KYPipe, LLC

Figures from KYPipe Reference Manual

Original Manual date April 1995 - Imaged December 2011

Jana [Pick the date]

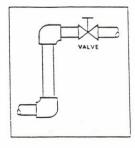


Figure 1 Pipe Section

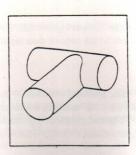


Figure 2 Junction Node

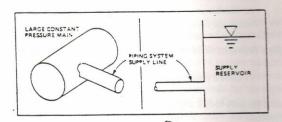


Figure 3 Fixed Grade Node

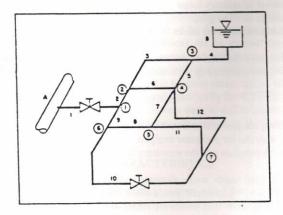


Figure 4 Geometric Relation Demonstration $p=12, j=7, \ell=4$ and f=2 (12=7+4+2-1)

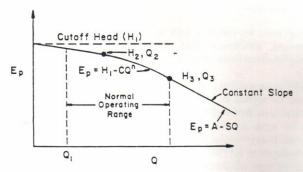


Figure 5a Pump Curve for Three Data Points

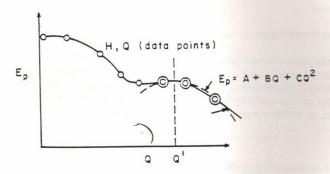
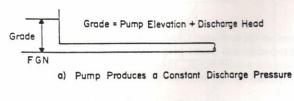
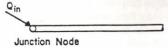


Figure 5b Pump Curve for Multiple Data Points





b) Pump Inputs Specified Flowrate

Figure 6 Alternate Pump Representations

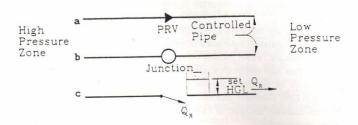


Figure 7 Pressure Regulating Valve (PRV)

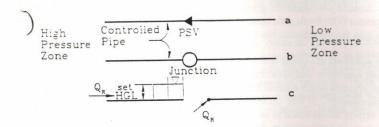


Figure 8 Pressure Sustaining Valve (PSV)

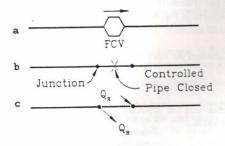
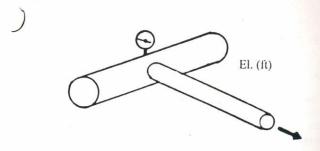


Figure 9 Flow Control Valve (FCV)

available pressure	head increase
(psi)	(ft)
70	161.5
62	143.0
53	122.3
	(psi) 70 62



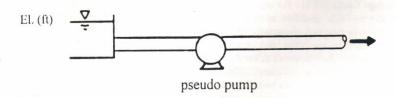


Figure 10 Variable Pressure Supply

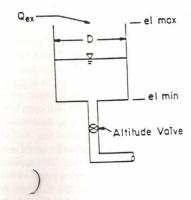
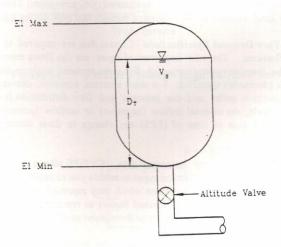


Figure 11 Constant Diameter Tank



b) variable area tank

Figure 12 Variable Area Tank

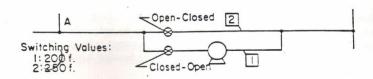


Figure 13 Pressure Switch - Pump and Bypass

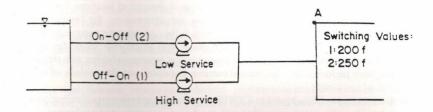


Figure 14 Pressure Switch - High and Low Service Pump

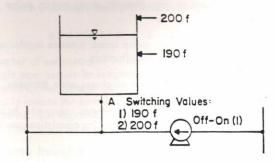


Figure 15 Pressure Switch - Booster Pump to Storage Tank

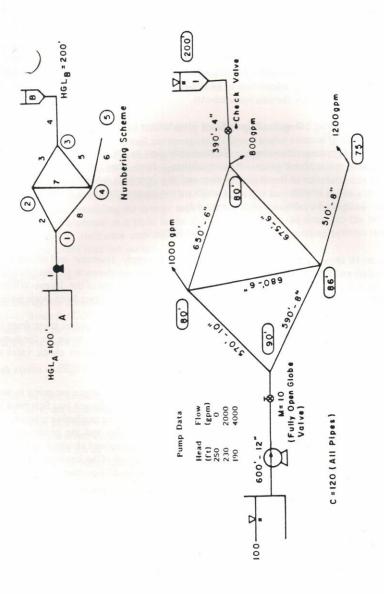


Figure 16 Example 1 - Eight Pipe System

University of Kentucky Hydralic Analysis Program
for the Distribution of Pressure and Flows in Pipe Network Systems
FORTRAN VERSION - 1.00 (09/15/91)

DATE: 9/10/1991
TIME: 14:31:20
INPUT DATA FILENAME ------ EXI.DAT
POSTRACCESSOR REGULTS FILENAME --- EXI.OUT
POSTRACCESSOR REGULTS FILENAME --- EXI.RES

UNITS SPECIFIED

FLOWRATE # gallons/minute HEAD (HGL) # feet PRESSURE # psig

PIPELINE DATA

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE
CV -CHECK VALVE RV -REGULATING VALVE
PIPE NODE NOS. LENGTH DIAMETER ROUGHRESS MINOR LOSS FGRA

| NUMBER | 1 | 02 | (ft) | (in) | COEFF. | COEFF. | (ft) | (in) | COEFF. | (ft) | COEFF. |

PUMP DATA

JUNCTION NODE DATA

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

SYSTEM CONFIGURATION

NUMBER OF PIPES (p) = 6

NUMBER OF JUNCTION NODES (j) = 5

NUMBER OF PRIMARY LOOPS (l) = 2

NUMBER OF FIXED GRADE NODES (l) = 2

NUMBER OF SUPPLY ZONES (z) = 1

SIMULATION RESULTS

THE RESULTS ARE OBTAINED AFTER 4 TRIALS WITH AN ACCURACY * .00046

SIMULATION DESCRIPTION (LABEL)
Example 1 - KYPIPE2 Users Manual

Pump Fed - 8 pipes and 5 junction nodes

One change specified - close pipe no. 4

Table 1 Results - Example 1

	SIMULATION RESULTS
*	(C)
*	
*	F .
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ACCURACY
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OBTAINED
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RESULTS
THE

PU -PUMP LINE TK -STORAGE TANK

FG -FIXED GRADE NODE RV -REGULATING VALVE

PIPELINE RESULTS STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

		- 1			10.10	77 (4)	
	IE TANK	1000 (ft/ft	25.14 27.03 83.66 27.27	29.70	26.76	JUNCTION PRESSURE (psi)	82.52 80.17 56.61 77.41 75.61
	PU -PUMP LINE TK -STORAGE TANK	LINE VELO. (ft/s)	9.04 8.38 11.18 4.73	7.66	7.24	PRESSURE HEAD (ft)	190.43 185.02 130.64 178.64
	PU TX	MINOR LOSS (ft)	12.67	00.	00.	_	1
	ADE NODE	PUMP HEAD (ft)	208.18	00.	00.	JUNCTION ELEVATION (ft)	90.00 80.00 86.00 75.00
	FG -FIXED GRADE NODE BV -REGULATING VALVE	HEAD LOSS (ft)	15.08 15.41 54.38	15.15		L T S HYDRAULIC GRADE (ft)	280.43 265.02 210.64 264.64 249.49
	FG -	FLOWRATE (gpm)	3185.20 2050.93 985.20	200.00	65.73	n s	
RESULTS	-CLOSED PIPE -CHECK VALVE	FI	2.19			E G 5	.00 1000.00 800.00 .00
	XX -CLOSED PIPE CV -CHECK VALVE	NODE NOS.	4860	64	0.00	ON NODE JUNCTION EX	
I N E		2 -	20 00	9.	- 11	н	
PIPELINE	STATUS CODE:	PIPE	1-FGPU 2 3	S-XX	0 1 8	JUNCTION NUMBER	24371
HL/ 1000 (ft/ft	27.63	37.86 89.65 24.71 29.70	37.96		JUNCTION PRESSURE (psi)	79.75 77.82 67.15 71.78 69.98	
LINE VELO. (ft/s)	9.51	7.29 8.99 7.66	3.86		PRESSURE HEAD (ft)	184.04 179.58 154.96 165.65	
MINOR LOSS (ft)	14.04	00000	000		-	186	. 3z
PUMP HEAD (ft)	204.66	00000	00.		JUNCTION ELEVATION (ft)	90.00 80.00 86.00 75.00	OUTFLO
HEAD LOSS (ft)	16.58	24.61 34.96 16.68	22.39	I S	HYDRAULIC GRADE (ft)	274.04 259.58 234.96 251.65 236.50	A N D GRADE N
FLOWRATE (gpm)	3352.12	642.13 352.12 509.99 1200.00	339.99	RESULT	EXTERNAL HYD DEMAND G (gpm) (1000.00 800.00 2 1200.00 2	SUMMARY OF INFLOWS AND OUT (+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES
105.	1 2	80 E S	33	NODE	EXT DE (8	100 80	INF SYSTEM E SYSTE
NODE NOS.	10	とたのい	1 2	z	JUNCTION		O F NTO THE FROM THI
PE	1-FGPU	3 4-FGCV 5 6		CIIO		26.32	M A R Y NFLOWS I
PIPE	1.2	60.00	8	JUNC	JUNCTION		S U M

SUMMARY OF INFLOWS AND OUTFLOWS (+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

PIPE FLOWRATE NUMBER (8pm) 1 3352.12 4 -352.12

NET SYSTEM OUTFLOW = 3352.12 NET SYSTEM OUTFLOW = -352.12 NET SYSTEM DEMAND = 3000.00

PIPE FLOWRATE (gpm)
1 3185.20 NET SYSTEM INFLOW = 3185.20 NET SYSTEM OUTFLOW = -185.20 NET SYSTEM DEWAND = 3000.00 DATA CHANGES FOR NEXT SIMULATION

**** KYPIPE SIMULATION COMPLETED ***

PIPE STATUS CHANGES

LINE 5 IS CLOSED

Table 1 (cont.) Results - Example 1

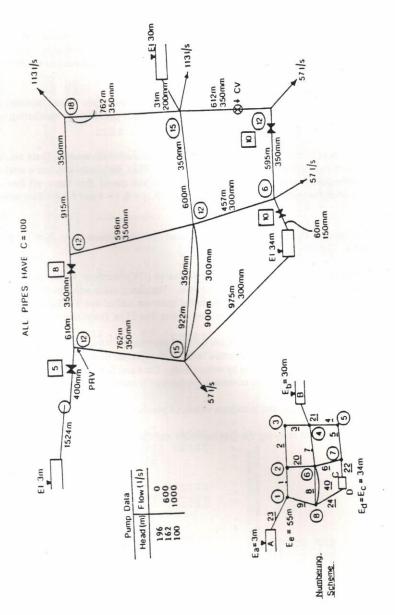


Figure 17 Example 2 - Fifteen Pipe System

********** KYPIPE2 *********	PIPEL
* for the Distribution of Pressure and Flows in Pipe Network Systems * * for the Distribution of Pressure and Flows in Pipe Network Systems *	STATUS COD
	PIPE
DATE: 9/11/1991 TIME: 10:22:26	120
INPUT DATA FILENAME	- XXCV
SUMMARY OF ORIGINAL DATA	9-RV 20 21-FG 22-FG
UNITS SPECIFIED	22 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -
FLOWRATE # liters/second HEAD (HGL) meters PRESSURE * kpa	S U N C

	OUTPUT		
	TABULATED		
	THE 2		15
	Z		
OUTPUT OPTION DAIA	OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT MAXIMUM AND MINIMUM PRESSURES = 2 MAXIMUM AND MINIMUM VELOCITIES = 3	CONFIGURATION	OF PIPES (p) OF JUNCTION NODES (j) OF PRIMARY LOOPS (1) OF SUPPLY JONES (1) OF SUPPLY JONES (2)
	IM		NUMBER OF NUMBER
H	BASE	2.	55555
0	2 2	-	NUMBER NUMBER NUMBER NUMBER NUMBER
-	5	60	NUMBER NUMBER NUMBER NUMBER
7	rPI	>-	
0	50	SYSTEM	

	*	RESULT	*
	*	1	*
	*	•	*
	:	S	*
	:	M	*
	*	×	*
	********	SIMULATION	******************
	*	0	*
	:	н	*
	*	-	*
	*	-	*
	*	-	*
	*	-	*
	*	P	:
	*	E	*
	*	-	*
	=	S	*
	-		~

THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY = .00001

Illustrates following features: PRV, Max - Min tables, non-consecutive SIMULATION DESCRIPTION (LABEL) numbering, data check (*1), etc. Example 2 - KYPIPE Users Manual

PIPELINE RESULTS

STATUS CODE:	55	-CHECK VALVE	RV	-REGULATING VALVE	NG VALVE	¥ -i	TK -STORAGE TANK	TANK
PIPE	ODE	NOS.	FLOWRATE	HEAD	PUMP	MINOR	LINE	HL/
NUMBER	-	7.	(1/s)	(E)	(E)	(E)	(m/s)	
1		2	325.68		00.	4.67	3.39	43.96
		. (*)	167.74	11.7	00.	00.	1.74	12.86
9 60		3	54.74		00.	00.	.57	1.62
4-XXCV	3	2					1	1
	2	7	-57.00	-1.04	00.	18	59	-1.74
. 4	9	7	100.46	4.82	00.	00.	1.42	10.55
10	, 4	. 9	-148.31	-6.15	00.	00.	-1.54	-10.24
. 0	. 4		-46.69	-1.11	00.	00.	69	-1.20
0-DV			217.21	15.82	00.	00.	2.26	20.76
		9	157.94	6.8	00.	00.	1.64	11.51
21-50	. 1	0	90.06		00.	00.	2.87	62.05
			-13.54		00.	30	77	-7.53
MODE - CC			542.89	6	168.25	4.76	4.32	59.11
24-10		. 0	69.37	5	00.	00.	86.	5.31
			-64.15	1	00.	00.	62	-1.23
				1				
JUNCTI	z o	NODE	RESULT	S H				
JUNCTION	TITLE	ON EXTERNAL DEMAND (1/s)	Al gra	HYDRAULIC GRADE (m)	JUNCTION ELEVATION (m)	z	PRESSURE HEAD (m)	JUNCTION PRESSURE (kpa)
10		00		76.42				
٠,		113.00		33.16	18.00		15.16	148.63
0 4		113.00	00	31.92	15.00		16.92	165.96
·		57	57.00	32.03	12.00		20.03	196.46
9			.00	38.07				
7		57	57.00	3.5	6.00		27.25	77.197
α		57	57.00	39.18	15.00		24.18	237.12

MAXIMUM AND MINIMUM VALUES

MAXIMUM PRESSURES - MINIMUM PRESSURES 7 267.22 4 148.63 8 237.12 4 165.96 location (node or pipe) and value

MAXIMUM VELOCITIES - MINIMUM VELOCITIES 23 8 .49 8 .57 21 3.39 5 5 57 21 2.87 5 5 59

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(x)

DOWNSTREAM THROUGH GRADE FLOW (m) (1/s)	9.18 21
8	
UPSTREAM GRADE (m)	76.42
VALVE	55.00 THROTTLED
SETTING (m or 1/s)	55.00
VALVE POSITION CONTROLLED TYPE NODE PIPE	6
POSITION	1
VALVE POS TYPE N	PRV-1

Table 2

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(+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

	6.00
72.66 42.39 29.97 29.54	35.81 30.51 37.02
.00 .00 113.00 169.50 85.50	.00 85.50 85.50
40034	978
90.06 42.89 69.37	556.43 1359.43 97.00
21 -90 22 1: 24 24 24 -66	NET SYSTEM INFLOW = 550 NET SYSTEM OUTFLOW = -150 NET SYSTEM DEMAND = 399
	72.66 42.39 29.97 29.54

JUNCTION PRESSURE (kpa)

PRESSURE HEAD (m)

JUNCTION NODE RESULTS

128.13 146.83 172.01 240.34

13.07 14.97 17.54 24.51

MAXIMUM AND MINIMUM VALUES

DATA CHANGES FOR NEXT SIMULATION

location (node or pipe) and value

- MINIMUM VELOCITIES
21 .29
4 .36
8 .51 - MINIMUM PRESSURES 3 128.13 4 146.83 MAXIMUM VELOCITIES - 23 4.39 1 3.31 9 2.42 MAXIMUM PRESSURES 7 240.34 8 215.96

REGULATING VALVE REPORT

UPSTREAM DOWNSTREAM I GRADE (m) (m) 72.66 37.02 2 55.00 THROTTLED VALUE POSITION CONTROLLED VALUE TYPE NODE PIPE SETTING STATUS (m or 1/s) PRV-1 1

THROUGH FLOW (1/s) 232.74

SUMMARY OF INFLOWS AND OUTFLOWS (+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

PU -PUMP LINE TK -STORAGE TANK

FG -FIXED GRADE NODE RV -REGULATING VALVE

XX -CLOSED PIPE CV -CHECK VALVE

STATUS CODE:

PIPELINE RESULTS

FLOWRATE (1/8)

NODE NOS.

PIPE

THE RESULTS ARE OBTAINED AFTER & TRIALS WITH AN ACCURACY = .00039

FLOWRATE (1/s) 9.03 30.23 551.60 -51.86 590.86 -51.86 539.00 NET SYSTEM INFLOW = NET SYSTEM DEMAND = PIPE NUMBER 21 22 23 24

HL/ (m/m) (m/m) (42.34 11.59 11.59 11.59 11.59 11.05 1

4-CV

25.78 11.33 1.09 1.09 5.30 -5.83 -1.22 17.98 6.59 6.59 6.59 6.59

318.86 164.31 35.34 35.34 105.73 105.73 15.76 154.55 154.55 154.55 154.55 154.55 154.55 154.55 154.55 154.55 154.55 154.55

9-RV 20 21-FG 22-FG 23-FGPU 24-FG

**** KYPIPE SIMULATION COMPLETED ***

Results - Example 2

(cont.)

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

DEMAND (1/s)

JUNCTION NUMBER

DEMAND TYPE = 1 - GDF = 1.500 DEMAND CHANGES

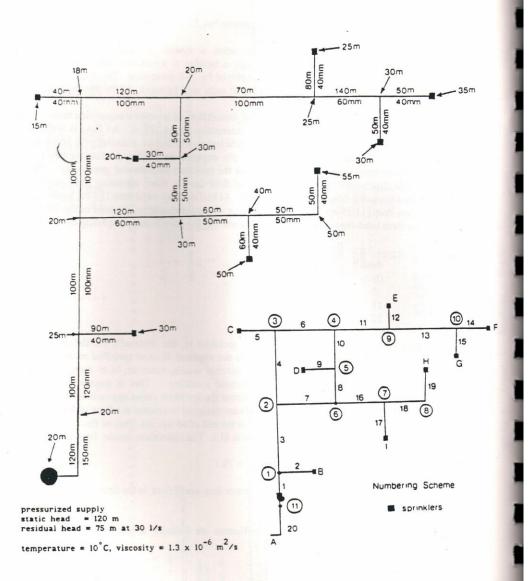


Figure 18 Example 3 - Twenty Pipe Sprinkler System

University of Kentucky Hydraulic Analysis Program for the Distribution of Pressure and Flows in Pipe Network Systems (00715/91)

DATE: 9/11/1991 TIME: 13:43:55

INPIT DATA FILENAME ------ EX3.DAT TABULATED OUTPUT FILENAME ----- EX3.OUT POSTPROCESSOR RESULTS FILENAME --- EX3.RES

SUMMARY OF ORIGINAL DATA

UNITS SPECIFIED

FLOWRATE = liters/second HEAD (HGL) = meters | kpa 58

THE DARCY WEISBACH HEAD LOSS EQUATION IS USED, THE KINEMATIC VIS. = .0000013

PIPELINE DATA

PU -PUMP LINE FG -FIXED GRADE NODE RV -REGULATING VALVE XX -CLOSED PIPE CV -CHECK VALVE STATUS CODE:

PIPE	NODE • 1	NOS.	(m)	DIAMETER (cm)	ROUGHNESS COEFF.	MINOR LOSS COEFF.	TGN-HGL
1	11	1	100.0	12.0	. 20	00.	
2-FG	1	0	0.06	6.0	. 20	21.50	30.00
	1	2	100.0	10.0	. 50	.30	
4	2	3	100.0	10.0	. 50	.30	
S-FG	0	0	0.0%	0.9	.20	21.50	15.00
9	e	4	120.0	10.0	. 50	1.80	
7	2	9	120.0	6.0	.20	1.80	
8	S	9	50.0	5.0	.20	1.80	
9-FG	S	0	30.0	6.0	.20	21.50	20.00
10	9	S	50.0	5.0	.20	.30	
11	9	6	70.0	10.0	. 50	.30	
12-FG	6	0	80.0	4.0	. 20	21.50	25.00
13	6	10	140.0	6.0	. 20	.30	
14-FG	10	0	50.0	4.0	. 20	20.00	35.00
15-FG	10	0	50.0	0.4	.20	21.50	30.00
16	9	7	0.09	5.0	.20	.30	
17-FG	7	0	0.09	4.0	. 20	21.50	50.00
18	7	8	50.0	5.0	. 20	.30	
19-FG	8	0	50.0	4.0	. 20	20.60	55.00
20-FGPU	0	11	120 0	15.0	. 20	1.40	20.00

PUMP DATA

THERE IS A PUMP IN LINE 20 DESCRIBED BY THE FOLLOWING DATA:

HEAD FICWRATE.

(I/s)

120.00

180.75

15.00

JUNCTION NODE DATA

JUNCTION

TUNCTION	EXTERNAL	JUNCTION	THE PARTY OF	0		
TITLE	(1/s)	(m)	CONNE	CONNECTING	PIPES	
	00.		1	2	3	
	00.		3	,	7	
	00.		9	2	9	
	00.	20.00	9	10	11	
	00.		8	6	10	
	00.		1	8	16	
	00.		16	17	18	
	00.		18	19		
	00.		11	12	13	
	00.		13	14	15	
	00.		1	20		

1009876911

.......

OUTPUT OPTION DATA

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

20 11 11 9 NUMBER OF PIPES (p) =

NUMBER OF JUNCTION NODES (j) =

NUMBER OF PRIMARY LOOPS (l) =

NUMBER OF PIXED GRADE NODES (f) =

NUMBER OF SUPPLY ZONES (f) = SYSTEM CONFIGURATION

Data Input Summary Example 3 Table 3

SIMULATION

THE RESULTS ARE OBTAINED AFTER 5 TRIALS WITH AN ACCURACY =

SIMULATION DESCRIPTION (LABEL)

JUNCTION NODE RESULTS

EXTERNAL DEMAND (1/s)

JUNCTION JUNCTION NUMBER TITLE

Example 3 - KYPIPE2 Users Manual

Twenty Pipe Sprinkler System (8 sprinklers)

three cycles of operation

PU -PUMP LINE
-PUMP
Pd
NODE
GRADE
FG -FIXED GRADE NODE
FG
PIPE
XX -CLOSED PIPE CV -CHECK VALVE
X S
CODE:
STATUS CODE

	C	-CHECK VALVE	ALVE RV	-REGULATING V	REGULATING VALVE	¥2	-STORAGE TANK	TANK
PIPE	NODE	NOS.	FLOWRATE	HEAD	PUMP	MINOR	LINE	HE/
			(1/s)	(E)	Ē	(E)		(m/m)
1	11	1	28 19	K 17			!	
2-FG		c			00.	. 00		61.67
•		, ,			00.	14.35		524.90
. 4	4 (4 (23.64		00.	. 14		142. AR
20-0	9 (ກ (17.75		00.	.08		80 00
	ກ ເ	0	5.63		00.	22.00		799 80
0 1	n (j	12.12		00.	. 22		30 . 00
٠ ،	7	9	5.89	12.60	00.	07	2.08	104.07
00	nı	9	-2.62		00.	16	-1.34	-56.07
54.6	n.	0	5.33		00.	19.69	4.24	717 03
0 :	*	2	2.70		00.	0.3	200	00.00
11	3	6	9.42		00		DC . T	67.60
12-FG	6	C	2 20			70.	1.20	23.20
13	0	0 0	200		00.	9.52	2.95	350.42
14-FG	10	2	27.0		00.	90.	2.02	99.01
15-50	0 0	0 0	2.03		00.	4.53	2.11	181.88
16	24	9 6	3.07		00.	6.53	2.44	242.02
200	0 (,	3.26		00.	70	1 66	0.0
54-17	,	0	1.99		00	2 75		10.00
18	7	80	1 27			6.13	1.58	104.08
19-FG	α	-	100		00.	.01	. 65	14.05
20-FGPIT	0 0		17.71		00.	1.08	1.01	44.06
	0	11	28.19		80.28	10		

ELEVATION ELEVATION 25.00 20.00 30.00 40.00 55.00 55.00 30.00 50.00 30.00 55.0 HYDRAULIC GRADE (m) 91.59 77.17 64.20 64.20 64.17 58.99 58.99 58.99 58.99 58.99 58.99 58.99 100

SUMMARY OF INFLOWS AND OUTFLOWS (+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES
(-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

FLOWRATE (1/s)	-4.55	-5.63	-5.33	-3.70	-2.65	-3.07	-1.99	-1.27	28.19	28.19 -28.19
PIPE	7	2	6	12	14	15	17	19	20	INFLOW = OUTFLOW = DEMAND =
										NET SYSTEM NET SYSTEM NET SYSTEM

(cont.) Results (case 1) - Example 3 Table 3

DATA CHANGES FOR NEXT SIMULATION

PIPE STATUS CHANGES

CLOSED	CLOSED	CLOSED	CLOSED
13	SI	13	5
5 13	12	14	17
LINE	LINE	LINE	LINE

SIMULATION RESULTS

.00014 THE RESULTS ARE OBTAINED AFTER 4 TRIALS WITH AN ACCURACY =

PU -PUMP LINE TK -STORAGE TANK XX -CLOSED PIPE FG -FIXED GRADE NODE CV -CHECK VALVE RV -REGULATING VALVE PIPELINE RESULTS S STATUS CODE:

PIPE NODE NOS. FLOWRATE	Chan	PUMP	MINOR	LINE	HL/
G 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	HEAD				
XFG 11 1 2 2 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	LOSS	HEAD	LOSS	VELO.	1000
11111111111111111111111111111111111111	(E)	(m)	(m)	(m/s)	(m/m)
444466488888889986	i	00.	.00	1.88	35.58
746666666666666666666666666666666666666		00.	19.25	4.19	701.05
44mm488888888		00.	90.	2.04	66.07
100 9 9 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	2.68	00.	.03	1.29	26.81
0,000,000,000				11	
2000 9 6 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		00.	.15	1.29	26.81
200000000000000000000000000000000000000		00.	07.	2.08	104.54
, , , , , , , , , , , , , , , , , , ,		00.	12	-1.13	-40.76
100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		00.	33.84	5.56	1224.38
100000000000000000000000000000000000000		00.	60.	2.42	178.58
9 0 0 10 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0		00	01	69	7.76
9 10 10 0 10 0 7 0					
9 10 10 0 10 0 6 7					
10 0 10 0 6 7		00.	90.	1.90	66.18
10 0 6 7 7 0		-			
6 7		00.	20.10	87.4	131.61
0 4		00.	.05	1.86	106.48
7		00.	.05	1.86	106.48
0		00.	8.87	2.91	340.92
0 11		97.36	.10	1.20	11.28

			20.00							
										115.90
00.	00.	00.	00.	00.	00.	00.	00.	00	00	00.
			. 4		. 4	, ,		000	10	11

JUNCTION DUNCTION EXTERNAL HYDRAULIC JUNCTION DEMAND GRADE ELEVATION (1/3) (m)

SUNCTION NODE RESULTS

JUNCTION PRESSURE (Rps) | 856.54 | 856.54 | 833.22 | 833.22 | 833.22 | 833.22 | 833.22 | 833.95 | 833.95 | 833.95 | 840.46 | 940.46 | 940.46 | 940.46 | 940.46 | 940.46 |

87.34 85.67 84.96 779.96 60.58 62.73 46.29 30.91 74.06 56.67

SUMMARY OF INFLOWS AND OUTFLOWS (+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES(-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

FLOWRATE

(1/s)	-5.27	-6.98	-5.38	-3.65	21.28	21.28	-21.28	00.
NUMBER	2	6	15	19	20	INFLOW -	- MOTILION	DEMAND =
						SYSTEM	SYSTEM	GVGTFW
						NET	NET	T-IN

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Examp
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2)
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Results
(cont.)
e 3
Table

DATA CHANGES FOR NEXT SIMULATION

PIPE STATUS CHANGES

Q	O	Q	Q	Q	Q	G
R	NE	NE	SE	SE	SE	SE
OPE	3PE	3 dC	SIC	SIC	SLO	CLO
S	S	S	S	S	S	S
2 1	7	7	2	1 6	2	1 6
-	-	-		0000	-	-
(±)	ш	(1)	μ	ы	E	ы
ZI,	NI.	Z	=	H	ZI	Z
-	had	-	-	Н	-	н
	12 IS (12 IS 0 14 IS 0	12 IS 0 14 IS 0 17 IS 0	12 IS 14 IS 17 IS 2 IS	12 IS 0 14 IS 0 17 IS 0 2 IS 0 9 IS 0	LINE 14 IS OPENED LINE 14 IS OPENED LINE 17 IS OPENED LINE 17 IS OPENED LINE 2 IS CLOSED LINE 9 IS CLOSED LINE 15 IS CLOSED

THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY . . 00006

SIMULATION RESULTS

PU -PUMP LINE TK -STORAGE TANK FG -FIXED GRADE NODE RV -REGULATING VALVE PIPELINE RESULTS STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE 61

PIPE	NODE	NOS.	FLOWRATE	HEAD	PUMP	MINOR	LINE	五八
NUMBER	#1	.2		LOSS	HEAD	LOSS	VELO.	1000
			(1/s)	(E)	(E)	(m)	(m/s)	(m/m)
1	11	-	20.77	3,39	00.	00.	1.84	33.92
2-XXFG	1	0						
	1	2	20.77	11.05	00.	.11	2.64	110.53
3	2	e	15.96	6.56	00.	90.	2.03	65.63
5-50		0	6.90	47.83	00.	33.04	5.49	1195.67
		9	90.6	2.58	00.	.12	1.15	21.50
7	2	9	4.81	8.48	00.	.27	1.70	70.67
. 00	S	9	79	28	00.	01	09	-5.66
9-XXFG	2	0						
10	4	S	79	28	00.	00	07	-5.66
11	2	6	9.85	1.77	00.	.02	1.25	25.32
12-FG	6	0	46.94	49.43	00.	16.94	3.93	617.92
13	6	10	4.91	10.29	00.	.05	1.74	73.51
14-FG	10	0	4.91	30.49	00.	15.54	3.90	609.77
15-XXFG	10	0						
16	9	7	4.02	7.72	00.	90.	2.05	128.60
17-FG	7	0	4.02	24.74	00.	11.23	3.20	412.31
18	7	8	00.	00.	00.	00.	00.	00.
19-XXFG	8	0						
20-FGPII	0	11	20.77	1.29	34.86	.10	1.18	10.76

SUMMARY OF INFLOWS AND OUTFLOWS

JUNCTION PRESSURE (Rpa) 869.40 869.40 869.40 869.40 862.25 622.25 622.25 622.25 622.25 635.16 450.87 950.46

ON EXTERNAL HYDRAULIC JUNCTION F DEMAND GRADE ELEVATION (T.)

(1.51) (m) (m) (m) (T.)

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JUNCTION NODE RESULTS

JUNCTION JUNCTION NUMBER TITLE

(+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

FLOWRATE (1/s)	1 1 1 1 1 1 1 1 1	-6.90	76.4-	-4.91	-4.02	20.77	20.77	-20.77	.00
							я	n	и
PIPE		2	12	14	17	20	INFLOW	OUTFLOW	DEMAND
							SYSTEM	SYSTEM	SYSTEM
							NET	NET	NET

*** KYPIPE SIMULATION COMPLETED ***

DATE: 9/11/1991 TIME: 13:43:59

Table 3 (cont.) Results (case 3) - Example 3

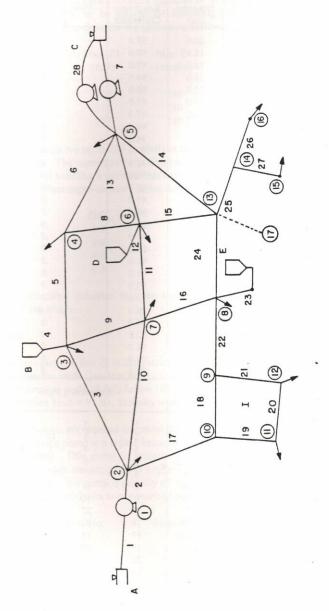


Figure 19 Example 4 - Twenty Eight Pipe System - EPS

1 DESCRIBED BY THE FOLLOWING DATA: 100 00 00 17 DESCRIBED BY THE FOLLOWING DATA: 11 DESCRIBED BY THE FOLLOWING DATA: 11 000 00	28 DESCRIBED BY THE FOLLOWING DATA: 43 5.00 7.00 7.00 7.00 7.00	JUNCTION CONNECTING PIPES (ft)	90.00 1 2 10 17 95.00 1 95.00 2 3 10 17 95.00 3 4 5 10 10 10 10 10 10 10 10 10 10 10 10 10	THE FOLLOWING RESULTS ARE INCLUDED IN THE TABULATED OUTPUT. PIPES ARE NOTED ATH PUMPS TO THESE TO THE FOLLOWING RESULTS ARE INCLUDED IN THE TABULATED OUTPUT.
THERE IS A PUMP IN LINE 1 DESCRIBE HALD (TE) (IME d) (TE) (IME d) (TE) (IME d) (TE) (TE) (TE) (TE) (TE) (TE) (TE) (TE	THERE IS A PUMP IN LINE 28 DESCRIBE (ft.) (ft.) (fm.d.) (fm.d.) (m.d.) (m.d.) (m.d.) (m.d.) (m.d.) (m.d.) (m.d.) 275.00 (0.00 2.75.00 12.00 2.40.00 12.00	JUNCTION JUNCTION EXTERNAL NUMBER TITLE DESKND (mgd)	1-2 Main St	CTION: CLOSED PIPES PIPES I 10 20 COWING 1
. K.	PU -PUMP LINE	MINOR LOSS FGN-HGL COEFF. (ft)	270 00 00 00 00 00 00 00 00 00 00 00 00 0	7.00 270.00 7.00 270.00 .00 .00 .00 .00 .00 .00 .00 .00 .00
ME EXADC DAT ME EXADC CUT ME EXADC RES	million gallons/day million gallons/day feet feet feet gallons gallons Rallons TYEE FG -FIXED GRADE NODE FOUR	SS	120.0 12	
DATE: 9/17/1991 TIME: 7:16:48 RIPUT DATA FILENAME TRAULATED OUTPUT FILENAME POSTFROCESSOR RESULTS FILENAME S UM MARY OF	S P E C I F I E D " million " feet LOW	NOS. LENGTH		9 12 1550.0 8 1900.0 8 1900.0 13 14 160.0 14 15 1500.0 0 5 2100.0
DATE: 9/1 TIME: 7:1 INPUT DATA TARGLATED POSTPROCES	FLOWRATE HEAD (HGI) PERSONE METERED FLOW FIRE LINE STATUS CODE:	PIPE NUMBER	1-FGPU	22 23-FG 24-25 26 26 27 27-26

Table 4 Tabulated Data Summary - Example 4

DATA CHANGES FOR NEXT SIMULATIO	DEMAND CHANGES	DEMAND TYPE = 1 - GDF = 1.300	L DATA CHANGES FOR	.00 DEMAND TYPE = 1 - GDF = 1.540	DATA CHANGES FOR NEXT SIMULATIO	DEMAND CHANGES	DEMAND TYPE = 1 - GDF = 1.560	DATA CHANGES FOR NEXT SIMULATIO	DEMAND CHANGES DEMAND TYPE = 1 - GDF = 1.550		CHANGES FOR	DEMAND TYPE = 1 - GDF = 1.550	DATA CHANGES FOR NEXT SIMULATION	DEMAND CHANGES	DEMAND TYPE * 1 - GDF = 1.200
			INITIAL VOLUME (gal)	634562. 634562. 634562.			2 - DEPTH/VOLUME DATA								
S DATA TOTAL TIME FOR SIMULATION = 24.000		VARIABLE HEAD TANK DATA	TANK PIPE MAXIMUM MINIMUM TANK NUMBER NUMBER ELEVATION CAPACITY (*) (ft) (ft) (gal)	00.00 VOLUM		1.000	* TANK TYPE: 1 - CONSTANT DIAMETER 2 - DE	FLOW METER SUMMARY	THE FOLLOWING PIPES CONTAIN FLOW METERS:	PRESSURE SWITCH DATA	REFERENCE SWITCHING PIPE NODE GRADES (f+)	7 15 197.00 & 226.00 28 15 197.00 & 226.00	STEM CONFIGURATION	ER OF PIPES(p) = 28 ER OF JUNCTION NODES(j) = 16	NUMBER OF PRIMARY LOOPS(1) = 7 NUMBER OF FIXED GRADE NODES(f) = 6 NUMBER OF SURPLY ZONES(z) = 1

Table 4 Tabulated Data Summary - Example 4

*** SIMULATION TERMINATED ****
AN ERROR WAS DETECTED OR YOU REQUESTED A DATA CHECK OPTION (*1*)

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(+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

DATA CHANGES FOR NEXT SIMULATION

DEMAND TYPE = 1 - GDF = 1.550 DEMAND CHANGES

FLOWRATE (mgd)	 9.57	1.42	9.38	1.42	1.82
PIPE	 1	,	7	12	23

NET SYSTEM INFLOW = 23.61 NET SYSTEM OUTFLOW = .00 NET SYSTEM DEMAND = 23.61

THE RESULTS ARE OBTAINED AFTER 3 TRIALS WITH AN ACCURACY = .00000

SIMULATION RESULTS

H VOLUME VOLUME STATUS DEPTH (Eal) (%) (%) (%) (Et) (Et) (7) (335710, \$2.9 DRAINING 10.27 (4) 178573, \$28.1 DRAINING 1.28 TANK STATUS REPORT (time = 8.0000 hours) TANK PIPE NET WATER TANK NUMBER NUMBER FLOW ELEVATION DEPTH (#) (ft) (ft) (ft) 2-1.42 254.63 14.63 3-2 23 23 248.44 8.44 P MINOR LINE HL/
LOSS VECLO 1000

(ft) (ft) (ft/ft)

0.00 6.79 11.87

0.00 4.32 7.34

0.00 4.32 7.34

PU -PUMP LINE TK -STORAGE TANK

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE CV -CHECK VALVE RV -REGULATING VALVE

FOLLOWING ADDITIONAL PIPES ARE CLOSED : 28

2 - DEPTH/VOLUME DATA

* TANK TYPE: 1 - CONSTANT DIAMETER

FLOW METER REPORT (time = 8.0000 hours)

PIPE	NODE	(4)	METERED
NUMBER	NUMBERS	ERS	FLOW
	•1	# 5	(gal)
2	1	2	2970868.
7	0	2	2861357.
28	0	S	0
9	3	0	-298852.
12	0	9	325021.
23	0	80	455989.

JUNCTION PRESSURE JUNCTION

[EL) (ft) (ft) (pi)

115.00 119.07 51.60

130.00 85.97 37.25

JUNCTION JUNCTION EXTERNAL HYDRAULIC NUMBER TITLE DEMAND GRADE (mgd) (ft)

11 Lakeview Rd. .77 234.07

15 East Mall .39 206.84

14-2 Central H9s. .25 215.97

JUNCTION NODE RESULTS

JUNCTION ELEVATION (ft)

DATA CHANGES FOR NEXT SIMULATION

DEMAND TYPE = 1 - GDF = 1.550 DEMAND CHANGES

Table 4 Tabulated Results - Example 4 (8 hours)

THERE IS A PUMP IN LINE 1 DESCRIBED BY THE FOLLOWING DATA: HEAD (ft.) (ft.) 270.00 240.00 8.00 195.00 10.00	THERE IS A PUMP IN LINE 7 DESCRIBED BY THE FOLLOWING DATA: HEAD HEAD (fr) (fr) (fr) 185.00 225.00 195.00 10.00 195.00 10.00	A A A A A A A A A A A A A A A A A A A
INPUT DATA FILENAME EXSA.DAT TABULATED OUTPUT FILENAME EXSA.OUT POSTFROCESSOR RESULTS FILENAME EXSA.RES S UMMARY OF ORIGINAL DATA	FLOWPATE	FIRE LINE DATA STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE CV - CHECK VALVE RV - REGULATING VALVE PIPE NODE NOS. LENGTH DIAMETER ROUGHNESS MINOR LOSS (Ft.) 1-FGPU 0 1 *1 2000.0 26.0 98.00 .00 100.00 2 2 3 1 2000.0 16.0 98.00 .00 256.00 3 4 -FG 3 0 *1 2000.0 16.0 99.00 .00 256.00 5 5 6 1 3900.0 15.0 99.00 .00 120.0 94.00 .00 7 - FGPU 0 5 1 2500.0 16.0 99.00 .00 12 - FG 1 3 1 2000.0 15.0 99.00 .00 12 - FG 1 3 1 2000.0 15.0 99.00 .00 12 - FG 1 3 1 2000.0 15.0 99.00 .00 12 - FG 1 3 1 2000.0 15.0 99.00 .00 13 - FG 1 3 1 2500.0 15.0 99.00 .00 14 - FG 2 900.0 15.0 99.00 .00 15 - FG 1 3 1 2500.0 15.0 99.00 .00 15 - FG 1 3 1 2500.0 15.0 99.00 .00 15 - FG 1 3 1 2500.0 15.0 99.00 .00 15 - FG 1 3 1 2500.0 15.0 99.00 .00 15 - FG 1 3 1 2500.0 12.0 99.00 .00 16 - FG 1 3 10.0 0 12.0 99.00 .00 17 - FG 1 3 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1 1500.0 12.0 99.00 .00 18 - FG 1 3 1 1500.0 12.0 99.00 .00 18 - FG 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

Table 5A Tabulated Results - Example 5A

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SIMULATION RESULTS	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY =	SIMULATION DESCRIPTION (LABEL)	Example 5A - Field pressures: node 10 - 70 paig, node 15 - 50 psig	Illustrates the calculation of calibration parameters:	global roughness and global demand factors
	THE RESULTS ARE	SIMULATI	Example 5A - Fie	Illustrates the	global rough

102.13	101.40	97.27	100.37	97.27	100.37	99.34	100.37	96.66	99.3¢ 96.23 94.16	96.23	99.34	96.23	94.16	124.17			RESULTS				.,	23			• • •									.00 262.90
7 - ROUGHNESS	7 - ROUGHNESS	7 - ROUGHNESS	7 - ROUGHNESS	7 - ROUGHNESS 7 - ROUGHNESS	7 - ROUGHNESS 7 - ROUGHNESS	7 - ROUGHNESS	7 - ROUGHNESS 7 - ROUGHNESS 7 - ROUGHNESS	7 - ROUGHNESS	7 - ROUGHNESS 7 - ROUGHNESS 7 - ROUGHNESS	7 - ROUGHNESS	7 - ROUGHNESS	7 - ROUGHNESS	7 - ROUGHNESS	7 - ROUGHNESS			ION NOD																	
FIFE NO.	12	e a	9	7 8	10	11	11.13	17	119	22	23	25	27	28			JUNCI	NOTTONIT	NUMBER		-	*2 2	*2 3	*2	C 7 **	*2 7	*2 *	6	10	*2 11	13	14	*2 15	*2 16
									XX	HL/	(ft/ft)	9.87	16.70	15.90	.25	5.27	-1.90	1.54	5.68	-6.07	8.72	-2.97	1.93	4.54	2.07	6.85	27.6	-6.36	-2.93	-3.79	3.73	4.37	00.	
	*0000			psig					PUMP LINE STORAGE TA	LINE	(ft/s)	07.9	7.90	3.91	.62	3.74	9.69			1						2								
			(1)	- 50					PA TA	MINOR	(ft)	00.	00.	00.	00.	00.	8.6	00.	8.6										1					
	AN ACCUR		(LABE	g, node	ameters:				ADE NODE	PUMP	(ft)	220.72	00.	00.	00.	00.	218.25	8.0.	0.0	88.		•		00.	00.	00.	7.0		Fig. 3					
	LS WITH 1		NO	- 70 psi	tion par	factors			FIXED GR	HEAD	LOSS (ft)	19.74	13.36	26.49	.93	20.55	57.50	4.76				17.85						į						
			IPT	node 10	calibra	1 demand		S	FG	LOWRATE	(mgd)	9.03	9.03	3.53	32	2.97	8.56	.51	3.09	59	2.14	2.55	5.73	1.51	66.	. 52	.07	38	00-	-1.37	54.	.23	. 23	
	TAINED AFTER		DESC	pressures:	lculation of	ss and globa		RESULT	-CLOSED PIPE -CHECK VALVE	Nos.	1.5		2 *1	3 *1	0 4	* * *	5 *1	7 * 1	7 *1	6 *1	6 * 1								1 . 6					7. /1
	ARE OB		TIO	- Field	the ca	roughne		NE	ž5	NODE	•1		0 -	2	m c	2 10	0	9 6	5 2	۲.	o w	S	9	۲,	301	10	11	6	80 (0 0	13	14	16	13
	THE RESULTS		SIMULA	Example 5A	Illustrates	global,		PIPELI			NUMBER		1-FGFU	m	6-FG	n 4	7-FGPU	& 0	10	11	13	16	15	16	10	01	20	21	22	23-FG	25	26	27	87
	1 7 - ROUGHNESS	0000¢ 7 - ROUGHNESS 2 7 - ROUGHNESS 2	7 TRIALS WITH AN ACCURACY = .00004 2 7 - ROUGHNESS 3 7 - ROUGHNESS 4 7 - ROUGHNESS 4 7 - ROUGHNESS 4 7 - ROUGHNESS	7 TRIALS WITH AN ACCURACY = .00004 TO TRIALS WITH AN ACCURACY = .00004 TO TRIALS	00004	7 TRIALS WITH AN ACCURACY = .00004	- 00004 P. 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FLOWRATE HEAD PUMP MINOR LINE HLV S COUGHNESS NUMBER 1 0S (FL) (FL) (FL) (FL) (FL) (FL) (FL) (FL)	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY = .00004 S IM U L A T I O N D E S C R I P T I O N (L A B E L) Example 5A - Field pressures: node 10 - 70 paig, node 15 - 50 paig Blobal roughness and global demand factors Rlobal roughness and global demand factors PIPE L I N E R E S U L T S STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE STATUS CODE: XX - CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP FG - FIXED GRADE NODE PUMP	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY = .00004 S I M U L A T I O N D E S C R I P T I O N (L A B E L) Example 5A - Field pressures: node 10 - 70 paig, node 15 - 50 paig Elobal roughness and global demand factors global roughness and global demand factors FILD F E I N E R E S U L T S STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP LINE THE STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PUP PUMP PUMP PUMP PUMP PUMP PUMP PUMP	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY = .00004 SIMULATION DESCRIPTION (LABEL) SIMULATION DESCRIPTION (LABEL) COUGHNESS Example 5A - Field pressures: node 10 - 70 paig, node 15 - 50 paig global roughness and global demand factors global roughness and global demand factors PIPEL IN E RESULTS PIPEL IN E RESULTS PIPEL IN E RESULTS WOUGHNESS PIPEL IN E RESULTS PIPEL IN E RESULTS WOUGHNESS STATUS CODE: XX -CLOSED PIPE FG - FIXED GRADE NODE PUP PUMP LINE NOUGHNESS NUMBER 41 42 1974 220.72 100 5.40 9.87 2 100 104 105 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY = .00004 SIMUL A T I O N D E S C R I P T I O N (L A B E L) SIMUL A T I O N D E S C R I P T I O N (L A B E L) Example 5A - Field pressures: node 10 - 70 paig, node 15 - 50 paig global roughness and global demand factors global roughness programmed factors global roughness global roughness global roughness reconstructs global roughness g	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY = .0000¢ SIMULATION DESCRIPTION (LABEL) SIMULATION DESCRIPTION (LAB	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY = .00004 S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N (L A B E L) S I M U L A T I O N D E S C R I P T I O N O D E O D O D O D O D O D O D O D O D O	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY = .00004 SIMULATION DESCRIPTION (LABEL) SIMULATION DESCRIPTION (LABEL) Example 5A - Field pressures: node 10 - 70 paig, node 15 - 50 paig SIDURATES STATUS SIDURATES S	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY = .00004 SINULATION DESCRIPE 7 TRIALS WITH AN ACCURACY = .00004 SINULATION DESCRIPE 7 TRIALS WITH AN ACCURACY = .00004 Example 5A - Field pressures: node 10 - 70 paig, node 15 - 50 paig Blobal roughness and global demand factors RIUSTRICE CHOICED PROBLEM CONTRIBER	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY00004 SI M ULATION DESCRIPTION (LABEL) SIMULATION DESCRIPTION (LABEL) Example 5A - Field pressures: node 10 - 70 paig, node 15 - 50 paig global roughness and global demand factors global roughness and global demand factors RINGHERS NOT CODE: XX CLOSED PIPE FG - FIXED GRADE NODE THE LINE RESULTS STATUS CODE: XX CLOSED PIPE FG - FIXED GRADE NODE NOT CONTINUES NOT CONTINU	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY00004 SINULE TRIALS WITH AN ACCURACY00004 SINULE TRIALS WITH AN ACCURACY00004 SINULE TO N DE S C R I P T I O N (L A B E L) Example SA - Field pressures: node 10 - 70 paig, node 15 - 50 paig Example SA - Field pressures: node 10 - 70 paig, node 15 - 50 paig Example SA - Field pressures: node 10 - 70 paig, node 15 - 50 paig Example SA - Field pressures: node 10 - 70 paig, node 15 - 50 paig Example SA - Field pressures: node 10 - 70 paig, node 15 - 50 paig Example SA - Field pressures: node 10 - 70 paig, node 15 - 50 paig Example SA - Field pressures: node 10 - 70 paig, node 15 - 50 paig Example SA - Field pressures: node 10 - 70 paig, node 15 - 50 paig Example SA - Field pressures: node 10 - 70 paig, node 15 - 50 paig Example SA - Field pressures: node 10 - 70 paig, node 15 - 50 paig Example SA - Field pressures: node 10 - 70 paig, node 15 - 50 paig Example SA - Field pressures: node 10 - 70 paig, node 15 - 50 paig Example SA - Field pressures: node 10 - 70 paig, node 15 - 50 paig Example SA - Field pressures: node 10 - 70 paig, node 15 - 70 paig, node 15 - 70 paig, node 16 paig, node	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY00004 SI T POUGHNESS 100 SI M UL A T 10 N DE S C R I P T 10 N (L A B E L) Example 5A - Field pressures: node 10 - 70 psig, node 15 - 50 psig global roughness and global demand factors global roughness and global demand factors RIOGHNESS 100 FLOWER RESULTS FLOWENTE RES	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY00004. The control of the control o	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH ANY ACCUTACY = .00004. SI T PROUGHNESS 1000 SI M U L A T 10 N D E S C R I P T 10 N (L A B E L) Example 5A - Field pressures: node 10 - 70 psig, node 15 - 50 psig global roughness and global demand factors global roughness and global demand factors RIODAL TOUGHNESS 10 T ROUGHNESS 10 T	THE RESULTS ARE ORTAINED AFTER 7 TRIALS WITH AN ACCURACY00004 SI NOTHERS 100 Example 5A - Field pressures: node 10 - 70 psig. node 15 - 50 psig. Example 5A - Field pressures: node 10 - 70 psig. node 15 - 50 psig. Example 5A - Field pressures: node 10 - 70 psig. node 15 - 50 psig. Example 5A - Field pressures: node 10 - 70 psig. node 15 - 50 psig. Example 5A - Field pressures: node 10 - 70 psig. node 15 - 50 psig. Example 5A - Field pressures: node 10 - 70 psig. node 15 - 50 psig. Example 5A - Field pressures: node 10 - 70 psig. node 15 - 50 psig. Example 5A - Field pressures: node 10 - 70 psig. node 15 - 50 psig. Example 5A - Field pressures: node 10 - 70 psig. node 15 - 50 psig. Example 5A - Field pressures: node 10 - 70 psig. node 15 - 50 psig. Example 5A - Field pressures: node 10 - 70 psig. node 15 - 50 psig. Example 5A - Field pressures: node 10 - 70 psig. node 15 - 7 ROUGHNESS 100 Example 5A - Field pressures: node 10 - 70 psig. node 15 - 7 ROUGHNESS 100 Example 5A - Field pressures: node 10 - 70 psig. node 15 - 7 ROUGHNESS 100 Example 7A - ROU	THE RESULTS ARE ORTAINED AFTER 7 TRIALS WITH AM ACCUMANCY	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY00004 S IN UL A T 10 N D E S C R I P T 10 N (L A B E L) Example 5A - Field pressures: node 10 - 70 psig, node 15 - 50 psig global roughness and global demand factors Transcriptor of the result of	THE RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCURACY00004 SINUL A T I O N D E S C R I P T I O N (L A B E L) Example SA - Field pressures: node 10 - 70 psis, node 15 - 50 psis Example SA - Field pressures: node 10 - 70 psis, node 15 - 50 psis Example SA - Field pressures: node 10 - 70 psis, node 15 - 50 psis Example SA - Field pressures: node 10 - 70 psis, node 15 - 50 psis Example SA - Field pressures: node 10 - 70 psis, node 15 - 50 psis Example SA - Field pressures: node 10 - 70 psis, node 15 - 50 psis Example SA - Field pressures: node 10 - 70 psis, node 15 - 50 psis Example SA - Field pressures: node 10 - 70 psis, node 15 - 50 psis Example SA - Field pressures: node 10 - 70 psis, node 15 - 50 psis Example SA - Field pressures: node 10 - 70 psis, node 15 - 50 psis Example SA - Field pressures: node 10 - 70 psis, node 15 - 50 psis Example SA - Field pressures: node 10 - 70 psis, node 15 - 50 psis Example SA - Field pressures: node 10 - 70 psis, node 15 - 50 psis Example SA - Field pressures: node 10 - 70 psis, node 15	THE RESULTS ARE DETAINED AFTER 7 TRIALS WITH AN ACCUDACY00004 SINULAR TION DESCRIPTION (LABEL) SINULAR TION DESCRIPTION (LABEL) SINULAR TION DESCRIPTION (LABEL) Example 5A - Field pressures: node 10 - 70 paig, node 15 - 50 paig global roughness and global demand factors global roughness and global demand factors From the calculation of calibration parameters: RANTUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINES STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINES STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINES STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINES STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE: XX - CLOSED PIPE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE FOR TIXED GAADE NODE PUP - PROPINESS STATUS CODE FOR TIXED GAADE NODE PUP -	## RESULTS ARE OBTAINED AFTER 7 TRIALS WITH AN ACCUDACY	THE RESULTS ARE DETAINED AFTER 7 TRIALS WITH AN ACCUDACY00004 S 1 H ULA TION DESCRIPTION (LABEL) S 1 HOUGHRESS 100 S 1 H ULA TION DESCRIPTION (LABEL) Example 5A - Field pressures: node 10 - 70 paig, node 15 - 50 paig global roughness and global demand factors global roughness and global demand factors R 1 PELINE R ESULTS FOURTHEESS 100 FOURTHESS 100

PRESCUE PRESCUE (1081)

PRESSURE HEAD (ft) 177.62 165.20 185.20 185.20 189.37 189.37 169.37

ELEVATION (FL) | 100 | 90.00 | 110.00 | 95.00 | 110.00 | 95.00 | 110.00 | 110.00 | 110.00 | 110.00 | 112.00 | 112.00 | 112.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 113.00 | 1

HYDRAULIC GRADE GRADE 100.98 261.15 260.20 2

THERE IS A PUMP IN LINE 1 DESCRIBED BY THE FOLLOWING DATA: HEAD (mgd) (ft) 270.00	195.00 10.00 10.00 THERE IS A PUMP IN LINE 7 DESCRIBED BY THE FOLLOWING DATA: HEAD (ft) (mgd) 255.00 8.00 225.00 8.00 195.00 10.00	JUNCTION NODE DATA JUNCTION JUNCTION EXTERNAL JUNCTION NUMBER TITLE (med) (ft)	110.00 2 110.00 2 105.00 3 105.00 5 100.00 6 0 100.00 6	107.00 18 21 22 115.00 17 18 19 19 115.00 11 18 19 19 115.00 11 18 19 115.00 10 14 15 24 115.00 25 26 27 115.00 28 115.00 28	OUTPUT OF TION DATA OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT HAXIMUM AND MINIMUM PRESSURES	SYSTEM CONFIGURATION NUMBER OF PIPES NUMBER OF PIPES NUMBER OF PIXED GRADE NODES NUMBER OF PIXED GRADE NODES NUMBER OF PRESSURE ZONES NUMBER OF PRESSURE ZONES
INPUT DATA FILENMAE EX5B.DAT TABULATED OUTPUT FILENMAE EX5B.OUT POSTPROCESSOR RESULTS FILENMAE EX5B.RES SUM MARY OF ORIGINAL DATA	UNITS SPECIFIED FLOWRATE = million gallons/day HEAD HGL) = feet PRESSURE = paig	CONSTRAINT DATA CONSTRAINT PARAMETER NUMBER SET NUMBER TYPE NUMBER 273.46 1 - PUMP SPEED 2 294.62	FIRE LINE DATA STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE CV -CHECK VALVE RV -REGULATING VALVE CV -CHECK VALVE RV -REGULATING VALVE PIPE NODE NOS. LEWITH DIAMETER ROUGHNESS MINOR LOSS FGN-HGL (ft)	U 0 1 2 800.0 18.0 98.00 2.0 18.0 18.00 18	FG 6 0 1 3700.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0	FG 8 0 41 1750.0 6.0 91.00 1.00 1.00 1.00 1.00 1.00 1.00 1

Table 5B Tabulated Results - Example 5B

CALCULATED VALUE				
PARAMETER TYPE	SETTING	SPEED	SETTING	CHITING
AME TER	FGN S	PUMP	FGN	ECN O
AR	1	1	1	1
۵	3	-	m	C
. ON	4	7	12	00
PIPE				,

PIPE NO. PARAPILEM IPE 7 1 - POLMP SPEED 1 2 - POLMP SPEED 23 3 - FGN SETTING	CHCCCC ALCCC	239.48	1.34	239.48	239.48	
	AME LEK LIVE	FGN SETTING	PUMP SPEED	FGN SETTING	FGN SETTING	
	XX	1	1	1	E	
	2	0	-	(1)	9	

60 paig (nodpuMP LINE R LINE R LINE (FL's) (FL's)	SIMULATION RESULTS SIMULATION RESULTS	ATION RESULTS	N R E S U L T S	**************************************	>		.00016		23 23	1 - PUMP SPEED 3 - FGN SETTING 3 - FGN SETTING		1.34	
Column C	SULTS ARE	OBTAINED AFILE	TWI I						JUNCT		ы	ULTS	
the calculation of operating parameters: 1 .00 1 .00 1 .00 2 .00 1 .00 2 .00 1 .00 2 .00 1 .00 2 .00 1 .00 2 .00 3 .00 3 .00 3 .00 5 .00 5 .00 6 .00 6 .00 6 .00 6 .00 7 .00 8	ULATI		RIPT	10 N CI	ABEL	5			JUNCTION	JUNCTION	EXTERNAL DEMAND (mgd)	HYDRAULIC GRADE (ft)	ELE
D LOSS VELO (ft./ft) 15 10 10 10 10 10 10 10 10 10 10 10 10 10	le 5B								1		00.	307.90	
DE PU -PUMP LINE 15 12 100 150 150 150 150 150 150 150 150 150	trates the	calculation of	f operati	ng parame	rers:				2		1.00	294.62	-
R E S U L T S			Control Control	00	in trode	2). 60	paig (noc	le 15)	3		1.00	269.57	
R E S U L T S X -CLOSED PIPE FG -FIXED GRADE NODE FU -PUMP LINE 110 100 100 100 100 100 100 100 100 10	omp speed (pipe 1 and 71	bressu.	es: on ha	97				,		3.00	278.64	-
R E S U L T S									. 5		1.00	333.03	-
N									9		3.50	269.04	1
R E S U L T S									1		3.00	266.48	
R E S U L T S											1.50	257.65	-
X -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE 10 .00 TO CHECK VALVE RV -REGULATING VALVE 11 .50 DE NOS. FLOWRATE HEAD PUMP MINOR LINE HL/ 13 .00 10 .00 11 .00 12 .00 13 .00 14 .00 15 .00 16 .00 17 .00 18 .00	ELINE		S								00.	274.51	-
XX - CLOSED PIPE FO - FIRE CALLS GANDE AND FOR THE CALLS F				and dans	auon au	pit - I	DUMP LINE		10		00.	278.73	-
CV - CHECK VALVE RV FREGULATION FALVE HL/ 13 .00 NODE NOS. FLOWRATE HRAD PUMP MINOR LINE HL/ 13 .00 **I # CO		KX -CLOSED PIP.		FIXED GRA	O VALVE				111		. 50	269.11	1
NODE NOS. FLOWRATE HEAD PUMP MINOR LINE HL/ 13 .00		CV - CHECK VALV.	RV	-REGULATIN	C VALVE				12		. 50	268.41	-
NODE NOS. FLOWRATE LOSS HEAD LOSS VELO. 1000 14 .00 .25 .25			-		Directo	MINOR	LINE	HL/	13		00.	289.53	-
R #1 #2 (mgd) (ft) (ft) (ft/s) (ft/ft) 15 .25 .25 .25 .25 .25 .25 .25 .25 .25 .2			FLOWRATE		FORE	1088	VELO	1000	14		00.	281.87	-
(mgd) (ft) .25 .25 .00 6.17 9.94 17 .00				LOSS	HEAD	16+1	(ft/s)	(ft/ft)	15		.25	273.46	-
00. 17 9.94 17 0.00 17 17 0.00			(mgd)	(rt)	(11)			1 1 1 1 1 1	16		.25	272.06	-
			1 0	40 07	77 77	00.	6.17	96.6	17		00.	289.53	

		1000 (ft/ft)	9.94 16.60 5.01 42.98 2.45 13.95
	PU -PUMP LINE	LINE VELO. (ft/s)	6.17 7.61 3.68 8.43 2.06 6.12
		MINOR LOSS (ft)	000000000000000000000000000000000000000
	FG -FIXED GRADE NODE RV -REGULATING VALVE	PUMP HEAD (ft)	227.77
	TIXED GRA	HEAD LOSS (ft)	19.87 13.28 25.05 30.09 9.07 54.40
	FG -F	FLOWRATE	8.69 8.69 3.32 2.97 1.04
1 7 0	-CLOSED PIPE -CHECK VALVE	H	
E	CLOSE	NOS.	E M O M N H
N E	C X	NODE #1	24 3 3 5 5 0
PIPELINE RESULIS	STATUS CODE:	ER	1-FGPU 2 3 4-FG 5
p I p	STATU	PIPE	

Ca Ca		4.2		LOSS	HEAD	2000		1 437 431	
MBEK	7	2	(mgd)	(ff)	(ft)	(ft)	(ft/3)	(11/11)	
			1 4 1	1000	1 6	00	6.17	96.6	
1-FGPU	0	1	8.69	19.61	000		7 61	16.60	
2	1	2	8.69	13.28	00.			5 01	1
	, ,	•	3.32	25.05	00.		00.0		
	7	,	2 07	30 09	00.		8.43	65.39	2
PEG-PG	m	0 *1	16.7	0.00	00		2.06	2.45	
5	9	3	1.04	9.01			6 13	13.95	
	5	3	4.85	54.40	00.		27.0	65 50	
0	0 0		13 25	137.56	350.59		14.68	00.00	
7-FGPU	0	7	13.57	0 60	00		-2.29	-3.84	
8	9	9	10.	000			1.10	1.00	
o		7	. 39	3.09	00.		2 2 6	6 12	
	, (1	2.82	28.14	00.		3.00	21.0	
10	3		6.3	2.56	00.		1.04	. 63	
11	9	,		20 00	00		6.27	32.84	
12-FG	9	0 *1	1.41	27.30			4 7 4	22.07	
1.3	ď	4	3.42	63.88	00.			67 0	
) w	13	3.98	43.50	00.		20.6	10.0	
7 6	0	2 1	1 21	-20 49	00.		-3.45	-8.20	
15	9	61	17.	8 82	00		2.10	3.27	
16	7	20			00		3.06	5.13	
17	2	10	1.56	12.63			1 05	2 22	
	10	o	66.	4.22	00.				
97	0 0		5.7	9.62	00.		2.51	10.0	
19	10	11		70	00.		. 51	19.	
20	11	12		6 10	00		1.93	3.70	
21	6	12	2	01.0	000		2.46	5.81	
22	6	8	96.	10.00			4.06	8.62	
23-FG	8	0 *1	2.06	10.38	000		1. 1.6	10.28	
	13	æ	2.26	31.88	00.		9		
9.7	22		50	7.66	00.		2.25		
25	13	7.	30	0 81	00		1.97	5.61	
26	14	16	67.	10.0			1.97	5.61	
27	16	15	. 25	14.9	00.		00	00	
000	13	17	00.	00.	00.				
0.7									

MAXIMUM AND MINIMUM VALUES location (node or pipe) and value

PRESSURE (PA1) (PA

20NCT10N ELEVAT10N (ft) 1 110.00 95.00 110.00 103.00 103.00 112.00 112.00 113.00 113.00 113.00

MAXIMUM	PRESSURES	1	MINIMUM	PRESSURES
5	100.98		15	60.00
1	94.42		16	61.56
2	80.00		11	86.78
13	77.80		8	67.02
	75.65		12	67.78
17	75.63		14	70.14

SUMMARY OF INFLOWS AND OUTFLOWS (+) INELOWS INTO THE SYSTEM FROM FIXED GRADE NODES (-) QUIFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

FLOWRATE (mgd)		8.69	-2.97	13.25	-1.61	-2.06	21.94
	-						u
PIPE		1	4	7	12	23	TNFLOW
							MOTER CVCTEM INFLOW
							Tal

15.50 NET SYSTEM INFLOW = NET SYSTEM OUTFLOW = NET SYSTEM DEMAND =

Tabulated Results - Example 5B Table 5B

SUMMARY OF INFLOWS AND OUTFLOWS	(+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES	PIPE FLOWRATE NUMBER (mgd)	1 11.45 4 9.18 12 1.30 23 1.57	NET SYSTEM INFLOW = 24.05 NET SYSTEM OUTFLOW = .00 NET SYSTEM DEMAND = 24.06	TANK STATUS REPORT (time = 6.0000 hours)	TANK PIPE NET WATER TANK TANK TANK PROJECTE NUMBER FLOW ELEVATION DEPTH VOLUME VOLUME STATUS DEPTH (#) (#) (#)	1-1 1 6 6.6 DRAINING 17.77 37.854, 59.0 DRAINING 12.57 2-1 17.71 37.854, 59.0 DRAINING 12.57 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5	TANK TYPE: 1 - CONSTANT DIAMETER 2 - DEPTH/VOLU	FLOW METER REPORT (time = 6.0000 hours)	PIPE NODE METERED FLOW NUMBER NUMBERS FLOW (gal)	200	m 0 0	DATA CHANGES FOR NEXT SIMULATION	→
	z			00000		-PUMP LINE -STORAGE TANK	LINE HL/ VELO. 1000 (ft/s) (ft/ft)	8.12 16.54 10.18 33.23 5.09 9.92 4030					HEAD PRESSURE (ft) (psi)	138.46 60.00 77.98 33.79 92.79 40.21
	IMULATIO		RESULTS				PUMP MINOR HEAD LOSS (ft) (ft)	247.95 .00 209.28 .00 .00 .00					JUNCTION P ELEVATION (ft)	115.00 135.00 130.00
	NEXTS		N THION PESULTS	6.0000 HOURS 3 TRIALS WITH		FG -FIXED GRADE NODE RV -REGULATING VALVE	OWRATE HEAD LOSS (mgd) (ft)	11.45 33.07 9.18 69.78 4.03 54.55	LATIONS	CALCULATED VALUE	CLOSED :	SULTS	GRADE (ft)	253.46 212.98 222.79
	M.	HANGES GDF = 1.580	SIMULA		2 H 11 D 2 H 2 D 2 D 2 D 2 D 2 D 2 D 2 D 2 D 2		H	11 *1	CALCUI			NODERE	DEN (mg	d79
+	HANGE	AND C		TIME FROM INITIATION OF EPS = THE RESULIS ARE OBTAINED AFTER	j. 2	:	NODE NOS.	11200	ETER	PARAMETER TYPE 1 - PUMP SPEED	FOLLOWING ADDITIONAL PIPES ARE		65	Lakeview Rd. East Mall Central Hos.
	DATA C	DEMAND TYPE		TIME FROM	9	STATUS CODE:	PIPE	1-FGPU 7-FGPU 10 20	PARAM	PIPE NO.	FOLLOWING 28	Z O I E	JUNCTION	11 15 16-2

Tabulated Results - Example 5D (6 hours) Table 5D