

MCAS
NEW RIVER

PSA

POWER SYSTEM ANALYSIS

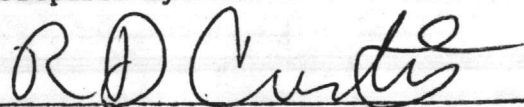
Atlantic Division
Naval Facilities Engineering Command

DISTRIBUTION SYSTEM ANALYSIS
MCAS H NEW RIVER
CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

JULY 1982

UTILITIES, ENERGY AND ENVIRONMENTAL DIVISION
ATLANTIC DIVISION, NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA

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ENCLOSURE (2)



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SECTION I

Purpose

Utilities Division of the Atlantic Division, Naval Facilities Engineering Command, is conducting periodic in-depth analysis on all distribution systems to insure that the distribution systems provide a quantity and quality of service necessary to safely, reliably and efficiently meet all mission requirements.

Objective of the analysis is three fold.

First, it is used to develop a long range plan for system expansion to meet load growth and military construction objectives.

Second, it is used to optimize utilization of capital within DOD funding constraints.

Third, it is used to develop a data base for future system analysis.



SECTION II

Procedure

Procedure involved compiling information and data on file and from field investigation in order to determine existing circuit configurations and existing load data. Drawings and diagrams of the electrical system were prepared.

Load flow and fault current analysis were conducted as necessary for the existing system and loads. Future loading was projected based on military construction objectives and the system changes required to serve additional loading were determined.

It is requested that the data and information in the report be continually updated by the activity and that a copy of all changes be provided to LANTNAVFACENCOM, Code 11.



SECTION III

Summary

Primary Source: Carolina Power and Light Company

Available Short Circuit: Three phase = 6,798 amps
Line to ground = 7,012 amps

Supply Voltage: 12.47 KV

Supply Capacity: 15,000 KVA, CP&L main 115 KV - 12.47 KV substation

Voltage Regulation: 3-Phase 750 KVA, 12.47 KV regulator

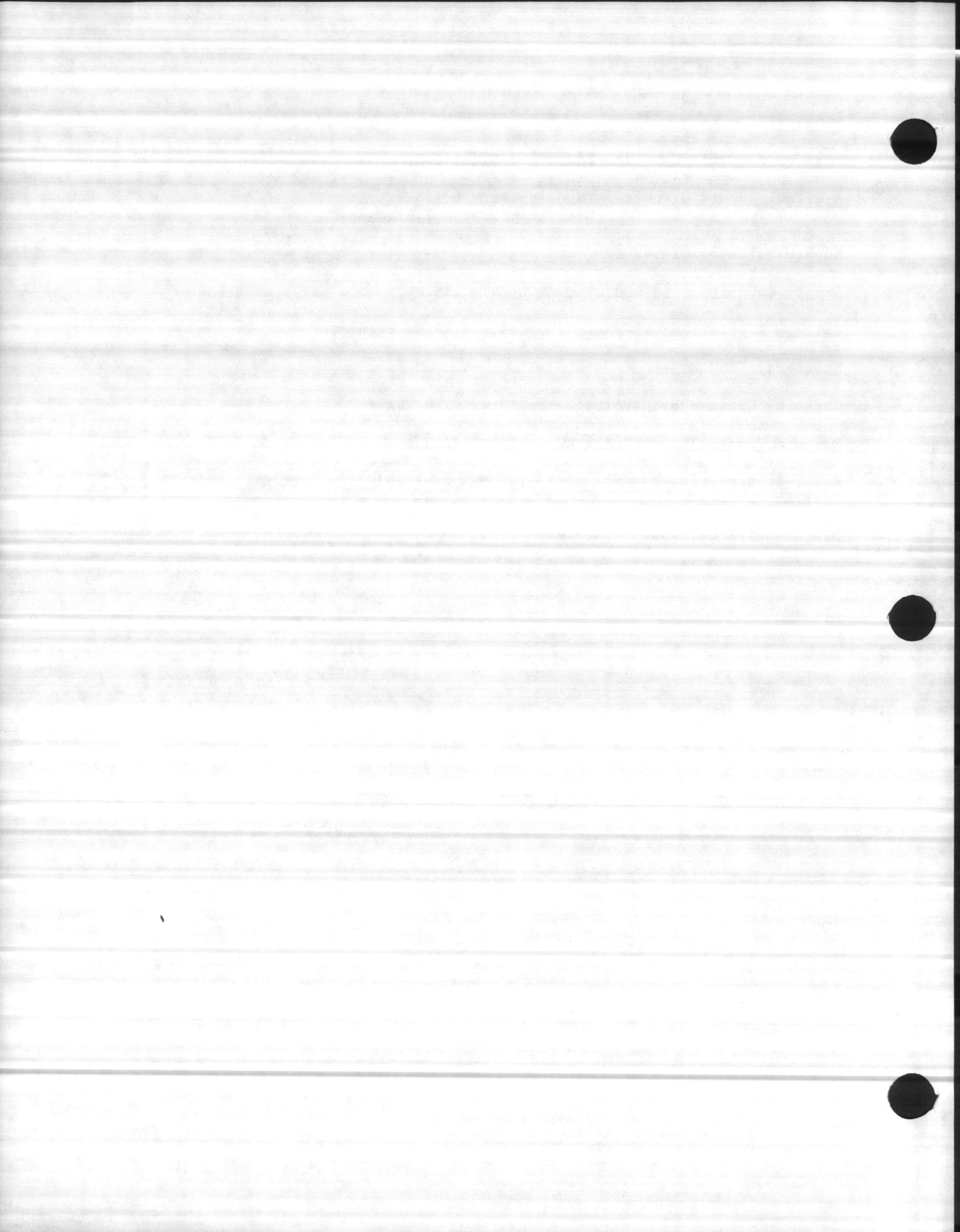
Frequency: 60 Hz

Capacity Limited by: Voltage regulator (750 KVA)

Maximum demand 1981: 7,855 KW (estimated)

Fault Interrupting Requirement: 147 MVA available fault at main switching station

Distribution Voltage: 12.47 KV



SECTION IV

Existing System Description

The MCAS H NEW RIVER regulating and switching station receives electric service from the Carolina Power and Light Company at 12,470/7,200 volts, at a CP&L 15,000 KVA, 115,000 - 12,470 volt transformer station. The CP&L substation is fed by a 115 KV three-phase 60 HZ aerial line. The available fault at the CP&L substation is 147 MVA. The Government receives the power from the CP&L substation at the main circuit breaker, which is a vacuum breaker rated at 1200 amps. The power is then transmitted to the MCAS H NEW RIVER regulating and switching station via two parallel 750 MCM circuits. The Bus serves two regulators, one 750 KVA regulator for MCAS H NEW RIVER and one 500 KVA for Camp Geiger. A separate single phase line runs from the CP&L substation to the ammunition dump.

System Switching Capabilities

<u>Feeder</u>	<u>Circuit Capacity</u>	<u>Breaker Interrupting Capacity</u>
New River No. 1	11.4 MVA	483 MVA
New River No. 2	11.4 MVA	483 MVA
New River Loop	11.4 MVA	222 MVA

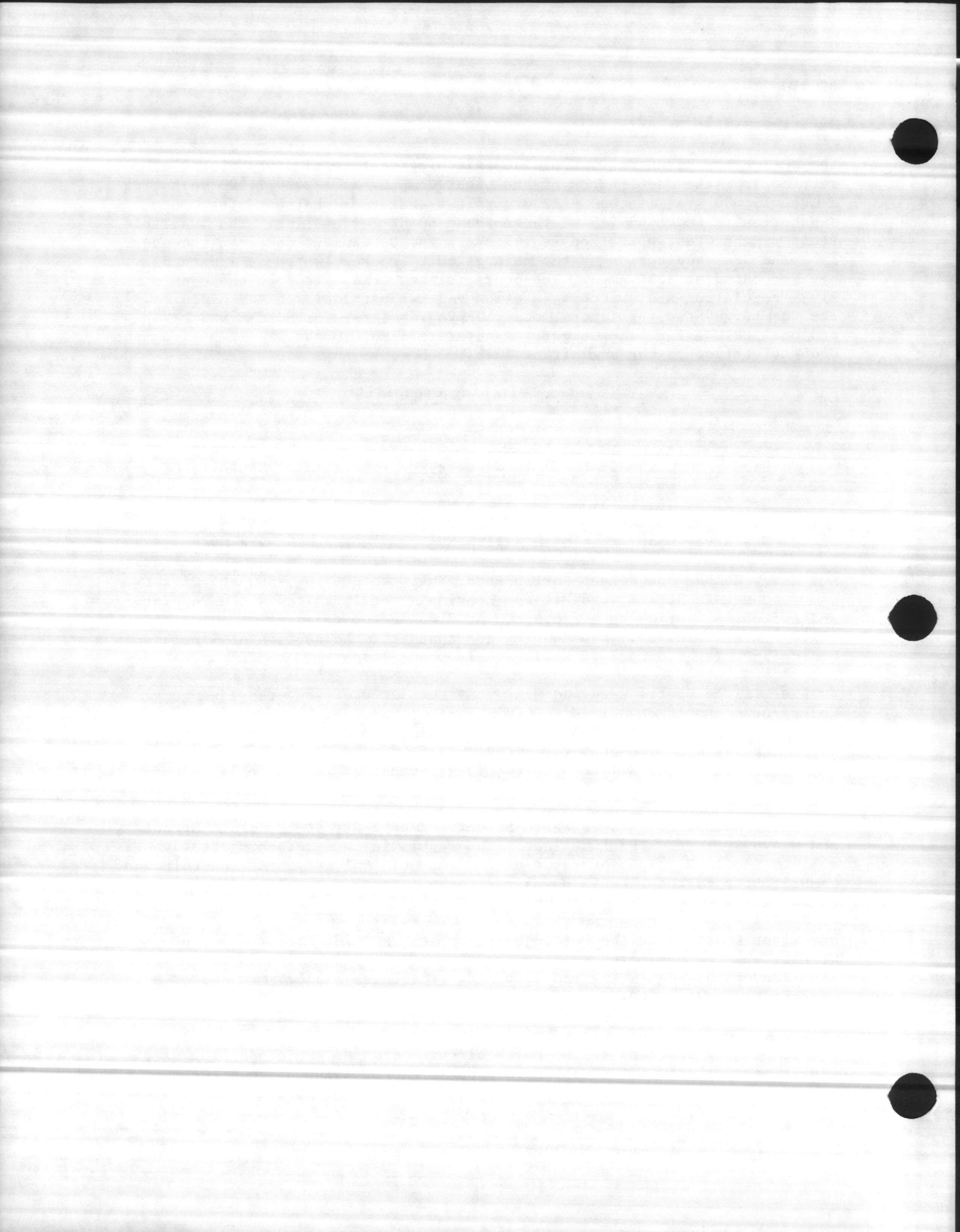
New River Number One serves Curtis Road, Enlisted Housing, BOQ and Officers Club, Longstaff Street, and Officer Housing. The line leaves the regulating and switching station as a 336.4 MCM ASCR conductor rated at 540 amps (11,663 KVA). The Enlisted Housing is tapped off the section of line and is basically a large number of small single phase loads.

Just after the Curtis Road and McAvoy Street intersection, the line goes underground and is downsized to 4/0 XLP cable rated at 250 amps (5,400 KVA). At the tap to the BOQ and Officers Club the cable is downsized to No. 2 XLP rated at 160 amps (3,456 KVA). At Officer Housing the line returns to an overhead line with the large number of small single phase loads.

New River Number Two serves White Street, Cambell Street, Bancroft Street and McAvoy Street. The line leaves the regulating and switching station as a 336.4 mcm ASCR conductor rated at 540 amps (11,663 KVA). At Bancroft and Cambell Streets the line is downsized to No. 4 copper rated at 170 amps (3,672 KVA).

New River Loop serves the Curtis Road complex, Schmidt Street, part of White Street, and the perimeter road to the airfield lighting transformer. The line leaves the regulating and switching station as a 336.4 mcm ASCR conductor rated at 540 amps (11,663 KVA). A tap at Schmidt Street and the perimeter road is No. 4 copper rated at 170 amps (3,672 KVA).

Sectionalizing switches on the three circuits provide the capability of isolating sections of the system for repair and/or maintenance as well as providing alternate methods of serving portions of the distribution system.



The last circuit is the water well circuit along Curtis Road. It cannot be switched to any of the other circuits.

At present there is no standby or alternate power source for MCAS H NEW RIVER. There are, however, emergency generators provided at critical loads.



SECTION V

Load Requirements

Existing peak load for 1981 was estimated to be 7855 KW. The future load requirements were determined by considering the increase electrical loads imposed by the following projects:

Projects Currently Under Construction

- P-413 Maint Hangar Addition
- P-206 UEPH
- N-518 Exchange and Community Complex
- N-908 EM Club

Estimated Load 700 KW

FY-83

- P-354 Ordnance Magazine Area

Estimated Load 15 KW

FY-84

- P-327 Radar Air Traffic Control Facility
- P-358 Hazardous/Flammable Storehouse
- P-282 Addition to Dining Facility

Estimated Load 318 KW

FY-85

- P-451 Maint Hangar Modernization
- P-404 Aircraft Maintenance Hangar
- P-211 Ground Support Equipment Facility
- P-357 General Warehouse
- P-133 Gymnasium

Estimated Load 820 KW

FY-86

- P-410 UEPH
- P-449 Commissary

Estimated Load 312 KW

FY-87

- P-433 Corrosion Control Hangar
- P-185 General Purpose Warehouse
- P-174 Swimming Pool

Estimated Load 217 KW

FY-88

- P-406 General Warehouse
- P-450 Library/Post Office/Thrift Shop

Estimated Load 80 KW

Estimated Total Future Planned Load

2462 KW



SECTION VI

General Discussion and Recommendations

The existing electrical system is in very good condition with no major operational problems. The system has adequate capacity to supply the existing load and future projected loads through the FY-88 MILCON project year.

The Main Breaker IAC 77 overcurrent relays have limited the ability to achieve adequate coordination of the distribution system. Replacing the IAC 77 with an IAC 53 type will result in increased flexibility in achieving relay coordination.

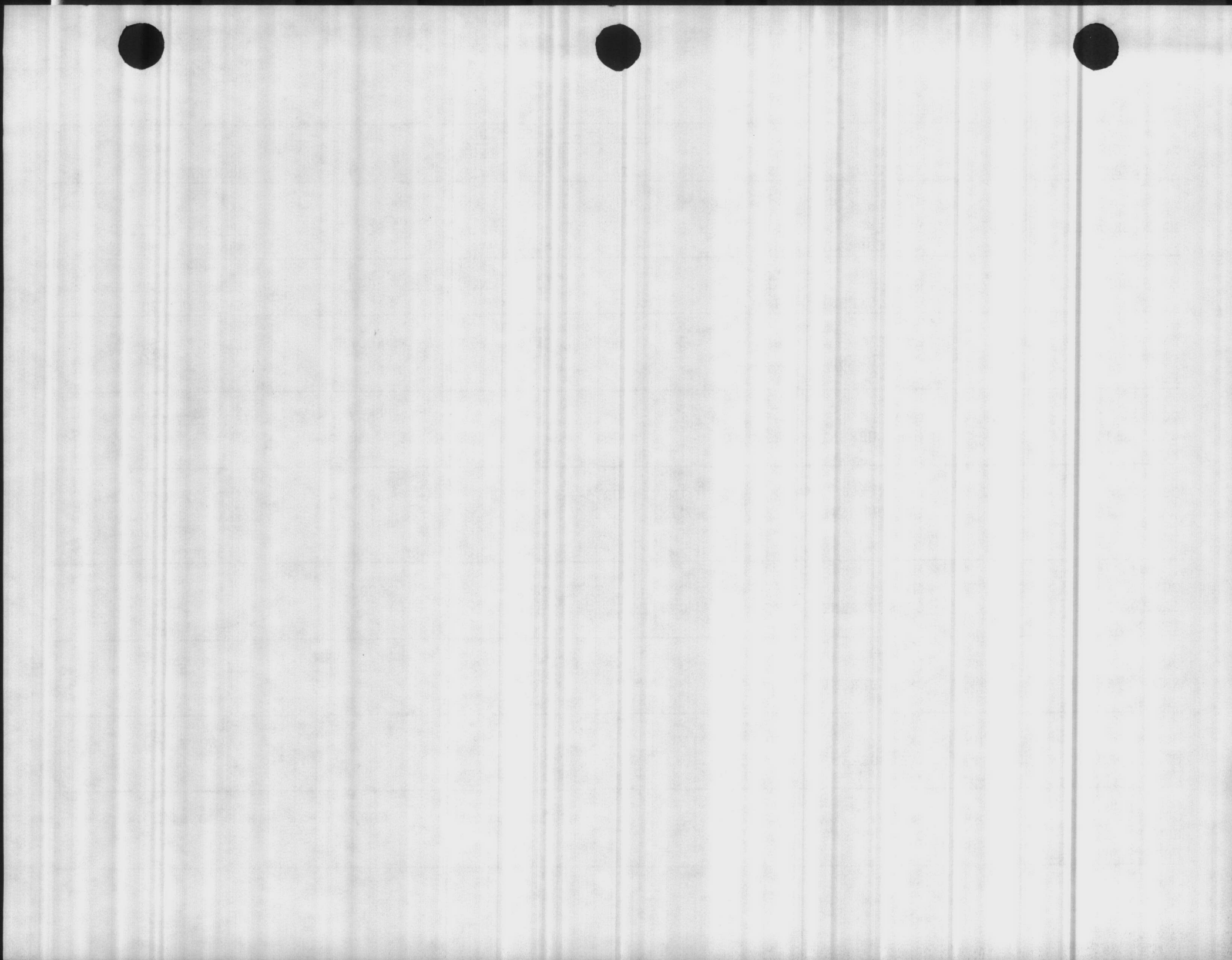
A number of the existing line and tap fuses cannot be coordinated with their main breaker or upstream reclosures due to the available fault current. This will result in the upstream devices clearing the faults before the fuses can interrupt the fault. In order to improve selectivity with downstream fuses the instantaneous elements of the feeder breakers must be locked out (blocked) on the first and subsequent reclosures. This will require modification to the circuit breaker time overcurrent relay and G.E. Type ACR reclosure control circuits.

The following relay settings are recommended for the electrical substation serving MCAS H NEW RIVER and Camp Geiger.



RELAY SETTINGS

LOCATION (SUBSTATION)	CIRCUIT VOLTAGE	RELAY FUNCTION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS			RATIO CT (PT)	REMARKS
					TAP	TIME DIAL	INST. TRIP		
MAIN BREAKER	12.47KV	PHASE OVERCURRENT	GE IAC 77	3	5	9	N.A.	800/5	1. INTERIM SETTING 2. SEE NOTE (1)
MAIN BREAKER	12.47KV	GND OVERCURRENT	GE IAC 77	1	4	10	N.A.	800/5	1. INTERIM SETTING 2. SEE NOTE (2)
OCB #1 CAMP GEIGER FDR	12.47KV	PHASE OVERCURRENT	GE IAC 51	3	1.5	1	20	400/5	SEE NOTE (3)
OCB #1 CAMP GEIGER FDR	12.47KV	GND OVERCURRENT	GE IAC 51	1	1.5	1	6	400/5	SEE NOTE (3)
OCB #2 CAMP GEIGER ITR FOR	12.47KV	PHASE OVERCURRENT	WH-PRM REC	INST. CURVE #3, TAP 3 TIME DELAY CURVE #2				600/5	TRIPS TO LOCKOUT-4 RESET - 2 SEC. RECLOSURE TIME - IT, 2, 15 SEC.
OCB #2 CAMP GEIGER ITR FOR	12.47KV	GND OVERCURRENT	WH-PRM REC	GND MIN. TRIP AMPS - 1.4 GND INST. TRIP - 4				600/5	
OCB #3 NEW RIVER FDR #1	12.47KV	PHASE OVERCURRENT	GE IAC 53	3	5	2	20	400/5	SEE NOTE (3)
OCB #3 NEW RIVER FDR #1	12.47KV	GND OVERCURRENT	GE IAC 53	1	1.5	1	25	400/5	SEE NOTE (3)
OCB #4 NEW RIVER FDR #2	12.47KV	PHASE OVERCURRENT	GE IAC 53	3	4	1.5	20	400/5	SEE NOTE (3)



RELAY SETTINGS

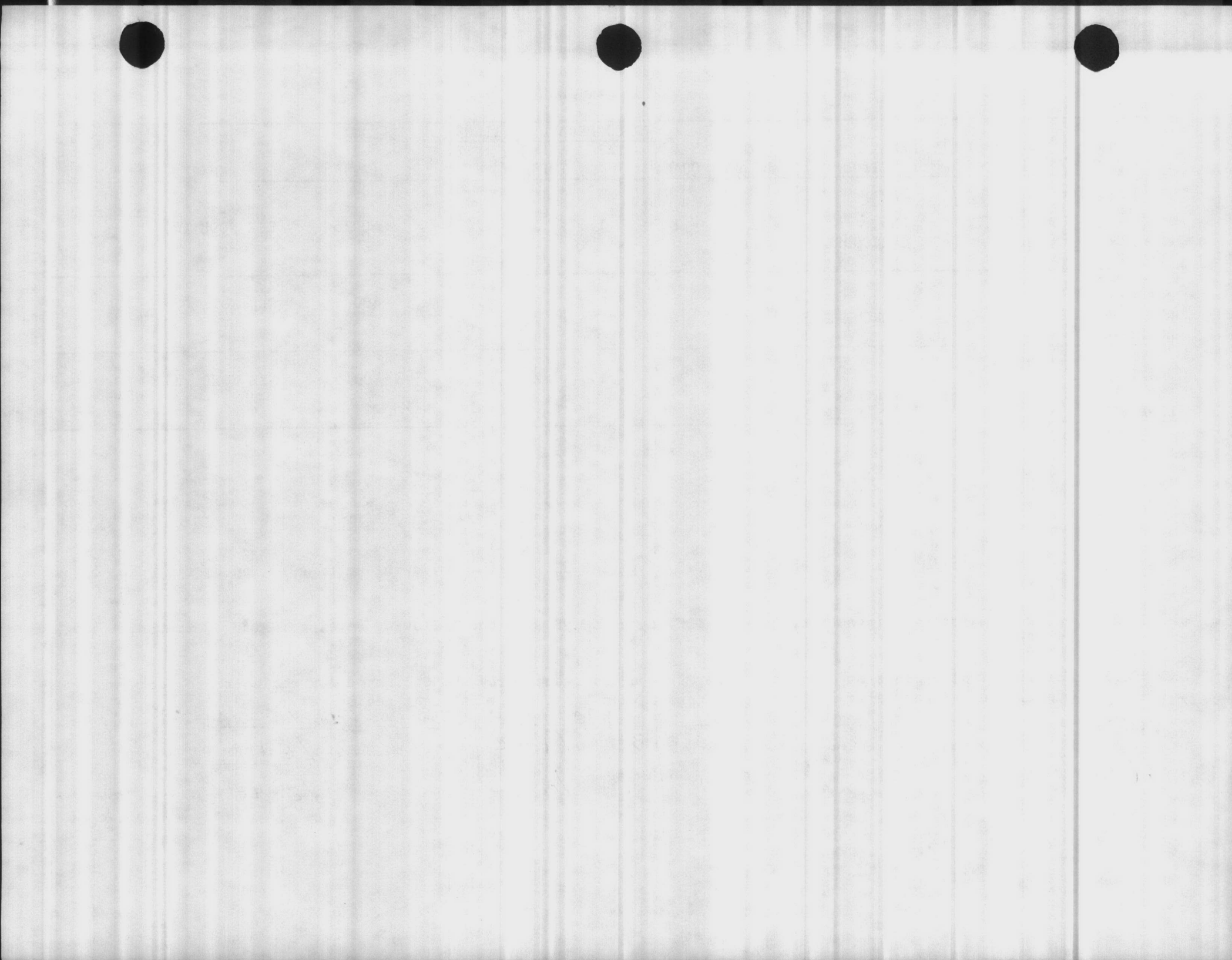
LOCATION (SUBSTATION)	CIRCUIT VOLTAGE	RELAY FUNCTION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS			RATIO CT (PT)	REMARKS
					TAP	TIME DIAL	INST. TRIP		
2OCB #4 NEW RIVER FDR #2	12.47KV	GND OVERCURRENT	GE IAC 53	1	1.5	2	20	400/5	SEE NOTE (3)
OCB #5 NEW RIVER LOOP FDR	12.47KV	PHASE OVERCURRENT	GE IAC 77	3	4	2	20	400/5	SEE NOTE (3)
OCB #5 NEW RIVER LOOP FDR	12.47KV	GND OVERCURRENT	GE IAC 77	1	1.5	2	12.5	400/5	SEE NOTE (3)

NOTE (1) Recommend existing relays be changed to G.E. type IAC 53 with the following settings: Tap 8, time dial 5, C.T. ratio 400/5.

NOTE (2) Recommend existing relays be changes to G.E. type IAC 53 with the following settings: Tap 3, time dial 4.5, C.T. ratio 400/5.

NOTE (3) Modify control circuit of circuit breaker time overcurrent relay and G.E. type ACR reclosure to lock out (block) overcurrent relay instantaneous trip on the first and subsequent reclosures.

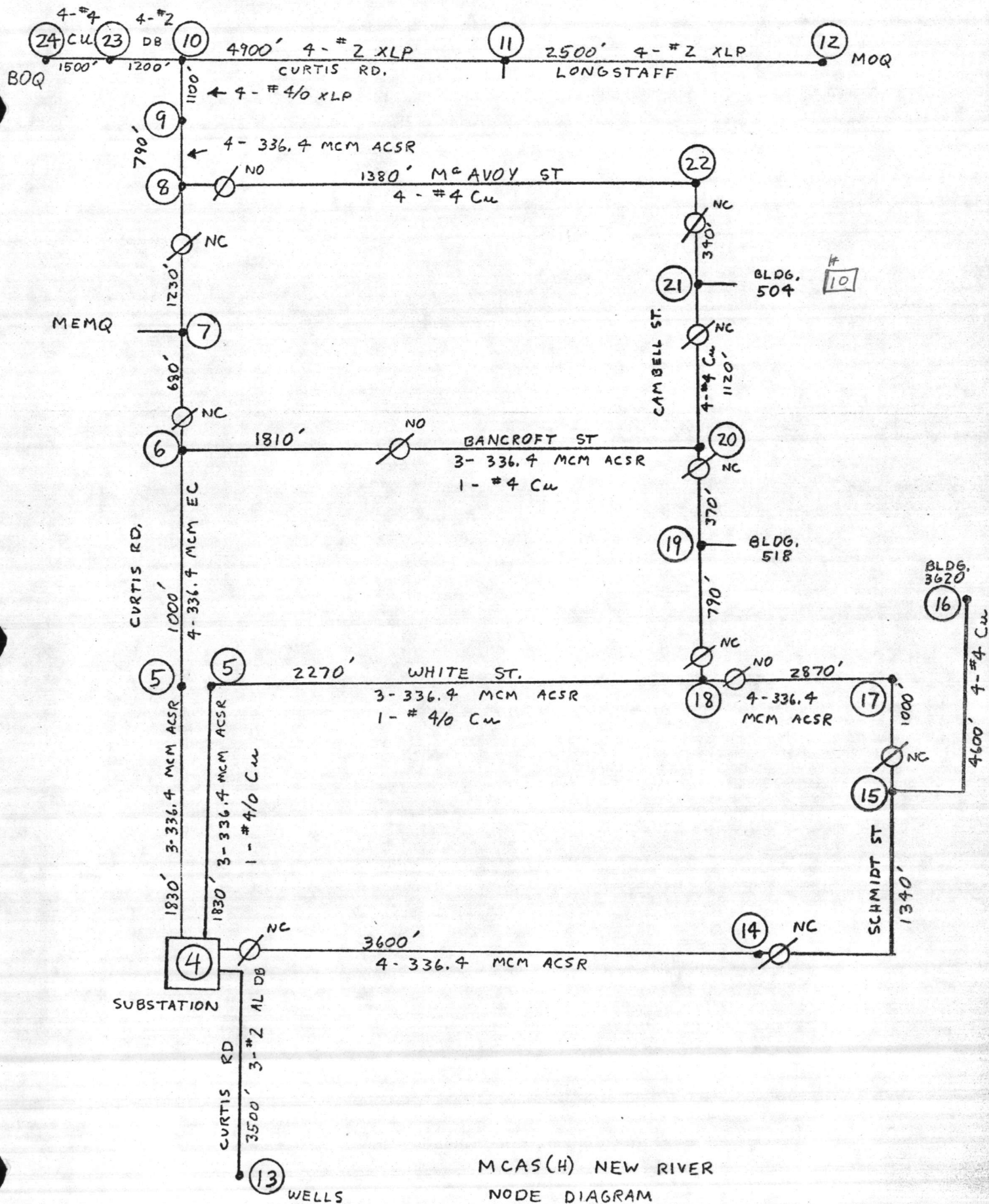
					TAP / Reclos	Time Dial	Inst / Reclos	CT
VCB #10	12.47	PHASE OVERCURRENT	^{WESTING HOUSE} CO-11	3	1-12		6-144	
VCB #10	12.47	GND OVERCURRENT	CO-11	1	0.5-2.5		2-48	



Section VII

One-Line Diagram of Existing System





MCAS(H) NEW RIVER
NODE DIAGRAM

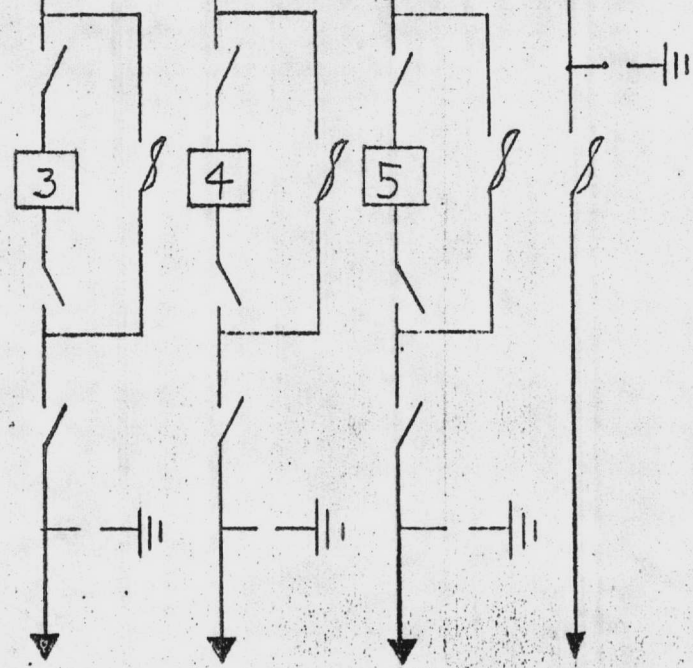
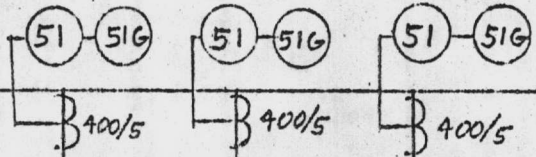
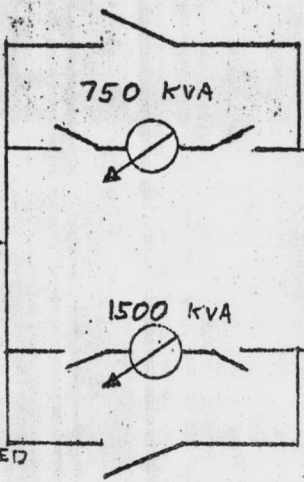
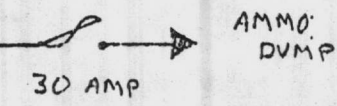


CP&L

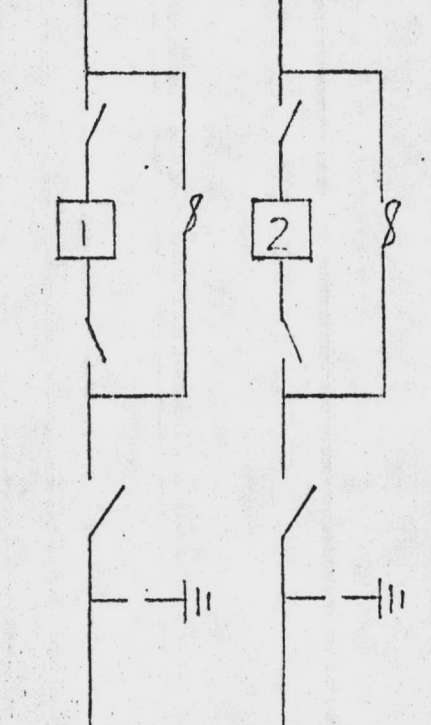
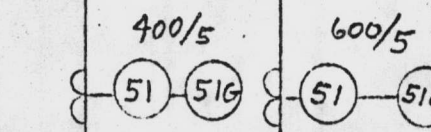
115 KV 12.47 KV



3 - 750 MCM SHIELDED
1 - 750 MCM THW
EACH DUCT

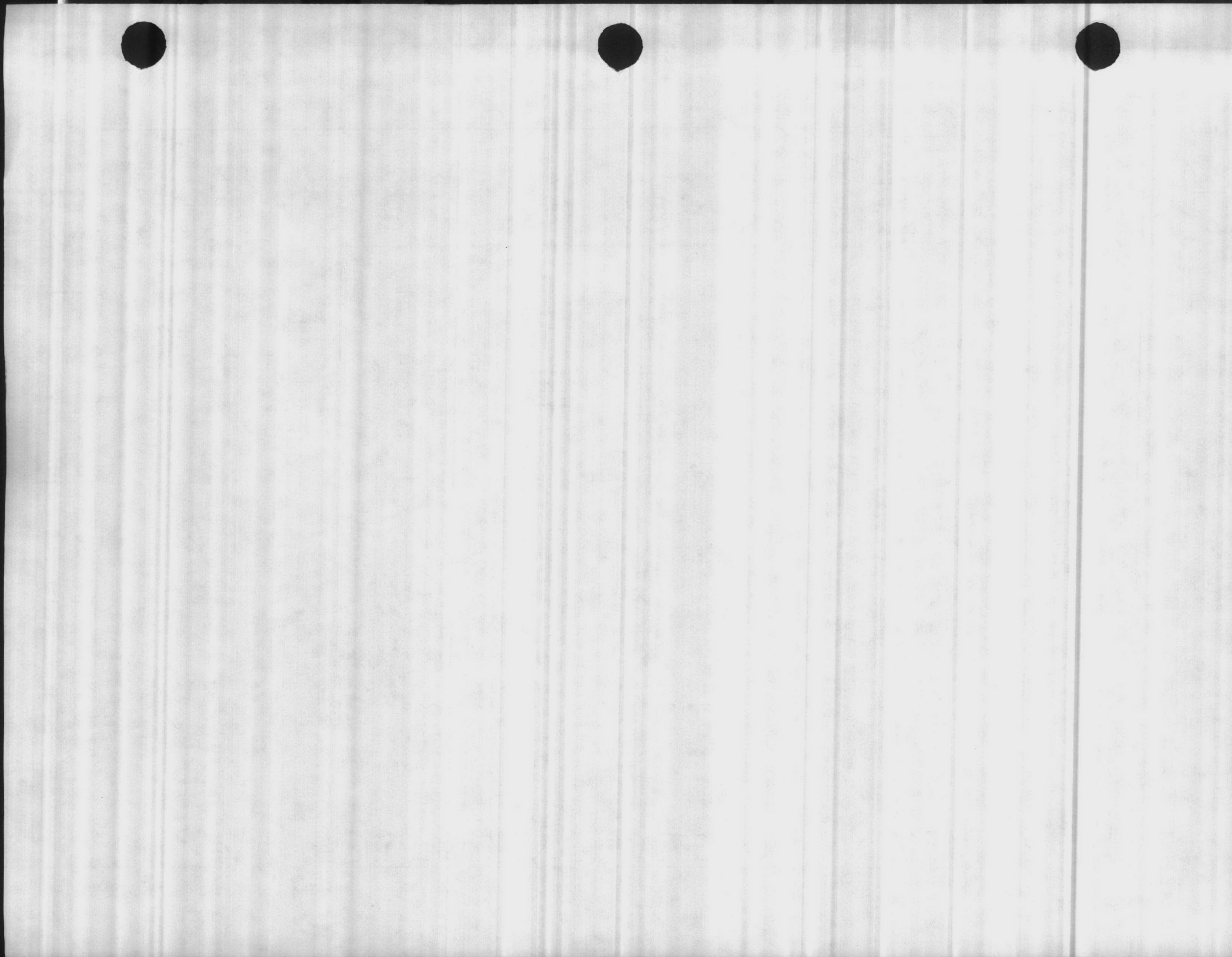


FDR #1 FDR #2 "LOOP" FDR. WELL FEEDER



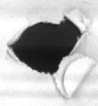
CAMP GEIGER FDR. "ITR" FDR

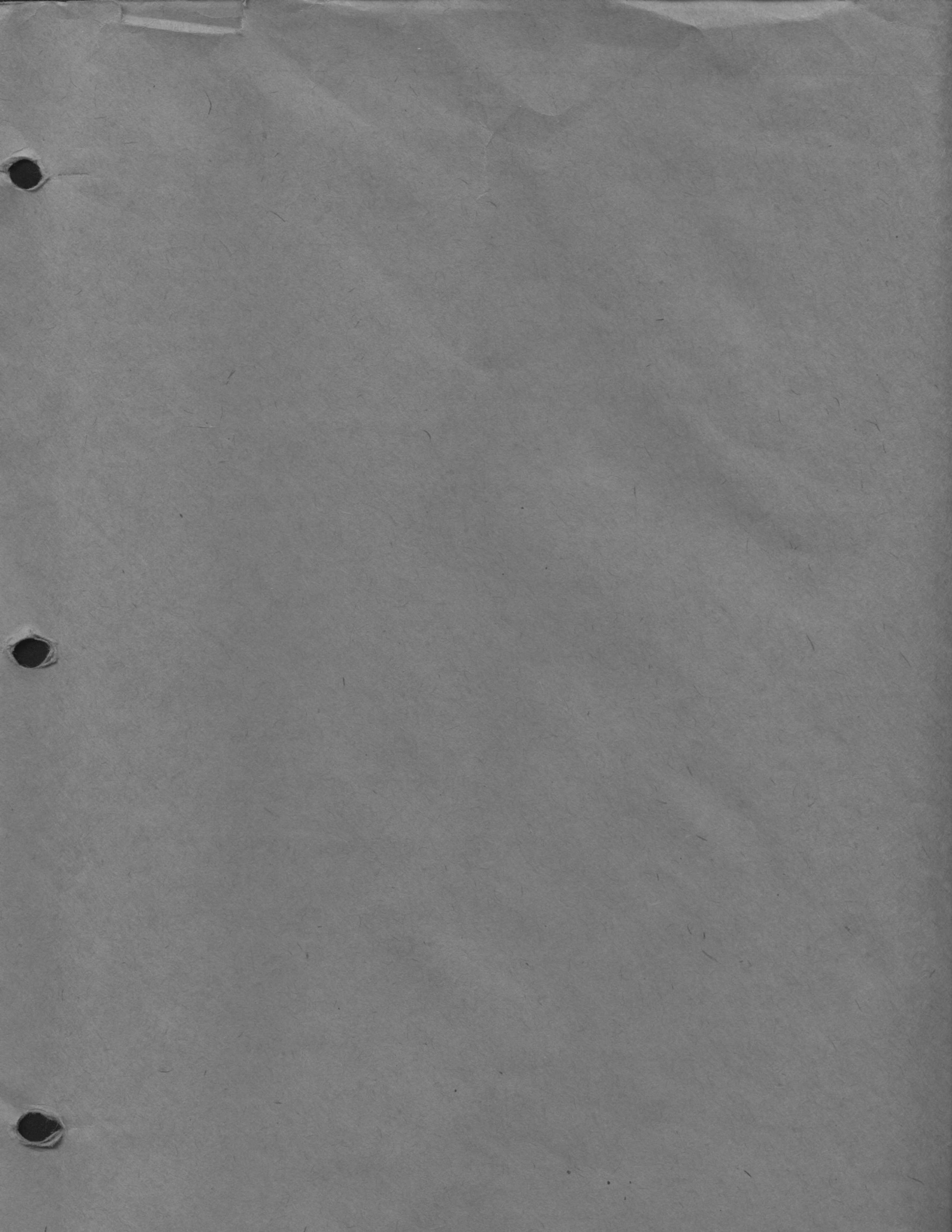
AIR STATION SUBSTATION - ONE LINE DIAGRAM

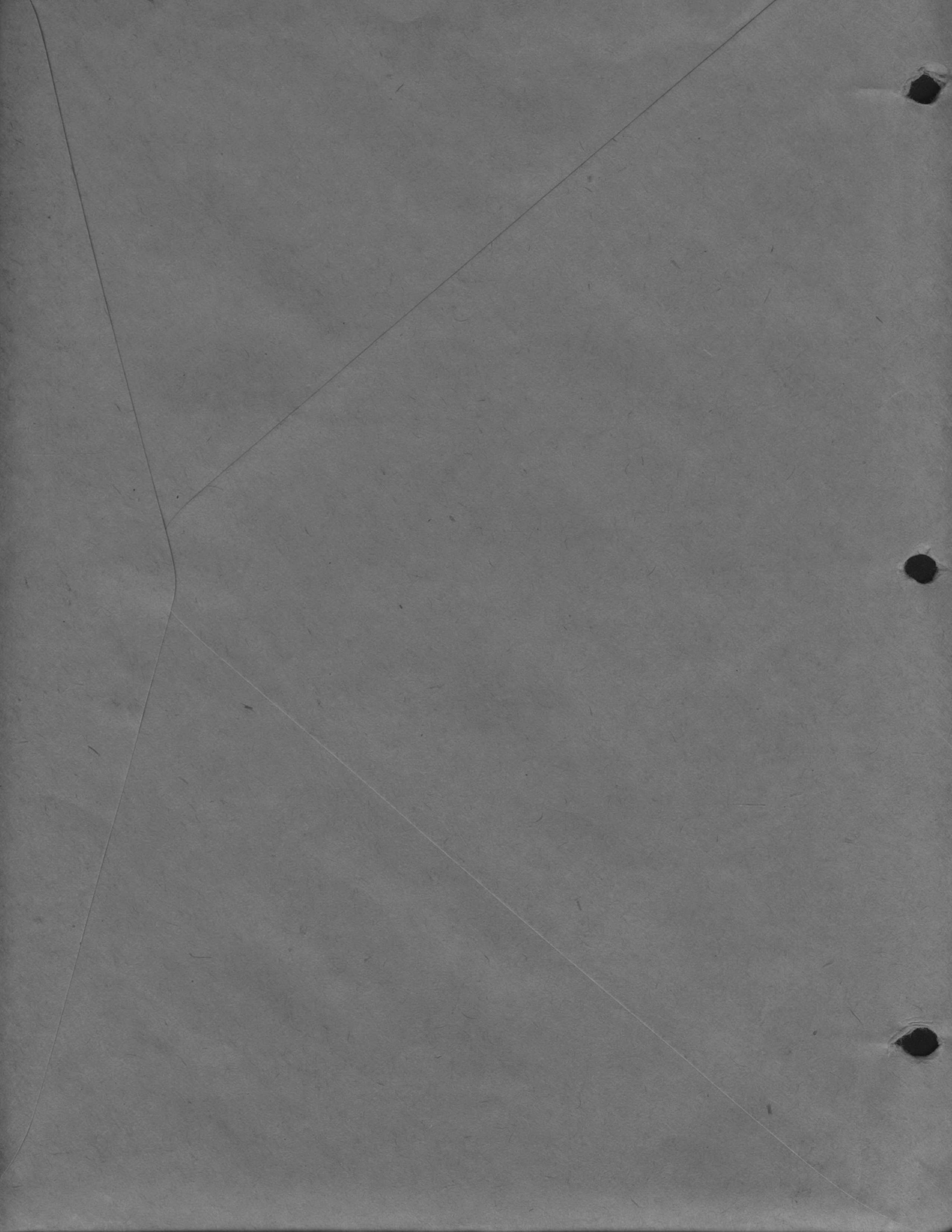


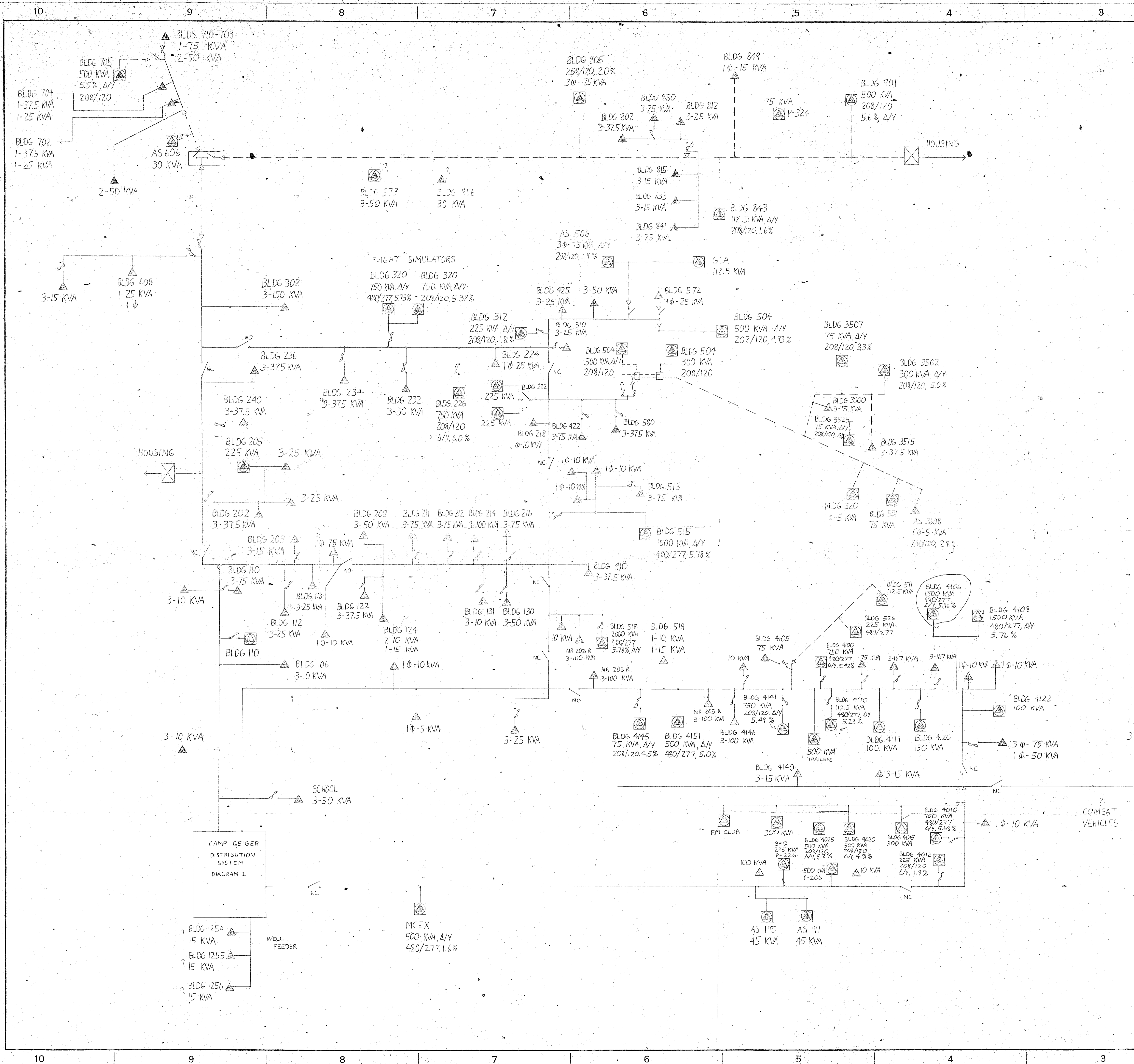
MCAS H NEW RIVER
 FAULT CURRENT STUDY SUMMARY SHEET

BUS NO.	LOCATION	3- Ø MVA	AMPS	1- Ø MVA	AMPS
1	CP&L	147	6803	152	7015
2	Vacuum Breaker	147	6798	151	7012
4	MCAS Bus	146	6776	149	6890
5	Curtis Rd. & White St.	132	6105	125	5791
7	EM Housing Reclosure	112	5168	99	4569
24	"O" Club	69	3208	51	2364
12	Officer Housing Reclosure	54	2512	32	1486
21	Tap to Hanger 504	83	3854	66	3070
19	Tap to Hanger 518	99	4582	82	3801
17	Tap to Hangers 4106/4108	85	3949	70	3239
16	Bldg. 3620	55	2535	42	1959
14	Mess Hall	102	4732	88	4098
13	Water Well	103	4772	83	3836









REVISIONS			
NO.	DESCRIPTION	DATE	APPROVED

OS	FUSED CUTOFF & OIL SWITCH
▲	POLE MOUNTED TRANSFORMER
▲	PAD MOUNTED TRANSFORMER
XX	OVERCURRENT DEVICE
CT	CURRENT TRANSFORMER
VR	VOLTAGE REGULATOR
ST	SUBSTATION TRANSFORMER
+	NO CONNECTION
—	OVERHEAD
- - -	UNDERGROUND
△	TERMINATION
⊃	FUSED CUTOFF
⊃	BLADE DISCONNECT
⊃	SWITCH
⊃	OIL SWITCH
⊃	CIRCUIT BREAKER
⊃	LIGHTNING ARRESTER
+	CONNECTION
⊃	POLE MOUNTED RECLOSER

5/27/82

EPD DWG. NO.	DEPARTMENT OF THE NAVY	NAVAL FACILITIES ENGINEERING COMMAND
JOB ORDER NO.	ATLANTIC DIVISION	
DES.	NAVAL STATION	NORFOLK, VA.
DRWN. TWR	MARINE CORPS BASE, CAMP LEJEUNE, N.C.	
TR.	ELECTRICAL DISTRIBUTION SYSTEM	
CHK.	MCAS H, NEW RIVER	
DES. DIR.	DATE	
SATISFACTORY TO	DATE	
APPROVED	DATE	
FOR EPD FOR COMMANDER NAVFAC	SIZE	CODE IDENT. NO.
	F	80091
	SCALE	NAVFAC DRAWING NO.
		CONSTR. CONTR. NO.
		SHEET

