

STATEMENT OF A. EARL CULLUM, JR. IN CONNECTION WITH THE APPLICATION OF THE PLAINS RADIO BROADCASTING COMPANY, AMARILLO, TEXAS, LICENSEE OF RADIO STATION KGNC, FOR CONSTRUCTION PERMIT TO CHANGE FREQUENCY FROM 1440 KILOCYCLES TO 860 KILOCYCLES, INCREASE POWER FROM 5,000 WATTS DAYTIME, 1,000 WATTS NIGHTTIME USING A NON-DIRECTIVE ANTENNA, TO 10,000 WATTS DAYTIME, 5,000 WATTS NIGHTTIME USING A DIRECTIONAL ANTENNA DURING NIGHTTIME HOURS.

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I, A. EARL CULLUM, JR., AM A CONSULTING RADIO ENGINEER WITH OFFICES LOCATED IN DALLAS, TEXAS. I GRADUATED FROM THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY IN 1931 WITH A BACHELOR OF SCIENCE DEGREE IN COMMUNICATION ENGINEERING. MY EXPERIENCE INCLUDES ALMOST CONTINUOUS EMPLOYMENT BY BROADCAST STATIONS SINCE 1922. SINCE 1936 I HAVE MAINTAINED AN OFFICE AS A CONSULTING RADIO ENGINEER. I HAVE BEEN EMPLOYED BY THE PLAINS RADIO BROADCASTING COMPANY, LICENSEE OF RADIO STATION KGNC, TO MAKE AN ALLOCATION STUDY OF THE 860 KILOCYCLE CHANNEL IN ACCORDANCE WITH THE PROVISIONS OF THE NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT AND TO DESIGN AN ANTENNA SYSTEM TO ALLOW 10,000 WATT NON-DIRECTIVE OPERATION DURING DAYTIME HOURS AND 5,000 WATT DIRECTIVE OPERATION DURING NIGHTTIME HOURS IN THE VICINITY OF AMARILLO, TEXAS.

EXISTING OPERATING CONDITIONS - 1440 KILOCYCLES

THE EXISTING ASSIGNMENT OF RADIO STATION KGNC PROVIDES FOR OPERATION AT AMARILLO, TEXAS ON THE 1440 KILOCYCLE CHANNEL WITH 5,000 WATTS DAYTIME, 1,000 WATTS NIGHTTIME. THE ANTENNA SYSTEM AT KGNC CONSISTS OF A TRUSCON UNIFORM CROSS-SECTION GUYED RADIATOR HAVING AN OVERALL HEIGHT OF 367 FEET, ALONG WITH A

GROUND SYSTEM CONSISTING OF 120 RADIALS BURIED 6 INCHES, EACH RADIAL HAVING A LENGTH FROM 330 FEET TO 450 FEET. THE LENGTH OF THE GROUND RADIALS VARIES AS THEY EXTEND TO THE EDGE OF A SQUARE PLOT OF GROUND. THE GROUND SYSTEM IS SUPPLEMENTED BY A GROUND SCREEN HAVING A RADIUS OF APPROXIMATELY 20 FEET. IT IS ASSUMED THAT THE EFFICIENCY OF THE ANTENNA SYSTEM IS 250 MILLIVOLTS PER METER AT ONE MILE FOR 1,000 WATTS OF POWER. COVERAGE MAPS SHOWING THE EXISTING OPERATING CONDITIONS HAVE BEEN PREPARED BASED ON MEASUREMENTS MADE AT KGNC.

AN ALLOCATION STUDY HAS BEEN MADE OF THE EXISTING NIGHTTIME CONDITIONS ON THE 1440 KILOCYCLE CHANNEL. LIMITATIONS TO THE OTHER STATIONS WERE CALCULATED USING THE SECOND HOUR SKY-WAVE CURVES OF THE FEDERAL COMMUNICATIONS COMMISSION AND A RATIO OF 20 TO 1 FOR DESIRED TO UNDESIRE SIGNAL. THE STUDY SHOWS THE FOLLOWING TO BE THE EXISTING NIGHTTIME CONDITIONS:

KGNC 1440 KC 1,000 WATTS - EXISTING NIGHTTIME LIMITATIONS

| LIMITATION TO | LIMITATION FROM | DISTANCE MILES | POWER WATTS | UNATTENUATED FIELD | INTERFERENCE LEVEL |
|---------------|-----------------|----------------|-------------|--------------------|--------------------|
| KMED          | KGNC            | 1243           | 1000        | 250                | 0.85               |
| KFJM          | KGNC            | 920            | 1000        | 250                | 2.05               |
| WROK          | KGNC            | 850            | 1000        | 250                | 2.50               |
| WBCM          | KGNC            | 1130           | 1000        | 250                | 1.11               |
| WAAB          | KGNC            | 1745           | 1000        | 250                | 0.37               |
| WHIS          | KGNC            | 1162           | 1000        | 250                | 1.02               |
| WSFA          | KGNC            | 922            | 1000        | 250                | 2.02               |
| CMGH          | KGNC            | 1490           | 1000        | 250                | 0.53               |
| XELZ          | KGNC            | 1130           | 1000        | 250                | 1.11               |
| XEFI          | KGNC            | 520            | 1000        | 250                | 5.30               |
| XERT          | KGNC            | 905            | 1000        | 250                | 2.07               |

| LIMITATION TO | LIMITATION FROM | DISTANCE MILES | POWER WATTS | UNATTENUATED FIELD | INTERFERENCE LEVEL |
|---------------|-----------------|----------------|-------------|--------------------|--------------------|
| KGNC          | KMED            | 1243           | 1000        | 175                | 0.60               |
| KGNC          | KFJM            | 920            | 500         | 124                | 1.03               |
| KGNC          | WROK            | 850            | 500         | 141                | 1.41               |
| KGNC          | WBCM            | 1130           | 500         | 124                | 0.55               |
| KGNC          | WAAB            | 1745           | 1000        | 250                | 0.37               |
| KGNC          | WHIS            | 1162           | 500         | 124                | 0.52               |
| KGNC          | WSFA            | 922            | 500         | 134                | 1.08               |
| KGNC          | CMGH            | 1490           | 1000        | 175                | 0.76               |
| KGNC          | XELZ            | 1130           | 1000        | 175                | 0.78               |
| KGNC          | XEFI            | 520            | 1000        | 175                | 4.19               |
| KGNC          | XERT            | 905            | 500         | 124                | 1.04               |
| KGNC          | RSS             |                |             |                    | 4.19               |

PROPOSED OPERATING CONDITIONS - 860 KILOCYCLES

AFTER A STUDY HAD BEEN MADE OF THE ALLOCATION CONDITIONS ON THE 860 KILOCYCLE CHANNEL, AN ANTENNA SYSTEM WAS DESIGNED TO ALLOW 10,000 WATT NON-DIRECTIVE OPERATION DURING DAYTIME HOURS, AND 5,000 WATT DIRECTIVE OPERATION DURING NIGHTTIME HOURS IN THE VICINITY OF AMARILLO, TEXAS. COMPLETE SPECIFICATIONS OF THE PROPOSED DIRECTIVE ANTENNA ARE ATTACHED.

AN ALLOCATION STUDY HAS BEEN MADE OF THE PROPOSED NIGHTTIME CONDITIONS ON THE 860 KILOCYCLE CHANNEL. THE LIMITATIONS TO THE OTHER STATIONS WERE CALCULATED USING THE SECOND HOUR SKY-WAVE CURVES OF THE FEDERAL COMMUNICATIONS COMMISSION AND A RATIO OF 20 TO 1 FOR DESIRED TO UNDESIRED SIGNAL. THE STUDY SHOWS THE FOLLOWING TO BE THE PROPOSED NIGHTTIME CONDITIONS:

## KGNC 860 KC 5,000 WATTS DA - PROPOSED NIGHTTIME LIMITATIONS

| LIMITATION TO | LIMITATION FROM | DISTANCE MILES | POWER WATTS | UNATTENUATED FIELD | INTERFERENCE LEVEL |
|---------------|-----------------|----------------|-------------|--------------------|--------------------|
| CFRB          | KGNC            | 1330           | 5000 DA     | (1)                | (1)                |
| XEMO          | KGNC            | 910            | 5000 DA     | 292                | 2.46               |
| XEXX          | KGNC            | 1105           | 5000 DA     | 315                | 1.50               |
| CMBL          | KGNC            | 1450           | 5000 DA     | 670                | 1.50               |
| KTRB          | KGNC            | 1080           | 5000 DA     | 655                | 2.83               |
| KGNC          | CFRB            | 1330           | 10000       | 474                | 1.34               |
| KGNC          | XEMO            | 910            | 5000        | 392                | 3.30               |
| KGNC          | XEXX            | 1105           | 5000        | 392                | 1.87               |
| KGNC          | CMBC            | 1450           | 5000        | 392                | 0.39               |
| KGNC          | KTRB            | 1080           | 1000 DA     | (2)                | (2)                |
| KGNC          | RSS             |                |             |                    | 3.30               |

(1) CFRB 0.5 MILLIVOLTS PER METER SKY-WAVE CONTOUR IS FULLY PROTECTED.

(2) C.P. GRANTED SUBJECT TO ACCEPTABLE DIRECTIVE ANTENNA BEING SUBMITTED TO F.C.C. SEE FILE B5-P-2631.

A STUDY OF THE 860 KILOCYCLE CHANNEL UNDER THE TERMS OF THE NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT INDICATES THAT THE CHANNEL WILL BE USED BY A CLASS I-A STATION IN TORONTO, ONTARIO, CANADA, OPERATING WITH 10,000 WATTS OF POWER. THE CANADIAN STATION IS PROTECTED ONLY TO THE EAST OF NORTH DAKOTA. SUPPLEMENTAL TERMS OF THE NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT PROVIDES FOR CLASS II STATIONS IN HAVANA, CUBA, MEXICO CITY, MEXICO, AND TIJUANA, B. C., MEXICO. THE PROPOSED KGNC OPERATION WILL FULLY PROTECT ALL OF THESE STATIONS IN ACCORDANCE WITH THE ENGINEERING STANDARDS OF THE NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT. THE LIMITATION TO KGNC IS NOT EXPECTED TO BE IN EXCESS OF 3.3 MILLIVOLTS PER METER. IF THE 860 KILOCYCLE OPERATION IN TIJUANA, B. C., MEXICO FULLY PROTECTS THE I-A OPERATION IN TORONTO, ONTARIO, CANADA, KGNC WOULD INDIRECTLY

BE PROTECTED TO APPROXIMATELY THE 2.5 MILLIVOLTS PER METER CONTOUR.

FIELD INTENSITY MEASUREMENTS

DURING JUNE, 1936, FIELD INTENSITY MEASUREMENTS WERE MADE ON KGNC WHEN OPERATING ON 1410 KILOCYCLES WITH 1,000 WATTS OF POWER. AT THAT TIME THE ANTENNA AT KGNC CONSISTED OF A 229 FOOT BLAW-KNOX, TAPERED, SELF-SUPPORTING TOWER. THE ANTENNA EFFICIENCY WAS APPROXIMATELY 210 MILLIVOLTS PER METER AT ONE MILE FOR 1,000 WATTS. ALL OF THE MEASUREMENTS WERE MADE BY ME USING AN RCA FIELD INTENSITY METER, TYPE TMV-758, SERIAL 520, WHICH HAD BEEN PREVIOUSLY CALIBRATED BY THE RCA MANUFACTURING COMPANY ON JANUARY 9, 1936. THESE MEASUREMENTS WERE MADE IN 1936 FOR THE PURPOSE OF A COMMERCIAL SURVEY ONLY. ACCORDINGLY, THE MEASUREMENTS ARE RATHER LIMITED IN COMPARISON WITH PRESENT DAY ENGINEERING PRACTICES, BUT IT IS MY OPINION AND BELIEF AS AN EXPERT RADIO ENGINEER THAT THESE MEASUREMENTS PROVIDE A BETTER INDICATION OF THE SOIL CONDUCTIVITY AROUND AMARILLO THAN THE CONDUCTIVITY INDICATED ON THE FEDERAL COMMUNICATIONS COMMISSION SOIL MAP REFERRED TO IN THE FEDERAL COMMUNICATIONS COMMISSION STANDARDS OF GOOD ENGINEERING PRACTICE. AN ANALYSIS OF THESE MEASUREMENTS HAS BEEN MADE WHICH INDICATES THAT THE SOIL VARIES FROM 15 TIMES 10 TO THE MINUS 14TH TO 30 TIMES 10 TO THE MINUS 14TH. ALL OF THESE MEASUREMENTS ARE NOW ON FILE WITH THE FEDERAL COMMUNICATIONS COMMISSION, FILE 83-P-2969.

LIST OF EXHIBITS ATTACHED

IN CARRYING OUT THE ALLOCATION STUDY AND DESIGNING THE DIRECTIVE ANTENNA, A NUMBER OF EXHIBITS WERE PREPARED. ATTACHED WILL BE FOUND THE FOLLOWING EXHIBITS PREPARED BY ME OR UNDER MY DIRECTIONS:

1. SPECIFICATIONS OF PROPOSED ANTENNA FOR RADIO STATION KGNC.
2. DIRECTIVE ANTENNA DESIGN FORMULA.
3. DIRECTIVE ANTENNA CALCULATIONS FOR 5,000 WATTS OF POWER.
4. ANTENNA AND GROUND SYSTEM SPECIFICATIONS.
5. REFERENCES SUPPORTING DIRECTIVE ANTENNA DESIGN FORMULA.
6. (A) DIRECTIVE ANTENNA GROUND-WAVE PATTERN FOR 5,000 WATT 360 KILOCYCLE NIGHTTIME OPERATION.
6. (B) ENLARGED PORTION OF DIRECTIVE ANTENNA GROUND-WAVE PATTERN FOR 5,000 WATT 360 KILOCYCLE NIGHTTIME OPERATION.
6. (C) TABULATION OF DIRECTIVE ANTENNA GROUND-WAVE PATTERN CALCULATIONS FOR 5,000 WATTS OF POWER ON 360 KILOCYCLES.
7. DIRECTIVE ANTENNA SKY-WAVE PATTERNS AND TABULATIONS OF CALCULATIONS FOR 5,000 WATT 360 KILOCYCLE NIGHTTIME OPERATION.
8. MAP OF NORTH AMERICA SHOWING THE PROPOSED OPERATING CONDITIONS DURING NIGHTTIME HOURS ON 360 KILOCYCLES.
9. (A) MAP SHOWING THE 250 MILLIVOLTS PER METER CONTOUR FROM THE PROPOSED NON-DIRECTIVE OPERATION USING 10,000 WATTS OF POWER ON 360 KILOCYCLES.

9. (B) MAP SHOWING THE 25 AND 5.0 MILLIVOLTS PER METER CONTOURS FROM THE PROPOSED NON-DIRECTIVE OPERATION USING 10,000 WATTS OF POWER ON 860 KILOCYCLES.
9. (C) MAP SHOWING THE 2.0 AND 0.5 MILLIVOLTS PER METER CONTOURS FROM THE PROPOSED NON-DIRECTIVE OPERATION USING 10,000 WATTS OF POWER ON 860 KILOCYCLES.
9. (D) MAP SHOWING THE RAND McNALLY MAJOR TRADING AREA IN THE VICINITY OF AMARILLO, TEXAS. IT SHOULD BE NOTED THAT AMARILLO IS THE MAJOR TRADING CENTER FOR 1 OF 60 MAJOR TRADING AREAS IN THE UNITED STATES. IT SHOULD ALSO BE NOTED THAT THE PROPOSED 0.5 MILLIVOLTS PER METER CONTOUR FROM THE 860 KILOCYCLE 10,000 WATT OPERATION COVERS PRACTICALLY ALL OF THIS AREA.
9. (E) MAP SHOWING THE EXISTING 0.5 MILLIVOLTS PER METER DAYTIME CONTOUR, THE PROPOSED 0.5 MILLIVOLTS PER METER DAYTIME CONTOUR, AND THE DAYTIME SERVICE AREA TO BE GAINED BY RADIO STATION KGNC, SHOULD THIS APPLICATION BE GRANTED. AN ANALYSIS OF THE EXISTING DAYTIME RADIO SERVICE WITHIN THE AREA TO BE GAINED BY RADIO STATION KGNC HAS BEEN MADE AND IS SHOWN ON THIS MAP.
9. (F) MAP SHOWING THE PARTIAL 0.5 AND 0.25 MILLIVOLTS PER METER CONTOURS FROM THE PROPOSED NON-DIRECTIVE OPERATION USING 10,000 WATTS OF POWER ON 860 KILOCYCLES ALONG WITH PARTIAL 0.5 AND 0.25 MILLIVOLTS PER METER CONTOURS FROM THE EXISTING NON-DIRECTIVE DAYTIME OPERATION OF KOA WHEN

USING 50,000 WATTS OF POWER ON 850 KILOCYCLES. IT SHOULD BE NOTED THAT THE 0.5 MILLIVOLTS PER METER GROUND-WAVE COVERAGE OF KOA IS FULLY PROTECTED BY THE PROPOSED KGNC OPERATION AND THAT THE PROPOSED 0.5 MILLIVOLTS PER METER GROUND-WAVE COVERAGE OF THE PROPOSED KGNC OPERATION WOULD BE FULLY PROTECTED BY THE OPERATION OF RADIO STATION KOA.

10. (A) MAP SHOWING THE 250 MILLIVOLTS PER METER CONTOUR FROM THE PROPOSED NIGHTTIME DIRECTIVE ANTENNA USING 5,000 WATTS OF POWER ON 860 KILOCYCLES.
10. (B) MAP SHOWING THE 25 AND 5.0 MILLIVOLTS PER METER CONTOURS FROM THE PROPOSED NIGHTTIME DIRECTIVE ANTENNA USING 5,000 WATTS OF POWER ON 860 KILOCYCLES.
10. (C) MAP SHOWING THE 2.5 AND 2.0 MILLIVOLTS PER METER CONTOURS FROM THE PROPOSED NIGHTTIME DIRECTIVE ANTENNA USING 5,000 WATTS OF POWER ON 860 KILOCYCLES.
10. (D) MAP SHOWING THE 3.3 MILLIVOLTS PER METER CONTOUR FROM THE PROPOSED NIGHTTIME DIRECTIVE ANTENNA USING 5,000 WATTS OF POWER ON 860 KILOCYCLES.
10. (E) MAP SHOWING THE EXISTING NIGHTTIME COVERAGE, THE PROPOSED NIGHTTIME COVERAGE AND THE NIGHTTIME PRIMARY COVERAGES FROM OTHER STATIONS PROVIDING COVERAGE IN THE VICINITY OF AMARILLO, TEXAS. IT SHOULD BE NOTED THAT NO OTHER STATION PROVIDES NIGHTTIME PRIMARY COVERAGE TO THE SERVICE AREA TO BE GAINED BY RADIO STATION KGNC BETWEEN THE EXISTING NIGHTTIME COVERAGE AREA AND THE

PROPOSED NIGHTTIME COVERAGE AREA.

11. (A) MAP SHOWING THE 500 AND 250 MILLIVOLTS PER METER CONTOURS FROM THE EXISTING DAYTIME NON-DIRECTIVE ANTENNA USING 5,000 WATTS OF POWER ON 1440 KILOCYCLES.
11. (B) MAP SHOWING THE 25 MILLIVOLTS PER METER CONTOUR FROM THE EXISTING DAYTIME NON-DIRECTIVE ANTENNA USING 5,000 WATTS OF POWER ON 1440 KILOCYCLES.
11. (C) MAP SHOWING THE 5.0, 2.0, AND 0.5 MILLIVOLTS PER METER CONTOURS FROM THE EXISTING DAYTIME NON-DIRECTIVE ANTENNA USING 5,000 WATTS OF POWER ON 1440 KILOCYCLES.
12. (A) MAP SHOWING THE 250 MILLIVOLTS PER METER CONTOUR FROM THE EXISTING NIGHTTIME NON-DIRECTIVE ANTENNA USING 1,000 WATTS OF POWER ON 1440 KILOCYCLES.
12. (B) MAP SHOWING THE 25 MILLIVOLTS PER METER CONTOUR FROM THE EXISTING NIGHTTIME NON-DIRECTIVE ANTENNA USING 1,000 WATTS OF POWER ON 1440 KILOCYCLES.
12. (C) MAP SHOWING THE 5.0, 2.5, AND 2.0 MILLIVOLTS PER METER CONTOURS FROM THE EXISTING NIGHTTIME NON-DIRECTIVE ANTENNA USING 1,000 WATTS OF POWER ON 1440 KILOCYCLES.
12. (D) MAP SHOWING THE 4.2 MILLIVOLTS PER METER CONTOUR FROM THE EXISTING NIGHTTIME NON-DIRECTIVE ANTENNA USING 1,000 WATTS OF POWER ON 1440 KILOCYCLES.
13. AIRWAYS MAP OF AMARILLO, TEXAS AND THE SURROUNDING AREA SHOWING THE PROPOSED KGNC PLANT SITE.
14. PHOTOGRAPHS TAKEN FROM THE PROPOSED PLANT SITE IN THE VARIOUS DIRECTIONS NOTED.

POPULATION ANALYSIS OF COVERAGE MAPS

A POPULATION ANALYSIS HAS BEEN PREPARED BASED ON THE CALCULATED COVERAGE MAPS, THE 1940 CENSUS FIGURES AND THE STANDARDS OF THE FEDERAL COMMUNICATIONS COMMISSION CONCERNING COVERAGE. TOTAL POPULATION FIGURES WERE DETERMINED BY AN ANALYSIS OF THE POPULATION DISTRIBUTION USING MINOR CIVIL DIVISION MAPS. FROM THE TOTAL POPULATION FIGURES WITHIN EACH CONTOUR, THE URBAN AREAS OF 2500 OR GREATER RECEIVING LESS THAN 2.0 MILLIVOLTS PER METER AND THE URBAN AREAS OF 10,000 OR GREATER RECEIVING LESS THAN 5.0 MILLIVOLTS PER METER, WERE SUBTRACTED. THE FOLLOWING IS A TABULATION OF THE COVERAGE FIGURES AS TAKEN FROM EACH POPULATION STUDY:

## PROPOSED KGNC - 860 KC - 10,000 WATTS - DAYTIME

| <u>CONTOUR</u>              | <u>POPULATION</u><br><u>1940</u> | <u>Sq. MI.</u> |
|-----------------------------|----------------------------------|----------------|
| WITHIN THE 25 MV/M CONTOUR  | 57,224                           |                |
| WITHIN THE 5.0 MV/M CONTOUR | 128,997                          |                |
| WITHIN THE 2.0 MV/M CONTOUR | 190,753                          |                |
| WITHIN THE 0.5 MV/M CONTOUR | 499,356                          | 63,100         |

## PROPOSED KGNC - 860 KC - 5,000 WATTS DA - NIGHTTIME

| <u>CONTOUR</u>              | <u>POPULATION</u><br><u>1940</u> | <u>Sq. MI.</u> |
|-----------------------------|----------------------------------|----------------|
| WITHIN THE 25 MV/M CONTOUR  | 54,497                           |                |
| WITHIN THE 5.0 MV/M CONTOUR | 79,072                           |                |
| WITHIN THE 3.3 MV/M CONTOUR | 94,947                           | 8,400          |
| WITHIN THE 2.5 MV/M CONTOUR | 112,573                          | 9,290          |
| WITHIN THE 2.0 MV/M CONTOUR | 135,964                          |                |

## EXISTING KGNC - 1440 KC - 5,000 WATTS - DAYTIME

| <u>CONTOUR</u>              | <u>POPULATION</u><br><u>1940</u> | <u>Sq. MI.</u> |
|-----------------------------|----------------------------------|----------------|
| WITHIN THE 25 MV/M CONTOUR  | 55,306                           |                |
| WITHIN THE 5.0 MV/M CONTOUR | 75,113                           |                |
| WITHIN THE 2.0 MV/M CONTOUR | 125,543                          |                |
| WITHIN THE 0.5 MV/M CONTOUR | 190,398                          | 26,000         |

EXISTING KGNC - 1440 KC - 1,000 WATTS - NIGHTTIME

| <u>CONTOUR</u>              | <u>POPULATION</u><br><u>1940</u> | <u>Sq. Mi.</u> |
|-----------------------------|----------------------------------|----------------|
| WITHIN THE 25 MV/M CONTOUR  | 52,200                           |                |
| WITHIN THE 5.0 MV/M CONTOUR | 61,872                           |                |
| WITHIN THE 4.2 MV/M CONTOUR | 64,774                           | 2,480          |
| WITHIN THE 2.5 MV/M CONTOUR | 72,676                           | 4,410          |
| WITHIN THE 2.0 MV/M CONTOUR | 83,033                           |                |

A POPULATION STUDY OF THE 250 MILLIVOLTS PER METER CONTOURS HAS BEEN MADE BY AN ACTUAL COUNT OF HOUSES EXISTING WITHIN THESE CONTOURS. IT WAS ASSUMED THAT FOUR PEOPLE RESIDED WITHIN EACH HOUSE. IN VIEW OF THE FACT THAT THESE POPULATION STUDIES ARE BASED ON EXISTING CONDITIONS, WE HAVE OBTAINED THE 1940 CENSUS FIGURES FOR THE CITY OF AMARILLO SO THAT IT CAN BE USED IN CONNECTION WITH THIS STUDY. THE FOLLOWING IS A TABULATION OF THE COVERAGE FIGURES AS TAKEN FROM EACH POPULATION STUDY:

PROPOSED KGNC - 860 KC - 10,000 WATTS - DAYTIME

| <u>CONTOUR</u>              | <u>SOURCE</u> | <u>POPULATION</u><br><u>1940</u> |
|-----------------------------|---------------|----------------------------------|
| WITHIN THE 250 MV/M CONTOUR | COUNT HOUSES  | 48                               |
| WITHIN THE CITY OF AMARILLO | 1940 CENSUS   | 51,497                           |
| WITHIN THE COUNTY OF POTTER | 1940 CENSUS   | 54,260                           |

PROPOSED KGNC - 860 KC - 5,000 WATTS DA - NIGHTTIME

| <u>CONTOUR</u>              | <u>SOURCE</u> | <u>POPULATION</u><br><u>1940</u> |
|-----------------------------|---------------|----------------------------------|
| WITHIN THE 250 MV/M CONTOUR | COUNT HOUSES  | 40                               |
| WITHIN THE CITY OF AMARILLO | 1940 CENSUS   | 51,497                           |
| WITHIN THE COUNTY OF POTTER | 1940 CENSUS   | 54,260                           |

EXISTING KGNC - 1440 KC - 5,000 WATTS - DAYTIME

| <u>CONTOUR</u>              | <u>SOURCE</u> | <u>POPULATION</u><br><u>1940</u> |
|-----------------------------|---------------|----------------------------------|
| WITHIN THE 250 MV/M CONTOUR | COUNT HOUSES  | 3,980                            |
| WITHIN THE CITY OF AMARILLO | 1940 CENSUS   | 51,497                           |
| WITHIN THE COUNTY OF POTTER | 1940 CENSUS   | 54,260                           |

EXISTING KGNC - 1440 KC - 1,000 WATTS - NIGHTTIME

| <u>CONTOUR</u>              | <u>SOURCE</u> | <u>POPULATION</u><br><u>1940</u> |
|-----------------------------|---------------|----------------------------------|
| WITHIN THE 250 MV/M CONTOUR | COUNT HOUSES  | 280                              |
| WITHIN THE CITY OF AMARILLO | 1940 CENSUS   | 51,497                           |
| WITHIN THE COUNTY OF POTTER | 1940 CENSUS   | 54,260                           |

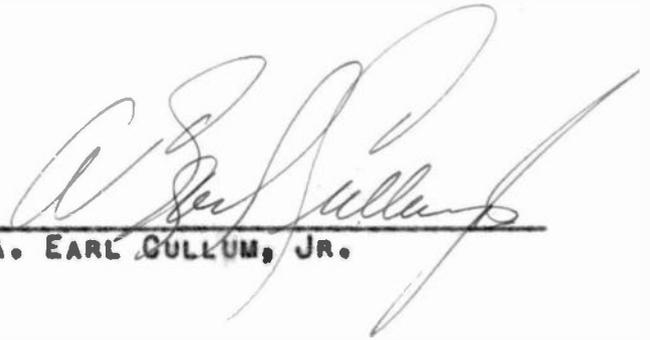
CONCLUSIONS

FROM THE ABOVE IT WILL BE SEEN THAT THE EXISTING OPERATION PROVIDES COVERAGE DURING DAYTIME HOURS TO APPROXIMATELY 190,398 PEOPLE WITHIN THE NORMALLY PROTECTED 0.5 MILLIVOLTS PER METER CONTOUR AND PROVIDES COVERAGE DURING NIGHTTIME HOURS TO APPROXIMATELY 64,774 PEOPLE WITHIN THE PROTECTED 4.2 MILLIVOLTS PER METER CONTOUR. THE PROPOSED OPERATION WILL PROVIDE COVERAGE DURING DAYTIME HOURS TO APPROXIMATELY 439,356 PEOPLE WITHIN THE NORMALLY PROTECTED 0.5 MILLIVOLTS PER METER CONTOUR AND WILL PROVIDE COVERAGE DURING NIGHTTIME HOURS TO APPROXIMATELY 94,947 PEOPLE WITHIN THE PROTECTED 3.3 MILLIVOLTS PER METER CONTOUR.

THE PROPOSED 250 MILLIVOLTS PER METER CONTOURS WILL INCLUDE CONSIDERABLY LESS THAN 1 PER CENT OF THE POPULATION OF AMARILLO, TEXAS. THE PROPOSED 25 MILLIVOLTS PER METER CONTOURS WILL COVER ALL OF THE CITY OF AMARILLO, TEXAS. THE PROPOSED DIRECTIVE

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ANTENNA WILL MEET WITH ALL OF THE REQUIREMENTS OF GOOD  
ENGINEERING PRACTICE OF THE FEDERAL COMMUNICATIONS COMMISSION.

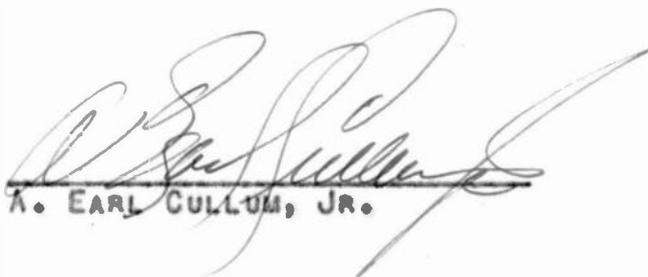


A. EARL CULLUM, JR.

JULY 15, 1941.

STATE OF TEXAS     )  
                          )  
COUNTY OF DALLAS )   88:

A. EARL CULLUM, JR., BEING DULY SWORN, UPON HIS OATH DEPOSES AND SAYS THAT THE FACTS STATED IN THE FOREGOING, TOGETHER WITH ALL EXHIBITS ATTACHED HERETO, ARE TRUE OF HIS OWN KNOWLEDGE, EXCEPT AS TO SUCH STATEMENTS AS THEREIN STATED TO BE ON INFORMATION AND BELIEF, AND AS TO SUCH STATEMENTS HE BELIEVES THEM TO BE TRUE.

  
A. EARL CULLUM, JR.

SUBSCRIBED AND SWORN TO BEFORE ME THIS 15TH DAY OF JULY, 1941.

  
NOTARY PUBLIC IN AND FOR  
DALLAS COUNTY, TEXAS

MY COMMISSION EXPIRES JUNE 1, 1943.

**A. EARL CULLUM, JR.**  
**CONSULTING RADIO ENGINEER**  
**HIGHLAND PARK VILLAGE**  
**DALLAS, TEXAS**

**SPECIFICATIONS OF PROPOSED ANTENNA FOR RADIO STATION KGNC:**

|                               |   |
|-------------------------------|---|
| FREQUENCY                     | 860 KILOCYCLES  |
| RATED POWER DAY               | 10,000 WATTS NON-DIRECTIONAL  |
| RATED POWER NIGHT             | 5,000 WATTS DIRECTIONAL   |
| NUMBER OF TOWERS              | 4 TOWERS  |
| TYPE OF TOWERS                | SELF SUPPORTED, TRIANGULAR, TAPERED   |
| TOWER BASE WIDTH              | 5% OF TOWER HEIGHT  |
| TOWER FEED SYSTEM             | SERIES  |
| TOWER HEIGHT ABOVE INSULATORS | 283 FEET  |
| TOWER HEIGHT ABOVE GROUND     | 286 FEET  |
| TOWER HEIGHT ABOVE SEA-LEVEL  | 3,871 FEET  |
| LINE OF TOWERS                | N36.75E REFERRED TO TRUE NORTH  |
| TOWER SPACING ELECTRICAL      | 70-140-70 DEGREES   |
| TOWER SPACING PHYSICAL        | 222.5-445-222.5 FEET  |
| TOWER CURRENT RATIO           | SEE EXHIBIT 4   |
| TOWER CURRENT PHASE           | SEE EXHIBIT 4   |
| NUMBER OF GROUND RADIALS      | 120 EQUALLY SPACED ABOUT EACH TOWER   |
| LENGTH OF GROUND RADIALS      | 300 FEET EXCEPT FOR OVERLAPS  |
| DEPTH OF GROUND RADIALS       | 6 TO 8 INCHES   |
| TRANSMISSION LINES            | 70 OHM CONCENTRIC LINES   |
| ANTENNA AMMETERS              | THERMAL AND REMOTE THERMAL  |
| CURRENT RATIO MEASUREMENTS    | CURRENT MONITOR FROM SAMPLING LOOPS   |
| CURRENT PHASE MEASUREMENTS    | PHASE MONITOR FROM SAMPLING LOOPS   |
| LOCATION                      | NEW ON TEXAS HIGHWAY 136 APPROXIMATELY<br>9 MILES NORTHEAST AMARILLO CITY<br>LIMITS<br>N. LAT. 35° 18' 26"<br>W. LONG. 101° 41' 11" |

EXHIBIT 1

DIRECTIVE ANTENNA DESIGN FORMULA:

$$F_1(E) : \sqrt{1 + (M_1)^2 + 2(M_1) \cos(A_1 - KD_1 \cos\theta \cos\phi)} \quad (1)$$

$$F_2(E) : \sqrt{1 + (M_2)^2 + 2(M_2) \cos(A_2 - KD_2 \cos\theta \cos\phi)} \quad (1)$$

$$F_x(E) : \frac{\cos(A \sin \theta) - \cos A}{(\cos \theta) (1 - \cos A)} \quad (2)$$

$$K : \frac{1 - \cos A}{\sin A} \quad (3)$$

$$P : (R_1 \times I_1^2) + (R_2 \times I_2^2) + (R_3 \times I_3^2) + (R_4 \times I_4^2) \quad (4)$$

$$E : 37.25 \times I \times K \times F_1(E) \times F_2(E) \times F_x(E) \quad (5)$$

WHERE

E IS FIELD INTENSITY IN MILLIVOLTS PER METER AT ONE MILE  
P IS ACTUAL RADIATED POWER IN WATTS  
I<sub>1</sub> IS CURRENT AT BASE OF ELEMENT 1 OPERATING DIRECTIONAL  
I<sub>2</sub> IS CURRENT AT BASE OF ELEMENT 2 OPERATING DIRECTIONAL  
I<sub>3</sub> IS CURRENT AT BASE OF ELEMENT 3 OPERATING DIRECTIONAL  
I<sub>4</sub> IS CURRENT AT BASE OF ELEMENT 4 OPERATING DIRECTIONAL  
R<sub>1</sub> IS RESISTANCE AT BASE OF ELEMENT 1 OPERATING DIRECTIONAL  
R<sub>2</sub> IS RESISTANCE AT BASE OF ELEMENT 2 OPERATING DIRECTIONAL  
R<sub>3</sub> IS RESISTANCE AT BASE OF ELEMENT 3 OPERATING DIRECTIONAL  
R<sub>4</sub> IS RESISTANCE AT BASE OF ELEMENT 4 OPERATING DIRECTIONAL  
M IS RATIO BETWEEN THE CURRENTS IN THE ELEMENTS  
A IS PHASE BETWEEN THE CURRENTS IN THE ELEMENTS  
A IS HEIGHT OF THE ELEMENTS  
θ IS ANGLE FROM HORIZONTAL TO RADIATION VECTOR  
φ IS ANGLE FROM LINE OF ELEMENTS TO RADIATION VECTOR  
KD IS ELECTRICAL DISTANCE BETWEEN THE ELEMENTS

**DIRECTIVE ANTENNA CALCULATIONS FOR 5,000 WATTS:**

RATED POWER 5,000 WATTS

**TRANSMISSION LOSSES**

TRANSMISSION LINES

PHASING EQUIPMENT

COUPLING TRANSMISSION LINES TO ANTENNA

CURRENT AND PHASE METER LOSSES

GROUND RESISTANCE LOSSES

TOTAL PROBABLE LOSSES 5 %

ACTUAL RADIATED POWER EXPECTED IS (5410) x (1.00 - 0.05)

|      |                 |              |       |
|------|-----------------|--------------|-------|
| THEN | P               | 5,140 WATTS  | GIVEN |
|      | R <sub>1</sub>  | 19.5 OHMS    | (6)   |
|      | R <sub>2</sub>  | 2.2 OHMS     | (6)   |
|      | R <sub>3</sub>  | 35.2 OHMS    | (6)   |
|      | R <sub>4</sub>  | 16.2 OHMS    | (6)   |
|      | M <sub>1</sub>  | 0.59         | GIVEN |
|      | M <sub>2</sub>  | 1.00         | GIVEN |
|      | A <sub>1</sub>  | +33 DEGREES  | GIVEN |
|      | A <sub>2</sub>  | -115 DEGREES | GIVEN |
|      | KD <sub>1</sub> | 210 DEGREES  | GIVEN |
|      | KD <sub>2</sub> | 70 DEGREES   | GIVEN |
|      | A               | 90 DEGREES   | GIVEN |

**SOLVING THE DIRECTIVE ANTENNA FORMULA:**

VECTOR CURRENT I is 11.4 (4)

FORM FACTOR K is 1.00 (3)

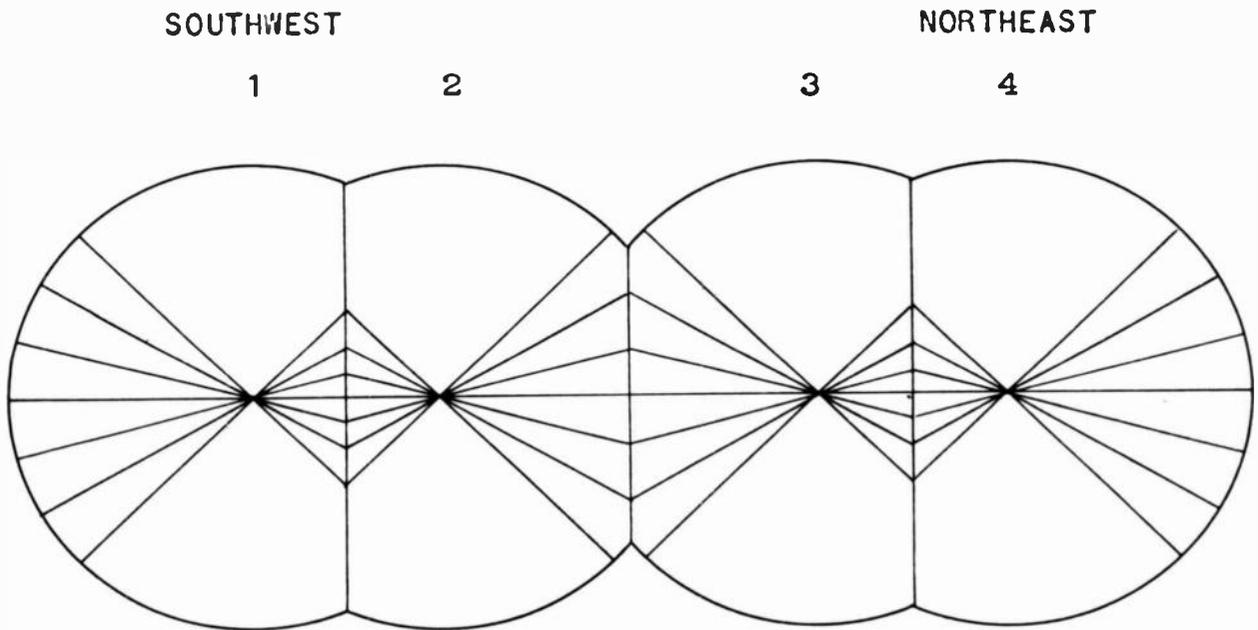
FIELD INTENSITY )  
 AT ONE MILE IN ) E IS 425 x F<sub>1</sub>(E) x F<sub>2</sub>(E) x F<sub>x</sub>(E) (5)  
 ANY DIRECTION )

VARIOUS VALUES WERE THEN ASSIGNED TO  $\Theta$  AND  $\Phi$  AND THE CORRESPONDING VALUES OF F<sub>1</sub>(E), F<sub>2</sub>(E), F<sub>x</sub>(E) AND E DETERMINED. THE RESULTS OF EACH OF THESE CALCULATIONS ARE LISTED ON EACH OF THE ATTACHED EXHIBITS.

AFTER THE HORIZONTAL RADIATION PATTERN WAS PLOTTED AND PLANIMETERED, THE R.M.S. VALUE OF THE HORIZONTAL FIELD WAS FOUND TO BE 456 MV/M UNATTENUATED AT ONE MILE FROM THE ANTENNA.

ANTENNA AND GROUND SYSTEM SPECIFICATIONS:

ARRANGEMENT OF TOWERS:



| UNIT VECTORS:   |       |      |       |       |
|-----------------|-------|------|-------|-------|
| CURRENT RATIO   | 1.00  | 1.00 | 0.59  | 0.59  |
| CURRENT PHASE   | 00    | +115 | -33   | +82   |
| BASE RESISTANCE | 19.5  | 2.2  | 35.2  | 16.2  |
| BASE REACTANCE  | +43.8 | +8.0 | +57.1 | -4.9  |
| BASE CURRENT    | 11.4  | 11.4 | 6.725 | 6.725 |

REFERENCES - ACCORDING TO LINE NUMBER

- (1) I.R.E. JANUARY, 1937 PAGE 99 (60)
- (2) I.R.E. JANUARY, 1936 PAGE 51 (5)
- (3) I.R.E. JANUARY, 1936 PAGE 52 (6)
- (4) I.R.E. JANUARY, 1937 PAGE 102 (72)
- (5) I.R.E. JANUARY, 1937 PAGE 102 (75)
- (6) I.R.E. JANUARY, 1937 PAGE 102 (71)

EXHIBIT 5

30° 330°  
20° 340°

10° 350°

350° 10°  
340° 20°

330° 30°

RADIO STATION KGNC  
HORIZONTAL RADIATION PATTERN  
A. EARL CULLUM, JR.  
CONSULTING ENGINEER  
DALLAS 410710 A

40  
320

320  
40

50  
310

310  
50

60  
300

300  
60

70  
290

290  
70

80  
280

280  
80

90  
270

270  
90

100  
260

260  
100

110  
250

250  
110

120  
240

240  
120

130  
230

230  
130

140  
220

220  
140

N

1000 mi.

1150 mi.

1150 mi.

KTRB  
1080 mi.

CANADIAN  
BORDER

910 mi. XEMO

200

400

600

CMBL  
1450 mi.

XEXX  
1105 mi.

RMS 456 MV/M  
5000 WATTS  
860 KC

150° 210°

160° 200°

170° 190°

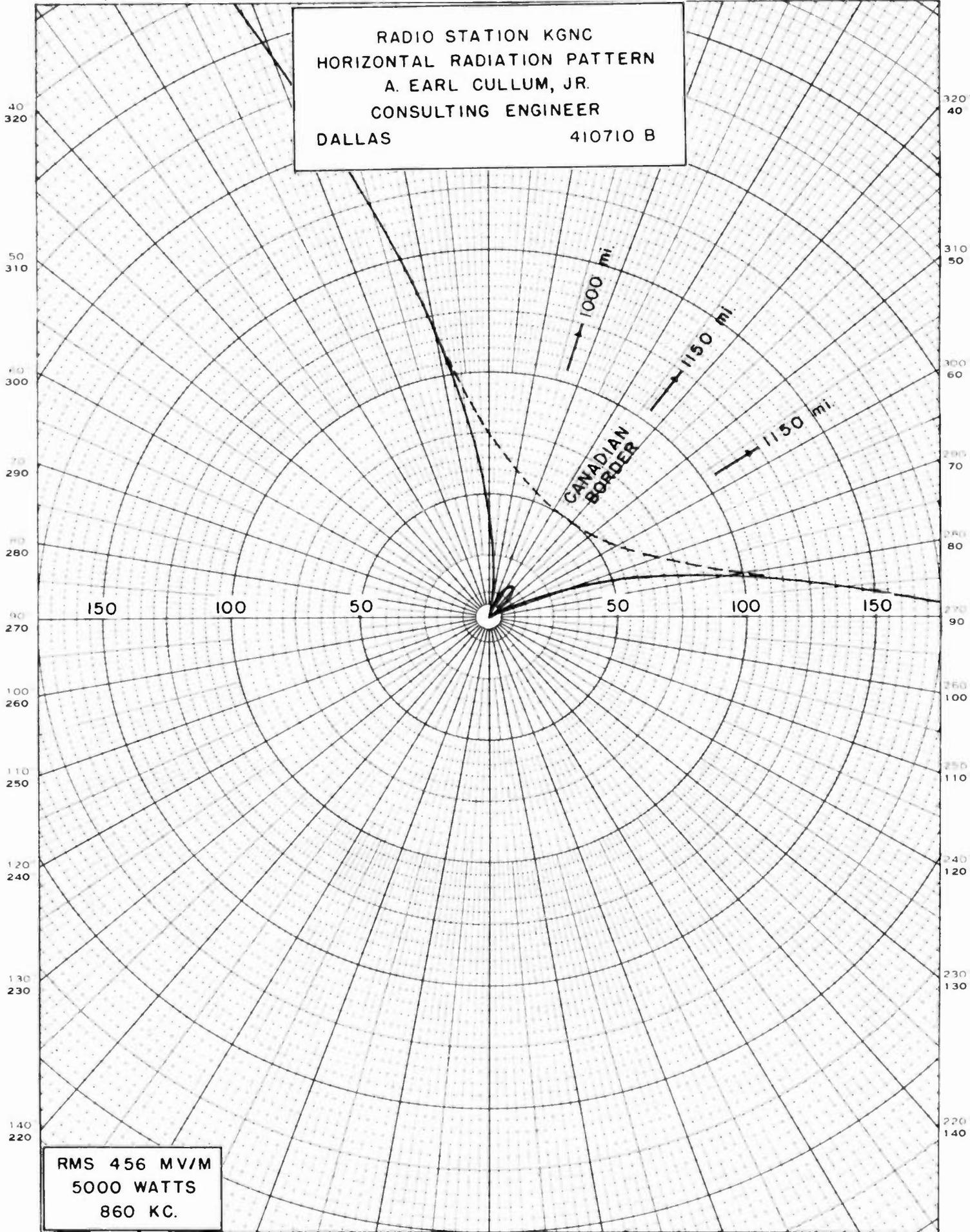
180° 180°

190° 170°

200° 160°

210° 150°

RADIO STATION KGNC  
HORIZONTAL RADIATION PATTERN  
A. EARL CULLUM, JR.  
CONSULTING ENGINEER  
DALLAS 410710 B



RMS 456 MV/M  
5000 WATTS  
860 KC.

**A. EARL CULLUM, JR.**  
**CONSULTING RADIO ENGINEER**  
**HIGHLAND PARK VILLAGE**  
**DALLAS, TEXAS**

**RADIO STATION KGNC**

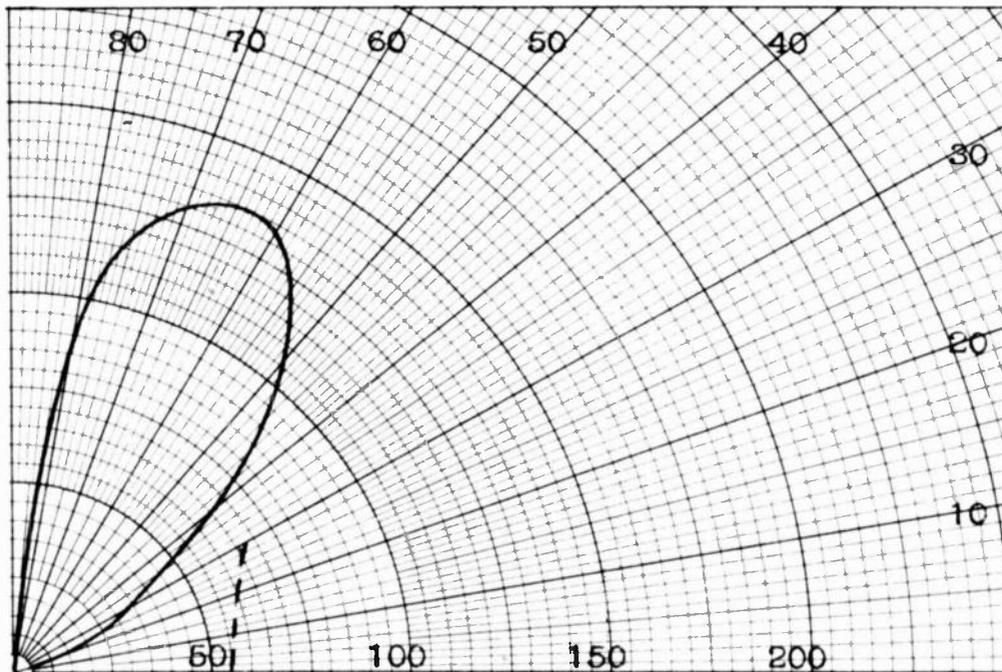
**HORIZONTAL RADIATION PATTERN**

| BEARINGS        | $\Phi$ | $F_1 (E)$ | $F_2 (E)$ | $E_{5000}$ |
|-----------------|--------|-----------|-----------|------------|
| 036.75 - 036.75 | 00     | 0.411     | 0.090     | 15.7       |
| 026.75 - 046.75 | 10     | 0.420     | 0.063     | 11.2       |
| 016.75 - 056.75 | 20     | 0.460     | 0.000     | 0.0        |
| 006.75 - 066.75 | 30     | 0.581     | 0.078     | 19.3       |
| 356.75 - 076.75 | 40     | 0.788     | 0.200     | 67.0       |
| 346.75 - 086.75 | 50     | 1.050     | 0.347     | 155.       |
| 336.75 - 096.75 | 60     | 1.309     | 0.518     | 288.       |
| 326.75 - 106.75 | 70     | 1.505     | 0.702     | 449.       |
| 316.75 - 116.75 | 80     | 1.590     | 0.890     | 601.       |
| 306.75 - 126.75 | 90     | 1.529     | 1.074     | 698.       |
| 296.75 - 136.75 | 100    | 1.328     | 1.248     | 704.       |
| 286.75 - 146.75 | 110    | 1.023     | 1.400     | 609.       |
| 276.75 - 156.75 | 120    | 0.687     | 1.532     | 447.       |
| 266.75 - 166.75 | 130    | 0.441     | 1.640     | 307.       |
| 256.75 - 176.75 | 140    | 0.452     | 1.720     | 331.       |
| 246.75 - 186.75 | 150    | 0.618     | 1.780     | 467.       |
| 236.75 - 196.75 | 160    | 0.773     | 1.790     | 588.       |
| 226.75 - 206.75 | 170    | 0.871     | 1.842     | 682.       |
| 216.75 - 216.75 | 180    | 0.902     | 1.850     | 709.       |

EXHIBIT 6C

**A. EARL CULLUM, JR.**  
CONSULTING RADIO ENGINEER  
HIGHLAND PARK VILLAGE  
DALLAS, TEXAS

KGNC DIRECTIVE ARRAY  
VERTICAL RADIATION PATTERN  
IN PLANES N 16.75 E AND N 56.75 E  
THROUGH NULLS TOWARD CANADIAN BORDER



P 5000

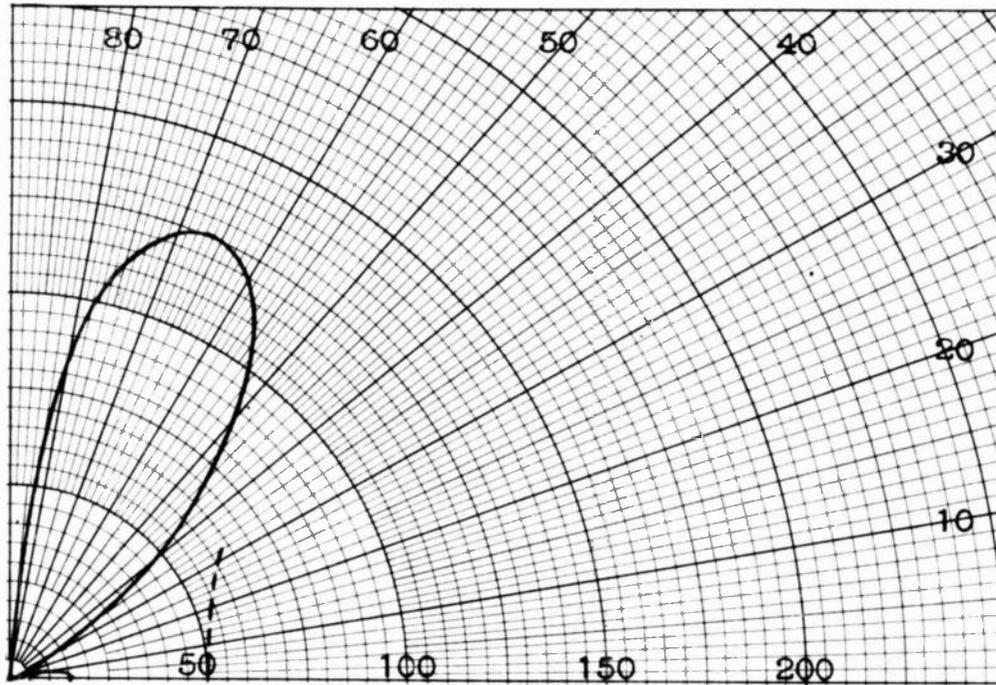
$\psi$  20

| $\theta$ | $F_1$ (E) | $F_2$ (E) | $F_x$ (E) | $E_{5000}$ |
|----------|-----------|-----------|-----------|------------|
| 00       | 0.461     | 0.000     | 1.000     | 0.0        |
| 10       | 0.479     | 0.000     | 0.978     | 0.0        |
| 20       | 0.543     | 0.078     | 0.914     | 16.6       |
| 30       | 0.687     | 0.141     | 0.816     | 33.6       |
| 40       | 0.838     | 0.253     | 0.694     | 66.2       |
| 50       | 1.127     | 0.395     | 0.560     | 106.0      |
| 60       | 1.355     | 0.553     | 0.416     | 132.4      |
| 70       | 1.525     | 0.726     | 0.275     | 129.3      |
| 80       | 1.590     | 0.903     | 0.140     | 85.4       |
| 90       | -----     | -----     | 0.000     | 0.0        |

EXHIBIT 7A

**A. EARL CULLUM, JR.**  
CONSULTING RADIO ENGINEER  
HIGHLAND PARK VILLAGE  
DALLAS, TEXAS

KGNC DIRECTIVE ARRAY  
VERTICAL RADIATION PATTERN  
IN PLANE N 36.75 E  
THROUGH SMALL LOBE IN LINE OF TOWERS



P 5000

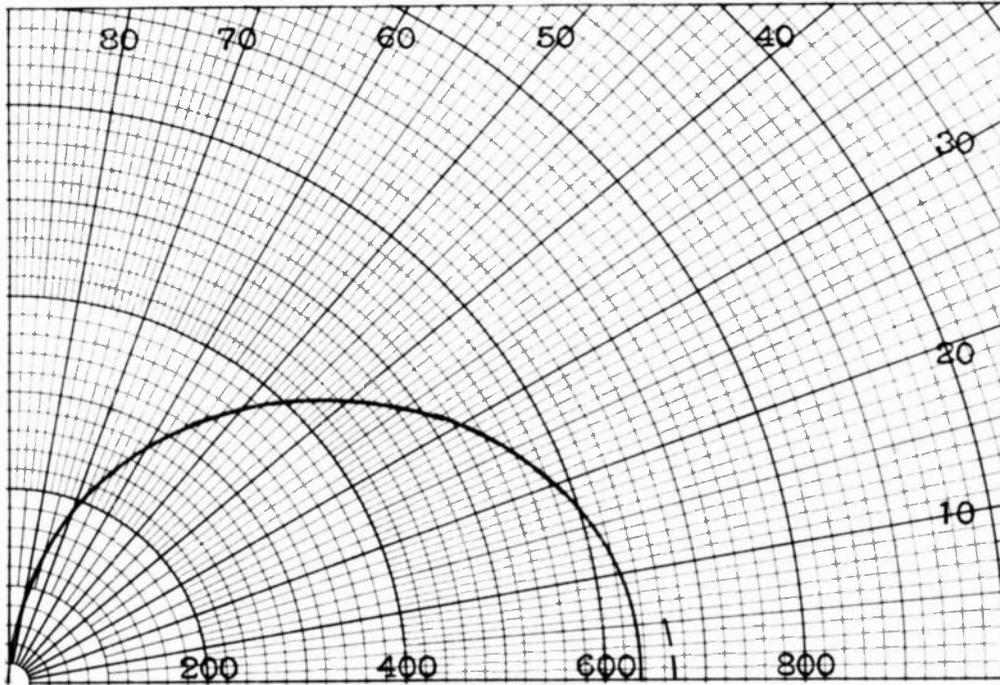
Φ 0

| $\theta$ | $F_1 (E)$ | $F_2 (E)$ | $F_x (E)$ | $E_{5000}$ |
|----------|-----------|-----------|-----------|------------|
| 00       | 0.411     | 0.090     | 1.000     | 15.7       |
| 10       | 0.420     | 0.063     | 0.978     | 11.0       |
| 20       | 0.460     | 0.000     | 0.914     | 0.0        |
| 30       | 0.581     | 0.078     | 0.816     | 15.7       |
| 40       | 0.788     | 0.200     | 0.694     | 46.5       |
| 50       | 1.050     | 0.347     | 0.560     | 86.8       |
| 60       | 1.309     | 0.518     | 0.416     | 119.8      |
| 70       | 1.505     | 0.702     | 0.275     | 123.6      |
| 80       | 1.590     | 0.890     | 0.140     | 84.2       |
| 90       | -.----    | -.----    | 0.000     | 0.0        |

EXHIBIT 7B

A. EARL CULLUM, JR.  
CONSULTING RADIO ENGINEER  
HIGHLAND PARK VILLAGE  
DALLAS, TEXAS

KGNC DIRECTIVE ARRAY  
VERTICAL RADIATION PATTERN  
IN PLANE N 119.5 E  
TOWARD HAVANA, CUBA



P 5000

$\Phi$  82.75

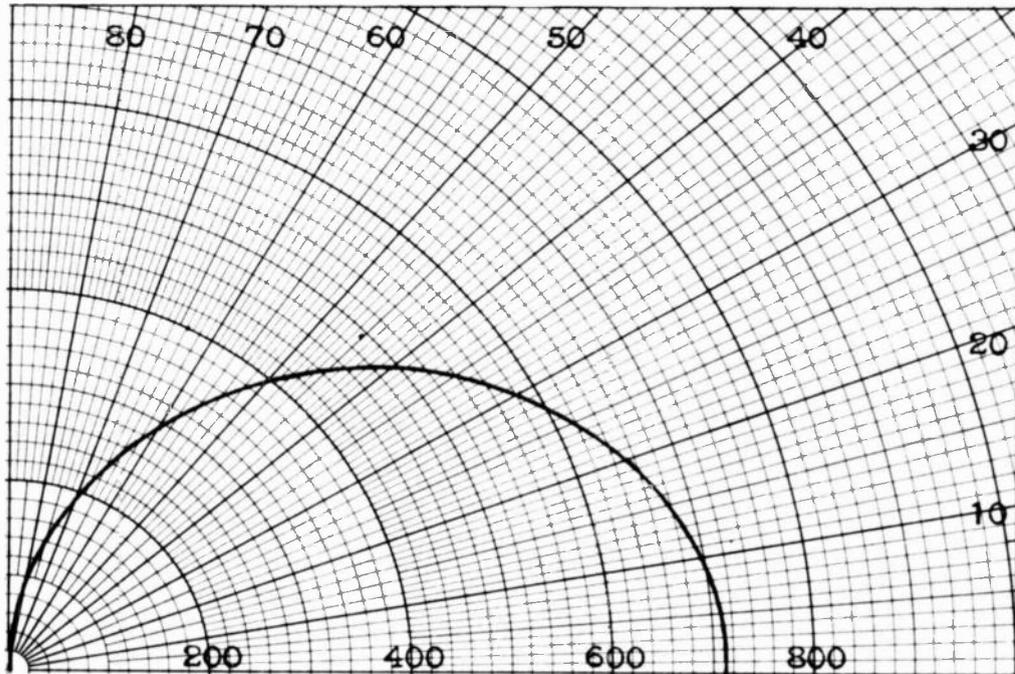
| $\theta$ | $F_1$ (E) | $F_2$ (E) | $F_x$ (E) | $E_{5000}$ |
|----------|-----------|-----------|-----------|------------|
| 00       | 1.587     | 0.942     | 1.000     | 635.       |
| 10       | 1.587     | 0.944     | 0.978     | 622.       |
| 20       | 1.586     | 0.951     | 0.914     | 585.       |
| 30       | 1.585     | 0.960     | 0.816     | 528.       |
| 40       | 1.582     | 0.973     | 0.694     | 454.       |
| 50       | 1.575     | 0.990     | 0.560     | 371.       |
| 60       | 1.568     | 1.010     | 0.416     | 280.       |
| 70       | 1.557     | 1.030     | 0.275     | 188.       |
| 80       | 1.544     | 1.054     | 0.140     | 97.        |
| 90       | -----     | -----     | 0.000     | 0.         |

$\theta$  CMBL APPROX. 0 DEGREES WITH DISTANCE 1450 MILES.

EXHIBIT 7C

**A. EARL CULLUM, JR.**  
CONSULTING RADIO ENGINEER  
HIGHLAND PARK VILLAGE  
DALLAS, TEXAS

KGNC DIRECTIVE ARRAY  
VERTICAL RADIATION PATTERN  
IN PLANES N 132.75 E AND N 300.75 E  
THROUGH MAXIMA BROADSIDE TO TOWERS



P 5000

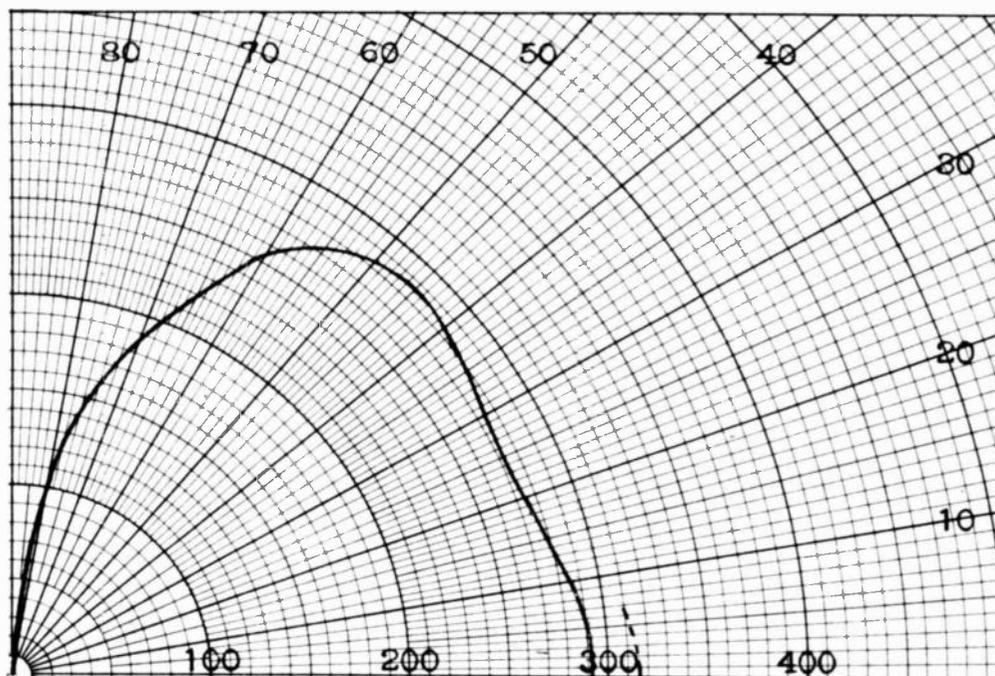
$\Phi$  96

| $\theta$ | $F_1 (E)$ | $F_2 (E)$ | $F_x (E)$ | $E_{5000}$ |
|----------|-----------|-----------|-----------|------------|
| 00       | 1.424     | 1.180     | 1.000     | 714.       |
| 10       | 1.425     | 1.178     | 0.978     | 697.       |
| 20       | 1.431     | 1.173     | 0.914     | 652.       |
| 30       | 1.442     | 1.165     | 0.816     | 583.       |
| 40       | 1.452     | 1.156     | 0.694     | 495.       |
| 50       | 1.467     | 1.144     | 0.560     | 399.       |
| 60       | 1.483     | 1.128     | 0.416     | 295.       |
| 70       | 1.498     | 1.111     | 0.275     | 195.       |
| 80       | 1.517     | 1.094     | 0.140     | 99.        |
| 90       | -.----    | -.----    | 0.000     | 0.         |

EXHIBIT 7D

**A. EARL CULLUM, JR.**  
CONSULTING RADIO ENGINEER  
HIGHLAND PARK VILLAGE  
DALLAS, TEXAS

KGNC DIRECTIVE ARRAY  
VERTICAL RADIATION PATTERN  
IN PLANE N 171 E  
THROUGH NULL TOWARD MEXICO, D. F.



P 5000

$\phi$  134.25

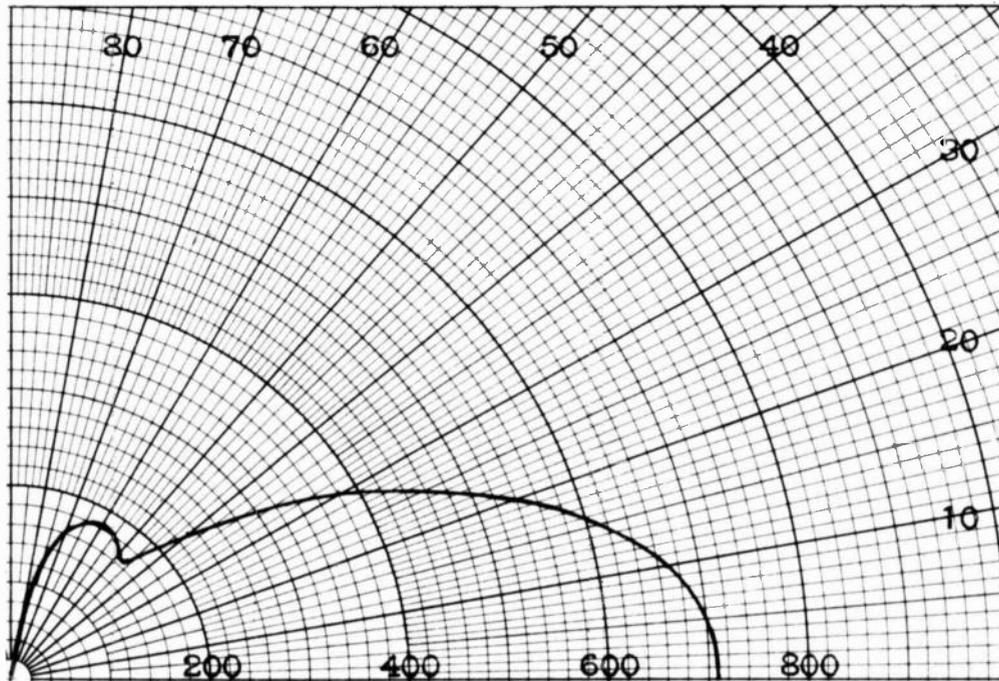
| $\theta$ | $F_1 (E)$ | $F_2 (E)$ | $F_x (E)$ | $E_{5000}$ |
|----------|-----------|-----------|-----------|------------|
| 00       | 0.410     | 1.675     | 1.000     | 292.       |
| 10       | 0.411     | 1.670     | 0.978     | 285.       |
| 20       | 0.428     | 1.640     | 0.914     | 273.       |
| 30       | 0.490     | 1.610     | 0.816     | 273.       |
| 40       | 0.614     | 1.560     | 0.694     | 283.       |
| 50       | 0.797     | 1.492     | 0.560     | 283.       |
| 60       | 1.008     | 1.422     | 0.416     | 253.       |
| 70       | 1.220     | 1.307     | 0.275     | 186.       |
| 80       | 1.402     | 1.196     | 0.140     | 100.       |
| 90       | -.----    | -.----    | 0.000     | 0.         |

$\theta$  XEXX APPROX. 3 DEGREES WITH DISTANCE 1105 MILES.

EXHIBIT 7E

**A. EARL CULLUM, JR.**  
**CONSULTING RADIO ENGINEER**  
**HIGHLAND PARK VILLAGE**  
**DALLAS, TEXAS**

**KGNC DIRECTIVE ARRAY**  
**VERTICAL RADIATION PATTERN**  
**IN PLANE N 216.75 E**  
**THROUGH MAXIMUM IN LINE OF TOWERS**



P 5000

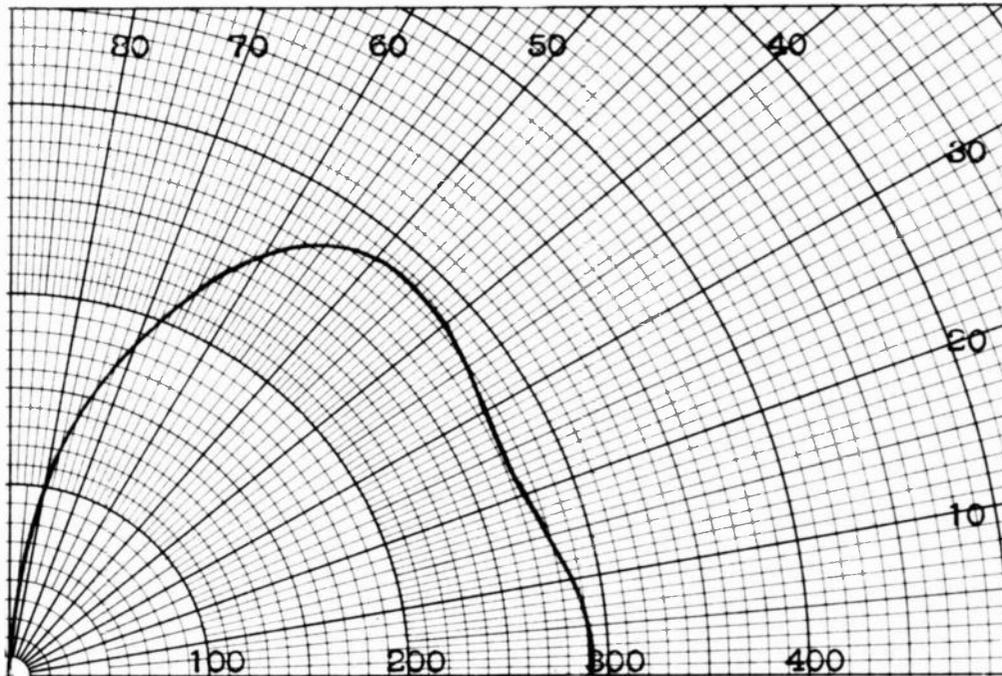
$\Phi$  180

| $\theta$ | $F_1 (E)$ | $F_2 (E)$ | $F_x (E)$ | $E_{5000}$ |
|----------|-----------|-----------|-----------|------------|
| 00       | 0.902     | 1.850     | 1.000     | 709.       |
| 10       | 0.871     | 1.842     | 0.978     | 667.       |
| 20       | 0.773     | 1.790     | 0.914     | 538.       |
| 30       | 0.618     | 1.780     | 0.816     | 381.       |
| 40       | 0.452     | 1.720     | 0.694     | 229.       |
| 50       | 0.441     | 1.640     | 0.560     | 172.       |
| 60       | 0.687     | 1.532     | 0.416     | 186.       |
| 70       | 1.023     | 1.378     | 0.275     | 165.       |
| 80       | 1.328     | 1.248     | 0.140     | 99.        |
| 90       | -.----    | -.----    | 0.000     | 0.         |

EXHIBIT 7F

**A. EARL CULLUM, JR.**  
CONSULTING RADIO ENGINEER  
HIGHLAND PARK VILLAGE  
DALLAS, TEXAS

KGNC DIRECTIVE ARRAY  
VERTICAL RADIATION PATTERN  
IN PLANE N 262.5 E  
THROUGH NULL TOWARD TIJUANA



P 5000

$\Phi$  134.25

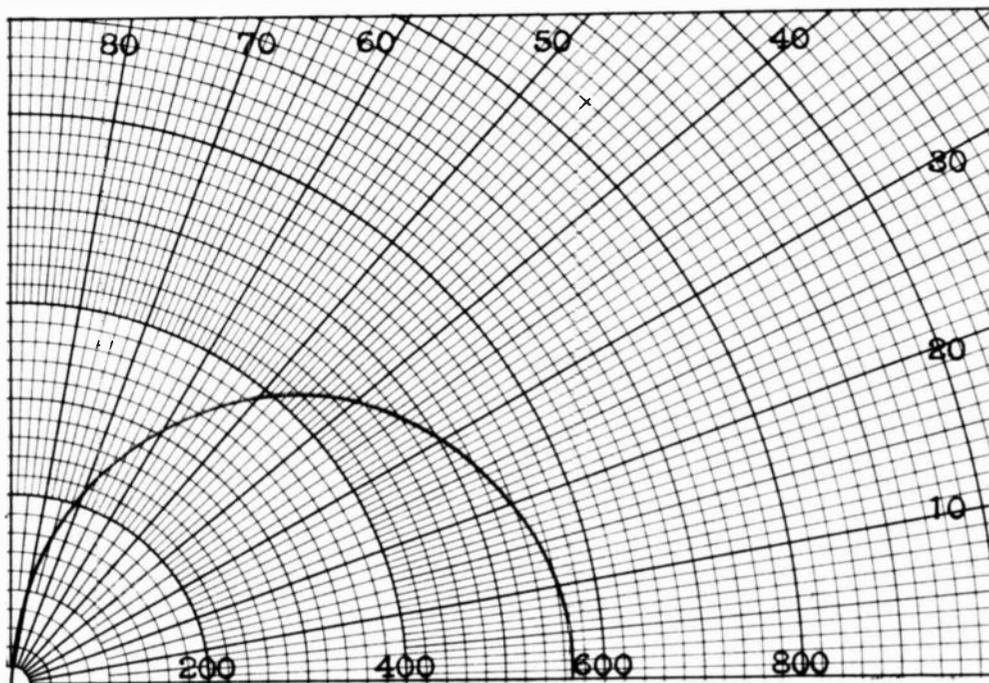
| $\theta$ | $F_1 (E)$ | $F_2 (E)$ | $F_x (E)$ | $E_{5000}$ |
|----------|-----------|-----------|-----------|------------|
| 00       | 0.410     | 1.675     | 1.000     | 292.       |
| 10       | 0.411     | 1.670     | 0.978     | 285.       |
| 20       | 0.428     | 1.640     | 0.914     | 273.       |
| 30       | 0.400     | 1.610     | 0.816     | 273.       |
| 40       | 0.614     | 1.560     | 0.694     | 283.       |
| 50       | 0.797     | 1.492     | 0.560     | 283.       |
| 60       | 1.008     | 1.422     | 0.416     | 253.       |
| 70       | 1.220     | 1.307     | 0.275     | 186.       |
| 80       | 1.420     | 1.196     | 0.140     | 100.       |
| 90       | -.----    | -.----    | 0.000     | 0.         |

$\theta$  XEMO APPROX. 5 DEGREES WITH DISTANCE 910 MILES.

EXHIBIT 7G

A. EARL CULLUM, JR.  
CONSULTING RADIO ENGINEER  
HIGHLAND PARK VILLAGE  
DALLAS, TEXAS

KGNC DIRECTIVE ARRAY  
VERTICAL RADIATION PATTERN  
IN PLANE N 284.0 E  
TOWARD MODESTO, CALIFORNIA



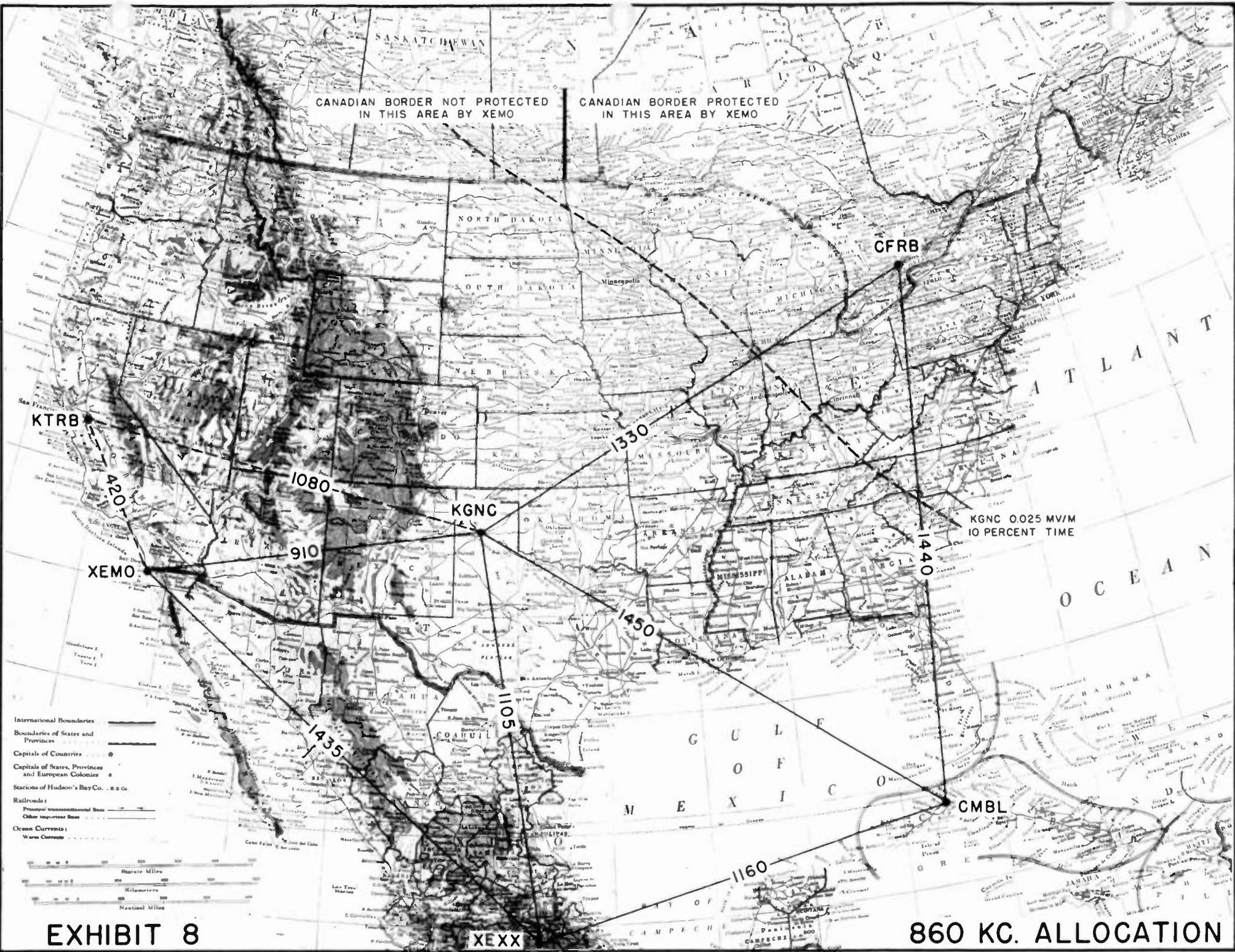
P 5000

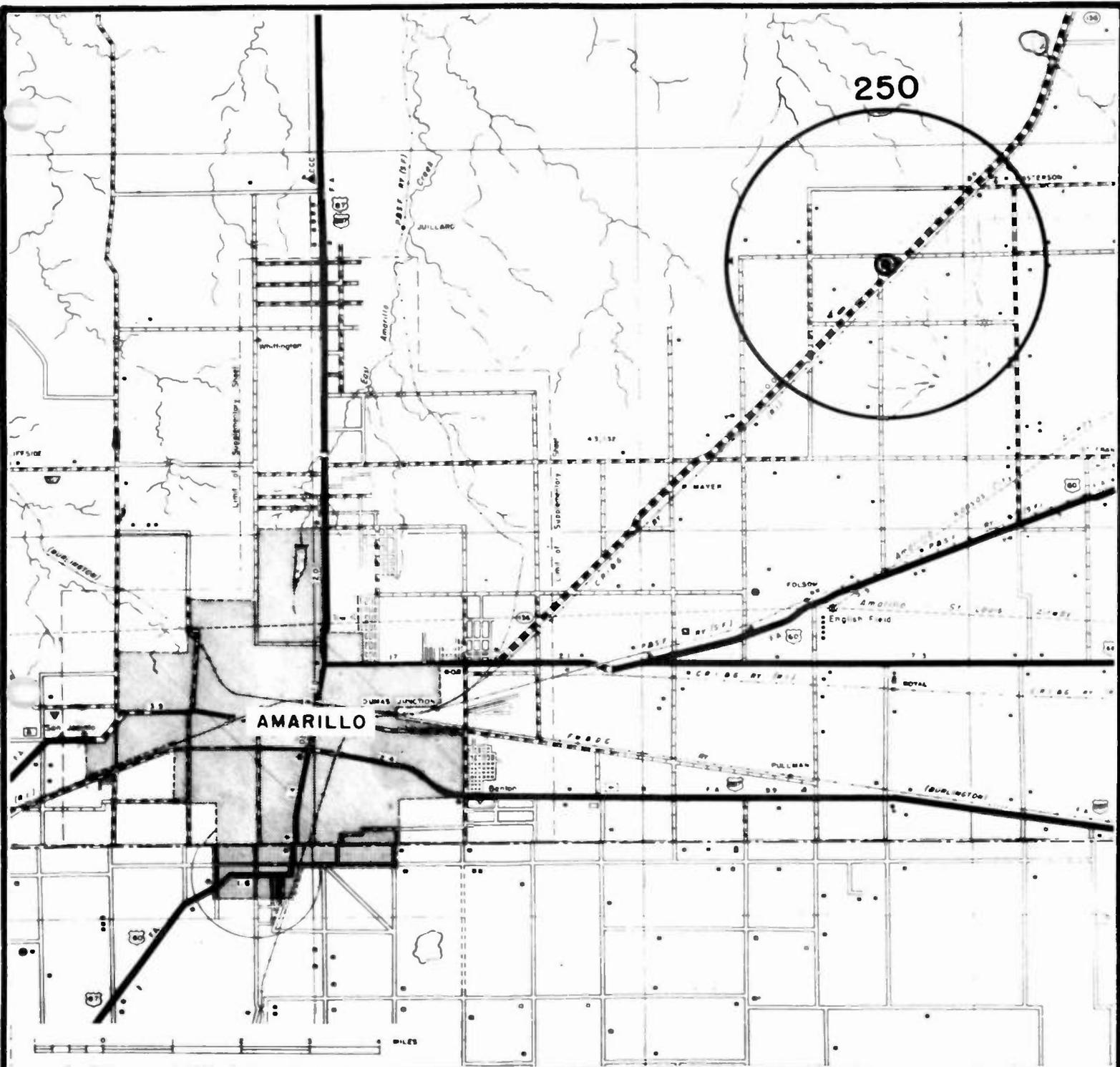
$\Phi$  112.75

| $\theta$ | $F_1(E)$ | $F_2(E)$ | $F_x(E)$ | $E_{5000}$ |
|----------|----------|----------|----------|------------|
| 00       | 0.930    | 1.440    | 1.000    | 569.       |
| 10       | 0.942    | 1.434    | 0.978    | 561.       |
| 20       | 0.978    | 1.414    | 0.914    | 537.       |
| 30       | 1.037    | 1.404    | 0.816    | 505.       |
| 40       | 1.117    | 1.387    | 0.694    | 457.       |
| 50       | 1.203    | 1.367    | 0.560    | 391.       |
| 60       | 1.296    | 1.342    | 0.416    | 307.       |
| 70       | 1.387    | 1.314    | 0.275    | 213.       |
| 80       | 1.466    | 1.285    | 0.140    | 112.       |
| 90       | -.---    | -.---    | 0.000    | 0.         |

$\theta$  KTRB APPROX. 2 DEGREES WITH DISTANCE 1080 MILES.

EXHIBIT 7H





AMARILLO, TEXAS

AND SURROUNDING TERRITORY

A. EARL CULLUM, JR.

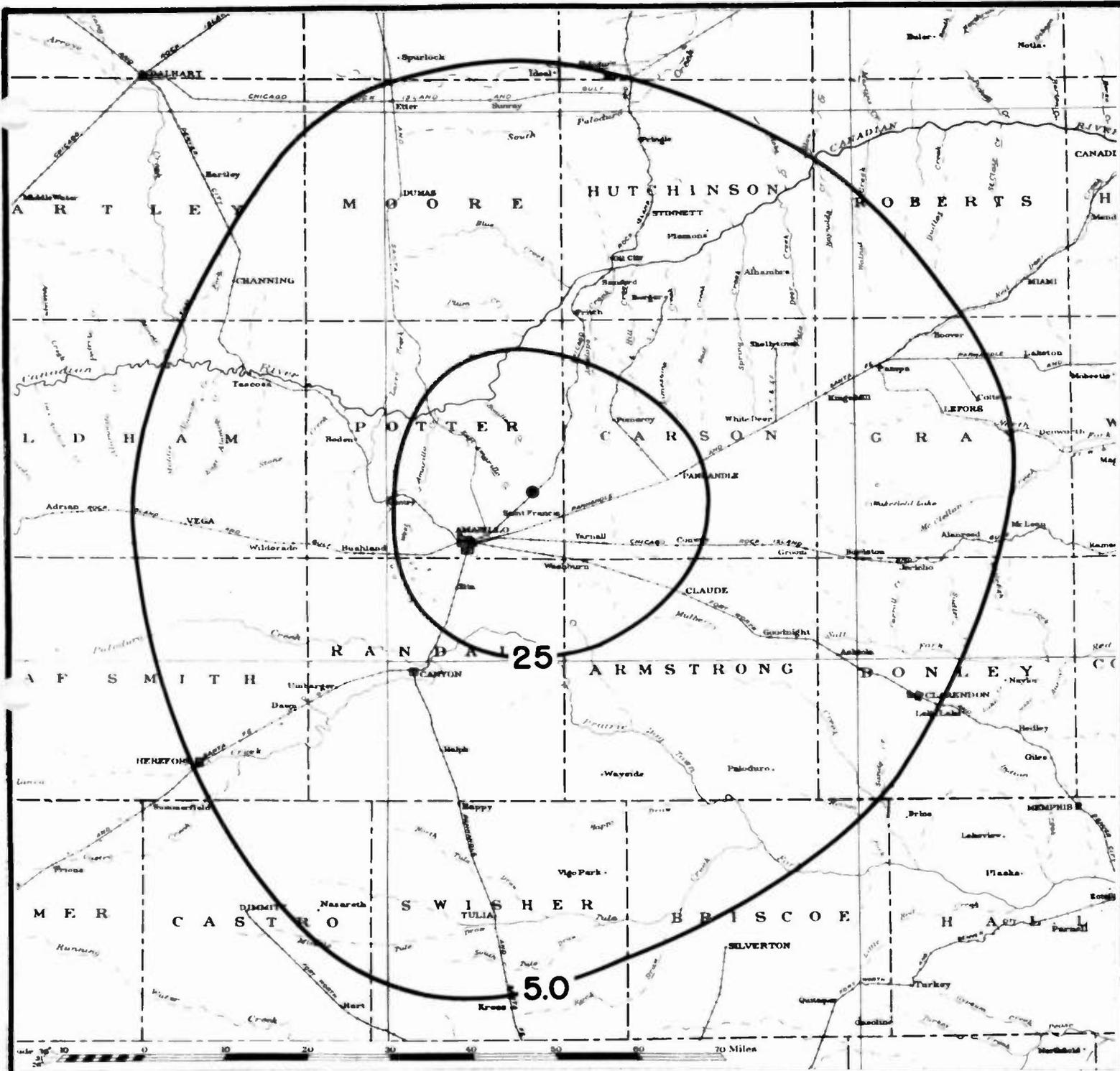
CONSULTING RADIO ENGINEER

RADIO STATION KGNC

PROPOSED OPERATION

860 KC. 10,000 WATTS

EXHIBIT NUMBER 9A



AMARILLO, TEXAS

AND SURROUNDING TERRITORY

A. EARL CULLUM, JR.

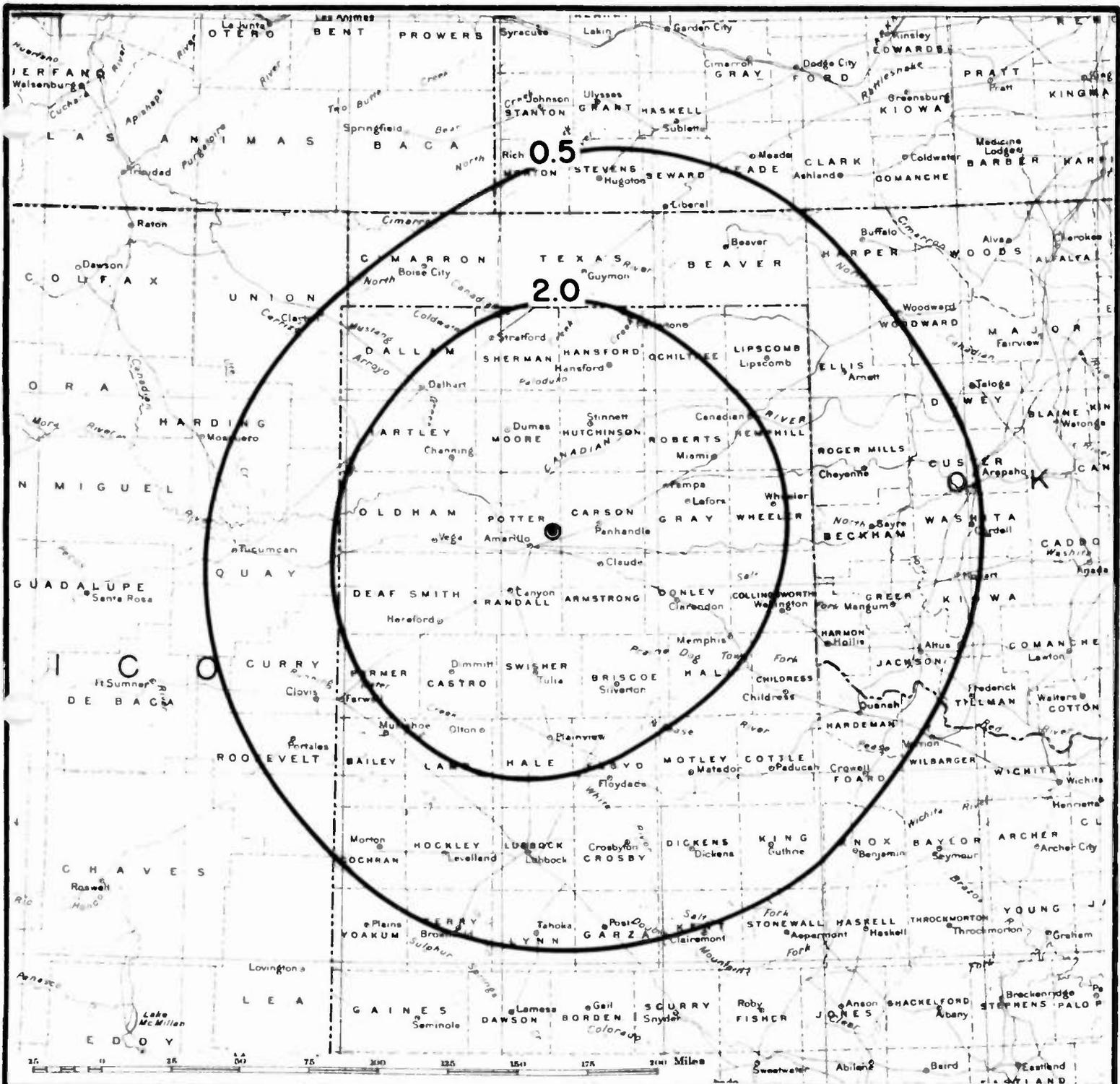
CONSULTING RADIO ENGINEER

RADIO STATION KGNC

PROPOSED OPERATION

860 KC. 10,000 WATTS

EXHIBIT NUMBER 93



AMARILLO, TEXAS

AND SURROUNDING TERRITORY

A. EARL CULLUM, JR.

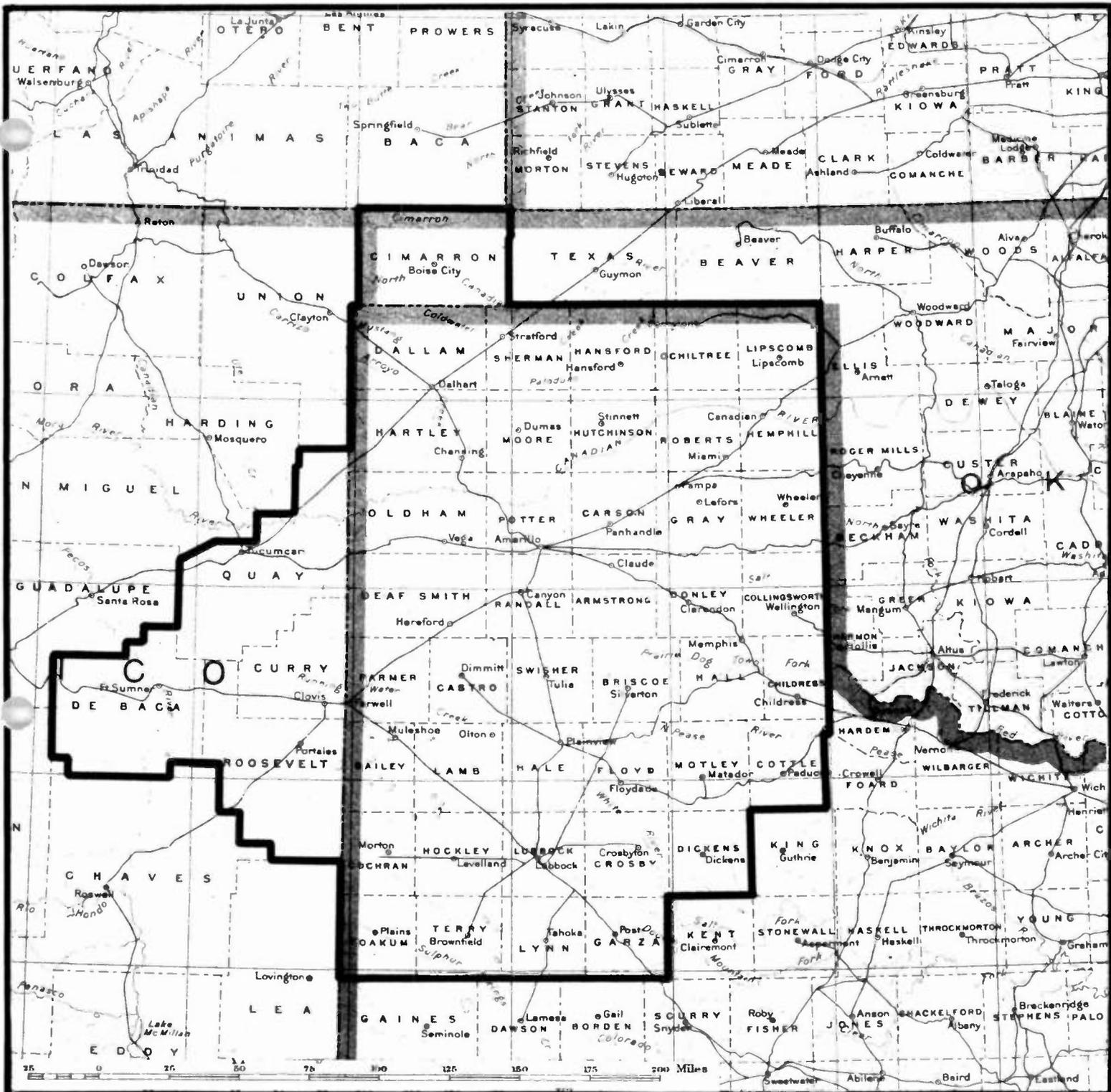
CONSULTING RADIO ENGINEER

RADIO STATION KGNC

PROPOSED OPERATION

860 KC. 10,000 WATTS

EXHIBIT NUMBER 9C



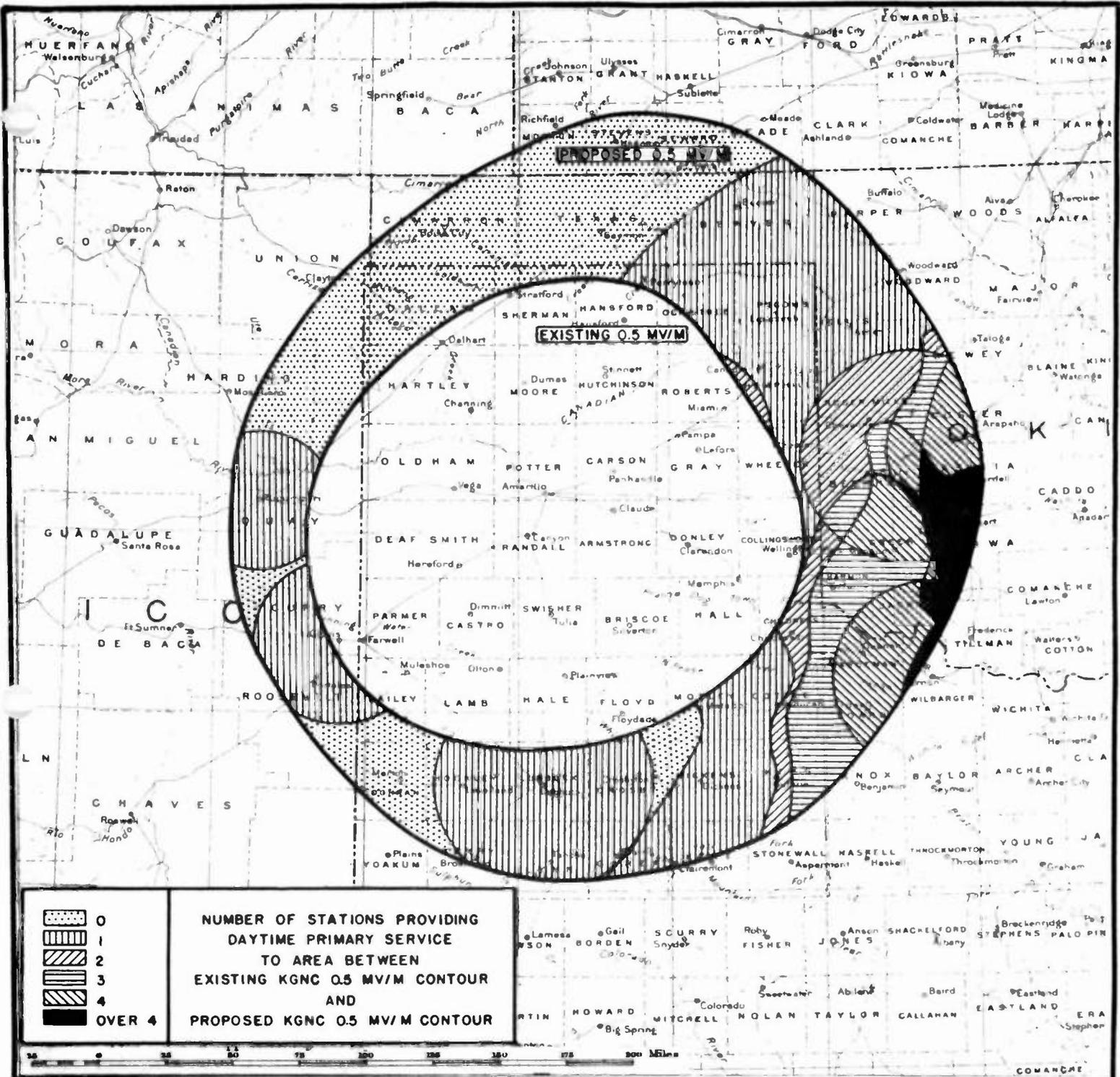
AMARILLO, TEXAS

AND SURROUNDING TERRITORY

RAND MCNALLY

MAJOR TRADING AREA

EXHIBIT NUMBER



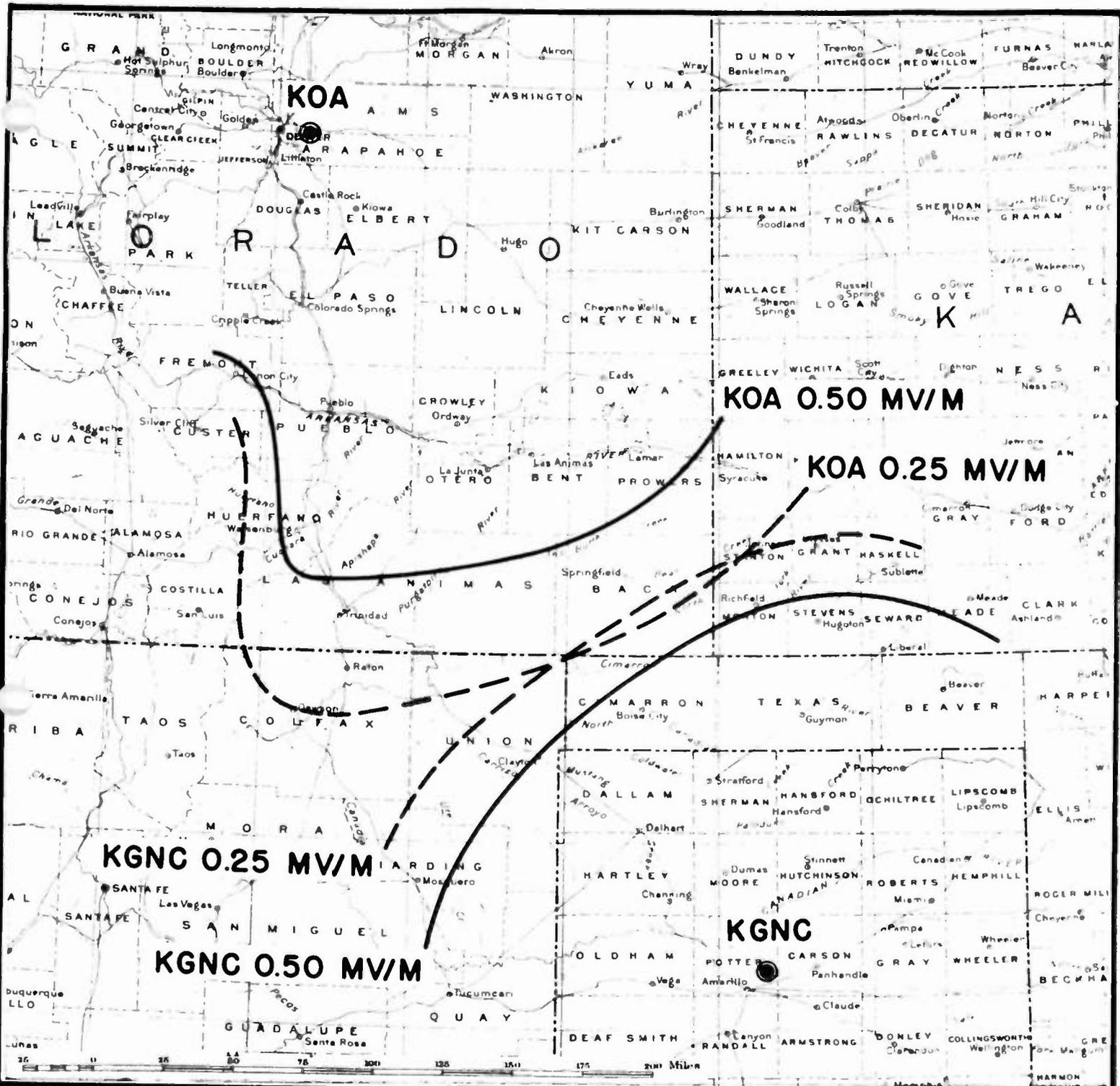
**AMARILLO, TEXAS  
AND SURROUNDING TERRITORY**

**A. EARL CULLUM, JR.**

**CONSULTING RADIO ENGINEER**

**EXISTING KGNC DAYTIME  
PROPOSED KGNC DAYTIME  
AND OTHER SERVICES**

**EXHIBIT NUMBER 9E**



AMARILLO, TEXAS

AND SURROUNDING TERRITORY

A. EARL CULLUM, JR.

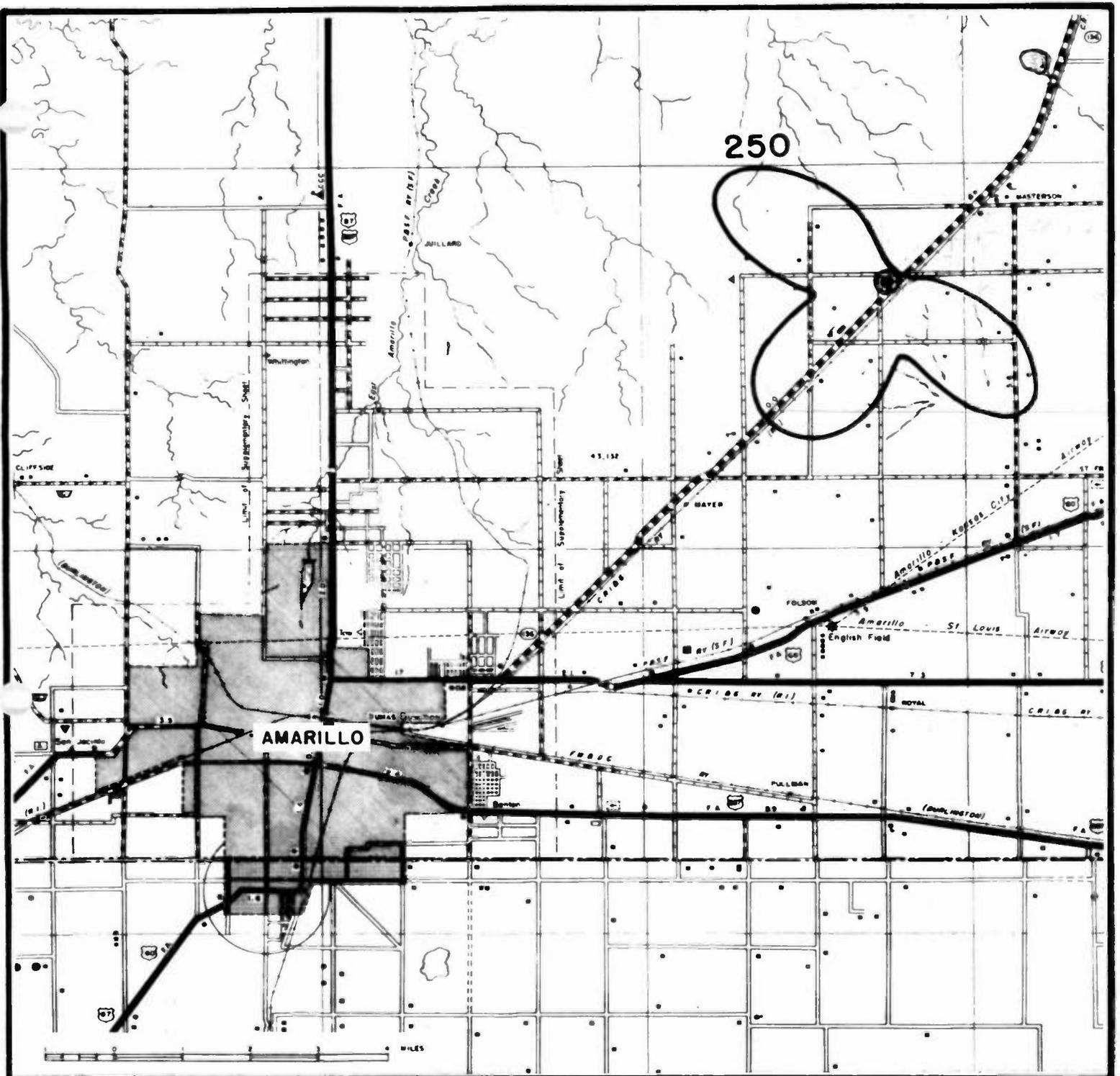
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RADIO STATION KGNC

PROPOSED OPERATION

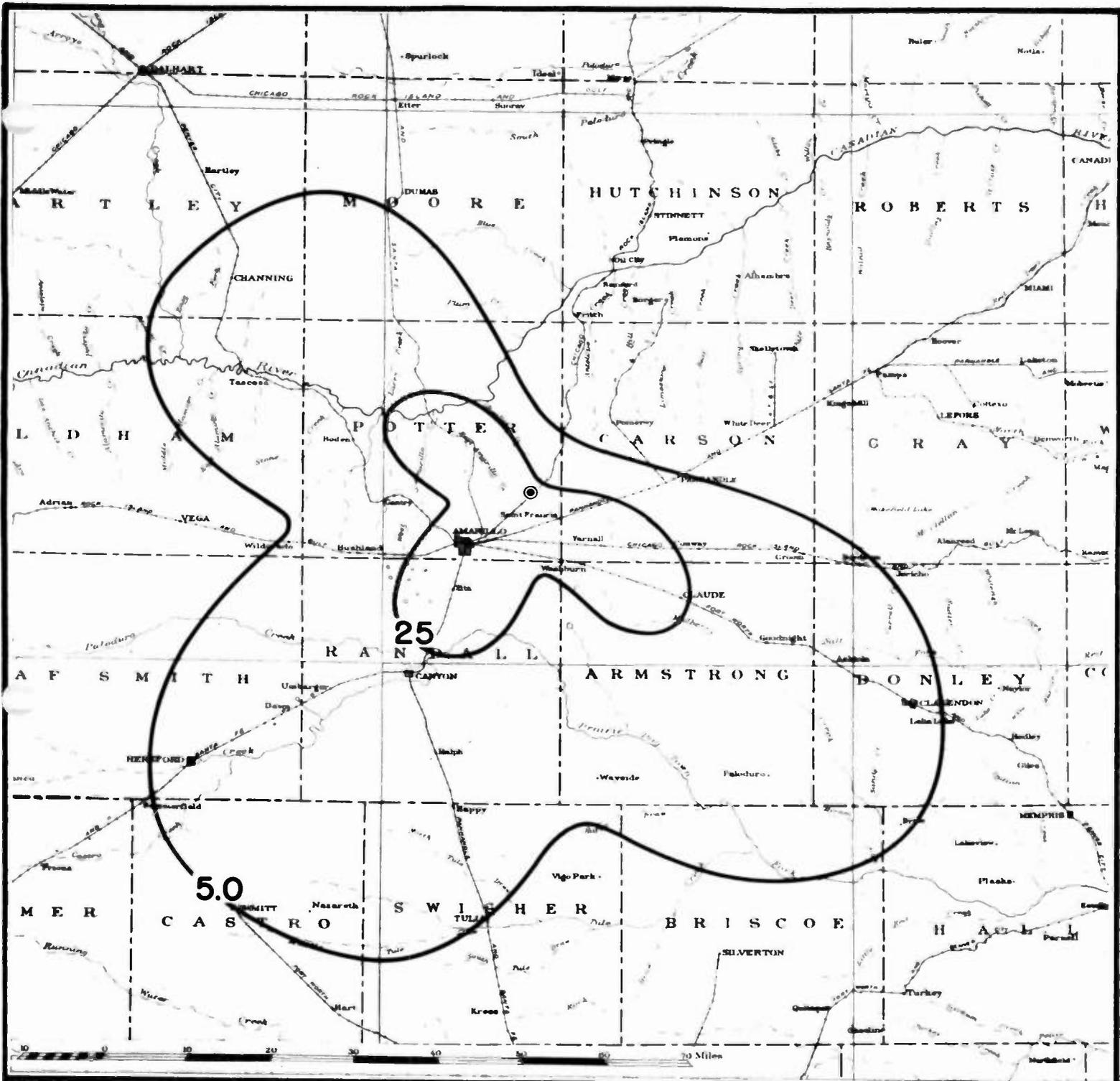
860 KC. 10,000 WATTS

EXHIBIT NUMBER 9F



AMARILLO, TEXAS  
 AND SURROUNDING TERRITORY  
 A. EARL CULLUM, JR.  
 CONSULTING RADIO ENGINEER

RADIO STATION KGNC  
 PROPOSED OPERATION  
 860 KC 5,000 WATTS-DA  
 EXHIBIT NUMBER 10A



AMARILLO, TEXAS

AND SURROUNDING TERRITORY

A. EARL CULLUM, JR.

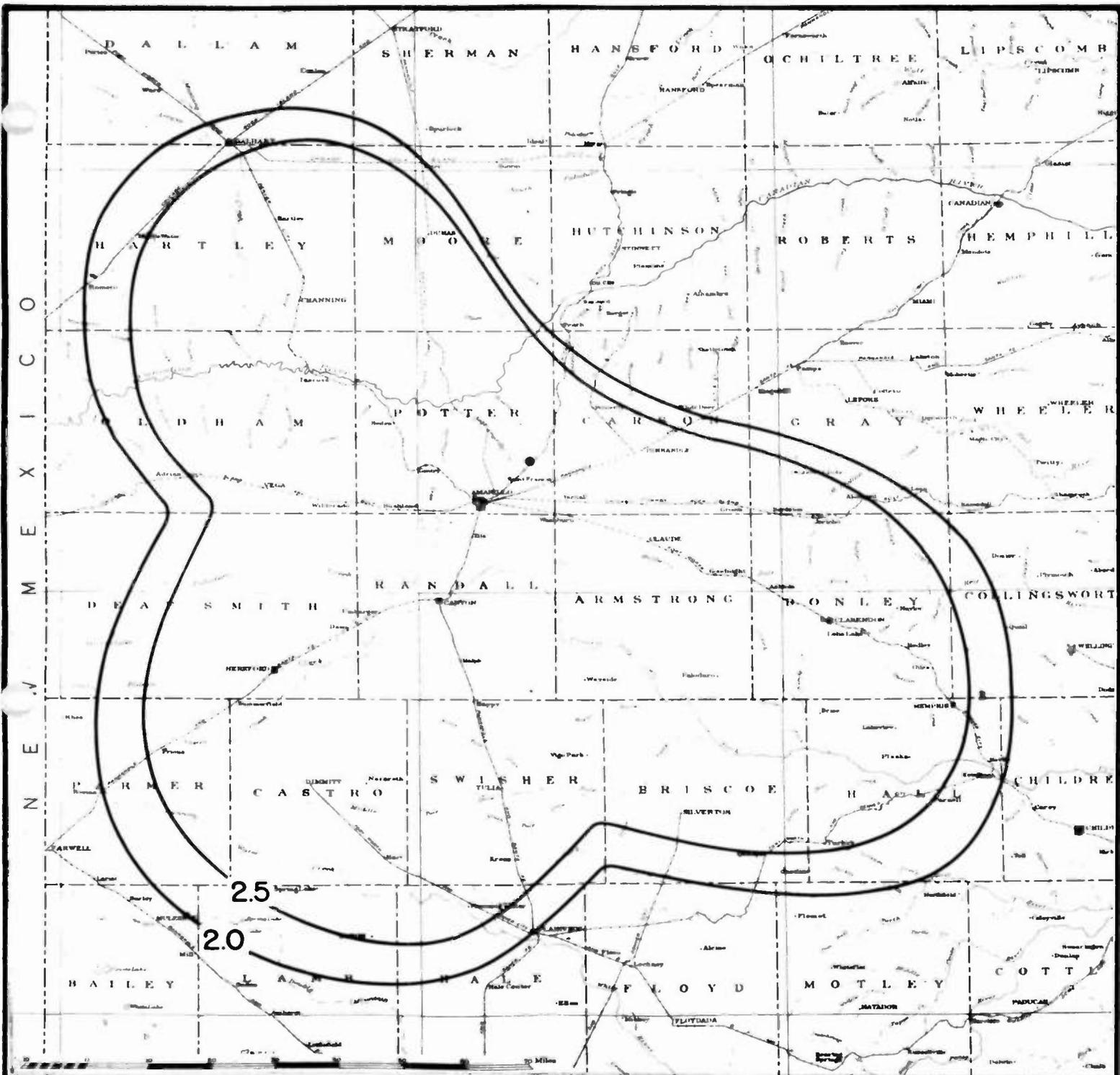
CONSULTING RADIO ENGINEER

RADIO STATION KGNC

PROPOSED OPERATION

860 KC 5,000 WATTS-DA

EXHIBIT NUMBER 108



AMARILLO, TEXAS

AND SURROUNDING TERRITORY

A. EARL CULLUM, JR.

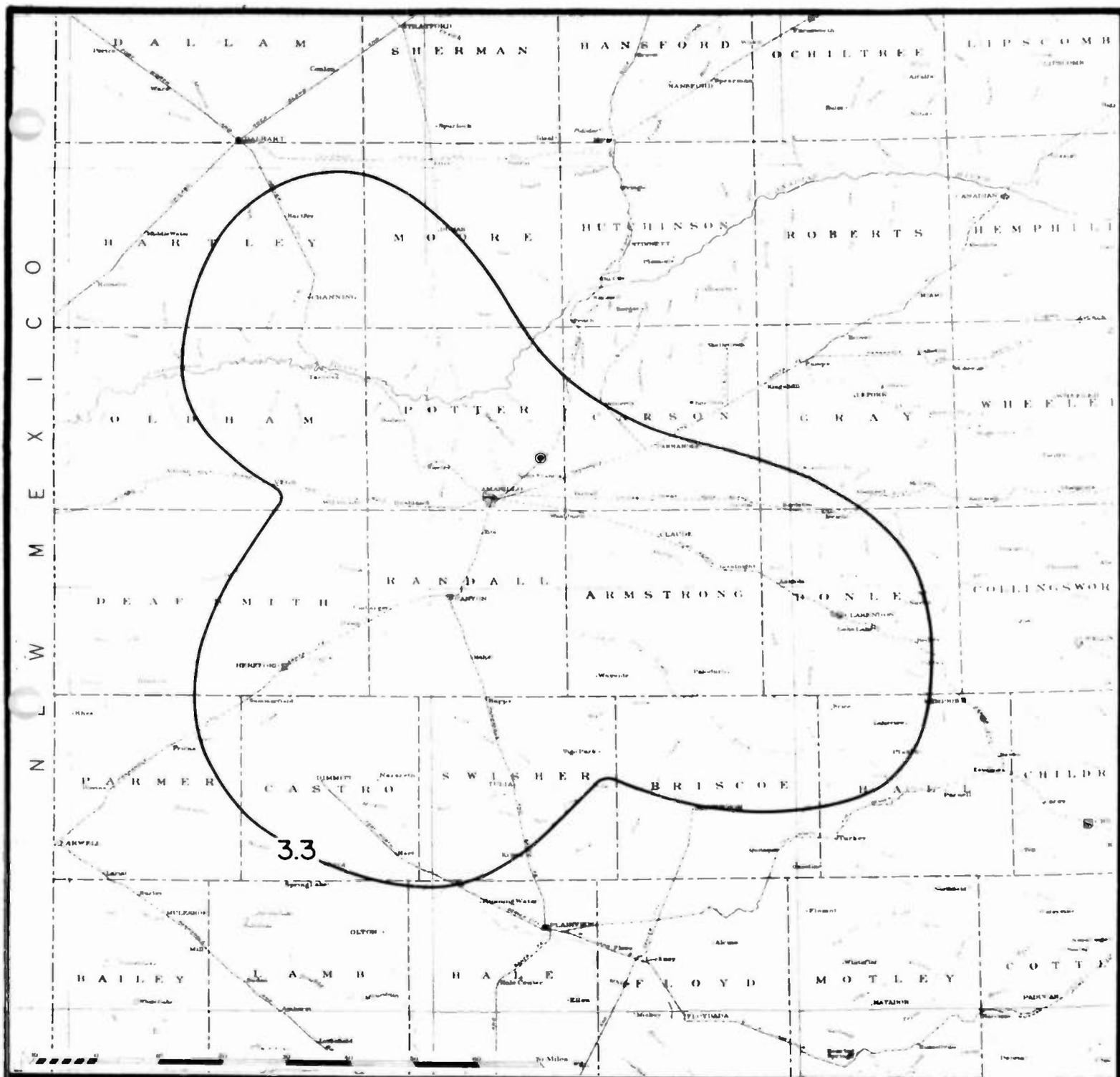
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RADIO STATION KGNC

PROPOSED OPERATION

860 KC 5,000 WATTS-DA

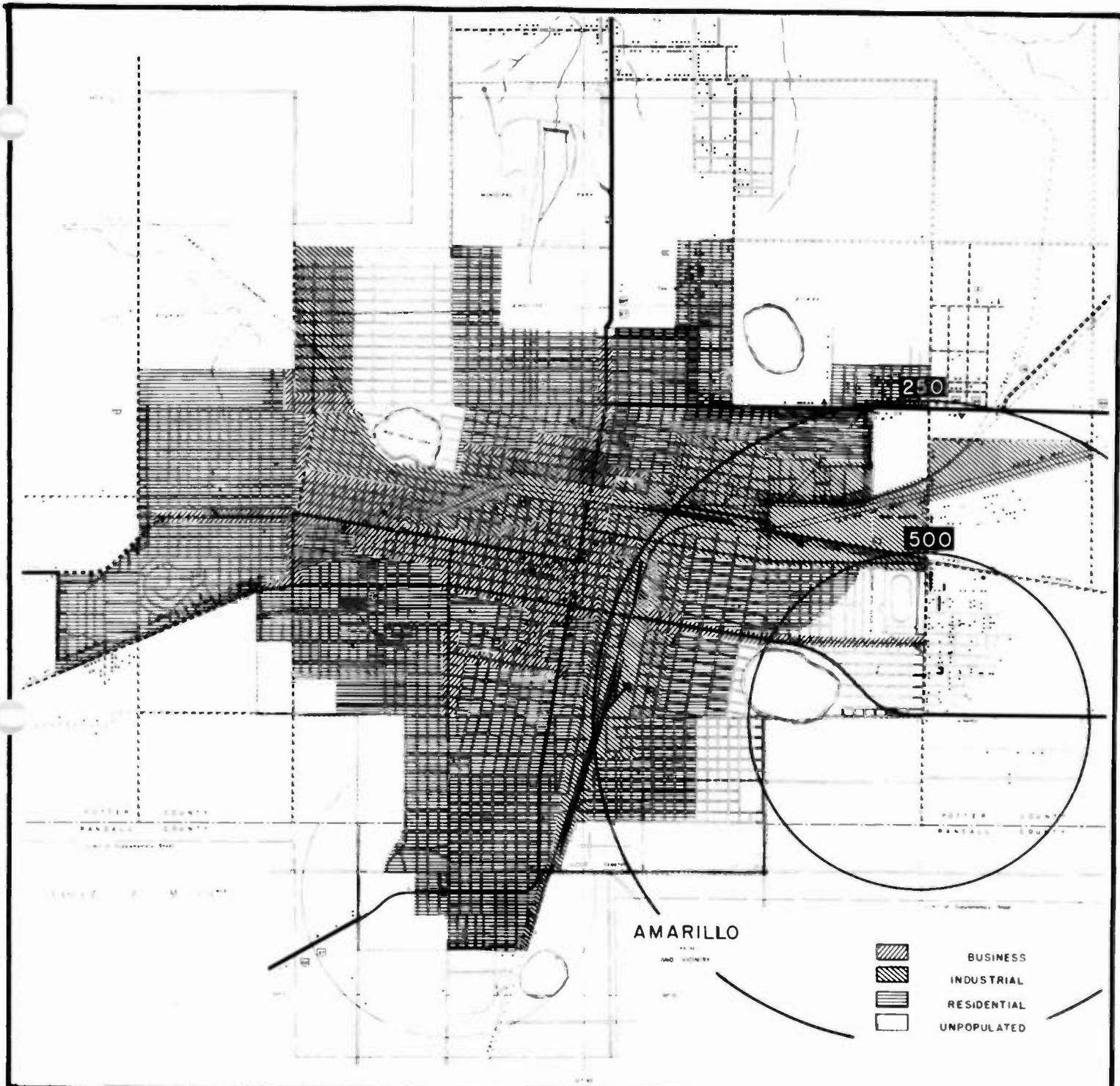
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**AMARILLO, TEXAS**  
**AND SURROUNDING TERRITORY**  
**A. EARL CULLUM, JR.**  
**CONSULTING RADIO ENGINEER**

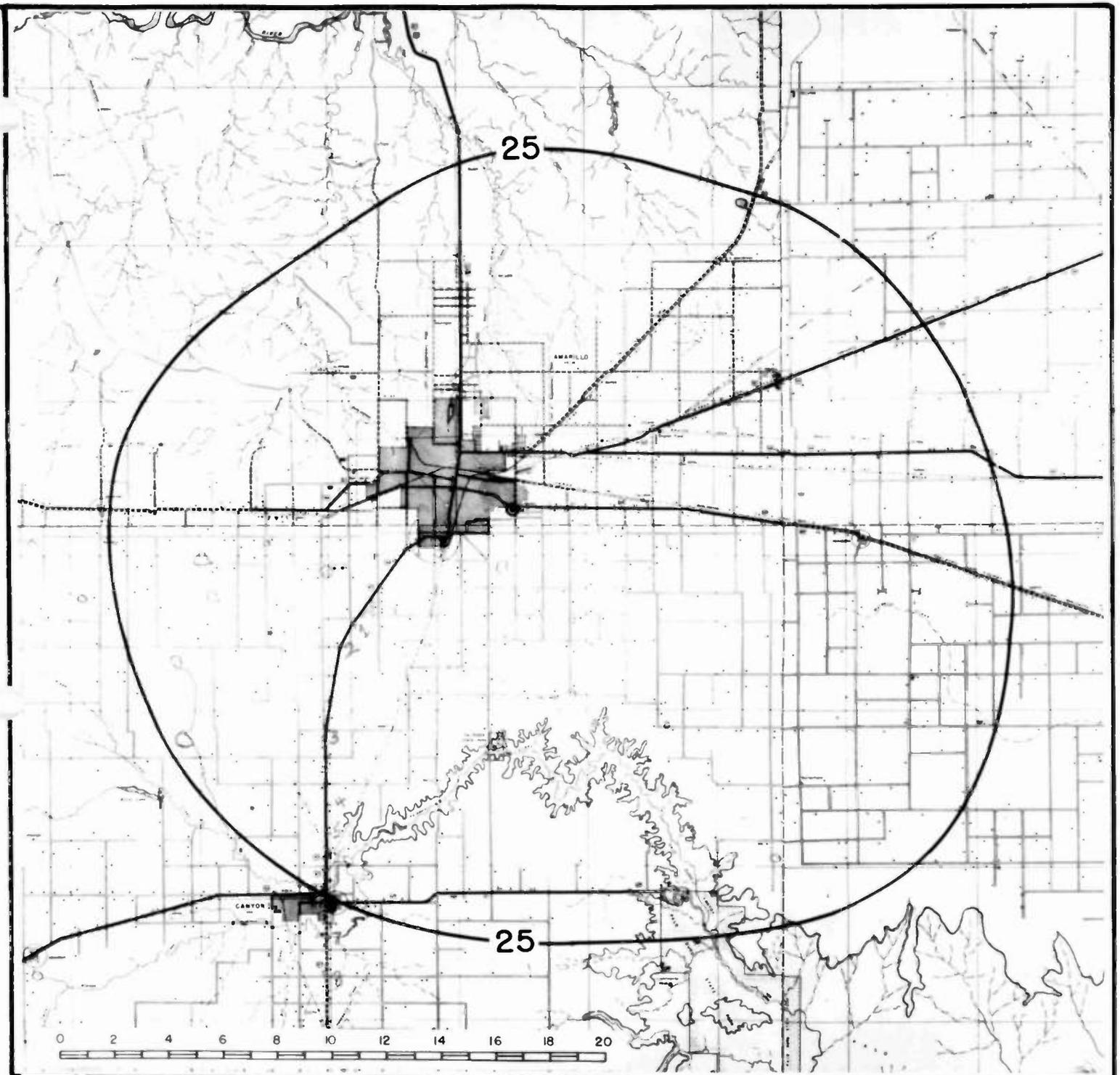
**RADIO STATION KGNC**  
**PROPOSED OPERATION**  
**860 KC 5,000 WATTS-DA**  
**EXHIBIT NUMBER 10 D**





AMARILLO, TEXAS  
 AND SURROUNDING TERRITORY  
 A. EARL CULLUM, JR.  
 CONSULTING RADIO ENGINEER

RADIO STATION KGNC  
 EXISTING OPERATION  
 1440 KC 5000 WATTS  
 EXHIBIT NUMBER 11A



AMARILLO, TEXAS

AND SURROUNDING TERRITORY

A. EARL CULLUM, JR.

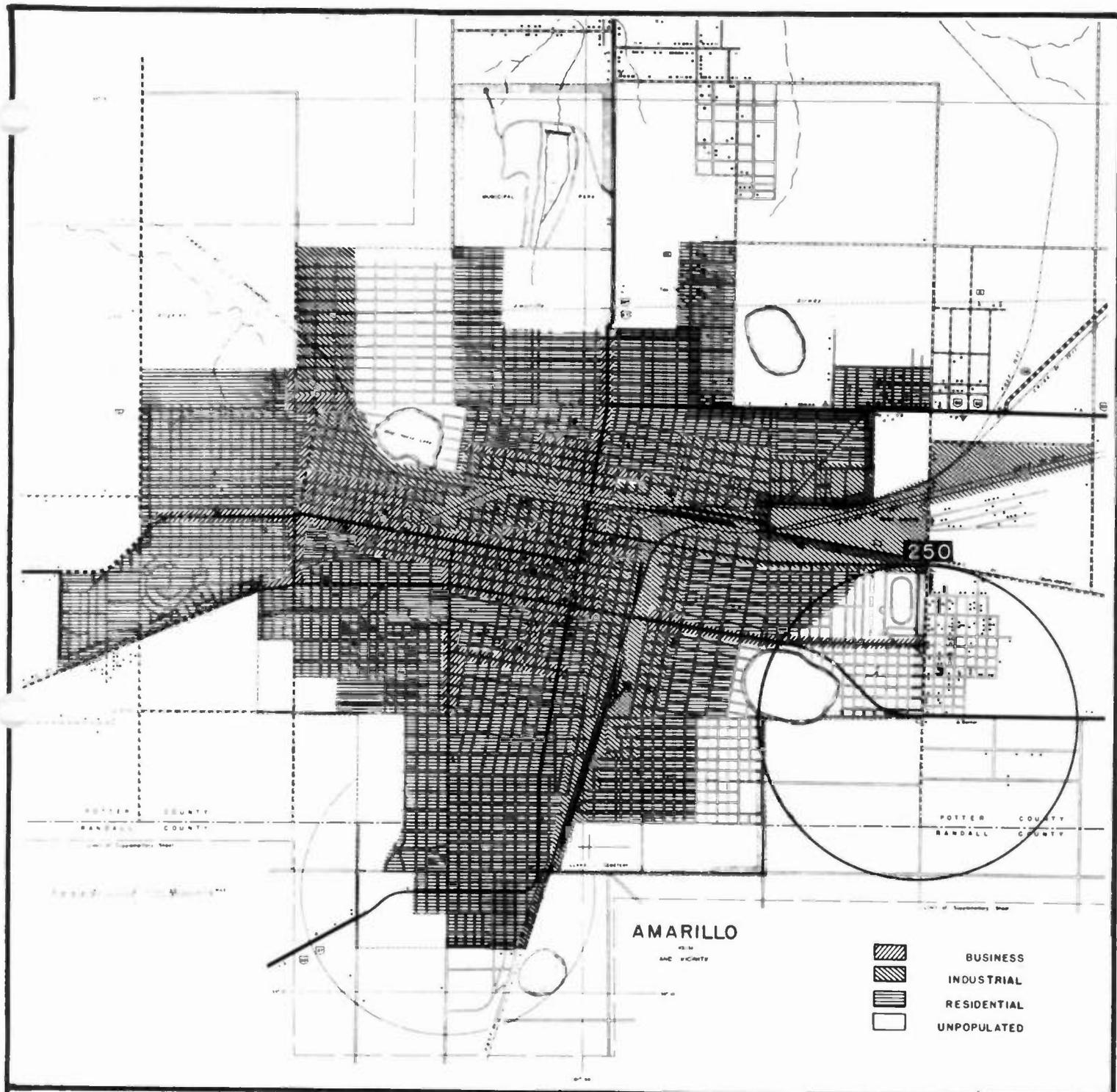
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RADIO STATION KGNC

EXISTING OPERATION

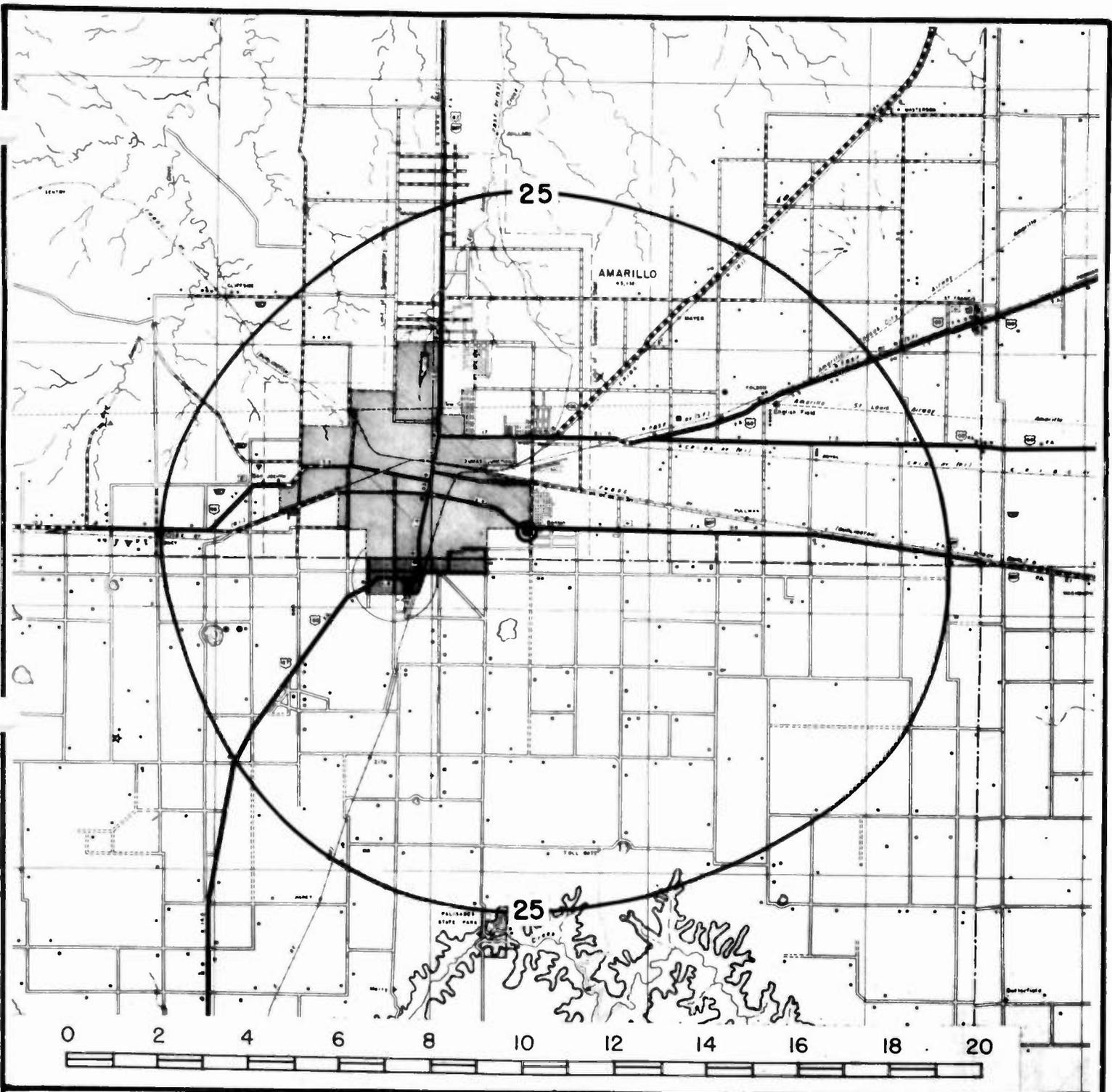
1440 KC 5000 WATTS

EXHIBIT NUMBER 11B



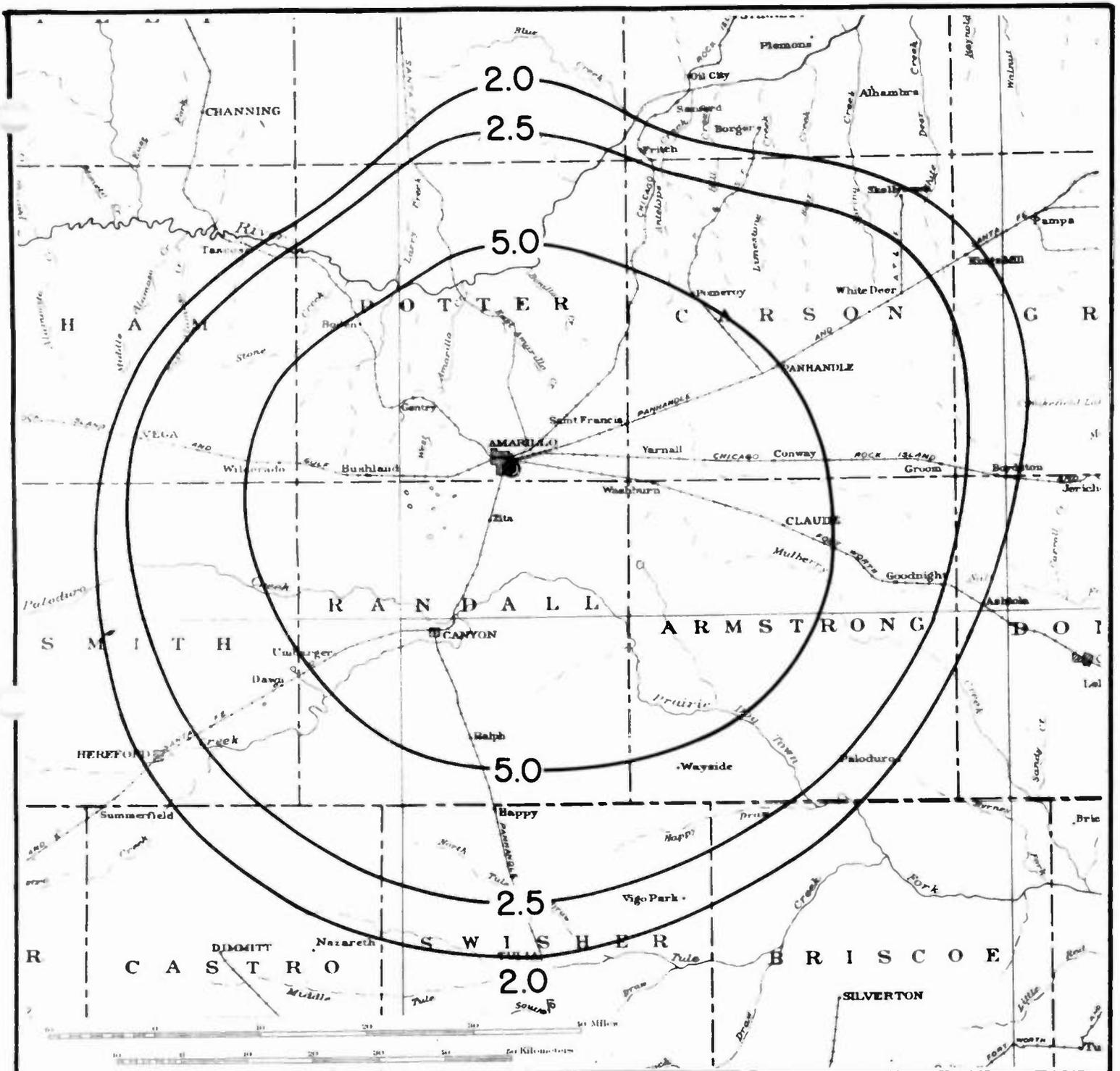
AMARILLO, TEXAS  
 AND SURROUNDING TERRITORY  
 A. EARL CULLUM, JR.  
 CONSULTING RADIO ENGINEER

RADIO STATION KGNC  
 EXISTING OPERATION  
 1440 KC 1000 WATTS  
 EXHIBIT NUMBER 12A



AMARILLO, TEXAS  
 AND SURROUNDING TERRITORY  
 A. EARL CULLUM, JR.  
 CONSULTING RADIO ENGINEER

RADIO STATION KGNC  
 EXISTING OPERATION  
 1440 KC 1000 WATTS  
 EXHIBIT NUMBER 12B



AMARILLO, TEXAS

AND SURROUNDING TERRITORY

A. EARL CULLUM, JR.

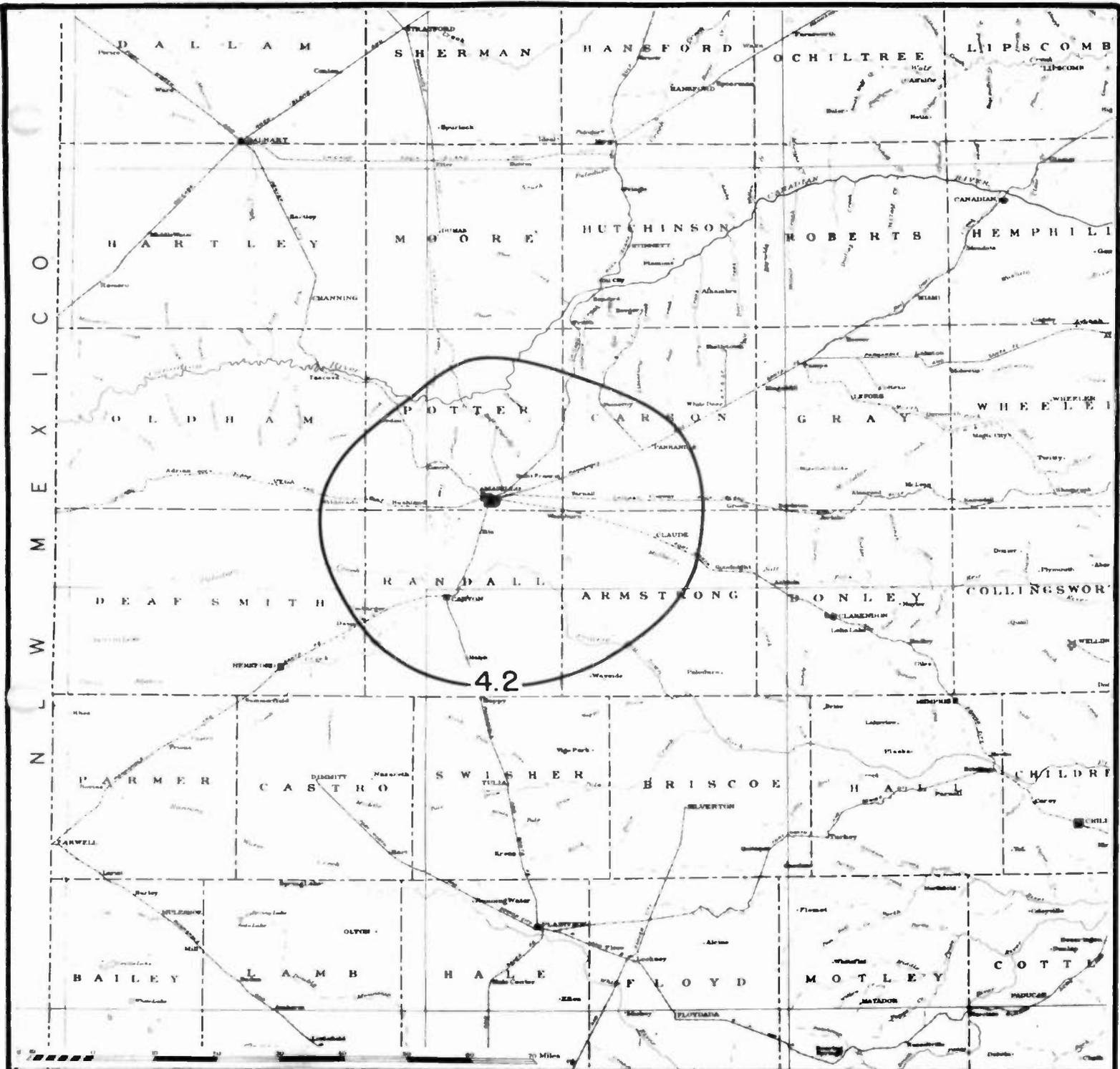
CONSULTING RADIO ENGINEER

RADIO STATION KGNC

EXISTING OPERATION

1440 KC 1000 WATTS

EXHIBIT NUMBER 12 C



AMARILLO, TEXAS

AND SURROUNDING TERRITORY

A. EARL CULLUM, JR.

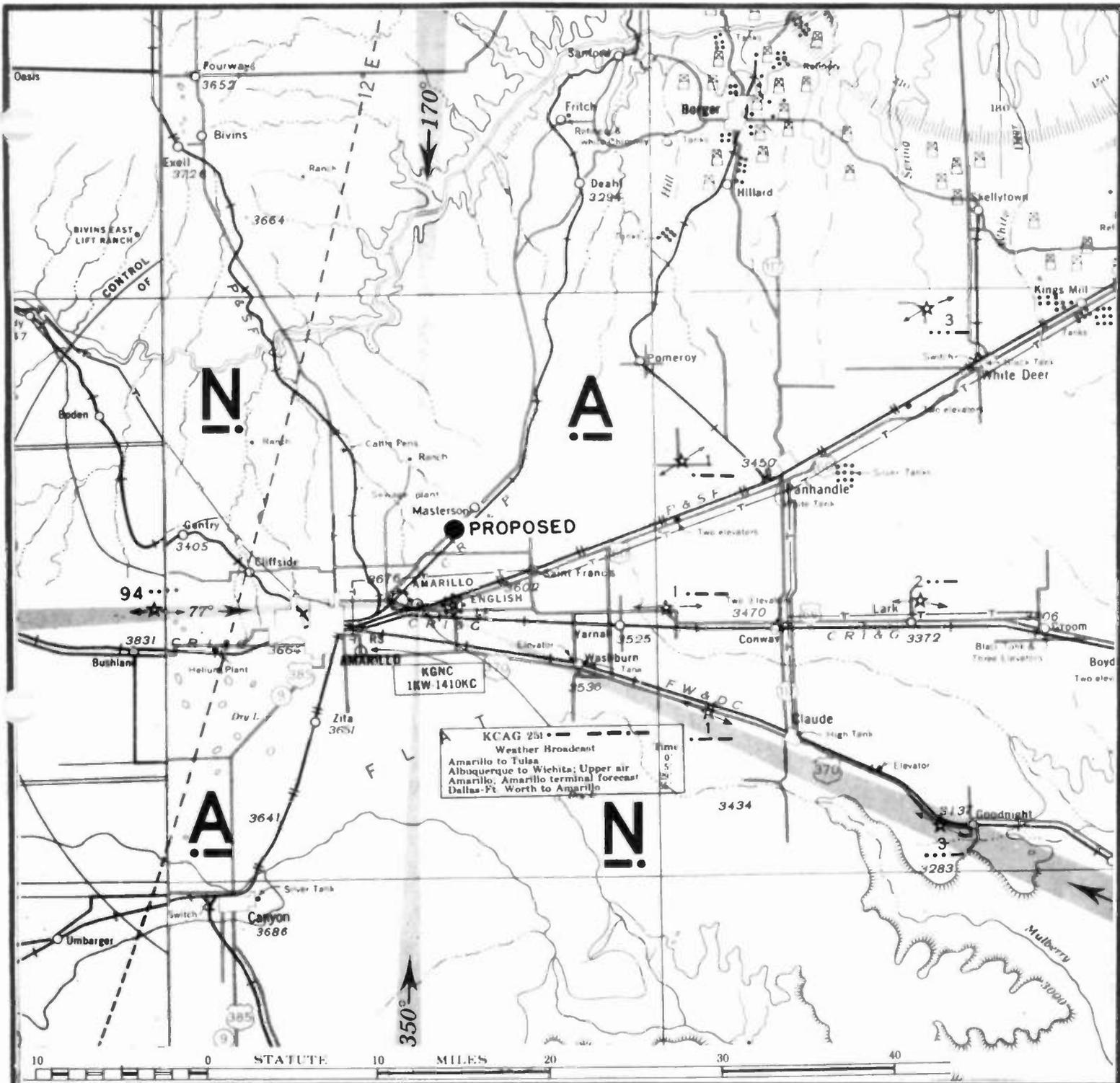
CONSULTING RADIO ENGINEER

RADIO STATION KGNC

EXISTING OPERATION

1440 KC 1000 WATTS

EXHIBIT NUMBER 12 D



AMARILLO, TEXAS  
 AND SURROUNDING TERRITORY  
 A. EARL CULLUM, JR.  
 CONSULTING RADIO ENGINEER

RADIO STATION KGNC  
 PROPOSED OPERATION  
 860 KC. 10,000 WATTS  
 EXHIBIT NUMBER 13

PHOTOGRAPHS TAKEN FROM  
PROPOSED KGNC PLANT SITE

EXHIBIT 14

NORTHEAST



NORTH





EAST



SOUTHEAST



SOUTH



SOUTHWEST



NORTHWEST