	2,9	23,0	1324,4
1975	47,5	112,6	169,0	180,3	163,9	40,2	69,4	0,3	11,6	0,0	1,6	45,0	831,4
1976	35,3	89,2	155,2	72,0	22,6	7,4	6,0	4,2	0,0	0,0G	0,0	3,8	395,7
1977	125,4	103,2	71,4	184,4	67,8	48,6	49,2	0,0	0,0	0,0	0,0	0,0	650,0
1978	6,0	128,6	212,6	185,7	64,9	27,0	9,2	0,0	0,0	0,0	33,0	9,8	676,8
1979	29,3	55,4	91,2	97,2	75,5	0,0	0,0	0,0	0,0	0,0	0,0	17,2	365,8
1980	67,4	242,8	76,6	42,5	34,0	24,2	0,0	0,0	0,0	0,0	0,0	0,0	487,4
1981	25,4	24,0	316,0	44,0	41,0	0,0	0,0	0,0	0,0	6,0	0,0	44,2	494,6
1982	10,2	61,8	249,1	136,0	73,3	7,2	0,0	5,0	0,0	0,0	4,0	0,0	552,6
1983	0,0	78,4	124,0	83,4	18,4	0,0	0,0	0,0	0,0	0,0	0,0	19,2	323,4
1984	15,0	97,2	197,4	169,0	189,0	31,8	24,4	3,0	0,0	0,0	0,0	0,0	726,8
1985	195,6	327,6	352,1	415,8	122,1	96,6	36,6	0,0	0,0	0,0	1,0	41,6	1589,0
	JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DE	TOTAL
Nº DE ANOS C/ DADOS	69	69	69	69	69	70	70	70	70	70	70	70	68
MÉDIA	68,3	114,0	172,7	166,3	79,7	27,0	14,5	2,0	0,8	1,8	4,4	14,4	643,8
MÁXIMA	259,5	523,9	468,4	516,2	260,0	131,8	102,1	44,4	18,4	68,5	54,2	141,8	1993,1
MÍNIMA	0,0	0,0	0,0	0,2	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	77,3

D - TOTAL MENSAL SOMENTE E,F,G - VALOR ESTIMADO H - VALOR HOMOGENEIZADO * - VALOR DUVIDOSO

ORIGEM DOS DADOS - ARQUIVO DE MICROFICHAS DA SUDENE

A partir da análise das séries pluviométricas verifica-se que o regime das chuvas caracteriza-se por uma irregularidade interanual, ou seja, em determinado ano ocorre alta pluviosidade, enquanto que em outros as precipitações são bastante deficientes Os coeficientes de variação são bastante elevados, normalmente com valores de 0,4

A média anual de chuvas da estação Salão está em torno de 644 mm

As precipitações se concentram no quadrimestre de fevereiro a maio, quando se verifica, em média, 81% da precipitação anual O período de menor precipitação se situa, normalmente, nos meses de agosto, setembro e outubro, nos quais se verifica em média, o máximo de 1% da média anual

Praticamente a metade da chuva anual ocorre em somente 2 meses, março e abril O trimestre fevereiro/abril ou março/maio é responsável por quase dois terços da pluviosidade do ano

A visualização gráfica dessa repartição temporal é representada na ***Figura 04***, que contém o histograma médio mensal para o posto considerado neste trabalho, o qual está mais diretamente associado e representável ao local do barramento

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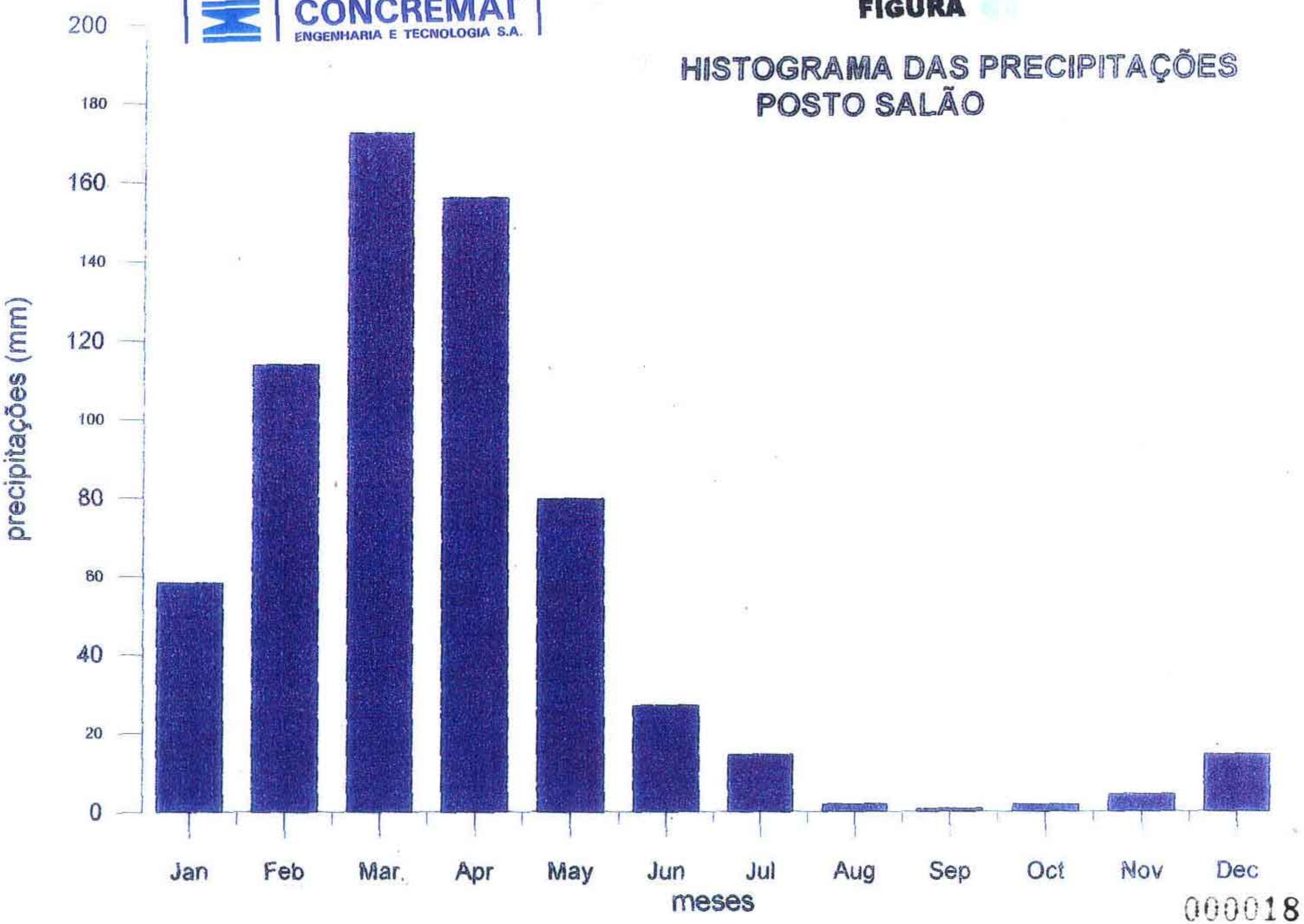
FIGURA

HISTOGRAMA DAS PRECIPITAÇÕES
POSTO SALÃO



3.3.4 - Série de Precipitações Médias Diárias na Bacia Hidrográfica.

A obtenção da precipitação média na bacia hidrográfica, correspondente ao boqueirão barrável foi obtida pelo método de Thissen, utilizando técnica de Monte Carlo

A metodologia é totalmente digital e consiste no cálculo dos coeficientes de Thissen de cada posto pluviométrico mediante a contagem do número de pontos aleatórios que se situam dentro da bacia hidrográfica e na proximidade de cada posto

A geração dos pontos foi realizada mediante uma rotina de tipo RANDOM, com inicializador (SEED) no relógio do computador e distribuição estatística de valores de tipo retangular, com média (1/2) e variância (1/12)

Estes números aleatórios foram compostos em pares e multiplicados pelos respectivos fatores de escala (latitude e longitude) que permitissem gerar pontos localizados num retângulo que circunscrevia a bacia hidrográfica em estudo

Uma rotina computacional avaliou a localização de cada ponto (dentro ou fora da poligonal que define a bacia hidrográfica) e outra rotina se encarregou de definir qual posto pluviométrico se encontra vizinho ao ponto pesquisado Sendo os pontos gerados mediante distribuição retangular, a cobertura dos mesmos é homogênea e, conseqüentemente, o número de pontos associados a cada posto pluviométrico representa um excelente indicador do coeficiente de Thissen de referido posto

A vantagem desta técnica com relação às tradicionalmente utilizadas (método de construção geométrica dos polígonos de Thissen apoia-se de no fato que, esta pode ser aplicada para cada intervalo de tempo com os postos que efetivamente dispõem de dados naquele período, facilitando assim enormemente o cálculo e estendendo a série de precipitações médias o máximo possível com os dados disponíveis

No caso da barragem de Souza foram utilizados no cálculo da precipitação média 10 postos pluviométricos (a ***Tabela 4*** e apresentam os nomes, códigos, características e coordenadas dos postos pluviométricos utilizados) e foram pesquisadas 40 configurações diferentes de polígonos de Thissen Os resultados

Tabela - 4

Nomes, Códigos e Coordenadas dos Postos Pluviométricos da Região.

Nome do Posto	Código do Posto	Latitude	Longitude
Paramoti	2881152	4° 04'	39° 15'
Salvação	2881504	4° 15'	39° 29'
Parafuso	2880572	4° 16'	39° 39'
Ubiraçu	2880871	4° 24'	39° 39'
Itatira	2890078	4° 31'	39° 37'
Lagoa do Mato	2890378	4° 40'	39° 37'
Caridade	2881462	4° 13'	39° 12'
Salão	2881838	4° 25'	39° 19'
Fazenda Feijão	2891168	4° 34'	39° 10'
General Sampaio	2881006	4° 02'	39° 29'

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Tabela - 5 CARACTERIZAÇÃO DO REGIME PLUVIOMETRICO
ANÁLISE MENSAL E ANUAL

PERIODO 1932-1988

POSTO	CODIGO	PARAM	LAT	LONG	JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ	ANUAL
		PR			58 316	100 089	193 544	184 175	90 689	45 825	16 112	1 135	2 065	6 126	2 523	18 621	718221
		S			58 827	82 577	90 519	100 849	70 341	40 944	23 304	3 123	4 393	15 210	4 900	28 247	300 396
PARAMOTI	2881162	CVR	4° 04	39° 16	1 009	0 825	0 468	0 548	0 776	0 913	1 446	2 751	2 129	2 483	1 942	1 515	0 418
		G			1 413	1 313	0 407	0 549	1 034	1 303	2 036	4 490	2 340	2 947	2 307	1 904	0 941
		R1			0 053	0 000	0 023	0 000	0 137	0 296	0 128	0 000	0 253	0 471	0 093	0 000	——
		R			0 251	0 120	0 571	0 600	0 234	0 253	0 070	0 205	0 706	0 239	0 104	0 285	0 540
		PR			53 807	107 046	194 509	182 212	90 958	33 244	11 347	2 007	1 354	1 819	5 111	23 726	707 140
		S			58 793	76 226	98 511	108 735	73 512	36 334	18 494	3 900	4 477	6 923	14 767	36 443	292 160
SALVAÇAO	2881604	CVR	4 16	39° 29	1 093	0 712	0 506	0 597	0 808	1 093	1 630	1 943	3 305	3 805	2 890	1 536	0 413
		G			1 952	0 812	0 335	0 910	1 414	1 969	2 240	2 296	4 943	5 188	4 544	2 107	1 097
		R1			0 249	0 000	0 081	0 000	0 000	0 252	0 000	0 003	0 000	0 000	0 000	0 155	——
		R			0 255	0 197	0 362	0 454	0 243	0 145	0 493	0 000	0 427	0 000	0 010	0 109	0 669
		PR			73 044	118 527	207 314	177 253	91 705	35 321	11 389	2 540	3 739	1 977	4 054	18 412	744 670
		S			84 238	86 779	96 565	103 322	76 964	40 457	19 479	7 035	23 532	7 251	20 607	27 073	305 777
PARAFUSO	2880672	CVR	4° 16	39° 39	1 153	0 732	0 465	0 581	0 845	1 145	1 710	2 769	6 292	3 667	5 083	1 470	0 411
		G			1 592	0 739	0 334	0 664	1 162	1 218	2 445	3 606	7 019	4 571	6 766	1 465	0 829
		R1			0 150	0 000	0 136	0 329	0 111	0 192	0 000	0 331	0 000	0 033	0 000	0 059	——
		R			0 333	0 151	0 330	0 285	0 334	0 397	0 468	0 000	0 069	0 000	0 000	0 254	0 526
		PR			74 446	147 863	245 332	204 974	99 702	48 954	23 295	6 814	2 349	4 491	7 839	27 723	993 682
		S			69 200	105 649	130 170	117 328	72 305	42 456	25 888	11 075	3 504	9 664	20 364	28 125	356 594
JBIRAÇU	2880871	CVR	4° 24	39° 39	0 930	0 715	0 531	0 573	0 725	0 867	1 111	1 625	1 492	2 151	2 598	1 015	0 359
		G			1 536	0 903	1 218	1 391	0 925	0 963	1 722	2 593	2 376	4 765	4 511	1 651	1 562
		R1			0 066	0 000	0 112	0 006	0 126	0 192	0 000	0 027	0 000	0 000	0 038	0 015	——
		R			0 305	0 034	0 329	0 478	0 254	0 207	0 189	0 003	0 545	0 011	0 104	0 406	0 648
		PR			64 275	105 395	206 000	209 937	142 837	89 284	44 642	15 453	4 339	2 570	4 502	25 172	904 405
		S			47 157	80 747	115 787	111 030	95 994	69 050	42 348	29 185	8 532	5 233	8 625	31 602	308 691
ITATIPA	2890078	CVP	4° 31	39° 37	0 369	0 766	0 562	0 529	0 672	0 998	0 949	1 889	1 967	2 036	1 916	1 261	0 374
		G			0 918	1 128	1 139	0 366	0 721	3 549	0 941	4 844	2 979	2 971	3 013	1 751	0 025
		R1			0 000	0 000	0 192	0 000	0 000	0 000	0 122	0 061	0 000	0 060	0 016	0 000	——
		R			0 266	0 293	0 436	0 556	0 196	0 165	0 336	0 000	0 224	0 415	0 069	0 328	0 498
		PR			46 279	85 530	205 260	174 628	100 386	53 751	17 056	4 854	1 174	1 121	1 651	14 004	705 693
		S			97 959	108 226	289 395	238 657	76 521	72 853	26 433	11 548	3 940	3 854	5 165	20 521	784 477
LAGOA	2890378	CVR	4° 40	39° 37	2 115	1 265	1 410	1 367	0 762	1 355	1 550	2 379	3 357	3 437	3 129	1 473	1 112
DO MATO		G			5 437	3 145	5 552	4 912	0 972	4 043	2 847	3 611	4 211	4 610	4 232	1 712	5 380
		R1			0 022	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	——
		R			0 653	0 766	0 913	0 782	0 164	0 244	0 032	0 192	0 000	0 000	0 062	0 308	0 695
		PR			35 767	70 509	128 556	116 802	53 858	29 302	8 696	1 788	1 205	0 865	2 974	10 433	460 753
		S			29 469	53 389	56 324	69 471	35 490	28 982	11 282	3 921	2 501	1 445	1 701	12 396	193 343
CARIDADE	2881462	CVR	4° 13	39° 12	0 824	0 757	0 438	0 595	0 659	0 989	1 297	2 195	2 075	1 671	1 561	1 188	0 420
		G			1 072	1 543	0 432	1 598	0 822	2 359	2 228	3 474	3 332	3 143	2 214	2 624	0 947
		R1			0 284	0 006	0 041	0 009	0 000	0 294	0 038	0 084	0 175	0 125	0 000	0 000	——
		R			0 473	0 272	0 358	0 574	0 256	0 237	0 607	0 000	0 000	0 057	0 230	0 281	0 725
		PR			51 260	108 102	169 672	154 495	78 170	31 125	13 404	2 040	1 188	4 921	5 289	15 504	635 166
		S			60 475	76 330	83 002	92 398	56 469	32 527	21 666	6 545	3 570	19 230	14 286	26 293	258 858
SALAO	2881838	CVP	4 26	39° 19	1 180	0 725	0 489	0 598	0 722	1 045	1 631	3 208	3 006	3 903	2 701	1 696	0 408
		G			1 288	1 194	0 126	0 901	1 209	1 072	2 164	5 051	2 873	4 977	3 347	2 835	0 950
		R1			0 193	0 000	0 047	0 000	0 000	0 183	0 000	0 000	0 000	0 000	0 000	0 000	——
		R			0 275	0 053	0 320	0 504	0 067	0 186	0 592	0 049	0 110	0 000	0 172	0 185	0 601
		PR			55 272	103 093	177 865	169 127	115 312	59 704	26 391	5 607	1 332	2 312	3 468	22 228	735 765
		S			52 401	70 669	89 584	85 646	61 130	47 957	37 530	12 262	3 742	5 530	8 568	27 668	314 355
FAZENDA	2881168	CVP	4 34	39° 10	0 948	0 685	0 506	0 625	0 721	0 803	1 422	2 187	2 810	4 391	1 894	1 245	0 427
FEIJAO		G			2 199	0 563	0 411	0 615	1 170	0 626	3 064	4 974	5 284	4 685	1 940	1 680	0 976
		R1			0 350	0 001	0 146	0 000	0 000	0 151	0 000	0 000	0 017	0 000	0 232	0 000	——
		R			0 261	0 352	0 453	0 481	0 359	0 536	0 752	0 029	0 163	0 253	0 000	0 219	0 668
		PP			62 640	112 696	213 044	186 204	99 091	44 823	17 074	2 702	2 475	1 179	5 454	18 898	765 717
		S			60 974	92 584	95 186	113 468	75 281	46 810	28 159	5 243	5 378	3 367	13 332	27 067	345 586
GENERAL	2881006	CVR	4 02	39° 29	0 9 5	0 822	0 447	0 609	0 760	1 044	1 649	1 940	2 173	2 873	2 612	1 432	0 451
SAMPAIO		G			1 265	1 331	0 239	0 652	0 930	1 295	2 513	2 237	2 717	1 195	3 652	1 967	0 650
		R1			0 000	0 000	0 000	0 000	0 052	0 281	0 049	0 000	0 090	0 000	0 000	0 018	——
		R			0 240	0 272	0 456	0 539	0 374	0 181	0 253	0 202	0 170	0 000	0 000	0 493	0 636

PR Media, S Desvio Padrao, CVR Coeficiente de Variação, G Assimetria, R1 Autocorrelação (mes anterior),
R Autocorrelação (mesmo mes do ano anterior)

obtidos são apresentados na ***Figura 3***, onde são apresentadas os principais parâmetros

Pelo exame dos resultados do Thiessen, constata-se que o posto Salão, com coordenadas geográficas 4º 25'e 39º 20', tem ampla predominância sobre a bacia, tendo sido utilizados seus dados de chuva máxima de um dia para obtenção das chuvas correspondentes as frequências consideradas na determinação das descargas máximas a serem utilizadas e espedadas no local da barragem.

As series integrais do posto mencionado contendo os valores das médias mensais e anuais e máximas diárias anuais encontram-se nas ***Tabela 2 e 3***.

TABELA 03 - VALORES DAS PRECIPITAÇÕES MÁXIMAS DIÁRIA ANUAIS

ANO	PRECIPITAÇÃO (mm)	ANO	PRECIPITAÇÃO (mm)	ANO	PRECIPITAÇÃO (mm)
1916	41,5	1941	72,2	1968	90,3
1917	74,5	1942	36,0	1969	54,0
1918	44,3	1942	32,0	1970	40,3
1919	90,3	1944	83,0	1971	71,4
1920	66,5	1946	119,0	1972	48,7
1921	60.4	1948	32,2	1973	52,6
1922	66,0	1949	47,7	1974	69,6
1923	46,0	1950	75,0	1975	36,6
1924	76,0	1951	52,0	1976	26,6
1925	66,0	1952	35,0	1977	90,5
1926	69,1	1953	42,3	1978	113,2
1927	50,5	1954	32,5	1979	38,8
1929	68,7	1955	55,4	1980	52,0
1930	37,5	1956	66,0	1981	59,0
1931	70,7	1957	79,0	1982	81,8
1932	62,3	1959	73,0	1983	35,4
1933	45,0	1960	52,0	1984	70,1
1934	56,0	1961	58,0	1985	89,6
1935	41,0	1962	55,8	1986	58,6
1936	46,0	1963	79,3	1987	39,2
1937	129,5	1964	118,8	1988	137,4
1938	107,2	1965	64,5		
1939	76,2	1966	68,0		
1940	51,3	1967	79,0		

3.3.5 - Chuvas Intensas

Para uma utilização prática dos dados de chuva nos trabalhos de hidrologia, faz-se necessário conhecer a relação entre as três características fundamentais da chuva intensidade, duração e frequência

Nos trabalhos hidrológicos, em geral, interessa não somente o conhecimento das máximas precipitações observadas nas séries históricas, mas, principalmente, prever com base nos dados observados, e valendo-se dos princípios das probabilidades, quais as máximas precipitações que possam vir a ocorrer em uma certa localidade, com determinada frequência

A metodologia empregada na determinação das precipitações intensas foi a das ISOZONAS, desenvolvida pelo Prof Taborga Torrico O método consiste, basicamente, em utilizar estudos estatísticos de uma série de chuvas diária, para, através de um processo de desagregação e regionalização, estimar as precipitações de menores durações (2 horas, 1hora, 6 minutos)

Os cálculos foram feitos conforme a sequência descrita a seguir

• **Seleção do posto pluviométrico** - O posto pluviométrico selecionado foi o Salão, devido à sua representatividade na bacia Este posto apresenta as seguintes coordenadas geográficas 4º 25' de Latitude Sul e 39º 20'de Longitude de Longitude Oeste, a ***Tabela 2*** e a ***Figura 2***, apresentam a série histórica das precipitações mensais e as principais características das mesmas para o Açude Souza

• **Compilação dos dados** - Foram compiladas as chuvas máximas anuais, isto é, para uma dada duração escolheu-se a máxima intensidade pluviométrica observada em cada ano hidrológico que compõe a série observada na **Tabela 3**

• **Estudo probabilístico das precipitações extremas** - A série observada foi ajustada à distribuição de Gumbel Em geral, as distribuições de valores extremos de grandezas hidrológicas, tais como as chuvas, por exemplo, ajustam-se satisfatoriamente à distribuição tipo I de Fisher-Tippett, conhecida também como a distribuição de Gumbel. Os parâmetros estatísticos obtidos bem como as

precipitações de períodos de retorno de 50, 100, 500, 1 000 e 10 000 anos, constam na **Tabela 6**

TABELA 06

ANÁLISE ESTATÍSTICA DA SÉRIE DE PRECIPITAÇÕES MÁXIMA DIÁRIAS ANUAIS (POSTO SALÃO)

PERÍODO DE RETORNO (ANOS)	PROBABILIDADE	VARIÁVEL REDUZIDA	PRECIPITAÇÃO (mm)
50	0,9800	3,902	130,6
100	0,9900	4,600	144,6
500	0,9980	6,214	176,9
1000	0,9990	6,907	190,7
10000	0,9999	9,210	236,8

- Média da Amostra (x) ..... 63,8 mm
- Desvio Padrão (Sx) ..... 24,2 mm
- Média da Variável Reduzida (Yn) 0,55
- Desvio Padrão da Variável Reduzida (Sn) 1,19
- Moda dos Valores Extremos(Xf) 52,6Xf = x - Sx (Yn/Sn), donde Xf = 52,6
- Variável Reduzida Y = 0,05 (x - 52,6)
- Precipitação (x) x = (Y + 2,63)/0,05

• **Cálculo da chuva virtual de 24 horas de duração (p24h)** - Esses valores foram obtidos a partir da multiplicação das chuvas de duração de um dia, pelo fator 1,10 (recomendado por Taborga para esta transformação) Os resultados constam na ***Tabela 7***

• **Determinação da ISOZONA a qual pertence a bacia** - O posto Salão esta situado na ISOZONA "D" conforme pode ser observado na ***Figura 5***

• **Determinação das precipitações com duração inferiores a 24 horas de duração para períodos de retorno de 500 e 1.000 e 10.000 anos** - Essas precipitações foram obtidas multiplicando-se a chuva de 24 horas pela relação R, entre a chuva de 24 horas e 1 hora, obtida da ***Figura 5*** Para o período de retorno de 500 anos, que não consta na figura, o valor da chuva foi obtido por interpolação Os resultados constam na ***Tabela 8*** Logo estes resultados foram plotados em papel probabilístico e obtidos os valores de durações de precipitação requeridos (5 min ,15 min 30 min , 60 min . 2 hs , 6 hs ,12 hs). (***A Figura 6*** apresenta o gráfico das alturas de chuva para os diversos períodos de duração)

TABELA 07

CHUVAS VIRTUAIS DE 24 HORAS DE DURAÇÃO, PARA PERÍODOS DE RETORNO DE 50, 100, 500, 1.000 E 10.000 ANOS.

PERÍODO DE RETORNO (ANOS)	PRECIPITAÇÃO DIÁRIA (mm)	CHUVA VIRTUAL 24 HORAS (mm)
50	130,6	143,7
100	144,6	159,1
500	176,9	194,6
1000	190,7	209,8
10000	236,8	260,5

TABELA 08

PRECIPITAÇÕES INTENSAS PONTUAIS DE 1 HORA E 24 HORAS DE DURAÇÃO PARA PERÍODOS DE RETORNO DE 50, 100, 500, 1.000 E 10.000 ANOS

PERÍODO DE RETORNO (ANOS)	P (24 HORAS) (mm)	R (%)	P (1 HORA) (mm)
50	143,7	0,407	58,5
100	159,1	0,403	64,1
500	194,6	0,397	77,3
1.000	209,8	0,390	81,8
10.000	260,5	0,379	98,7

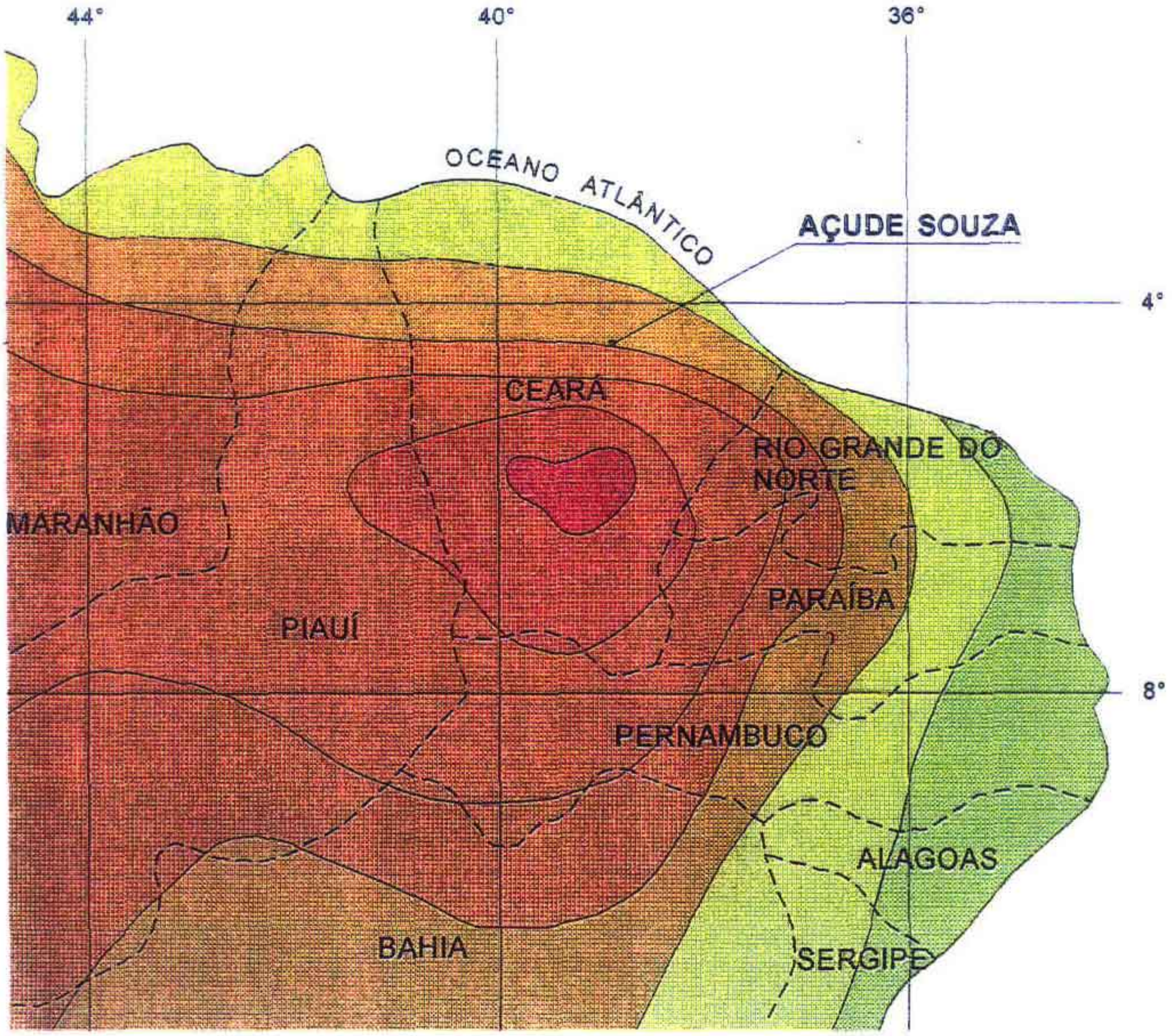
TABELA 09

PRECIPITAÇÕES INTENSAS ESPACIAIS DE 1 HORA E 24 HORAS DE DURAÇÃO PARA PERÍODOS DE RETORNO DE 50, 100, 500, 1.000 E 10.000 ANOS, DISTRIBUÍDAS NA BACIA DO AÇUDE SOUZA.

DURAÇÃO DAS CHUVAS	T = 50 ANOS	T = 100 ANOS	T = 500 ANOS	T = 1.000 ANOS	T = 10.000 ANOS
PRECIPITAÇÕES (MM)					
1	46,2	50,6	61,1	64,6	78,0
24	113,5	125,7	153,7	165,7	205,8

FIGURA 05

ISOZONAS DO NORDESTE



ISOZONAS DE IGUAL RELAÇÃO

TEMPO DE RECORRÊNCIA EM ANOS													
ISOZONA		1 HORA / 24 HORAS CHUVA										5 min. 24h CHUVA	
		5	10	15	20	25	30	50	100	1000	10000	5-50	100
B		38.1	37.8	37.5	37.4	37.3	37.2	36.9	36.6	35.4	34.3	8.4	7.5
C		40.1	39.7	39.5	39.3	39.2	39.1	38.0	38.4	37.2	36.2	9.6	9.0
D		42.0	41.6	41.4	41.2	41.1	41.0	40.7	40.3	39.0	37.9	11.2	10.0
E		44.0	43.6	43.3	43.2	43.0	42.9	42.6	42.2	40.9	39.6	12.6	11.2
F		46.0	45.5	45.5	45.1	49.9	44.9	44.6	44.1	42.7	41.3	13.9	12.4
G		47.9	47.4	47.2	47.0	46.0	45.7	46.4	45.9	44.5	43.1	16.4	13.7
H		49.9	49.4	49.1	49.9	49.9	46.5	46.3	47.0	46.3	44.9	16.7	14,9

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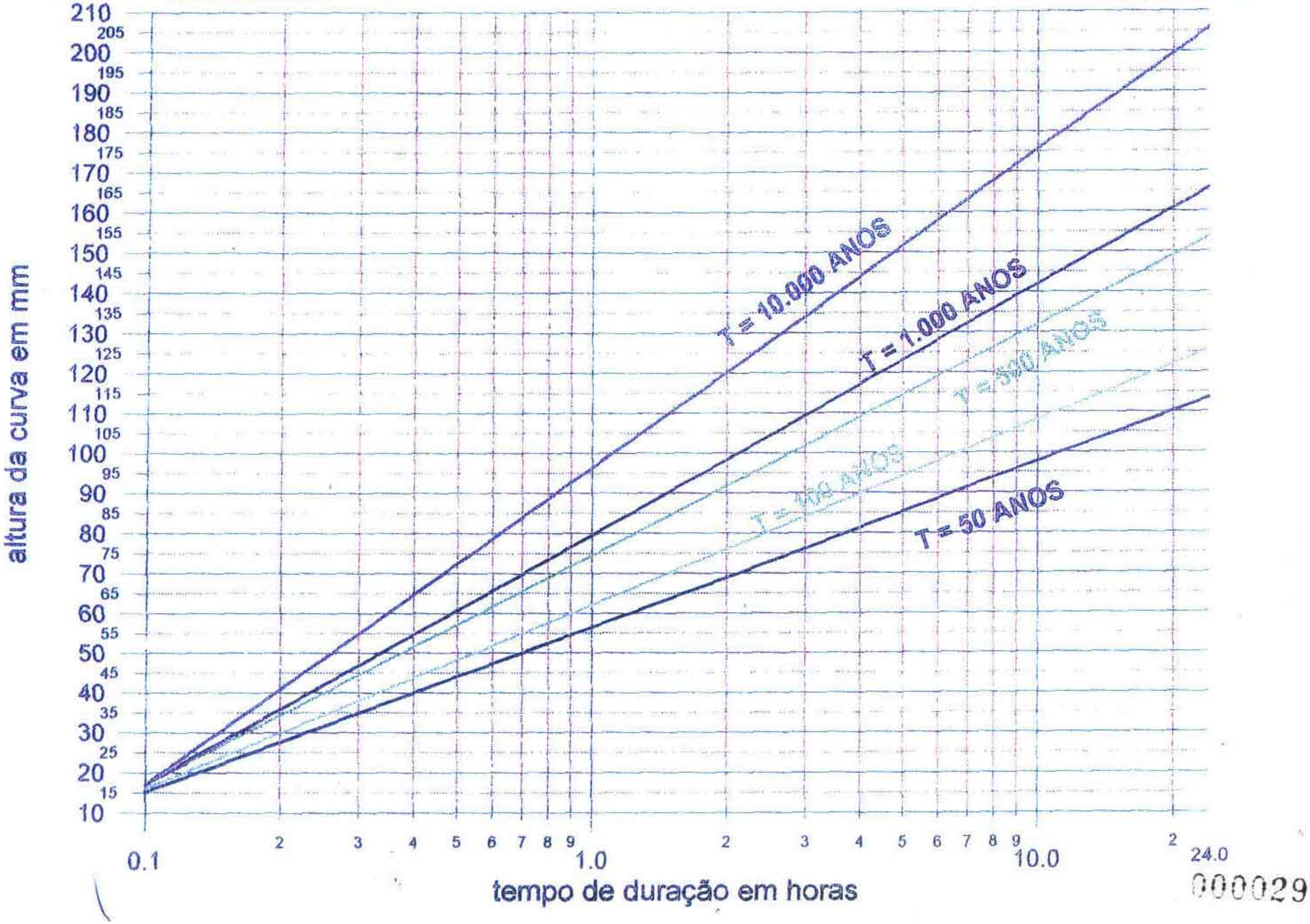
ALTURA DE CHUVA E TEMPO DE DURAÇÃO

FIGURA 6



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3.3.6 - Chuva de Projeto

• Cálculo do Tempo de Concentração da Bacia (Tc)

$Tc = 57(L^3/H)^{0.385}$, onde

- Tc = Tempo de concentração em (minutos)
- L = extensão do talvegue em (Km) = 21 Km
- H = máximo desnível no talvegue em (m) = 238m

Logo

$Tc = 57 (21^3 / 38)^{0.385}$ = 233.38 minutos ou

Tc = 4 horas

• Chuvas de Projeto

Com o valor do Tempo de Concentração da bacia de 4 horas, entramos na curva "ALTURA x DURAÇÃO x FREQUÊNCIA" e encontramos as chuvas de projeto para os períodos de retorno 50, 100, 500 e 1 000 e 10 000 anos, conforme ***Tabela 10.***

3.4 - Estudo das Cheias

A determinação das cheias na região do Juriti foi feita através do método do Hidrograma Unitário Triangular (HUT) desenvolvido pelo Soil Conservation Service (SCS) O hidrógrama foi determinado para uma precipitação unitária, de 1 milímetro, distribuída sobre toda a bacia, com uma duração correspondente a um quinto do tempo de concentração (1/5 Tc)

O excesso de precipitação para o cálculo do hidrograma total foi determinado através do método "Curve number", também desenvolvido pelo SCS

3.4.1 - Cálculo do Hidrograma Unitário Triangular

O cálculo do HUT foi feito para uma duração igual a um quinto do tempo de concentração e uma precipitação de 1 mm, como mencionado anteriormente O HUT tem a forma mostrada na ***Figura 5*** O seu cálculo foi procedido da seguinte forma

- tr = 1/5 Tc = 1/5 x 4h = 0,80h

  tr = duração do excesso de chuva

- tp = 0.6Tc + 0.5tr = 0.6 x 4 + 0.5 x 0.8 = 2,80h

  tp = tempo até a vazão de pico

- tb = 2.76tp = 2,67 x 2,80 = 7,48h

  tb = tempo de base do hidrograma

- qp = (2 x Pe x Ab)/tb = (2 x 0,001m x 220 x 10^6 m^2)/7,48h x 3 600s = 16,34m^3 /s

  qp = vazão de pico do hidrograma

  Pe = excesso de precipitação = 1 mm

  Ab = área da bacia hidrográfica = 220 km^2

3.4.2 - Cálculo da Precipitação Excedente (Pe) para os Diversos Períodos de Retorno.

O cálculo da precipitação excedente foi feita através do método do "Curve Number" do SCS, utilizando-se a seguinte fórmula

Pe = (P - 5080/N + 50,8)^2 / (P + 20320/N - 203,2) , onde

- Pe = Excesso de chuva ou Precipitação excedente em mm

- P = Precipitação ou chuva de projeto em mm

- N = Número de deflúvio que define o complexo hidrológico solo x vegetação

Para as condições da área em estudo. obteve-se N = 77 (Solo Tipo C - vegetação, floresta pouco densa, caatinga arbustiva)

Aplicando-se a fórmula acima para as precipitações da ***Tabela 7***, obteve-se o excesso de chuva para os diversos períodos de retorno em estudo Os valores constam na ***Tabela 8***

FIGURA 8 - HIDROGRAMA DE UMA CHUVA DE 5 mm E DURAÇÃO IGUAL AO TEMPO DE CONCENTRAÇÃO

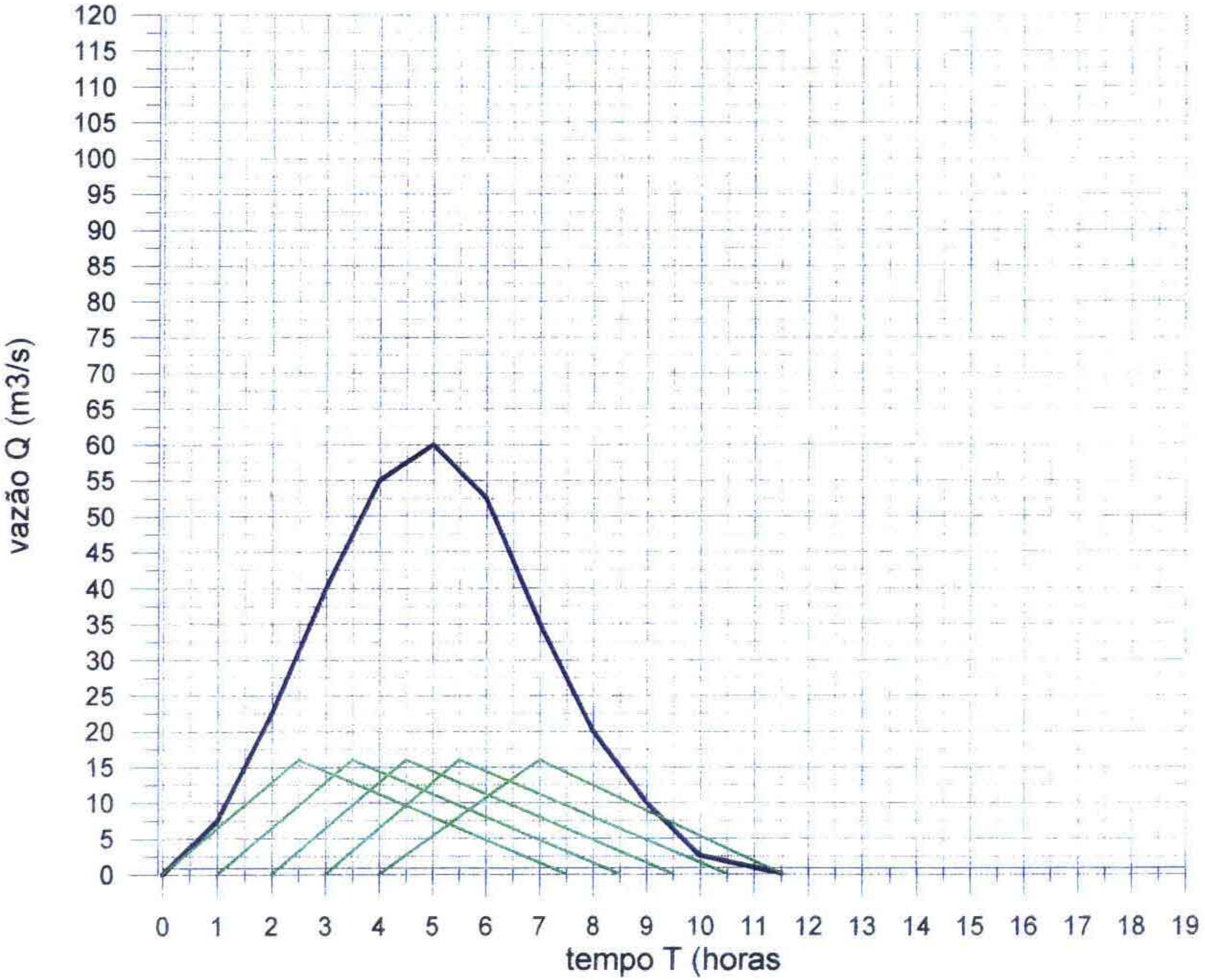

TABELA 10 - CHUVAS DE PROJETO

PERÍODO DE RETORNO (ANOS)	CHUVA DE PROJETO (MM)
500	71
100	79
500	96
1.000	103
10.000	126

TABELA 11
VALORES DE PRECIPITAÇÃO EXCEDENTE PARA PERÍODOS DE RETORNO DE 50, 100 500, 1.000 E 10.000 ANOS.

PERÍODO DE RETORNO (ANOS)	PRECIPITAÇÃO EXCEDENTE Pe (mm)
50	23,7
100	29,2
500	41,7
1.000	47,1
10.000	65,8

TABELA 12
HIDROGRAMAS AFLUENTES AO AÇUDE SOUZA PARA PERÍODOS DE RETORNO DE 50, 100, 500, 1.000 E 10.000 ANOS

TEMPO (HORAS)	VALORES DE Q EM M3/S				
	PERÍODOS DE RETORNO TR (ANOS)				
	50	100	500	1000	10000
0	0	0	0	0	0
1	38.92	47,95	68,47	77,34	111,76
2	108.36	133,50	190,65	215,34	311,76
3	199,74	246,10	351,45	396,96	570,59
4	274,26	337,90	482,55	545,04	776,47
5	292,88	360,85	515,33	582,06	823,53
6	257,33	317,05	452,78	511,41	717,65
7	176,04	216,90	309,75	349,86	488,24
8	99,87	123,05	175,72	198,48	247,06
9	47,40	58,40	83,40	94,20	129,41
10	11,85	14,60	20,85	23,55	35,29
10,68	0	0	0	0	0

3.4.3 - Cálculo do Hidrograma Total Afluente

O hidrograma total afluente foi calculado em duas fases

a) Calculou-se o hidrograma para uma chuva de duração igual ao tempo de concentração da bacia para uma altura de chuva efetiva igual a 5 mm (Ver ***Figura 8***)

B) Posteriormente calculou-se o hidrograma para as chuvas de período de retorno de 50, 100. 500, 1 000 e 10 000 anos, multiplicando-se as ordenados do hidrograma obtido na fase anterior, pela relação Pe(T)/5, onde Pe(T) é a precipitação excedente (***Tabela 11***), correspondente ao período de retorno T Os valores obtidos constam na ***Tabela12***, e estão plotados na ***Figura 8***

3.4.4 - Determinação do Amortecimento de Cheia

Alterando-se a vazão de entrada de um reservatório de acumulação, a vazão de saída não é instantaneamente alterada do mesmo valor O nível da água tende a manter-se horizontal e o acréscimo de vazão na entrada é traduzido em uma elevação da superfície líquida

A vazão de saída deste reservatório fica afixada pela altura (h) acima da cota da soleira do vertedouro a qual determina também o volume de acumulação (v) a a área (A) do espelho d'água do reservatório (***Figura 9***)

Consideremos neste estudo a vazão sobre o vertedouro como a única saída do reservatório

3.4.4.1 - Considerações Teóricas

Suponha-se que se queira calcular a hidrógrafa de saída Qs (t) de um reservatório criado por uma barragem cujo vertedor tem largura (L) e não tenha comportas Os dados são

Qa (t). a relação $v(h) = a\,(h + b)^m$ e a relação $Qs(h) = C\ \ L\ \ h^{3/2}$

Assim

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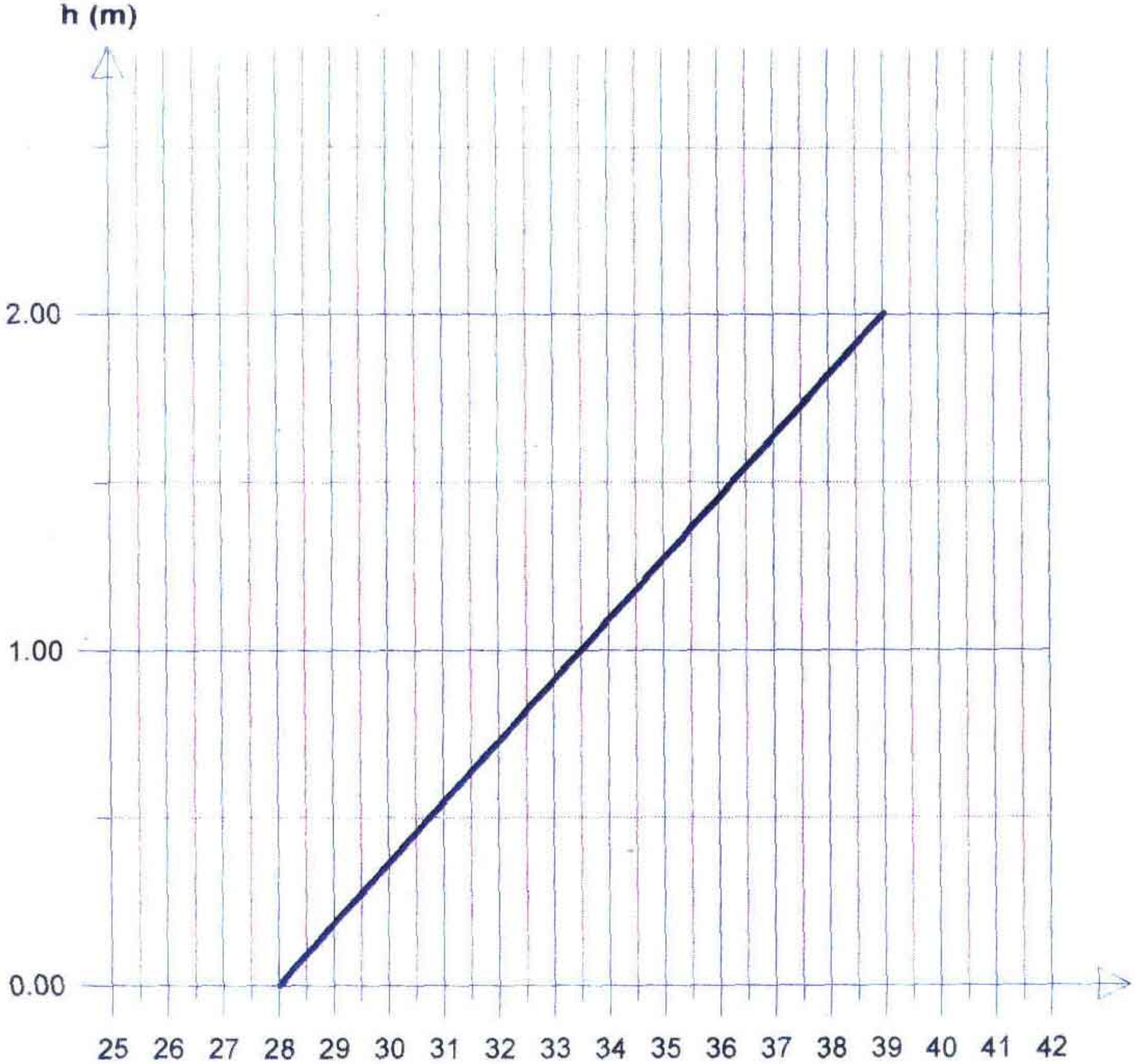
FIGURA 9 - CURVA ALTURA D'ÁGUA - VOLUME



$Q_a - Q_s = \Delta V / \Delta t$ onde

$Q_a = (Q_{ai} + Q_{ai+1}) / 2$

$Q_s = (Q_{si} + Q_{si+1}) / 2$

$\Delta V = V_{i+1} - V_i$

$\Delta t = t_{i+1} - t_i$

Os índices (i) referem-se ao início do intervalo Δt, (tempo t_i) e os índices ($_{i+1}$) ao fim do intervalo Δt, (tempo t_{i+1})

Substituindo os dados nas equações acima, tem-se

$$Q_a + a/\Delta t\,(h_i + b)^m - \tfrac{1}{2}\,C\,L\,h_i^{3/2} = a/\Delta t\,(h_{i+1} + b)^m + \tfrac{1}{2}\,C\,L\,h_{i+1}^{3/2} \quad \text{(eq 1)}$$

Fazendo-se

$$Y_1(hi) = a/\Delta t\,(h_i + b)^m - \tfrac{1}{2}\,C\,L\,h_i^{3/2} \quad \text{(eq 2)}$$

$$Y_2(h_{i+1}) = a/\Delta t\,(h_{i+1} + b)^m - \tfrac{1}{2}\,C\,L\,h_{i+1}^{3/2} \quad \text{(eq. 3)}$$

A equação (1) fica

$$Qa + Y_1(hi) = Y_2(h_{i+1}) \quad \text{(eq 4)}$$

Para maior facilidade das operações tabela-se Y1 (h) e Y2 (h), (***Figura 10***) ou faz-se gráficos

Iniciando com um valor de Qa conhecido no intervalo de tempo $t_1 - t_0$ e um valor de $h = h_0$, pela equação (4) tira-se Y2 (h_1) e pelo gráfico desta função (ou tabela). tira-se h_1 Com esse valor, calcula-se $Q_{si}(h_i)$ E assim sucessivamente, calcula-se Qs (h) que é o objetivo dessa integração

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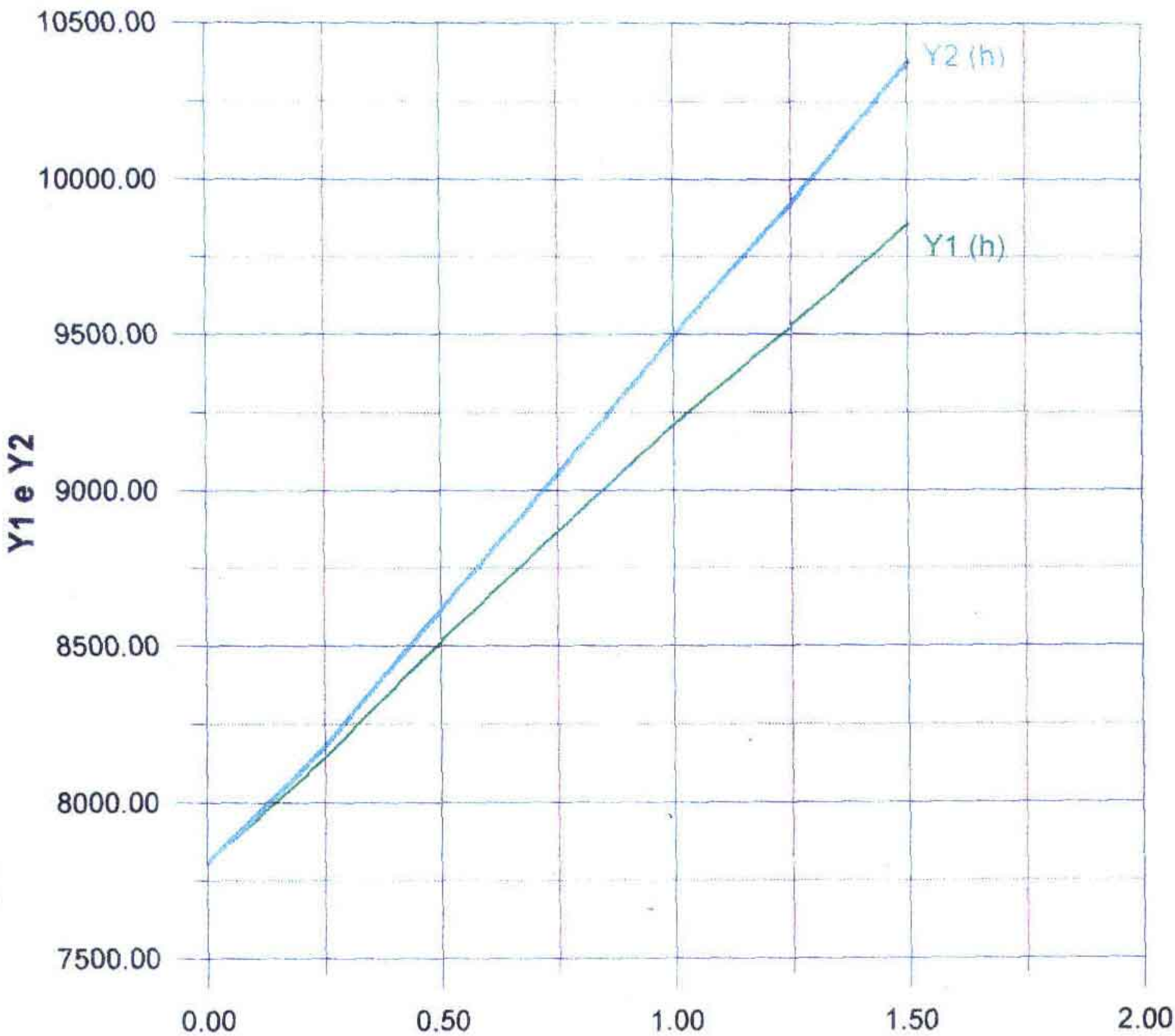
FIGURA 10 - FUNÇÕES Y1 (h) e Y2 (h)



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3.4.4.2 - Determinação das Hidrógrafas das Vazões Efluentes

Conhecendo-se as hidrógrafas das vazões afluentes (para períodos de retorno de 1 000 e 10 000 anos) plotadas na ***Figura 11***, e sabendo-se que a vazão efluente é dada pela lei dos vertedores $Q = C\ L\ h^{3/2}$, pode-se determinar as hidrógrafas das vazões efluentes

Pela equação (2),tem-se

$$Y1\ (h) = V_I/\ \Delta t - \tfrac{1}{2}\ C\ L\ h_i^{3/2}$$

Fazendo C = 2.19, L = 130,00m e t = 1 hora = 3 600 seg., tem-se

$$Y1\ (h) = V_I/3\ 600 - 142{,}35\ h_I^{3/2}$$

Aplicando-se o mesmo procedimento na equação (3), tem-se

$$Y2\ (h) = V_I/3\ 600 + 142{,}35\ h_{i+1}^{3/2}$$

Substituindo os valores de h e V, tirados do gráfico da ***Figura 10***, pode-se construir a ***Tabela 13*** e os gráficos da ***Figura 10***

Para a determinação das hidrógrafas das vazões efluentes, utilizou-se o seguinte procedimento

a) Cálculo de h inicial

Para t = 0, $Q_a = Q_s = 0{,}00$ m3/seg

$Q_s = C\ L\ h^{3/2}$ $\quad 0{,}00 = 2{,}19 \times 130{,}00 \times ho^{3/2}$ $\quad Ho = 0{,}00m$

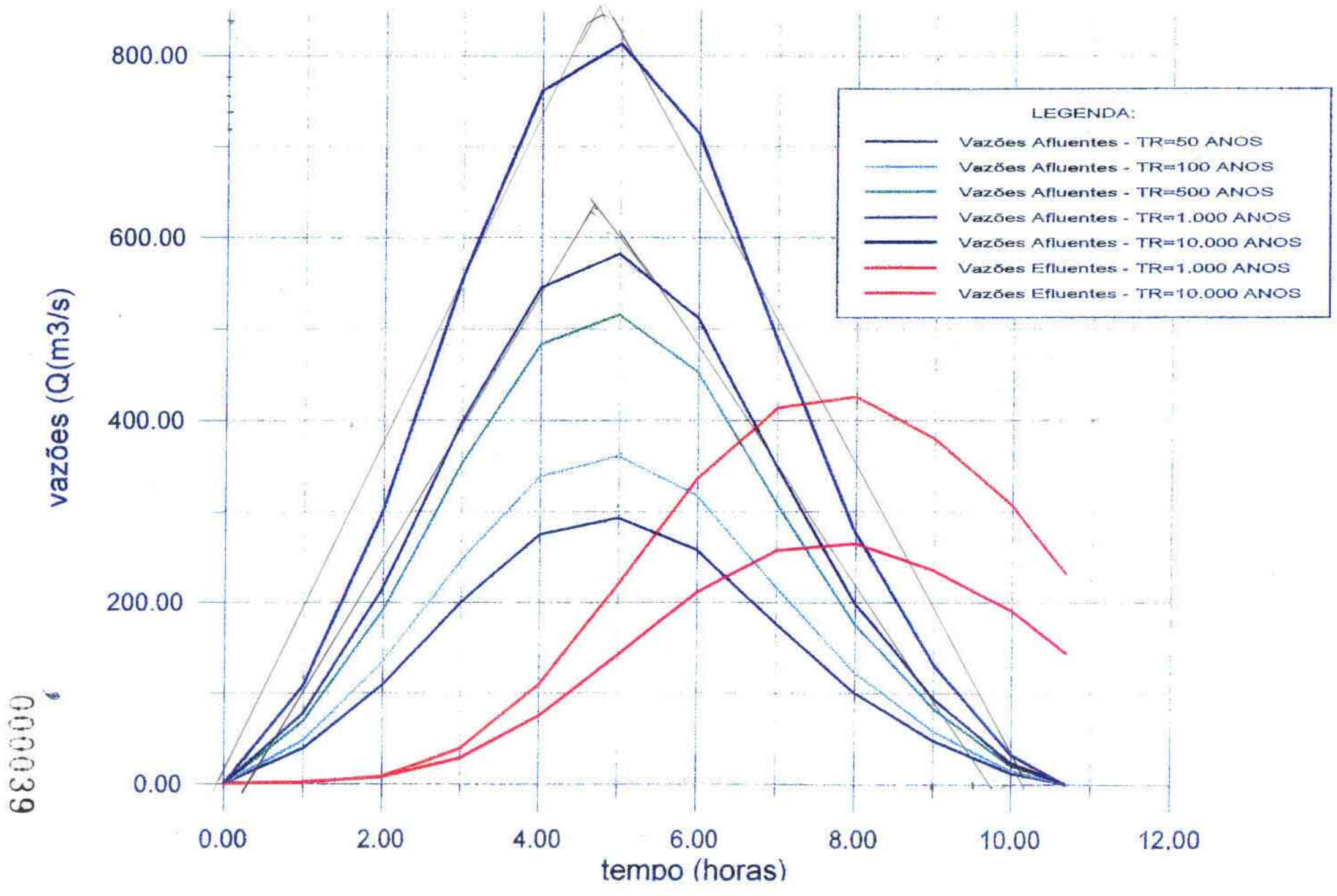
b) Determinação de Qs

$Y2(h) = Q_a + Y1(h)$ (eq 5)

$Q_s + 142{,}35\ (h_{i+1}^{3/2} - h_i^{3/2})$ (eq 6)

$Q_{si+1} = 2Q_s - Q_{si}$ (eq 7)

FIGURA 11 - HIDROGRAMAS TOTAIS AFLUENTES PARA AS CHUVAS DE PERÍODOS DE RETORNO DE 50, 100, 500, 1.000 e 10.000 ANOS E EFLUENTES PARA CHUVAS DE PERÍODO DE RETORNO DE 1.000 e 10.000 ANOS



Roteiro de Cálcu'o:

1 Conhecido h pela ***Figura 10***, determina-se Y1 (h)
2 Com Y1 (h), pela equação (5), determina-se Y2 (h)
3 Com Y2 (h), pela ***Figura 10***, determina-se h_{i+1}
4 Com h_{i+1}, pela equação (6), determina-se Qs
5 Com Qs, plea equação (7), determina-se Q_{si+1}
6 Repete-se novamente as operações de 1 a 5. fazendo-se $h_i = h_{i+1}$

c) Substituindo-se os valores numéricos, construiu-se as ***Tabelas 13 e 14***

D) Com os dados das ***Tabelas 14 e 15***, plotou-se as hidrógrafas de vazões efluentes

Os valores encontrados nos conduzem aos resultados mostrados na ***Tabela 16***

3.5 - Dimensionamento Hidrológico do Reservatório

3.5.1 - Metodologia

O dimensionamento hidrológico do açude Souza foi determinado, numa primeira alternativa, com base no método de Campos, 1987
O referido método apresenta um modelo gráfico aplicado a reservatórios de águas superficiais situadas em regiões com rios intermitentes sujeitos a altas taxas de evaporação Tem como suporte teórico a Teoria Estocástica dos Reservatórios ou Teoria do Armazenamento de Moran. Segundo o autor, este método apresenta com novidade na Teoria, a introdução de uma matriz de evaporação por levar em conta as perdas devido a esse fenômeno
O modelo gráfico contempla as seguintes variáveis capacidade do reservatório, volume anual regularizado e probabilidade de esvaziamento da reserva As variáveis de entrada do modelo são. volume afluente médio anual, coeficiente de variação dos deflúvios anuais lâmina de evaporação e um fator que representa a forma da bacia hidráulica

TABELA 13 : VALORES DE Y1(h) E Y2(h)			
h (m)	v (10^3 x m^3)	Y1	Y2
0,00	28.092	7.803,33	7.803,33
0,25	29.375	8.141,93	8.177,52
0,50	30.833	8.514,39	8.615,05
0,75	32.250	8.865,87	9.050,79
1,00	33.668	9.209,87	9.494,57
1,25	35.000	9.523,28	9.921,16
1,50	36.417	9.854,32	10.377,35

TABELA 14
VALORES DA HIDRÓGRAFA DA VAZÃO EFLUENTE PARA PERÍODO DE RETORNO DE 1.000 ANOS E LARGURA DO SANGRADOURO DE 130,00 M

t (h)	hi (m)	Y1 (h)	Qa (m3/seg)	Y2 (h)	h_{i+1}	Qs (m3/seg)	Qsi (m3/seg)	Qsi + 1
0 - 1	0	7.803,33	38,67	7.842,00	0,05	1,59	0	3,18
1 - 2	0,05	7.838,33	146,34	7.984,67	0,12	7,51	3,18	11,84
2 - 3	0,12	7.950,00	306,15	8.256,15	0,29	28,15	11,84	44,46
3 - 4	0,29	8.199,86	471,00	8.670,86	0,51	74,08	44,46	103,70
4 - 5	0,51	8.500,67	563,55	9.064,22	0,73	141,48	103,70	179,26
5 - 6	0,73	8.801,48	546,73	9.348,21	0,90	210,35	179,26	241,44
6 - 7	0,90	9.033,93	430,63	9.464,56	0,97	257,09	241,44	272,74
7 - 8	0,97	9.129,64	274,17	9.403,81	0,93	264,18	272,74	255,67
8 - 9	0,93	9.074,95	146,34	9.221,29	0,83	234,56	255,67	213,45
9 - 10	0,83	8.938,21	58,88	8.997,09	0,70	190,21	213,45	166,97
10 - 10,68	0,70	8.760,46	11,78	8.772,24	0,56	143,75	166,97	120,52

TABELA 15
VALORES DA HIDRÓGRAFA DA VAZÃO EFLUENTE PARA PERÍODO DE RETORNO DE 10.000 ANOS E LARGURA DO SANGRADOURO DE 130,00 m

t (h)	hi (m)	Y1 (h)	Qa (m3/seg)	Y2 (h)	h_{i+1}	Qs (m3/seg)	Qsi (m3/seg)	Qsi + 1
0 - 1	0	7.803,33	54,02	7.857,35	0,03	0,74	0	1,48
1 - 2	0,03	7.844,35	204,44	8.048,79	0,14	8,44	1,48	15,40
2 - 3	0,14	7.994,76	427,70	8.422,46	0,36	38,30	15,40	61,20
3 - 4	0,36	8.295,57	658,00	8.953,57	0,67	108,85	61,20	156,49
4 - 5	0,67	8.719,44	787,30	9.506,74	0,99	218,81	156,49	281,14
5 - 6	0,99	9.156,99	763,81	9.920,80	1,23	335,29	281,14	389,43
6 - 7	1,23	9.485,15	601,61	10.086,76	1,33	412,63	389,43	435,82
7 - 8	1,33	9.621,88	383,02	10.004,90	1,28	425,14	435,82	414,47
8 - 9	1,28	9.553,51	204,44	9.757,95	1,14	379,15	414,47	343,82
9 - 10	1,14	9.362,09	82,25	9.444,34	0,96	306,35	343,82	268,88
10 - 10,68	0,96	9.115,97	16,45	9.132,42	0,77	230,90	268,88	192,92

TABELA 16 : REDUÇÃO DA ONDA DE CHEIA NO ACUDE SOUZA

ONDA DE CHEIA (ANOS)	REDUÇÃO (%)
1.000	46,9
10.000	53,6

3.5.2 - Estudo das Disponibilidades

3.5.2.1 - Volume Afluente Médio Anual e Coeficiente de Variação

Da ***Tabela 17***, Série Histórica de Vazões, obteve-se o volume afluente médio anual (μ) que é de 25 410 000 m3 O coeficiente de variação (cv) dos valores de deflúvios anuais é de 1,20

A lâmina média de escoamento do rio Jurití foi calculada por correlação com a bacia representativa do reservatório de Pentecoste A correlação foi obtida através da aplicação de dois coeficientes

$C_0 = (AS/AP)^{-0.075}$ onde

AS = Área da bacia hidrográfica de Souza = 220 Km^2

AP = Área da bacia hidrográfica de Pentecoste = 3 330 Km^2

C_1 = PS/PP onde

PS = precipitação média em Souza = 643,8 mm

PP = precipitação média em Pentecoste = 498,2 mm

Então, a lâmina média escoada na bacia do açude Souza é igual a

LS = C_0 x C_1 x LP, onde:

LS = lâmina escoada em Souza em mm

LP = lâmina escoada em Pentecoste em mm

LS = (220/3 330) $^{-0.075}$ x (643,78/498,2) x 72,9 mm = 115,50mm

O volume afluente médio anual (μ) é obtido através da relação

μ = LS x AS

μ = 0,11550 x 220 000 000 = 25 410 000,00 m3

O coeficiente de variação dos deflúvios anuais (cv) foi tomado igual ao reservatório de Pentecoste, isto é, cv = 1.20

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TABELA 17 - SÉRIE HISTÓRICA DE VAZÕES AFLUENTES RESERVATÓRIO PENTECOSTE

ANOS	MESES												
	JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ	TOTAL
1912	25,3	272	445	339,3	370,7	29,3	4,9	0,3	0	0	0	0	1486,8
1913	0	259,1	521,4	86,7	117,6	9,5	4,1	0,3	0	0	0	23,1	1021,8
1914	18,9	1,8	32,9	40,3	7,4	4,2	2,7	0,1	0	0	0	0	108,3
1915	0	0	0	0	0	0	0	0	0	0	0	0	0
1916	0,1	0,3	200,7	64,7	172,2	59	6,4	0,5	0	0	0	0	503,9
1917	95	137,5	663,6	131,4	368,1	14,1	6,3	0,5	0	0	0	0	1416,5
1918	0	0,1	6,1	24	3,3	1,1	0	0	0	0	0	0	34,6
1919	21	0	0	0	0	0	0	0	0	0	0	0	21
1920	0	0	328,1	291,9	27,8	10,8	4,2	0,2	0	0	0	0	663
1921	0	110	544,5	380,6	543,3	12,2	6,5	1,3	0	0	0	0	1598,4
1922	0	0	0	146,7	40,3	5,6	2,5	0,1	0	0	0	25,6	220,8
1923	0	0	3,3	0,9	0,1	0	0	0	0	0	0	0	4,3
1924	213,2	130,3	683	892,2	224,9	36	9,9	1,5	0	0	0	0	2191
1925	0	0	90,4	77,8	75,3	6	0,8	0	0	0	0	0	250,3
1926	0	93,9	589,7	410,1	72,8	8,6	2	0	0	0	0	0	1177,1
1927	0	1,3	19,1	21,3	24,9	2,6	0,2	0	0	0	0	0	69,4
1928	0	0	0,3	0,9	3,8	0	0,2	0	0	0	0	0	5,2
1929	0	91,2	137,5	190,3	13,6	6,8	2,1	0	0	0	0	0	441,5
1930	0	0	0	15,9	2,3	0,3	0	0	0	0	0	0	18,5
1931	49,7	39,5	28,9	13,5	6,5	1,8	0	0	0	0	0	0	139,9
1932	0	79,9	3,4	1	0	0	0	0	0	0	0	0	84,3
1933	10,6	1	4,4	183,1	10,9	3,4	0,1	0	0	0	0	0	213,5
1934	0	133,5	319,2	110,1	141,7	11,5	3,7	0,1	0	0	0	0	719,8
1935	0	92,8	58,5	536,2	86,4	33,5	7,2	0,9	0	0	0	0	815,5
1936	0	0	0,1	0	0	0	0	0	0	0	0	0	0,1
1937	0	20,4	1,9	103,5	6,2	3,8	0,7	0	0	0	0	0	136,5
1938	0	0	117	371,9	14,7	10,8	3	0	0	0	0	0	517,4
1939	0	95,4	158,5	75,4	14,4	8,3	2,1	0	0	0	0	0	354,1

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ANOS	MESES												
	JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ	TOTAL
1940	0	2,6	71,7	493,6	454,4	46,8	10,2	2,7	0	0	0	0	1082
1941	0	0	117,3	60,7	25	5,9	1,2	0	0	0	0	0	210,1
1942	0	2,9	18,4	13	2,8	0,3	0	0	0	0	0	0	37,4
1943	0	10	15,1	151,8	7,1	1,8	0	0	0	0	0	0	185,8
1944	0	0	13,8	21,9	6,9	3,6	0,2	0	0	0	0	0	46,4
1945	0	164,1	164,4	495,8	244,8	14,2	10,2	1,9	0	0	0	0	1095,4
1946	0	19,8	42,1	42	3,9	0,3	0	0	0	0	0	0	108,1
1947	0	5	160,4	121,5	282,5	9,2	2,9	0	0	0	0	0	581,5
1948	0	0	121,4	59,4	70,8	9,1	4,3	0,3	0	0	0	0	265,3
1949	0	0	60	144,3	225,7	12,1	4,7	0,3	0	0	0	0	447,1
1950	0	1,3	98,6	829,8	215,1	9,7	2,4	0	0	0	0	0	1156,9
1951	0	0	0	87,3	4	26,4	1	0	0	0	0	0	118,7
1952	0	0	15,6	70	13	2,8	0,1	0	0	0	0	0	101,5
1953	0	9,3	52,2	78	20,7	4,8	0,8	0	0	0	0	0	165,8
1954	0	17,1	34,4	5	7,7	2,2	0	0	0	0	0	0	66,4
1955	0	0,2	40	103,9	53,2	9,9	2,7	0	0	0	0	0	209,9
1956	0	41,1	147	276,3	12,5	4,9	1	0	0	0	0	0	482,8
1957	0	0	166,9	516,9	13,8	6,7	1,3	0	0	0	0	0	705 6
1958	0	0	0	0	0	0	0	0	0	0	0	0	0
1959	51	1,8	197,7	16,8	11,5	6	1,5	0	0	0	0	0	286,3
1960	0	0	205,6	10,1	6,5	1,5	0	0	0	0	0	0	223,7
1961	4,3	442,4	639,8	538,2	89,5	7,7	2,2	0	0	0	0	0	1724,1
1962	0	0	196,7	224,8	11,4	4,6	0,4	0	0	0	0	0	437,9
1963	9,8	1,4	219,2	263,8	11,5	3,5	0,1	0	0	0	0	0	509,3
1964	8,8	95,6	170,3	815,9	98,3	11	4,5	0,3	0	0	0	0	1204,7
1965	0	0	95,7	309,7	61,8	8,9	3,8	0,1	0	0	0	0	480
1966	0	0	0	0	0,3	0	0	0	0	0	0	0	0,3
1967	0	68,1	145	476,2	153,3	8,7	2,4	0	0	0	0	0	853,7
1968	1,8	0	131,3	105,4	254	12,1	3,2	0	0	0	0	0	507,8
1969	0	4,7	7,9	100,5	11,1	5,7	9,6	0	0	0	0	0	139,5
1970	8,2	0	13,7	27	3,2	0	0	0	0	0	0	0	52,1
1971	0	0	80,6	53,8	16,9	9,7	5	0,6	0	0	0	0	166,6

CONTINUAÇÃO

ANOS	MESES												
	JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ	TOTAL
1972	0	0	0,1	0,1	0,6	0	0	0	0	0	0	0	0,8
1973	1,6	6,5	24,6	126,5	114,7	101,5	10,5	20,8	0	0	0	0	406,7
1974	0	113,2	477,1	678,1	529,1	289	21,7	8,3	0	0	0	0	2116,5
1975	8,9	7,1	57,3	38,6	40	0	0	0	0	0	0	0	151,9
1976	2,9	5,4	17,2	24,3	4,5	0	0	0	0	0	0	0	54,3
1977	7	19,7	49,7	26,3	58,7	16,1	8,2	0	0	0	0	0	185,7
1978	0	2,8	56,1	74,1	31,5	3,5	5,6	3,3	0	0	0	0	176,9
1979	0	0	4,4	0	7,3	0	0	0	0	0	0	0	11,7
1980	0	7,9	117,7	1,3	0	0	0	0	0	0	0	0	126,9
1981	0	0	166	57,2	2	0	0	0	0	0	0	0	225,2
1982	1,1	2,7	9,4	12,9	3,4	0	0	0	0	0	0	0	29,5
1983	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	2,2	18,3	103,4	36,3	0	0	0	0	0	0	0	160,2
1985	7,6	180	595,4	631,5	154,2	29,2	17	8,5	8,4	3,1	1,5	9,8	1646,2
1986	3,3	73,4	316	384,1	128	28,5	11,8	7,1	0	0	0	0	952,2
1987	2,3	6,4	102,9	26,6	4,4	18	7,4	3	0	0	0	0	171
1988	8,5	5,2	29,7	299	226	10,1	8,8	1	0	0	0	0	588,3
1989	3,3	2,4	23	401,1	241	13,1	62,8	2,6	0	0	0	0	799
1990	0	0	1,3	0	11	0	0	0	0	0	0	0	12,3
TOTAL	564,2	2882,3	10466,5	13908,2	6335,1	1038,3	299,1	66,6	8,4	3,1	1,5	108,2	35681,5
MÉDIA	6,6	33,9	121,7	163,6	75,4	12,2	3,6	0,8	0,1	0,0	0,0	1,3	424,8

3.5.2.2 - Lâmina de Evaporação (Ev)

Os dados de evaporação média foram extraídos da publicação de Hargreaves, para a região de Canindé, e seus dados encontram-se na ***Tabela 18*** A lâmina média anual evaporada é de 2 498 mm

3.5.2.3. - Fator de Forma da Bacia (α)

O fator de forma da bacia foi obtido através de correlação entre o volume (v) e a altura d'água (h), da curva COTA X VOLUME, pela equação $v = \alpha h^3$ O valor de α encontrado foi de 8 283

3.5.2.4 - Fator Admensional de Evaporação (FE)

$FE = [3 \times (\alpha)^{1/3} \times Ev] / (\mu)^{1/3}$, onde ,

- Ev = lâmina evaporada durante a estação seca (JUN/JAN) - Ev = 1,792 m
- μ = volume afluente médio anual = 25 410 000 m3

Portanto FE = 0.40

3.5.2.5 - Relação Volume Regularizado X Capacidade de Reserva:

Utilizando-se os parâmetros FE = 0,40, Cv = 1.20 e $\mu = 25.41 \times 10^6 m^3$ e aplicando a metodologia adotada, calculou-se a relação entre o volume, com garantias de 80, 85, 90 e 95%, e a capacidade do reservatório Os valores estão apresentados na ***Tabela 19***

TABELA 20 : VALORES DA EVAPORAÇÃO PARA A REGIÃO DE CANINDÉ

EVAPORAÇÃO MÉDIA mm												
JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ	TOTAL
241	199	186	161	160	165	193	218	234	251	244	246	2.498

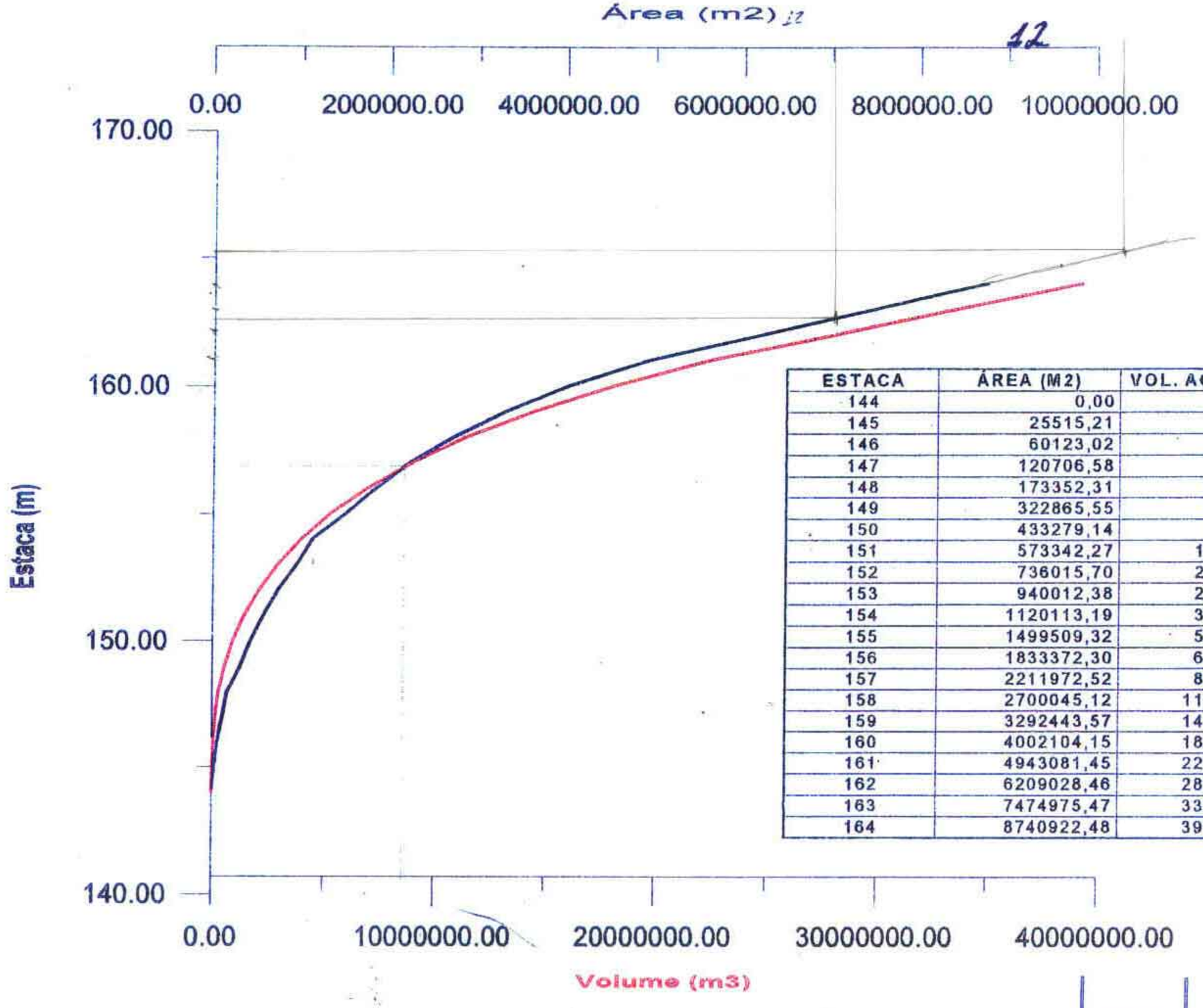
TABELA 21

VALORES DOS VOLUMES ANUAIS REGULARIZADOS COM GARANTIAS DE 80, 85, 90 E 95%, PARA O AÇUDE SOUZA

GARANTIAS (%)	CAPACIDADE DO AÇUDE (hm3)	VOLUME REGULARIZADSO ANUAL (hm3/ANO)
80%	25,41	5,971
	28,00	6,302
	38,12	7,623
85%	25,41	5,209
	28,00	5,463
	38,12	6,480
90%	25,41	3,939
	28,00	4,243
	38,12	5,463
95%	25,41	2,541
	28,00	2,846
	38,12	4,116

OBS A capacidade de acumulação do açude Souza é de aproximadamente 30 000 000 m^3. considerando a cota da soleira do sangradouro com 162,50 Portanto obtemos vazões regularizadas anuais de 6,566 hm^3/ano, 5,666 hm^3/ano, 4,487 hm^3/ano e 3.100 hm^3/ano, com garantias de 80. 85, 90, e 95% respectivamente (***Tabela - 21***)

CURVA COTA x ÁREA x VOLUME



ESTACA	ÁREA (M2)	VOL. ACUM. (M3)
144	0,00	0,00
145	25515,21	12757,61
146	60123,02	55576,73
147	120706,58	145991,53
148	173352,31	293020,98
149	322865,55	541129,91
150	433279,14	919202,26
151	573342,27	1422512,97
152	736015,70	2077191,96
153	940012,38	2915206,00
154	1120113,19	3945268,79
155	1499509,32	5255080,05
156	1833372,30	6921520,86
157	2211972,52	8944193,27
158	2700045,12	11400202,09
159	3292443,57	14396446,44
160	4002104,15	18043720,30
161	4943081,45	22516313,10
162	6209028,46	28092368,06
163	7474975,47	33668423,02
164	8740922,48	39244477,98

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3.6 - Estudo de Simulação do Reservatório

Visando o aprimoramento dos estudos efetuados no dimensionamento do reservatório (Açude Souza), resolvemos efetuar a simulação do balanço hídrico a partir das informações disponíveis, a seguir especificadas

- Série de vazões afluentes obtida mediante a utilização de modelo matemático MODHAC, de tipo chuva - deflúvio, com escala temporal mensal e dados de precipitação obtidos mediante técnicas Thissen - Monte Carlo.
- Dados médios mensais de evaporação e precipitação na vizinhança da bacia hidráulica ou em local hidrometeorologicamente semelhante
- Curva Cota - Área - Volume, decorrente dos estudos topográficos da bacia hidráulica (***Figura 12***)

A seguir são descritas as metodologias específicas utilizadas nas principais etapas

3.6.1 - Obtenção da Série Fluviométrica de Vazões Mensais

O modelo de transformação chuva - deflúvio utilizado foi o denominado MODHAC, este modelo foi desenvolvido no Instituto de Pesquisa Hidráulicas por Antônio E Lanna e M Schwarzbach ("MODHAC - Modelo Hidrológico Auto-Calibrável", IPH, UFRGS, Porto Alegre, 1988)

Este modelo simula o processo de transformação chuva-deflúvio de forma continua, utilizando dados de precipitação diária e dando como resultado deflúvio mensais

O processo de separação do escoamento é realizado no modelo mediante uma analogia hidráulica composta de três reservatórios lineares, correspondente aos armazenamentos de água superficial, sub-superficial e subterrâneo O modelo utiliza 9 parâmetros relacionados com as capacidades máximas dos referidos reservatórios e as taxas de esvaziamento dos mesmos

- Série de evapotranspirações potenciais diárias.

A deficiente disponibilidade de dados hidrometeorológicos no Estado do Ceará não permite a utilização de séries históricas de evapotranspirações potenciais necessárias para a simulação do ciclo hidrológico

Não obstante, a baixa variabilidade da evapotranspiração permite substituir as séries históricas por sequências diárias desta variável obtidas com base nas médias mensais de longo período calculada mediante o método de Hargreaves

A estação utilizada foi Canindé, com características hidroclimáticas semelhantes à bacia em estudo Os valores mensais da evaporação estão apresentados na ***Tabela 20***

3.6.2 - Calibração do Modelo.

A simulação do ciclo hidrológico mediante modelos matemáticos do tipo do MODHAC exige a adoção de um conjunto de parâmetros que refletem, basicamente, as características da bacia hidrográfica, sua capacidade de armazenamento d'água, tanto a nível superficial, a nível de umidade na parcela superior do solo como também a nível de armazenamento subterrâneo profundo

Dado o caráter do modelo utilizado, estes parâmetros refletem também a "velocidade" ou fração d'água armazenada que é liberada em cada um dos armazenamentos na unidade de tempo da simulação

O procedimento habitual para a seleção destes parâmetros consiste na calibração/validação deste conjunto de parâmetros mediante o confronto dos resultados obtidos na simulação (séries de vazões calculadas pelo modelo) e dados observados da realidade (série histórica de vazões observadas)

Este confronto é inexequível no caso do local do barramento em estudo por carecer de dados fluviométricos no mesmo e, incluso em bacias vizinhas semelhantes à estudada

Assim a alternativa escolhida para a seleção dos parâmetros foi utilizar o conjunto de parâmetros selecionados pelo PERH para simular bacias hidrográficas vizinhas

O açude São Mateus, com bacia hidrográfica semelhante localizada também na alta bacia do Curu (vizinho à cidade de Canindé) foi objeto de simulação hidrológica nos estudos de base do PERH com um conjunto de parâmetros obtidos a partir de calibrações do modelo MODHAC para o posto fluviométrico denominado São Luís do Curu, localizado na mesma bacia hidrográfica mas com área da bacia hidrográfica com ordem de grandeza superior à estudada

Este critério foi mantido na ausência de melhores subsídios para obtenção do conjunto de parâmetros do modelo A ***Tabela 22***, apresenta os nomes, uma breve descrição e os valores dos parâmetros utilizados na simulação

TABELA - 22

Parâmetro	Descrição	Valor adotado
RSPX	Capacidade máxima do reservatório superficial	85 30
RSSX	Capacidade máxima do reservatório subsuperficial	182 50
RSBX	Capacidade máxima do reservatório subterrâneo	0 00
IMIN	Infiltração mínima	4 26
IMAX	Permeabilidade do solo	16 14
IDEC	Coeficiente de infiltração	0 5404
ASB	Exponente da lei de esvaziamento do reservatório subterrâneo	0 0
CEVA	Parâmetro da lei que controla a evapotranspiração real do solo	0 3101
ASP	Exponente da lei de esvaziamento do reservatório superficial	0 0001
ASS	Exponente da lei de esvaziamento do reservatório subsuperficial	0 6276

3.6.3 - As Séries Geradas.

O conjunto de parâmetros obtidos mediante calibração representa as caraterísticas hidrológicas da região em estudo O único aspecto a ressaltar é com referência à escala da bacia em estudo e a bacia onde foram obtidos os parâmetros do modelo

Em termos gerais duas bacias morfológica e pedológicamente comparáveis apresentam variação exclusivamente nos parâmetros que reflitam o traslado das vazões nos cursos de água

Se o intervalo da simulação supera amplamente os tempos de concentração de ambas bacias este aspecto resulta irrelevante Assim os parâmetros obtidos para a bacia do posto fluviométrico de São Luís do Curu podem ser utilizados na geração de séries temporais de vazões para a bacia da Barragem de Souza sempre que se mantenham os intervalos de simulação mensais

A série temporal gerada foi de uma extensão de 76 anos (1913/1988) período para o qual se dispunha de dados pluviométricos na região A ***Tabela 23*** e a ***Figura 13*** apresentam os resultados obtidos mediante a simulação

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Tabela 23 Vazão média mensal da bacia do reservatório de Souza (m3/s)

ANO	JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ	Q. ANUAL	<Med	NP
912	9,3	5,01	8,32	0,13	0,01	0	0	0	0	0	0	0	1,892		
913	4,25	4,9	13,74	0,55	0,01	0	0	0	0	0	2,43	6,41	2,866		
914	0,03	0	0	0	0	0	0	0	0	0	0	0	0,003	b	
915	0	0	0	0	0	0	0	0	0	0	2,96	0	0,245	b	
916	0	4,31	0,08	2,79	0	0	0	0	0	0	0	0	0,567	b	3
917	5,2	10,7	3,32	5,35	0,01	0	0	0	0	0	0	0	1,985		
918	0	0	0,01	0,01	0	0	0	0	0	0	0	0	0,002	b	
919	0	0	0	0	0	0	0	0	0	0	0	0	0,000	b	2
920	0	5,69	6,78	0,01	0	0	0	0	0	0	0	0	1,175		
921	0,01	0,01	0,01	0,99	0,01	0	0	0	0	0	0	0	0,085	b	1
922	0	0	14,95	0,04	0	0	0	0	0	0	0	0	1,273		
923	0	0,01	3,21	0	0	0	0	0	0	0	0	0,62	0,326	b	1
924	14,32	0,56	18,27	10,47	0,03	0	0	0	0	0	0	5,9	4,175		
925	0,13	0	0,01	0,01	0	0	0	0	0	0	0	0	0,013	b	1
926	4,3	16,15	13,31	0,05	0	0	0	0	0	0	0	0	2,892		
927	0	0,01	0,01	0	0	0	0	0	0	0	0	0	0,002	b	
928	0	8,67	2,27	0,01	0	0	0	0	0	0	0	0	0,874	b	2
929	5,96	6,77	5,85	0,01	0	0	0	0	0	0	0	0	1,677		
930	0	2,78	7,93	0,01	0	0	0	0	0	0	0	0	0,888	b	
931	0	0,01	0,01	0	0	0	0	0	0	0	0	0	0,002	b	
932	0	0	0	0	0	0	0	0	0	0	0	0	0,000	b	
933	2,2	0,01	2,12	0,34	0	0	0	0	0	0	0	0	0,396	b	
934	0,21	6,39	1,13	0,01	0	0	0	0	0	0	0	0	0,605	b	5
935	9,33	0,23	10,34	1,26	0	0	0	0	0	0	0	0	1,792		
936	7,68	0,22	0	0	0	0	0	0	0	0	0	0	0,669	b	
937	0	0	5,06	0,01	0	0	0	0	0	0	0	0	0,431	b	
938	0	6,13	4,91	0,01	0	0	0	0	0	0	0	0	0,888	b	
939	0	0,01	0,1	0,01	0	0	0	0	0	0	0	0	0,010	b	4
940	0,01	9,46	3,9	0,35	1,63	0	0	0	0	0	0	0	1,225		
941	2,67	4,62	0	0	0	0	0	0	0	0	0	0	0,597	b	
942	0	0	0	0	0	0	0	0	0	0	0	0	0,000	b	
943	0	0	0	0	0	0	0	0	0	0	0	0	0,000	b	
944	0	0	0	0	0	0	0	0	0	0	0	0	0,000	b	
945	0,01	0,01	0,21	6,71	0	0	0	0	0	0	0	0	0,571	b	
946	0	0	0	0	0	0	0	0	0	0	0	0	0,000	b	6
947	0	12,26	5,77	0,01	0	0	0	0	0	0	0	0	1,431		
948	0	5,6	3,99	2,04	0	0	0	0	0	0	0	0	0,936		
949	0	0	4,31	0,01	0	0	0	0	0	0	0	0	0,367	b	1
950	0	3,86	12,43	0,03	0	0	0	0	0	0	0	0	1,356		
951	0	0	0,01	0	0	0	0	0	0	0	0	0	0,001	b	
952	0	0	0,01	0	0	0	0	0	0	0	0	0	0,001	b	
953	0	0	0	0	0	0	0	0	0	0	0	0	0,000	b	
954	0	0	0,01	0	0	0	0	0	0	0	0	0	0,001	b	
955	0,59	0	0,01	0,01	0	0	0	0	0	0	0	0	0,052	b	
956	0	0	1,7	0,01	0	0	0	0	0	0	0	0	0,145	b	6
957	0	14,09	21,66	0,86	0	0	0	0	0	0	0	0,31	3,018		
958	2,29	0	0	0	0	0	0	0	0	0	0	0	0,194	b	
959	0	0	0	0	0	0	0	0	0	0	0	0	0,000	b	2
960	0	31,07	0,75	0,01	0	0	0	0	0	0	0	3,45	2,744		
961	0,01	4,4	1,75	0,01	0	0	0	0	0	0	0	0	0,488	b	
962	0,01	0	0,01	0,01	0	0	0	0	0	0	0	0	0,003	b	2
963	0,6	11,43	10,33	0,01	0	0	0	0	0	0	0	0	1,806		
964	4,12	12,06	10,49	3,68	0,02	0	0	0	0	0	0	0	2,472		
965	0	0	4,81	0,01	0,01	0	0	0	0	0	0	0	0,410	b	
966	0	0	2,69	0,01	0	0	0	0	0	0	0	0	0,229	b	2
967	0	0	13,12	0,54	0	0	0	0	0	0	0	0	1,159		
968	0	15,3	1,56	5,06	0,01	0	0	0	0	0	0	0	1,723		
969	0	1,59	1,72	0	0	0	0	0	0	0	0	0	0,268	b	
970	0	0	0	0	0	0	0	0	0	0	0	0	0,000	b	
971	0	0	3,23	0,74	0	0	0	0	0	0	0	0	0,335	b	
972	0	0	0	0	0	0	0	0	0	0	0,52	0,01	0,044	b	4
973	0	0,01	22,56	0,01	0	0	0	0	0	0	0	5,02	2,346		
974	0,15	0,01	44,16	9,08	0,01	0	0	0	0	0	0	0	4,513		
975	0	0,01	0,01	0	0	0	0	0	0	0	0	0,26	0,025	b	1
976	28,39	17,42	0	0	0	0	0	0	0	0	0	0	3,748		
977	0	0,01	9,07	0,24	0	0	0	0	0	0	0	0	0,791	b	1
978	0	0,65	16,15	1,1	0	0	0	0	0	0	0	0	1,512		
979	0	0	0	0,01	0	0	0	0	0	0	0	0,53	0,046	b	
980	1,57	0	0	0	0	0	0	0	0	0	0	0	0,159	b	
981	0	1,57	4,23	0,03	0	0	0	0	0	0	0	0	0,482	b	
982	0	0,8	0,75	0	0	0	0	0	0	0	0	0	0,125	b	4
983	0,01	0	11,79	0	0	0	0	0	0	0	0	0	1,002		
984	0	28,71	30,37	0,37	0,01	0	0	0	0	0	0	1,02	4,900		
985	17,76	0,01	15,4	1,54	0	0	0	0	0	0	0	0	2,945		
986	0,01	3,27	8,01	0,01	0	0	0	0	0	0	0	0	0,933		
987	0	4,8	0,47	0	0	0	0	0	0	0	0	0	0,408	b	1
988	0	7,44	5,46	0,03	0	0	0	0	0	0	0	0	1,039		
MEDIA	1,476	3,531	5,110	0,717	0,023	0,000	0,000	0,000	0,000	0,000	0,078	0,337	0,926	soma	49
MAXIMA	28,390	31,070	44,160	10,470	1,630	0,000	0,000	0,000	0,000	0,000	2,980	8,410	4,900	média	2,579
MINIMA	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	desvio	1,742
DESVIO	4,390	6,365	7,888	1,954	0,187	0,000	0,000	0,000	0,000	0,000	0,441	1,347	1,171		
CV	2,98	1,80	1,54	2,72	8,11							4,00	1,26		

COEFIC. DE ESCOAMENTO	0,2045
DEFLUVIO MEDIO (hm3/ano)	29,69261
DEFLUVIO MAXIMO (hm3/ano)	157,0913
DEFLUVIO MINIMO (hm3/ano)	0,00

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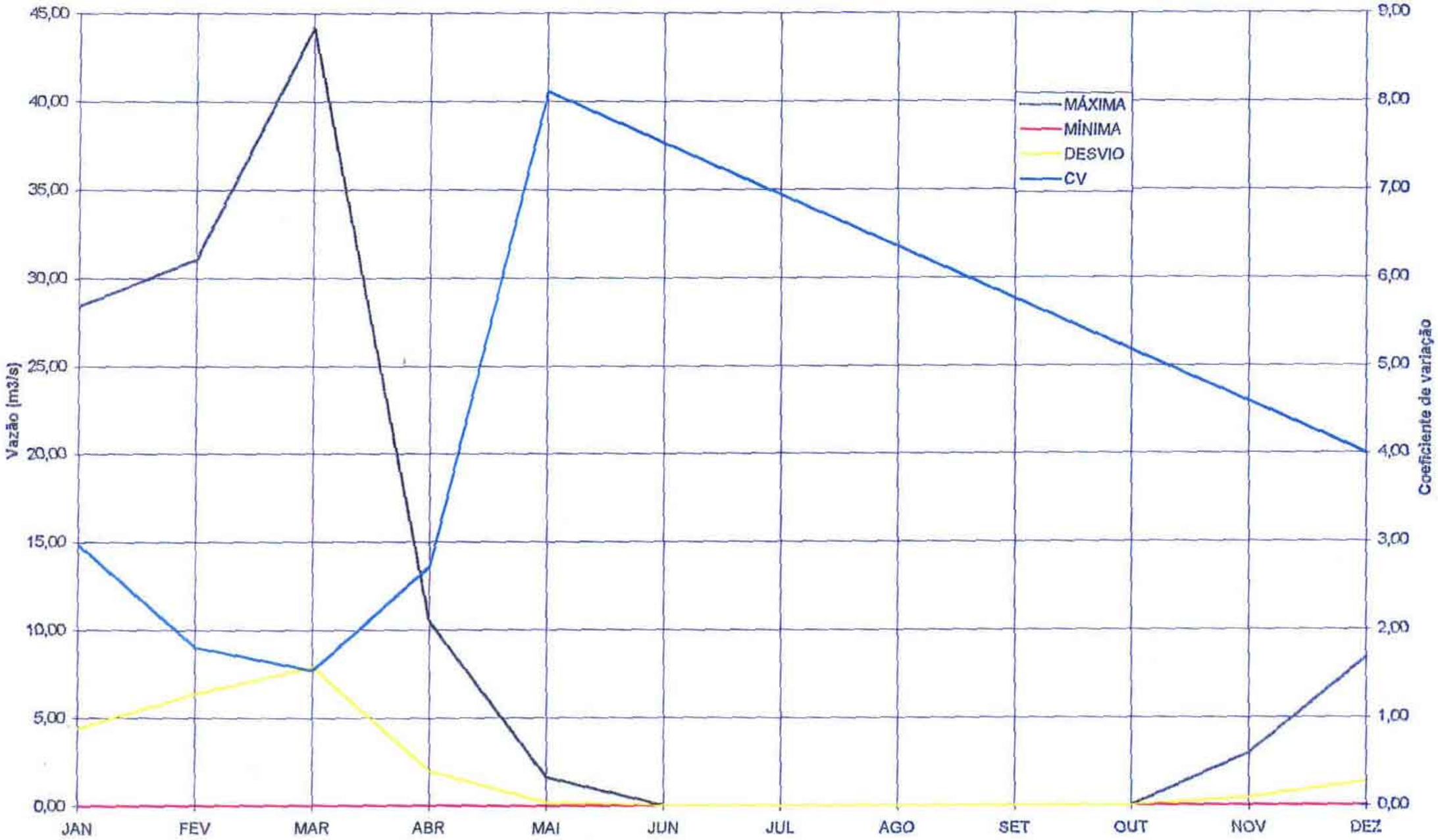
Figura 13 - Parâmetro da série de vazões médias mensais



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3.7 - Determinação da Capacidade do Reservatório e da Vazão Regularizada.

O dimensionamento hidrológico de reservatórios superficiais visa obter uma primeira aproximação da capacidade do reservatório e. associada à mesma uma dada vazão regularizada

O tamanho do reservatório indica, de forma indireta os custos associados com a estocagem de água, pois define a altura e outras dimensões da barragem a ser construída. o valor da vazão regularizada correspondente representa o benefício obtido com esta ação

Os valores obtidos neste estudo serão a base para a análise econômica do empreendimento

3.7.1 - Operação do Reservatório.

A análise preliminar da topografia e morfologia detalhada do boqueirão de Sousa qualificaram esta barragem como ponto apropriado para realizar estudos mais detalhados

A oferta d'água de um reservatório corresponde a vazão por ele regularizada associada a uma determinada garantia

Para sua avaliação o procedimento consiste na simulação da operação do reservatório utilizando a série histórica de vazões afluentes e/ou séries estocasticamente geradas por modelos apropriados

A simulação baseia-se na equação do balanço hídrico num reservatório, dada por

$$V_{t+1} = V_t + Q_{a_t} - E_t\left(\frac{A_t + A_{t-1}}{2}\right) - Q_{ab_t}$$

Sempre que o reservatório apresenta um volume inferior à retirada desejada, apenas uma parte desta é satisfeita, sendo esse evento denominado falha

A vazão regularizada está portanto associada a um determinado nível de garantia avaliado em função do número de falhas (f) e do número de períodos simulados (n) como sendo

$$g = \left(1 - \frac{f}{n}\right)100$$

O nível de garantia adotado usualmente em estudos hidrológicos no Brasil é de 90% Os reservatórios da região semi-árida do nordeste do Brasil apresentam uma estrutura temporal de ocorrência de falhas caracterizada por uma alta concentração daquelas nos períodos secos, ou seja quando ocorre uma falha esta geralmente nunca ocorre isoladamente Para o caso da barragem de Sousa a série de vazões afluentes de 76 anos apresenta 49 anos com deflúvios inferiores à média e estes valores se distribuem segundo períodos que tem por média 2.6 anos de duração (ver ***Tabela 23***)

As falhas que estes reservatórios apresentam podem estender-se ao longo de vários meses, ou anos, o que coloca em xeque o conceito de vazão regularizada com 90% de garantia

Nestes casos é bastante arriscado contar com uma vazão com garantia de 90%, dado que durante os restantes 10% todas as atividades sócio-econômicas da região abastecidas pelos reservatórios podem entrar em colapso Justifica-se portanto a introdução de um outro conceito que, traduzido em regra de operação, venha a minorar tais riscos (PERH-CE. 1991)

Trata-se do conceito de volume de alerta de um reservatório, este corresponde ao volume a partir do qual apenas um percentual da vazão regularizada pode ser retirada A introdução deste conceito na regra de operação resulta em

$$Q_{ab_i} = \begin{cases} Q_r \Leftrightarrow V_{i+1} \geq V_a \\ \%Q_r \Leftrightarrow V_a \geq V_i \geq V_{min} \\ 0 \Leftrightarrow \left[V_i + Q_{a_i} - E_i \left(\frac{A_i + A_{i-1}}{2} \right) \right] \leq V_{min} \\ Q_r < \%Q_r \Leftrightarrow V_{i-1} \geq V_{min} \end{cases}$$

$$V_{i+1} \leq V_{max} \rightarrow i = 1,2, \quad ,n$$

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onde Vi+1, Vi, Ai+1. Ai são. respectivamente, os volumes e as áreas do espelho d'água do reservatório para os instantes de tempo i e i+1 da simulação, Qabi é a vazão retirada. Ei é a parcela de evaporação, Qa é a vazão afluente ao reservatório. todas respectivamente no intervalo de tempo i da simulação, Vmin e Vmax, respectivamente o volume mínimo operacional e a capacidade máxima do

reservatório. Qv, a vazão de falhas e n o número de intervalos de tempo simulados

Esta foi a metodologia adotada para a obtenção da vazão regularizada Os critérios de volume de alerta estão associados ao suprimento de uma vazão 50% inferior à vazão regularizada

Procedeu-se ao cálculo da curva de vazões regularizadas utilizando como base a série temporal de vazões afluentes geradas mediante o modelo MODHAC e um modelo de balanço de massa de reservatórios

Foram pesquisados capacidades diferentes do reservatório utilizando-se o NEC 1 a ***Tabela 24***, apresenta os resultados obtidos

Tabela 24

Vazões regularizadas para diferentes capacidades do reservatório de Sousa.

VOLUME (m^3)	COTA M	Q 90(SEM VA/(m^3/s)	Q90(COMVA/M^3S)
18 043 720	160,00	0,207	0,126
20 280 020	160,50	0,229	0,148
22 516 310	161,00	0,241	0,156
25 304 340	161,50	0,270	0,175
28 092 370	162,00	0,284	0,196
30 880 400	162,50	0,303	0,206
33 668 420	163,00	0,334	0,231
36 456 450	163,50	0,352	0,252
39 244 480	164,00	0,361	0,261

3.7.2 - Simulação Hidrológica - Hidráulica do Evento Extremo.

3.7.2.1 - Simulação Hidrológica - Hidráulica do Evento Extremo - Metodologia.

Os modelos de transformação chuva - deflúvio para a simulação de eventos extremos diferem sensivelmente dos modelos utilizados para geração de séries temporais de vazões

Em primeiro lugar o intervalo de tempo da simulação deve ser o suficientemente pequeno como para permitir refletir o pico da cheia gerada pelo evento extremo

Por outro lado o processo de infiltração de água no solo é simulado mediante

métodos que se limitam a separar a parcela infiltrada da água disponível para escoamento direto

O modelo matemático utilizado para este estudo foi o HEC - 1. as metodologias utilizadas foram as seguintes

- Composição de um hietograma de chuvas intensas

O critério seguido para a composição deste hietograma foi o seguinte

O menor intervalo de tempo com estimativa de chuvas intensas compõe a parte central do hietograma, os valores de intensidade são calculados de forma tal que seja possível encontrar para cada intervalo de tempo uma intensidade de chuva igual à calculada como máxima para aquela duração e para uma dado período de retorno, este procedimento encontra-se incorporado ao modelo HEC-1

- Separação do Escoamento mediante o método TR-55 do SCS, conhecido também como Método do Número de Curva de perdas ou "Curve Number"

Com base no zoneamento de solos realizado durante PERH procedeu-se a identificação dos valores de CN correspondentes O valor de CN estimado para toda a bacia foi de 74, este valor corresponde a áreas com predominância de solos rasos e pouco permeáveis (tipo D) com precipitações antecedentes que ainda não atingiram a saturação Optou-se por este valor, mesmo considerado levemente baixo, porque durante o evento extremo a ser simulado seria superado amplamente o intervalo de chuva correspondente ao "tempo de concentração da bacia". saturando completamente o solo às primeiras 6hs do evento

Os valores iniciais de CN foi de 77. tendo-se optado agora por valores mais conservadores e que não afetem os resultados finais

- Simulação do escoamento na bacia e nos canais principais mediante onda cinemática

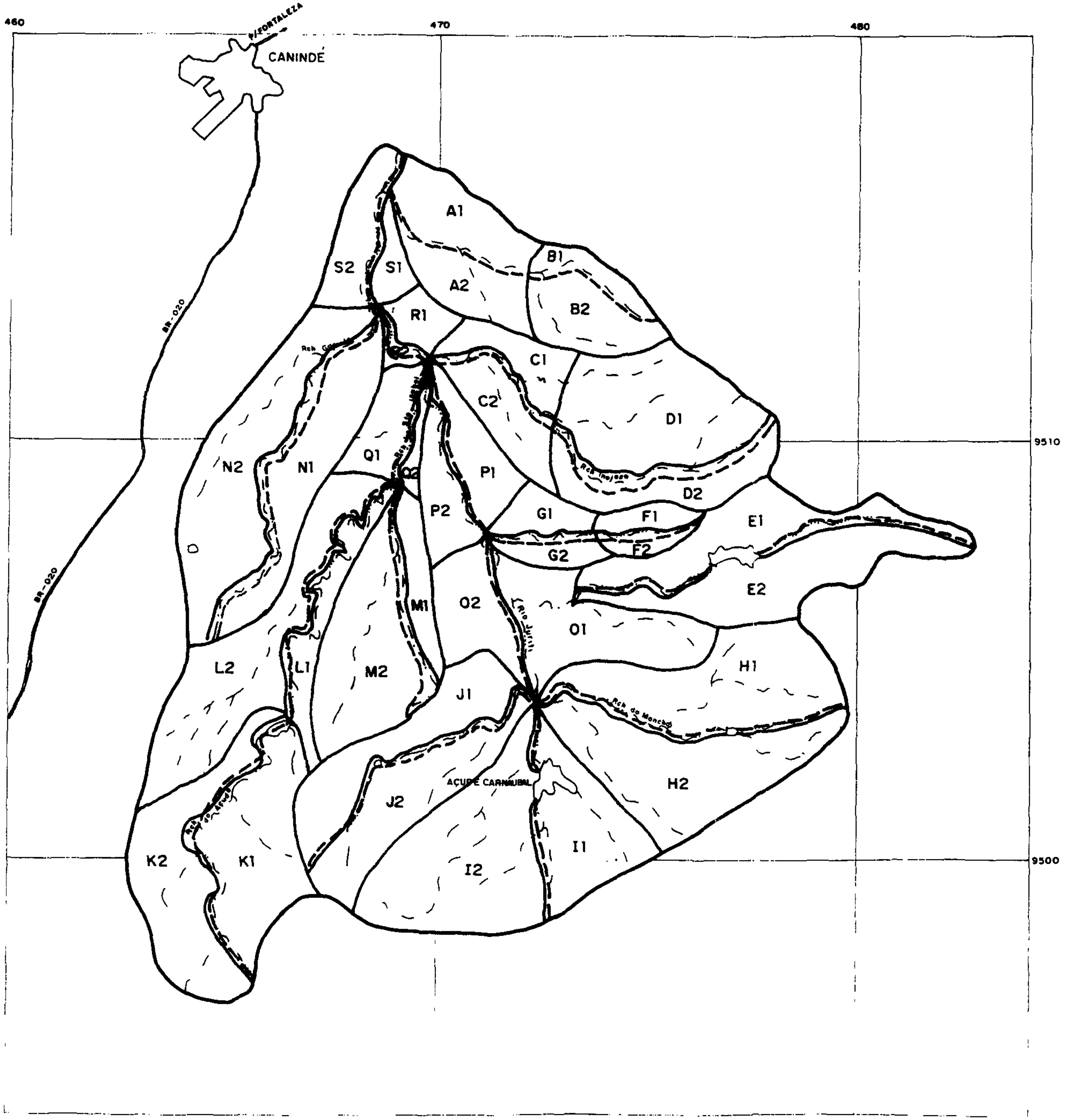
A bacia hidrográfica em estudo foi subdividida em 19 sub-bacias, a ***Figura 07*** apresenta a discretização em sub-bacias e planos de escoamento utilizada na simulação da bacia hidrográfica boqueirão de Souza
Os valores de declividade das áreas de escoamento não hierarquizado (denominadas "overlands") e dos canais naturais foram estimados mediante análise da cartografia disponível (cartas em escala 1 100 000). Os valores de rugosidade para canais naturais e para "overlands" foi estimado a partir de análise "in loco" e valores de tabelas obtidos em vários locais e estudos anteriores Estes parâmetros são apresentados na ***Tabela 21***

- Composição dos hidrogramas das sub-bacias

A composição dos Hidrogramas das sub-bacias foi obtido mediante o método da onda cinemática que consiste basicamente na solução do sistema de equações diferenciais composto pela equação de continuidade, tanto nas seções de stream como numa seção de overland, e a equação de Manning como relação funcional entre o tirante hidráulico e a vazão

- Simulação da passagem da cheia pelo reservatório

A simulação da passagem da cheia pelo reservatório foi realizada pelo método de Puls, este método resolve a equação de continuidade (Qi - Qo = dS/dt),mediante uma discretização com intervalo de tempo igual ao da hidrógrafa afluente (neste caso 5 min), as condições iniciais foram , reservatório cheio até a cota da soleira do vertedouro e vazão efluente inicial nula



SUB-BACIA	ÁREA Km²
A1	5 1
A2	4 8
B1	2.2
B2	5 0
C1	4 4
C2	4 0
D1	12.5
D2	4 2
E1	7 2
E2	10 5
F1	2.1
F2	1 3
G1	3 3
G2	2 2
H1	11 4
H2	13.3
I1	76
I2	14 1
J1	8 1
J2	7 4
K1	10 6
K2	11 1
L1	4 2
L2	13 1
M1	4.6
M2	9 8
N1	8 3
N2	13.6
O1	9.9
O2	5.3
P1	4 6
P2	4 7
Q1	2.5
Q2	3.4
R1	2 6
R2	1 5
S1	1 5
S2	3 1
BACIA	219 3

LEGENDA

- LIMITE DE BACIA
- LIMITE DE SUB-BACIA
- RIO OU RIACHO
- BR

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FIGURA 7

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BARRAGEM SOUZA
MAPA DA BACIA HIDROGRÁFICA

DATA	ESCALA
MAIO / 96	1 / 100 000

Tabela - 24 : Parâmetros utilizados no modelo de onda cinemática.

NOME DA SUB - BACIA	OVERLAND	COMPRIMENTO DOS STREAMS (km)	DECLIVIDADES DOS STREAMS (ad)	ÁREAS DAS SUB-BACIAS (km2)	COMPRIMENTO DAS SUB-BACIAS (km)	DECLIVIDADE DAS SUB-BACIAS (ad)
A	1	5	0.0133	4,56	0,91	0,040
	2			4,29	0,86	0,040
B	1	4	0,1000	1,97	0,49	0,080
	2			4,47	1,12	0,080
C	1	4,5	0,0080	3,94	0,87	0,040
	2			3,58	0,80	0,040
D	1	6	0,0150	11,18	1,86	0,120
	2			3,76	0,63	0,120
E	1	8	0,0080	6,44	0,81	0,080
	2			9,39	1,17	0,080
F	1	1,5	0,0100	1,88	1,25	0,016
	2			1,16	0,78	0,016
G	1	3	0,0100	2,95	0,98	0,016
	2			1,97	0,66	0,016
H	1	9	0,0133	10,20	1,13	0,027
	2			11,90	1,32	0,027
I	1	4	0,0062	6,80	1,70	0,027
	2			12,62	3,16	0,027
J	1	6	0,0044	7,25	1,21	0,020
	2			6,62	1,10	0,020
K	1	7,1	0,0160	9,48	1,34	0,053
	2			9,93	1,40	0,060
L	1	8,5	0,0047	3,76	0,44	0,027
	2			11,72	1,38	0,027
M	1	5,5	0,0133	4,12	0,75	0,016
	2			8,77	1,59	0,016
N	1	9,5	0,0053	7,43	0,78	0,020
	2			12,17	1,28	0,020
O	1	6,5	0,0062	8,86	1,36	0,020
	2			4 74	0,73	0,020
P	1	5	0,0050	4,12	0,82	0,020
	2			4,21	0,84	0,020
Q	1	3	0 0050	2,24	0,75	0,016
	2			3,04	1.01	0.016
R	1	2	0,0050	2 33	1,16	0,016
	2			1,34	0.67	0,016
S	1	3	0,0050	1,34	0,45	0,016
	2			2,77	0,92	0,016

3.7.2.2 - Simulação Hidrológica - Hidráulica do Evento Extremo Resultados Obtidos.

Os resultados obtidos mediante a simulação podem ser apreciados nos "output file" gerados pelo modelo HEC1, apresentados em anexo

Um resumo destes resultados pode ser apreciado na ***Tabela 21***, onde são mostradas as vazões de pico de afluência e efluência do reservatório para os eventos extremos com recorrência de 500, 1 000 e 10 000 anos, utilizando a curva cota- área - volume apresentada na ***Figura 6*** vertedouros com as seguintes características

1ª alternativa	2ª Alternativa
Largura: 130 m	Largura: 100m
Cota da soleira 162,5 m	Cota de soleira: 162,5m
Tipo CREAGER	Tipo CREAGEM
Coeficiente do vertedouro 2,21	Coeficiente de vertedouro. 2,21
Altura de Sangria 1m	Altura da sangria 1,92m
Descarga - Decamilenar Amortecida	Descarga - Decamilenar Amortecida

A predeterminação da largura do sangradouro em 100 e 130m, adveio da necessidade de reservar o maior volume de água possível, atendendo as condições topográficas e geológicas locais

Visando também proporcionar maior vazão, foi projetado referido sangradouro em perfil tipo CREAGER, com bacia de dissipação a jusante

3.8 - Interferência do Açude Souza Sobre a Barragem Pereira de Miranda

O Açude Souza, apresenta as características a seguir:

Área da bacia Hidrográfica	220Km^2
Volume afluente Médio	29,69Hm^3/ano
Volume armazenado(cota 162,50)	30,88 Hm^3
Vazão regularizada	0,304m^3/s(90% de garantia)

Em contrapartida com o Açude Pereira de Miranda, que apresenta as seguintes características

Área da bacia Hidrográfica	2 840Km^2
Volume afluente Médio	180Hm^3
Volume armazenado	395Hm^3
Vazão regularizada	4,63m^3/s

Conforme podemos observar, o Açude Souza está dimensionado para conter apenas a vazão afluente média anual sendo portanto uma barragem sujeita a sangrias frequentes Sua bacia hidrográfica, com 220Km2 é equivalente a menos de 10% da bacia hidrográfica do Açude Pereira de Miranda e sua descarga regularizada é menor que 10% da descarga regularizada do Açude Pereira de Miranda, sendo portanto a sua interferência sobre este de pequena monta e dificilmente detectável por programas de simulação, com vista à escassez de informações existentes

O Açude Souza, fornece uma vazão regularizada com 90% de garantia de 300l/s, valor este bem inferior a vazão de garantia do Açude Pereira de Miranda.

Com vista ao exposto concluímos que a influência do Açude Souza sobre a barragem Pereira de Miranda é desprezível ou pelo menos de uma ordem de grandeza inferior aos erros de estimativa das variáveis envolvidas

Para melhor avaliar a influência do Açude Souza sobre a Açude Pereira de Miranda, foi feita uma avaliação, de conformidade com a metodologia a seguir

3.8.1 - Metodologia

Para avaliar o impacto de um açude situado a montante de outro se procede à simulação da operação do reservatório impactada nas duas hipótese

a) sem o reservatório impactante,

b) com o reservatório impactante,

Para a simulação referida no item "b" se procede à subtração da área do Açude impactante na área da bacia hidrográfica contribuinte do Açude impactado, podendo-se considerar os volumes vertidos pelo reservatório impactante como contribuição eventual

No caso do açude Souza, o reservatório impactado é o denominado Pereira de Miranda, cujas principais características aparecem acima.

O resumo das simulações com e sem o reservatório de Souza podem ser apreciados nas tabelas

Para uma vazão regularizada com 90% de garantia observaram-se diminuições de 6% da vazão regularizado pelo reservatório Pereira de Miranda para a situação mais conservadora, isto é. ausência total de vertimentos no reservatório de Souza

Já para a vazão regularizada com volume de alerta (conforme metodologia do PERH) a diminuição de vazão foi de 3,6%. Ambos resultados são absolutamente desprezíveis pois se enquadram na ordem de grandezas dos erros admissíveis neste tipo estudo (***Tabela 25 e 26***)

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TABELA 25

VALORES DA SIMULAÇÃO DO AÇUDE PEREIRA DE MIRANDA COMO 2840 KM
DE BACIA HIDROGRÁFICA (INCLUI A BACIA HIDROGRÁFICA DO AÇUDE SOUSA)

VAZÃO REGULARIZADA (M3/S)	GARANTIA	VOLUME DE ALERTA	VAZÃO DE EMERGÊNCIA	PERCENTAGEM DE ATENDIMENTO NA EMERGÊNCIA	NRO FALHAS	
4,15	**90,04**	**18.500.000,00**	**2,08**	**13,03**	**92**	*
4,15	90,04	27.928.450,00	2,08	13,03	92	
3,90	90,48	37.356.900,00	1,95	28,63	88	
3,67	90,91	46.785.350,00	1,83	42,74	84	
3,67	90,15	56.213.800,00	1,83	52,19	91	
3,58	90,15	65.642.250,00	1,79	60,08	91	
3,36	90,80	75.070.700,00	1,68	74,24	85	
3,32	**90,48**	**84.499.150,00**	**1,66**	**80,92**	**88**	**
3,12	90,91	93.927.600,00	1,56	93,47	84	
3,12	90,15	103.356.100,00	1,56	94,80	91	
2,93	90,58	112.784.500,00	1,47	98,79	87	
2,89	90,26	122.213.000,00	1,45	99,73	90	
2,72	90,69	131.641.400,00	1,36	100,00	86	
2,56	90,91	141.069.900,00	1,28	100,00	84	
2,56	90,04	150.498.300,00	1,28	100,00	92	

* VAZÃO REGULARIZADA COM 90% DE GARANTIA PARA ÁREA DE 2840 KM -

** VAZÃO RUGULARIZADA COM 90 % DE GARANTIA E VOLUME DE ALERTA CONFORME CRITERIO DO PERH PARA ÁREA DE 2840 KM

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TABELA 26

VALORES DA SIMULAÇÃO DO AÇUDE PEREIRA DE MIRANDA COMO 2620 KM
DE BACIA HIDROGRÁFICA (EXCLUI A BACIA HIDROGRÁFICA DO AÇUDE SOUSA)

VAZÃO REGULARIZADA (M3/S)	GARANTIA	VOLUME DE ALERTA	VAZÃO DE EMERGÊNCIA	PERCENTAGEM DE ATENDIMENTO NA EMERGÊNCIA	NRO FALHAS	
3,90	**90,80**	**18.500.000,00**	**1,95**	**17,04**	**85**	+
3,90	90,80	27.928.450,00	1,95	17,04	85	
3,85	90,48	37.356.900,00	1,93	27,08	88	
3,62	90,80	46.785.350,00	1,81	43,72	85	
3,62	90,04	56.213.800,00	1,81	52,85	92	
3,41	90,91	65.642.250,00	1,70	63,05	84	
3,41	90,15	75.070.700,00	1,70	70,71	91	
3,20	**90,69**	**84.499.150,00**	**1,60**	**84,37**	**86**	++
3,16	90,26	93.927.600,00	1,58	89,65	90	
2,97	90,80	103.356.100,00	1,48	96,52	85	
2,93	90,26	112.784.500,00	1,47	98,47	90	
2,76	90,91	122.213.000,00	1,38	100,00	84	
2,76	90,04	131.641.400,00	1,38	100,00	92	
2,59	90,48	141.069.900,00	1,29	100,00	88	
2,43	90,69	150.498.300,00	1,22	100,00	86	

* VAZÃO REGULARIZADA COM 90% DE GARANTIA PARA ÁREA DE 2620 KM -

** VAZÃO RUGULARIZADA COM 90 % DE GARANTIA E VOLUME DE ALERTA CONFORME CRITERIO DO PERH PARA ÁREA DE 2620 KM

Visando atender as recomendações do Painel, foi feito o estudo de redução da largura do sangradouro para 100m.

Foi estudada a laminação da cheia milenar, atingindo-se a lâmina máxima na cota 163,65 m com 1,15 m (***Tabela 27***).

Para a cheia centenária atingiu-se a cota 164,42 com lâmina de 2,12, abaixo da cota do coroamento da barragem (***Tabela 28***).

Para este estudo foram utilizadas as cheias obtidas por simulação pelo HEC 1, por se julgarem mais precisas e apresentarem resultados mais conservadores com maior segurança para a obra.

Os valores de escoamento mensal foram comparados com os valores gerados no estudo do DNOCS para a bacia do Curu, reservatório de Pentecoste.

Estes estudos forneceram os seguintes resultados: vazões afluentes ao Reservatório de Pentecoste.

Q média = $424,8 \times 10^6$ m^3/ano

Ap = Área da bacia hidrográfica = 2840Km^2

Por correlação de áreas, teremos:

Qs Vazão afluente ao reservatório de Souza

As = área de bacia hidrográfica do Açude Souza = 220Km

$$Qs = \frac{A_s}{A_p} \triangleright Q_p$$

$$Q_s = \frac{220}{2840} x424,8x10^6 = 32,9x10^6 m^3 / ano$$

Valor muito semelhante ao encontrado nos estudos de simulação

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TABELA - 27

FLOOD ROUTING
SOUZA 10.000 ANOS VERT DE 100 M
B: QXT 600M B: HXV B: HXQ2
NA inicial 162.5 intervalo de tempo 1 horas
tempo inicial do hidrograma 04 dias

DIA	COTA	VAZÃO AFLUENTE	VAZÃO EFLUENTE
0.08	162.51	11.78	0.34
0.12	162.57	130.03	5.50
0.17	162.78	422.63	37.53
0.21	163.04	592.97	102.46
0.25	163.33	600.93	197.14
0.29	163.52	529.49	289.31
0.33	163.62	440.39	368.83
0.37	163.65	363.67	331.81
0.42	163.64	307.85	318.50
0.46	163.62	269.27	306.88
0.50	163.58	241.00	291.53
0.54	163.54	217.87	274.86
0.58	163.49	195.84	256.80
0.62	163.44	174.89	238.81
0.67	163.40	157.39	220.27
0.71	163.34	139.64	201.48
0.75	163.29	119.73	182.87
0.79	163.24	94.86	165.34
0.83	163.19	79.52	148.79
0.87	163.14	66.40	133.78
0.92	163.10	59.34	120.30
0.96	163.06	51.33	108.22
1.00	163.02	44.24	97.38
1.04	162.99	39.20	88.75
1.08	162.96	34.15	82.08
1.12	162.94	30.17	75.91
1.17	162.92	27.12	70.27
1.21	162.90	24.07	65.06
1.25	162.88	21.13	60.24
1.29	162.86	19.08	55.84
1.33	162.84	17.09	51.79
1.37	162.82	15.54	48.09
1.42	162.81	14.61	44.73
1.46	162.79	13.09	41.63
1.50	162.78	12.04	38.81
1.54	162.77	11.04	36.22
1.58	162.76	9.99	33.82
1.62	162.75	9.04	31.59
1.67	162.73	8.05	29.51
1.71	162.72	7.99	27.64
1.75	162.71	7.05	25.88
1.79	162.71	6.99	24.28
1.83	162.70	6.07	22.78

CONCREMAT
ENGENHARIA E TECNOLOGIA S.A.

TABELA - 28

FLOOD ROUTING
FLOOD ROUTING SOUZA 500 ANOS (M) **VERT 130M CRISTA 162.50**
B: QXT 500M **B: HXV** **B: HXQ1**
NA inicial 162.5 intervalo de tempo 1 horas
tempo inicial do hidrograma 64 dias

DIA	COTA	VAZÃO AFLUENTE	VAZÃO EFLUENTE
0.08	162.50	4.69	-1.97
0.12	162.52	30.49	-0.68
0.17	162.64	228.36	10.31
0.21	162.98	744.29	66.82
0.25	163.55	1,027.18	218.30
0.29	164.01	1,007.49	372.66
0.33	164.29	854.10	477.83
0.37	164.40	683.20	524.70
0.42	164.42	552.20	531.06
0.46	164.38	464.86	515.80
0.50	164.32	403.15	490.10
0.54	164.24	352.82	459.27
0.58	164.16	312.89	427.01
0.62	164.03	201.79	378.66
0.67	163.96	253.70	352.45
0.71	163.88	222.28	325.68
0.75	163.81	189.34	298.30
0.79	163.72	158.17	270.88
0.83	163.64	131.96	244.46
0.87	163.56	109.75	221.06
0.92	163.49	91.65	201.95
0.96	163.41	77.53	178.39
1.00	163.35	66.39	156.03
1.04	163.29	58.37	140.63
1.08	163.24	49.23	126.34
1.12	163.19	42.25	113.60
1.17	163.14	37.21	102.41
1.21	163.10	33.16	92.56
1.25	163.06	29.17	83.83
1.29	163.03	26.12	76.12
1.33	162.99	23.07	69.57
1.37	162.97	20.13	64.62
1.42	162.95	18.09	60.44
1.46	162.93	17.03	56.47
1.50	162.91	15.09	52.78
1.54	162.89	14.03	49.40
1.58	162.88	12.04	46.22
1.62	162.86	11.04	43.28
1.67	162.85	10.05	40.57
1.71	162.83	10.04	38.12
1.75	162.82	9.04	35.83
1.79	162.80	7.99	33.67
1.83	162.79	8.04	31.73
1.87	162.78	6.99	29.90
1.92	162.77	7.04	28.24
1.96	162.76	5.99	26.65
2.00	162.75	6.04	25.19
2.04	162.74	5.13	23.80

3.9 - Estudo probabilístico de enchimento do Reservatório

O estudo probabilístico de enchimento de um reservatório é função de utilização de sua disponibilidade hídrica.

O açude Souza, projetado para uma capacidade de acumulação de 30.880.400m^3 apresenta bons índices de enchimento, face à vazão anual afluente média da ordem de 29.692.000m^3.

A bacia apresentou em 77 anos 49 anos de fluvio abaixo da média, isto é uma probabilidade de 63,6% de ocorrerem sangrias.

Para uma retirada contínua de 0,3m^3/ano e perdas por evaporação teremos 29 anos de sangria num totas de 77 anos, com probabilidade de sangria de 37,6%, ou seja, a barragem deverá atingir sua cota máxima de sangria uma vez a cada três anos.

Se considerarmos, a barragem sem retirada (volume regularizado nulo) e, somente teremos a evaporação uma possibilidade de enchimento de ordem de 48,1%.

ANO	QAFL $10^6 m^3$/ano	Sangria c/ retirada $0,3m^3/s$	Sem retirada ao ANO	QAFL		
1912	62,5	s	s	1960	s	s
1913	92,4	s	s	1961	-	s
1914	0,1	-	-	1962	-	-
1915	7,7	-	-	1963	s	s
1916	17,9	-	-	1964	s	s
1917	62,6	s	s	1965	-	s
1918	0,0	-	-	1966	-	-
1919	0,0	-	-	1967	s	s
1920	37,1	s	s	1968	s	s
1921	2,7	-	-	1969	-	-
1922	40,1	s	s	1970	-	-
1923	10,3	-	-	1971	-	-
1924	131,7	s	s	1972	-	-
1925	0,4	-	-	1973	s	s
1926	91,2	s	s	1974	s	s
1927	0,0	-	-	1975	-	-
1928	27,6	s	s	1976	s	s
1929	52,9	s	s	1977	s	s
1930	26,0	s	s	1978	s	s
1931	0,0	-	-	1979	-	-
1932	0,0	-	-	1980	-	-
1933	12,5	-	-	1981	-	-
1934	19,1	-	-	1982	-	-
1935	56,5	s	s	1983	-	s
1936	21,1	s	s	1984	s	s
1937	13,6	-	-	1985	s	s
1938	28,0	s	s	1986	s	s
1939	3,1	-	-	1987	-	s
1940	38,6	s	s	1988	s	s
1941	18,8	s	s			
1942	0,0	-	-			
1943	0,0	-	-			
1944	0,0	-	-			
1945	16,0	-	-			
1946	0,0	-	-			
1947	45,1	s	s			
1948	29,5	s	s			
1949	11,6	-	-			
1950	42,6	s	s			
1951	0,0	-	-			
1952	0,0	-	-			
1953	0,0	-	-			
1954	0,0	-	-			
1955	1,6	-	-			
1956	4,6	-	-			
1957	96,2	s	s			
1958	1,1	-	-			
1959	0,0	-	-			

Com retirada de $0,3m^3/s$

29 anos de sangria

77 anos de observação

37,6 de possibilidade de enchimento sem retirada

37 anos de sangria

77 anos de observação

98,1% de possibilidade de enchimento

s = sim

3.10 - ESTUDO DOS CUSTOS DA VAZÃO REGULARIZADA

A barragem Souza, apresentou um valor orçado para construção de R$ 3.239.694,88, tendo com 90% de garantia e volume de alerta de 6,9Hm^3 uma vazão anual regularizada de 0,303m^3/s, equivalente a 9.555.400m^3/ano.
O valor do m^3 regularizado, calculado foi de R$ 0,34 enquanto o do m^3 estocado foi de R$ 0,10.

3.11 - ESTUDO ECONÔMICO DE ALTERNATIVAS DE SANGRADOURO

O sangradouro da barragem Souza foi inicialmente estudado, para perfil CREAGER, com 100 e 130m de largura. Devido a fatores geológicos, com Rocha Sã a grande profundidade a largura de sangria fixada em 100m
Não foi efetuado estudo comparativo de custos dentre estas 2 (duas) alternativas, visto que por se tratarem de perfis idênticos, a 2ª alternativa terá um custo de aproximadamente 30% a menos a 1ª alternativa.
Posteriormente, após reunião do painel foram desenvolvidas 2 (duas) hipóteses finais a 1ª em perfil CREAGER, na cota 159, com fundação indo até a cota 156, e com lage de 20m de extensão ancorada na Rocha Sã e a 2ª, com fundação diretamente ancorada na Rocha Sã, aprofundada até a cota 153.

1ª Alternativa - somente o perfil vertedouro e lage			TOTAL
Concreto ciclópico	900m^3	112,79	101.511,00
Concreto simples	200m^3	110,97	22.184,00
Concreto estrutural armado simples	600m^3	123,10	73.860,00
Ancoragem de estrutura	900m	267,90	241.110,00
Juntas Fungenband	301m	37,77	11.368,77
Armadura para lage	100Kg	1,39	139,00
Escavação material 2ª categoria	150m^3	2,18	1.327,00
	TOTAL		450.499,77

2ª Alternativa

Concreto ciclópico 12% pedra de mão	1.050,00m^3	112,79	118.429,50

Concreto simples	200,00m^3	110,97	22.184,00
Juntas Fungenband	50m	37,77	2.266,20
Escavação mat 2ª categoria	250m^3	2,18	545,00
Escavação mat 3ª categoria	50m^3	11,65	582,50
TOTAL			144.607,20

Tornando-se a 2ª alternativa bastante mais econômica.

Estas alternativas, por medida de segurança serão apresentadas aos consultores, estando no orçamento da barragem o orçamento da 1ª alternativa.

CONCREMAT

ENGENHARIA E TECNOLOGIA S.A.

Simulação Modelo TR 500

000075

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ID      BACIA HIDROGRAFICA DO RESERVATORIO DE SOUSA
ID      MODELO DE ONDA CINEMATICA DA BACIA TR-500
IT    30 15APR96    1500     300
IO    30
IM
*
*DIAGRAM
KK      BACIA ABANICO COMPONENTE E
KM      ESC  SUPERFICIAL SUBBACIA E
KO     3
BA 15 83
PH   0 5   220 0    19 4    40 0    77 3    98 0   110 0   140 0   164 0   194.0
LS           74                      74
UK   810      05      40    40 6
UK  1170      05      40    59 4
RK  8000     006     045            TRAP       0      40
KK      BACIA ABANICO COMPONENTE H
KM      ESC  SUPERFICIAL SUBBACIA H
KO     3
BA  22 1
UK  1130     016      40    46 1
UK  1320     016      40    53 9
RK  9000     008     045            TRAP       0      40
KK      BACIA ABANICO COMPONENTE I
KM      ESC  SUPERFICIAL SUBBACIA I
KO     3
BA 19 42
UK  1700     016      40    35.0
UK  3150     016      40    65 0
RK  4000    0040     045            TRAP       0      40
KK      BACIA ABANICO COMPONENTE J
KM      ESC  SUPERFICIAL SUBBACIA J
KO     3
BA 13 87
UK  1210     013      40    52 3
UK  1100     013      40    47 7
RK  6000   .0030     045            TRAP       0      40
KK BACIA EM ABANICO COMPLETA
HC     4
KK      BACIA F-G COMPONENTE F
KM      ESC  SUPERFICIAL SUBBACIA F
KO     3
BA  3 04
UK  1250     010      40    61 8
UK   780     010      40    38 2
RK  1500    0080     045            TRAP       0      40
KK      BACIA F - G  COMPONENTE G
KM      ESC  SUPERFICIAL SUBBACIA G
KO     3
BA  4 92
UK   980     010      40    59 9
UK   660     010      40    40 1
RK  3000   .0080     045            TRAP       0      40     YES
KK BACIA EM ABANICO COMPLETA + BACIA F - G
HC     2
KK      BACIA P
KM      ESC  SUPERFICIAL BACIA P
KO     3
BA  8 33
UK   820     013      40    49 4
UK   840     013      40    50 6
RK  5000    0030     045            TRAP       0      40     YES
KK      BACIA K-L COMPONENTE K
KM      ESC  SUPERFICIAL SUBBACIA K
KO     3
BA 19 41
UK  1340     003      40    48 8
UK  1400     003      40    51 2
RK  7100    0080     045            TRAP       0      40
KK      BACIA K - L  COMPONENTE L
KM      ESC  SUPERFICIAL SUBBACIA L
KO     3
BA 15 48
UK   440     020     .40    24 3
UK  1380     020      40    75 7
RK  8500   .0030     045            TRAP       0      40     YES
KK      BACIA M
KM      ESC  SUPERFICIAL BACIA M
KO     3
BA 12 89
UK   750     010      40    31 9
UK  1590     010      40    68 1
RK  5500    0080     045            TRAP       0      40
KK BACIA M + BACIA K - L
HC     2
KK      BACIA Q
KM      ESC  SUPERFICIAL SUBBACIA Q
KO     3
BA  5 28
UK   750     013      40    42 4
UK  1010     013      40    57 6
RK  3000    0030     045            TRAP       0      40     YES
KK      BACIA D-C COMPONENTE D
KM      ESC  SUPERFICIAL SUBBACIA D
KO     3
BA 14 94
UK  1860     080      40    74 8
UK   630     080      40    25 2
RK  6000    0080     045            TRAP       0      40
KK      BACIA D - C  COMPONENTE C
KM      ESC  SUPERFICIAL SUBBACIA C
KO     3
BA  7 52
UK   870     030      40    24 3
UK   800     030      40    75 7
RK  4500    0060     045            TRAP       0      40     YES
KK BACIA Q + BACIA P + BACIA D-C
HC     3
KK      BACIA R
KM      ESC  SUPERFICIAL SUBBACIA R
KO     3
BA  3 67
UK  1160     013      40    63 4
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UK   670     013      40     36 6
RK  2000    0030     045             TRAP        0       40      YES
KK       BACIA B-A COMPONENTE B
KM       ESC  SUPERFICIAL SUBBACIA B
KO     3
BA  6 44
UK   490     050      40     30 5
UK  1120     050      40     69 5
RK  4000    0100     045             TRAP        0       40
KK       BACIA B - A  COMPONENTE A
KM       ESC  SUPERFICIAL SUBBACIA A
KO     3
BA  8 85
UK   910     030      40     51 5
UK   860     030      40     48 5
RK  5000    0080     045             TRAP        0       40      YES
KK       BACIA N
KM       ESC  SUPERFICIAL SUBBACIA N
KO     3
BA 19 60
UK   780     013      40     37 9
UK  1280     013      40     62 1
RK  9500    0030     045             TRAP        0       40
KK BACIA R + BACIA N + BACIA A-B
HC     3
KK       BACIA S
KM       ESC  SUPERFICIAL SUBBACIA S
KO     1
BA  4 11
UK   450     010      40     32 6
UK   920     010      40     67 3
RK  3000    0030     045             TRAP        0       40      YES
KK  BARRAGEM DE SOUSA
KO     1
RS     1    STOR  30000        -1
SV        18043   22516  28092 3 33668 4 39244 4
SE    97      98       99      100      101      102
SS 100 5    130       1 4      1 5
ZZ
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*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            SEPTEMBER 1990             *
*             VERSION 4 0               *
*                                       *
*  RUN DATE  05/05/1996  TIME  18 09 10 *
*                                       *
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*                                       *
*    U S  ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81 THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS-WRITE STAGE FREQUENCY,
DSS READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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          LINE          ID       1       2       3       4 .    .5       6      ..7       8       9     ..10
             1          ID        BACIA HIDROGRAFICA DO RESERVATORIO DE SOUSA
             2          ID        MODELO DE ONDA CINEMATICA DA BACIA TR-500
             3          IT      30 15APR96     1500      300
             4          IO      30
             5          IM
                        *
                        *DIAGRAM

             6          KK         BACIA ABANICO COMPONENTE E
             7          KM         ESC  SUPERFICIAL SUBBACIA E
             8          KO       3
             9          BA    15 83
            10          PH     0 5   220 0    19 4    40 0    77 3    98 0   110 0   148 0   164 0   194 0
            11          LS              74                      74
            12          UK     810       05      40     40 6
            13          UK    1170       05      40     59 4
            14          RK    8000      006     045             TRAP        0       40

            15          KK         BACIA ABANICO COMPONENTE H
            16          KM         ESC  SUPERFICIAL SUBBACIA H
            17          KO       3
            18          BA     72 1
            19          UK    1130      016      40     46 1
            20          UK    1320      016      40     53 9
            21          RK    9000      008     045             TRAP        0       40

            22          KK         BACIA ABANICO COMPONENTE I
            23          KM         ESC  SUPERFICIAL SUBBACIA I
            24          KO       3
            25          BA    19 42
            26          UK    1700      016      40     35 0
            27          UK    3150      016      40     65 0
            28          RK    4000     0040     045             TRAP        0       40

            29          KK         BACIA ABANICO COMPONENTE J
            30          KM         ESC  SUPERFICIAL SUBBACIA J
            31          KO       3
            32          BA    13 87
            33          UK    1210      013      40     52 3
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          34          UR    1100      013      40    47 7
          35          RR    6000     0030     045              TRAP        0       40

          36          KK    BACIA EM ABANICO COMPLETA
          37          HC       4

          38          KK         BACIA F-G COMPONENTE F
          39          KM         ESC  SUPERFICIAL SUBBACIA F
          40          KO       3
          41          BA    3 04
          42          UR    1250      010      40    61 8
          43          UR     780      010      40    38 2
          44          RK    1500     0080     045              TRAP        0       40
1                                                 HEC-1 INPUT

PAGE  2

        LINE          ID       1        2        3        4        5        6        7    .   8        9       10

          45          KK         BACIA F - G  COMPONENTE G
          46          KM         ESC  SUPERFICIAL SUBBACIA G
          47          KO       3
          48          BA    4 92
          49          UR     980      010      40    59 9
          50          UR     660      010      40    40.1
          51          RK    3000     0080     045              TRAP        0       40      YES

          52          KK    BACIA EM ABANICO COMPLETA + BACIA F - G
          53          HC       2

          54          KK         BACIA P
          55          KM         ESC  SUPERFICIAL BACIA P
          56          KO       3
          57          BA    8 33
          58          UR     820      013      40    49.4
          59          UR     840      013      40    50.6
          60          RK    5000     0030     045              TRAP        0       40      YES

          61          KK         BACIA K-L COMPONENTE K
          62          KM         ESC  SUPERFICIAL SUBBACIA K
          63          KO       3
          64          BA   19 41
          65          UR    1340      003     .40    48 8
          66          UR    1400      003      40    51 2
          67          RK    7100     0080     045              TRAP        0       40

          68          KK         BACIA K - L  COMPONENTE L
          69          KM         ESC  SUPERFICIAL SUBBACIA L
          70          KO       3
          71          BA   15 48
          72          UR     440      020      40    24 3
          73          UR    1380      020      40    75.7
          74          RK    8500     0030     045              TRAP        0       40      YES

          75          KK         BACIA M
          76          KM         ESC  SUPERFICIAL BACIA M
          77          KO       3
          78          BA   12 89
          79          UR     750      010      40    31 9
          80          UR    1590      010      40    68 1
          81          RK    5500     0080     045              TRAP        0       40

          82          KK    BACIA M + BACIA K - L
          83          HC       2

          84          KK         BACIA Q
          85          KM         ESC  SUPERFICIAL SUBBACIA Q
          86          KO       3
          87          BA    5 28
          88          UR     750      013      40    42 4
          89          UR    1010      013      40    57 6
          90          RK    3000     0030     045              TRAP        0       40      YES
1                                                 HEC-1 INPUT

PAGE  3

        LINE          ID       1        2        3        4        5        6        7        8.       9    .  10

          91          KK         BACIA D-C COMPONENTE D
          92          KM         ESC  SUPERFICIAL SUBBACIA D
          93          KO       3
          94          BA   14 94
          95          UR    1860      080      40    74 8
          96          UR     630      080      40    25 2
          97          RK    6000     0080     045              TRAP        0       40

          98          KK         BACIA D - C  COMPONENTE C
          99          KM         ESC  SUPERFICIAL SUBBACIA C
         100          KO       3
         101          BA    7 52
         102          UR     870      030      40    24.3
         103          UR     800      030      40    75.7
         104          RK    4500     0060     045              TRAP        0       40      YES

         105          KK    BACIA Q + BACIA P + BACIA D-C
         106          HC       3

         107          KK         BACIA R
         108          KM         ESC  SUPERFICIAL SUBBACIA R
         109          KO       3
         110          BA    3 67
         111          UR    1160      013      40    63 4
         112          UR     670      013      40    36 6
         113          RK    2000     0030     045              TRAP        0       40      YES

         114          KK         BACIA B-A COMPONENTE B
         115          KM         ESC  SUPERFICIAL SUBBACIA B
         116          KO       3
         117          BA    6 44
         118          UR     490      050     .40    30 5
         119          UR    1120      050      40    69 5
```

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          120          RK    4000    0100     045            TRAP       0      40

          121          KK        BACIA B - A  COMPONENTE A
          122          KM        ESC  SUPERFICIAL SUBBACIA A
          123          KO      3
          124          BA    8 85
          125          UK     910     030      40    51 5
          126          UK     860     030      40    48.5
          127          RK    5000    0080     045            TRAP       0      40     YES

          128          KK        BACIA N
          129          KM        ESC  SUPERFICIAL SUBBACIA N
          130          KO      3
          131          BA   19 60
          132          UK     780     013      40    37 9
          133          UK    1280     013      40    62 1
          134          RK    9500    0030     045            TRAP       0      40
1                                                  HEC-1 INPUT
PAGE  4

          LINE          ID       1       2       3       4       5       6       7       8       9      10

          135          KK   BACIA R + BACIA N + BACIA A-B
          136          HC       3

          137          KK        BACIA S
          138          KM        ESC  SUPERFICIAL SUBBACIA S
          139          KO      1
          140          BA    4 11
          141          UK     450     010      40    32 6
          142          UK     920     010      40    67 3
          143          RK    3000    0030     045            TRAP       0      40     YES

          144          KK    BARRAGEM DE SOUSA
          145          KO       1
          146          RS       1    STOR  30000       -1
          147          SV          18043   22516  28092 3 33668.4 39244.4
          148          SE      97      98      99     100     101     102
          149          SS   100 5    130     1 4     1 5
          150          ZZ
1
               SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE       (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

    NO       ( ) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

       6

      15

      22

      29

      36       BACIA

      38                        V
                                V
      45                          ***

      52       BACIA
                   V
                   V
      54             ***

      61                        V
                                V
      68                          ***

      75

      82                  BACIA
                                V
                                V
      84                          ***

      91                                  V
                                          V
      98                                    ***

     105       BACIA
                   V
                   V
     107             ***

     114                       V
                               V
     121                         ***

     128

     135       BACIA
                   V
                   V
```

```
  137             ***
               V
               V
  144        BARR

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1***************************************                                                  ***************************************
*                                       *                                                  *                                     *
*   FLOOD HYDROGRAPH PACKAGE   (HEC-1)  *                                                  *   U S  ARMY CORPS OF ENGINEERS      *
*             SEPTEMBER 1990            *                                                  *    HYDROLOGIC ENGINEERING CENTER    *
*               VERSION 4 0             *                                                  *         609 SECOND STREET           *
*                                       *                                                  *       DAVIS, CALIFORNIA 95616       *
*  RUN DATE  05/05/1996  TIME  18 09 10 *                                                  *          (916) 756-1104             *
*                                       *                                                  *                                     *
*****************************************                                                  ***************************************


                              BACIA HIDROGRAFICA DO RESERVATORIO DE SOUSA
                              MODELO DE ONDA CINEMATICA DA BACIA TR-500

   4 IO         OUTPUT CONTROL VARIABLES
                      IPRNT             30  PRINT CONTROL
                      IPLOT              0  PLOT CONTROL
                      QSCAL             0.  HYDROGRAPH PLOT SCALE

     IT         HYDROGRAPH TIME DATA
                       NMIN             30  MINUTES IN COMPUTATION INTERVAL
                      IDATE        15APR96  STARTING DATE
                      ITIME           1500  STARTING TIME
                         NQ            300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE        21APR96  ENDING DATE
                     NDTIME           2030  ENDING TIME
                      ICENT             19  CENTURY MARK

                  COMPUTATION INTERVAL      .50 HOURS
                       TOTAL TIME BASE  149 50 HOURS

        METRIC UNITS
             DRAINAGE AREA           SQUARE KILOMETERS
             PRECIPITATION DEPTH     MILLIMETERS
             LENGTH, ELEVATION       METERS
             FLOW                    CUBIC METERS PER SECOND
             STORAGE VOLUME          CUBIC METERS
             SURFACE AREA            SQUARE METERS
             TEMPERATURE             DEGREES CELSIUS

   8 KO         OUTPUT CONTROL VARIABLES
                      IPRNT              3  PRINT CONTROL
                      IPLOT              0  PLOT CONTROL
                      QSCAL             0.  HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

   9 BA         SUBBASIN CHARACTERISTICS
                      TAREA          15 83  SUBBASIN AREA

                PRECIPITATION DATA

  10 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                      HYDRO-35                  .     .       TP-40       .       . .      ...     .    TP-49  .     ..
                5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                19 40   40 00   77 30   98.00  110.00  148 00  164 00  194 00      00     .00      00     .00

                                                        STORM AREA =   220 00

  11 LS         SCS LOSS RATE
                      STRTL          17 85  INITIAL ABSTRACTION
                     CRVNBR          74 00  CURVE NUMBER
                      RTIMP             00  PERCENT IMPERVIOUS AREA

                  LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                      STRTL          17 85  INITIAL ABSTRACTION
                     CRVNBR          74 00  CURVE NUMBER
                      RTIMP             00  PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
  12 UK           OVERLAND-FLOW ELEMENT NO  1
                          L            810  OVERLAND FLOW LENGTH
                          S          0500   SLOPE
                          N            400  ROUGHNESS COEFFICIENT
                         PA           40 6  PERCENT OF SUBBASIN
                      DXMIN              5  MINIMUM NUMBER OF DX INTERVALS
  13 UK           OVERLAND-FLOW ELEMENT NO. 2
                          L          1170.  OVERLAND FLOW LENGTH
                          S           0500  SLOPE
                          N            400  ROUGHNESS COEFFICIENT
                         PA           59 4  PERCENT OF SUBBASIN
                      DXMIN              5  MINIMUM NUMBER OF DX INTERVALS

                KINEMATIC WAVE
  14 RK           MAIN CHANNEL
                          L          8000   CHANNEL LENGTH
                          S           0060  SLOPE
                          N            045  CHANNEL ROUGHNESS COEFFICIENT
                         CA          15 83  CONTRIBUTING AREA
                      SHAPE           TRAP  CHANNEL SHAPE
                         WD             00  BOTTOM WIDTH OR DIAMETER
                          Z          40 00  SIDE SLOPE
                     NDXMIN              2  MINIMUM NUMBER OF DX INTERVALS
                     RUPSTQ             NO  ROUTE UPSTREAM HYDROGRAPH

                                                     ***

                                       COMPUTED KINEMATIC PARAMETERS
                                             VARIABLE TIME STEP
                                           (DT SHOWN IS A MINIMUM)

                 ELEMENT    ALPHA        M         DT        DX       PEAK    TIME TO     VOLUME    MAXIMUM
                                                                               PEAK                 CELERITY
                                                  (MIN)      (M)      (CMS)   (MIN)       (MM)      (MPS)
```

PLANE1	56	1 67	18 55	162 05	38.57	805 08	101 54	15
PLANE2	56	1 67	24 65	234 08	47 66	831 75	101 41	16
MAIN	32	1 33	25 16	2667 54	76 39	864 79	101 35	1 78

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 0000E+00 EXCESS- 1612E+04 OUTFLOW- 1599E+04 BASIN STORAGE- 1187E+01 PERCENT ERROR- 7

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	32	1 33	30 00	75 84	870 00	101.41

*** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL = 177 18, TOTAL LOSS = 75 05, TOTAL EXCESS = 102 13

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149 50-HR
+ (CU M/S)	(HR)				
	(CU M/S)				
+ 76	14 50	48	18	6	3
	(MM)	66 048	98.598	101 150	101 359
	(1000 CU M)	1046	1561	1601	1605

CUMULATIVE AREA = 15 83 SQ KM

17 KO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0	HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

18 BA SUBBASIN CHARACTERISTICS

TAREA	22 10	SUBBASIN AREA

PRECIPITATION DATA

10 PH

DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM											
HYDRO-35					TP-40					TP-49	
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
19 40	40 00	77 30	98 00	110.00	140.00	164 00	194 00	00	00	00	00

STORM AREA = 220.00

11 LS SCS LOSS RATE

STRTL	17 85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT

STRTL	17.85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

KINEMATIC WAVE

19 UK OVERLAND-FLOW ELEMENT NO 1

L	1130.	OVERLAND FLOW LENGTH
S	0160	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	46 1	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

20 UK OVERLAND-FLOW ELEMENT NO. 2

L	1320	OVERLAND FLOW LENGTH
S	0160	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	53 9	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

KINEMATIC WAVE

21 RK MAIN CHANNEL

L	9000	CHANNEL LENGTH
S	.0080	SLOPE
N	045	CHANNEL ROUGHNESS COEFFICIENT
CA	22 10	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WD	00	BOTTOM WIDTH OR DIAMETER
Z	40 00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	NO	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	32	1 67	27 47	161 48	40 14	918.48	101 30	10
PLANE2	32	1 67	30.00	188.63	42 33	920.98	101.21	10
MAIN	37	1 33	25.15	3000.98	76 77	953 46	101 19	1 99

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 0000E+00 EXCESS- 2251E+04 OUTFLOW- 2229E+04 BASIN STORAGE- 4756E+01 PERCENT ERROR- 8

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	37	1 33	30 00	76 30	960 00	101 17

*** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL = 177 18, TOTAL LOSS = 75 05, TOTAL EXCESS = 102 13

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW

```
                                        6-HR        24-HR        72-HR     149 50-HR
+  (CU M/S)     (HR)
                    (CU M/S)
+       76     16 00                     58.          24            9            4
                          (MM)       56 474       95.452      100.592      101 113
                  (1000 CU M)         1248         2109         2223         2235

                        CUMULATIVE AREA =   22 10 SQ KM


   24 KO          OUTPUT CONTROL VARIABLES
                       IPRNT            3  PRINT CONTROL
                       IPLOT            0  PLOT CONTROL
                       QSCAL            0  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

   25 BA          SUBBASIN CHARACTERISTICS
                       TAREA        19 42  SUBBASIN AREA

                PRECIPITATION DATA

   10 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                      HYDRO-35                                 TP-40                                    TP-49
                5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                19.40   40 00   77 30   98 00  110 00  148 00  164 00  194 00      00      00      00      00

                                                STORM AREA =  220 00

   11 LS          SCS LOSS RATE
                       STRTL        17.85  INITIAL ABSTRACTION
                      CRVNBR        74 00  CURVE NUMBER
                       RTIMP           00  PERCENT IMPERVIOUS AREA

                  LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                       STRTL        17 85  INITIAL ABSTRACTION
                      CRVNBR        74 00  CURVE NUMBER
                       RTIMP           00  PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
   26 UK          OVERLAND-FLOW ELEMENT NO. 1
                           L         1700  OVERLAND FLOW LENGTH
                           S         0160  SLOPE
                           N          400  ROUGHNESS COEFFICIENT
                          PA         35 0  PERCENT OF SUBBASIN
                        DXMIN            5  MINIMUM NUMBER OF DX INTERVALS
   27 UK          OVERLAND-FLOW ELEMENT NO  2
                           L         3150  OVERLAND FLOW LENGTH
                           S         0160  SLOPE
                           N          400  ROUGHNESS COEFFICIENT
                          PA         65 0  PERCENT OF SUBBASIN
                        DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

                KINEMATIC WAVE
   28 RK          MAIN CHANNEL
                           L         4000  CHANNEL LENGTH
                           S        .0040  SLOPE
                           N          045  CHANNEL ROUGHNESS COEFFICIENT
                          CA        19.42  CONTRIBUTING AREA
                       SHAPE         TRAP  CHANNEL SHAPE
                          WD          .00  BOTTOM WIDTH OR DIAMETER
                           Z        40.00  SIDE SLOPE
                       NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                       RUPSTQ           NO  ROUTE UPSTREAM HYDROGRAPH

                                                                  ***
                                    COMPUTED KINEMATIC PARAMETERS
                                         VARIABLE TIME STEP
                                     (DT SHOWN IS A MINIMUM)

                     ELEMENT     ALPHA        M          DT          DX        PEAK     TIME TO PEAK      VOLUME     MAXIMUM CELERITY
                                                         (MIN)        (M)       (CMS)        (MIN)          (MM)          (MPS)

                     PLANE1          32       1 67       30.00      188.95      20 13      984 18      101 23            10
                     PLANE2          32       1 67       30 00      242.39      24 41     1212 43      100 90            11
                     MAIN            26       1 33       17 12     1333.77      39 95     1011 92      101 00          1 31

 CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00  EXCESS-  1978E+04 OUTFLOW-  1955E+04 BASIN STORAGE-  1173E+02 PERCENT ERROR-     6

                                    INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                     MAIN            26       1 33       30 00                  39 95     1020 00      101 00

          ***            ***             ***            ***            ***

                        HYDROGRAPH AT STATION

     TOTAL RAINFALL =  177 18, TOTAL LOSS =   75 05, TOTAL EXCESS =  102 13

   PEAK FLOW     TIME                                MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR     149 50-HR
+  (CU M/S)     (HR)
                    (CU M/S)
+       40     17 00                     37           20            7.           4
                          (MM)       40 809       89 469       99 664      100.952
                  (1000 CU M)          793         1737         1935         1960

                        CUMULATIVE AREA =   19 42 SQ KM


   31 KO          OUTPUT CONTROL VARIABLES
                       IPRNT            3  PRINT CONTROL
                       IPLOT            0  PLOT CONTROL
                       QSCAL            0  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

   32 BA          SUBBASIN CHARACTERISTICS
                       TAREA        13.87  SUBBASIN AREA
```

000082

```
               PRECIPITATION DATA

 10 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                     HYDRO-35                             TP-40                    .   ..      TP-49
               5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR    2-DAY   4-DAY   7-DAY  10-DAY
               19 40   40 00   77 30   98 00  110 00  148 00  164 00  194 00     .00     00      .00     00

                                                  STORM AREA -   220 00

 11 LS         SCS LOSS RATE
                   STRTL        17 85  INITIAL ABSTRACTION
                  CRVNBR        74 00  CURVE NUMBER
                   RTIMP           00  PERCENT IMPERVIOUS AREA

                LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                   STRTL        17 85  INITIAL ABSTRACTION
                  CRVNBR        74 00  CURVE NUMBER
                   RTIMP           00  PERCENT IMPERVIOUS AREA

               KINEMATIC WAVE
 33 UK          OVERLAND-FLOW ELEMENT NO. 1
                       L        1210   OVERLAND FLOW LENGTH
                       S        0130   SLOPE
                       N         400   ROUGHNESS COEFFICIENT
                      PA        52 3   PERCENT OF SUBBASIN
                   DXMIN           5   MINIMUM NUMBER OF DX INTERVALS
 34 UK          OVERLAND-FLOW ELEMENT NO. 2
                       L        1100   OVERLAND FLOW LENGTH
                       S        0130   SLOPE
                       N         400   ROUGHNESS COEFFICIENT
                      PA        47 7   PERCENT OF SUBBASIN
                   DXMIN           5   MINIMUM NUMBER OF DX INTERVALS

               KINEMATIC WAVE
 35 RK          MAIN CHANNEL
                       L        6000   CHANNEL LENGTH
                       S        0030   SLOPE
                       N         045   CHANNEL ROUGHNESS COEFFICIENT
                      CA        13 87  CONTRIBUTING AREA
                   SHAPE        TRAP   CHANNEL SHAPE
                      WD          00   BOTTOM WIDTH OR DIAMETER
                       Z        40 00  SIDE SLOPE
                  NDXMIN           2   MINIMUM NUMBER OF DX INTERVALS
                  RUPSTQ          NO   ROUTE UPSTREAM HYDROGRAPH

                                                          ***

                                         COMPUTED KINEMATIC PARAMETERS
                                              VARIABLE TIME STEP
                                             (DT SHOWN IS A MINIMUM)

                 ELEMENT    ALPHA        M         DT        DX        PEAK     TIME TO      VOLUME     MAXIMUM
                                                                                 PEAK                  CELERITY
                                                 (MIN)      (M)       (CMS)     (MIN)       (MM)       (MPS)

                PLANE1        29       1 67      28 07     151 30     25 57     926 36     101 29        09
                PLANE2        29       1 67      29 45     157 19     24.92     904.34     101 32       .09
                MAIN          22       1 33      27 45    2000 66     46 95     956 84     101 23      1 22

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00  EXCESS-  1413E+04 OUTFLOW-  1399E+04 BASIN STORAGE-  3254E+01 PERCENT ERROR-      7


                                           INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL


                MAIN          22       1 33      30 00                46 86     960 00     101 28

      ***          ***          ***          ***          ***

                      HYDROGRAPH AT STATION

   TOTAL RAINFALL -  177 18, TOTAL LOSS -   75 05, TOTAL EXCESS -  102 13

  PEAK FLOW      TIME                        MAXIMUM AVERAGE FLOW
                                  6-HR         24-HR        72-HR      149 50-HR
+  (CU M/S)      (HR)
                       (CU M/S)
+      47       16 00              36           15            5            3.
                          (MM)    55 807       95 309      100 679      101 227
                    (1000 CU M)    774          1322        1396.         1404

                      CUMULATIVE AREA -   13 87 SQ KM


  40 KO        OUTPUT CONTROL VARIABLES
                   IPRNT             3   PRINT CONTROL
                   IPLOT             0   PLOT CONTROL
                   QSCAL           0     HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

  41 BA        SUBBASIN CHARACTERISTICS
                   TAREA          3 04   SUBBASIN AREA

               PRECIPITATION DATA

  10 PH                               DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                     HYDRO-35          .       .         TP-40            .           ..    . TP-49    ..
               5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR    2-DAY   4-DAY   7-DAY  10-DAY
               19 40   40 00   77 30   98.00  110.00  148.00  164 00  194 00      00     .00      00      00

                                                  STORM AREA -   220 00

  11 LS        SCS LOSS RATE
                   STRTL        17.85  INITIAL ABSTRACTION
                  CRVNBR        74 00  CURVE NUMBER
                   RTIMP          00   PERCENT IMPERVIOUS AREA

                LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
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                    STRTL          17 85  INITIAL ABSTRACTION
                   CRVNBR          74 00  CURVE NUMBER
                    RTIMP             00  PERCENT IMPERVIOUS AREA

                 KINEMATIC WAVE
  42 UK            OVERLAND-FLOW ELEMENT NO  1
                        L        1250   OVERLAND FLOW LENGTH
                        S        0100   SLOPE
                        N         400   ROUGHNESS COEFFICIENT
                       PA        61 8   PERCENT OF SUBBASIN
                    DXMIN           5   MINIMUM NUMBER OF DX INTERVALS
  43 UK            OVERLAND-FLOW ELEMENT NO  2
                        L         780   OVERLAND FLOW LENGTH
                        S        0100   SLOPE
                        N         400   ROUGHNESS COEFFICIENT
                       PA        38 2   PERCENT OF SUBBASIN
                    DXMIN           5   MINIMUM NUMBER OF DX INTERVALS

                 KINEMATIC WAVE
  44 RK            MAIN CHANNEL
                        L        1500   CHANNEL LENGTH
                        S        0080   SLOPE
                        N         045   CHANNEL ROUGHNESS COEFFICIENT
                       CA        3 04   CONTRIBUTING AREA
                    SHAPE        TRAP   CHANNEL SHAPE
                       WD          00   BOTTOM WIDTH OR DIAMETER
                        Z       40 00   SIDE SLOPE
                   NDXMIN           2   MINIMUM NUMBER OF DX INTERVALS
                   RUPSTQ          NO   ROUTE UPSTREAM HYDROGRAPH

                                                ***


                              COMPUTED KINEMATIC PARAMETERS
                                   VARIABLE TIME STEP
                                 (DT SHOWN IS A MINIMUM)

             ELEMENT     ALPHA      M         DT        DX       PEAK   TIME TO     VOLUME   MAXIMUM
                                                                           PEAK               CELERITY
                                            (MIN)      (M)      (CMS)    (MIN)       (MM)      (MPS)

             PLANE1         25     1 67      28.92    138.93      5 88    965 42    101 32        08
             PLANE2         25     1 67      24 51    111 47      5.01    890 86    101.43        08
             MAIN           37     1 33       7 10    500 16      9 98    933 22    101 39      1 20

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00  EXCESS-  3096E+03 OUTFLOW-  3072E+03 BASIN STORAGE-  6957E+00 PERCENT ERROR-     6

                                INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL


             MAIN           37     1 33      30 00                9 98    930 00    101 30

      ***        ***        ***        ***        ***

                      HYDROGRAPH AT STATION

    TOTAL RAINFALL -  177 18  TOTAL LOSS -   75 05, TOTAL EXCESS -  102 13

  PEAK FLOW      TIME                      MAXIMUM AVERAGE FLOW
                                 6-HR       24-HR        72-HR     149 50-HR
+  (CU M/S)      (HR)
                      (CU M/S)
+       10      15 50               8          3            1             1
                           (MM)    56 255     95 555      100 700       101 248
                     (1000 CU M)    171        290          306           308

                     CUMULATIVE AREA -    3 04 SQ KM

  47 KO          OUTPUT CONTROL VARIABLES
                      IPRNT             3  PRINT CONTROL
                      IPLOT             0  PLOT CONTROL
                      QSCAL             0  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

  48 BA          SUBBASIN CHARACTERISTICS
                      TAREA          4 92  SUBBASIN AREA

                 PRECIPITATION DATA

  10 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                    HYDRO-35   .          ..         . .  TP-40         .      .         -          TP-49 .
                 5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                 19 40   40 00   77 30   98 00  110 00  148 00  164.00  194 00      00      00     .00      00
                                                          STORM AREA -  220 00

  11 LS          SCS LOSS RATE
                    STRTL          17 85  INITIAL ABSTRACTION
                   CRVNBR          74 00  CURVE NUMBER
                    RTIMP             00  PERCENT IMPERVIOUS AREA

                   LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                    STRTL          17 85  INITIAL ABSTRACTION
                   CRVNBR          74 00  CURVE NUMBER
                    RTIMP             00  PERCENT IMPERVIOUS AREA

                 KINEMATIC WAVE
  49 UK            OVERLAND-FLOW ELEMENT NO  1
                        L         980.  OVERLAND FLOW LENGTH
                        S        0100   SLOPE
                        N         400   ROUGHNESS COEFFICIENT
                       PA        59.9   PERCENT OF SUBBASIN
                    DXMIN           5   MINIMUM NUMBER OF DX INTERVALS
  50 UK            OVERLAND-FLOW ELEMENT NO  2
                        L         660   OVERLAND FLOW LENGTH
                        S        0100   SLOPE
                        N         400   ROUGHNESS COEFFICIENT
                       PA        40 1   PERCENT OF SUBBASIN
                    DXMIN           5   MINIMUM NUMBER OF DX INTERVALS
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                  KINEMATIC WAVE
  51 RK             MAIN CHANNEL
                          L        3000   CHANNEL LENGTH
                          S         0080  SLOPE
                          N          045  CHANNEL ROUGHNESS COEFFICIENT
                         CA         4 92  CONTRIBUTING AREA
                      SHAPE         TRAP  CHANNEL SHAPE
                         WD           00  BOTTOM WIDTH OR DIAMETER
                          Z        40 00  SIDE SLOPE
                     NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                     RUPSTQ          YES  ROUTE UPSTREAM HYDROGRAPH

                                                  ***
                                        COMPUTED KINEMATIC PARAMETERS
                                             VARIABLE TIME STEP
                                           (DT SHOWN IS A MINIMUM)

                 ELEMENT    ALPHA       M         DT         DX        PEAK    TIME TO      VOLUME     MAXIMUM
                                                                                 PEAK                  CELERITY
                                                 (MIN)       (M)       (CMS)     (MIN)       (MM)       (MPS)

                PLANE1         25       1 67      26 19     122 54      11 02     909 83     101 38        08
                PLANE2         25       1 67      24.68     110 04       9.11     864 22     101 36        07
                MAIN           37       1 33      10 99    1000.33      28.38     909 94     101 34      1 52

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  3067E+03  EXCESS-  5011E+03 OUTFLOW-  8040E+03 BASIN STORAGE-  8424E+00 PERCENT ERROR-      4


                                              INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL


                MAIN           37       1 33      30 00                 28 16     930 00     101 25

     ***          ***          ***          ***          ***

                       HYDROGRAPH AT STATION

     TOTAL RAINFALL -  177 18  TOTAL LOSS -   75 05, TOTAL EXCESS -  102 13

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                   6-HR         24-HR        72-HR     149 50-HR
+   (CU M/S)     (HR)
                           (CU M/S)
+        28       15 50             21            9            3             1
                             (MM)  58 333       96 175     100 735       101 201
                      (1000 CU M)    464          766          802           806

                         CUMULATIVE AREA -     7 96 SQ KM


  56 KO           OUTPUT CONTROL VARIABLES
                      IPRNT             3  PRINT CONTROL
                      IPLOT             0  PLOT CONTROL
                      QSCAL             0   HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

  57 BA           SUBBASIN CHARACTERISTICS
                      TAREA          8 33  SUBBASIN AREA

                  PRECIPITATION DATA

  10 PH                                     DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                      HYDRO-35          .        ..      .     TP-40          .  . .         ..    .  TP-49 ..     .
                  5-MIN  15-MIN  60-MIN     2-HR     3-HR     6-HR    12-HR   24-HR    2-DAY    4-DAY    7-DAY   10-DAY
                  19 40   40 00   77 30    98 00   110 00   148 00   164 00  194 00       00       00       00      .00

                                                           STORM AREA -   220 00

  11 LS           SCS LOSS RATE
                      STRTL         17 85  INITIAL ABSTRACTION
                     CRVNBR         74 00  CURVE NUMBER
                      RTIMP            00  PERCENT IMPERVIOUS AREA

                    LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                      STRTL         17 85  INITIAL ABSTRACTION
                     CRVNBR         74 00  CURVE NUMBER
                      RTIMP            00  PERCENT IMPERVIOUS AREA

                  KINEMATIC WAVE
  58 UK             OVERLAND-FLOW ELEMENT NO  1
                          L          820   OVERLAND FLOW LENGTH
                          S         0130  SLOPE
                          N          400  ROUGHNESS COEFFICIENT
                         PA         49 4  PERCENT OF SUBBASIN
                      DXMIN            5  MINIMUM NUMBER OF DX INTERVALS
  59 UK             OVERLAND-FLOW ELEMENT NO  2
                          L          840  OVERLAND FLOW LENGTH
                          S         0130  SLOPE
                          N          400  ROUGHNESS COEFFICIENT
                         PA         50 6  PERCENT OF SUBBASIN
                      DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

                  KINEMATIC WAVE
  60 RK             MAIN CHANNEL
                          L         5000  CHANNEL LENGTH
                          S         0030  SLOPE
                          N          045  CHANNEL ROUGHNESS COEFFICIENT
                         CA         8 33  CONTRIBUTING AREA
                      SHAPE         TRAP  CHANNEL SHAPE
                         WD           00  BOTTOM WIDTH OR DIAMETER
                          Z        40 00  SIDE SLOPE
                     NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                     RUPSTQ          YES  ROUTE UPSTREAM HYDROGRAPH

                                                  ***
                                        COMPUTED KINEMATIC PARAMETERS
                                             VARIABLE TIME STEP
                                           (DT SHOWN IS A MINIMUM)
```

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	29	1 67	26 48	136 71	18 33	879.39	101 36	09
PLANE2	29	1 67	27 07	140 05	18 59	883 91	101 33	09
MAIN	22	1 33	15 58	1667 21	274 43	957 18	100 89	1.79

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 7981E+04 EXCESS- 8484E+03 OUTFLOW- 8799E+04 BASIN STORAGE- 2433E+01 PERCENT ERROR- 3

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	22	1 33	30 00		273 77	960 00	100 88
***	***	***	***		***		

HYDROGRAPH AT STATION

TOTAL RAINFALL = 177 18, TOTAL LOSS = 75 05, TOTAL EXCESS = 102 13

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149.50-HR
+ (CU M/S)	(HR)				
	(CU M/S)				
+ 274	16 00	217	96	34	16
	(MM)	53 551	94 344	100 201	100 831
	(1000 CU M)	4686	8256	8769	8824.

CUMULATIVE AREA = 87 51 SQ KM

63 KO OUTPUT CONTROL VARIABLES
IPRNT 3 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0 HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

64 BA SUBBASIN CHARACTERISTICS
TAREA 19 41 SUBBASIN AREA

PRECIPITATION DATA

10 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35			TP-40					TP-49			
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
19 40	40 00	77 30	98 00	110.00	148.00	164 00	194 00	00	00	00	00

STORM AREA = 220 00

11 LS SCS LOSS RATE
STRTL 17.85 INITIAL ABSTRACTION
CRVNBR 74 00 CURVE NUMBER
RTIMP 00 PERCENT IMPERVIOUS AREA

LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
STRTL 17.85 INITIAL ABSTRACTION
CRVNBR 74.00 CURVE NUMBER
RTIMP 00 PERCENT IMPERVIOUS AREA

KINEMATIC WAVE
65 UK OVERLAND-FLOW ELEMENT NO 1
L 1340 OVERLAND FLOW LENGTH
S 0030 SLOPE
N 400 ROUGHNESS COEFFICIENT
PA 48.8 PERCENT OF SUBBASIN
DXMIN 5 MINIMUM NUMBER OF DX INTERVALS
66 UK OVERLAND-FLOW ELEMENT NO. 2
L 1400 OVERLAND FLOW LENGTH
S 0030 SLOPE
N 400 ROUGHNESS COEFFICIENT
PA 51 2 PERCENT OF SUBBASIN
DXMIN 5 MINIMUM NUMBER OF DX INTERVALS

KINEMATIC WAVE
67 RK MAIN CHANNEL
L 7100 CHANNEL LENGTH
S 0080 SLOPE
N 045 CHANNEL ROUGHNESS COEFFICIENT
CA 19 41 CONTRIBUTING AREA
SHAPE TRAP CHANNEL SHAPE
WD 00 BOTTOM WIDTH OR DIAMETER
Z 40 00 SIDE SLOPE
NDXMIN 2 MINIMUM NUMBER OF DX INTERVALS
RUPSTO NO ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	14	1 67	27 85	78 85	18.61	1204.95	101.11	05
PLANE2	14	1 67	27 31	77.80	18.98	1226.01	101 08	.05
MAIN	37	1 33	23 87	2367 44	36.64	1231 43	101 03	1.66

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 0000E+00 EXCESS- .1977E+04 OUTFLOW- 1955E+04 BASIN STORAGE- 1416E+02 PERCENT ERROR- 4

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	37	1 33	30 00		36.62	1230 00	101 03
***	***	***	***		***		

HYDROGRAPH AT STATION

TOTAL RAINFALL = 177 18 TOTAL LOSS = 75 05, TOTAL EXCESS = 102 13

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149 50-HR
+ (CU M/S)	(HR)				
		(CU M/S)			
+ 37	20 50	34	20	7	4
	(MM)	37 681	87 317	99 423	100 976
	(1000 CU M)	731	1695	1930	1960.

CUMULATIVE AREA = 19 41 SQ KM

70 KO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0	HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

71 BA SUBBASIN CHARACTERISTICS

TAREA	15 48	SUBBASIN AREA

PRECIPITATION DATA

10 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35					TP-40			TP-49			
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
19 40	40 00	77 30	98 00	110 00	140 00	164.00	194.00	.00	.00	00	00

STORM AREA = 220 00

11 LS SCS LOSS RATE

STRTL	17 85	INITIAL ABSTRACTION
CRVNBR	74.00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT

STRTL	17 85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

KINEMATIC WAVE

72 UK OVERLAND-FLOW ELEMENT NO 1

L	440.	OVERLAND FLOW LENGTH
S	0200	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	24 3	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

73 UK OVERLAND-FLOW ELEMENT NO 2

L	1380	OVERLAND FLOW LENGTH
S	0200	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	75 7	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

KINEMATIC WAVE

74 RK MAIN CHANNEL

L	8500	CHANNEL LENGTH
S	0030	SLOPE
N	045	CHANNEL ROUGHNESS COEFFICIENT
CA	15 48	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WD	00	BOTTOM WIDTH OR DIAMETER
Z	40 00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	YES	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	35	1 67	16 57	88.03	24 51	787.31	101.61	09
PLANE2	35	1 67	29 74	197 21	43 79	907 40	101 26	11
MAIN	22	1 33	27 03	2125.70	72 56	973 51	100 81	1 31

CONTINUITY SUMMARY (1000 CU-M)-INFLOW= 1953E+04 EXCESS= 1577E+04 OUTFLOW= 3505E+04 BASIN STORAGE= 4498E+01 PERCENT ERROR= 6

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	22	1 33	30 00	72 40	990 00	100 78

*** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL = 177 18, TOTAL LOSS = 75 05, TOTAL EXCESS = 102 13

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149 50-HR
+ (CU M/S)	(HR)				
		(CU M/S)			
+ 72	16 50	63	36	13.	7
	(MM)	38 881	89 133	99 518	100 725
	(1000 CU M)	1357	3110	3472	3514

CUMULATIVE AREA = 34 89 SQ KM

000087

77 KO OUTPUT CONTROL VARIABLES

```
                    IPRNT          3  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL          0  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

 78 BA           SUBBASIN CHARACTERISTICS
                    TAREA       12 89  SUBBASIN AREA

                 PRECIPITATION DATA

 10 PH                              DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                      HYDRO-35                          TP-40                              TP-49
                 5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                 19 40   40 00  77 30   98 00  110 00  148 00  164 00  194 00      00      00      00      00

                                                  STORM AREA -  220 00

 11 LS           SCS LOSS RATE
                    STRTL       17 85  INITIAL ABSTRACTION
                   CRVNBR       74 00  CURVE NUMBER
                    RTIMP          00  PERCENT IMPERVIOUS AREA

                   LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                    STRTL       17 85  INITIAL ABSTRACTION
                   CRVNBR       74 00  CURVE NUMBER
                    RTIMP          00  PERCENT IMPERVIOUS AREA

                 KINEMATIC WAVE
 79 UR             OVERLAND-FLOW ELEMENT NO  1
                        L         750   OVERLAND FLOW LENGTH
                        S        0100   SLOPE
                        N         400   ROUGHNESS COEFFICIENT
                       PA        31 9   PERCENT OF SUBBASIN
                     DXMIN           5  MINIMUM NUMBER OF DX INTERVALS
 80 UR             OVERLAND-FLOW ELEMENT NO  2
                        L        1590   OVERLAND FLOW LENGTH
                        S        0100   SLOPE
                        N         400   ROUGHNESS COEFFICIENT
                       PA        68 1   PERCENT OF SUBBASIN
                     DXMIN           5  MINIMUM NUMBER OF DX INTERVALS

                 KINEMATIC WAVE
 81 RK             MAIN CHANNEL
                        L        5500   CHANNEL LENGTH
                        S       .0080   SLOPE
                        N         045   CHANNEL ROUGHNESS COEFFICIENT
                       CA       12 89   CONTRIBUTING AREA
                    SHAPE        TRAP   CHANNEL SHAPE
                       WD         .00   BOTTOM WIDTH OR DIAMETER
                        Z       40 00   SIDE SLOPE
                    NDXMIN           2  MINIMUM NUMBER OF DX INTERVALS
                    RUPSTQ          NO  ROUTE UPSTREAM HYDROGRAPH

                                                                  ***
                                        COMPUTED KINEMATIC PARAMETERS
                                             VARIABLE TIME STEP
                                          (DT SHOWN IS A MINIMUM)

                   ELEMENT     ALPHA        M          DT         DX        PEAK     TIME TO      VOLUME     MAXIMUM
                                                                                        PEAK                   CELERITY
                                                       (MIN)       (M)      (CMS)      (MIN)       (MM)       (MPS)

                   PLANE1          25      1 67       27.64    125.04      18 00     887.19     101 30         08
                   PLANE2          25      1 67       30 00    159 05      22.98    1039 92     101 21         08
                   MAIN            37      1 33       18 57   1833 93      35.43     944 72     101 21       1 65

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00  EXCESS-  1313E+04 OUTFLOW-  1300E+04 BASIN STORAGE-  4090E+01 PERCENT ERROR-    .6

                                          INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                   MAIN            37      1 33       30 00                 35 35     930 00     101 24

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION

    TOTAL RAINFALL -  177 18, TOTAL LOSS -   75 05, TOTAL EXCESS -  102 13

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR         24-HR         72-HR     149 50-HR
+  (CU M/S)     (HR)
                          (CU M/S)
+       35     15 50              30           14             5             2
                               (MM)      50.957       93 826      100.449       101.189
                         (1000 CU M)       657.         1209         1295          1304

                        CUMULATIVE AREA -   12 89 SQ KM

 86 KO           OUTPUT CONTROL VARIABLES
                    IPRNT          3  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL          0  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

 87 BA           SUBBASIN CHARACTERISTICS
                    TAREA        5 28  SUBBASIN AREA

                 PRECIPITATION DATA

 10 PH                              DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                      HYDRO-35                          TP-40                              TP-49
                 5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                 19 40   40 00  77 30   98 00  110 00  148 00  164.00  194 00      00      00      00      00

                                                  STORM AREA -  220 00

 11 LS           SCS LOSS RATE
```

```
                 STRTL          17 85  INITIAL ABSTRACTION
                CRVNBR          74 00  CURVE NUMBER
                 RTIMP             00  PERCENT IMPERVIOUS AREA

              LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                 STRTL          17 85  INITIAL ABSTRACTION
                CRVNBR          74 00  CURVE NUMBER
                 RTIMP             00  PERCENT IMPERVIOUS AREA

             KINEMATIC WAVE
 88 UK         OVERLAND-FLOW ELEMENT NO  1
                     L            750  OVERLAND FLOW LENGTH
                     S           0130  SLOPE
                     N            400  ROUGHNESS COEFFICIENT
                    PA           42 4  PERCENT OF SUBBASIN
                 DXMIN              5  MINIMUM NUMBER OF DX INTERVALS
 89 UK         OVERLAND-FLOW ELEMENT NO  2
                     L           1010  OVERLAND FLOW LENGTH
                     S           0130  SLOPE
                     N            400  ROUGHNESS COEFFICIENT
                    PA           57 6  PERCENT OF SUBBASIN
                 DXMIN              5  MINIMUM NUMBER OF DX INTERVALS

             KINEMATIC WAVE
 90 RK         MAIN CHANNEL
                     L           3000  CHANNEL LENGTH
                     S           0030  SLOPE
                     N            045  CHANNEL ROUGHNESS COEFFICIENT
                    CA           5 28  CONTRIBUTING AREA
                 SHAPE           TRAP  CHANNEL SHAPE
                    WD            .00  BOTTOM WIDTH OR DIAMETER
                     Z          40.00  SIDE SLOPE
                NDXMIN              2  MINIMUM NUMBER OF DX INTERVALS
                RUPSTQ            YES  ROUTE UPSTREAM HYDROGRAPH

                                                         ***
                                    COMPUTED KINEMATIC PARAMETERS
                                         VARIABLE TIME STEP
                                        (DT SHOWN IS A MINIMUM)

               ELEMENT    ALPHA      M        DT        DX       PEAK     TIME TO     VOLUME    MAXIMUM
                                                                            PEAK                CELERITY
                                             (MIN)      (M)      (CMS)    (MIN)       (MM)       (MPS)

               PLANE1       29      1 67     24 62    125.04     10 35    863.66     101 36        08
               PLANE2       29      1 67     27.27    144.33     12 06    916 69     101.33        09
               MAIN         22      1 33     11.41   1000 33    121 71    978 97     100.78      1.46

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  4802E+04  EXCESS-  5377E+03 OUTFLOW-  5329E+04 BASIN STORAGE-  1575E+01 PERCENT ERROR-     .2

                                      INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL


               MAIN         22      1 33     30.00               121 39    990 00     100 77

      ***           ***          ***          ***          ***

                        HYDROGRAPH AT STATION

    TOTAL RAINFALL -  177 18, TOTAL LOSS -   75 05, TOTAL EXCESS -  102 13

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                 6-HR        24-HR        72-HR     149 50-HR
+   (CU M/S)     (HR)
                       (CU M/S)
+      121       16 50           104           56           20           10
                         (MM)   42 514       90 464       99 675      100 716
                  (1000 CU M)     2256         4800         5289        5344.

                      CUMULATIVE AREA -   53 06 SQ KM


  93 KO         OUTPUT CONTROL VARIABLES
                    IPRNT             3  PRINT CONTROL
                    IPLOT             0  PLOT CONTROL
                    QSCAL          0     HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

  94 BA         SUBBASIN CHARACTERISTICS
                    TAREA         14 94  SUBBASIN AREA

                PRECIPITATION DATA

  10 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                    HYDRO-35                         TP-40                                TP-49
             5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
             19 40   40 00   77 30   98 00  110 00  140 00  164 00  194 00      00      00      00      00
                                                  STORM AREA -   220.00

  11 LS         SCS LOSS RATE
                    STRTL         17 85  INITIAL ABSTRACTION
                   CRVNBR         74 00  CURVE NUMBER
                    RTIMP            00  PERCENT IMPERVIOUS AREA

              LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                    STRTL         17 85  INITIAL ABSTRACTION
                   CRVNBR         74.00  CURVE NUMBER
                    RTIMP            00  PERCENT IMPERVIOUS AREA

             KINEMATIC WAVE
  95 UK         OVERLAND-FLOW ELEMENT NO  1
                        L         1860.  OVERLAND FLOW LENGTH
                        S          0000  SLOPE
                        N           400  ROUGHNESS COEFFICIENT
                       PA          74 8  PERCENT OF SUBBASIN
                    DXMIN             5  MINIMUM NUMBER OF DX INTERVALS
  96 UK         OVERLAND-FLOW ELEMENT NO. 2
                        L           630  OVERLAND FLOW LENGTH
                        S          0000  SLOPE
```

```
                    N          400  ROUGHNESS COEFFICIENT
                   PA          25 2  PERCENT OF SUBBASIN
                DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

             KINEMATIC WAVE
 97 RK         MAIN CHANNEL
                    L         6000   CHANNEL LENGTH
                    S         0080   SLOPE
                    N          045   CHANNEL ROUGHNESS COEFFICIENT
                   CA        14 94   CONTRIBUTING AREA
                SHAPE         TRAP   CHANNEL SHAPE
                   WD           00   BOTTOM WIDTH OR DIAMETER
                    Z        40 00   SIDE SLOPE
               NDXMIN            2   MINIMUM NUMBER OF DX INTERVALS
               RUPSTQ           NO   ROUTE UPSTREAM HYDROGRAPH

                                              ***
                                 COMPUTED KINEMATIC PARAMETERS
                                      VARIABLE TIME STEP
                                    (DT SHOWN IS A MINIMUM)

              ELEMENT    ALPHA        M          DT          DX        PEAK    TIME TO     VOLUME    MAXIMUM
                                                                               PEAK                  CELERITY
                                               (MIN)         (M)      (CMS)    (MIN)       (MM)      (MPS)

              PLANE1       71       1 67       29 40      372.12      51 51    867.83     101.22       .21
              PLANE2       71       1 67       12 55      126 04      28 31    768.76     101.75       17
              MAIN         37       1 33       17 56     2000.66      64 45    861.76     101 32      1.91

CONTINUITY SUMMARY (1000 CU-M)-INFLOW=  0000E+00  EXCESS=  1522E+04 OUTFLOW=  1509E+04 BASIN STORAGE=  1364E+01 PERCENT ERROR=     8

                                   INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL


              MAIN         37       1 33       30 00                  64 44    870.00     101 22

    ***          ***          ***          ***          ***

                  HYDROGRAPH AT STATION

  TOTAL RAINFALL =  177 18, TOTAL LOSS =   75 05, TOTAL EXCESS =  102 13

 PEAK FLOW     TIME                     MAXIMUM AVERAGE FLOW
                               6-HR          24-HR        72-HR    149 50-HR
+  (CU M/S)    (HR)
                      (CU M/S)
+     64      14 50              45             17           6.           3.
                       (MM)    65 171        98 086      100 911      101 168
                  (1000 CU M)    974           1465        1508.        1511

                  CUMULATIVE AREA =   14 94 SQ KM


 100 KO        OUTPUT CONTROL VARIABLES
                  IPRNT            3  PRINT CONTROL
                  IPLOT            0  PLOT CONTROL
                  QSCAL        0   HYDROGRAPH PLOT SCALE

            SUBBASIN RUNOFF DATA

 101 BA        SUBBASIN CHARACTERISTICS
                  TAREA        7 52  SUBBASIN AREA

               PRECIPITATION DATA

  10 PH                             DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                  HYDRO-35                          TP-40                                   TP-49
 5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR    12-HR    24-HR    2-DAY   4-DAY   7-DAY  10-DAY
 19 40   40 00   77 30    98 00  110 00  148 00  164.00   194 00     .00     00      .00     .00

                                          STORM AREA =   220 00

  11 LS        SCS LOSS RATE
                  STRTL        17 85  INITIAL ABSTRACTION
                 CRVNBR        74 00  CURVE NUMBER
                  RTIMP           00  PERCENT IMPERVIOUS AREA

                LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                  STRTL        17 85  INITIAL ABSTRACTION
                 CRVNBR        74 00  CURVE NUMBER
                  RTIMP           00  PERCENT IMPERVIOUS AREA

               KINEMATIC WAVE
 102 UK          OVERLAND-FLOW ELEMENT NO  1
                    L          870   OVERLAND FLOW LENGTH
                    S         0300   SLOPE
                    N         .400   ROUGHNESS COEFFICIENT
                   PA         24 3   PERCENT OF SUBBASIN
                DXMIN            5   MINIMUM NUMBER OF DX INTERVALS
 103 UK          OVERLAND-FLOW ELEMENT NO  2
                    L          800   OVERLAND FLOW LENGTH
                    S         0300   SLOPE
                    N          400   ROUGHNESS COEFFICIENT
                   PA         75 7   PERCENT OF SUBBASIN
                DXMIN            5   MINIMUM NUMBER OF DX INTERVALS

               KINEMATIC WAVE
 104 RK          MAIN CHANNEL
                    L         4500   CHANNEL LENGTH
                    S         0060   SLOPE
                    N          045   CHANNEL ROUGHNESS COEFFICIENT
                   CA         7 52   CONTRIBUTING AREA
                SHAPE         TRAP   CHANNEL SHAPE
                   WD           00   BOTTOM WIDTH OR DIAMETER
                    Z        40 00   SIDE SLOPE
               NDXMIN            2   MINIMUM NUMBER OF DX INTERVALS
               RUPSTQ          YES   ROUTE UPSTREAM HYDROGRAPH

                                              ***
                                 COMPUTED KINEMATIC PARAMETERS
                                      VARIABLE TIME STEP
```

1506 4 25 871 39 101 13 1 83

CONTINUITY SUMMARY (1000 CU-M) INFLOW- 1506E+04 EXCESS- 7659E+03 OUTFLOW- 2264E+04 BASIN STORAGE- 7091E+00 PERCENT ERROR- 3

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

	MAIN	32	1 33	30 00	99 14	870 00	101 19

*** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL = 177 18, TOTAL LOSS = 75 05, TOTAL EXCESS = 102 13

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149 50-HR
+ (CU M/S)	(HR)				
		(CU M/S)			
+ 99	14 50	68	25	9	4
	(MM)	64 976	98 075	100.890	101 139
	(1000 CU M)	1459	2203	2266	2272

CUMULATIVE AREA = 22 46 SQ KM

109 KO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0	HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

110 BA SUBBASIN CHARACTERISTICS

TAREA	3 67	SUBBASIN AREA

PRECIPITATION DATA

10 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35					TP-40					TP-49	
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
19 40	40 00	77 30	98 00	110.00	148.00	164.00	194 00	00	00	00	00

STORM AREA = 220 00

11 LS SCS LOSS RATE

STRTL	17 85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT

STRTL	17.85	INITIAL ABSTRACTION
CRVNBR	74.00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

KINEMATIC WAVE

111 UK OVERLAND-FLOW ELEMENT NO 1

L	1160	OVERLAND FLOW LENGTH
S	0130	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	63 4	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

112 UK OVERLAND-FLOW ELEMENT NO 2

L	670.	OVERLAND FLOW LENGTH
S	0130	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	36.6	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

KINEMATIC WAVE

113 RK MAIN CHANNEL

L	2000	CHANNEL LENGTH
S	0030	SLOPE
N	045	CHANNEL ROUGHNESS COEFFICIENT
CA	3.67	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WD	00	BOTTOM WIDTH OR DIAMETER
Z	40 00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	YES	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	29	1 67	30 00	165.77	8 43	915.72	101 23	09
PLANE2	29	1 67	26 93	134 04	6 50	849.45	101 29	08
MAIN	22	1 33	5.52	666 89	488 01	943 22	100.77	2 05

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 1638E+05 EXCESS- 3738E+03 OUTFLOW- 1674E+05 BASIN STORAGE- .1622E+01 PERCENT ERROR- .1

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

	MAIN	22	1 33	30.00	485.95	960.00	100 76

```
      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION

     TOTAL RAINFALL =  177 18. TOTAL LOSS =   75 05. TOTAL EXCESS =  102 13

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                    6-HR          24-HR          72-HR      149 50-HR
+  (CU M/S)     (HR)
                              (CU M/S)
+      486      16 00                390            180             64            31
                                  (MM)     50 495         93 342         99 989        100 707
                           (1000 CU M)      8417           15560          16668         16788.

                           CUMULATIVE AREA =  166 70 SQ KM


  116 KO          OUTPUT CONTROL VARIABLES
                        IPRNT          3  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL          0  HYDROGRAPH PLOT SCALE

                  SUBBASIN RUNOFF DATA

  117 BA          SUBBASIN CHARACTERISTICS
                        TAREA       6 44  SUBBASIN AREA

                  PRECIPITATION DATA

   10 PH                                 DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                        HYDRO-35                          TP-40                                    TP-49
                  5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR    12-HR   24-HR    2-DAY   4-DAY   7-DAY  10-DAY
                  19 40   40 00   77 30   98 00  110 00  148 00  164 00  194.00      00      00      00      00

                                                 STORM AREA =  220.00

   11 LS          SCS LOSS RATE
                        STRTL      17 85  INITIAL ABSTRACTION
                       CRVNBR      74 00  CURVE NUMBER
                        RTIMP         00  PERCENT IMPERVIOUS AREA

                    LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                        STRTL      17 85  INITIAL ABSTRACTION
                       CRVNBR      74 00  CURVE NUMBER
                        RTIMP         00  PERCENT IMPERVIOUS AREA

                  KINEMATIC WAVE
  118 UK            OVERLAND-FLOW ELEMENT NO  1
                            L        490  OVERLAND FLOW LENGTH
                            S       0500  SLOPE
                            N        400  ROUGHNESS COEFFICIENT
                           PA       30.5  PERCENT OF SUBBASIN
                         DXMIN          5  MINIMUM NUMBER OF DX INTERVALS
  119 UK            OVERLAND-FLOW ELEMENT NO. 2
                            L       1120  OVERLAND FLOW LENGTH
                            S       0500  SLOPE
                            N        400  ROUGHNESS COEFFICIENT
                           PA       69 5  PERCENT OF SUBBASIN
                         DXMIN          5  MINIMUM NUMBER OF DX INTERVALS

                  KINEMATIC WAVE
  120 RK            MAIN CHANNEL
                            L       4000  CHANNEL LENGTH
                            S       0100  SLOPE
                            N        045  CHANNEL ROUGHNESS COEFFICIENT
                           CA       6 44  CONTRIBUTING AREA
                        SHAPE       TRAP  CHANNEL SHAPE
                           WD         00  BOTTOM WIDTH OR DIAMETER
                            Z       40 00  SIDE SLOPE
                        NDXMIN          2  MINIMUM NUMBER OF DX INTERVALS
                        RUPSTQ         NO  ROUTE UPSTREAM HYDROGRAPH

                                                  ***
                                  COMPUTED KINEMATIC PARAMETERS
                                       VARIABLE TIME STEP
                                   (DT SHOWN IS A MINIMUM)

                    ELEMENT     ALPHA       M          DT          DX         PEAK      TIME TO       VOLUME      MAXIMUM
                                                                                          PEAK                      CELERITY
                                                       (MIN)       (M)       (CMS)      (MIN)        (MM)        (MPS)

                    PLANE1        .56      1.67       12 42       98.03      14.84     779.60      101 76          13
                    PLANE2         56      1 67       23 84      224.07      23 06     825.58      101 36          16
                    MAIN          .41      1.33       12 73     1333.77      33 02     824 74      101 48        1.76

  CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00  EXCESS-  6559E+03 OUTFLOW- .6514E+03 BASIN STORAGE-  4270E+00 PERCENT ERROR-     6

                                  INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                    MAIN            41      1 33       30 00                 32 63     810 00      101 47

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION

     TOTAL RAINFALL =  177.18. TOTAL LOSS =   75 05. TOTAL EXCESS =  102 13

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                    6-HR          24-HR          72-HR      149 50-HR
+  (CU M/S)     (HR)
                              (CU M/S)
+       33      13 50                21              7              3             1.
                                  (MM)     68 780         99 227         101 250       101.419
                           (1000 CU M)       443.           639            652           653

                           CUMULATIVE AREA =   6 44 SQ KM


  123 KO          OUTPUT CONTROL VARIABLES
                        IPRNT          3  PRINT CONTROL
```

```
                    IPLOT          0  PLOT CONTROL
                    QSCAL          0  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

 124 BA          SUBBASIN CHARACTERISTICS
                    TAREA       8 85  SUBBASIN AREA

                 PRECIPITATION DATA

  10 PH                          DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                    HYDRO-35                        TP-40                          .     TP-49          .
                 5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                 19 40   40 00   77 30   98 00  110 00  148 00  164 00  194 00     .00      00     .00      00

                                                STORM AREA -  220 00

  11 LS          SCS LOSS RATE
                    STRTL       17 85  INITIAL ABSTRACTION
                   CRVNBR       74 00  CURVE NUMBER
                    RTIMP          00  PERCENT IMPERVIOUS AREA

                 LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                    STRTL       17 85  INITIAL ABSTRACTION
                   CRVNBR       74.00  CURVE NUMBER
                    RTIMP          00  PERCENT IMPERVIOUS AREA

                 KINEMATIC WAVE
  125 UK           OVERLAND-FLOW ELEMENT NO  1
                        L         910   OVERLAND FLOW LENGTH
                        S        0300   SLOPE
                        N         400   ROUGHNESS COEFFICIENT
                       PA        51 5   PERCENT OF SUBBASIN
                     DXMIN           5  MINIMUM NUMBER OF DX INTERVALS
  126 UK           OVERLAND-FLOW ELEMENT NO  2
                        L         860   OVERLAND FLOW LENGTH
                        S        0300   SLOPE
                        N         400   ROUGHNESS COEFFICIENT
                       PA        48 5   PERCENT OF SUBBASIN
                     DXMIN           5  MINIMUM NUMBER OF DX INTERVALS

                 KINEMATIC WAVE
  127 RK           MAIN CHANNEL
                        L        5000   CHANNEL LENGTH
                        S       .0080   SLOPE
                        N         045   CHANNEL ROUGHNESS COEFFICIENT
                       CA        8 85   CONTRIBUTING AREA
                    SHAPE        TRAP   CHANNEL SHAPE
                       WD          00   BOTTOM WIDTH OR DIAMETER
                        Z       40 00   SIDE SLOPE
                   NDXMIN           2  MINIMUM NUMBER OF DX INTERVALS
                   RUPSTQ         YES  ROUTE UPSTREAM HYDROGRAPH

                                                  ***
                                    COMPUTED KINEMATIC PARAMETERS
                                         VARIABLE TIME STEP
                                      (DT SHOWN IS A MINIMUM)

                    ELEMENT     ALPHA        M          DT         DX        PEAK     TIME TO      VOLUME     MAXIMUM
                                                                                        PEAK                    CELERITY
                                                        (MIN)       (M)       (CMS)     (MIN)       (MM)       (MPS)

                    PLANE1          43      1 67       24 73    182 06       23 07    832.33     101 32          12
                    PLANE2          43      1 67       23 68    172 06       22 20    824.40     101 37          12
                    MAIN            37      1 33       14.41   1667 21       75 64    854 81     101 43        1 93

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  6508E+03  EXCESS- .9013E+03 OUTFLOW-  1546E+04 BASIN STORAGE-  8552E+00 PERCENT ERROR-     4

                                    INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                    MAIN            37      1 33       30 00                 74 74    870 00     101 46

      ***             ***             ***             ***             ***

                       HYDROGRAPH AT STATION

    TOTAL RAINFALL -  177 18, TOTAL LOSS -   75 05, TOTAL EXCESS -  102.13

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     149 50-HR
+  (CU M/S)     (HR)
                          (CU M/S)
+       75     14 50              48           17            6             3.
                    (MM)     67 193       98 776       101 203       101 412
              (1000 CU M)      1027         1510         1547          1551

                    CUMULATIVE AREA -   15 29 SQ KM


  130 KO          OUTPUT CONTROL VARIABLES
                    IPRNT          3  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL          0  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

  131 BA          SUBBASIN CHARACTERISTICS
                    TAREA       19 60  SUBBASIN AREA

                 PRECIPITATION DATA

  10 PH                          DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                    HYDRO-35                        TP-40                          .     TP-49          .
                 5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                 19 40   40 00   77 30   98 00  110 00  148 00  164 00  194 00      00      00      00      00

                                                STORM AREA -  220 00

  11 LS          SCS LOSS RATE
                    STRTL       17 85  INITIAL ABSTRACTION
```

```
                    CRVNBR        74 00  CURVE NUMBER
                    RTIMP           00   PERCENT IMPERVIOUS AREA

                  LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                    STRTL         17 85  INITIAL ABSTRACTION
                    CRVNBR        74 00  CURVE NUMBER
                    RTIMP           00   PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
132 UK            OVERLAND-FLOW ELEMENT NO  1
                        L          780   OVERLAND FLOW LENGTH
                        S         0130   SLOPE
                        N          400   ROUGHNESS COEFFICIENT
                       PA         37 9   PERCENT OF SUBBASIN
                     DXMIN            5  MINIMUM NUMBER OF DX INTERVALS
133 UK            OVERLAND-FLOW ELEMENT NO  2
                        L         1280   OVERLAND FLOW LENGTH
                        S         0130   SLOPE
                        N          400   ROUGHNESS COEFFICIENT
                       PA         62 1   PERCENT OF SUBBASIN
                     DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

                KINEMATIC WAVE
134 RK            MAIN CHANNEL
                        I         9500   CHANNEL LENGTH
                        S         0030   SLOPE
                        N          045   CHANNEL ROUGHNESS COEFFICIENT
                       CA         19 60  CONTRIBUTING AREA
                    SHAPE         TRAP   CHANNEL SHAPE
                       WD           00   BOTTOM WIDTH OR DIAMETER
                        Z         40 00  SIDE SLOPE
                    NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                    RUPSTQ           NO  ROUTE UPSTREAM HYDROGRAPH

                                                  ***
                                    COMPUTED KINEMATIC PARAMETERS
                                         VARIABLE TIME STEP
                                      (DT SHOWN IS A MINIMUM)

                  ELEMENT     ALPHA       M          DT          DX        PEAK     TIME TO PEAK    VOLUME     MAXIMUM CELERITY
                                                     (MIN)        (M)      (CMS)        (MIN)         (MM)          (MPS)

                  PLANE1          29      1 67       25 37      130.04     33 83       870.43       101.40          .09
                  PLANE2          29      1 67       29 68      160.05     41 12       938.54       101.31          09
                  MAIN            22      1 33       30.00     2375.78     64.32       969.24       101.22        1 30

CONTINUITY SUMMARY (1000 CU-M)-INFLOW=  0000E+00  EXCESS=  1996E+04 OUTFLOW= .1977E+04 BASIN STORAGE= .4511E+01 PERCENT ERROR=     7

                                          INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                  MAIN            22      1 33       30 00                  63 62     960 00     101 16

      ***           ***           ***          ***           ***

                        HYDROGRAPH AT STATION

    TOTAL RAINFALL =  177 18, TOTAL LOSS =   75 05, TOTAL EXCESS =  102 13

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                      6-HR          24-HR         72-HR     149 50-HR
+  (CU M/S)     (HR)
                      (CU M/S)
+       64     16 00                  50.            22             8             4
                          (MM)      54 880        95 019       100.561       101 103
                (1000 CU M)          1076          1862          1971          1982

                     CUMULATIVE AREA =   19 60 SQ KM


  139 KO          OUTPUT CONTROL VARIABLES
                      IPRNT            1  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL            0  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

  140 BA          SUBBASIN CHARACTERISTICS
                      TAREA         4 11  SUBBASIN AREA

                PRECIPITATION DATA

   10 PH                              DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                      HYDRO-35                          TP-40                                                  TP-49
                5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR    12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                19 40   40 00  77 30    90 00  110 00  140.00  164 00  194 00      00      00     .00     .00

                                                STORM AREA =  220 00

   11 LS          SCS LOSS RATE
                      STRTL         17 85  INITIAL ABSTRACTION
                      CRVNBR        74 00  CURVE NUMBER
                      RTIMP           .00  PERCENT IMPERVIOUS AREA

                  LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                      STRTL         17 85  INITIAL ABSTRACTION
                      CRVNBR        74 00  CURVE NUMBER
                      RTIMP           00   PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
  141 UK          OVERLAND-FLOW ELEMENT NO  1
                        L          450   OVERLAND FLOW LENGTH
                        S         0100   SLOPE
                        N          400   ROUGHNESS COEFFICIENT
                       PA         32 6   PERCENT OF SUBBASIN
                     DXMIN            5  MINIMUM NUMBER OF DX INTERVALS
  142 UK          OVERLAND-FLOW ELEMENT NO  2
                        L          920.  OVERLAND FLOW LENGTH
                        S         0100   SLOPE
                        N          400   ROUGHNESS COEFFICIENT
```

	PA	67 3	PERCENT OF SUBBASIN
	DXMIN	5	MINIMUM NUMBER OF DX INTERVALS
	KINEMATIC WAVE		
143 RK	MAIN CHANNEL		
	L	3000	CHANNEL LENGTH
	S	0030	SLOPE
	N	045	CHANNEL ROUGHNESS COEFFICIENT
	CA	4 11	CONTRIBUTING AREA
	SHAPE	TRAP	CHANNEL SHAPE
	WD	00	BOTTOM WIDTH OR DIAMETER
	Z	40 00	SIDE SLOPE
	NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
	RUPSTQ	YES	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	25	1 67	21 97	90.03	7.21	811 44	101.43	07
PLANE2	25	1 67	28 21	131 47	10.73	896 27	101 38	08
MAIN	22	1 33	7 82	1000 33	612 75	950 26	100 69	2 17

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 2025E+05 EXCESS- 4182E+03 OUTFLOW- 2064E+05 BASIN STORAGE- 2263E+01 PERCENT ERROR- 1

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	22	1 33	30 00	612 18	960 00	100 63									

HYDROGRAPH AT STATION

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
15	APR	1500	1	00	00	00	0	18	APR	1800	151	00	.00	00	2.
15	APR	1530	2	1 10	1 10	00	0	18	APR	1830	152	00	.00	00	2
15	APR	1600	3	1 13	1 13	00	0	18	APR	1900	153	00	00	00	2
15	APR	1630	4	1 17	1 17	00	0	18	APR	1930	154	.00	00	.00	2.
15	APR	1700	5	1 20	1 20	00	0	18	APR	2000	155	00	00	00	2
15	APR	1730	6	1 25	1 25	00	0	18	APR	2030	156	.00	00	00	2
15	APR	1800	7	1 29	1 29	00	0	18	APR	2100	157	00	00	00	2
15	APR	1830	8	1 35	1 35	00	0	18	APR	2130	158	.00	.00	00	2
15	APR	1900	9	1 40	1 40	00	0	18	APR	2200	159	00	00	.00	2.
15	APR	1930	10	1 46	1 46	00	0.	18	APR	2230	160	00	00	00	2
15	APR	2000	11	1 53	1 53	00	0	18	APR	2300	161	00	00	.00	2
15	APR	2030	12	1 61	1 61	00	0	18	APR	2330	162	.00	00	00	2
15	APR	2100	13	1 70	1 70	00	0	19	APR	0000	163	.00	00	.00	2.
15	APR	2130	14	1 36	1.36	00	0	19	APR	0030	164	.00	00	00	1
15	APR	2200	15	1 46	1 45	02	0	19	APR	0100	165	00	00	00	1
15	APR	2230	16	1 58	1 51	07	0	19	APR	0130	166	00	00	00	1
15	APR	2300	17	1 72	1 59	13	0	19	APR	0200	167	00	.00	00	1
15	APR	2330	18	1 89	1 68	21	0	19	APR	0230	168	00	00	00	1
16	APR	0000	19	2 10	1 79	31	0	19	APR	0300	169	00	00	00	1.
16	APR	0030	20	5 41	4 28	1 13	0	19	APR	0330	170	00	00	.00	1
16	APR	0100	21	5 94	4 21	1 73	0	19	APR	0400	171	00	00	00	1
16	APR	0130	22	6 66	4 21	2 45	0	19	APR	0430	172	.00	00	.00	1
16	APR	0200	23	6 27	3 54	2 73	0	19	APR	0500	173	00	00	00	1
16	APR	0230	24	10 15	5 02	5 13	1	19	APR	0530	174	00	00	00	1
16	APR	0300	25	19 91	7 91	12 00	4	19	APR	0600	175	.00	00	00	1
16	APR	0330	26	31 34	8 97	22 36	13	19	APR	0630	176	.00	00	00	1
16	APR	0400	27	11 96	2 67	9 29	46	19	APR	0700	177	00	00	00	1
16	APR	0430	28	7 06	1 43	5 64	140	19	APR	0730	178	00	00	00	1
16	APR	0500	29	7 14	1 35	5 80	289	19	APR	0800	179	00	.00	00	1
16	APR	0530	30	6 27	1 11	5 16	433	19	APR	0830	180	00	00	00	1
16	APR	0600	31	5 65	95	4 71	538	19	APR	0900	181	00	.00	00	1
16	APR	0630	32	2 23	36	1 87	596.	19	APR	0930	182	00	00	.00	1
16	APR	0700	33	1 99	32	1 67	613	19	APR	1000	183	00	00	00	1
16	APR	0730	34	1 80	28	1 52	599	19	APR	1030	184	.00	00	00	1
16	APR	0800	35	1 64	25	1 39	567	19	APR	1100	185	00	00	00	1
16	APR	0830	36	1 52	23	1 29	526	19	APR	1130	186	00	00	00	1.
16	APR	0900	37	1 41	21	1.20	481	19	APR	1200	187	00	00	00	1
16	APR	0930	38	1 75	26	1 49	437	19	APR	1230	188	00	00	00	1
16	APR	1000	39	1 65	24	1 41	397	19	APR	1300	189	00	.00	00	1.
16	APR	1030	40	1 57	23	1 35	361	19	APR	1330	190	00	.00	00	1
16	APR	1100	41	1 50	21	1 29	331	19	APR	1400	191	00	00	00	1
16	APR	1130	42	1 43	20	1 23	306.	19	APR	1430	192	00	.00	00	1
16	APR	1200	43	1 37	19	1 18	285	19	APR	1500	193	00	00	.00	1.
16	APR	1230	44	1 32	18	1 14	268	19	APR	1530	194	00	00	00	1
16	APR	1300	45	1 27	17	1 10	253	19	APR	1600	195	.00	00	00	1
16	APR	1330	46	1 23	.16	1 06	240	19	APR	1630	196	.00	00	00	1
16	APR	1400	47	1 18	16	1 03	228	19	APR	1700	197	00	00	00	1
16	APR	1430	48	1 15	15	1.00	217.	19	APR	1730	198	.00	00	.00	1.
16	APR	1500	49	1 11	14	97	206	19	APR	1800	199	00	.00	00	1.
16	APR	1530	50	00	00	00	195	19	APR	1830	200	00	00	00	1
16	APR	1600	51	00	00	00	185	19	APR	1900	201	00	00	00	1
16	APR	1630	52	00	00	00	174.	19	APR	1930	202	00	00	00	1
16	APR	1700	53	00	00	00	163.	19	APR	2000	203	00	00	00	1
16	APR	1730	54	00	00	00	152	19	APR	2030	204	00	00	00	1
16	APR	1800	55	00	00	00	141	19	APR	2100	205	00	00	00	1.
16	APR	1830	56	00	00	00	130.	19	APR	2130	206	.00	00	00	1.
16	APR	1900	57	00	00	00	120	19	APR	2200	207	.00	00	00	1
16	APR	1930	58	00	00	00	110	19	APR	2230	208	00	00	00	1
16	APR	2000	59	00	00	00	102	19	APR	2300	209	00	.00	00	1
16	APR	2030	60	00	00	00	94	19	APR	2330	210	.00	.00	00	1
16	APR	2100	61	00	00	00	86	20	APR	0000	211	.00	.00	00	1.
16	APR	2130	62	00	00	00	79	20	APR	0030	212	00	.00	00	1
16	APR	2200	63	00	00	00	73	20	APR	0100	213	00	00	00	1
16	APR	2230	64	00	00	00	68	20	APR	0130	214	00	00	00	1.
16	APR	2300	65	00	00	00	63	20	APR	0200	215	.00	00	00	1
16	APR	2330	66	00	00	00	59	20	APR	0230	216	.00	00	00	1
17	APR	0000	67	00	00	00	55	20	APR	0300	217	00	00	00	1
17	APR	0030	68	00	00	00	51	20	APR	0330	218	00	00	00	1

17 APR	0100	69	00	00	00	47	*	20 APR	0400	219	00	.00	.00	1
17 APR	0130	70	00	00	00	44	*	20 APR	0430	220	00	00	00	1
17 APR	0200	71	00	00	00	41	*	20 APR	0500	221	00	00	00	1
17 APR	0230	72	00	00	00	39	*	20 APR	0530	222	.00	00	00	1.
17 APR	0300	73	00	00	00	36	*	20 APR	0600	223	00	.00	00	1
17 APR	0330	74	00	00	00	34	*	20 APR	0630	224	00	.00	00	1
17 APR	0400	75	00	00	00	32	*	20 APR	0700	225	00	.00	00	1.
17 APR	0430	76	00	00	00	30	*	20 APR	0730	226	00	00	00	1
17 APR	0500	77	00	00	00	28	*	20 APR	0800	227	00	00	00	1
17 APR	0530	78	00	00	00	27	*	20 APR	0830	228	00	00	00	1
17 APR	0600	79	00	00	00	25	*	20 APR	0900	229	00	00	00	1
17 APR	0630	80	00	00	00	24	*	20 APR	0930	230	00	00	00	0.
17 APR	0700	81	00	00	.00	23	*	20 APR	1000	231	.00	00	00	0.
17 APR	0730	82	00	00	00	21	*	20 APR	1030	232	00	.00	00	0
17 APR	0800	83	00	00	00	20	*	20 APR	1100	233	00	00	00	0
17 APR	0830	84	00	00	00	19	*	20 APR	1130	234	00	.00	00	0
17 APR	0900	85	00	00	00	18	*	20 APR	1200	235	00	00	00	0
17 APR	0930	86	00	00	00	17	*	20 APR	1230	236	00	00	00	0
17 APR	1000	87	00	00	.00	16	*	20 APR	1300	237	00	00	00	0
17 APR	1030	88	00	00	00	16	*	20 APR	1330	238	00	.00	00	0
17 APR	1100	89	00	00	00	15	*	20 APR	1400	239	.00	00	00	0
17 APR	1130	90	00	00	00	14	*	20 APR	1430	240	.00	00	00	0
17 APR	1200	91	00	00	00	14	*	20 APR	1500	241	00	00	00	0
17 APR	1230	92	00	00	00	13	*	20 APR	1530	242	00	00	00	0
17 APR	1300	93	00	00	00	12	*	20 APR	1600	243	00	00	00	0
17 APR	1330	94	00	00	00	12	*	20 APR	1630	244	00	.00	00	0.
17 APR	1400	95	00	00	00	11	*	20 APR	1700	245	00	00	00	0
17 APR	1430	96	00	00	00	11	*	20 APR	1730	246	00	00	00	0
17 APR	1500	97	00	00	00	10	*	20 APR	1800	247	00	00	00	0
17 APR	1530	98	00	00	00	10	*	20 APR	1830	248	00	00	00	0
17 APR	1600	99	00	00	00	10	*	20 APR	1900	249	00	.00	00	0
17 APR	1630	100	00	00	00	9	*	20 APR	1930	250	.00	.00	00	0
17 APR	1700	101	00	00	00	9	*	20 APR	2000	251	00	00	00	0
17 APR	1730	102	00	00	00	8	*	20 APR	2030	252	.00	00	.00	0
17 APR	1800	103	00	00	00	8	*	20 APR	2100	253	00	00	00	0
17 APR	1830	104	00	00	00	8	*	20 APR	2130	254	00	00	00	0
17 APR	1900	105	00	00	00	8	*	20 APR	2200	255	00	00	00	0
17 APR	1930	106	00	00	00	7	*	20 APR	2230	256	00	00	00	0
17 APR	2000	107	00	00	00	7	*	20 APR	2300	257	00	00	00	0
17 APR	2030	108	00	00	00	7	*	20 APR	2330	258	00	00	00	0.
17 APR	2100	109	00	00	00	7	*	21 APR	0000	259	00	00	00	0
17 APR	2130	110	00	00	00	6	*	21 APR	0030	260	00	00	00	0
17 APR	2200	111	00	00	00	6	*	21 APR	0100	261	00	00	00	0
17 APR	2230	112	00	00	00	6	*	21 APR	0130	262	00	.00	00	0.
17 APR	2300	113	00	00	00	6	*	21 APR	0200	263	00	00	00	0
17 APR	2330	114	.00	00	00	5.	*	21 APR	0230	264	.00	.00	.00	0.
18 APR	0000	115	00	00	00	5	*	21 APR	0300	265	00	00	00	0
18 APR	0030	116	00	00	00	5	*	21 APR	0330	266	00	00	00	0
18 APR	0100	117	00	00	00	5	*	21 APR	0400	267	00	00	00	0
18 APR	0130	118	00	00	00	5	*	21 APR	0430	268	00	00	00	0
18 APR	0200	119	00	00	00	5	*	21 APR	0500	269	00	00	00	0
18 APR	0230	120	00	00	00	5	*	21 APR	0530	270	00	.00	00	0.
18 APR	0300	121	00	00	00	4	*	21 APR	0600	271	.00	00	00	0
18 APR	0330	122	00	00	00	4	*	21 APR	0630	272	00	00	00	0
18 APR	0400	123	00	00	00	4	*	21 APR	0700	273	00	00	00	0.
18 APR	0430	124	00	00	00	4	*	21 APR	0730	274	00	.00	00	0
18 APR	0500	125	00	00	00	4	*	21 APR	0800	275	00	00	00	0
18 APR	0530	126	00	00	00	4	*	21 APR	0830	276	00	00	00	0
18 APR	0600	127	00	00	00	4	*	21 APR	0900	277	.00	.00	00	0
18 APR	0630	128	00	00	00	4	*	21 APR	0930	278	00	00	00	0
18 APR	0700	129	00	00	00	3	*	21 APR	1000	279	00	.00	00	0
18 APR	0730	130	00	00	00	3	*	21 APR	1030	280	00	00	.00	0
18 APR	0800	131	00	00	00	3	*	21 APR	1100	281	00	00	00	0
18 APR	0830	132	00	00	00	3	*	21 APR	1130	282	.00	00	.00	0
18 APR	0900	133	00	00	00	3	*	21 APR	1200	283	00	00	00	0.
18 APR	0930	134	00	00	00	3	*	21 APR	1230	284	00	00	00	0
18 APR	1000	135	00	00	00	3	*	21 APR	1300	285	00	00	00	0.
18 APR	1030	136	00	00	00	3	*	21 APR	1330	286	00	00	00	0
18 APR	1100	137	00	00	00	3	*	21 APR	1400	287	00	00	00	0
18 APR	1130	138	00	00	00	3	*	21 APR	1430	288	00	.00	00	0
18 APR	1200	139	00	00	00	3	*	21 APR	1500	289	00	.00	00	0.
18 APR	1230	140	00	00	00	3.	*	21 APR	1530	290	00	00	00	0
18 APR	1300	141	00	00	00	2	*	21 APR	1600	291	.00	00	00	0
18 APR	1330	142	00	00	00	2	*	21 APR	1630	292	00	00	00	0
18 APR	1400	143	00	00	00	2	*	21 APR	1700	293	.00	00	.00	0
18 APR	1430	144	00	00	00	2	*	21 APR	1730	294	00	00	00	0
18 APR	1500	145	00	00	00	2	*	21 APR	1800	295	00	00	00	0
18 APR	1530	146	00	00	00	2	*	21 APR	1830	296	00	00	00	0.
18 APR	1600	147	00	00	00	2	*	21 APR	1900	297	00	.00	00	0
18 APR	1630	148	00	00	00	2	*	21 APR	1930	298	00	00	00	0
18 APR	1700	149	00	00	00	2	*	21 APR	2000	299	00	00	00	0
18 APR	1730	150	00	00	00	2	*	21 APR	2030	300	00	00	00	0

TOTAL RAINFALL = 177 18, TOTAL LOSS = 75.15, TOTAL EXCESS = 102 03

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	149.50-HR
+ (CU M/S)	(HR)					
		(CU M/S)				
+ 613	16 00		488	223	79	38
		(MM)	51 269	93 534	99 910	100 579
		(1000 CU M)	10546	19240.	20551.	20689

CUMULATIVE AREA = 205 70 SQ KM

145 KO OUTPUT CONTROL VARIABLES
IPRNT 1 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0 HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

146 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP STOR TYPE OF INITIAL CONDITION
RSVRIC 30000.00 INITIAL CONDITION
X -1 00 WORKING R AND D COEFFICIENT

147 SV STORAGE 0 18043 0 22516.0 28092 3 33660.4 39244 4

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148 SE          ELEVATION       97 00     98 00     99 00    100.00    101 00    102 00

149 SS          SPILLWAY
                     CREL       100 50  SPILLWAY CREST ELEVATION
                    SPWID       130 00  SPILLWAY WIDTH
                     COQW         1 40  WEIR COEFFICIENT
                     EXPW         1 50  EXPONENT OF HEAD
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COMPUTED OUTFLOW-ELEVATION DATA

OUTFLOW	00	00	06	46	1 55	3 67	7.17	12 38	19 66	29 35
ELEVATION	97 00	100 50	100 50	100 52	100 54	100.57	100 62	100 67	100 73	100 80
OUTFLOW	41 79	57 33	76 31	99 07	125 96	157 32	193 49	234 83	281 67	334 36
ELEVATION	100 88	100 96	101 06	101 17	101 28	101 41	101 54	101 69	101 84	102 00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	00	18043 00	22516.00	28092.30	30880 35	30983 60	31112 67	31293 39	31525 71	31809.69
OUTFLOW	00	00	00	.00	00	46	1.55	3 67	7 17	12 38
ELEVATION	97 00	98 00	99 00	100 00	100 50	100 52	100 54	100 57	100 62	100 67
STORAGE	32145 30	32532 52	32971 39	33461 86	33668 40	34004.01	34597 72	35243 11	35940.11	36688 72
OUTFLOW	19 66	29 35	41 79	57 33	64 35	76 31	99 07	125.96	157 32	193 49
ELEVATION	100 73	100 80	100 88	100 96	101 00	101 06	101 17	101.28	101 41	101 54
STORAGE	37489 01	38340 86	39244 40							
OUTFLOW	234 83	281 67	334.36							
ELEVATION	101 69	101 84	102 00							

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HYDROGRAPH AT STATION BARR

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
15	APR	1500	1	0	30000 0	100 3	17	APR	1700	101	55	33380 8	100 9	19	APR	1900	201	8	31588 4	100 6
15	APR	1530	2	0	30000 0	100 3	17	APR	1730	102	53.	33339.9	100.9	19	APR	1930	202	8	31581.6	100 6
15	APR	1600	3	0	30000 0	100 3	17	APR	1800	103	52	33299 9	100 9	19	APR	2000	203	8	31575 0	100 6
15	APR	1630	4	0	30000 0	100 3	17	APR	1830	104	51	33260 6	100 9	19	APR	2030	204	8	31568.4	100.6
15	APR	1700	5	0	30000.0	100 3	17	APR	1900	105	50	33222 3	100 9	19	APR	2100	205	8	31562.0	100 6
15	APR	1730	6	0	30000 0	100 3	17	APR	1930	106	49.	33184 7	100 9	19	APR	2130	206	8	31555.6	100.6
15	APR	1800	7	0	30000 0	100 3	17	APR	2000	107	47	33148.0	100.9	19	APR	2200	207	8	31549 3	100 6
15	APR	1830	8	0	30000 0	100 3	17	APR	2030	108	46.	33112 1	100.9	19	APR	2230	208	7	31543 2	100.6
15	APR	1900	9	0	30000 0	100 3	17	APR	2100	109	45	33076.9	100.9	19	APR	2300	209	7	31537.1	100 6
15	APR	1930	10	0	30000 0	100 3	17	APR	2130	110	44	33042 6	100 9	19	APR	2330	210	7	31531.1	100.6
15	APR	2000	11	0	30000 0	100 3	17	APR	2200	111	43	33009.0	100.9	20	APR	0000	211	7.	31525.2	100 6
15	APR	2030	12	0	30000 0	100 3	17	APR	2230	112	42	32976 1	100 9	20	APR	0030	212	7	31519 4	100.6
15	APR	2100	13	0	30000 0	100 3	17	APR	2300	113	41	32944.0	100 9	20	APR	0100	213	7	31513 6	100 6
15	APR	2130	14	0	30000 0	100 3	17	APR	2330	114	40	32912.5	100.9	20	APR	0130	214	7	31508 0	100 6
15	APR	2200	15	0	30000 0	100 3	18	APR	0000	115	39	32881 6	100.9	20	APR	0200	215	7	31502 3	100 6
15	APR	2230	16	0	30000 0	100 3	18	APR	0030	116	38	32851.4	100.9	20	APR	0230	216	7	31496 8	100.6
15	APR	2300	17	0	30000.0	100 3	18	APR	0100	117	38	32821 8	100 8	20	APR	0300	217	7	31491 3	100 6
15	APR	2330	18	0	30000 0	100 3	18	APR	0130	118	37	32792 7	100.8	20	APR	0330	218	7	31485 9	100.6
16	APR	0000	19	0	30000 0	100 3	18	APR	0200	119	36	32764.3	100.8	20	APR	0400	219	6	31480.6	100.6
16	APR	0030	20	0.	30000 1	100 3	18	APR	0230	120	35.	32736 5	100 8	20	APR	0430	220	6	31475.3	100 6
16	APR	0100	21	0	30000 1	100 3	18	APR	0300	121	34	32709 2	100 8	20	APR	0500	221	6	31470 1	100 6
16	APR	0130	22	0	30000 3	100 3	18	APR	0330	122	34	32682 5	100 8	20	APR	0530	222	6	31464.9	100 6
16	APR	0200	23	0	30000 6	100 3	18	APR	0400	123	33	32656 4	100 8	20	APR	0600	223	6	31459 8	100 6
16	APR	0230	24	0	30001 4	100 3	18	APR	0430	124	32	32630 8	100 8	20	APR	0630	224	6	31454.8	100.6
16	APR	0300	25	0	30003 8	100 3	18	APR	0500	125	31	32605 7	100 8	20	APR	0700	225	6	31449 8	100.6
16	APR	0330	26	0	30011 4	100 3	18	APR	0530	126	31.	32581 2	100 8	20	APR	0730	226	6	31444.9	100 6
16	APR	0400	27	0	30038 1	100 3	18	APR	0600	127	30	32557 2	100.8	20	APR	0800	227	6	31440 0	100 6
16	APR	0430	28	0	30121 8	100 4	18	APR	0630	128	29	32533 7	100 8	20	APR	0830	228	6	31435 2	100 6
16	APR	0500	29	0	30314 7	100 4	18	APR	0700	129	29	32510.6	100.8	20	APR	0900	229	6	31430 5	100.6
16	APR	0530	30	0	30639 8	100 5	18	APR	0730	130	28	32488 0	100 8	20	APR	0930	230	6	31425 8	100 6
16	APR	0600	31	1	31076 4	100 5	18	APR	0800	131	28	32465 8	100 8	20	APR	1000	231	6	31421 2	100.6
16	APR	0630	32	8	31582 5	100 6	18	APR	0830	132	27	32444 1	100 8	20	APR	1030	232	6	31416 6	100 6
16	APR	0700	33	19	32114 1	100.7	18	APR	0900	133	27	32422.7	100 8	20	APR	1100	233	5	31412 1	100.6
16	APR	0730	34	32	32636 3	100 8	18	APR	0930	134	26	32401 7	100 8	20	APR	1130	234	5	31407 7	100 6
16	APR	0800	35	47	33125 7	100 9	18	APR	1000	135	26	32381 1	100 8	20	APR	1200	235	5	31403.3	100.6
16	APR	0830	36	61	33569 3	101 0	18	APR	1030	136	25	32361 0	100 8	20	APR	1230	236	5.	31398 9	100 6
16	APR	0900	37	75	33961 6	101 1	18	APR	1100	137	25	32341 2	100 8	20	APR	1300	237	5	31394 6	100 6
16	APR	0930	38	88	34301 9	101 1	18	APR	1130	138	24	32321 7	100 8	20	APR	1330	238	5	31390 4	100 6
16	APR	1000	39	99	34593 2	101 2	18	APR	1200	139	24	32302 7	100 8	20	APR	1400	239	5	31386 2	100 6
16	APR	1030	40	109	34840 4	101 2	18	APR	1230	140	23	32284 0	100 8	20	APR	1430	240	5	31382 0	100.6
16	APR	1100	41	118	35049 6	101 2	18	APR	1300	141	23	32265 7	100 7	20	APR	1500	241	5.	31378.0	100 6
16	APR	1130	42	125	35226 5	101 3	18	APR	1330	142	22	32247 7	100 7	20	APR	1530	242	5	31373 9	100 6
16	APR	1200	43	132	35376 5	101 3	18	APR	1400	143	22	32230 0	100 7	20	APR	1600	243	5	31369 9	100 6
16	APR	1230	44	138	35503 8	101 3	18	APR	1430	144	21	32212 7	100 7	20	APR	1630	244	5	31366 0	100 6
16	APR	1300	45	143	35612 1	101 3	18	APR	1500	145	21	32195 8	100.7	20	APR	1700	245	5	31362 1	100 6
16	APR	1330	46	147	35703 6	101 4	18	APR	1530	146	21	32179 2	100.7	20	APR	1730	246	5	31358.3	100.6
16	APR	1400	47	150	35780 5	101 4	18	APR	1600	147	20	32162 9	100.7	20	APR	1800	247	5.	31354.5	100 6
16	APR	1430	48	153	35844 1	101 4	18	APR	1630	148	20	32146 9	100 7	20	APR	1830	248	5	31350 7	100 6
16	APR	1500	49	155	35895 5	101 4	18	APR	1700	149	19	32131 2	100 7	20	APR	1900	249	4	31347 0	100 6
16	APR	1530	50	157	35935 4	101 4	18	APR	1730	150	19	32115.7	100.7	20	APR	1930	250	4	31343 4	100.6
16	APR	1600	51	158	35964 5	101 4	18	APR	1800	151	19.	32100 6	100 7	20	APR	2000	251	4	31339 7	100 6
16	APR	1630	52	159	35982 9	101 4	18	APR	1830	152	18	32085 6	100 7	20	APR	2030	252	4	31336 2	100.6
16	APR	1700	53	160	35990 9	101 4	18	APR	1900	153	18	32071 0	100 7	20	APR	2100	253	4	31332 6	100 6
16	APR	1730	54	160	35988 8	101 4	18	APR	1930	154	18	32056.5	100.7	20	APR	2130	254	4	31329 2	100 6
16	APR	1800	55	159	35976 9	101 4	18	APR	2000	155	17	32042 3	100 7	20	APR	2200	255	4	31325 7	100.6
16	APR	1830	56	158	35956 0	101 4	18	APR	2030	156	17	32028 4	100.7	20	APR	2230	256	4	31322.3	100.6
16	APR	1900	57	157	35926 7	101 4	18	APR	2100	157	17	32014 7	100 7	20	APR	2300	257	4	31319 0	100 6
16	APR	1930	58	155	35889 9	101 4	18	APR	2130	158	17	32001 2	100.7	20	APR	2330	258	4	31315 7	100 6
16	APR	2000	59	153	35846 6	101 4	18	APR	2200	159	16	31987 9	100 7	21	APR	0000	259	4	31312.4	100.6
16	APR	2030	60	151	35797 5	101 4	18	APR	2230	160	16	31974 9	100.7	21	APR	0030	260	4	31309 2	100 6
16	APR	2100	61	148	35743 6	101 4	18	APR	2300	161	16	31962 1	100 7	21	APR	0100	261	4	31306 0	100 6
16	APR	2130	62	146	35685 7	101 4	18	APR	2330	162	15	31949.5	100.7	21	APR	0130	262	4.	31302.8	100.6
16	APR	2200	63	143	35624 4	101 4	19	APR	0000	163	15	31937 1	100 7	21	APR	0200	263	4	31299.7	100.6
16	APR	2230	64	140	35560 6	101 3	19	APR	0030	164	15	31924 9	100.7	21	APR	0230	264	4	31296 7	100 6
16	APR	2300	65	137	35494 7	101 3	19	APR	0100	165	15	31913 0	100 7	21	APR	0300	265	4	31293 6	100 6
16	APR	2330	66	134	35427 3	101 3	19	APR	0130	166	14	31901.2	100.7	21	APR	0330	266	4	31290 6	100.6
17	APR	0000	67	131	35358 8	101 3	19	APR	0200	167	14	31889 6	100 7	21	APR	0400	267	4	31287 6	100 6
17	APR	0030	68	128	35289 5	101 3	19	APR	0230	168	14	31878.3	100.7	21	APR	0430	268	4	31284 7	100 6
17	APR	0100	69	125	35219 8	101 3	19	APR	0300	169	14	31867 1	100 7	21	APR	0500	269	4	31281 8	100.6
17	APR	0130	70	122	35149 8	101 3	19	APR	0330	170	13	31856 2	100.7	21	APR	0530	270	3	31278 9	100 6
17	APR	0200	71	119	35079 6	101 3	19	APR	0400	171	13	31845 4	100 7	21	APR	0600	271	3	31276 0	100 6
17	APR	0230	72	116	35009 7	101.2	19	APR	0430	172	13	31834 8	100 7	21	APR	0630	272	3	31273 2	100 6

17 APR	0300	73	113	34940	0	101	2	19 APR	0500	173	13	31824	4	100	7	21 APR	0700	273	3.	31270.4	100	6
17 APR	0330	74	110	34870	9	101	2	19 APR	0530	174	12	31814	2	100	7	21 APR	0730	274	3	31267	6	100	6
17 APR	0400	75	108	34802	3	101	2	19 APR	0600	175	12	31804	1	100	7	21 APR	0800	275	3	31264	8	100	6
17 APR	0430	76	105	34734	5	101	2	19 APR	0630	176	12	31794	2	100	7	21 APR	0830	276	3.	31262	1	100	6
17 APR	0500	77	102	34667	7	101	2	19 APR	0700	177	12	31784	4	100	7	21 APR	0900	277	3	31259	4	100	6
17 APR	0530	78	99	34601	8	101	2	19 APR	0730	178	12	31774	8	100	7	21 APR	0930	278	3	31256	7	100	6
17 APR	0600	79	97	34536	9	101	2	19 APR	0800	179	12	31765	3	100	7	21 APR	1000	279	3	31254	1	100	6
17 APR	0630	80	94	34472	9	101	1	19 APR	0830	180	11	31756	0	100	7	21 APR	1030	280	3	31251	5	100	6
17 APR	0700	81	92	34410	0	101	1	19 APR	0900	181	11.	31746.8		100	7	21 APR	1100	281	3	31248	9	100	6
17 APR	0730	82	89	34348	1	101	1	19 APR	0930	182	11	31737.7		100	7	21 APR	1130	282	3.	31246	3	100	6
17 APR	0800	83	87	34287	3	101	1	19 APR	1000	183	11	31728.8		100	7	21 APR	1200	283	3	31243	7	100	6
17 APR	0830	84	85	34227	6	101	1	19 APR	1030	184	11	31719	9	100	7	21 APR	1230	284	3	31241	2	100	6
17 APR	0900	85	83	34169	0	101	1	19 APR	1100	185	11	31711	3	100	6	21 APR	1300	285	3.	31238	7	100	6
17 APR	0930	86	80	34111	6	101	1	19 APR	1130	186	10	31702	7	100	6	21 APR	1330	286	3	31236	2	100	6
17 APR	1000	87	78	34055	4	101	1	19 APR	1200	187	10	31694	3	100	6	21 APR	1400	287	3	31233	8	100	6
17 APR	1030	88	76	34000	4	101	1	19 APR	1230	188	10	31685.9		100	6	21 APR	1430	288	3.	31231	3	100	6
17 APR	1100	89	74	33946	4	101	0	19 APR	1300	189	10.	31677	8	100	6	21 APR	1500	289	3	31228	9	100	6
17 APR	1130	90	72	33893	6	101	0	19 APR	1330	190	10	31669	7	100	6	21 APR	1530	290	3	31226	5	100	6
17 APR	1200	91	71	33841	8	101	0	19 APR	1400	191	10	31661	7	100	6	21 APR	1600	291	3.	31224	2	100	6
17 APR	1230	92	69	33791	0	101	0	19 APR	1430	192	10.	31653	9	100	6	21 APR	1630	292	3	31221	8	100	6
17 APR	1300	93	67	33741	4	101	0	19 APR	1500	193	9	31646	2	100	6	21 APR	1700	293	3	31219	5	100	6
17 APR	1330	94	65	33692	8	101	0	19 APR	1530	194	9	31638.6		100	6	21 APR	1730	294	3	31217.2		100	6
17 APR	1400	95	64	33645	3	101	0	19 APR	1600	195	9	31631	1	100	6	21 APR	1800	295	3	31214	9	100	6
17 APR	1430	96	62	33598	8	101	0	19 APR	1630	196	9	31623	7	100	6	21 APR	1830	296	3	31212	7	100	6
17 APR	1500	97	60	33553	2	101	0	19 APR	1700	197	9	31616.4		100	6	21 APR	1900	297	3	31210	4	100	6
17 APR	1530	98	59	33508	7	101	0	19 APR	1730	198	9	31609	3	100	6	21 APR	1930	298	3	31208	2	100	6
17 APR	1600	99	57	33465	2	101	0	19 APR	1800	199	9	31602	2	100	6	21 APR	2000	299	3	31206	0	100	6
17 APR	1630	100	56	33422	6	101	0	19 APR	1830	200	8	31595	2	100	6	21 APR	2030	300	3	31203	9	100	6

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	149 50-HR
(CU M/S)	(HR)	(CU M/S)				
160	26 00		157	128	65	34
		(MM)	16 484	53 688	82 521	88 874
		(1000 CU M)	3391	11044	16975	18281

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	149 50-HR
(1000 CU M)	(HR)				
35991	26 00	35931	35263	33521	32297

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	149 50-HR
(METERS)	(HR)				
101 42	26 00	101 41	101 29	100.97	100 75

CUMULATIVE AREA = 205 70 SQ KM

1

RUNOFF SUMMARY, AVERAGE FLOW IN CUBIC METERS PER SECOND
AREA IN SQUARE KILOMETERS

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT		75 89	14 50	48 40	18 06	6 18	15.83		
HYDROGRAPH AT		76 34	16 00	57 78	24 42	8.58	22 10		
HYDROGRAPH AT		39 97	17 00	36 69	20 11	7 47	19 42		
HYDROGRAPH AT		46 89	16 00	35 84	15 30	5 39	13 87		
4 COMBINED AT	BACIA	218 51	15 50	174 78	77 83	27 61	71 22		
HYDROGRAPH AT		9 98	15 50	7 92	3 36	1 18	3 04		
HYDROGRAPH AT		28 18	15 50	21 50	8 86	3 09	7.96		
2 COMBINED AT	BACIA	246 69	15 50	196 02	86 67	30 70	79 18		
HYDROGRAPH AT		273 94	16 00	216 96	95 56	33 83	87 51		
HYDROGRAPH AT		36 64	20 50	33 86	19 62	7 45	19 41		
HYDROGRAPH AT		72 44	16 50	62 80	35 99	13 40	34.89		
HYDROGRAPH AT		35 37	15 50	30 41	14 00	5 00	12 89		
2 COMBINED AT	BACIA	106 68	16 00	92 44	49 94	18 39	47 78		
HYDROGRAPH AT		121 47	16 50	104 44	55 56	20 40	53 06		
HYDROGRAPH AT		64 48	14 50	45 08	16 96	5 82	14 94		
HYDROGRAPH AT		99 20	14 50	67 56	25.49	8 74	22 46		
3 COMBINED AT	BACIA	476 58	15 50	381 46	176.43	62 97	163 03		
HYDROGRAPH AT									

CONCREMAT

ENGENHARIA E TECNOLOGIA S.A

Simulação Modelo TR 1.000

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!*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            SEPTEMBER 1990             *
*              VERSION 4 0              *
*                                       *
*  RUN DATE  05/05/1996  TIME  18 10 55 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U S  ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE
THE DEFINITION OF -ANSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81 THIS IS THE FORTRAN77 VERSION
NEW OPTIONS DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS WRITE STAGE FREQUENCY,
DSS READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE NEW FINITE DIFFERENCE ALGORITHM


```
LINE          ID       1       2       3       4       5       6       7     . 8.      9     .10
   1          ID        BACIA HIDROGRAFICA DO RESERVATORIO DE SOUSA
   2          ID        MODELO DE ONDA CINEMATICA DA BACIA TR-1000
   3          IT      30 15APR96    1500     300
   4          IO      30
   5          IM
              *
              *DIAGRAM

   6          KK        BACIA ABANICO COMPONENTE E
   7          KM        ESC  SUPERFICIAL SUBBACIA E
   8          KO      3
   9          BA   15 83
  10          PH     0 1   220 0    20 8    45 0    81 8   107 0   120 0   160 0   178 0   209 8
  11          LS              74                      74
  12          UK     810      05      40    40.6
  13          UK    1170      05      40    59 4
  14          RK    8000     006     045            TRAP       0      40

  15          KK        BACIA ABANICO COMPONENTE H
  16          KM        ESC  SUPERFICIAL SUBBACIA H
  17          KO      3
  18          BA    22 1
  19          UK    1130     016      40    46 1
  20          UK    1320     016      40    53.9
  21          RK    9000     008     045            TRAP       0      40

  22          KK        BACIA ABANICO COMPONENTE I
  23          KM        ESC  SUPERFICIAL SUBBACIA I
  24          KO      3
  25          BA   19 42
  26          UK    1700     016      40    35 0
  27          UK    3150     016      40    65 0
  28          RK    4000    0040     045            TRAP       0      40

  29          KK        BACIA ABANICO COMPONENTE J
  30          KM        ESC  SUPERFICIAL SUBBACIA J
  31          KO      3
  32          BA   13 87
  33          UK    1210     013      40    52 3
  34          UK    1100     013      40    47 7
  35          RK    6000    0030     045            TRAP       0      40

  36          KK   BACIA EM ABANICO COMPLETA
  37          HC       4

  38          KK        BACIA F-G COMPONENTE F
  39          KM        ESC  SUPERFICIAL SUBBACIA F
  40          KO      3
  41          BA    3 04
  42          UK    1250     010      40    61 8
  43          UK     780     010      40    30 2
  44          RK    1500    0080     045            TRAP       0      40
```



```
LINE          ID       1       2       3       4       5       6       7       8       9      10

  45          KK        BACIA F - G  COMPONENTE G
  46          KM        ESC  SUPERFICIAL SUBBACIA G
  47          KO      3
  48          BA    4 92
  49          UK     980     010      40    59 9
  50          UK     660     010      40    40 1
  51          RK    3000    0080     045            TRAP       0      40     YES

  52          KK   BACIA EM ABANICO COMPLETA + BACIA F - G
  53          HC       2

  54          KK        BACIA P
  55          KM        ESC  SUPERFICIAL BACIA P
  56          KO      3
  57          BA    8 33
  58          UK     820     013      40    49 4
  59          UK     840     013      40    50.6
  60          RK    5000    0030     045            TRAP       0      40     YES
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000100

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 61          KK        BACIA K-L COMPONENTE K
 62          KM        ESC  SUPERFICIAL SUBBACIA K
 63          KO      3
 64          BA   19 41
 65          UK    1340      003       40     48 8
 66          UK    1400      003       40     51 2
 67          RK    7100     0080      045              TRAP        0       40

 68          KK        BACIA K - L  COMPONENTE L
 69          KM        ESC  SUPERFICIAL SUBBACIA L
 70          KO      3
 71          BA   15 48
 72          UK     440      020       40     24 3
 73          UK    1380      020       40     75 7
 74          RK    8500     0030      045              TRAP        0       40      YES

 75          KK        BACIA M
 76          KM        ESC  SUPERFICIAI BACIA M
 77          KO      3
 78          BA   12 89
 79          UK     750      010       40     31 9
 80          UK    1590      010       40     68 1
 81          RK    5500     0080      045              TRAP        0       40

 82          KK   BACIA M + BACIA K - L
 83          HC      2

 84          KK        BACIA Q
 85          KM        ESC  SUPERFICIAL SUBBACIA Q
 86          KO      3
 87          BA    5 28
 88          UK     750      013       40     42.4
 89          UK    1010      013      .40     57.6
 90          RK    3000     0030      045              TRAP        0       40      YES
1                                                  HEC-1 INPUT                                                  PAGE  3

LINE         ID       1        2        3        4    .  5        6    .    7.    .  8        9    .. 10

 91          KK        BACIA D-C COMPONENTE D
 92          KM        ESC  SUPERFICIAL SUBBACIA D
 93          KO      3
 94          BA   14 94
 95          UK    1860      080       40     74 8
 96          UK     630      080       40     25 2
 97          RK    6000     0080      045              TRAP        0       40

 98          KK        BACIA D - C  COMPONENTE C
 99          KM        ESC  SUPERFICIAL SUBBACIA C
100          KO      3
101          BA    7 52
102          UK     870      030       40     24 3
103          UK     800      030       40     75 7
104          RK    4500     0060      045              TRAP        0       40      YES

105          KK   BACIA Q + BACIA P + BACIA D-C
106          HC      3

107          KK        BACIA R
108          KM        ESC  SUPERFICIAL SUBBACIA R
109          KO      3
110          BA    3 67
111          UK    1160      013       40     63.4
112          UK     670      013       40     36 6
113          RK    2000     0030      045              TRAP        0       40      YES

114          KK        BACIA B-A COMPONENTE B
115          KM        ESC  SUPERFICIAL SUBBACIA B
116          KO      3
117          BA    6 44
118          UK     490      050       40     30 5
119          UK    1120      050       40     69 5
120          RK    4000     0100      045              TRAP        0       40

121          KK        BACIA B - A  COMPONENTE A
122          KM        ESC  SUPERFICIAL SUBBACIA A
123          KO      3
124          BA    8 85
125          UK     910      030       40     51 5
126          UK     860      030       40     48 5
127          RK    5000     0080      045              TRAP        0       40      YES

128          KK        BACIA N
129          KM        ESC  SUPERFICIAL SUBBACIA N
130          KO      3
131          BA   19 60
132          UK     780      013       40     37 9
133          UK    1280      013       40     62 1
134          RK    9500     0030     .045              TRAP        0       40
1                                                  HEC-1 INPUT                                                  PAGE  4

LINE         ID       1        2        3        4        5        6        7        8    .  9       10

135          KK   BACIA R + BACIA N + BACIA A-B
136          HC      3

137          KK        BACIA S
138          KM        ESC  SUPERFICIAL SUBBACIA S
139          KO      1
140          BA    4 11
141          UK     450      010       40     32.6
142          UK     920      010       40     67 3
143          RK    3000     0030      045              TRAP        0       40      YES

144          KK    BARRAGEM DE SOUSA
145          KO      1
146          RS      1    STOR  30000       -1
147          SV          18043   22516  28092 3 33668 4 39244 4
148          SE       97      98       99      100.     101      102
149          SS   100 5     130       1 4      1.5
150          ZZ
```

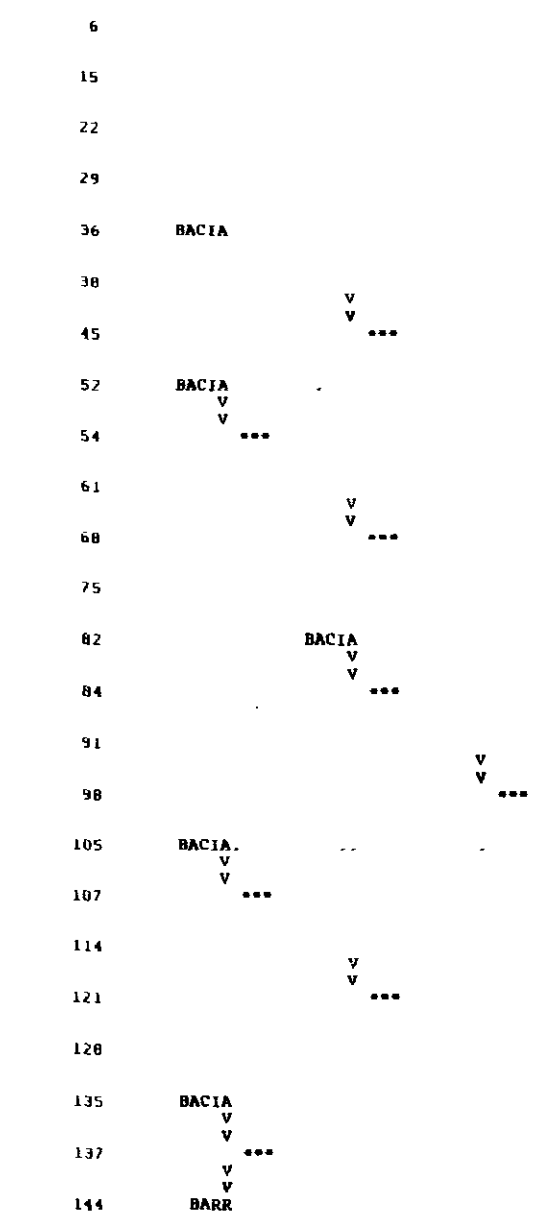
1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO

(V) ROUTING (---->) DIVERSION OR PUMP FLOW

( ) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            SEPTEMBER 1990             *
*             VERSION 4 0               *
*                                       *
*  RUN DATE  05/05/1996  TIME  18 10 55 *
*                                       *
*****************************************
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*                                       *
*    U S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
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BACIA HIDROGRAFICA DO RESERVATORIO DE SOUSA
MODELO DE ONDA CINEMATICA DA BACIA TR-1000

4 10 OUTPUT CONTROL VARIABLES

IPRNT	30	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	30	MINUTES IN COMPUTATION INTERVAL
IDATE	15APR96	STARTING DATE
ITIME	1500	STARTING TIME
NQ	300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	21APR96	ENDING DATE
NDTIME	2030	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL 50 HOURS
TOTAL TIME BASE 149 50 HOURS

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        METRIC UNITS
             DRAINAGE AREA          SQUARE KILOMETERS
             PRECIPITATION DEPTH    MILLIMETERS
             LENGTH, ELEVATION      METERS
             FLOW                   CUBIC METERS PER SECOND
             STORAGE VOLUME         CUBIC METERS
             SURFACE AREA           SQUARE METERS
             TEMPERATURE            DEGREES CELSIUS

 8 KO          OUTPUT CONTROL VARIABLES
                   IPRNT          3  PRINT CONTROL
                   IPLOT          0  PLOT CONTROL
                   QSCAL          0  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

 9 BA          SUBBASIN CHARACTERISTICS
                   TAREA      15 83  SUBBASIN AREA

               PRECIPITATION DATA

10 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                   HYDRO-35                                TP-40                                  TP-49
          5-MIN   15-MIN   60-MIN     2-HR     3-HR     6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY   10-DAY
          20 80    45 00    81 80   107 00   120 00   160.00   178 00   209 80       00       00       00       00

                                                 STORM AREA -   220 00

11 LS          SCS LOSS RATE
                   STRTL      17 85  INITIAL ABSTRACTION
                  CRVNBR      74 00  CURVE NUMBER
                   RTIMP         00  PERCENT IMPERVIOUS AREA

                 LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                   STRTL      17 85  INITIAL ABSTRACTION
                  CRVNBR      74 00  CURVE NUMBER
                   RTIMP         00  PERCENT IMPERVIOUS AREA

               KINEMATIC WAVE
12 UK            OVERLAND-FLOW ELEMENT NO  1
                       L        810   OVERLAND FLOW LENGTH
                       S       0500   SLOPE
                       N        400   ROUGHNESS COEFFICIENT
                      PA       40.6   PERCENT OF SUBBASIN
                    DXMIN          5  MINIMUM NUMBER OF DX INTERVALS
13 UK            OVERLAND-FLOW ELEMENT NO  2
                       L       1170   OVERLAND FLOW LENGTH
                       S       0500   SLOPE
                       N        400   ROUGHNESS COEFFICIENT
                      PA       59 4   PERCENT OF SUBBASIN
                    DXMIN          5  MINIMUM NUMBER OF DX INTERVALS

               KINEMATIC WAVE
14 RK            MAIN CHANNEL
                       L       8000   CHANNEL LENGTH
                       S       0060   SLOPE
                       N        045   CHANNEL ROUGHNESS COEFFICIENT
                      CA      15 83   CONTRIBUTING AREA
                   SHAPE       TRAP   CHANNEL SHAPE
                      WD         00   BOTTOM WIDTH OR DIAMETER
                       Z      40 00   SIDE SLOPE
                   NDXMIN          2  MINIMUM NUMBER OF DX INTERVALS
                   RUPSTQ         NO  ROUTE UPSTREAM HYDROGRAPH

                                                                ***
                                        COMPUTED KINEMATIC PARAMETERS
                                             VARIABLE TIME STEP
                                          (DT SHOWN IS A MINIMUM)

                    ELEMENT     ALPHA        M          DT          DX        PEAK     TIME TO      VOLUME     MAXIMUM
                                                                                          PEAK                  CELERITY
                                                        (MIN)       (M)      (CMS)      (MIN)        (MM)       (MPS)

                    PLANE1         56       1 67       17.51    162 05     45 87     790.53      114 21         16
                    PLANE2         56       1 67       23 15    234 08     55 73     816.27      114.00         17
                    MAIN           32       1 33       24.02   2667 54     89 31     849 81      113 96       1 85

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00  EXCESS-  1812E+04 OUTFLOW-  1798E+04 BASIN STORAGE-  1149E+01 PERCENT ERROR-     7

                                        INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                    MAIN           32       1 33       30 00                 87 99     870 00     113 97

          ***            ***            ***            ***            ***

                              HYDROGRAPH AT STATION

     TOTAL RAINFALL -  191 61, TOTAL LOSS -   76 81, TOTAL EXCESS -  114 80

   PEAK FLOW     TIME                                MAXIMUM AVERAGE FLOW
                                          6-HR          24-HR          72-HR       149 50-HR
 +  (CU M/S)     (HR)
                          (CU M/S)
 +        88    14 50                       55            20.             7             3.
                                (MM)    75 653        111 100        113 696       113 908
                         (1000 CU M)      1198           1759           1800          1803

                             CUMULATIVE AREA -   15 83 SQ KM


 17 KO          OUTPUT CONTROL VARIABLES
                   IPRNT          3  PRINT CONTROL
                   IPLOT          0  PLOT CONTROL
                   QSCAL          0  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

 18 BA          SUBBASIN CHARACTERISTICS
                   TAREA      22 10  SUBBASIN AREA
```

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                PRECIPITATION DATA

 10 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                    HYDRO-35                          TP-40                              TP-49
               5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
               20 80   45 00  81 80  107 00  120 00  160.00  178 00  209 80      00      00      00      00

                                              STORM AREA =  220 00

 11 LS          SCS LOSS RATE
                     STRTL       17 85  INITIAL ABSTRACTION
                    CRVNBR       74 00  CURVE NUMBER
                     RTIMP          00  PERCENT IMPERVIOUS AREA

                  LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                     STRTL       17 85  INITIAL ABSTRACTION
                    CRVNBR       74.00  CURVE NUMBER
                     RTIMP          00  PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
 19 UK            OVERLAND-FLOW ELEMENT NO  1
                         L        1130   OVERLAND FLOW LENGTH
                         S         0160  SLOPE
                         N          400  ROUGHNESS COEFFICIENT
                        PA         46 1  PERCENT OF SUBBASIN
                      DXMIN            5  MINIMUM NUMBER OF DX INTERVALS
 20 UK            OVERLAND-FLOW ELEMENT NO. 2
                         L        1320   OVERLAND FLOW LENGTH
                         S         0160  SLOPE
                         N          400  ROUGHNESS COEFFICIENT
                        PA         53.9  PERCENT OF SUBBASIN
                      DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

                KINEMATIC WAVE
 21 RK            MAIN CHANNEL
                         L        9000   CHANNEL LENGTH
                         S         0080  SLOPE
                         N          045  CHANNEL ROUGHNESS COEFFICIENT
                        CA        22 10  CONTRIBUTING AREA
                     SHAPE         TRAP  CHANNEL SHAPE
                        WD           00  BOTTOM WIDTH OR DIAMETER
                         Z        40 00  SIDE SLOPE
                     NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                     RUPSTQ           NO  ROUTE UPSTREAM HYDROGRAPH

                                                  ***
                                  COMPUTED KINEMATIC PARAMETERS
                                       VARIABLE TIME STEP
                                    (DT SHOWN IS A MINIMUM)

                   ELEMENT    ALPHA        M          DT          DX        PEAK     TIME TO PEAK    VOLUME    MAXIMUM CELERITY
                                                     (MIN)        (M)       (CMS)        (MIN)         (MM)          (MPS)

                   PLANE1         32      1 67       29.82     188.40     47 90       899.94       113.79           .11
                   PLANE2         32      1 67       29 40     186.63     50 67       900.14       113.83           .11
                   MAIN           37      1 33       24 08    3000 98     91.64       934 85       113.75          2 08

 CONTINUITY SUMMARY (1000 CU-M)-INFLOW=  0000E+00  EXCESS=  2530E+04 OUTFLOW=  2506E+04 BASIN STORAGE=  4987E+01 PERCENT ERROR=     8

                                  INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                   MAIN           37      1 33       30 00                90 98     930 00       113.75

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION

     TOTAL RAINFALL =  191 61. TOTAL LOSS =   76 81. TOTAL EXCESS =  114 80

  PEAK FLOW      TIME                                MAXIMUM AVERAGE FLOW
                                          6-HR          24-HR          72-HR      149 50-HR
+  (CU M/S)      (HR)
                      (CU M/S)
+       91       15 50                    67             28             10              5
                           (MM)       65 764         107 887        113 148         113 686
                  (1000 CU M)         1453.           2384           2501            2512

                        CUMULATIVE AREA =   22 10 SQ KM

 24 KO          OUTPUT CONTROL VARIABLES
                     IPRNT            3  PRINT CONTROL
                     IPLOT            0  PLOT CONTROL
                     QSCAL            0  HYDROGRAPH PLOT SCALE

              SUBBASIN RUNOFF DATA

 25 BA          SUBBASIN CHARACTERISTICS
                     TAREA       19 42  SUBBASIN AREA

                PRECIPITATION DATA

 10 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                ..... HYDRO-35 .....   ............... TP-40 ..... ... .  .  .  .. TP-49 .. .
               5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
               20 80   45 00  81 80  107 00  120.00  160.00  178 00  209 80      00      00      00      00

                                              STORM AREA =  220 00

 11 LS          SCS LOSS RATE
                     STRTL       17 85  INITIAL ABSTRACTION
                    CRVNBR       74 00  CURVE NUMBER
                     RTIMP          00  PERCENT IMPERVIOUS AREA

                  LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                     STRTL       17 85  INITIAL ABSTRACTION
                    CRVNBR       74 00  CURVE NUMBER
                     RTIMP          00  PERCENT IMPERVIOUS AREA
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              KINEMATIC WAVE
 26 UK          OVERLAND-FLOW ELEMENT NO  1
                         L          1700   OVERLAND FLOW LENGTH
                         S          0160   SLOPE
                         N           400   ROUGHNESS COEFFICIENT
                        PA          35 0   PERCENT OF SUBBASIN
                     DXMIN             5   MINIMUM NUMBER OF DX INTERVALS
 27 UK          OVERLAND-FLOW ELEMENT NO. 2
                         L          3150.  OVERLAND FLOW LENGTH
                         S          0160   SLOPE
                         N           400   ROUGHNESS COEFFICIENT
                        PA          65 0   PERCENT OF SUBBASIN
                     DXMIN             5   MINIMUM NUMBER OF DX INTERVALS

              KINEMATIC WAVE
 28 RK          MAIN CHANNEL
                         L          4000   CHANNEL LENGTH
                         S          0040   SLOPE
                         N           045   CHANNEL ROUGHNESS COEFFICIENT
                        CA         19 42   CONTRIBUTING AREA
                     SHAPE          TRAP   CHANNEL SHAPE
                        WD            00   BOTTOM WIDTH OR DIAMETER
                         Z         40 00   SIDE SLOPE
                    NDXMIN             2   MINIMUM NUMBER OF DX INTERVALS
                    RUPSTQ            NO   ROUTE UPSTREAM HYDROGRAPH

                                                   ***
                                  COMPUTED KINEMATIC PARAMETERS
                                       VARIABLE TIME STEP
                                      (DT SHOWN IS A MINIMUM)

                ELEMENT   ALPHA      M        DT        DX      PEAK    TIME TO    VOLUME    MAXIMUM
                                                                          PEAK               CELERITY
                                            (MIN)      (M)     (CMS)     (MIN)      (MM)      (MPS)

               PLANE1       32      1 67    30 00    212 57    24 07    957.71    113.85        11
               PLANE2       32      1 67    30 00    262 59    28 95   1169.77    113.50        12
               MAIN         26      1.33    16 31   1333.77    47 85    992 78    113 60       1 37

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00  EXCESS-  2223E+04 OUTFLOW-  2199E+04 BASIN STORAGE-  1148E+02 PERCENT ERROR-     6

                                     INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

               MAIN         26      1 33    30 00              47 77    990 00    113 58

      ***          ***          ***          ***          ***

                     HYDROGRAPH AT STATION

   TOTAL RAINFALL -  191 61, TOTAL LOSS -   76.81, TOTAL EXCESS -  114 80

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR          24-HR         72-HR      149.50-HR
+  (CU M/S)      (HR)
                       (CU M/S)
+        48      16 50                43            23            8.            4
                           (MM)    48 217       101 623       112 196       113 525
                    (1000 CU M)      936          1974          2179          2205

                     CUMULATIVE AREA -   19 42 SQ KM


 31 KO        OUTPUT CONTROL VARIABLES
                     IPRNT             3   PRINT CONTROL
                     IPLOT             0   PLOT CONTROL
                     QSCAL          0      HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

 32 BA        SUBBASIN CHARACTERISTICS
                     TAREA         13 87   SUBBASIN AREA

              PRECIPITATION DATA

 10 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                    HYDRO-35                .            TP-40        ..             ..       TP-49            ..
              5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR    2-DAY   4-DAY   7-DAY  10-DAY
              20 80   45 00   81 80  107 00  120 00  160 00  178 00  209 80      .00      00      00      00
                                                   STORM AREA -   220 00

 11 LS        SCS LOSS RATE
                     STRTL         17 85   INITIAL ABSTRACTION
                    CRVNBR         74 00   CURVE NUMBER
                     RTIMP            00   PERCENT IMPERVIOUS AREA

                LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                     STRTL         17 85   INITIAL ABSTRACTION
                    CRVNBR         74 00   CURVE NUMBER
                     RTIMP            00   PERCENT IMPERVIOUS AREA

              KINEMATIC WAVE
 33 UK          OVERLAND-FLOW ELEMENT NO  1
                         L          1210   OVERLAND FLOW LENGTH
                         S          .0130  SLOPE
                         N           400   ROUGHNESS COEFFICIENT
                        PA          52 3   PERCENT OF SUBBASIN
                     DXMIN             5   MINIMUM NUMBER OF DX INTERVALS
 34 UK          OVERLAND-FLOW ELEMENT NO  2
                         L          1100   OVERLAND FLOW LENGTH
                         S          0130   SLOPE
                         N           400   ROUGHNESS COEFFICIENT
                        PA          47 7   PERCENT OF SUBBASIN
                     DXMIN             5   MINIMUM NUMBER OF DX INTERVALS

              KINEMATIC WAVE
 35 RK          MAIN CHANNEL
                         L          6000   CHANNEL LENGTH
                         S          0030   SLOPE
                         N          .045   CHANNEL ROUGHNESS COEFFICIENT
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              CA        13 87  CONTRIBUTING AREA
           SHAPE         TRAP  CHANNEL SHAPE
              WD           00  BOTTOM WIDTH OR DIAMETER
               Z        40 00  SIDE SLOPE
          NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
          RUPSTQ           NO  ROUTE UPSTREAM HYDROGRAPH

                                            ***
                            COMPUTED KINEMATIC PARAMETERS
                                 VARIABLE TIME STEP
                               (DT SHOWN IS A MINIMUM)

     ELEMENT    ALPHA        M        DT        DX        PEAK     TIME TO     VOLUME     MAXIMUM
                                                                    PEAK                 CELERITY
                                     (MIN)      (M)       (CMS)     (MIN)       (MM)       (MPS)

     PLANE1       29        1 67     29 84    172 91      30.47    903 59     113 83        10
     PLANE2       29        1 67     27 41    157 19      29.56    912 38     113 95        10
     MAIN         22        1 33     26 27   2000 66      55.23    960 96     113 83      1 27

CONTINUITY SUMMARY (1000 CU-M)-INFLOW=  0000E+00  EXCESS=  1588E+04 OUTFLOW=  1574E+04 BASIN STORAGE=  3103E+01 PERCENT ERROR=    .7

                               INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

     MAIN         22        1 33     30 00                55 22    960 00     113.84

 ***           ***          ***          ***          ***

                 HYDROGRAPH AT STATION

  TOTAL RAINFALL =  191 61, TOTAL LOSS =   76 81, TOTAL EXCESS =  114 80

 PEAK FLOW      TIME                  MAXIMUM AVERAGE FLOW
                             6-HR        24-HR       72-HR     149 50-HR
+  (CU M/S)     (HR)
                    (CU M/S)
+      55     16 00          41          17           6.           3
                  (MM)    64 500     107.565     113 211     113 777
           (1000 CU M)     895        1492        1570        1578

                 CUMULATIVE AREA =   13 87 SQ KM

  40 KO        OUTPUT CONTROL VARIABLES
                  IPRNT           3  PRINT CONTROL
                  IPLOT           0  PLOT CONTROL
                  QSCAL           0  HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

  41 BA        SUBBASIN CHARACTERISTICS
                  TAREA        3 04  SUBBASIN AREA

               PRECIPITATION DATA

  10 PH                          DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                 HYDRO-35                      . TP-40                 .                .   . TP-49           .
               5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
               20 80   45 00   81 80  107 00  120 00  160 00  178 00  209.80      00      00     .00      00

                                                STORM AREA =   220 00

  11 LS        SCS LOSS RATE
                  STRTL       17 85  INITIAL ABSTRACTION
                 CRVNBR       74 00  CURVE NUMBER
                  RTIMP          00  PERCENT IMPERVIOUS AREA

                 LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                  STRTL       17 85  INITIAL ABSTRACTION
                 CRVNBR       74 00  CURVE NUMBER
                  RTIMP          00  PERCENT IMPERVIOUS AREA

               KINEMATIC WAVE
  42 UK          OVERLAND-FLOW ELEMENT NO  1
                      L        1250   OVERLAND FLOW LENGTH
                      S        0100   SLOPE
                      N         400   ROUGHNESS COEFFICIENT
                     PA        61 8   PERCENT OF SUBBASIN
                 DXMIN            5   MINIMUM NUMBER OF DX INTERVALS
  43 UK          OVERLAND-FLOW ELEMENT NO  2
                      L         780   OVERLAND FLOW LENGTH
                      S        0100   SLOPE
                      N         400   ROUGHNESS COEFFICIENT
                     PA        38 2   PERCENT OF SUBBASIN
                 DXMIN            5   MINIMUM NUMBER OF DX INTERVALS

               KINEMATIC WAVE
  44 RK          MAIN CHANNEL
                      L        1500   CHANNEL LENGTH
                      S        0080   SLOPE
                      N         045   CHANNEL ROUGHNESS COEFFICIENT
                     CA        3 04   CONTRIBUTING AREA
                  SHAPE        TRAP   CHANNEL SHAPE
                     WD          00   BOTTOM WIDTH OR DIAMETER
                      Z       40 00   SIDE SLOPE
                 NDXMIN           2   MINIMUM NUMBER OF DX INTERVALS
                 RUPSTQ          NO   ROUTE UPSTREAM HYDROGRAPH

                                            ***
                            COMPUTED KINEMATIC PARAMETERS
                                 VARIABLE TIME STEP
                               (DT SHOWN IS A MINIMUM)

     ELEMENT    ALPHA        M        DT        DX        PEAK     TIME TO     VOLUME     MAXIMUM
                                                                    PEAK                 CELERITY
                                     (MIN)      (M)       (CMS)     (MIN)       (MM)       (MPS)

     PLANE1       25        1 67     26 91    138.93       7 03    941 24     113 93       .09
     PLANE2       25        1 67     26 47    130.04       5.81    874 39     113.98        08
     MAIN         37        1 33      6 66    500 16      12 81    898 86     113 98      1 26
```

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- .0000E+00 EXCESS- .3480E+03 OUTFLOW- .3453E+03 BASIN STORAGE- .6814E+00 PERCENT ERROR- 6

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

	MAIN	37	1 33	30 00	12 01	900 00	114 30
	***	***	***	***	***		

HYDROGRAPH AT STATION

TOTAL RAINFALL = 191 61, TOTAL LOSS = 76 81, TOTAL EXCESS = 114 80

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	149 50-HR
+	(CU M/S)	(HR)				
			(CU M/S)			
+	12	15 00	9	4	1	1
			(MM) 65 610	108 360	113.681	114 241
			(1000 CU M) 199	329	346	347

CUMULATIVE AREA = 3 04 SQ KM

47 KO OUTPUT CONTROL VARIABLES
IPRNT 3 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0 HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

48 BA SUBBASIN CHARACTERISTICS
TAREA 4 92 SUBBASIN AREA

PRECIPITATION DATA

10 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35					TP-40				TP-49		
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
20 80	45 00	81 80	107 00	120 00	160 00	178 00	209 80	00	00	00	00

STORM AREA = 220 00

11 LS SCS LOSS RATE
STRTL 17 85 INITIAL ABSTRACTION
CRVNBR 74 00 CURVE NUMBER
RTIMP .00 PERCENT IMPERVIOUS AREA

LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
STRTL 17 85 INITIAL ABSTRACTION
CRVNBR 74 00 CURVE NUMBER
RTIMP 00 PERCENT IMPERVIOUS AREA

KINEMATIC WAVE
49 UK OVERLAND-FLOW ELEMENT NO 1
L 980 OVERLAND FLOW LENGTH
S 0100 SLOPE
N 400 ROUGHNESS COEFFICIENT
PA 59.9 PERCENT OF SUBBASIN
DXMIN 5 MINIMUM NUMBER OF DX INTERVALS
50 UK OVERLAND-FLOW ELEMENT NO 2
L 660 OVERLAND FLOW LENGTH
S 0100 SLOPE
N 400 ROUGHNESS COEFFICIENT
PA 40 1 PERCENT OF SUBBASIN
DXMIN 5 MINIMUM NUMBER OF DX INTERVALS

KINEMATIC WAVE
51 RK MAIN CHANNEL
L 3000 CHANNEL LENGTH
S 0080 SLOPE
N 045 CHANNEL ROUGHNESS COEFFICIENT
CA 4 92 CONTRIBUTING AREA
SHAPE TRAP CHANNEL SHAPE
WD 00 BOTTOM WIDTH OR DIAMETER
Z 40 00 SIDE SLOPE
NDXMIN 2 MINIMUM NUMBER OF DX INTERVALS
RUPSTQ YES ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	25	1 67	27 80	140 05	13 00	915 72	113 88	08
PLANE2	25	1 67	23 22	110 04	10 63	846 53	114 04	.08
MAIN	37	1 33	10 66	1000 33	33.45	911 44	114 09	1.59

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- .3461E+03 EXCESS- .5633E+03 OUTFLOW- .9051E+03 BASIN STORAGE- .8841E+00 PERCENT ERROR- 4

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

	MAIN	37	1 33	30 00	33 30	900 00	113 99
	***	***	***	***	***		

HYDROGRAPH AT STATION

TOTAL RAINFALL = 191 61, TOTAL LOSS = 76 81, TOTAL EXCESS = 114 80

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	149 50-HR
+	(CU M/S)	(HR)				

```
                    (CU M/S)
+       33      15 00                25          10           3           2
                      (MM)      67 493      108 663      113 452     113 932
                (1000 CU M)       537          865          903         907

                     CUMULATIVE AREA =    7 96 SQ KM


   56 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL          0  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

   57 BA          SUBBASIN CHARACTERISTICS
                       TAREA       8 33  SUBBASIN AREA

                  PRECIPITATION DATA

   10 PH                              DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                  HYDRO-35                          TP-40                          TP-49
                5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR    12-HR   24-HR   2-DAY   4-DAY   7-DAY   10-DAY
                20 80   45 00   81 80  107 00  120 00  160.00  178 00  209 80      00      00      00       00

                                                STORM AREA =  220 00

   11 LS          SCS LOSS RATE
                       STRTL       17 85  INITIAL ABSTRACTION
                      CRVNBR       74 00  CURVE NUMBER
                       RTIMP          00  PERCENT IMPERVIOUS AREA

                    LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                       STRTL       17 85  INITIAL ABSTRACTION
                      CRVNBR       74 00  CURVE NUMBER
                       RTIMP          00  PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
   58 KK          OVERLAND-FLOW ELEMENT NO  1
                           L         820   OVERLAND FLOW LENGTH
                           S        0130   SLOPE
                           N         400   ROUGHNESS COEFFICIENT
                          PA        49.4   PERCENT OF SUBBASIN
                        DXMIN           5  MINIMUM NUMBER OF DX INTERVALS
   59 KK          OVERLAND-FLOW ELEMENT NO  2
                           L         840.  OVERLAND FLOW LENGTH
                           S        0130   SLOPE
                           N         400   ROUGHNESS COEFFICIENT
                          PA        50 6   PERCENT OF SUBBASIN
                        DXMIN           5  MINIMUM NUMBER OF DX INTERVALS

                KINEMATIC WAVE
   60 RK          MAIN CHANNEL
                           L        5000   CHANNEL LENGTH
                           S        0030   SLOPE
                           N         045   CHANNEL ROUGHNESS COEFFICIENT
                          CA        8 33   CONTRIBUTING AREA
                       SHAPE        TRAP   CHANNEL SHAPE
                          WD          00   BOTTOM WIDTH OR DIAMETER
                           Z       40 00   SIDE SLOPE
                      NDXMIN           2  MINIMUM NUMBER OF DX INTERVALS
                      RUPSIQ         YES  ROUTE UPSTREAM HYDROGRAPH

                                                  ***
                                  COMPUTED KINEMATIC PARAMETERS
                                       VARIABLE TIME STEP
                                    (DT SHOWN IS A MINIMUM)

                    ELEMENT    ALPHA       M          DT          DX        PEAK     TIME TO      VOLUME     MAXIMUM
                                                                                        PEAK                   CELERITY
                                                      (MIN)        (M)      (CMS)      (MIN)        (MM)       (MPS)

                    PLANE1          29      1 67       24 84    136 71     21 34     860.36      114 03         09
                    PLANE2         .29      1.67       25.31    140.05     21.64     864.52      113.92        .09
                    MAIN            22      1 33       15 04   1667 21    324 52     936 19      113 46       1 86

 CONTINUITY SUMMARY (1000 CU-M)-INFLOW=  8974E+04  EXCESS=  9536E+03 OUTFLOW=  9896E+04 BASIN STORAGE=  2473E+01 PERCENT ERROR=     3

                                  INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                    MAIN            22      1 33       30 00               323 56     930 00     113 45

       ***             ***             ***             ***             ***

                       HYDROGRAPH AT STATION

     TOTAL RAINFALL =  191 61, TOTAL LOSS =   76 81, TOTAL EXCESS =  114 80

   PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR        72-HR     149 50-HR
+  (CU M/S)      (HR)
                    (CU M/S)
+      324      15 50                     251          108           38           18
                      (MM)      61 927     106.658      112 741     113 387
                (1000 CU M)       5419        9334         9866        9922

                     CUMULATIVE AREA =   87 51 SQ KM


   63 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL          0  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

   64 BA          SUBBASIN CHARACTERISTICS
                       TAREA       19 41  SUBBASIN AREA

                  PRECIPITATION DATA
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10 PH                              DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
              HYDRO-35                              TP-40                             TP-49
          5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
          20 80   45 00   81 80  107 00  120 00  160 00  178 00  209 80      00      00      00      00

                                                  STORM AREA -  220 00

11 LS     SCS LOSS RATE
              STRTL         17 85  INITIAL ABSTRACTION
             CRVNBR         74 00  CURVE NUMBER
              RTIMP            00  PERCENT IMPERVIOUS AREA

            LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
              STRTL         17 85  INITIAL ABSTRACTION
             CRVNBR         74 00  CURVE NUMBER
              RTIMP            00  PERCENT IMPERVIOUS AREA

          KINEMATIC WAVE
65 UK       OVERLAND-FLOW ELEMENT NO. 1
                  L          1340   OVERLAND FLOW LENGTH
                  S          0030  SLOPE
                  N           400  ROUGHNESS COEFFICIENT
                 PA          40 8  PERCENT OF SUBBASIN
             DXMIN              5  MINIMUM NUMBER OF DX INTERVALS
66 UK       OVERLAND-FLOW ELEMENT NO  2
                  I          1400   OVERLAND FLOW LENGTH
                  S          0030  SLOPE
                  N           400  ROUGHNESS COEFFICIENT
                 PA          51 2  PERCENT OF SUBBASIN
             DXMIN              5  MINIMUM NUMBER OF DX INTERVALS

          KINEMATIC WAVE
67 RK       MAIN CHANNEL
                  L          7100   CHANNEL LENGTH
                  S          0080  SLOPE
                  N           045  CHANNEL ROUGHNESS COEFFICIENT
                 CA         19 41  CONTRIBUTING AREA
              SHAPE          TRAP  CHANNEL SHAPE
                 WD            00  BOTTOM WIDTH OR DIAMETER
                  Z         40 00  SIDE SLOPE
             NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
             RUPSTQ            NO  ROUTE UPSTREAM HYDROGRAPH

                                                          ***
                                        COMPUTED KINEMATIC PARAMETERS
                                             VARIABLE TIME STEP
                                            (DT SHOWN IS A MINIMUM)

             ELEMENT     ALPHA         M          DT         DX        PEAK     TIME TO     VOLUME     MAXIMUM
                                                                                  PEAK                 CELERITY
                                                (MIN)        (M)       (CMS)     (MIN)       (MM)       (MPS)

            PLANE1          14      1 67       27 47      83.78       22 09    1164 08     113 69          05
            PLANE2          14      1 67       26 86      82 38       22 52    1183 77     113.67          05
            MAIN            37      1 33       22 77    2367 44       43 64    1199.67     113 64        1 73

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00  EXCESS-  2222E+04 OUTFLOW-  2199E+04 BASIN STORAGE-  1484E+02 PERCENT ERROR-       4

                                             INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL


            MAIN            37      1 33       30 00                  43.64    1200 00     113 64

     ***          ***          ***          ***          ***

                    HYDROGRAPH AT STATION

   TOTAL RAINFALL -  191 61, TOTAL LOSS -   76 81, TOTAL EXCESS -  114 80

 PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR        72-HR      149 50-HR
+  (CU M/S)     (HR)
                       (CU M/S)
+      44     20.00                  40           22            8            4
                            (MM)   44 645       99 484      111 996      113 576
                     (1000 CU M)    867         1931         2174         2205

                  CUMULATIVE AREA -   19 41 SQ KM


70 KO         OUTPUT CONTROL VARIABLES
                  IPRNT           3  PRINT CONTROL
                  IPLOT           0  PLOT CONTROL
                  QSCAL           0  HYDROGRAPH PLOT SCALE

          SUBBASIN RUNOFF DATA

71 BA         SUBBASIN CHARACTERISTICS
                  TAREA       15 48  SUBBASIN AREA

              PRECIPITATION DATA

10 PH                              DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
              HYDRO-35                              TP-40                             TP-49
          5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
          20 80   45 00   81 80  107 00  120 00  160 00  178 00  209 80      00      00      00      00

                                                  STORM AREA -  220.00

11 LS         SCS LOSS RATE
                  STRTL     17.85  INITIAL ABSTRACTION
                 CRVNBR     74 00  CURVE NUMBER
                  RTIMP        00  PERCENT IMPERVIOUS AREA

               LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                  STRTL     17 85  INITIAL ABSTRACTION
                 CRVNBR     74 00  CURVE NUMBER
                  RTIMP        00  PERCENT IMPERVIOUS AREA

              KINEMATIC WAVE
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 72 UK            OVERLAND-FLOW ELEMENT NO  1
                        L        440   OVERLAND FLOW LENGTH
                        S       0200   SLOPE
                        N        400   ROUGHNESS COEFFICIENT
                       PA       24 3   PERCENT OF SUBBASIN
                    DXMIN          5   MINIMUM NUMBER OF DX INTERVALS
 73 UK            OVERLAND-FLOW ELEMENT NO  2
                        L       1380   OVERLAND FLOW LENGTH
                        S       0200   SLOPE
                        N        400   ROUGHNESS COEFFICIENT
                       PA       75 7   PERCENT OF SUBBASIN
                    DXMIN          5   MINIMUM NUMBER OF DX INTERVALS

                  KINEMATIC WAVE
 74 RK              MAIN CHANNEL
                        L       8500   CHANNEL LENGTH
                        S       0030   SLOPE
                        N        045   CHANNEL ROUGHNESS COEFFICIENT
                       CA       15 48  CONTRIBUTING AREA
                    SHAPE       TRAP   CHANNEL SHAPE
                       WD         00   BOTTOM WIDTH OR DIAMETER
                        Z       40 00  SIDE SLOPE
                   NDXMIN          2   MINIMUM NUMBER OF DX INTERVALS
                   RUPSTQ        YES   ROUTE UPSTREAM HYDROGRAPH

                                                    ***
                                      COMPUTED KINEMATIC PARAMETERS
                                           VARIABLE TIME STEP
                                        (DT SHOWN IS A MINIMUM)

                    ELEMENT     ALPHA        M          DT         DX        PEAK     TIME TO PEAK    VOLUME     MAXIMUM CELERITY
                                                        (MIN)       (M)      (CMS)       (MIN)         (MM)         (MPS)

                    PLANE1          35       1 67       15 36      88 03     28 60      789 97       114 28          10
                    PLANE2          35       1 67       30 00     230 08     51 13      918 25       113 83          12
                    MAIN            22       1 33       30 00    2834 26     87 33      966.72       113.20        1 39

 CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  2197E+04  EXCESS-  1772E+04 OUTFLOW-  3936E+04 BASIN STORAGE-  4308E+01 PERCENT ERROR-     7

                                      INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                    MAIN            22       1 33       30 00                86 87     960 00       113 20

       ***             ***             ***             ***             ***

                          HYDROGRAPH AT STATION

     TOTAL RAINFALL =  191 61  TOTAL LOSS =   76 81, TOTAL EXCESS =  114 80

   PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR     149 50-HR
 +  (CU M/S)      (HR)
                 (CU M/S)
 +       87      16 00                75           41           15            7
                      (MM)        46 346       101 343      111 924       113 143
                (1000 CU M)        1617         3536         3985          3948

                          CUMULATIVE AREA =   34 89 SQ KM


 77 KO            OUTPUT CONTROL VARIABLES
                     IPRNT           3   PRINT CONTROL
                     IPLOT           0   PLOT CONTROL
                     QSCAL           0   HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

 78 BA            SUBBASIN CHARACTERISTICS
                     TAREA       12 89   SUBBASIN AREA

                  PRECIPITATION DATA

 10 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                    HYDRO-35                                TP-40                                   TP-49
                  5-MIN   15-MIN   60-MIN    2-HR    3-HR    6-HR    12-HR   24-HR   2-DAY   4-DAY   7-DAY   10-DAY
                  20 80    45 00   81 80  107 00  120 00  160 00  178 00  209 80      00     .00      00     .00

                                                STORM AREA =  220 00

 11 LS            SCS LOSS RATE
                     STRTL       17 85   INITIAL ABSTRACTION
                    CRVNBR       74 00   CURVE NUMBER
                     RTIMP          00   PERCENT IMPERVIOUS AREA

                  LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                     STRTL       17 85   INITIAL ABSTRACTION
                    CRVNBR       74 00   CURVE NUMBER
                     RTIMP          00   PERCENT IMPERVIOUS AREA

                  KINEMATIC WAVE
 79 UK              OVERLAND-FLOW ELEMENT NO  1
                        L        750   OVERLAND FLOW LENGTH
                        S       0100   SLOPE
                        N        400   ROUGHNESS COEFFICIENT
                       PA       31 9   PERCENT OF SUBBASIN
                    DXMIN          5   MINIMUM NUMBER OF DX INTERVALS
 80 UK              OVERLAND-FLOW ELEMENT NO  2
                        L       1590   OVERLAND FLOW LENGTH
                        S       0100   SLOPE
                        N        400   ROUGHNESS COEFFICIENT
                       PA       68 1   PERCENT OF SUBBASIN
                    DXMIN          5   MINIMUM NUMBER OF DX INTERVALS

                  KINEMATIC WAVE
 81 RK              MAIN CHANNEL
                        L       5500   CHANNEL LENGTH
                        S       0080   SLOPE
                        N        045   CHANNEL ROUGHNESS COEFFICIENT
                       CA       12 89  CONTRIBUTING AREA
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SHAPE	TRAP	CHANNEL SHAPE
WD	00	BOTTOM WIDTH OR DIAMETER
Z	40 00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	NO	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	25	1 67	25.66	125 04	20.95	867 56	113.91	08
PLANE2	25	1 67	30 00	159 05	27 52	1003.13	113 81	09
MAIN	37	1 33	17 86	1833 93	42 24	925 43	113 81	1 72

CONTINUITY SUMMARY (1000 CU-M)-INFLOW= 0000E+00 EXCESS= 1476E+04 OUTFLOW= 1462E+04 BASIN STORAGE= 4033E+01 PERCENT ERROR= 6

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	37	1 33	30 00	42 20	930.00	113 77

*** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL = 191 61, TOTAL LOSS = 76 81, TOTAL EXCESS = 114 80

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149 50-HR
+ (CU M/S)	(HR)				
		(CU M/S)			
+ 42	15 50	36	16	6	3
	(MM)	59 692	106 128	112 961	113 708
	(1000 CU M)	769	1368	1456	1466

CUMULATIVE AREA = 12 89 SQ KM

86 KO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0	HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

87 BA SUBBASIN CHARACTERISTICS

TAREA	5 28	SUBBASIN AREA

PRECIPITATION DATA

10 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35				TP-40				TP-49			
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
20 80	45 00	81 80	107 00	120 00	160 00	178 00	209 80	00	.00	00	00

STORM AREA = 220 00

11 LS SCS LOSS RATE

STRTL	17 85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT

STRTL	17 85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

KINEMATIC WAVE

8L UK OVERLAND-FLOW ELEMENT NO. 1

L	750	OVERLAND FLOW LENGTH
S	0130	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	42 4	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

89 UK OVERLAND-FLOW ELEMENT NO 2

L	1010	OVERLAND FLOW LENGTH
S	0130	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	57 6	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

KINEMATIC WAVE

90 RK MAIN CHANNEL

L	3000	CHANNEL LENGTH
S	0030	SLOPE
N	045	CHANNEL ROUGHNESS COEFFICIENT
CA	5.28	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WD	00	BOTTOM WIDTH OR DIAMETER
Z	40 00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	YES	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	29	1 67	27 67	150.05	12 03	849 40	113 83	09
PLANE2	29	1 67	25 49	144 33	14 42	895 06	113 96	09
MAIN	22	1 33	10 88	1000.33	146.40	956.65	113 23	1 53

```
CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 5394E+04 EXCESS- 6045E+03 OUTFLOW- 5988E+04 BASIN STORAGE- 1608E+01 PERCENT ERROR- 2

                              INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

              MAIN          22      1 33      30 00            146 17    960 00    113 23

      ***         ***        ***        ***        ***

                   HYDROGRAPH AT STATION

    TOTAL RAINFALL -  191 61, TOTAL LOSS -   76 81, TOTAL EXCESS -  114 80

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR     149.50-HR
+  (CU M/S)     (HR)
                       (CU M/S)
+     146       16 00               123          63           23            11
                            (MM)   50 003      102 741     112 121      113 172
                    (1000 CU M)    2653         5451        5949          6005

                      CUMULATIVE AREA -   53 06 SQ KM

    93 KO          OUTPUT CONTROL VARIABLES
                         IPRNT             3  PRINT CONTROL
                         IPLOT             0  PLOT CONTROL
                         QSCAL             0  HYDROGRAPH PLOT SCALE

                 SUBBASIN RUNOFF DATA

    94 BA          SUBBASIN CHARACTERISTICS
                         TAREA         14 94  SUBBASIN AREA

                   PRECIPITATION DATA

    10 PH                                 DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                        HYDRO-35                    ... TP-40  ..      .        .   .... . TP-49    .     .
                   5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY  4-DAY  7-DAY  10-DAY
                   20 80   45 00   81 80  107 00  120 00  160.00  178 00  209 80     00     00     00      00
                                                      STORM AREA -  220 00

    11 LS          SCS LOSS RATE
                         STRTL         17 85  INITIAL ABSTRACTION
                        CRVNBR         74 00  CURVE NUMBER
                         RTIMP            00  PERCENT IMPERVIOUS AREA

                     LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                         STRTL         17 85  INITIAL ABSTRACTION
                        CRVNBR         74.00  CURVE NUMBER
                         RTIMP            00  PERCENT IMPERVIOUS AREA

                   KINEMATIC WAVE
    95 UK            OVERLAND-FLOW ELEMENT NO  1
                              L        1860.  OVERLAND FLOW LENGTH
                              S         0800  SLOPE
                              N          400  ROUGHNESS COEFFICIENT
                             PA         74 8  PERCENT OF SUBBASIN
                         DXMIN             5  MINIMUM NUMBER OF DX INTERVALS
    96 UK            OVERLAND-FLOW ELEMENT NO  2
                              L         630   OVERLAND FLOW LENGTH
                              S         0800  SLOPE
                              N          400  ROUGHNESS COEFFICIENT
                             PA         25 2  PERCENT OF SUBBASIN
                         DXMIN             5  MINIMUM NUMBER OF DX INTERVALS

                   KINEMATIC WAVE
    97 RK            MAIN CHANNEL
                              L         6000  CHANNEL LENGTH
                              S         0080  SLOPE
                              N          045  CHANNEL ROUGHNESS COEFFICIENT
                             CA        14 94  CONTRIBUTING AREA
                         SHAPE          TRAP  CHANNEL SHAPE
                             WD           00  BOTTOM WIDTH OR DIAMETER
                              Z        40 00  SIDE SLOPE
                        NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
                        RUPSTQ            NO  ROUTE UPSTREAM HYDROGRAPH

                                                ***
                                    COMPUTED KINEMATIC PARAMETERS
                                         VARIABLE TIME STEP
                                       (DT SHOWN IS A MINIMUM)

              ELEMENT    ALPHA       M         DT        DX       PEAK    TIME TO    VOLUME    MAXIMUM
                                                                            PEAK               CELERITY
                                             (MIN)      (M)      (CMS)    (MIN)      (MM)      (MPS)

              PLANE1       71       1.67      27 66    372 12     60 07    849 36    113 83      .22
              PLANE2       71       1 67      11 92    126 04     32 84    768 79    114.43       18
              MAIN         37       1 33      16 72   2000 66     76.52    845 68    113 96     1 99

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 0000E+00 EXCESS- 1710E+04 OUTFLOW- 1697E+04 BASIN STORAGE- 1490E+01 PERCENT ERROR- 7

                              INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

              MAIN          37      1 33      30 00             76 10    840 00    114 05

      ***         ***        ***        ***        ***

                   HYDROGRAPH AT STATION

    TOTAL RAINFALL -  191 61, TOTAL LOSS -   76 81, TOTAL EXCESS -  114 80

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR     149.50-HR
+  (CU M/S)     (HR)
                       (CU M/S)
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```
+      76       14 00                 52             19            7            3
                      (MM)      74 841        110 815      113 726       113 986
                 (1000 CU M)      1118           1656         1699          1703

                      CUMULATIVE AREA =    14 94 SQ KM


 100 KO           OUTPUT CONTROL VARIABLES
                        IPRNT              3  PRINT CONTROL
                        IPLOT              0  PLOT CONTROL
                        QSCAL              0  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

 101 BA           SUBBASIN CHARACTERISTICS
                        TAREA           7 52  SUBBASIN AREA

                  PRECIPITATION DATA

  10 PH                                   DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                        HYDRO-35                          TP-40                          .  ..  TP-49       .
                  5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                  20 80   45 00   81 80  107 00  120 00  160 00  178 00  209 80      00      00      00      00

                                                         STORM AREA =   220 00

  11 LS           SCS LOSS RATE
                        STRTL          17 85  INITIAL ABSTRACTION
                       CRVNBR          74 00  CURVE NUMBER
                        RTIMP             00  PERCENT IMPERVIOUS AREA

                    LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                        STRTL          17 85  INITIAL ABSTRACTION
                       CRVNBR          74 00  CURVE NUMBER
                        RTIMP             00  PERCENT IMPERVIOUS AREA

                  KINEMATIC WAVE
 102 UK             OVERLAND-FLOW ELEMENT NO  1
                            L            870  OVERLAND FLOW LENGTH
                            S           0300  SLOPE
                            N            400  ROUGHNESS COEFFICIENT
                           PA           24 3  PERCENT OF SUBBASIN
                        DXMIN              5  MINIMUM NUMBER OF DX INTERVALS
 103 UK             OVERLAND-FLOW ELEMENT NO  2
                            L            800  OVERLAND FLOW LENGTH
                            S           0300  SLOPE
                            N            400  ROUGHNESS COEFFICIENT
                           PA           75 7  PERCENT OF SUBBASIN
                        DXMIN              5  MINIMUM NUMBER OF DX INTERVALS

                  KINEMATIC WAVE
 104 RK             MAIN CHANNEL
                            L           4500  CHANNEL LENGTH
                            S           0060  SLOPE
                            N            045  CHANNEL ROUGHNESS COEFFICIENT
                           CA           7.52  CONTRIBUTING AREA
                        SHAPE           TRAP  CHANNEL SHAPE
                           WD             00  BOTTOM WIDTH OR DIAMETER
                            Z          40 00  SIDE SLOPE
                       NDXMIN              2  MINIMUM NUMBER OF DX INTERVALS
                       RUPSTQ            YES  ROUTE UPSTREAM HYDROGRAPH

                                                       ***
                                        COMPUTED KINEMATIC PARAMETERS
                                             VARIABLE TIME STEP
                                           (DT SHOWN IS A MINIMUM)

                     ELEMENT     ALPHA       M         DT         DX        PEAK     TIME TO      VOLUME     MAXIMUM
                                                                                       PEAK                   CELERITY
                                                     (MIN)        (M)       (CMS)      (MIN)        (MM)       (MPS)

                    PLANE1         43       1 67      22 46     174 06      11.00     810 76      114 01         13
                    PLANE2         43       1 67      21 10     160.05      35.60     821.08      114.07         13
                    MAIN           32       1 33      13 13    1500.49     117 26     854 95      113.86       1 91

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  1697E+04  EXCESS-  8609E+03 OUTFLOW-  2549E+04 BASIN STORAGE-  6979E+00 PERCENT ERROR-     3

                                          INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL


                    MAIN           32       1 33      30 00                116.42     870 00      113 90

      ***          ***           ***           ***           ***

                         HYDROGRAPH AT STATION

   TOTAL RAINFALL =  191 61, TOTAL LOSS =   76 81, TOTAL EXCESS =  114 80

 PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
                                    6-HR          24-HR         72-HR       149 50-HR
+  (CU M/S)      (HR)
                          (CU M/S)
+     116       14 50                77             29            10             5.
                        (MM)      74 355        110 697       113 593       113 844
                   (1000 CU M)      1670           2486          2551          2557

                       CUMULATIVE AREA =    22 46 SQ KM

 109 KO           OUTPUT CONTROL VARIABLES
                        IPRNT              3  PRINT CONTROL
                        IPLOT              0  PLOT CONTROL
                        QSCAL              0  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

 110 BA           SUBBASIN CHARACTERISTICS
                        TAREA           3 67  SUBBASIN AREA

                  PRECIPITATION DATA
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```
 10 PH                                   DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                  HYDRO-35                                   TP-40                                  TP-49
              5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY   10-DAY
              20 80    45 00    81 80   107 00  120 00  160 00  178 00  209 80      00       00       00      .00

                                                     STORM AREA -  220 00

 11 LS        SCS LOSS RATE
                  STRTL         17 85  INITIAL ABSTRACTION
                 CRVNBR         74 00  CURVE NUMBER
                  RTIMP            00  PERCENT IMPERVIOUS AREA

               LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                  STRTL         17 85  INITIAL ABSTRACTION
                 CRVNBR         74 00  CURVE NUMBER
                  RTIMP            00  PERCENT IMPERVIOUS AREA

              KINEMATIC WAVE
 111 UK        OVERLAND-FLOW ELEMENT NO  1
                        L       1160.  OVERLAND FLOW LENGTH
                        S        0130  SLOPE
                        N         400  ROUGHNESS COEFFICIENT
                       PA        63 4  PERCENT OF SUBBASIN
                   DXMIN            5  MINIMUM NUMBER OF DX INTERVALS
 112 UK        OVERLAND-FLOW ELEMENT NO  2
                        L         670  OVERLAND FLOW LENGTH
                        S        0130  SLOPE
                        N         400  ROUGHNESS COEFFICIENT
                       PA        36 6  PERCENT OF SUBBASIN
                   DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

              KINEMATIC WAVE
 113 RK        MAIN CHANNEL
                        L        2000  CHANNEL LENGTH
                        S        0030  SLOPE
                        N         045  CHANNEL ROUGHNESS COEFFICIENT
                       CA        3 67  CONTRIBUTING AREA
                    SHAPE        TRAP  CHANNEL SHAPE
                       WD          00  BOTTOM WIDTH OR DIAMETER
                        Z       40.00  SIDE SLOPE
                  NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                  RUPSTQ          YES  ROUTE UPSTREAM HYDROGRAPH

                                                   ***
                                      COMPUTED KINEMATIC PARAMETERS
                                           VARIABLE TIME STEP
                                         (DT SHOWN IS A MINIMUM)

               ELEMENT    ALPHA        M          DT         DX         PEAK     TIME TO      VOLUME      MAXIMUM
                                                                                   PEAK                   CELERITY
                                                 (MIN)       (M)        (CMS)      (MIN)       (MM)        (MPS)

               PLANE1         29      1 67       28.74     165 77       10 00      895 16      113 88         10
               PLANE2         29      1 67       25 35     134 04        7.57      832 05      113 94         09
               MAIN           22      1 33        5.20     666 89      578 99      940 69      113 32       2 14

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  1842E+05  EXCESS-  4201E+03 OUTFLOW-  1883E+05 BASIN STORAGE-  1600E+01 PERCENT ERROR-    .1

                                           INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

               MAIN           22      1 33       30 00                 573 90      930.00      113.30

      ***           ***            ***            ***            ***

                          HYDROGRAPH AT STATION

    TOTAL RAINFALL -  191 61, TOTAL LOSS -   76 81, TOTAL EXCESS -  114 80

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR          24-HR          72-HR       149.50-HR
+  (CU M/S)     (HR)
                          (CU M/S)
+       574      15 50               453            204             72             35
                             (MM)    58 648        105 676        112.512        113.239
                     (1000 CU M)      9777          17616          18756          18877

                          CUMULATIVE AREA -  166 70 SQ KM


 116 KO        OUTPUT CONTROL VARIABLES
                    IPRNT           3  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0   HYDROGRAPH PLOT SCALE

              SUBBASIN RUNOFF DATA

 117 BA        SUBBASIN CHARACTERISTICS
                    TAREA        6 44  SUBBASIN AREA

               PRECIPITATION DATA

 10 PH                                   DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                  HYDRO-35                                   TP-40                                  TP-49
              5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY   10-DAY
              20 80    45 00    81 80   107 00  120 00  160 00  178 00  209 80      00       00       00       00

                                                     STORM AREA -  220.00

 11 LS        SCS LOSS RATE
                  STRTL         17 85  INITIAL ABSTRACTION
                 CRVNBR         74 00  CURVE NUMBER
                  RTIMP            00  PERCENT IMPERVIOUS AREA

               LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                  STRTL         17 85  INITIAL ABSTRACTION
                 CRVNBR         74 00  CURVE NUMBER
                  RTIMP            00  PERCENT IMPERVIOUS AREA

              KINEMATIC WAVE
 118 UK        OVERLAND-FLOW ELEMENT NO  1
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                        L          490   OVERLAND FLOW LENGTH
                        S          0500  SLOPE
                        N           400  ROUGHNESS COEFFICIENT
                       PA          30 5  PERCENT OF SUBBASIN
                     DXMIN             5  MINIMUM NUMBER OF DX INTERVALS
119 UK             OVERLAND-FLOW ELEMENT NO  2
                        L          1120   OVERLAND FLOW LENGTH
                        S          0500  SLOPE
                        N           400  ROUGHNESS COEFFICIENT
                       PA          69 5  PERCENT OF SUBBASIN
                     DXMIN             5  MINIMUM NUMBER OF DX INTERVALS

                   KINEMATIC WAVE
120 RK               MAIN CHANNEL
                        L          4000   CHANNEL LENGTH
                        S          0100  SLOPE
                        N           045  CHANNEL ROUGHNESS COEFFICIENT
                       CA          6 44  CONTRIBUTING AREA
                    SHAPE          TRAP  CHANNEL SHAPE
                       WD            00  BOTTOM WIDTH OR DIAMETER
                        Z         40 00  SIDE SLOPE
                    NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
                    RUPSTQ            NO  ROUTE UPSTREAM HYDROGRAPH

                                                ***
                                  COMPUTED KINEMATIC PARAMETERS
                                       VARIABLE TIME STEP
                                    (DT SHOWN IS A MINIMUM)

                    ELEMENT     ALPHA        M          DT          DX        PEAK     TIME TO      VOLUME     MAXIMUM
                                                                                          PEAK                  CELERITY
                                                       (MIN)        (M)      (CMS)       (MIN)        (MM)       (MPS)

                    PLANE1          56      1 67       11 79       98.03      17.21      767 23      114.45          14
                    PLANE2          56      1 67       22 41      224.07      26.98      810.39      114 02          17
                    MAIN            41      1 33       12 18     1333.77      39 22      822.55      114 16        1 83

CONTINUITY SUMMARY (1000 CU-M)-INFLOW=  0000E+00  EXCESS=  7373E+03 OUTFLOW=  7328E+03 BASIN STORAGE=  4450E+00 PERCENT ERROR=     .5

                                  INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                    MAIN            41      1 33       30 00                 38 94     810 00      114 15

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION

    TOTAL RAINFALL =  191 61. TOTAL LOSS =   76 81. TOTAL EXCESS =  114 80

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR          24-HR         72-HR     149 50-HR
+  (CU M/S)     (HR)
                (CU M/S)
+       39    13 50                23             8             3             1
                 (MM)          78 737        111 822       113 918       114 093
          (1000 CU M)             507           720           734           735

                    CUMULATIVE AREA =    6 44 SQ KM


123 KO             OUTPUT CONTROL VARIABLES
                     IPRNT             3  PRINT CONTROL
                     IPLOT             0  PLOT CONTROL
                     QSCAL             0  HYDROGRAPH PLOT SCALE

                   SUBBASIN RUNOFF DATA

124 BA             SUBBASIN CHARACTERISTICS
                     TAREA          8 85  SUBBASIN AREA

                   PRECIPITATION DATA

 10 PH                              DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                  HYDRO-35                    . . TP-40    ....    ..     .. . .    .. TP-49     ..    ..
                5-MIN  15-MIN  60-MIN    2-HR     3-HR     6-HR    12-HR    24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                20.80   45 00   81 80  107 00   120 00   160.00   178 00   209.80      00      00      00     .00

                                                STORM AREA =  220 00

 11 LS             SCS LOSS RATE
                     STRTL         17.85  INITIAL ABSTRACTION
                    CRVNBR         74 00  CURVE NUMBER
                     RTIMP            00  PERCENT IMPERVIOUS AREA

                  LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                     STRTL         17 85  INITIAL ABSTRACTION
                    CRVNBR         74 00  CURVE NUMBER
                     RTIMP            00  PERCENT IMPERVIOUS AREA

                   KINEMATIC WAVE
125 UK               OVERLAND-FLOW ELEMENT NO  1
                        L          910   OVERLAND FLOW LENGTH
                        S          0300  SLOPE
                        N           400  ROUGHNESS COEFFICIENT
                       PA          51.5  PERCENT OF SUBBASIN
                     DXMIN             5  MINIMUM NUMBER OF DX INTERVALS
126 UK               OVERLAND-FLOW ELEMENT NO  2
                        L          860   OVERLAND FLOW LENGTH
                        S          0300  SLOPE
                        N           400  ROUGHNESS COEFFICIENT
                       PA          48 5  PERCENT OF SUBBASIN
                     DXMIN             5  MINIMUM NUMBER OF DX INTERVALS

                   KINEMATIC WAVE
127 RF               MAIN CHANNEL
                        L          5000   CHANNEL LENGTH
                        S          0080  SLOPE
                        N           045  CHANNEL ROUGHNESS COEFFICIENT
                       CA          8 85  CONTRIBUTING AREA
                    SHAPE          TRAP  CHANNEL SHAPE
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            WD          00  BOTTOM WIDTH OR DIAMETER
             Z       40 00  SIDE SLOPE
        NDXMIN           2  MINIMUM NUMBER OF DX INTERVALS
        RUPSTQ         YES  ROUTE UPSTREAM HYDROGRAPH
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COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	43	1 67	23 22	182 06	26 97	816.82	114 03	.13
PLANE2	43	1 67	22 27	172 06	25 96	809 19	114 04	13
MAIN	37	1 33	13 76	1667 21	89 51	853.45	114 19	2.02

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 7322E+03 EXCESS- .1013E+04 OUTFLOW- 1740E+04 BASIN STORAGE- 7830E+00 PERCENT ERROR- 2

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	37	1 33	30 00		89.30	840 00	114 34

*** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL = 191 61, TOTAL LOSS = 76 81, TOTAL EXCESS = 114 80

```
 PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                               6-HR        24-HR       72-HR     149 50-HR
+ (CU M/S)     (HR)
                      (CU M/S)
+      89     14 00                55          20           7            3
                         (MM)   77 226     111 564     114 063      114 276
                    (1000 CU M)   1181        1706        1744         1747

                 CUMULATIVE AREA =   15 29 SQ KM


 130 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           3  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL           0  HYDROGRAPH PLOT SCALE

              SUBBASIN RUNOFF DATA

 131 BA         SUBBASIN CHARACTERISTICS
                    TAREA       19 60  SUBBASIN AREA

                PRECIPITATION DATA

  10 PH                             DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                    HYDRO-35     .         .        TP-40   .      ..          . . ..   . TP-49 ...  ..
                5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR    2-DAY   4-DAY   7-DAY  10-DAY
                20 80   45 00   81 80  107 00  120 00  160.00  178 00  209 80       00      00      00      00

                                                   STORM AREA =   220 00

  11 LS         SCS LOSS RATE
                    STRTL       17.85  INITIAL ABSTRACTION
                   CRVNBR       74 00  CURVE NUMBER
                    RTIMP          00  PERCENT IMPERVIOUS AREA

                  LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                    STRTL       17.85  INITIAL ABSTRACTION
                   CRVNBR       74.00  CURVE NUMBER
                    RTIMP          00  PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
 132 UK           OVERLAND-FLOW ELEMENT NO  1
                        L         780   OVERLAND FLOW LENGTH
                        S        0130  SLOPE
                        N         400  ROUGHNESS COEFFICIENT
                       PA        37 9  PERCENT OF SUBBASIN
                    DXMIN           5  MINIMUM NUMBER OF DX INTERVALS
 133 UK           OVERLAND-FLOW ELEMENT NO  2
                        L       1280.  OVERLAND FLOW LENGTH
                        S        0130  SLOPE
                        N         400  ROUGHNESS COEFFICIENT
                       PA        62 1  PERCENT OF SUBBASIN
                    DXMIN           5  MINIMUM NUMBER OF DX INTERVALS

                KINEMATIC WAVE
 134 RK           MAIN CHANNEL
                        L       9500.  CHANNEL LENGTH
                        S       .0030  SLOPE
                        N         045  CHANNEL ROUGHNESS COEFFICIENT
                       CA       19 60  CONTRIBUTING AREA
                    SHAPE        TRAP  CHANNEL SHAPE
                       WD          00  BOTTOM WIDTH OR DIAMETER
                        Z       40 00  SIDE SLOPE
                   NDXMIN           2  MINIMUM NUMBER OF DX INTERVALS
                   RUPSTQ          NO  ROUTE UPSTREAM HYDROGRAPH
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COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	29	1 67	28 54	156 05	39 21	855.76	113.83	09
PLANE2	29	1 67	27 57	160.05	49 18	916.17	113 91	10
MAIN	22	1 33	29 38	2375 78	75.95	948.44	113 76	1.35

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 0000E+00 EXCESS- 2244E+04 OUTFLOW- 2222E+04 BASIN STORAGE- 4408E+01 PERCENT ERROR- 8

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	22	1 33	30 00		75 66	960.00	113 69

*** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL = 191 61, TOTAL LOSS = 76 81, TOTAL EXCESS = 114 80

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149 50-HR
(CU M/S)	(HR)	(CU M/S)			
76	16 00	58	24	9	4
		(MM) 63 619	107 344	113.069	113 626
		(1000 CU M) 1247	2104	2216	2227

CUMULATIVE AREA = 19 60 SQ KM

139 KO OUTPUT CONTROL VARIABLES
IPRNT 1 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0 HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

140 BA SUBBASIN CHARACTERISTICS
TAREA 4 11 SUBBASIN AREA

PRECIPITATION DATA

10 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35					TP-40				TP-49		
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
20 80	45 00	81 80	107 00	120 00	160 00	178 00	209 80	.00	00	.00	00

STORM AREA = 220 00

11 LS SCS LOSS RATE
STRTL 17 85 INITIAL ABSTRACTION
CRVNBR 74 00 CURVE NUMBER
RTIMP 00 PERCENT IMPERVIOUS AREA

LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
STRTL 17 85 INITIAL ABSTRACTION
CRVNBR 74 00 CURVE NUMBER
RTIMP 00 PERCENT IMPERVIOUS AREA

KINEMATIC WAVE
141 UK OVERLAND-FLOW ELEMENT NO 1
L 450 OVERLAND FLOW LENGTH
S 0100 SLOPE
N 400 ROUGHNESS COEFFICIENT
PA 32 6 PERCENT OF SUBBASIN
DXMIN 5 MINIMUM NUMBER OF DX INTERVALS
142 UK OVERLAND-FLOW ELEMENT NO 2
L *920* *OVERLAND FLOW LENGTH*
S 0100 SLOPE
N 400 ROUGHNESS COEFFICIENT
PA 67 3 PERCENT OF SUBBASIN
DXMIN 5 MINIMUM NUMBER OF DX INTERVALS

KINEMATIC WAVE
143 RK MAIN CHANNEL
L 3000 CHANNEL LENGTH
S 0030 SLOPE
N 045 CHANNEL ROUGHNESS COEFFICIENT
CA 4 11 CONTRIBUTING AREA
SHAPE TRAP CHANNEL SHAPE
WD 00 BOTTOM WIDTH OR DIAMETER
Z 40 00 SIDE SLOPE
NDXMIN 2 MINIMUM NUMBER OF DX INTERVALS
RUPSTQ YES ROUTE UPSTREAM HYDROGRAPH

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COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	25	1 67	20 68	90 03	8.50	817 54	114.08	07
PLANE2	25	1 67	26 27	131.47	12.84	902 53	113.99	08
MAIN	22	1 33	7 36	1000 33	726.51	945 94	113 25	2 27

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 2277E+05 EXCESS- 4701E+03 OUTFLOW- 2322E+05 BASIN STORAGE- .2301E+01 PERCENT ERROR- 1

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	22	1 33	30 00		719 64	960.00	113 18

HYDROGRAPH AT STATION

DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
15 APR 1500	1	00	00	00	0	18 APR 1000	151	00	00	00	2
15 APR 1530	2	1 16	1 16	00	0	18 APR 1030	152	00	00	00	2
15 APR 1600	3	1 20	1 20	00	0	18 APR 1900	153	00	00	00	2

15	APR	1630	4	1	24	1	24	00	0	*	18	APR	1930	154	00	00	00	2	
15	APR	1700	5	1	28	1	28	00	0	*	18	APR	2000	155	00	00	00	2	
15	APR	1730	6	1	33	1	33	00	0	*	18	APR	2030	156	00	00	00	2	
15	APR	1800	7	1	38	1	38	00	0	*	18	APR	2100	157	.00	00	00	2	
15	APR	1830	8	1	43	1	43	00	0	*	18	APR	2130	158	00	00	00	2	
15	APR	1900	9	1	49	1	49	00	0	*	18	APR	2200	159	00	00	00	2	
15	APR	1930	10	1	56	1	56	00	0	*	18	APR	2230	160	00	00	.00	2	
15	APR	2000	11	1	63	1	63	00	0	*	18	APR	2300	161	00	00	00	2	
15	APR	2030	12	1	72	1	72	00	0	*	18	APR	2330	162	00	00	00	2	
15	APR	2100	13	1	81	1	81	.00	0	*	19	APR	0000	163	00	00	00	2	
15	APR	2130	14	1	52	1	51	01	0	*	19	APR	0030	164	00	00	00	1	
15	APR	2200	15	1	63	1	57	06	0	*	19	APR	0100	165	00	00	00	1	
15	APR	2230	16	1	75	1	63	13	0	*	19	APR	0130	166	00	00	00	1	
15	APR	2300	17	1	91	1	70	20	0	*	19	APR	0200	167	00	.00	00	1	
15	APR	2330	18	2	09	1	79	30	0	*	19	APR	0230	168	00	00	00	1	
16	APR	0000	19	2	33	1	91	42	0	*	19	APR	0300	169	00	00	00	1.	
16	APR	0030	20	5	70	4	31	1 39	0	*	19	APR	0330	170	.00	00	00	1	
16	APR	0100	21	6	27	4	24	2 04	0	*	19	APR	0400	171	00	00	00	1	
16	APR	0130	22	7	06	4	23	2 83	0	*	19	APR	0430	172	.00	00	00	1	
16	APR	0200	23	6	81	3	63	3 18	1	*	19	APR	0500	173	00	00	00	1	
16	APR	0230	24	11	97	5	51	6 45	2	*	19	APR	0530	174	00	00	00	1	
16	APR	0300	25	20	33	7	46	12 88	6	*	19	APR	0600	175	00	00	00	1	
16	APR	0330	26	33	89	8	93	24 97	20	*	19	APR	0630	176	00	00	.00	1	
16	APR	0400	27	13	90	2	81	11 08	75	*	19	APR	0700	177	00	00	00	1	
16	APR	0430	28	7	67	1	40	6 27	209	*	19	APR	0730	178	00	00	.00	1	
16	APR	0500	29	7	59	1	29	6 30	394	*	19	APR	0800	179	.00	00	00	1	
16	APR	0530	30	6	63	1	06	5 58	558	*	19	APR	0830	180	00	00	00	1	
16	APR	0600	31	5	97		90	5 07	667	*	19	APR	0900	181	.00	.00	00	1	
16	APR	0630	32	2	47		36	2 11	716	*	19	APR	0930	182	00	.00	00	1.	
16	APR	0700	33	2	20		31	1 89	720	*	19	APR	1000	183	00	00	.00	1	
16	APR	0730	34	2	00		28	1 72	692	*	19	APR	1030	184	00	00	00	1.	
16	APR	0800	35	1	83		25	1 58	646	*	19	APR	1100	185	00	00	00	1	
16	APR	0830	36	1	69		23	1 46	591	*	19	APR	1130	186	00	00	00	1	
16	APR	0900	37	1	57		21	1 36	535	*	19	APR	1200	187	00	.00	00	1	
16	APR	0930	38	1	86		25	1 62	482	*	19	APR	1230	188	00	00	00	1	
16	APR	1000	39	1	76		23	1 53	435	*	19	APR	1300	189	00	00	00	1	
16	APR	1030	40	1	67		21	1 46	395	*	19	APR	1330	190	00	00	00	1	
16	APR	1100	41	1	59		20	1 39	362.	*	19	APR	1400	191	00	00	00	1	
16	APR	1130	42	1	52		19	1 33	335	*	19	APR	1430	192	.00	00	00	1	
16	APR	1200	43	1	46		18	1 28	313	*	19	APR	1500	193	00	00	00	1	
16	APR	1230	44	1	40		17	1 23	294	*	19	APR	1530	194	.00	00	00	1	
16	APR	1300	45	1	35		16	1 19	277	*	19	APR	1600	195	.00	00	00	1	
16	APR	1330	46	1	30		16	1 15	261	*	19	APR	1630	196	00	.00	00	1	
16	APR	1400	47	1	26		15	1 11	247	*	19	APR	1700	197	00	00	00	1	
16	APR	1430	48	1	22		14	1 08	233	*	19	APR	1730	198	00	00	00	1	
16	APR	1500	49	1	18		14	1 04	220	*	19	APR	1800	199	00	00	00	1.	
16	APR	1530	50		00		00	00	208	*	19	APR	1830	200	.00	00	00	1	
16	APR	1600	51		00		00	00	196	*	19	APR	1900	201	00	00	00	1	
16	APR	1630	52		00		00	00	184	*	19	APR	1930	202	00	00	00	1	
16	APR	1700	53		00		00	00	172	*	19	APR	2000	203	00	.00	.00	1	
16	APR	1730	54		00		00	00	160	*	19	APR	2030	204	00	00	00	1	
16	APR	1800	55		00		00	00	148.	*	19	APR	2100	205	00	00	00	1	
16	APR	1830	56		00		00	00	137	*	19	APR	2130	206	.00	00	00	1	
16	APR	1900	57		00		00	00	126	*	19	APR	2200	207	00	00	00	1	
16	APR	1930	58		00		00	00	116	*	19	APR	2230	208	.00	00	00	1	
16	APR	2000	59		00		00	00	106	*	19	APR	2300	209	00	00	00	1	
16	APR	2030	60		00		00	00	98	*	19	APR	2330	210	00	00	00	1	
16	APR	2100	61		00		00	00	90	*	20	APR	0000	211	00	.00	00	1.	
16	APR	2130	62		00		00	00	83	*	20	APR	0030	212	00	00	00	1	
16	APR	2200	63		00		00	00	76	*	20	APR	0100	213	00	00	00	1	
16	APR	2230	64		00		00	00	71	*	20	APR	0130	214	00	00	00	1	
16	APR	2300	65		00		00	00	65	*	20	APR	0200	215	.00	00	00	1	
16	APR	2330	66		00		00	00	61	*	20	APR	0230	216	00	.00	00	1	
17	APR	0000	67		00		00	00	56	*	20	APR	0300	217	00	.00	00	1	
17	APR	0030	68		00		00	00	52	*	20	APR	0330	218	00	00	00	1	
17	APR	0100	69		00		00	00	49	*	20	APR	0400	219	00	00	00	1	
17	APR	0130	70		00		00	00	45	*	20	APR	0430	220	00	00	00	1	
17	APR	0200	71		00		00	00	42	*	20	APR	0500	221	.00	00	00	1	
17	APR	0230	72		00		00	00	40	*	20	APR	0530	222	00	00	00	1	
17	APR	0300	73		00		00	00	37	*	20	APR	0600	223	.00	00	00	1	
17	APR	0330	74		00		00	00	35	*	20	APR	0630	224	00	00	00	1	
17	APR	0400	75		00		00	00	33	*	20	APR	0700	225	00	00	00	1	
17	APR	0430	76		00		00	00	31	*	20	APR	0730	226	00	.00	00	1	
17	APR	0500	77		00		00	00	29	*	20	APR	0800	227	00	00	00	1	
17	APR	0530	78		00		00	00	27	*	20	APR	0830	228	00	00	00	1	
17	APR	0600	79		00		00	00	26	*	20	APR	0900	229	.00	00	.00	1.	
17	APR	0630	80		00		00	00	24	*	20	APR	0930	230	00	.00	00	0	
17	APR	0700	81		00		00	00	23	*	20	APR	1000	231	00	.00	00	0	
17	APR	0730	82		00		00	00	22	*	20	APR	1030	232	.00	00	00	0	
17	APR	0800	83		00		00	00	21	*	20	APR	1100	233	00	.00	00	0	
17	APR	0830	84		00		00	00	19	*	20	APR	1130	234	00	00	00	0	
17	APR	0900	85		00		00	00	19	*	20	APR	1200	235	00	.00	00	0	
17	APR	0930	86		00		00	00	18.	*	20	APR	1230	236	00	00	.00	0	
17	APR	1000	87		00		00	00	17	*	20	APR	1300	237	.00	00	00	0	
17	APR	1030	88		00		00	00	16	*	20	APR	1330	238	00	00	00	0	
17	APR	1100	89		00		00	00	15	*	20	APR	1400	239	.00	00	00	0	
17	APR	1130	90		00		00	00	14	*	20	APR	1430	240	00	00	00	0	
17	APR	1200	91		00		00	00	14	*	20	APR	1500	241	00	00	00	0	
17	APR	1230	92		00		00	00	13.	*	20	APR	1530	242	00	.00	00	0	
17	APR	1300	93		.00		00	00	13	*	20	APR	1600	243	00	00	00	0	
17	APR	1330	94		00		00	00	12	*	20	APR	1630	244	00	00	00	0.	
17	APR	1400	95		00		00	00	11	*	20	APR	1700	245	.00	00	00	0	
17	APR	1430	96		00		00	00	11	*	20	APR	1730	246	.00	.00	00	0	
17	APR	1500	97		00		00	00	11.	*	20	APR	1800	247	00	.00	00	0	
17	APR	1530	98		00		00	00	10	*	20	APR	1830	248	00	00	00	0	
17	APR	1600	99		00		00	00	10	*	20	APR	1900	249	00	00	.00	0	
17	APR	1630	100		00		00	00	9	*	20	APR	1930	250	00	.00	00	0	
17	APR	1700	101		00		00	00	9.	*	20	APR	2000	251	.00	00	00	0	
17	APR	1730	102		00		00	00	9	*	20	APR	2030	252	.00	.00	00	0	
17	APR	1800	103		00		00	00	8	*	20	APR	2100	253	00	00	00	0	
17	APR	1830	104		00		00	00	8	*	20	APR	2130	254	00	00	00	0	
17	APR	1900	105		00		00	00	8	*	20	APR	2200	255	00	00	00	0	
17	APR	1930	106		00		.00	00	7	*	20	APR	2230	256	00	00	.00	0	
17	APR	2000	107		00		00	00	7	*	20	APR	2300	257	00	00	.00	0	
17	APR	2030	108		00		00	00	7	*	20	APR	2330	258	00	00	00	0	
17	APR	2100	109		00		00	00	7	*	21	APR	0000	259	00	.00	00	0	
17	APR	2130	110		00		00	00	6.	*	21	APR	0030	260	00	00	00	0.	
17	APR	2200	111		00		00	00	6	*	21	APR	0100	261	00	00	00	0	
17	APR	2230	112		00		.00	00	6	*	21	APR	0130	262	.00	.00	.00	0.	
17	APR	2300	113		00		00	.00	6	*	21	APR	0200	263	00	00	00	0	
17	APR	2330	114		00		00	00	6	*	21	APR	0230	264	00	00	00	0	
18	APR	0000	115		00		00	.00	5	*	21	APR	0300	265	00	.00	00	0	
18	APR	0030	116		00		00	00	5	*	21	APR	0330	266	00	.00	00	0	

18 APR 0100	117	00	00	00	5	*	21 APR 0400	267	00	00	00	0
18 APR 0130	118	00	00	00	5	*	21 APR 0430	268	00	00	00	0
18 APR 0200	119	00	00	00	5	*	21 APR 0500	269	00	00	00	0
18 APR 0230	120	00	00	00	5	*	21 APR 0530	270	00	00	00	0
18 APR 0300	121	00	00	00	4	*	21 APR 0600	271	00	00	00	0
18 APR 0330	122	00	00	00	4	*	21 APR 0630	272	00	00	00	0
18 APR 0400	123	00	00	00	4	*	21 APR 0700	273	00	00	00	0
18 APR 0430	124	00	00	00	4	*	21 APR 0730	274	00	00	00	0
18 APR 0500	125	00	00	00	4	*	21 APR 0800	275	00	00	00	0
18 APR 0530	126	00	00	00	4	*	21 APR 0830	276	.00	.00	00	0
18 APR 0600	127	00	00	00	4	*	21 APR 0900	277	00	00	00	0
18 APR 0630	128	00	00	00	4	*	21 APR 0930	278	00	00	00	0
18 APR 0700	129	00	00	00	3	*	21 APR 1000	279	00	00	00	0
18 APR 0730	130	00	00	00	3	*	21 APR 1030	280	00	00	00	0
18 APR 0800	131	00	00	00	3	*	21 APR 1100	281	00	00	00	0
18 APR 0830	132	00	00	00	3	*	21 APR 1130	282	00	00	00	0.
18 APR 0900	133	00	00	00	3	*	21 APR 1200	283	00	00	00	0.
18 APR 0930	134	00	00	00	3	*	21 APR 1230	284	00	00	00	0
18 APR 1000	135	00	00	00	3	*	21 APR 1300	285	00	00	00	0
18 APR 1030	136	00	00	00	3	*	21 APR 1330	286	00	.00	00	0
18 APR 1100	137	00	00	00	3	*	21 APR 1400	287	00	00	00	0
18 APR 1130	138	00	00	00	3	*	21 APR 1430	288	.00	00	00	0
18 APR 1200	139	00	00	00	3	*	21 APR 1500	289	.00	00	00	0
18 APR 1230	140	00	00	00	3	*	21 APR 1530	290	00	00	00	0
18 APR 1300	141	00	00	00	3	*	21 APR 1600	291	00	.00	00	0.
18 APR 1330	142	00	00	00	2	*	21 APR 1630	292	00	.00	00	0
18 APR 1400	143	00	00	00	2	*	21 APR 1700	293	00	00	00	0
18 APR 1430	144	00	00	00	2	*	21 APR 1730	294	.00	00	00	0
18 APR 1500	145	00	00	00	2	*	21 APR 1800	295	00	00	00	0
18 APR 1530	146	00	00	00	2	*	21 APR 1830	296	00	00	00	0
18 APR 1600	147	00	00	00	2	*	21 APR 1900	297	00	00	00	0
18 APR 1630	148	00	00	00	2	*	21 APR 1930	298	00	00	00	0
18 APR 1700	149	00	00	00	2	*	21 APR 2000	299	00	00	00	0
18 APR 1730	150	00	00	00	2.	*	21 APR 2030	300	00	00	00	0.
						*						

TOTAL RAINFALL = 191 61, TOTAL LOSS = 76 93, TOTAL EXCESS = 114 69

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149 50-HR
+ (CU M/S)	(HR)				
	(CU M/S)				
+ 720	16 00	568	252	89	43
	(MM)	59 633	105 900	112 443	113 123
	(1000 CU M)	12266	21784.	23130	23269

CUMULATIVE AREA = 205 70 SQ KM

145 KO OUTPUT CONTROL VARIABLES

IPRNT	1	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0	HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

146 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	STOR	TYPE OF INITIAL CONDITION
RSVRIC	30000 00	INITIAL CONDITION
X	-1 00	WORKING R AND D COEFFICIENT

147 SV	STORAGE	0	18043.0	22516.0	28092 3	33668.4	39244.4
148 SE	ELEVATION	97 00	98 00	99 00	100.00	101.00	102 00

149 SS SPILLWAY

CREL	100 50	SPILLWAY CREST ELEVATION
SPWID	130 00	SPILLWAY WIDTH
COQW	1 40	WEIR COEFFICIENT
EXPW	1 50	EXPONENT OF HEAD

***

COMPUTED OUTFLOW-ELEVATION DATA

OUTFLOW	00	00	06	46	1 55	3 67	7 17	12 38	19 66	29 35
ELEVATION	97 00	100 50	100 50	100.52	100 54	100.57	100 62	100 67	100 73	100.80
OUTFLOW	41 79	57 33	76 31	99 07	125 96	157 32	193.49	234 83	281 67	334 36
ELEVATION	100 88	100 96	101 06	101.17	101 28	101 41	101.54	101 69	101 84	102 00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	00	18043 00	22516 00	28092 30	30880 35	30983.60	31112 67	31293 39	31525 71	31809 69
OUTFLOW	00	00	00	.00	00	.46	1.55	3.67	7.17	12.38
ELEVATION	97 00	98 00	99 00	100.00	100 50	100.52	100.54	100 57	100 62	100 67
STORAGE	32145 30	32532 52	32971 39	33461.86	33668 40	34004 81	34597 72	35243 11	35940 11	36688 72
OUTFLOW	19 66	29 35	41 79	57.33	64 35	76 31	99 07	125 96	157.32	193 49
ELEVATION	100 73	100 80	100.88	100 96	101 00	101 06	101 17	101 28	101.41	101.54
STORAGE	37489 01	38340 86	39244 40							
OUTFLOW	234 83	281 67	334 36							
ELEVATION	101 69	101 84	102 00							

HYDROGRAPH AT STATION BARR

DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE
15 APR 1500	1	0	30000 0	100 3	17 APR 1700	101	59	33506 1	101 0	19 APR 1900	201	9	31603 6	100 6
15 APR 1530	2	0	30000 0	100 3	17 APR 1730	102	57	33461 7	101 0	19 APR 1930	202	8	31596 6	100 6
15 APR 1600	3	0	30000 0	100 3	17 APR 1800	103	56	33418 3	101.0	19 APR 2000	203	8	31589 7	100 6
15 APR 1630	4	0	30000 0	100 3	17 APR 1830	104	55.	33375 9	100 9	19 APR 2030	204	8	31582.9	100 6
15 APR 1700	5	0	30000 0	100 3	17 APR 1900	105	53	33334 4	100 9	19 APR 2100	205	8	31576.2	100.6
15 APR 1730	6	0	30000 0	100 3	17 APR 1930	106	52	33293.8	100.9	19 APR 2130	206	8	31569 6	100 6
15 APR 1800	7	0	30000 0	100 3	17 APR 2000	107	51	33254 0	100.9	19 APR 2200	207	8	31563 1	100 6

15 APR 1830	8	0	30000 0	100 3	17 APR 2030	108	50	33215.2	100 9	19 APR 2230	208	8.	31556.7	100.6
15 APR 1900	9	0	30000 0	100 3	17 APR 2100	109	48	33177 2	100 9	19 APR 2300	209	8	31550.4	100 6
15 APR 1930	10	0	30000 0	100 3	17 APR 2130	110	47	33140.0	100 9	19 APR 2330	210	8	31544 2	100 6
15 APR 2000	11	0	30000 0	100 3	17 APR 2200	111	46	33103 7	100 9	20 APR 0000	211	7	31538 1	100 6
15 APR 2030	12	0	30000 0	100 3	17 APR 2230	112	45.	33068 3	100 9	20 APR 0030	212	7	31532 1	100.6
15 APR 2100	13	0	30000 0	100 3	17 APR 2300	113	44	33033 6	100.9	20 APR 0100	213	7	31526.2	100 6
15 APR 2130	14	0	30000 0	100 3	17 APR 2330	114	43	32999.8	100.9	20 APR 0130	214	7	31520 3	100 6
15 APR 2200	15	0	30000 0	100.3	18 APR 0000	115	42	32966.7	100 9	20 APR 0200	215	7	31514 5	100 6
15 APR 2230	16	0	30000 0	100 3	18 APR 0030	116	41	32934 4	100 9	20 APR 0230	216	7	31508 8	100 6
15 APR 2300	17	0	30000 0	100 3	18 APR 0100	117	40	32902.7	100.9	20 APR 0300	217	7	31503 2	100 6
15 APR 2330	18	0	30000 0	100 3	18 APR 0130	118	39	32871 7	100 9	20 APR 0330	218	7	31497 6	100 6
16 APR 0000	19	0	30000 1	100 3	18 APR 0200	119	38	32841 3	100.9	20 APR 0400	219	7	31492 1	100 6
16 APR 0030	20	0	30000 1	100 3	18 APR 0230	120	37	32811.5	100 8	20 APR 0430	220	7	31486 7	100 6
16 APR 0100	21	0	30000 2	100 3	18 APR 0300	121	36	32782.4	100 8	20 APR 0500	221	6	31481 3	100.6
16 APR 0130	22	0	30000 4	100 3	18 APR 0330	122	36	32753 9	100 8	20 APR 0530	222	6	31476 0	100 6
16 APR 0200	23	0	30000 9	100 3	18 APR 0400	123	35	32726 0	100.8	20 APR 0600	223	6.	31470.8	100.6
16 APR 0230	24	0	30002 1	100 3	18 APR 0430	124	34	32698 7	100 8	20 APR 0630	224	6	31465 6	100 6
16 APR 0300	25	0	30005 6	100 3	18 APR 0500	125	33	32671 9	100 8	20 APR 0700	225	6	31460 5	100 6
16 APR 0330	26	0	30017 1	100 3	18 APR 0530	126	33	32645.8	100 8	20 APR 0730	226	6	31455.4	100 6
16 APR 0400	27	0	30059 7	100 4	18 APR 0600	127	32	32620 1	100 8	20 APR 0800	227	6	31450 4	100.6
16 APR 0430	28	0	30187 1	100 4	18 APR 0630	128	31	32595 1	100 8	20 APR 0830	228	6	31445 5	100 6
16 APR 0500	29	0	30458 4	100 4	18 APR 0700	129	30	32570.5	100.8	20 APR 0900	229	6	31440.6	100.6
16 APR 0530	30	0	30886 8	100 5	18 APR 0730	130	30	32546 5	100 8	20 APR 0930	230	6.	31435.8	100 6
16 APR 0600	31	6	31435 3	100 6	18 APR 0800	131	29	32523 1	100 8	20 APR 1000	231	6	31431 0	100 6
16 APR 0630	32	18	32047 1	100 7	18 APR 0830	132	29	32500 0	100.8	20 APR 1030	232	6	31426 3	100 6
16 APR 0700	33	33	32670 6	100 8	18 APR 0900	133	28	32477.4	100.8	20 APR 1100	233	6	31421 7	100.6
16 APR 0730	34	51	33268 2	100 9	18 APR 0930	134	27	32455 2	100 8	20 APR 1130	234	6.	31417 1	100 6
16 APR 0800	35	70	33816 0	101 0	18 APR 1000	135	27	32433 5	100.8	20 APR 1200	235	5.	31412 6	100.6
16 APR 0830	36	88	34301 6	101 1	18 APR 1030	136	26	32412 2	100 8	20 APR 1230	236	5	31408 1	100.6
16 APR 0900	37	104	34721 6	101 2	18 APR 1100	137	26	32391 2	100 8	20 APR 1300	237	5	31403 7	100 6
16 APR 0930	38	119	35078 6	101 3	18 APR 1130	138	25	32370.7	100 8	20 APR 1330	238	5.	31399 3	100 6
16 APR 1000	39	132	35378 1	101 3	18 APR 1200	139	25	32350 6	100 8	20 APR 1400	239	5	31395 0	100 6
16 APR 1030	40	143	35627 8	101 4	18 APR 1230	140	24	32330 9	100 8	20 APR 1430	240	5.	31390 8	100 6
16 APR 1100	41	153	35835 5	101 4	18 APR 1300	141	24	32311 5	100.8	20 APR 1500	241	5	31386 6	100.6
16 APR 1130	42	161	36008 5	101 4	18 APR 1330	142	23	32292 5	100.8	20 APR 1530	242	5	31382 4	100 6
16 APR 1200	43	168	36152 5	101 4	18 APR 1400	143	23	32273 9	100.7	20 APR 1600	243	5	31378 3	100 6
16 APR 1230	44	173	36272 0	101 5	18 APR 1430	144	22	32255.6	100 7	20 APR 1630	244	5.	31374 3	100 6
16 APR 1300	45	178	36370 5	101 5	18 APR 1500	145	22	32237.7	100 7	20 APR 1700	245	5	31370 3	100 6
16 APR 1330	46	182	36450 4	101 5	18 APR 1530	146	22	32220 2	100 7	20 APR 1730	246	5.	31366 4	100 6
16 APR 1400	47	185	36513 8	101 5	18 APR 1600	147	21	32203 0	100 7	20 APR 1800	247	5	31362 5	100.6
16 APR 1430	48	187	36562 0	101 5	18 APR 1630	148	21	32186 1	100.7	20 APR 1830	248	5	31358 6	100.6
16 APR 1500	49	189	36596 6	101 5	18 APR 1700	149	20	32169.6	100.7	20 APR 1900	249	5	31354 8	100 6
16 APR 1530	50	190	36618 8	101 5	18 APR 1730	150	20	32153 3	100 7	20 APR 1930	250	5.	31351 0	100.6
16 APR 1600	51	191	36629 4	101 5	18 APR 1800	151	19	32137 4	100 7	20 APR 2000	251	4	31347 3	100 6
16 APR 1630	52	191	36629 1	101 5	18 APR 1830	152	19	32121 8	100 7	20 APR 2030	252	4	31343 7	100 6
16 APR 1700	53	190	36618 3	101 5	18 APR 1900	153	19	32106 4	100.7	20 APR 2100	253	4	31340 0	100.6
16 APR 1730	54	189	36597 4	101 5	18 APR 1930	154	18	32091.3	100.7	20 APR 2130	254	4	31336 5	100.6
16 APR 1800	55	188	36566 9	101 5	18 APR 2000	155	18	32076 4	100.7	20 APR 2200	255	4	31332 9	100.6
16 APR 1830	56	186	36527 2	101 5	18 APR 2030	156	18	32061 8	100 7	20 APR 2230	256	4	31329 4	100 6
16 APR 1900	57	183	36479 3	101 5	18 APR 2100	157	18	32047 5	100 7	20 APR 2300	257	4	31326 0	100 6
16 APR 1930	58	181	36424 1	101 5	18 APR 2130	158	17	32033 4	100 7	20 APR 2330	258	4	31322 6	100 6
16 APR 2000	59	178	36362 6	101 5	18 APR 2200	159	17	32019 5	100.7	21 APR 0000	259	4.	31319.2	100.6
16 APR 2030	60	175	36295 8	101 5	18 APR 2230	160	17	32005 9	100 7	21 APR 0030	260	4.	31315.9	100.6
16 APR 2100	61	171	36224 6	101 5	18 APR 2300	161	16	31992 5	100 7	21 APR 0100	261	4	31312 6	100 6
16 APR 2130	62	167	36149 9	101 4	18 APR 2330	162	16	31979 3	100.7	21 APR 0130	262	4	31309 4	100 6
16 APR 2200	63	164	36072 5	101 4	19 APR 0000	163	16	31966 3	100.7	21 APR 0200	263	4	31306 2	100.6
16 APR 2230	64	160	35993 0	101 4	19 APR 0030	164	16.	31953 6	100 7	21 APR 0230	264	4.	31303 0	100 6
16 APR 2300	65	156	35912 1	101 4	19 APR 0100	165	15	31941.1	100.7	21 APR 0300	265	4	31299.9	100.6
16 APR 2330	66	152	35830 0	101 4	19 APR 0130	166	15	31928 8	100 7	21 APR 0330	266	4	31296.8	100 6
17 APR 0000	67	149	35747 2	101 4	19 APR 0200	167	15	31916 7	100 7	21 APR 0400	267	4	31293 8	100.6
17 APR 0030	68	145	35664 0	101 4	19 APR 0230	168	14	31904 9	100 7	21 APR 0430	268	4	31290 8	100 6
17 APR 0100	69	141	35580 7	101 3	19 APR 0300	169	14	31893 2	100.7	21 APR 0500	269	4	31287 8	100 6
17 APR 0130	70	137	35497 7	101 3	19 APR 0330	170	14	31881 8	100 7	21 APR 0530	270	4.	31284 8	100 6
17 APR 0200	71	134	35415 1	101 3	19 APR 0400	171	14	31870 5	100 7	21 APR 0600	271	4.	31281 9	100.6
17 APR 0230	72	130	35333 3	101 3	19 APR 0430	172	13	31859 4	100 7	21 APR 0630	272	4	31279 0	100.6
17 APR 0300	73	126	35252 4	101 3	19 APR 0500	173	13	31848 6	100 7	21 APR 0700	273	3	31276 2	100 6
17 APR 0330	74	123	35172 5	101 3	19 APR 0530	174	13.	31837.9	100 7	21 APR 0730	274	3	31273 3	100 6
17 APR 0400	75	120	35093 6	101 3	19 APR 0600	175	13	31827.4	100.7	21 APR 0800	275	3	31270 5	100.6
17 APR 0430	76	116	35015 8	101 2	19 APR 0630	176	13	31817 1	100.7	21 APR 0830	276	3	31267 7	100.6
17 APR 0500	77	113	34939 2	101 2	19 APR 0700	177	12	31806 9	100 7	21 APR 0900	277	3.	31265.0	100 6
17 APR 0530	78	110	34863 8	101 2	19 APR 0730	178	12	31796 9	100 7	21 APR 0930	278	3	31262 2	100 6
17 APR 0600	79	107	34789 8	101 2	19 APR 0800	179	12	31787 1	100 7	21 APR 1000	279	3	31259 5	100 6
17 APR 0630	80	104	34717 2	101 2	19 APR 0830	180	12	31777 4	100.7	21 APR 1030	280	3	31256 8	100.6
17 APR 0700	81	101	34646 0	101 2	19 APR 0900	181	12	31767 8	100.7	21 APR 1100	281	3	31254 2	100.6
17 APR 0730	82	98	34576 4	101 2	19 APR 0930	182	11	31758 4	100.7	21 APR 1130	282	3	31251 5	100 6
17 APR 0800	83	96	34508 1	101 2	19 APR 1000	183	11	31749 1	100 7	21 APR 1200	283	3	31248 9	100 6
17 APR 0830	84	93	34441 2	101 1	19 APR 1030	184	11	31740 0	100 7	21 APR 1230	284	3	31246 4	100.6
17 APR 0900	85	91	34375 7	101 1	19 APR 1100	185	11	31731 0	100 7	21 APR 1300	285	3.	31243 8	100.6
17 APR 0930	86	88	34311 5	101 1	19 APR 1130	186	11	31722 1	100.7	21 APR 1330	286	3	31241 3	100.6
17 APR 1000	87	86	34248 8	101 1	19 APR 1200	187	11	31713 4	100.6	21 APR 1400	287	3	31238 8	100 6
17 APR 1030	88	83	34187 4	101 1	19 APR 1230	188	10	31704 7	100 6	21 APR 1430	288	3	31236 3	100.6
17 APR 1100	89	81	34127 4	101 1	19 APR 1300	189	10	31696 2	100.6	21 APR 1500	289	3.	31233.8	100 6
17 APR 1130	90	79	34068 8	101 1	19 APR 1330	190	10	31687 9	100 6	21 APR 1530	290	3	31231.4	100 6
17 APR 1200	91	77	34011 6	101 1	19 APR 1400	191	10	31679 6	100 6	21 APR 1600	291	3	31229 0	100 6
17 APR 1230	92	75	33955 6	101 1	19 APR 1430	192	10	31671 5	100 6	21 APR 1630	292	3.	31226 6	100.6
17 APR 1300	93	73	33901 0	101 0	19 APR 1500	193	10	31663 5	100 6	21 APR 1700	293	3	31224 2	100.6
17 APR 1330	94	71	33847 5	101 0	19 APR 1530	194	10	31655 6	100 6	21 APR 1730	294	3	31221 9	100.6
17 APR 1400	95	69	33795 2	101 0	19 APR 1600	195	9	31647 8	100 6	21 APR 1800	295	3	31219.5	100 6
17 APR 1430	96	67	33744 2	101 0	19 APR 1630	196	9	31640 2	100 6	21 APR 1830	296	3.	31217 2	100 6
17 APR 1500	97	65	33694 3	101 0	19 APR 1700	197	9	31632 6	100.6	21 APR 1900	297	3	31215 0	100 6
17 APR 1530	98	64	33645 6	101 0	19 APR 1730	198	9	31625.2	100.6	21 APR 1930	298	3	31212 7	100 6
17 APR 1600	99	62	33598 1	101 0	19 APR 1800	199	9	31617 9	100 6	21 APR 2000	299	3	31210 5	100.6
17 APR 1630	100	60	33551 6	101 0	19 APR 1830	200	9	31610 7	100 6	21 APR 2030	300	3	31208 3	100.6

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	149 50-HR
+ (CU M/S)	(HR)	(CU M/S)				
+ 191	25 00		187	151	75	39
		(MM)	19 689	63 235	94 758	101 375
		(1000 CU M)	4050	13007	19492	20853

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	149 50-HR
+ (1000 CU M)	(HR)					
36629	25 00		36565	35764	33757	32418

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	149 50-HR
+ (METERS)	(HR)					
101 53	25 00		101 52	101 38	101 02	100 78

CUMULATIVE AREA = 205 70 SQ KM

1

RUNOFF SUMMARY, AVERAGE FLOW IN CUBIC METERS PER SECOND
AREA IN SQUARE KILOMETERS

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT		88 04	14 50	55 44	20 36	6 94	15 83		
HYDROGRAPH AT		91 04	15 50	67 29	27 60	9 65	22 10		
HYDROGRAPH AT		47 80	16 50	43 35	22 84	8 41	19 42		
HYDROGRAPH AT		55 25	16 00	41 42	17 27	6 06	13 87		
4 COMBINED AT	BACIA	258 94	15 50	202 83	88 01	31 05	71 22		
HYDROGRAPH AT		12 01	15 00	9 23	3 81	1 33	3 04		
HYDROGRAPH AT		33 32	15 00	24 87	10 01	3 48	7 96		
2 COMBINED AT	BACIA	291 67	15 50	227 15	98 02	34.54	79 18		
HYDROGRAPH AT		323 76	15 50	250 89	108 03	38 06	87 51		
HYDROGRAPH AT		43 66	20 00	40 12	22 35	8 39	19 41		
HYDROGRAPH AT		86 92	16 00	74 86	40 92	15 07	34 89		
HYDROGRAPH AT		42 22	15 50	35 62	15 83	5 62	12.89		
2 COMBINED AT	BACIA	128 29	16 00	109 27	56 69	20.68	47 78		
HYDROGRAPH AT		146 26	16 00	122.83	63 10	22.95	53.06		
HYDROGRAPH AT		76 14	14 00	51 76	19 16	6 56	14 94		
HYDROGRAPH AT		116 49	14 50	77 32	28 78	9 84	22 46		
3 COMBINED AT	BACIA	565 63	15 50	444 57	199 66	70 85	163.03		
HYDROGRAPH AT		574 24	15 50	452 62	203 89	72.36	166.70		
HYDROGRAPH AT		38 96	13 50	23 48	8 33	2 83	6 44		
HYDROGRAPH AT		89 36	14 00	54.67	19 74	6 73	15 29		
HYDROGRAPH AT		75 71	16 00	57 73	24 35	8 55	19 60		
3 COMBINED AT	BACIA	712 75	15 50	558 37	247 67	87 63	201 59		
HYDROGRAPH AT		720 07	16 00	567 89	252 13	89 23	205.70		
ROUTED TO	BARR	190 62	25 00	187 50	150 55	75 20	205 70	101 53	25 00

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CMS)	(MIN)	(MM)	(MIN)	(CMS)	(MIN)	(MM)
	MANE	24 02	89 31	849 81	113 96	30 00	87 99	870 00	113 97
CONTINUITY SUMMARY (1000 CU M)-INFLOW- 0000E+00 EXCESS- 1812E+04 OUTFLOW- 1798E+04 BASIN STORAGE- 1149E+01 PERCENT ERROR- 7									
	MANE	24 08	91 64	934 85	113 75	30 00	90 98	930 00	113 75
CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 0000E+00 EXCESS- 2530E+04 OUTFLOW- 2506E+04 BASIN STORAGE- 4987E+01 PERCENT ERROR- 8									
	MANE	16 31	47 85	992 78	113 60	30 00	47 77	990 00	113 58
CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 0000E+00 EXCESS- 2223E+04 OUTFLOW- 2199E+04 BASIN STORAGE- 1148E+02 PERCENT ERROR- 6									

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                    MANE        26 27     55 23    960 96    113 83     30 00     55 22    960 00     113 84

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00 EXCESS-  1588E+04 OUTFLOW-  1574E+04 BASIN STORAGE-  3103E+01 PERCENT ERROR-     7

                    MANE         6 66     12 01    898 86    113 98     30 00     12.01    900 00     114 30

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00 EXCESS-  3480E+03 OUTFLOW-  3453E+03 BASIN STORAGE-  6814E+00 PERCENT ERROR-     6

                    MANE        10 66     33 45    911 44    114 09     30 00     33.30    900 00     113.99

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  3461E+03 EXCESS- .5633E+03 OUTFLOW-  9051E+03 BASIN STORAGE-  8841E+00 PERCENT ERROR-     4

                    MANE        15 04    324 52    936 19    113 46     30 00    323 56    930 00     113 45

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  8974E+04 EXCESS-  9536E+03 OUTFLOW-  9896E+04 BASIN STORAGE-  2473E+01 PERCENT ERROR-     3

                    MANE        22 77     43 64   1199 67    113.64     30 00     43 64   1200 00     113 64

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00 EXCESS-  2222E+04 OUTFLOW-  2199E+04 BASIN STORAGE-  1484E+02 PERCENT ERROR-     4

                    MANE        30 00     87 33    966 72    113 20     30 00     86 87    960.00     113 20

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  2197E+04 EXCESS-  1772E+04 OUTFLOW-  3936E+04 BASIN STORAGE-  4308E+01 PERCENT ERROR-     7

                    MANE        17 86     42 24    925 43    113 81     30 00     42 20    930 00     113 77

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00 EXCESS-  1476E+04 OUTFLOW-  1462E+04 BASIN STORAGE-  4033E+01 PERCENT ERROR-     6

                    MANE        10 88    146 40    956 65    113 23     30 00    146 17    960 00     113 23

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  5394E+04 EXCESS-  6045E+03 OUTFLOW-  5988E+04 BASIN STORAGE-  1608E+01 PERCENT ERROR-     2

                    MANE        16 72     76 52    845 68    113 96     30 00     76.10    840 00     114 05

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00 EXCESS-  1710E+04 OUTFLOW-  1697E+04 BASIN STORAGE-  1490E+01 PERCENT ERROR-     7

                    MANE        13 13    117 26    854 95    113 86     30 00    116 42    870 00     113 90

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  1697E+04 EXCESS-  8609E+03 OUTFLOW-  2549E+04 BASIN STORAGE-  6979E+00 PERCENT ERROR-     3

                    MANE         5 20    578 99    940 69    113 32     30 00    573.90    930.00     113 30

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  1842E+05 EXCESS-  4201E+03 OUTFLOW-  1883E+05 BASIN STORAGE-  1600E+01 PERCENT ERROR-     1

                    MANE        12 18     39 22    822 55    114 16     30 00     38 94    810 00     114 15

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00 EXCESS-  7373E+03 OUTFLOW-  7328E+03 BASIN STORAGE-  4450E+00 PERCENT ERROR-     5

                    MANE        13 76     89 51    853 45    114 19     30 00     89 30    840 00     114 34

CONTINUITY SUMMARY (1000 CU-M) INFLOW-  7322E+03 EXCESS-  1013E+04 OUTFLOW-  1740E+04 BASIN STORAGE- .7830E+00 PERCENT ERROR-    .2

                    MANE        29 38     75 95    948 44    113.76     30 00     75 66    960.00     113 69

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00 EXCESS-  2244E+04 OUTFLOW-  2222E+04 BASIN STORAGE-  4408E+01 PERCENT ERROR-     8

                    MANE         7 36    726 51    945.94    113 25     30 00    719.64    960 00     113.18

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  2277E+05 EXCESS-  4701E+03 OUTFLOW-  2322E+05 BASIN STORAGE- .2301E+01 PERCENT ERROR-    .1


*** NORMAL END OF HEC-1 ***
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+			486 24	16 00	389 70	180 09	64 31	166 70	
+	HYDROGRAPH AT		32 65	13 50	20 51	7 40	2 52	6 44	
+	HYDROGRAPH AT		74 78	14 50	47 56	17 48	5 97	15 29	
+	HYDROGRAPH AT		63 66	16 00	49 80	21 56	7.60	19.60	
+	3 COMBINED AT	BACIA	599 99	16 00	480 19	218 92	77 87	201 59	
+	HYDROGRAPH AT		612 54	16 00	488 24	222 69	79.29	205 70	
+	ROUTED TO	BARR	159 77	26 00	156 98	127 82	65 49	205 70	
+									101 42 26 00

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME	
		(MIN)	(CMS)	(MIN)	(MM)	(MIN)	(CMS)	(MIN)	(MM)	
	MANE	25 16	76 39	864 79	101 35	30 00	75 84	870 00	101 41	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	1612E+04	OUTFLOW-	1599E+04	BASIN STORAGE-	1187E+01	PERCENT ERROR-	7
	MANE	25.15	76.77	953.46	101.19	30 00	76.30	960.00	101.17	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	2251E+04	OUTFLOW-	2229E+04	BASIN STORAGE-	4756E+01	PERCENT ERROR-	8
	MANE	17 12	39 95	1011 92	101 00	30.00	39 95	1020.00	101.00	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	1978E+04	OUTFLOW-	.1955E+04	BASIN STORAGE-	1173E+02	PERCENT ERROR-	6
	MANE	27 45	46 95	956 84	101 23	30 00	46 86	960.00	101 28	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	1413E+04	OUTFLOW-	.1399E+04	BASIN STORAGE-	.3254E+01	PERCENT ERROR-	7
	MANE	7 10	9 98	933 22	101 39	30.00	9 98	930.00	101.30	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	.3096E+03	OUTFLOW-	3072E+03	BASIN STORAGE-	6957E+00	PERCENT ERROR-	6
	MANE	10 99	28 30	909 94	101 34	30 00	28 16	930.00	101 25	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	3067E+03	EXCESS-	5011E+03	OUTFLOW-	.8040E+03	BASIN STORAGE-	.8424E+00	PERCENT ERROR-	4
	MANE	15.58	274 43	957 18	100 89	30.00	273 77	960.00	100 88	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	7981E+04	EXCESS-	.8484E+03	OUTFLOW-	8799E+04	BASIN STORAGE-	2433E+01	PERCENT ERROR-	.3
	MANE	23 87	36 64	1231 43	101 03	30 00	36 62	1230 00	101 03	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	1977E+04	OUTFLOW-	1955E+04	BASIN STORAGE-	1416E+02	PERCENT ERROR-	.4
	MANE	27 03	72 56	973 51	100 81	30.00	72 40	990.00	100 78	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	1953E+04	EXCESS-	1577E+04	OUTFLOW-	3505E+04	BASIN STORAGE-	4498E+01	PERCENT ERROR-	.6
	MANE	18 57	35 43	944.72	101 21	30 00	35.35	930 00	101 24	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	1313E+04	OUTFLOW-	1300E+04	BASIN STORAGE-	4098E+01	PERCENT ERROR-	6
	MANE	11 41	121 71	978 97	100 78	30 00	121.39	990.00	100.77	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	4802E+04	EXCESS-	5377E+03	OUTFLOW-	.5329E+04	BASIN STORAGE-	1575E+01	PERCENT ERROR-	2
	MANE	17 56	64 45	861 76	101 32	30 00	64.44	870 00	101.22	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	1522E+04	OUTFLOW-	1509E+04	BASIN STORAGE-	1364E+01	PERCENT ERROR-	8
	MANE	13 73	99 25	871 39	101.13	30.00	99.14	870.00	101 19	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	1506E+04	EXCESS-	7659E+03	OUTFLOW-	2264E+04	BASIN STORAGE-	7091E+00	PERCENT ERROR-	3
	MANE	5 52	488 01	943 22	100 77	30 00	485 95	960 00	100 76	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	1638E+05	EXCESS-	3738E+03	OUTFLOW-	1674E+05	BASIN STORAGE-	1622E+01	PERCENT ERROR-	1

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                    MANE          12 73     33 02    824 74    101 48     30.00     32 63    810 00      101 47

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00 EXCESS-  6559E+03 OUTFLOW-  6514E+03 BASIN STORAGE-  4270E+00 PERCENT ERROR-     6

                    MANE          14 41     75 64    854 81    101 43     30 00     74 74    870 00      101 46

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  6508E+03 EXCESS-  9013E+03 OUTFLOW-  1546E+04 BASIN STORAGE-  8552E+00 PERCENT ERROR-     4

                    MANE          30 00     64 32    969 24    101 22     30 00     63 62    960 00      101 16

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00 EXCESS-  1996E+04 OUTFLOW-  1977E+04 BASIN STORAGE-  4511E+01 PERCENT ERROR-    .7

                    MANE           7 82    612 75    950 26    100 69     30 00    612.18    960 00      100 63

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  2025E+05 EXCESS-  4182E+03 OUTFLOW-  2064E+05 BASIN STORAGE-  2263E+01 PERCENT ERROR-     1


*** NORMAL END OF HEC-1 ***

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CONCREMAT

ENGENHARIA E TECNOLOGIA S.A.

Simulação Modelo TR 10.000

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!*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*         SEPTEMBER 1990                *
*          VERSION 4 0                  *
*                                       *
*  RUN DATE  05/05/1996  TIME  18 11 28 *
*                                       *
*****************************************
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*****************************************
*                                       *
*   U S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*        609 SECOND STREET              *
*      DAVIS, CALIFORNIA 95616          *
*         (916) 756-1104                *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -ANSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81 THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBROUTINE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE GREEN AND AMPT INFILTRATION
KINEMATIC WAVE NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE          ID       1       2       3       4 ..    5       6    . 7   .  8    . .9  ..  10
   1          ID        BACIA HIDROGRAFICA DO RESERVATORIO DE SOUSA
   2          ID        MODELO DE ONDA CINEMATICA DA BACIA TR-10000
   3          IT      30 15APR96     1500      300
   4          IO      30
   5          IN
              *
              *DIAGRAM

   6          KK         BACIA ABANICO COMPONENTE E
   7          KM         ESC  SUPERFICIAL SUBBACIA E
   8          KO       3
   9          BA    15 83
  10          PH     0 1   220 0    26.0    49.0    98 7   120 0   138 0   190 0   215 0   260 5
  11          LS              74                      74
  12          UK     810      05      40    40.6
  13          UK    1170      05      40    59.4
  14          RK    8000     006     045             TRAP       0      40

  15          KK         BACIA ABANICO COMPONENTE H
  16          KM         ESC  SUPERFICIAL SUBBACIA H
  17          KO       3
  18          BA    22 1
  19          UK    1130     016      40    46 1
  20          UK    1320     016     .40    53.9
  21          RK    9000     008     045             TRAP       0      40

  22          KK         BACIA ABANICO COMPONENTE I
  23          KM         ESC  SUPERFICIAL SUBBACIA I
  24          KO       3
  25          BA    19 42
  26          UK    1700     016      40    35 0
  27          UK    3150    .016      40    65 8
  28          RK    4000    0040     045             TRAP       0      40

  29          KK         BACIA ABANICO COMPONENTE J
  30          KM         ESC  SUPERFICIAL SUBBACIA J
  31          KO       3
  32          BA    13 87
  33          UK    1210     013      40    52.3
  34          UK    1100     013      40    47.7
  35          RK    6000    0030     045             TRAP       0      40

  36          KK    BACIA EM ABANICO COMPLETA
  37          HC       4

  38          KK         BACIA F-G COMPONENTE F
  39          KM         ESC  SUPERFICIAL SUBBACIA F
  40          KO       3
  41          BA    3 04
  42          UK    1250     010      40    61.8
  43          UK     780     010      40    38 2
  44          RK    1500    0080     045             TRAP       0      40
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1 HEC-1 INPUT PAGE 2

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LINE          ID       1       2       3       4.      5       6       7     . 8       9       10
  45          KK         BACIA F - G  COMPONENTE G
  46          KM         ESC  SUPERFICIAL SUBBACIA G
  47          KO       3
  48          BA    4 92
  49          UK     980     010     .40    59 9
  50          UK     660     010      40    40 1
  51          RK    3000    0080     045             TRAP       0      40     YES

  52          KK    BACIA EM ABANICO COMPLETA + BACIA F - G
  53          HC       2

  54          KK         BACIA P
  55          KM         ESC  SUPERFICIAL BACIA P
  56          KO       3
  57          BA    8 33
  58          UK     820     013      40    49.4
  59          UK     840    .013      40    50.6
  60          RK    5000    0030     045             TRAP       0      40     YES
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000126

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 61          KK        BACIA K-L COMPONENTE K
 62          KM        ESC  SUPERFICIAL SUBBACIA K
 63          KO      3
 64          BA   19 41
 65          UK    1340      003       40     48.8
 66          UK    1400      003       40     51 2
 67          RK    7100     0080      045              TRAP        0       40

 68          KK        BACIA K - L  COMPONENTE L
 69          KM        ESC  SUPERFICIAL SUBBACIA L
 70          KO      3
 71          BA   15 48
 72          UK     440      020       40     24 3
 73          UK    1380      020       40     75 7
 74          RK    8500     0030     .045              TRAP        0       40      YES

 75          KK        BACIA M
 76          KM        ESC  SUPERFICIAL BACIA M
 77          KO      3
 78          BA   12 89
 79          UK     750      010       40     31 9
 80          UK    1590      010       40     68 1
 81          RK    5500     0080      045              TRAP        0       40

 82          KK   BACIA M + BACIA K - L
 83          HC      2

 84          KK        BACIA Q
 85          KM        ESC  SUPERFICIAL SUBBACIA Q
 86          KO      3
 87          BA    5 28
 88          UK     750      013       40     42 4
 89          UK    1010     .013       40     57 6
 90          RK    3000     0030     .045              TRAP        0       40      YES
1                                                  HEC-1 INPUT                                                  PAGE  3

          LINE      ID      1       2      . 3     ...4       5  ..   6.       7.    . 8.     .9    ...10

 91          KK        BACIA D-C COMPONENTE D
 92          KM        ESC  SUPERFICIAL SUBBACIA D
 93          KO      3
 94          BA   14.94
 95          UK    1860      080       40     74 8
 96          UK     630      080       40     25 2
 97          RK    6000     0080      045              TRAP        0       40

 98          KK        BACIA D - C  COMPONENTE C
 99          KM        ESC. SUPERFICIAL SUBBACIA C
100          KO      3
101          BA    7 52
102          UK     870      030       40     24.3
103          UK     800      030       40     75 7
104          RK    4500     0060     .045              TRAP        0       40      YES

105          KK   BACIA Q + BACIA P + BACIA D-C
106          HC      3

107          KK        BACIA R
108          KM        ESC  SUPERFICIAL SUBBACIA R
109          KO      3
110          BA    3 67
111          UK    1160      013       40     63.4
112          UK     670      013       40     36.6
113          RK    2000     0030      045              TRAP        0       40      YES

114          KK        BACIA B-A COMPONENTE B
115          KM        ESC  SUPERFICIAL SUBBACIA B
116          KO      3
117          BA    6.44
118          UK     490      050       40     30.5
119          UK    1120      050       40     69 5
120          RK    4000     0100      045              TRAP        0       40

121          KK        BACIA B - A  COMPONENTE A
122          KM        ESC  SUPERFICIAL SUBBACIA A
123          KO      3
124          BA    8 85
125          UK     910      030       40     51.5
126          UK     860      030       40     48 5
127          RK    5000     0080      045              TRAP        0       40      YES

128          KK        BACIA N
129          KM        ESC  SUPERFICIAL SUBBACIA N
130          KO      3
131          BA   19 60
132          UK     780      013       40     37.9
133          UK    1280      013      .40     62.1
134          RK    9500     0030      045              TRAP        0       40
1                                                  HEC-1 INPUT                                                  PAGE  4

          LINE      ID      1       2       3       4    .  5    .  6..     7       8.      9     ..10

135          KK   BACIA R + BACIA N + BACIA A-B
136          HC      3

137          KK        BACIA S
138          KM        ESC  SUPERFICIAL SUBBACIA S
139          KO      1
140          BA    4 11
141          UK     450     .010      .40     32 6
142          UK     920      010       40     67 3
143          RK    3000     0030      045              TRAP        0       40      YES

144          KK    BARRAGEM DE SOUSA
145          KO      1
146          RS      1    STOR  30000       -1
147          SV          18043   22516. 28092.3 33668.4 39244.4
148          SE       97      98      99      100      101      102
149          SS   100 5    130.     1.4     1.5
150          ZZ
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 61           KK        BACIA K-L COMPONENTE K
 62           KM        ESC  SUPERFICIAL SUBBACIA K
 63           KO      3
 64           BA    19 41
 65           UK    1340    .003      40     48 8
 66           UK    1400     003      40     51.2
 67           RK    7100    0080     045                TRAP       0       40

 68           KK        BACIA K - L  COMPONENTE L
 69           KM        ESC  SUPERFICIAL SUBBACIA L
 70           KO      3
 71           BA    15 48
 72           UK     440     020      40     24 3
 73           UK    1380     020      40     75 7
 74           RK    8500    0030     045                TRAP       0       40      YES

 75           KK        BACIA M
 76           KM        ESC  SUPERFICIAL BACIA M
 77           KO      3
 78           BA    12 89
 79           UK     750     010      40     31 9
 80           UK    1590     010      40     68 1
 81           RK    5500    0080     045                TRAP       0       40

 82           KK    BACIA M + BACIA K - L
 83           HC      2

 84           KK        BACIA Q
 85           KM        ESC  SUPERFICIAL SUBBACIA Q
 86           KO      3
 87           BA     5 28
 88           UK     750     013      40     42 4
 89           UK    1010     013      40     57.6
 90           RK    3000    0030     045                TRAP       0       40      YES
1                                              HEC-1 INPUT                                             PAGE  3

LINE          ID       1       2       3       4   ... 5       6       7   .  8.      9   . 10


 91           KK        BACIA D-C COMPONENTE D
 92           KM        ESC  SUPERFICIAL SUBBACIA D
 93           KO      3
 94           BA    14 94
 95           UK    1860     080      40     74 8
 96           UK     630     080      40     25.2
 97           RK    6000   .0080     045                TRAP       0       40

 98           KK        BACIA D - C  COMPONENTE C
 99           KM        ESC  SUPERFICIAL SUBBACIA C
100           KO      3
101           BA     7 52
102           UK     870    .030      40     24 3
103           UK     800     030      40     75 7
104           RK    4500   .0060     045                TRAP       0       40      YES

105           KK    BACIA Q + BACIA P + BACIA D-C
106           HC      3

107           KK        BACIA R
108           KM        ESC  SUPERFICIAL SUBBACIA R
109           KO      3
110           BA     3 67
111           UK    1160     013      40     63.4
112           UK     670     013      40     36 6
113           RK    2000    0030     045                TRAP       0       40      YES

114           KK        BACIA B-A COMPONENTE B
115           KM        ESC  SUPERFICIAL SUBBACIA B
116           KO      3
117           BA     6 44
118           UK     490     050      40     30 5
119           UK    1120     050      40     69.5
120           RK    4000    0100     045                TRAP       0       40

121           KK        BACIA B - A  COMPONENTE A
122           KM        ESC  SUPERFICIAL SUBBACIA A
123           KO      3
124           BA     8 85
125           UK     910     030      40     51.5
126           UK     860     030      40     48 5
127           RK    5000    0080     045                TRAP       0       40      YES

128           KK        BACIA N
129           KM        ESC  SUPERFICIAL SUBBACIA N
130           KO      3
131           BA    19 60
132           UK     780     013      40     37 9
133           UK    1280     013      40     62 1
134           RK    9500    0030     045                TRAP       0       40
1                                              HEC-1 INPUT                                             PAGE  4

LINE          ID       1       2       3       4   .   5       6  ..   7   .   8       9      10


135           KK    BACIA R + BACIA N + BACIA A-B
136           HC      3

137           KK        BACIA S
138           KM        ESC  SUPERFICIAL SUBBACIA S
139           KO      1
140           BA     4 11
141           UK     450     010      40     32 6
142           UK     920     010     .40     67 3
143           RK    3000    0030     045                TRAP       0       40      YES

144           KK      BARRAGEM DE SOUSA
145           KO      1
146           RS      1    STOR   30000       -1
147           SV         18043.  22516. 28092.3 33668.4 39244.4
148           SE      97      98      99     100     101     102.
149           SB    100 5    130.     1 4     1 5
150           ZZ
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000128

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        METRIC UNITS
             DRAINAGE AREA          SQUARE KILOMETERS
             PRECIPITATION DEPTH    MILLIMETERS
             LENGTH, ELEVATION      METERS
             FLOW                   CUBIC METERS PER SECOND
             STORAGE VOLUME         CUBIC METERS
             SURFACE AREA           SQUARE METERS
             TEMPERATURE            DEGREES CELSIUS

  8 KO          OUTPUT CONTROL VARIABLES
                      IPRNT               3  PRINT CONTROL
                      IPLOT               0  PLOT CONTROL
                      QSCAL            0   HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

  9 BA          SUBBASIN CHARACTERISTICS
                      TAREA         15 83  SUBBASIN AREA

                PRECIPITATION DATA

 10 PH                                 DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                      HYDRO-35                 .          TP-40       .        .        ..     .       TP-49     .     ..
                5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                26 00   49 00   98 70  120 00  138 00  190.00  215.00  260.50     .00     .00      00     .00

                                                    STORM AREA =  220 00

 11 LS          SCS LOSS RATE
                      STRTL         17 85  INITIAL ABSTRACTION
                     CRVNBR         74 00  CURVE NUMBER
                      RTIMP            00  PERCENT IMPERVIOUS AREA

                  LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                      STRTL         17 85  INITIAL ABSTRACTION
                     CRVNBR         74 00  CURVE NUMBER
                      RTIMP            00  PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
 12 UK            OVERLAND-FLOW ELEMENT NO  1
                          L          810   OVERLAND FLOW LENGTH
                          S          0500  SLOPE
                          N           400  ROUGHNESS COEFFICIENT
                         PA          40 6  PERCENT OF SUBBASIN
                      DXMIN             5  MINIMUM NUMBER OF DX INTERVALS
 13 UK            OVERLAND-FLOW ELEMENT NO  2
                          L         1170   OVERLAND FLOW LENGTH
                          S          0500  SLOPE
                          N           400  ROUGHNESS COEFFICIENT
                         PA          59.4  PERCENT OF SUBBASIN
                      DXMIN             5  MINIMUM NUMBER OF DX INTERVALS

                KINEMATIC WAVE
 14 RK            MAIN CHANNEL
                          L         8000   CHANNEL LENGTH
                          S          0060  SLOPE
                          N           045  CHANNEL ROUGHNESS COEFFICIENT
                         CA         15.83  CONTRIBUTING AREA
                      SHAPE          TRAP  CHANNEL SHAPE
                         WD            00  BOTTOM WIDTH OR DIAMETER
                          Z         40 00  SIDE SLOPE
                     NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
                     RUPSTQ            NO  ROUTE UPSTREAM HYDROGRAPH

                                                   ***
                                      COMPUTED KINEMATIC PARAMETERS
                                            VARIABLE TIME STEP
                                          (DT SHOWN IS A MINIMUM)

                  ELEMENT     ALPHA        M         DT         DX       PEAK    TIME TO     VOLUME    MAXIMUM
                                                                                   PEAK                CELERITY
                                                   (MIN)        (M)      (CMS)     (MIN)      (MM)      (MPS)

                 PLANE1          56       1 67      15 34     162 05     62.29    776 19     156 06        18
                 PLANE2          56       1 67      20 45     234 08     77 19    809 64     155 77        19
                 MAIN            32       1 33      22 13    2667.54    123 91    842 73     155.79      2 01

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00  EXCESS- .2472E+04 OUTFLOW-  2450E+04 BASIN STORAGE-  1173E+01 PERCENT ERROR-     5

                                              INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                 MAIN            32       1 33      30 00                123 68    840 00     155.62

     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION

   TOTAL RAINFALL =  237 92, TOTAL LOSS =   81 34, TOTAL EXCESS =  156 58

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR         24-HR          72-HR      149 50-HR
+  (CU M/S)     (HR)
                      (CU M/S)
+       124     14 00               76            28              9              5
                         (MM)   103 411       152 195        155.317        155.542
                   (1000 CU M)     1637          2409           2459           2462

                       CUMULATIVE AREA =   15 83 SQ KM

 17 KO          OUTPUT CONTROL VARIABLES
                      IPRNT               3  PRINT CONTROL
                      IPLOT               0  PLOT CONTROL
                      QSCAL            0   HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

 18 BA          SUBBASIN CHARACTERISTICS
                      TAREA         22 10  SUBBASIN AREA
```

PRECIPITATION DATA

10 PH — DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35					TP-40				TP-49		
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
26 00	49 00	98 70	120 00	138 00	190 00	215 00	260 50	00	00	.00	00

STORM AREA - 220 00

11 LS — SCS LOSS RATE

STRTL	17 85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT

STRTL	17.85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

KINEMATIC WAVE

19 UK — OVERLAND-FLOW ELEMENT NO 1

L	1130.	OVERLAND FLOW LENGTH
S	.0160	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	46 1	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

20 UK — OVERLAND-FLOW ELEMENT NO 2

L	1320	OVERLAND FLOW LENGTH
S	0160	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	53 9	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

KINEMATIC WAVE

21 RK — MAIN CHANNEL

L	9000	CHANNEL LENGTH
S	0080	SLOPE
N	.045	CHANNEL ROUGHNESS COEFFICIENT
CA	22 10	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WD	00	BOTTOM WIDTH OR DIAMETER
Z	40 00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	NO	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	32	1 67	25 69	188.40	67 51	870 28	155.50	.12
PLANE2	32	1 67	28 95	220.07	73 32	872.86	155 42	13
MAIN	37	1 33	21 98	3000.98	132 48	898 69	155 41	2 28

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 0000E+00 EXCESS- 3451E+04 OUTFLOW- 3423E+04 BASIN STORAGE- 5233E+01 PERCENT ERROR- 6

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	37	1 33	30 00	132 44	900.00	155 29

*** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL - 237 92 TOTAL LOSS - 81 34. TOTAL EXCESS - 156 58

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149 50-HR
+ (CU M/S)	(HR)				
		(CU M/S)			
+ 133	15 00	94	38	13	6
		(MM) 92 095	148 430	154.628	155 210
		(1000 CU M) 2035	3280	3417	3430

CUMULATIVE AREA - 22 10 SQ KM

24 KO — OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0	HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

25 BA — SUBBASIN CHARACTERISTICS

TAREA	19 42	SUBBASIN AREA

PRECIPITATION DATA

10 PH — DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35					TP-40				TP-49		
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
26 00	49 00	98 70	120 00	138 00	190 00	215 00	260 50	00	00	00	.00

STORM AREA - 220 00

11 LS — SCS LOSS RATE

STRTL	17 85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT

STRTL	17 85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

```
             KINEMATIC WAVE
 26 UK         OVERLAND-FLOW ELEMENT NO  1
                      L         1700   OVERLAND FLOW LENGTH
                      S         0160   SLOPE
                      N          400   ROUGHNESS COEFFICIENT
                     PA         35 0   PERCENT OF SUBBASIN
                  DXMIN            5   MINIMUM NUMBER OF DX INTERVALS
 27 UK         OVERLAND-FLOW ELEMENT NO  2
                      L         3150   OVERLAND FLOW LENGTH
                      S         0160   SLOPE
                      N          400   ROUGHNESS COEFFICIENT
                     PA         65 0   PERCENT OF SUBBASIN
                  DXMIN            5   MINIMUM NUMBER OF DX INTERVALS

             KINEMATIC WAVE
 28 RK         MAIN CHANNEL
                      L         4000   CHANNEL LENGTH
                      S         0040   SLOPE
                      N          045   CHANNEL ROUGHNESS COEFFICIENT
                     CA        19 42   CONTRIBUTING AREA
                  SHAPE         TRAP   CHANNEL SHAPE
                     WD           00   BOTTOM WIDTH OR DIAMETER
                      Z        40 00   SIDE SLOPE
                 NDXMIN            2   MINIMUM NUMBER OF DX INTERVALS
                 RUPSTQ           NO   ROUTE UPSTREAM HYDROGRAPH

                                                  ***
                                     COMPUTED KINEMATIC PARAMETERS
                                          VARIABLE TIME STEP
                                       (DT SHOWN IS A MINIMUM)

               ELEMENT    ALPHA       M          DT         DX       PEAK    TIME TO     VOLUME    MAXIMUM
                                                                             PEAK                  CELERITY
                                               (MIN)        (M)      (CMS)   (MIN)       (MM)      (MPS)

               PLANE1       32       1 67      30 00      242 94     36 58    924 23     155 32       13
               PLANE2       32       1 67      30.00      286 46     44.18   1071 60     155.12       14
               MAIN         26       1 33      14 68     1333 77     73 68    951 82     155 20      1 52

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00  EXCESS- .3032E+04 OUTFLOW-  3004E+04 BASIN STORAGE-  1223E+02 PERCENT ERROR-      5

                                        INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

               MAIN         26       1 33      30 00                 73 53    960 00     155.17

     ***          ***         ***         ***          ***

                 HYDROGRAPH AT STATION

   TOTAL RAINFALL -  237 92, TOTAL LOSS -   81 34, TOTAL EXCESS -  156 58

  PEAK FLOW      TIME                      MAXIMUM AVERAGE FLOW
                                  6-HR         24-HR        72-HR      149 50-HR
+  (CU M/S)      (HR)
                       (CU M/S)
+       74      16 00              65            32           12             6
                          (MM)   71 803       141 486      153 659       155 091
                    (1000 CU M)    1394          2748         2984          3012

                       CUMULATIVE AREA -   19 42 SQ KM


 31 KO       OUTPUT CONTROL VARIABLES
                  IPRNT            3   PRINT CONTROL
                  IPLOT            0   PLOT CONTROL
                  QSCAL            0   HYDROGRAPH PLOT SCALE

            SUBBASIN RUNOFF DATA

 32 BA       SUBBASIN CHARACTERISTICS
                  TAREA        13 87   SUBBASIN AREA

             PRECIPITATION DATA

 10 PH                          DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                HYDRO-35              .      . .      TP-40    ...       .           ..   ..  TP-49  ...    .
             5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR    12-HR    24-HR     2-DAY    4-DAY    7-DAY  10-DAY
             26 00   49 00   98 70  120 00  138 00  190 00  215.00  260.50        00      .00       00      00

                                                   STORM AREA -   220 00

 11 LS       SCS LOSS RATE
                  STRTL        17 85   INITIAL ABSTRACTION
                 CRVNBR        74 00   CURVE NUMBER
                 RTIMP            00   PERCENT IMPERVIOUS AREA

               LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                  STRTL        17 85   INITIAL ABSTRACTION
                 CRVNBR        74 00   CURVE NUMBER
                 RTIMP            00   PERCENT IMPERVIOUS AREA

             KINEMATIC WAVE
 33 UK         OVERLAND-FLOW ELEMENT NO  1
                      L         1210   OVERLAND FLOW LENGTH
                      S         0130   SLOPE
                      N          400   ROUGHNESS COEFFICIENT
                     PA         52 3   PERCENT OF SUBBASIN
                  DXMIN            5   MINIMUM NUMBER OF DX INTERVALS
 34 UK         OVERLAND-FLOW ELEMENT NO. 2
                      L         1100   OVERLAND FLOW LENGTH
                      S         0130   SLOPE
                      N          400   ROUGHNESS COEFFICIENT
                     PA         47 7   PERCENT OF SUBBASIN
                  DXMIN            5   MINIMUM NUMBER OF DX INTERVALS

             KINEMATIC WAVE
 35 RK         MAIN CHANNEL
                      L         6000   CHANNEL LENGTH
                      S         0030   SLOPE
                      N          045   CHANNEL ROUGHNESS COEFFICIENT
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                 CA        13 87  CONTRIBUTING AREA
              SHAPE         TRAP  CHANNEL SHAPE
                 WD           00  BOTTOM WIDTH OR DIAMETER
                  Z        40 00  SIDE SLOPE
             NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
             RUPSTQ           NO  ROUTE UPSTREAM HYDROGRAPH

                                              ***
                              COMPUTED KINEMATIC PARAMETERS
                                    VARIABLE TIME STEP
                                  (DT SHOWN IS A MINIMUM)

           ELEMENT     ALPHA        M         DT         DX        PEAK    TIME TO      VOLUME     MAXIMUM
                                                                              PEAK                  CELERITY
                                            (MIN)        (M)       (CMS)    (MIN)        (MM)       (MPS)

           PLANE1         29       1 67      25.19     172.91     44 70     898.58      155 64         11
           PLANE2         29       1 67      27 25     183 39     41 94     858 13      155 49         11
           MAIN           22       1 33      23 98    2000 66     81 31     927 58      155.49       1 40

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00  EXCESS-  2166E+04 OUTFLOW-  2150E+04 BASIN STORAGE-  3193E+01 PERCENT ERROR-     .6

                                  INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

           MAIN           22       1 33      30 00                80.93     930 00      155 47

    ***        ***        ***        ***        ***

                    HYDROGRAPH AT STATION

    TOTAL RAINFALL -  237 92, TOTAL LOSS -   81 34, TOTAL EXCESS -  156 58

  PEAK FLOW    TIME                          MAXIMUM AVERAGE FLOW
                              6-HR         24-HR        72-HR      149.50-HR
+  (CU M/S)     (HR)
                   (CU M/S)
+       81     15 50            58           24            8            4
                       (MM)   91 057      148 302      154.785      155.394
                (1000 CU M)     1263         2057         2147         2155

                   CUMULATIVE AREA -   13 87 SQ KM


   40 KO          OUTPUT CONTROL VARIABLES
                       IPRNT            3  PRINT CONTROL
                       IPLOT            0  PLOT CONTROL
                       QSCAL            0  HYDROGRAPH PLOT SCALE

              SUBBASIN RUNOFF DATA

   41 BA          SUBBASIN CHARACTERISTICS
                       TAREA         3 04  SUBBASIN AREA

                  PRECIPITATION DATA

   10 PH                               DEPTHS FOR    0-PERCENT HYPOTHETICAL STORM
                    HYDRO-35                          TP-40        ...   .        ..      .   TP-49     .
                  5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR    12-HR   24-HR    2-DAY   4-DAY   7-DAY  10-DAY
                  26 00   49 00   98 70  120 00  138 00  190.00  215 00  260 50      00      00      00      00

                                                STORM AREA -   228 00

   11 LS          SCS LOSS RATE
                       STRTL       17 85  INITIAL ABSTRACTION
                      CRVNBR       74 00  CURVE NUMBER
                       RTIMP          00  PERCENT IMPERVIOUS AREA

                    LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                       STRTL       17 85  INITIAL ABSTRACTION
                      CRVNBR       74 00  CURVE NUMBER
                       RTIMP          00  PERCENT IMPERVIOUS AREA

                  KINEMATIC WAVE
   42 UK            OVERLAND-FLOW ELEMENT NO  1
                           L       1250   OVERLAND FLOW LENGTH
                           S      .0100   SLOPE
                           N       .400   ROUGHNESS COEFFICIENT
                          PA       61 8   PERCENT OF SUBBASIN
                       DXMIN          5   MINIMUM NUMBER OF DX INTERVALS
   43 UK            OVERLAND-FLOW ELEMENT NO  2
                           L       780.   OVERLAND FLOW LENGTH
                           S       0100   SLOPE
                           N        400   ROUGHNESS COEFFICIENT
                          PA       38 2   PERCENT OF SUBBASIN
                       DXMIN          5   MINIMUM NUMBER OF DX INTERVALS

                  KINEMATIC WAVE
   44 RK            MAIN CHANNEL
                           L       1500   CHANNEL LENGTH
                           S       0080   SLOPE
                           N        045   CHANNEL ROUGHNESS COEFFICIENT
                          CA       3 04   CONTRIBUTING AREA
                       SHAPE       TRAP   CHANNEL SHAPE
                          WD         00   BOTTOM WIDTH OR DIAMETER
                           Z      40 00   SIDE SLOPE
                      NDXMIN          2   MINIMUM NUMBER OF DX INTERVALS
                      RUPSTQ         NO   ROUTE UPSTREAM HYDROGRAPH

                                              ***
                              COMPUTED KINEMATIC PARAMETERS
                                    VARIABLE TIME STEP
                                  (DT SHOWN IS A MINIMUM)

           ELEMENT     ALPHA        M         DT         DX        PEAK    TIME TO      VOLUME     MAXIMUM
                                                                              PEAK                  CELERITY
                                            (MIN)        (M)       (CMS)    (MIN)        (MM)       (MPS)

           PLANE1         25       1 67      25 55     156 30     10.74     904.77      155 55         10
           PLANE2         25       1 67      23.10     130.04      8 13     844 11      155.67        .09
           MAIN           37       1 33       6 15     500 16     17 55     889.14      155 64       1 38
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000132

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 0000E+00 EXCESS- 4747E+03 OUTFLOW- 4716E+03 BASIN STORAGE- 6942E+00 PERCENT ERROR- .5

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	37	1 33	30 00		17 40	870.00	155 34

*** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL = 237 92, TOTAL LOSS = 81 34, TOTAL EXCESS = 156 58

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149 50-HR
+ (CU M/S)	(HR)				
		(CU M/S)			
+ 17	14 50	13	5	2.	1
		(MM) 91 949	148 392	154.656	155 264
		(1000 CU M) 280	451	470	472

CUMULATIVE AREA = 3 04 SQ KM

47 KO OUTPUT CONTROL VARIABLES
IPRNT 3 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0 HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

48 BA SUBBASIN CHARACTERISTICS
TAREA 4 92 SUBBASIN AREA

PRECIPITATION DATA

10 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35					TP-40					TP-49	
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
26 00	49 00	98 70	120 00	138 00	190 00	215 00	260.50	00	.00	00	00

STORM AREA = 220.00

11 LS SCS LOSS RATE
STRTL 17 85 INITIAL ABSTRACTION
CRVNBR 74 00 CURVE NUMBER
RTIMP 00 PERCENT IMPERVIOUS AREA

LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
STRTL 17 85 INITIAL ABSTRACTION
CRVNBR 74 00 CURVE NUMBER
RTIMP 00 PERCENT IMPERVIOUS AREA

KINEMATIC WAVE
49 UK OVERLAND-FLOW ELEMENT NO. 1
L 980. OVERLAND FLOW LENGTH
S 0100 SLOPE
N 400 ROUGHNESS COEFFICIENT
PA 59.9 PERCENT OF SUBBASIN
DXMIN 5 MINIMUM NUMBER OF DX INTERVALS
50 UK OVERLAND-FLOW ELEMENT NO 2
L 660 OVERLAND FLOW LENGTH
S 0100 SLOPE
N 400 ROUGHNESS COEFFICIENT
PA 40 1 PERCENT OF SUBBASIN
DXMIN 5 MINIMUM NUMBER OF DX INTERVALS

KINEMATIC WAVE
51 RK MAIN CHANNEL
L 3000 CHANNEL LENGTH
S .0080 SLOPE
N 045 *CHANNEL ROUGHNESS COEFFICIENT*
CA 4.92 CONTRIBUTING AREA
SHAPE TRAP CHANNEL SHAPE
WD 00 BOTTOM WIDTH OR DIAMETER
Z 40 00 SIDE SLOPE
NDXMIN 2 MINIMUM NUMBER OF DX INTERVALS
RUPSTQ YES ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	25	1 67	23.76	140.05	18 80	881.27	155 63	10
PLANE2	25	1 67	24 26	132.04	14 72	823.64	155 61	09
MAIN	37	1 33	9.61	1000 33	48.32	873 32	155 52	1 74

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 4703E+03 EXCESS- 7682E+03 OUTFLOW- 1234E+04 BASIN STORAGE- .8666E+00 PERCENT ERROR- 3

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	37	1 33	30 00		48 21	870 00	155 45

*** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL = 237 92, TOTAL LOSS = 81 34, TOTAL EXCESS = 156.58

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149 50-HR
+ (CU M/S)	(HR)				

```
                (CU M/S)
+      48      14 50               35           14           5           2
                    (MM)       94 351      149 207      154 844      155 365
                (1000 CU M)       751         1188         1233         1237

                 CUMULATIVE AREA =    7 96 SQ KM


   56 KO           OUTPUT CONTROL VARIABLES
                        IPRNT            3  PRINT CONTROL
                        IPLOT            0  PLOT CONTROL
                        QSCAL            0  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

   57 BA           SUBBASIN CHARACTERISTICS
                        TAREA         8 33  SUBBASIN AREA

                   PRECIPITATION DATA

   10 PH                              DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                      HYDRO-35                    .. TP-40 ... .         ... .     ..    .  .  TP-49  .      ..
                   5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                   26 00   49 00   98 70  120 00  138.00  190.00  215 00  260 50     .00      00     .00      00

                                                  STORM AREA =   220.00

   11 LS           SCS LOSS RATE
                        STRTL        17 85  INITIAL ABSTRACTION
                       CRVNBR        74 00  CURVE NUMBER
                        RTIMP          00  PERCENT IMPERVIOUS AREA

                     LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                        STRTL        17 85  INITIAL ABSTRACTION
                       CRVNBR        74 00  CURVE NUMBER
                        RTIMP          00  PERCENT IMPERVIOUS AREA

                   KINEMATIC WAVE
   58 UK             OVERLAND-FLOW ELEMENT NO  1
                            L         820.  OVERLAND FLOW LENGTH
                            S         0130  SLOPE
                            N          400  ROUGHNESS COEFFICIENT
                           PA         49.4  PERCENT OF SUBBASIN
                        DXMIN            5  MINIMUM NUMBER OF DX INTERVALS
   59 UK             OVERLAND-FLOW ELEMENT NO  2
                            L          840  OVERLAND FLOW LENGTH
                            S         0130  SLOPE
                            N          400  ROUGHNESS COEFFICIENT
                           PA         50 6  PERCENT OF SUBBASIN
                        DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

                   KINEMATIC WAVE
   60 RK             MAIN CHANNEL
                            L        5000.  CHANNEL LENGTH
                            S         0030  SLOPE
                            N          045  CHANNEL ROUGHNESS COEFFICIENT
                           CA         8 33  CONTRIBUTING AREA
                        SHAPE         TRAP  CHANNEL SHAPE
                           WD          .00  BOTTOM WIDTH OR DIAMETER
                            Z        40 00  SIDE SLOPE
                       NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                       RUPSTQ          YES  ROUTE UPSTREAM HYDROGRAPH

                                                 ***
                                       COMPUTED KINEMATIC PARAMETERS
                                            VARIABLE TIME STEP
                                          (DT SHOWN IS A MINIMUM)

                    ELEMENT     ALPHA         M          DT          DX        PEAK     TIME TO      VOLUME     MAXIMUM
                                                                                           PEAK                  CELERITY
                                                        (MIN)        (M)       (CMS)      (MIN)        (MM)       (MPS)

                  PLANE1          .29        1 67       25.91      164.05       29.75     838 49      155 54        .11
                  PLANE2           29        1 67       26 53      168.06       30 20     843 05      155 46         11
                  MAIN             22        1 33       13 68     1667 21      471 57     918 58      154 98       2.05

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  1225E+05  EXCESS-  1301E+04 OUTFLOW-  1352E+05 BASIN STORAGE-  2516E+01 PERCENT ERROR-     .3

                                     INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                  MAIN             22        1 33       30.00                  469 10     900 00      155 00

       ***           ***           ***           ***           ***

                      HYDROGRAPH AT STATION

    TOTAL RAINFALL =  237 92, TOTAL LOSS =   81.34, TOTAL EXCESS =   156 58

  PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR      149 50-HR
+  (CU M/S)      (HR)
                      (CU M/S)
+     469       15 00                   356          149          52           25.
                           (MM)      87 774      147.122     154.220      154.916
                     (1000 CU M)      7681.       12875.      13496.       13557.

                     CUMULATIVE AREA =   87 51 SQ KM


   63 KO           OUTPUT CONTROL VARIABLES
                        IPRNT            3  PRINT CONTROL
                        IPLOT            0  PLOT CONTROL
                        QSCAL            0  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

   64 BA           SUBBASIN CHARACTERISTICS
                        TAREA        19 41  SUBBASIN AREA

                   PRECIPITATION DATA
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000134

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10 PH                                  DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
             HYDRO-35                               TP-40                                   TP-49
         5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
         26 00   49 00   98 70  120 00  138 00  190 00  215.00  260 50     00     .00      00      00

                                           STORM AREA -  220.00

11 LS        SCS LOSS RATE
                STRTL          17 85  INITIAL ABSTRACTION
               CRVNBR          74 00  CURVE NUMBER
                RTIMP             00  PERCENT IMPERVIOUS AREA

              LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                STRTL          17 85  INITIAL ABSTRACTION
               CRVNBR          74 00  CURVE NUMBER
                RTIMP             00  PERCENT IMPERVIOUS AREA

             KINEMATIC WAVE
65 UK         OVERLAND-FLOW ELEMENT NO. 1
                    L          1340   OVERLAND FLOW LENGTH
                    S         .0030   SLOPE
                    N           400   ROUGHNESS COEFFICIENT
                   PA          48 8   PERCENT OF SUBBASIN
                DXMIN             5   MINIMUM NUMBER OF DX INTERVALS
66 UK         OVERLAND-FLOW ELEMENT NO  2
                    L          1400   OVERLAND FLOW LENGTH
                    S          0030   SLOPE
                    N           400   ROUGHNESS COEFFICIENT
                   PA          51 2   PERCENT OF SUBBASIN
                DXMIN             5   MINIMUM NUMBER OF DX INTERVALS

             KINEMATIC WAVE
67 RK         MAIN CHANNEL
                    L         7100.   CHANNEL LENGTH
                    S          0080   SLOPE
                    N           045   CHANNEL ROUGHNESS COEFFICIENT
                   CA         19.41   CONTRIBUTING AREA
                SHAPE          TRAP   CHANNEL SHAPE
                   WD           .00   BOTTOM WIDTH OR DIAMETER
                    Z         40.00   SIDE SLOPE
               NDXMIN             2   MINIMUM NUMBER OF DX INTERVALS
               RUPSTQ            NO   ROUTE UPSTREAM HYDROGRAPH

                                               ***
                                    COMPUTED KINEMATIC PARAMETERS
                                        VARIABLE TIME STEP
                                       (DT SHOWN IS A MINIMUM)

              ELEMENT    ALPHA      M        DT        DX       PEAK    TIME TO    VOLUME    MAXIMUM
                                                                          PEAK               CELERITY
                                           (MIN)       (M)      (CMS)    (MIN)      (MM)      (MPS)

              PLANE1       14      1 67     24 73     89 36     33.71   1067 40    155.41      .06
              PLANE2       14      1 67     25 67     93.36     34.30   1083.55    155 32      .06
              MAIN         37      1 33     20 54   2367 44     67 00   1117 13    155 33     1.93

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00  EXCESS-  3031E+04 OUTFLOW-  3005E+04 BASIN STORAGE-  1471E+02 PERCENT ERROR-    .4

                                       INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

              MAIN         37      1 33     30.00               66 92   1110 00    155 34

      ***         ***         ***         ***         ***

                 HYDROGRAPH AT STATION

   TOTAL RAINFALL -  237 92, TOTAL LOSS -   81.34, TOTAL EXCESS -  156 58

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                                 6-HR         24-HR        72-HR       149 50-HR
+   (CU M/S)     (HR)
                       (CU M/S)
+       67      18 50           60            31           12            6
                         (MM)   67 132       139 177      153 575      155 255
                  (1000 CU M)    1303         2701.        2981.        3014.

                CUMULATIVE AREA -   19 41 SQ KM

70 KO        OUTPUT CONTROL VARIABLES
                IPRNT            3  PRINT CONTROL
                IPLOT            0  PLOT CONTROL
                QSCAL            0  HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

71 BA        SUBBASIN CHARACTERISTICS
                TAREA          15 48  SUBBASIN AREA

             PRECIPITATION DATA

10 PH                                  DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
         .... HYDRO-35    .        .      ..    ... TP-40    ..... .. .....   .... ... .. TP-49    ...  ...
         5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
         26 00   49 00   98 70  120 00  138.00  190 00  215 00  260.50     00     .00      00      00
                                           STORM AREA -  220 00

11 LS        SCS LOSS RATE
                STRTL          17 85  INITIAL ABSTRACTION
               CRVNBR          74 00  CURVE NUMBER
                RTIMP             00  PERCENT IMPERVIOUS AREA

              LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                STRTL          17 85  INITIAL ABSTRACTION
               CRVNBR          74 00  CURVE NUMBER
                RTIMP             00  PERCENT IMPERVIOUS AREA

             KINEMATIC WAVE
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 72 UK            OVERLAND-FLOW ELEMENT NO  1
                        L        440   OVERLAND FLOW LENGTH
                        S       0200   SLOPE
                        N        400   ROUGHNESS COEFFICIENT
                       PA       24 3   PERCENT OF SUBBASIN
                     DXMIN          5   MINIMUM NUMBER OF DX INTERVALS
 73 UK            OVERLAND-FLOW ELEMENT NO  2
                        L       1380   OVERLAND FLOW LENGTH
                        S        0200  SLOPE
                        N        400   ROUGHNESS COEFFICIENT
                       PA       75 7   PERCENT OF SUBBASIN
                     DXMIN          5   MINIMUM NUMBER OF DX INTERVALS

                  KINEMATIC WAVE
 74 RK              MAIN CHANNEL
                        L       8500   CHANNEL LENGTH
                        S       .0030  SLOPE
                        N        045   CHANNEL ROUGHNESS COEFFICIENT
                       CA      15.48   CONTRIBUTING AREA
                    SHAPE       TRAP   CHANNEL SHAPE
                       WD         00   BOTTOM WIDTH OR DIAMETER
                        Z      40 00   SIDE SLOPE
                    NDXMIN          2  MINIMUM NUMBER OF DX INTERVALS
                    RUPSTQ        YES  ROUTE UPSTREAM HYDROGRAPH

                                                ***
                                  COMPUTED KINEMATIC PARAMETERS
                                       VARIABLE TIME STEP
                                    (DT SHOWN IS A MINIMUM)

                    ELEMENT     ALPHA        M          DT          DX        PEAK     TIME TO      VOLUME     MAXIMUM
                                                                                        PEAK                    CELERITY
                                                        (MIN)       (M)       (CMS)     (MIN)       (MM)       (MPS)

                    PLANE1          35       1 67       13.60      88 03      38 55    774.81     156.13        .11
                    PLANE2          35       1 67       27 48     230 08      73 98    860 22     155.54         14
                    MAIN            22       1 33       30 00    2834 26     128.88    939 09     154 84       1 53

 CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  3003E+04  EXCESS-  2417E+04 OUTFLOW- .5384E+04 BASIN STORAGE-  4333E+01 PERCENT ERROR-     6

                                       INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                    MAIN            22       1 33       30 00                128 04    930.00     154 82

      ***             ***             ***             ***             ***

                          HYDROGRAPH AT STATION

     TOTAL RAINFALL =  237 92, TOTAL LOSS =   81.34, TOTAL EXCESS =  156 58

   PEAK FLOW      TIME                              MAXIMUM AVERAGE FLOW
                                      6-HR          24-HR          72-HR      149.50-HR
 +  (CU M/S)      (HR)
                          (CU M/S)
 +      128       15 50                111.            57             21            10
                                (MM)    68 704      141 258        153 441       154.742
                       (1000 CU M)      2397          4929           5354          5399

                           CUMULATIVE AREA =   34 89 SQ KM


 77 KO            OUTPUT CONTROL VARIABLES
                       IPRNT          3   PRINT CONTROL
                       IPLOT          0   PLOT CONTROL
                       QSCAL          0   HYDROGRAPH PLOT SCALE

                  SUBBASIN RUNOFF DATA

 78 BA            SUBBASIN CHARACTERISTICS
                       TAREA      12 89   SUBBASIN AREA

                  PRECIPITATION DATA

 10 PH                                  DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                       HYDRO-35                              TP-40                                  TP-49
                5-MIN   15-MIN   60-MIN     2-HR     3-HR     6-HR     12-HR     24-HR     2-DAY     4-DAY     7-DAY     10-DAY
                26 00    49 00    98 70   120 00   138 00   190 00    215.00    260.50       00       .00        00        00

                                                 STORM AREA =  220 00

 11 LS            SCS LOSS RATE
                     STRTL      17 85   INITIAL ABSTRACTION
                     CRVNBR     74 00   CURVE NUMBER
                      RTIMP        00   PERCENT IMPERVIOUS AREA

                  LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                     STRTL      17 85   INITIAL ABSTRACTION
                     CRVNBR     74 00   CURVE NUMBER
                      RTIMP        00   PERCENT IMPERVIOUS AREA

                  KINEMATIC WAVE
 79 UK            OVERLAND-FLOW ELEMENT NO  1
                        L        750   OVERLAND FLOW LENGTH
                        S       0100   SLOPE
                        N        400   ROUGHNESS COEFFICIENT
                       PA       31 9   PERCENT OF SUBBASIN
                     DXMIN          5   MINIMUM NUMBER OF DX INTERVALS
 80 UK            OVERLAND-FLOW ELEMENT NO. 2
                        L       1590.  OVERLAND FLOW LENGTH
                        S       0100   SLOPE
                        N        400   ROUGHNESS COEFFICIENT
                       PA       68 1   PERCENT OF SUBBASIN
                     DXMIN          5   MINIMUM NUMBER OF DX INTERVALS

                  KINEMATIC WAVE
 81 RK              MAIN CHANNEL
                        L       5500   CHANNEL LENGTH
                        S       0080   SLOPE
                        N        045   CHANNEL ROUGHNESS COEFFICIENT
                       CA      12 89   CONTRIBUTING AREA
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SHAPE	TRAP	CHANNEL SHAPE
WD	00	BOTTOM WIDTH OR DIAMETER
Z	40 00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	NO	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	25	1.67	26 88	150.05	29.21	846 31	155.45	09
PLANE2	.25	1 67	28 10	176.72	42 18	933 08	155 47	10
MAIN	37	1 33	16 15	1833.93	62 80	930.02	155 47	1 90

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 0000E+00 EXCESS- 2013E+04 OUTFLOW- 1997E+04 BASIN STORAGE- 42B9E+01 PERCENT ERROR- 5

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	37	1 33	30.00	62 80	930 00	155 55

*** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL = 237 92, TOTAL LOSS = 81 34, TOTAL EXCESS = 156 58

PEAK FLOW (CU M/S)	TIME (HR)	MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	149 50-HR
		(CU M/S)			
63	15 50	51	22	8	4
		(MM) 85 498	146.652	154 652	155.469
		(1000 CU M) 1102	1890.	1993	2004

CUMULATIVE AREA = 12 89 SQ KM

86 KO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0	HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

87 BA SUBBASIN CHARACTERISTICS

TAREA	5 28	SUBBASIN AREA

PRECIPITATION DATA

10 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35 5-MIN	15-MIN	60-MIN	2-HR	3-HR	TP-40 6-HR	12-HR	24-HR	2-DAY	4-DAY	TP-49 7-DAY	10-DAY
26 00	49 00	98 70	120 00	138 00	190 00	215 00	260 50	00	.00	00	00

STORM AREA = 220 00

11 LS SCS LOSS RATE

STRTL	17.85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT

STRTL	17 85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

KINEMATIC WAVE

88 UK OVERLAND-FLOW ELEMENT NO. 1

L	750	OVERLAND FLOW LENGTH
S	0130	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	42 4	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

89 UK OVERLAND-FLOW ELEMENT NO. 2

L	1010	OVERLAND FLOW LENGTH
S	0130	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	57 6	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

KINEMATIC WAVE

90 RK MAIN CHANNEL

L	3000	CHANNEL LENGTH
S	0030	SLOPE
N	045	CHANNEL ROUGHNESS COEFFICIENT
CA	5 28	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WD	00	BOTTOM WIDTH OR DIAMETER
Z	40.00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	YES	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	29	1.67	24 20	150.05	16.72	823.09	155 61	10
PLANE2	29	1.67	25 54	160 39	20 22	868.55	155 54	.11
MAIN	22	1 33	9.94	1000.33	215.29	947 21	154 82	1.68

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 7377E+04 EXCESS- 8244E+03 OUTFLOW- 8188E+04 BASIN STORAGE- .1629E+01 PERCENT ERROR- 1

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	22	1 33	30 00	214 68	930 00	154 74

*** *** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL = 237.92, TOTAL LOSS = 81 34, TOTAL EXCESS = 156 58

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	149 50-HR	
+ (CU M/S)	(HR)					
		(CU M/S)				
+ 215	15 50	179	88	31	15	
		(MM) 72 792	142 649	153 526	154 656	
		(1000 CU M) 3862	7569.	8146	8206	

CUMULATIVE AREA = 53 06 SQ KM

93 KO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0	HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

94 BA SUBBASIN CHARACTERISTICS

TAREA	14 94	SUBBASIN AREA

PRECIPITATION DATA

10 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35					TP-40					TP-49		
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
26.00	49 00	98 70	120 00	138 00	190 00	215 00	260 50	00	00	00	00

STORM AREA = 220.00

11 LS SCS LOSS RATE

STRTL	17 85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT

STRTL	17.85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

KINEMATIC WAVE

95 UK OVERLAND-FLOW ELEMENT NO 1

L	1860.	OVERLAND FLOW LENGTH
S	0800	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	74 8	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

96 UK OVERLAND-FLOW ELEMENT NO 2

L	630	OVERLAND FLOW LENGTH
S	0800	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	25 2	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

KINEMATIC WAVE

97 RK MAIN CHANNEL

L	6000	CHANNEL LENGTH
S	0080	SLOPE
N	.045	CHANNEL ROUGHNESS COEFFICIENT
CA	14 94	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WD	.00	BOTTOM WIDTH OR DIAMETER
Z	40 00	SIDE SLOPE
NUXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	NO	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	71	1 67	24 19	372 12	83.47	823.04	155.61	26
PLANE2	71	1 67	10 70	126.04	44.61	756.86	156.22	.20
MAIN	37	1 33	15 44	2000 66	110 03	824 51	155 77	2 18

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 0000E+00 EXCESS- 2333E+04 OUTFLOW- 2320E+04 BASIN STORAGE- 1613E+01 PERCENT ERROR- 5

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	37	1 33	30 00	108 76	810 00	155 79

*** *** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL = 237 92 TOTAL LOSS = 81 34, TOTAL EXCESS = 156 58

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	149.50-HR	
+ (CU M/S)	(HR)					
		(CU M/S)				

```
+       109       13 50                   71           26.          9            4
                          (MM)    102 462      151 955      155 431      155 708
                    (1000 CU M)      1531         2270         2322         2326

                         CUMULATIVE AREA -    14 94 SQ KM


  100 KO             OUTPUT CONTROL VARIABLES
                           IPRNT              3  PRINT CONTROL
                           IPLOT              0  PLOT CONTROL
                           QSCAL              0   HYDROGRAPH PLOT SCALE

                   SUBBASIN RUNOFF DATA

  101 BA             SUBBASIN CHARACTERISTICS
                           TAREA          7 52  SUBBASIN AREA

                     PRECIPITATION DATA

   10 PH                                     DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                          HYDRO-35                   .             TP-40             .         . .           TP-49   .   .
                     5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR    2-DAY   4-DAY   7-DAY  10-DAY
                     26 00   49 00   98 70  120 00  138 00  190.00  215 00  260 50      00      00      00     .00

                                                         STORM AREA -   220 00

   11 LS             SCS LOSS RATE
                           STRTL          17 85  INITIAL ABSTRACTION
                         CRVNBR           74 00  CURVE NUMBER
                           RTIMP             00  PERCENT IMPERVIOUS AREA

                       LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                           STRTL          17 85  INITIAL ABSTRACTION
                         CRVNBR           74 00  CURVE NUMBER
                           RTIMP             00  PERCENT IMPERVIOUS AREA

                     KINEMATIC WAVE
  102 UK               OVERLAND-FLOW ELEMENT NO  1
                                  L         870   OVERLAND FLOW LENGTH
                                  S       .0300   SLOPE
                                  N        400   ROUGHNESS COEFFICIENT
                                 PA       24 3   PERCENT OF SUBBASIN
                           DXMIN            5   MINIMUM NUMBER OF DX INTERVALS
  103 UK               OVERLAND-FLOW ELEMENT NO  2
                                  L        800   OVERLAND FLOW LENGTH
                                  S       0300   SLOPE
                                  N        400   ROUGHNESS COEFFICIENT
                                 PA       75 7   PERCENT OF SUBBASIN
                           DXMIN            5   MINIMUM NUMBER OF DX INTERVALS

                     KINEMATIC WAVE
  104 RK               MAIN CHANNEL
                                  L       4500.   CHANNEL LENGTH
                                  S       0060   SLOPE
                                  N        045   CHANNEL ROUGHNESS COEFFICIENT
                                 CA       7 52   CONTRIBUTING AREA
                           SHAPE          TRAP   CHANNEL SHAPE
                                 WD         00   BOTTOM WIDTH OR DIAMETER
                                  Z      40 00   SIDE SLOPE
                         NDXMIN             2   MINIMUM NUMBER OF DX INTERVALS
                         RUPSTQ           YES   ROUTE UPSTREAM HYDROGRAPH

                                                                   ***
                                          COMPUTED KINEMATIC PARAMETERS
                                                VARIABLE TIME STEP
                                              (DT SHOWN IS A MINIMUM)

                        ELEMENT     ALPHA          M          DT          DX        PEAK     TIME TO      VOLUME     MAXIMUM
                                                                                              PEAK                   CELERITY
                                                             (MIN)        (M)       (CMS)    (MIN)        (MM)       (MPS)

                       PLANE1          43        1 67       19 85      174 06      15 34     803.72      155 80        .15
                       PLANE2          43        1 67       18 57      160 05      49 48     791 02      155.86        .14
                       MAIN            32        1.33       12.13     1500 49     166 63     839 64      155.70       2 08

 CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  2318E+04  EXCESS-  1174E+04 OUTFLOW-  3485E+04 BASIN STORAGE- .7301E+00 PERCENT ERROR-      2

                                              INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL


                       MAIN            32        1 33       30 00                  166.55     840 00      155 70

         ***            ***           ***           ***           ***

                             HYDROGRAPH AT STATION

     TOTAL RAINFALL -  237 92, TOTAL LOSS -   81 34, TOTAL EXCESS -  156.58

   PEAK FLOW      TIME                             MAXIMUM AVERAGE FLOW
                                       6-HR          24-HR         72-HR      149.50-HR
 +  (CU M/S)      (HR)
                            (CU M/S)
 +       167      14 00              106           39            13             6
                          (MM)    102 371      151 883      155 346      155 614
                    (1000 CU M)     2299.         3411         3489         3495.

                         CUMULATIVE AREA -    22 46 SQ KM


  109 KO             OUTPUT CONTROL VARIABLES
                           IPRNT              3  PRINT CONTROL
                           IPLOT              0  PLOT CONTROL
                           QSCAL              0   HYDROGRAPH PLOT SCALE

                   SUBBASIN RUNOFF DATA

  110 BA             SUBBASIN CHARACTERISTICS
                           TAREA          3 67  SUBBASIN AREA                                              000139

                     PRECIPITATION DATA
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```
10 PH                                    DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                 HYDRO-35                               TP-40                    .      ...        TP-49          .
            5-MIN  15-MIN  60 MIN     2-HR     3-HR     6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY   10-DAY
            26 00    49 00    98 70   120 00   138 00   190 00   215 00   260 50      00       00       00      .00

                                                    STORM AREA -   220 00

 11 LS        SCS LOSS RATE
                   STRTL          17 85   INITIAL ABSTRACTION
                  CRVNBR          74 00   CURVE NUMBER
                   RTIMP             00   PERCENT IMPERVIOUS AREA

               LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                   STRTL          17 85   INITIAL ABSTRACTION
                  CRVNBR          74 00   CURVE NUMBER
                   RTIMP             00   PERCENT IMPERVIOUS AREA

              KINEMATIC WAVE
111 UK          OVERLAND-FLOW ELEMENT NO  1
                       L         1160.   OVERLAND FLOW LENGTH
                       S          0130   SLOPE
                       N           400   ROUGHNESS COEFFICIENT
                      PA          63 4   PERCENT OF SUBBASIN
                   DXMIN             5   MINIMUM NUMBER OF DX INTERVALS
112 UK          OVERLAND-FLOW ELEMENT NO. 2
                       L          670    OVERLAND FLOW LENGTH
                       S          0130   SLOPE
                       N          .400   ROUGHNESS COEFFICIENT
                      PA          36.6   PERCENT OF SUBBASIN
                   DXMIN             5   MINIMUM NUMBER OF DX INTERVALS

              KINEMATIC WAVE
113 RK          MAIN CHANNEL
                       L          2000    CHANNEL LENGTH
                       S          0030    SLOPE
                       N           045    CHANNEL ROUGHNESS COEFFICIENT
                      CA          3 67    CONTRIBUTING AREA
                   SHAPE          TRAP    CHANNEL SHAPE
                      WD            00    BOTTOM WIDTH OR DIAMETER
                       Z         40 00    SIDE SLOPE
                  NDXMIN             2    MINIMUM NUMBER OF DX INTERVALS
                  RUPSTQ           YES    ROUTE UPSTREAM HYDROGRAPH

                                                           ***
                                        COMPUTED KINEMATIC PARAMETERS
                                            VARIABLE TIME STEP
                                           (DT SHOWN IS A MINIMUM)

              ELEMENT     ALPHA        M          DT          DX        PEAK      TIME TO      VOLUME      MAXIMUM
                                                                                    PEAK                    CELERITY
                                                 (MIN)        (M)       (CMS)      (MIN)        (MM)        (MPS)

             PLANE1          29       1 67       28 36      193 40      14 47     868.08      155 47         .11
             PLANE2          29       1 67       22 22      134 04      10 49     805.37      155.75          10
             MAIN            22       1 33        4 73      666 89     835 05     908.48      154 86        2.35

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  2517E+05  EXCESS- .5730E+03 OUTFLOW-  2573E+05 BASIN STORAGE-  1713E+01 PERCENT ERROR-      0

                                            INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL


             MAIN            22       1 33       30 00                 828 06     900.00      154 89

    ***            ***            ***            ***            ***

                       HYDROGRAPH AT STATION

     TOTAL RAINFALL -  237.92, TOTAL LOSS -   81 34, TOTAL EXCESS -  156 58

   PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
                                          6-HR          24-HR         72-HR      149.50-HR
 +  (CU M/S)       (HR)
                             (CU M/S)
 +      829       15 00                    644           282            99            48
                                 (MM)   83.461       146 051       154 028       154.808
                          (1000 CU M)    13913         24347         25676         25806.

                         CUMULATIVE AREA -   166 70 SQ KM


 116 KO        OUTPUT CONTROL VARIABLES
                     IPRNT             3   PRINT CONTROL
                     IPLOT             0   PLOT CONTROL
                     QSCAL             0   HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

 117 BA        SUBBASIN CHARACTERISTICS
                     TAREA          6 44   SUBBASIN AREA

               PRECIPITATION DATA

  10 PH                                   DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                 HYDRO-35                    .          TP-40           . .        .                  TP-49          .
            5-MIN  15-MIN  60-MIN     2-HR     3-HR     6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY   10-DAY
            26 00    49.00    98 70   120 00   138 00   190.00   215.00   260 50      00       00      .00      .00

                                                     STORM AREA -   220 00

  11 LS        SCS LOSS RATE
                    STRTL          17 85   INITIAL ABSTRACTION
                   CRVNBR          74 00   CURVE NUMBER
                    RTIMP             00   PERCENT IMPERVIOUS AREA

                LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                    STRTL          17 85   INITIAL ABSTRACTION
                   CRVNBR          74 00   CURVE NUMBER
                    RTIMP             00   PERCENT IMPERVIOUS AREA

               KINEMATIC WAVE
 118 UK          OVERLAND-FLOW ELEMENT NO  1
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                L          490   OVERLAND FLOW LENGTH
                S         0500   SLOPE
                N          400   ROUGHNESS COEFFICIENT
               PA         30 5   PERCENT OF SUBBASIN
            DXMIN            5   MINIMUM NUMBER OF DX INTERVALS
119 UK        OVERLAND-FLOW ELEMENT NO  2
                L         1120   OVERLAND FLOW LENGTH
                S         0500   SLOPE
                N          400   ROUGHNESS COEFFICIENT
               PA         69 5   PERCENT OF SUBBASIN
            DXMIN            5   MINIMUM NUMBER OF DX INTERVALS

          KINEMATIC WAVE
120 RK      MAIN CHANNEL
                L         4000   CHANNEL LENGTH
                S         0100   SLOPE
                N          045   CHANNEL ROUGHNESS COEFFICIENT
               CA         6 44   CONTRIBUTING AREA
            SHAPE         TRAP   CHANNEL SHAPE
               WD           00   BOTTOM WIDTH OR DIAMETER
                Z        40 00   SIDE SLOPE
           NDXMIN            2   MINIMUM NUMBER OF DX INTERVALS
           RUPSTQ           NO   ROUTE UPSTREAM HYDROGRAPH

                                      ***
                          COMPUTED KINEMATIC PARAMETERS
                               VARIABLE TIME STEP
                              (DT SHOWN IS A MINIMUM)

          ELEMENT    ALPHA      M        DT         DX       PEAK    TIME TO    VOLUME    MAXIMUM
                                                                      PEAK                CELERITY
                                        (MIN)       (M)      (CMS)    (MIN)      (MM)      (MPS)

          PLANE1       56     1.67      10 43      98.03     23 52    754 98    156 22       16
          PLANE2       56     1 67      19 66     224 07     37.62    803 29    155 80       19
          MAIN         41     1 33      11 18    1333 77     55 62    803 01    155 96     2 00

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  0000E+00  EXCESS-  1006E+04 OUTFLOW-  1001E+04 BASIN STORAGE-  3996E+00 PERCENT ERROR-      4

                           INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

          MAIN         41     1 33      30 00               54 84    810 00    156 03

  ***        ***         ***         ***         ***

                  HYDROGRAPH AT STATION

 TOTAL RAINFALL -  237 92, TOTAL LOSS -   81 34, TOTAL EXCESS -  156 58

PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                               6-HR        24-HR       72-HR     149 50-HR
+ (CU M/S)    (HR)
                   (CU M/S)
+      55     13 50             32           11           4            2
                      (MM)   106 683      153 203     155 759      155 944
               (1000 CU M)      687          987       1003.        1004

                  CUMULATIVE AREA -    6 44 SQ KM


123 KO        OUTPUT CONTROL VARIABLES
                IPRNT          3   PRINT CONTROL
                IPLOT          0   PLOT CONTROL
                QSCAL          0   HYDROGRAPH PLOT SCALE

          SUBBASIN RUNOFF DATA

124 BA        SUBBASIN CHARACTERISTICS
                TAREA        8 85   SUBBASIN AREA

          PRECIPITATION DATA

10 PH                         DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
              HYDRO-35                              TP-40                               TP-49
   5-MIN   15-MIN   60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR    2-DAY    4-DAY    7-DAY   10-DAY
   26.00    49 00    98 70  120.00  138 00  190 00  215 00  260 50      00       00       00       00
                                            STORM AREA -   220.00

11 LS         SCS LOSS RATE
                STRTL        17 85   INITIAL ABSTRACTION
               CRVNBR        74 00   CURVE NUMBER
                RTIMP           00   PERCENT IMPERVIOUS AREA

            LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                STRTL        17 85   INITIAL ABSTRACTION
               CRVNBR        74 00   CURVE NUMBER
                RTIMP           00   PERCENT IMPERVIOUS AREA

          KINEMATIC WAVE
125 UK      OVERLAND-FLOW ELEMENT NO  1
                L          910   OVERLAND FLOW LENGTH
                S         0300   SLOPE
                N          400   ROUGHNESS COEFFICIENT
               PA         51 5   PERCENT OF SUBBASIN
            DXMIN            5   MINIMUM NUMBER OF DX INTERVALS
126 UK      OVERLAND-FLOW ELEMENT NO. 2
                L         860.   OVERLAND FLOW LENGTH
                S         0300   SLOPE
                N          400   ROUGHNESS COEFFICIENT
               PA         48 5   PERCENT OF SUBBASIN
            DXMIN            5   MINIMUM NUMBER OF DX INTERVALS

          KINEMATIC WAVE
127 RK      MAIN CHANNEL
                L         5000   CHANNEL LENGTH
                S         0080   SLOPE
                N          045   CHANNEL ROUGHNESS COEFFICIENT
               CA         8.85   CONTRIBUTING AREA
            SHAPE         TRAP   CHANNEL SHAPE
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                 WD           00  BOTTOM WIDTH OR DIAMETER
                  Z        40 00  SIDE SLOPE
             NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
             RUPSTQ          YES  ROUTE UPSTREAM HYDROGRAPH

                                                      ***
                           COMPUTED KINEMATIC PARAMETERS
                                VARIABLE TIME STEP
                              (DT SHOWN IS A MINIMUM)

          ELEMENT    ALPHA       M        DT        DX       PEAK    TIME TO    VOLUME    MAXIMUM
                                                                      PEAK                CELERITY
                                         (MIN)      (M)      (CMS)    (MIN)      (MM)      (MPS)

          PLANE1        43      1 67     20.51    182 06     37 32    810 21    155 77        15
          PLANE2        43      1 67     19 59    172.06     36.17    800 81    155.77        15
          MAIN          37      1 33     12 82   1667 21    124 70    827 82    156 04      2 19

CONTINUITY SUMMARY (1000 CU-M)-INFLOW-  1001E+04  EXCESS-  1382E+04 OUTFLOW-  2378E+04 BASIN STORAGE- .7360E+00 PERCENT ERROR-     2

                              INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

          MAIN          37      1 33     30 00               122 59    840 00    155 97

     ***        ***        ***        ***        ***

                    HYDROGRAPH AT STATION

    TOTAL RAINFALL -  237 92, TOTAL LOSS -   81 34, TOTAL EXCESS -  156.58

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR       72-HR     149 50-HR
+  (CU M/S)     (HR)
                      (CU M/S)
+      123      14 00                 74          27          9            4
                           (MM)   104 708     152 648     155 664      155 890
                    (1000 CU M)      1601       2334.       2380         2384

                    CUMULATIVE AREA -   15 29 SQ KM

  130 KO        OUTPUT CONTROL VARIABLES
                    IPRNT           3  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0   HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

  131 BA        SUBBASIN CHARACTERISTICS
                    TAREA        19 60  SUBBASIN AREA

                PRECIPITATION DATA

   10 PH                            DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                .  HYDRO-35    .                .     TP-40       ...  .        ..  . TP-49        ....
              5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
              26 00   49 00   98 70  120 00  138 00  190.00  215.00  260 50     .00      00      00      00

                                                   STORM AREA -  220 00

   11 LS        SCS LOSS RATE
                    STRTL        17 85  INITIAL ABSTRACTION
                   CRVNBR        74 00  CURVE NUMBER
                    RTIMP           00  PERCENT IMPERVIOUS AREA

                  LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT
                    STRTL        17.85  INITIAL ABSTRACTION
                   CRVNBR        74 00  CURVE NUMBER
                    RTIMP           00  PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
  132 UK          OVERLAND-FLOW ELEMENT NO  1
                        L          780  OVERLAND FLOW LENGTH
                        S         0130  SLOPE
                        N         .400  ROUGHNESS COEFFICIENT
                       PA         37 9  PERCENT OF SUBBASIN
                    DXMIN            5  MINIMUM NUMBER OF DX INTERVALS
  133 UK          OVERLAND-FLOW ELEMENT NO. 2
                        L         1280  OVERLAND FLOW LENGTH
                        S         0130  SLOPE
                        N          400  ROUGHNESS COEFFICIENT
                       PA         62.1  PERCENT OF SUBBASIN
                    DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

                KINEMATIC WAVE
  134 RK          MAIN CHANNEL
                        L        9500   CHANNEL LENGTH
                        S        0030   SLOPE
                        N         045   CHANNEL ROUGHNESS COEFFICIENT
                       CA       19 60   CONTRIBUTING AREA
                    SHAPE        TRAP   CHANNEL SHAPE
                       WD         .00   BOTTOM WIDTH OR DIAMETER
                        Z       40 00   SIDE SLOPE
                   NDXMIN           2   MINIMUM NUMBER OF DX INTERVALS
                   RUPSTQ          NO   ROUTE UPSTREAM HYDROGRAPH

                                                      ***
                           COMPUTED KINEMATIC PARAMETERS
                                VARIABLE TIME STEP
                              (DT SHOWN IS A MINIMUM)

          ELEMENT    ALPHA       M        DT        DX       PEAK    TIME TO    VOLUME    MAXIMUM
                                                                      PEAK                CELERITY
                                         (MIN)      (M)      (CMS)    (MIN)      (MM)      (MPS)

          PLANE1        29      1 67     24.95    156.05     54.65    829.62    155 59        10
          PLANE2        29      1 67     26.48    182 92     72 92    884 45    155.48        12
          MAIN          22      1 33     26.81   2375 78    110 57    916.79    155 40      1.48
```

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 0000E+00 EXCESS- 3060E+04 OUTFLOW- 3036E+04 BASIN STORAGE- 4801E+01 PERCENT ERROR- 6

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	22	1 33	30 00	109 94	930 00	155 33

*** *** *** *** ***

HYDROGRAPH AT STATION

TOTAL RAINFALL = 237 97, TOTAL LOSS = 81 34, TOTAL EXCESS = 156 58

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149.50-HR
+ (CU M/S)	(HR)	(CU M/S)			
+ 110	15 50	81	34	12	6
		(MM) 89 545	147 987	154 652	155 253
		(1000 CU M) 1755	2901	3031	3043

CUMULATIVE AREA = 19 60 SQ KM

139 KO OUTPUT CONTROL VARIABLES

IPRNT	1	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0	HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

140 BA SUBBASIN CHARACTERISTICS

TAREA	4 11	SUBBASIN AREA

PRECIPITATION DATA

10 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35					TP-40				TP-49			
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
26 00	49 00	98 70	120 00	138 00	190 00	215 00	260 50	00	00	00	00

STORM AREA = 220 00

11 LS SCS LOSS RATE

STRTL	17 85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

LOSS RATE VARIABLES FOR SECOND OVERLAND FLOW ELEMENT

STRTL	17 85	INITIAL ABSTRACTION
CRVNBR	74 00	CURVE NUMBER
RTIMP	00	PERCENT IMPERVIOUS AREA

KINEMATIC WAVE

141 UK OVERLAND-FLOW ELEMENT NO 1

L	450	OVERLAND FLOW LENGTH
S	0100	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	32 6	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

142 UK OVERLAND-FLOW ELEMENT NO. 2

L	920	OVERLAND FLOW LENGTH
S	0100	SLOPE
N	400	ROUGHNESS COEFFICIENT
PA	67 3	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

KINEMATIC WAVE

143 RK MAIN CHANNEL

L	3000	CHANNEL LENGTH
S	.0030	SLOPE
N	045	CHANNEL ROUGHNESS COEFFICIENT
CA	4.11	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WD	00	BOTTOM WIDTH OR DIAMETER
Z	40 00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	YES	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (M)	PEAK (CMS)	TIME TO PEAK (MIN)	VOLUME (MM)	MAXIMUM CELERITY (MPS)
PLANE1	.25	1.67	18 22	90 03	11.78	787 35	155 88	88
PLANE2	25	1 67	26 28	153.38	18.02	875 94	155 59	.10
MAIN	22	1 33	6 82	1000.33	1048 74	912.92	154 81	2 49

CONTINUITY SUMMARY (1000 CU-M)-INFLOW- 3112E+05 EXCESS- 6411E+03 OUTFLOW- 3174E+05 BASIN STORAGE- 2357E+01 PERCENT ERROR- 1

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	22	1 33	30 00	1041 42	930.00	154 74

HYDROGRAPH AT STATION

DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
15 APR 1500	1	00	00	00	0.	18 APR 1800	151	00	.00	00	2.
15 APR 1530	2	1 64	1 64	00	0.	18 APR 1830	152	00	.00	00	2
15 APR 1600	3	1 69	1 69	00	0	18 APR 1900	153	00	00	00	2

15	APR	1630	4	1	74	1	74	00	0	*	18	APR	1930	154	00	00	00	2
15	APR	1700	5	1	80	1	80	00	0	*	18	APR	2000	155	.00	00	00	2
15	APR	1730	6	1	86	1	86	00	0	*	18	APR	2030	156	00	00	00	2
15	APR	1800	7	1	93	1	93	00	0	*	18	APR	2100	157	.00	.00	00	2
15	APR	1830	8	2	00	2	00	00	0	*	18	APR	2130	158	.00	00	00	2
15	APR	1900	9	2	08	2	08	00	0	*	18	APR	2200	159	00	00	00	2
15	APR	1930	10	2	16	2	16	00	0	*	18	APR	2230	160	00	.00	00	2
15	APR	2000	11	2	26	2	24	02	0.	*	18	APR	2300	161	00	00	00	2.
15	APR	2030	12	2	37	2	24	13	0	*	18	APR	2330	162	00	00	00	2
15	APR	2100	13	2	49	2	24	25	0	*	19	APR	0000	163	00	00	00	2.
15	APR	2130	14	2	03	1	74	29	0	*	19	APR	0030	164	00	00	00	2
15	APR	2200	15	2	17	1	78	39	0	*	19	APR	0100	165	.00	00	00	2
15	APR	2230	16	2	33	1	83	50	0	*	19	APR	0130	166	00	00	00	1
15	APR	2300	17	2	53	1	89	64	0	*	19	APR	0200	167	00	00	00	1
15	APR	2330	18	2	77	1	97	80	0	*	19	APR	0230	168	00	00	00	1
16	APR	0000	19	3	07	2	07	1 00	0	*	19	APR	0300	169	00	00	00	1
16	APR	0030	20	7	38	4	53	2 85	0	*	19	APR	0330	170	00	00	00	1
16	APR	0100	21	8	05	4	34	3 72	1	*	19	APR	0400	171	00	00	00	1
16	APR	0130	22	8	96	4	22	4 75	2	*	19	APR	0430	172	00	.00	00	1
16	APR	0200	23	8	97	3	69	5 27	5	*	19	APR	0500	173	00	00	00	1
16	APR	0230	24	11	07	3	97	7 10	12	*	19	APR	0530	174	00	00	00	1
16	APR	0300	25	25	99	7	42	18.57	33	*	19	APR	0600	175	00	00	00	1.
16	APR	0330	26	39	44	7	92	31 52	91	*	19	APR	0630	176	00	.00	00	1
16	APR	0400	27	13	32	2	08	11 25	245.	*	19	APR	0700	177	00	00	00	1
16	APR	0430	28	9	97	1	41	8 57	501	*	19	APR	0730	178	.00	00	00	1
16	APR	0500	29	9	57	1	24	8 32	763	*	19	APR	0800	179	00	00	00	1
16	APR	0530	30	8	47	1	03	7 44	945	*	19	APR	0830	180	00	00	00	1
16	APR	0600	31	7	69		88	6 82	1031	*	19	APR	0900	181	00	00	00	1
16	APR	0630	32	3	25		36	2 90	1042	*	19	APR	0930	182	00	00	00	1
16	APR	0700	33	2	91		31	2 60	1003	*	19	APR	1000	183	00	00	00	1
16	APR	0730	34	2	64		28	2 37	933	*	19	APR	1030	184	00	00	00	1
16	APR	0800	35	2	43		25	2 18	847	*	19	APR	1100	185	00	00	00	1
16	APR	0830	36	2	25		23	2 02	759	*	19	APR	1130	186	00	00	00	1
16	APR	0900	37	2	10		21	1 89	677	*	19	APR	1200	187	00	00	00	1.
16	APR	0930	38	2	56		25	2 31	606	*	19	APR	1230	188	00	00	00	1.
16	APR	1000	39	2	43		23	2 20	548	*	19	APR	1300	189	00	00	00	1
16	APR	1030	40	2	31		22	2 09	501	*	19	APR	1330	190	00	00	00	1
16	APR	1100	41	2	21		21	2 00	462	*	19	APR	1400	191	.00	00	00	1
16	APR	1130	42	2	12		20	1 92	429	*	19	APR	1430	192	00	00	00	1
16	APR	1200	43	2	04		19	1 85	401.	*	19	APR	1500	193	00	.00	.00	1
16	APR	1230	44	1	96		18	1 78	375	*	19	APR	1530	194	.00	00	00	1
16	APR	1300	45	1	89		17	1 72	351	*	19	APR	1600	195	00	00	00	1
16	APR	1330	46	1	83		16	1 67	330	*	19	APR	1630	196	00	00	00	1
16	APR	1400	47	1	77		15	1 62	312	*	19	APR	1700	197	00	00	00	1
16	APR	1430	48	1	72		15	1 57	295	*	19	APR	1730	198	00	00	00	1
16	APR	1500	49	1	67		14	1 53	280	*	19	APR	1800	199	00	.00	00	1
16	APR	1530	50		00		00	00	266.	*	19	APR	1830	200	00	.00	00	1
16	APR	1600	51		00		00	00	252	*	19	APR	1900	201	00	00	00	1
16	APR	1630	52		00		00	00	237	*	19	APR	1930	202	.00	00	00	1
16	APR	1700	53		00		00	00	221	*	19	APR	2000	203	00	00	00	1
16	APR	1730	54		00		00	00	205.	*	19	APR	2030	204	00	00	00	1
16	APR	1800	55		00		.00	00	188	*	19	APR	2100	205	00	.00	00	1
16	APR	1830	56		00		00	00	172	*	19	APR	2130	206	.00	00	.00	1
16	APR	1900	57		00		00	00	157	*	19	APR	2200	207	00	00	00	1
16	APR	1930	58		00		00	00	143.	*	19	APR	2230	208	00	.00	00	1
16	APR	2000	59		00		00	00	131	*	19	APR	2300	209	00	.00	00	1
16	APR	2030	60		00		00	00	119	*	19	APR	2330	210	00	00	00	1
16	APR	2100	61		00		00	00	109.	*	20	APR	0000	211	00	00	00	1
16	APR	2130	62		00		00	00	100	*	20	APR	0030	212	00	.00	.00	1
16	APR	2200	63		00		00	00	91	*	20	APR	0100	213	00	00	00	1
16	APR	2230	64		.00		00	.00	84	*	20	APR	0130	214	00	00	00	1
16	APR	2300	65		00		00	00	77	*	20	APR	0200	215	00	00	00	1.
16	APR	2330	66		00		00	00	71	*	20	APR	0230	216	00	.00	00	1.
17	APR	0000	67		00		00	00	66	*	20	APR	0300	217	00	00	00	1
17	APR	0030	68		.00		.00	00	61	*	20	APR	0330	218	.00	00	.00	1
17	APR	0100	69		00		00	00	56	*	20	APR	0400	219	.00	00	00	1
17	APR	0130	70		00		00	00	52.	*	20	APR	0430	220	00	.00	00	1
17	APR	0200	71		00		00	00	49	*	20	APR	0500	221	00	00	00	1
17	APR	0230	72		00		00	00	46	*	20	APR	0530	222	00	00	00	1
17	APR	0300	73		00		00	00	42	*	20	APR	0600	223	.00	00	00	1.
17	APR	0330	74		00		00	00	40.	*	20	APR	0630	224	00	.00	00	1
17	APR	0400	75		00		00	00	37	*	20	APR	0700	225	00	00	00	1
17	APR	0430	76		00		00	00	35	*	20	APR	0730	226	00	00	00	1
17	APR	0500	77		00		00	00	33	*	20	APR	0800	227	00	00	00	1
17	APR	0530	78		00		00	00	31	*	20	APR	0830	228	00	00	00	1
17	APR	0600	79		00		00	00	29	*	20	APR	0900	229	00	00	00	1
17	APR	0630	80		00		00	00	27	*	20	APR	0930	230	.00	00	00	1.
17	APR	0700	81		00		00	00	26	*	20	APR	1000	231	00	00	00	1
17	APR	0730	82		00		00	00	24.	*	20	APR	1030	232	00	00	00	1
17	APR	0800	83		00		00	00	23	*	20	APR	1100	233	00	00	.00	0
17	APR	0830	84		00		00	00	22	*	20	APR	1130	234	00	00	00	0
17	APR	0900	85		00		00	00	20.	*	20	APR	1200	235	00	00	00	0
17	APR	0930	86		00		00	00	19.	*	20	APR	1230	236	00	00	00	0
17	APR	1000	87		00		00	00	18	*	20	APR	1300	237	00	00	.00	0
17	APR	1030	88		00		00	00	17	*	20	APR	1330	238	00	00	.00	0.
17	APR	1100	89		00		00	00	17	*	20	APR	1400	239	00	.00	.00	0.
17	APR	1130	90		00		00	00	16	*	20	APR	1430	240	00	00	00	0
17	APR	1200	91		00		00	00	15	*	20	APR	1500	241	.00	00	.00	0
17	APR	1230	92		00		00	00	14	*	20	APR	1530	242	00	00	00	0.
17	APR	1300	93		00		00	00	14.	*	20	APR	1600	243	00	.00	00	0
17	APR	1330	94		00		00	00	13.	*	20	APR	1630	244	00	.00	00	0
17	APR	1400	95		00		00	00	12	*	20	APR	1700	245	00	00	00	0
17	APR	1430	96		00		00	00	12	*	20	APR	1730	246	00	00	00	0
17	APR	1500	97		00		00	00	11	*	20	APR	1800	247	00	00	.00	0.
17	APR	1530	98		00		00	00	11	*	20	APR	1830	248	00	00	.00	0
17	APR	1600	99		00		00	00	10	*	20	APR	1900	249	00	00	00	0.
17	APR	1630	100		00		00	00	10.	*	20	APR	1930	250	.00	.00	00	0
17	APR	1700	101		00		00	00	10	*	20	APR	2000	251	00	00	00	0
17	APR	1730	102		00		00	00	9	*	20	APR	2030	252	00	00	00	0.
17	APR	1800	103		00		00	00	9.	*	20	APR	2100	253	.00	00	00	0
17	APR	1830	104		00		00	00	8	*	20	APR	2130	254	00	00	00	0
17	APR	1900	105		00		00	00	8	*	20	APR	2200	255	00	00	00	0
17	APR	1930	106		00		00	00	8	*	20	APR	2230	256	00	.00	00	0
17	APR	2000	107		00		00	00	8	*	20	APR	2300	257	00	00	00	0
17	APR	2030	108		00		00	00	7	*	20	APR	2330	258	00	00	00	0
17	APR	2100	109		00		00	00	7	*	21	APR	0000	259	00	00	.00	0.
17	APR	2130	110		00		00	00	7	*	21	APR	0030	260	00	00	00	0
17	APR	2200	111		00		00	00	7	*	21	APR	0100	261	00	00	00	0
17	APR	2230	112		00		00	.00	6	*	21	APR	0130	262	.00	00	00	0.
17	APR	2300	113		00		00	00	6.	*	21	APR	0200	263	00	00	00	0.
17	APR	2330	114		00		00	00	6	*	21	APR	0230	264	00	00	00	0
18	APR	0000	115		00		00	00	6	*	21	APR	0300	265	00	00	00	0.
18	APR	0030	116		00		00	00	5	*	21	APR	0330	266	00	00	00	0

18 APR 0100	117	00	00	00	5	*	21 APR 0400	267	00	.00	00	0
18 APR 0130	118	00	00	00	5	*	21 APR 0430	268	00	.00	00	0
18 APR 0200	119	00	00	00	5	*	21 APR 0500	269	00	00	00	0
18 APR 0230	120	00	00	00	5	*	21 APR 0530	270	00	.00	.00	0
18 APR 0300	121	00	00	00	5	*	21 APR 0600	271	00	00	.00	0
18 APR 0330	122	00	00	00	5	*	21 APR 0630	272	00	00	00	0.
18 APR 0400	123	00	.00	00	4	*	21 APR 0700	273	00	00	00	0.
18 APR 0430	124	00	00	00	4	*	21 APR 0730	274	00	.00	00	0
18 APR 0500	125	00	00	00	4	*	21 APR 0800	275	00	00	00	0
18 APR 0530	126	00	00	00	4	*	21 APR 0830	276	00	00	.00	0
18 APR 0600	127	00	00	00	4	*	21 APR 0900	277	.00	00	00	0
18 APR 0630	128	00	00	00	4	*	21 APR 0930	278	00	.00	00	0
18 APR 0700	129	00	00	00	4	*	21 APR 1000	279	00	00	00	0.
18 APR 0730	130	00	00	00	4	*	21 APR 1030	280	00	00	00	0
18 APR 0800	131	00	00	00	3	*	21 APR 1100	281	00	00	00	0
18 APR 0830	132	00	00	00	3	*	21 APR 1130	282	00	.00	00	0.
18 APR 0900	133	00	00	00	3	*	21 APR 1200	283	00	.00	.00	0
18 APR 0930	134	00	00	00	3	*	21 APR 1230	284	00	00	00	0
18 APR 1000	135	.00	.00	00	3	*	21 APR 1300	285	.00	00	.00	0
18 APR 1030	136	00	00	00	3	*	21 APR 1330	286	00	.00	00	0
18 APR 1100	137	00	00	00	3	*	21 APR 1400	287	00	00	00	0
18 APR 1130	138	00	.00	00	3	*	21 APR 1430	288	00	.00	.00	0
18 APR 1200	139	00	00	.00	3	*	21 APR 1500	289	00	00	.00	0.
18 APR 1230	140	00	00	00	3	*	21 APR 1530	290	00	00	00	0.
18 APR 1300	141	00	00	00	3	*	21 APR 1600	291	00	.00	00	0
18 APR 1330	142	00	00	00	3	*	21 APR 1630	292	00	00	.00	0
18 APR 1400	143	00	00	00	3	*	21 APR 1700	293	00	00	00	0
18 APR 1430	144	00	00	.00	2	*	21 APR 1730	294	.00	00	00	0
18 APR 1500	145	00	00	00	2.	*	21 APR 1800	295	.00	00	00	0.
18 APR 1530	146	00	00	00	2	*	21 APR 1830	296	00	.00	00	0
18 APR 1600	147	00	00	00	2	*	21 APR 1900	297	.00	00	.00	0
18 APR 1630	148	00	00	00	2	*	21 APR 1930	298	00	00	00	0
18 APR 1700	149	00	00	00	2	*	21 APR 2000	299	00	00	00	0
18 APR 1730	150	00	00	00	2	*	21 APR 2030	300	00	00	00	0
						*						

TOTAL RAINFALL = 237 92, TOTAL LOSS = 81 50, TOTAL EXCESS = 156 42

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149 50-HR
(CU M/S)	(HR)				
		(CU M/S)			
1042	15 50	805	348	122	59
		(MM) 84 493	146 320	153 936	154 664
		(1000 CU M) 17380.	30098	31665	31814

CUMULATIVE AREA = 205 70 SQ KM

145 RO OUTPUT CONTROL VARIABLES
IPRNT 1 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0 HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

146 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP STOR TYPE OF INITIAL CONDITION
RSVRIC 30000.00 INITIAL CONDITION
X -1 00 WORKING R AND D COEFFICIENT

147 SV STORAGE 0 18043 0 22516 0 28092 3 33668.4 39244 4

148 SF ELEVATION 97 00 98 00 99 00 100 00 101 00 102 00

149 SS SPILLWAY
CREL 100 50 SPILLWAY CREST ELEVATION
SPWID 130.00 SPILLWAY WIDTH
COQW 1 40 WEIR COEFFICIENT
EXPW 1 50 EXPONENT OF HEAD

***

COMPUTED OUTFLOW-ELEVATION DATA

OUTFLOW	00	00	06	46	1 55	3.67	7 17	12 38	19 66	29 35
ELEVATION	97.00	100 50	100.50	100.52	100 54	100.57	100 62	100 67	100 73	100 80
OUTFLOW	41 79	57 33	76 31	99 07	125 96	157.32	193.49	234.83	281 67	334.36
ELEVATION	100 88	100 96	101 06	101 17	101.28	101 41	101.54	101 69	101 84	102 00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	00	18043.00	22516 00	28092 30	30880.35	30983 60	31112.67	31293 39	31525 71	31809 69
OUTFLOW	00	.00	00	00	.46	1.55	3 67	7 17	12 38	
ELEVATION	97.00	98 00	99.00	100.00	100 50	100.52	100 54	100 57	100.62	100.67
STORAGE	32145.30	32532 52	32971 39	33461.86	33668 40	34004.81	34597 72	35243.11	35940.11	36688.72
OUTFLOW	19 66	29 35	41.79	57 33	64 35	76.31	99 07	125 96	157 32	193 49
ELEVATION	100 73	100 80	100.88	100 96	101 00	101 06	101.17	101 28	101.41	101 54
STORAGE	37489 01	38340 86	39244 40							
OUTFLOW	234 83	281 67	334 36							
ELEVATION	101 69	101 84	102 00							

HYDROGRAPH AT STATION BARR

DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE
15 APR 1500	1	0	30000.0	100.3	17 APR 1700	101	72	33879 3	101 0	19 APR 1900	201	9.	31647 9	100.6
15 APR 1530	2	0	30000.0	100.3	17 APR 1730	102	70.	33824.1	101.0	19 APR 1930	202	9	31640 2	100.6
15 APR 1600	3	0	30000 0	100.3	17 APR 1800	103	68.	33770.2	101 0	19 APR 2000	203	9	31632.6	100 6
15 APR 1630	4	0	30000 0	100.3	17 APR 1830	104	66.	33717.6	101.0	19 APR 2030	204	9.	31625.2	100.6
15 APR 1700	5	0	30000 0	100.3	17 APR 1900	105	64.	33666 4	101 0	19 APR 2100	205	9	31617 8	100 6
15 APR 1730	6	0	30000 0	100 3	17 APR 1930	106	63	33616.5	101.0	19 APR 2130	206	9	31610.6	100 6
15 APR 1800	7	0	30000 0	100 3	17 APR 2000	107	61	33567 9	101 0	19 APR 2200	207	9	31603 4	100 6

15 APR 1830	8	0	30000 0	100 3	17 APR 2030	108	59	33520.5	101 0	19 APR 2230	208	8.	31596.4	100 6					
15 APR 1900	9	0	30000 0	100 3	17 APR 2100	109	58	33474 2	101 0	19 APR 2300	209	8.	31589 5	100.6					
15 APR 1930	10	0	30000 0	100 3	17 APR 2130	110	56	33429 1	101 0	19 APR 2330	210	8	31582 6	100.6					
15 APR 2000	11	0	30000.0	100 3	17 APR 2200	111	55	33385.0	100.9	20 APR 0000	211	8.	31575 9	100 6					
15 APR 2030	12	0	30000 0	100 3	17 APR 2230	112	54	33342 0	100.9	20 APR 0030	212	8	31569 3	100.6					
15 APR 2100	13	0	30000 0	100 3	17 APR 2300	113	52	33300 0	100 9	20 APR 0100	213	8	31562 8	100 6					
15 APR 2130	14	0	30000.0	100 3	17 APR 2330	114	51	33259.0	100 9	20 APR 0130	214	8	31556 3	100 6					
15 APR 2200	15	0	30000 0	100 3	18 APR 0000	115	50.	33218 9	100 9	20 APR 0200	215	8	31550.0	100 6					
15 APR 2230	16	0	30000 0	100 3	18 APR 0030	116	48	33179 8	100 9	20 APR 0230	216	7.	31543 8	100.6					
15 APR 2300	17	0	30000 1	100.3	18 APR 0100	117	47	33141.6	100.9	20 APR 0300	217	7	31537 7	100 6					
15 APR 2330	18	0	30000 1	100 3	18 APR 0130	118	46	33104.4	100.9	20 APR 0330	218	7	31531 6	100.6					
16 APR 0000	19	0	30000 3	100 3	18 APR 0200	119	45	33068 1	100.9	20 APR 0400	219	7	31525 6	100.6					
16 APR 0030	20	0	30000 5	100 3	18 APR 0230	120	44	33032 6	100 9	20 APR 0430	220	7	31519 8	100 6					
16 APR 0100	21	0	30001 0	100 3	18 APR 0300	121	43	32998 0	100.9	20 APR 0500	221	7	31514 0	100 6					
16 APR 0130	22	0	30002 2	100 3	18 APR 0330	122	42	32964 2	100 9	20 APR 0530	222	7	31508 2	100 6					
16 APR 0200	23	0	30005 2	100 3	18 APR 0400	123	41	32931.2	100.9	20 APR 0600	223	7	31502.6	100 6					
16 APR 0230	24	0	30012 8	100 3	18 APR 0430	124	40.	32898 9	100.9	20 APR 0630	224	7	31497 0	100.6					
16 APR 0300	25	0	30033 0	100 3	18 APR 0500	125	39	32867 3	100 9	20 APR 0700	225	7	31491 4	100.6					
16 APR 0330	26	0	30088 8	100 4	18 APR 0530	126	38	32836 4	100 9	20 APR 0730	226	7	31486 0	100 6					
16 APR 0400	27	0	30239 9	100 4	18 APR 0600	127	37	32806 2	100.8	20 APR 0800	227	6	31480 6	100 6					
16 APR 0430	28	0	30575 4	100 4	18 APR 0630	128	36	32776 6	100 8	20 APR 0830	228	6	31475 3	100 6					
16 APR 0500	29	2	31143 2	100 5	18 APR 0700	129	35	32747.6	100.8	20 APR 0900	229	6	31470 0	100 6					
16 APR 0530	30	14	31904 3	100 7	18 APR 0730	130	35.	32719 3	100 8	20 APR 0930	230	6	31464 8	100.6					
16 APR 0600	31	36	32770 6	100 8	18 APR 0800	131	34.	32691 7	100 8	20 APR 1000	231	6	31459 7	100 6					
16 APR 0630	32	64	33658 4	101 0	18 APR 0830	132	33	32664 6	100.8	20 APR 1030	232	6	31454 6	100 6					
16 APR 0700	33	96	34507 0	101 2	18 APR 0900	133	32	32638.1	100.8	20 APR 1100	233	6	31449 6	100 6					
16 APR 0730	34	128	35278 1	101 3	18 APR 0930	134	32	32612 2	100 8	20 APR 1130	234	6	31444 7	100 6					
16 APR 0800	35	158	35950 9	101 4	18 APR 1000	135	31	32586 9	100 8	20 APR 1200	235	6	31439 8	100 6					
16 APR 0830	36	185	36519 2	101 5	18 APR 1030	136	30	32562 2	100 8	20 APR 1230	236	6	31435 0	100 6					
16 APR 0900	37	209	36987 9	101 6	18 APR 1100	137	30.	32538.0	100 8	20 APR 1300	237	6	31430 2	100.6					
16 APR 0930	38	229	37368 4	101 7	18 APR 1130	138	29.	32514 3	100 8	20 APR 1330	238	6	31425 5	100 6					
16 APR 1000	39	245	37674 9	101 7	18 APR 1200	139	28	32491.1	100 8	20 APR 1400	239	6	31420 9	100 6					
16 APR 1030	40	259	37920 3	101 8	18 APR 1230	140	28	32468 3	100.8	20 APR 1430	240	6	31416 3	100 6					
16 APR 1100	41	269	38116 0	101 8	18 APR 1300	141	27	32446 0	100 8	20 APR 1500	241	5	31411 7	100 6					
16 APR 1130	42	278	38270 7	101 8	18 APR 1330	142	27	32424 1	100 8	20 APR 1530	242	5	31407 3	100.6					
16 APR 1200	43	285	38390 9	101 8	18 APR 1400	143	26	32402 7	100 8	20 APR 1600	243	5	31402 8	100 6					
16 APR 1230	44	290	38481 3	101 9	18 APR 1430	144	26	32381 6	100 8	20 APR 1630	244	5	31398 5	100.6					
16 APR 1300	45	294	38545 3	101 9	18 APR 1500	145	25	32361.0	100.8	20 APR 1700	245	5	31394 2	100 6					
16 APR 1330	46	296	38586 7	101 9	18 APR 1530	146	25	32340 8	100.8	20 APR 1730	246	5	31389 9	100 6					
16 APR 1400	47	297	38608 7	101 9	18 APR 1600	147	24	32321 0	100.8	20 APR 1800	247	5.	31385 7	100 6					
16 APR 1430	48	298	38614 3	101 9	18 APR 1630	148	24	32301 6	100 8	20 APR 1830	248	5	31381 5	100 6					
16 APR 1500	49	297	38605 8	101 9	18 APR 1700	149	23	32282 6	100 8	20 APR 1900	249	5	31377 4	100.6					
16 APR 1530	50	296	38584.9	101 9	18 APR 1730	150	23	32263 9	100 7	20 APR 1930	250	5	31373 4	100.6					
16 APR 1600	51	294	38552 7	101 9	18 APR 1800	151	22	32245.7	100.7	20 APR 2000	251	5	31369 4	100 6					
16 APR 1630	52	291	38509 3	101 9	18 APR 1830	152	22	32227 7	100 7	20 APR 2030	252	5	31365 4	100 6					
16 APR 1700	53	288	38454 8	101 9	18 APR 1900	153	21	32210.2	100.7	20 APR 2100	253	5	31361 5	100 6					
16 APR 1730	54	284	38388 8	101 8	18 APR 1930	154	21	32193 0	100 7	20 APR 2130	254	5	31357.7	100 6					
16 APR 1800	55	280	38311 8	101 8	18 APR 2000	155	20	32176 1	100 7	20 APR 2200	255	5	31353 8	100 6					
16 APR 1830	56	275	38224 3	101 8	18 APR 2030	156	20	32159 5	100 7	20 APR 2230	256	5	31350.1	100 6					
16 APR 1900	57	270	38127 3	101 8	18 APR 2100	157	20	32143 3	100 7	20 APR 2300	257	4	31346 4	100 6					
16 APR 1930	58	264	38022 3	101 8	18 APR 2130	158	19	32127 4	100 7	20 APR 2330	258	4	31342.7	100 6					
16 APR 2000	59	258	37910 8	101 8	18 APR 2200	159	19	32111 8	100.7	21 APR 0000	259	4	31339.1	100.6					
16 APR 2030	60	252	37794 0	101 7	18 APR 2230	160	19	32096 5	100 7	21 APR 0030	260	4	31335 5	100 6					
16 APR 2100	61	245	37673 4	101 7	18 APR 2300	161	18	32081.4	100.7	21 APR 0100	261	4	31332 0	100 6					
16 APR 2130	62	238	37550 0	101 7	18 APR 2330	162	18	32066 5	100 7	21 APR 0130	262	4	31328 5	100 6					
16 APR 2200	63	232	37424 8	101 7	19 APR 0000	163	18	32052 0	100 7	21 APR 0200	263	4	31325 0	100 6					
16 APR 2230	64	225	37298 3	101 7	19 APR 0030	164	17	32037 6	100 7	21 APR 0230	264	4	31321.6	100 6					
16 APR 2300	65	218	37171 3	101.6	19 APR 0100	165	17	32023 6	100 7	21 APR 0300	265	4.	31318.3	100 6					
16 APR 2330	66	212	37044 4	101 6	19 APR 0130	166	17	32009 7	100 7	21 APR 0330	266	4	31314 9	100 6					
17 APR 0000	67	205	36918 2	101 6	19 APR 0200	167	16	31996 1	100 7	21 APR 0400	267	4	31311 7	100 6					
17 APR 0030	68	199	36793 1	101 6	19 APR 0230	168	16.	31982 8	100 7	21 APR 0430	268	4	31308 4	100 6					
17 APR 0100	69	193	36669 7	101.5	19 APR 0300	169	16	31969 7	100.7	21 APR 0500	269	4	31305.2	100 6					
17 APR 0130	70	187	36548 0	101 5	19 APR 0330	170	16	31956 8	100 7	21 APR 0530	270	4	31302 1	100 6					
17 APR 0200	71	181	36428 2	101 5	19 APR 0400	171	15	31944.1	100 7	21 APR 0600	271	4	31298 9	100.6					
17 APR 0230	72	175	36310 4	101 5	19 APR 0430	172	15	31931 7	100 7	21 APR 0630	272	4	31295.9	100 6					
17 APR 0300	73	170	36194 8	101 5	19 APR 0500	173	15	31919 4	100 7	21 APR 0700	273	4	31292 8	100 6					
17 APR 0330	74	164	36081 6	101 4	19 APR 0530	174	15	31907 4	100 7	21 APR 0730	274	4	31289.8	100 6					
17 APR 0400	75	159	35970 7	101 4	19 APR 0600	175	14	31895 6	100.7	21 APR 0800	275	4	31286 8	100 6					
17 APR 0430	76	154	35862 4	101 4	19 APR 0630	176	14	31884 0	100 7	21 APR 0830	276	4	31283 9	100.6					
17 APR 0500	77	149	35756 4	101 4	19 APR 0700	177	14	31872.6	100 7	21 APR 0900	277	4	31281 0	100 6					
17 APR 0530	78	144	35652 8	101 4	19 APR 0730	178	14	31861 4	100 7	21 APR 0930	278	3	31278.1	100 6					
17 APR 0600	79	140	35551 6	101 3	19 APR 0800	179	13	31850.4	100 7	21 APR 1000	279	3	31275 2	100.6					
17 APR 0630	80	135	35452 8	101 3	19 APR 0830	180	13	31839.6	100 7	21 APR 1030	280	3	31272 4	100 6					
17 APR 0700	81	131	35356 5	101 3	19 APR 0900	181	13	31829 0	100.7	21 APR 1100	281	3	31269 5	100 6					
17 APR 0730	82	127	35262 8	101 3	19 APR 0930	182	13	31818 6	100 7	21 APR 1130	282	3	31266 8	100 6					
17 APR 0800	83	123	35171 5	101 3	19 APR 1000	183	12	31808.3	100 7	21 APR 1200	283	3	31264 0	100.6					
17 APR 0830	84	119	35082 5	101 3	19 APR 1030	184	12	31798 2	100 7	21 APR 1230	284	3.	31261.3	100 6					
17 APR 0900	85	116	34995 7	101 2	19 APR 1100	185	12	31788 3	100 7	21 APR 1300	285	3	31258 6	100 6					
17 APR 0930	86	112	34911 2	101 2	19 APR 1130	186	12	31778 5	100 7	21 APR 1330	286	3	31255 9	100 6					
17 APR 1000	87	109	34828 8	101 2	19 APR 1200	187	12	31768.8	100.7	21 APR 1400	287	3	31253 2	100 6					
17 APR 1030	88	105	34748 6	101 2	19 APR 1230	188	11	31759 4	100 7	21 APR 1430	288	3	31250 6	100 6					
17 APR 1100	89	102	34670 5	101 2	19 APR 1300	189	11	31750 0	100.7	21 APR 1500	289	3.	31248.0	100 6					
17 APR 1130	90	99	34594 6	101 2	19 APR 1330	190	11	31740 8	100 7	21 APR 1530	290	3	31245.4	100.6					
17 APR 1200	91	96	34520 6	101 2	19 APR 1400	191	11	31731 7	100 7	21 APR 1600	291	3	31242 8	100 6					
17 APR 1230	92	93	34448 6	101 1	19 APR 1430	192	11	31722 7	100.7	21 APR 1630	292	3	31240.3	100 6					
17 APR 1300	93	91	34378 4	101 1	19 APR 1500	193	11	31713 9	100.6	21 APR 1700	293	3	31237 8	100 6					
17 APR 1330	94	88	34310 0	101 1	19 APR 1530	194	10	31705 2	100.6	21 APR 1730	294	3	31235 3	100 6					
17 APR 1400	95	85	34243 4	101 1	19 APR 1600	195	10	31696.7	100.6	21 APR 1800	295	3	31232 9	100 6					
17 APR 1430	96	83	34178 5	101 1	19 APR 1630	196	10	31688 2	100 6	21 APR 1830	296	3.	31230.4	100 6					
17 APR 1500	97	81	34115 4	101 1	19 APR 1700	197	10	31679 9	100 6	21 APR 1900	297	3	31228 0	100 6					
17 APR 1530	98	78	34054 0	101 1	19 APR 1730	198	10	31671 8	100.6	21 APR 1930	298	3	31225 6	100 6					
17 APR 1600	99	76	33994 3	101 1	19 APR 1800	199	10	31663 7	100.6	21 APR 2000	299	3	31223 3	100 6					
17 APR 1630	100	74	33936 1	101 0	19 APR 1830	200	10	31655 7	100 6	21 APR 2030	300	3	31220 9	100 6					

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	149 50-HR
+ (CU M/S)	(HR)				
		(CU M/S)			
+ 298	23 50	292	228	107	55
		(MM) 30 697	95 587	135 429	142 793
		(1000 CU M) 6314	19662	27858	29372

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	149.50-HR
+ (1000 CU M)	(HR)				
38614	23 50	38524	37302	34471	32784

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	149 50-HR
+ (METERS)	(HR)				
101 89	23 50	101 87	101 65	101.14	100 84

CUMULATIVE AREA = 205 70 SQ KM

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RUNOFF SUMMARY, AVERAGE FLOW IN CUBIC METERS PER SECOND
AREA IN SQUARE KILOMETERS

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT		123 75	14 00	75 79	27 88	9 49	15 83		
HYDROGRAPH AT		132 52	15 00	94 23	37 97	13 18	22 10		
HYDROGRAPH AT		73 57	16 00	64 56	31 80	11 51	19 42		
HYDROGRAPH AT		80 98	15 50	58 47	23.81	8 28	13 87		
4 COMBINED AT	BACIA	379 44	15 00	288 21	121 36	42 46	71 22		
HYDROGRAPH AT		17 41	14 50	12 94	5 22	1 81	3 04		
HYDROGRAPH AT		48 24	14 50	34 77	13.75	4 76	7 96		
2 COMBINED AT	BACIA	426 72	15 00	322 53	135 11	47 22	79 18		
HYDROGRAPH AT		469 38	15 00	355 61	149 01	52 07	87 51		
HYDROGRAPH AT		66 96	18 50	60 33	31 27	11 50	19 41		
HYDROGRAPH AT		128 12	15 50	110 98	57 04	20 65	34 89		
HYDROGRAPH AT		62 84	15 50	51 02	21 88	7 69	12 89		
2 COMBINED AT	BACIA	190 96	15 50	159 63	78 83	28 34	47 78		
HYDROGRAPH AT		214 81	15 50	178 81	87 60	31.43	53 06		
HYDROGRAPH AT		108 83	13 50	70 87	26 28	8.96	14.94		
HYDROGRAPH AT		166 65	14 00	106.45	39 48	13 46	22 46		
3 COMBINED AT	BACIA	817 15	15 00	630 14	275 81	96 95	163 03		
HYDROGRAPH AT		828 55	15 00	644 11	281.79	99 06	166.70		
HYDROGRAPH AT		54 88	13 50	31.81	11 42	3 87	6 44		
HYDROGRAPH AT		122 66	14 00	74 12	27.01	9 18	15 29		
HYDROGRAPH AT		110 00	15 50	81 25	33 57	11 69	19 60		
3 COMBINED AT	BACIA	1028 86	15.00	789 46	342 04	119 93	201 59		
HYDROGRAPH AT		1042 04	15 50	804 64	348 36	122 16	205 70		
ROUTED TO	BARR	297 61	23 50	292 33	227 57	107 48	205 70	101 89	23 50

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SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CMS)	(MIN)	(MM)	(MIN)	(CMS)	(MIN)	(MM)
	MANE	22 13	123 91	842 73	155 79	30.00	123 68	840 00	155 62
CONTINUITY SUMMARY (1000 CU-M)- INFLOW- 0000E+00 EXCESS- 2472E+04 OUTFLOW- 2458E+04 BASIN STORAGE- 1173E+01 PERCENT ERROR- 5									
	MANE	21 98	132 48	898 69	155 41	30 00	132 44	900 00	155 29
CONTINUITY SUMMARY (1000 CU-M)- INFLOW- 0000E+00 EXCESS- 3451E+04 OUTFLOW- 3423E+04 BASIN STORAGE- .5233E+01 PERCENT ERROR- 6									
	MANE	14 68	73 68	951 82	155 20	30 00	73.53	960 00	155 17
CONTINUITY SUMMARY (1000 CU-M)- INFLOW- 0000E+00 EXCESS- 3032E+04 OUTFLOW- 3004E+04 BASIN STORAGE- 1223E+02 PERCENT ERROR- 5									

	MANE	23 98	81 31	927 58	155 49	30.00	80 93	930.00	155 47	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	2166E+04	OUTFLOW-	2150E+04	BASIN STORAGE-	3193E+01	PERCENT ERROR-	6
	MANE	6 15	17 55	889.14	155 64	30 00	17 40	870 00	155 34	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	4747E+03	OUTFLOW-	4716E+03	BASIN STORAGE-	6942E+00	PERCENT ERROR-	5
	MANE	9 61	48 32	873 32	155 52	30.00	48 21	870 00	155.45	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	4703E+03	EXCESS-	7682E+03	OUTFLOW-	1234E+04	BASIN STORAGE-	.8666E+00	PERCENT ERROR-	3
	MANE	13 68	471 57	918 58	154 98	30 00	469.10	900 00	155 00	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	1225E+05	EXCESS-	1301E+04	OUTFLOW-	1352E+05	BASIN STORAGE-	2516E+01	PERCENT ERROR-	3
	MANE	20 54	67 00	1117 13	155 33	30 00	66.92	1110.00	155 34	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	3031E+04	OUTFLOW-	3005E+04	BASIN STORAGE-	.1471E+02	PERCENT ERROR-	4
	MANE	30 00	128 88	939 09	154 84	30 00	128 04	930.00	154 82	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	3003E+04	EXCESS-	.2417E+04	OUTFLOW-	5384E+04	BASIN STORAGE-	4333E+01	PERCENT ERROR-	6
	MANE	16 15	62.80	930 02	155 47	30 00	62 80	930 00	155 55	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	2013E+04	OUTFLOW-	1997E+04	BASIN STORAGE-	4289E+01	PERCENT ERROR-	5
	MANE	9 94	215 29	947 21	154 82	30 00	214 68	930 00	154 74	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	7377E+04	EXCESS-	8244E+03	OUTFLOW-	8188E+04	BASIN STORAGE-	1629E+01	PERCENT ERROR-	1
	MANE	15 44	110 03	824 51	155 77	30 00	108 76	810 00	155 79	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	2333E+04	OUTFLOW-	2320E+04	BASIN STORAGE-	1613E+01	PERCENT ERROR-	5
	MANE	12 13	166 63	839 64	155 70	30 00	166 55	840 00	155 70	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	2318E+04	EXCESS-	1174E+04	OUTFLOW-	3485E+04	BASIN STORAGE-	7301E+00	PERCENT ERROR-	2
	MANE	4 73	835 05	908 48	154 86	30 00	828 06	900 00	154 89	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	2517E+05	EXCESS-	5730E+03	OUTFLOW-	2573E+05	BASIN STORAGE-	1713E+01	PERCENT ERROR-	0
	MANE	11 18	55 62	803 01	155 96	30 00	54 84	810 00	156.03	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	1006E+04	OUTFLOW-	1001E+04	BASIN STORAGE-	3996E+00	PERCENT ERROR-	4
	MANE	12 82	124 70	827 82	156 04	30 00	122 59	840 00	155.97	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	1001E+04	EXCESS-	1382E+04	OUTFLOW-	2378E+04	BASIN STORAGE-	7360E+00	PERCENT ERROR-	2
	MANE	26 81	110 57	916 79	155 40	30 00	109 94	930 00	155 33	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	0000E+00	EXCESS-	3060E+04	OUTFLOW-	3036E+04	BASIN STORAGE-	4801E+01	PERCENT ERROR-	6
	MANE	6 82	1048 74	912 92	154 81	30 00	1041 42	930 00	154 74	
CONTINUITY SUMMARY (1000 CU-M)-	INFLOW-	3112E+05	EXCESS-	.6411E+03	OUTFLOW-	3174E+05	BASIN STORAGE-	2357E+01	PERCENT ERROR-	.1

*** NORMAL END OF HEC-1 ***