GENERAL MANAGER'S COPY

ENGINEERING EXHIBIT
APPLICATION FOR A CHANGE OF SITE
AND CHANGE IN THE ANTENNA SYSTEM

KCSJ
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO

SEPTEMBER 1973

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado

FILE NUMBER:	BR 1610
LOCATION:	Pueblo, Colorado
FREQUENCY	590 kHz
NOMINAL POWER:	1 kW-U
OPERATING POWER DAYTIME:	1000 Watts
OPERATING POWER NIGHTTIME:	761 Watts
ANTENNA:	Directional DA-2
NUMBER OF ELEMENTS:	Three
TYPE OF ELEMENTS:	Uniform Cross-Section, Guyed Steel Galvanized Towers, Insulated at the Base and Series Feed
HEIGHT OF ELEMENTS:	Above Insulators = 420' (90.66°) Above Ground = 428' (including beacon) Above MSL = 5408'
SPACE OF ELEMENTS:	S_{1-2} = 532.7684' S_{1-3} = 741.243'
ORIENTATION:	S_{1-2} = 34.5°True S_{1-3} = 79.5° True
GEOGRAPHICAL COORDINATES OF ANTENNA ARRAY	N 38° 21' 30" W 104° 38' 13"
DATE	September 1973

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SEPTEMBER 1973

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado

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Section V-A and V-G of FCC Form 301, FCC Form 714, FAA 7460-1

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
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Pueblo, Colorado
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FCC Form 301 — FEDERAL COMMUNICATIONS COMMISSION — Section V-A

STANDARD BROADCAST ENGINEERING DATA

Name of applicant: American Radio Corporation of Kansas d/b as KCSJ

1. Indicate by check mark the purpose of this application. (The items of this Section that are applicable to, and must be answered for, each category are shown to the right of the category.)

[ ] Construct a new station	All items	
[ ] Change station location to a different city or town	All items	
[ ] Change power	All items	
[ ] Change transmitter location	All items	
[ ] Change frequency	All items	
[ ] Change from DA to Non-DA	All items	
[ ] Change from Non-DA to DA	All items	
[ ] Change in antenna system (including increase in height by addition of FM or TV antenna)	All items	
[ ] Install new Auxiliary Transmitter		2 thru 7, and 10
[ ] Install new Alternate Main Transmitter		2 thru 7, and 10
[ ] Change transmitter (non type accepted)		2 thru 7
[ ] Change Main Studio Location to point outside city limits and not at transmitter site		2 thru 7
[ ] Change Hours of Operation		2 thru 7
[ ] Other (specify): →		2 thru 7 (and appropriate other items)

If this application is not for a new station, summarize briefly the nature of the changes proposed:

KCSJ proposes to change antenna site and antenna system, using DA-2. Continuing operating of 590 kHz and 1 kW-U, DA-2

2. Facilities requested

Frequency	Hours of operation	Power in kilowatts Night	Power in kilowatts Day
590 kHz	unlimited	1.0	1.0

3. Station location

State	City or town
Colorado	Pueblo

4. Transmitter location

State	County
Colorado	El Paso

City or town	Street Address (or other identification)
near Pueblo	4.8 mi. north of Pueblo 1 mi. west of U.S.Hwy 25

5. Main studio location

State	County
Colorado	Pueblo

City or town	Street and number, if known
near Pueblo	4.8 mi. north of Pueblo 1 mi. west of U.S.Hwy 25

6. Remote control point location

State	City or town
not applicable	

Street Address (or other identification)

7. Transmitter

Make	Type No.	Rated Power
Collins	820D-1	1 kW

(If the above transmitter has not been accepted for licensing by the F.C.C., attach as Exhibit No. -- a complete showing of transmitter details. Showing should include schematic diagram and full details of frequency control. If changes are to be made in licensed transmitter include schematic diagram and give full details of change.)

on file

8. Modulation monitor

Make	Type No.
McMartin	TBM-8500

9. Frequency monitor

Make	Type No.
See Exhibit No. E-1	

10. Antenna system, including ground or counterpoise

Non-Directional Antenna: Day [ ] Night [ ]

Directional Antenna:
- Day only (DA-D) [ ]
- Night only (DA-N) [ ]
- Same constants and power day and night (DA-1) [ ]
- Different constants or power day and night (DA-2) [X]

(If a directional antenna is proposed submit complete engineering data. Show clearly whether directional operation is for day or night or both. If day and night patterns are different give full information on each pattern. This information is in addition to the information in Paragraph 10 and is submitted as Exhibit No. E-5--E-9 and signed by the engineer who designed the antenna system.) E-14--E-22F

Type radiator	Height in feet of complete radiator above base insulator, or above base if grounded.
uniform cross-section vertical guyed	420'

Overall height in feet above ground. (Without obstruction lighting)	Overall height in feet above mean sea level. (Without obstruction lighting)
425'	5405'

Overall height in feet above ground. (With obstruction lighting)	Overall height in feet above mean sea level. (With obstruction lighting)
428'	5408'

If antenna is either top loaded or sectionalized, describe fully as Exhibit No. neither

Excitation — Series [X] Shunt [ ]

Geographic coordinates to nearest second.
For direction antenna give coordinates of center of array.
For single vertical radiator give tower location.

North latitude	West longitude
38 ° 21 ' 30 "	104 ° 38 ' 13 "

If not fully described above, give further details and dimensions including any other antennas mounted on tower and associated isolation circuits as Exhibit No. fully described (Height figures should not include obstruction lighting.)

Submit as Exhibit No. E-2 a plat of the transmitter site showing boundary lines, and roads, railroads, or other obstructions; and also layout of the ground system or counterpoise. Show number and dimensions of ground radials or if a counterpoise is used, show height and dimensions.

11. Attach as Exhibit No. E-3 a sufficient number of aerial photographs taken in clear weather at appropriate altitudes and angles to permit identification of all structures in the vicinity. The photographs must be marked so as to show compass directions, exact boundary lines of the proposed site, and locations of the proposed 1000 mv/m contour for both day and night operation. Photographs taken in eight different directions from an elevated position on the ground will be acceptable in lieu of the aerial photographs if the data referred to can be clearly shown.

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12 Allocation Studies E-4, E-11, E-11A

A Attach as Exhibit No. map or maps, having reasonable scales, showing the 1000, 25, 5, 2, normally protected and interference-free contours in mv/m for both day and night operation both existing and as proposed by the application (NOTE: The 2 mv/m night contour need not be supplied if service is not rendered thereto.)

B (1) For daytime operation, attach as Exhibit No. E-10 an allocation study utilizing Figure M-3 of the Rules or an accurate full scale reproduction thereof and using pertinent field strength measurement data where available, a full scale exhibit of the entire pertinent area to show the following:

(a) Normally protected, the interference-free, and the interfering contours for the proposed operation along all azimuths.

(b) Complete normally protected and interference-free contours of all other proposals and existing stations to which objectionable interference would be caused.

(c) Interfering contours over pertinent arcs of all other proposals and existing stations from which objectionable interference would be received.

(d) Normally protected and interfering contours over pertinent arcs of all other proposals and existing stations which require study to show the absence of objectionable interference.

(e) The 0.1 mv/m groundwave contour of Class I-B stations and appropriate studies to establish compliance with Section 73.187 when operation is proposed on a U. S. Class I-B channel.

(f) Plot of the transmitter location of each station or proposal requiring investigation, with identifying call letters, file numbers, and operating or proposed facilities.

(g) Properly labeled longitude and latitude degree lines, shown across entire exhibit.

(2) For daytime operation, when necessary to show more detail, attach as Exhibit No. E-10 an additional allocation study utilizing World or Sectional Aeronautical charts to clearly show interference or absence thereof.

(3) For daytime operation, attach as Exhibit No. E-63 a tabulation of the following:

(a) Azimuths along which the groundwave contours were calculated for all stations or proposals shown on allocation study exhibits required by Paragraph 12B above.

(b) Inverse distance field strength used along each azimuth.

(c) Basis for ground conductivity utilized along azimuths specified in (3) (a). If field strength measurements are used, the measurements must be either submitted or be properly identified as to location in Commission files.

C For nighttime operation, attach as Exhibit No. E-23--E-63, allocation data to include the following:

(1) Proposed nighttime limitation to other existing or proposed stations with which objectionable interference would result, as well as those other proposals and existing stations which require study to clearly show absence of objectionable interference.

(2) All existing or proposed nighttime limitations which enter into the nighttime R.S.S. limitation of each of the existing or proposed facilities investigated under C (1) above.

(3) All existing and proposed limitations which contribute to the R.S.S. nighttime limitation of the proposed operation, together with those limitations which must be studied before being excluded.

(4) A detailed interference study plotted upon an appropriate scale map if a question exists with respect to nighttime interference to other existing or proposed facilities along bearings other than on a direct line toward the facility considered.

(5) Utilizing an appropriate scale map, clearly show the normally protected and interference-free contours of each of the existing and proposed stations which would receive nighttime interference from the proposed operation.

(6) The detailed basis for each nighttime limitation calculated under C (1) (2) (3) and (4) above, including a copy of each pertinent radiation pattern in the vertical plane and basis therefor.

13 Attach as Exhibit No. E-27 tables of the areas and populations within the contours included in Paragraph 12 (A) above, as well as within the normally protected and interference-free contours of each station or proposed operation to which interference would be caused according to the Commission Rules.

(NOTE: See the Standard Broadcast Technical Standards. All towns and cities having populations in excess of those given in Section 3.182(g) are not to be included in the tabulation of populations within the service contours. The latest Census Minor Civil Division maps are to be used in making population counts, subtracting any towns or cities not receiving adequate service, and where contours cut a minor division assuming a uniform distribution of population within the division, to determine the population included in the contours unless a more accuract count is made.)

FCC Form 301 STANDARD BRCADCAST ENGINEERING DATA Section V-A, Page 3

14. Attach as Exhibit No. E-4 map or maps having reasonable scales clearly showing the following:

(a) Proposed antenna location

(b) General character of the city or metropolitan district, particularly the retail business, wholesale business, manufacturing, residential, and unpopulated areas (by symbols, cross-hatching, colored crayons, or other means)

(c) Heights of buildings or other structures and terrain elevations in the vicinity of the antenna, indicating the location thereof.

(d) Transmitter location and call letters of all radio stations (except amateur) and the location of established commercial and government receiving stations within 2 miles of the proposed transmitter location. Call letters and locations of broadcast stations, including FM and television, within 5 miles must be shown.

(e) Terrain

15. If this application is for modification of construction permit state briefly as Exhibit No. the present status of construction and indicate when it is expected that construction will be completed.

I certify that I represent the applicant in the capacity indicated below and that I have examined the foregoing statement of technical information and that it is true to the best of my knowledge and belief.

Date September 27, 1973

Signature Oscar Leon Cuellar

(check appropriate box below)

- ☐ Technical Director
- ☐ Chief Operator
- ☒ Registered Professional Engineer
- ☒ Consulting Engineer

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

FCC Form 301 — FEDERAL COMMUNICATIONS COMMISSION — Section V-G (Antenna)

ANTENNA AND SITE INFORMATION (see instruction B, Section 1)

Name of applicant: American Radio Corporation of Kansas d/b as KCSJ

Legal Counsel: John B. Kenkel, Esquire
Address: 1225 Conn. Ave. N.W., Wash., D.C. Suite 514

Consulting Engineer: Oscar Leon Cuellar
Address: 1563 S. Hudson, Denver, Co. 80222

Class of station: AM
Facilities requested: 590 kHz, 1-U, DA-2

Purpose of application (Check appropriate box)
a. New antenna construction ☐
b. Alteration of existing antenna structures ☐
c. Change in location ☒

1. Location of antenna

State	County	City or Town
Colorado	Pueblo	Pueblo

Exact antenna location (street address) (If outside city limits, give distance and direction from, and name of nearest town)

4.8 miles North of Pueblo
1 mile West of U.S. Hwy. 25

Geographic coordinates (to be determined to nearest second. For directional antenna give coordinates of center of array.) For single vertical radiator give tower location.

North latitude	West longitude
38° 21' 30"	104° 38' 13"

2. Features of surrounding terrain

List any natural formations or existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft and thereby minimize the aeronautical hazard of the antenna. None

(The site has been approved by FAA-Aeronautical Study No. 73-RM-312-OE) dated 9/21/73

Submit as Exhibit No. E66 a chart on which is plotted the exact location of the antenna site, and also the relative location of the natural formations and/or the existing man-made structures listed above.
The chart used shall be an Instrument Approach Chart (or the landing chart on reverse side thereof), or a Sectional Aeronautical Chart, choice depending upon proximity of the antenna site to landing areas. 1/ In general, the Sectional Aeronautical Chart should be used only when the antenna site is more than 10 miles from a landing area or when an Instrument Approach Chart is unobtainable. 1/ These charts may be purchased from the U. S. Coast and Geodetic Survey, Washington, D. C. 20852
1/ Exception - Where the proposed antenna site is within the boundary of a landing area for which no Instrument Approach Chart is available, submit a self-made, large scale map showing antenna site, runway(s) and existing man-made structures listed above.

3. Designation, distance, and bearing to center line of nearest established airway within 5 miles: V-244; 3.4 mi. at 186°True

4. List all landing areas within 10 miles of antenna site. Give distance and direction to the nearest boundary of each landing area from the antenna site.

	Landing Area	Distance	Direction
(a)	Pueblo	7.7 mi.	115° True
(b)	Edenway (private)	0.44 mi.	163° True
(c)			

5. Description of antenna system (If directional, give spacing and orientation of towers). 3 towers 420 feet high
Space from tower No. 1 tower No. 2 = 532.7684 feet on a bearing of 34.5°True
Space from tower No. 1 to tower No. 3 = 741.243 ft. on a bearing of 79.5°True

Type: Vertical Guyed Wire
Description of tower(s)

Self-supporting	Guyed Yes			Tubular (Pole)		
Tower (height figures should include obstruction lighting)	#1	#2	#3	#4	#5	#6
Height of radiating elements	420'	420'	420'			
Overall height above ground	428'	428'	428'			
Overall height above mean sea level	5408'	5408'	5408'			

If a combination of Standard, FM, or TV operation is proposed on the same multi-element array (either existing or proposed) submit as Exhibit No. -- a horizontal plan for the proposed antenna system, giving heights of the elements above ground and showing their orientation and spacing in feet. Clearly indicate if any towers are existing.

Submit as Exhibit No. E65 a vertical plan sketch for the proposed total structure (including supporting building if any) giving heights above ground in feet for all significant features. Clearly indicate existing portions, noting painting and lighting.

Is the proposed antenna system designed so that obstruction lights may be installed and maintained at the uppermost point(s)? Yes ☒ No ☐

6. Is the proposed site the same or immediately adjoining the transmitter-antenna site of other stations authorized by the Commission or specified in another application pending before the Commission? ☐ Yes ☒ No

If the answer is "Yes", give: CALL LETTERS ..... FILE NUMBER .....

I certify that I represent the applicant in the capacity indicated below and that I have examined the foregoing statement of technical information and that it is true to the best of my knowledge and belief.

Sept. 27, 1973 (date)

Signature: Oscar Leon Cuellar (check appropriate box below)

☐ Technical Director ☐ Chief Operator ☒ Registered Professional Engineer ☒ Consulting Engineer

☆ U. S. GOVERNMENT PRINTING OFFICE : 1969 O - 349-412

FCC FORM 714
JULY 1967

FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

Form Approved
Budget Bureau No. 52-R178.1

SUPPLEMENT TO APPLICATION FOR NEW OR MODIFIED RADIO STATION AUTHORIZATION
(concerning antenna structure notification to FAA)

PART I - Instructions

1. When required, attach this form (ONE COPY ONLY) to application for radio station authorization (other than broadcasting) and submit to Federal Communications Commission, Washington, D. C. 20554. If more than one FAA Notice (see Part III below) was sent to FAA for antenna structure(s) covered by the attached application, submit a copy of this form for each such notification.
2. If the attached application is for modification and original application file number is known, enter file number in item 3 below.
3. Do not correspond with the Federal Communications Commission concerning Part 77 of the Federal Aviation Administration (FAA) Regulations. Information concerning FAA Rules should be obtained from one of the FAA Regional Offices listed on the reverse of this form.
4. Form FAA No. 117 "Notice of Proposed Construction or Alteration" is to be used for antenna structure notification to the Federal Aviation Administration. That form may be obtained from any one of the offices listed on the reverse of this form and should be returned to the Federal Aviation Administration.

PART II - Identification of Applicant

1. Name of Applicant (must be same as shown on attached application for radio authorization)
American Radio Corporation of Kansas
d/b as KCSJ

2. Name of Radio Service
Radio Station KCSJ

3. Application File Number (see Instruction 2 above) BR1610

PART III - Status of Notice to FAA

The Federal Aviation Administration requires notification of proposed antenna structure construction or alteration in accordance with its Part 77 Regulations, "Notice of Construction or Alteration affecting Navigable Airspace". Check 1 or 2 below and furnish the information requested.

1. [X] NOTIFICATION HAS BEEN SUBMITTED TO FAA

a. Name used (individual, company, corporation etc.) in making notification of construction or alteration to FAA
American Radio Corporation of Kansas

b. FAA regional office where filed
Denver, Colorado

c. Date of notification to FAA
September 14, 1973

d. Location of Antenna Structure as reported to FAA
City: Pueblo
State: Colorado
Geographical Coordinates
Latitude 38° 21' 30" N
Longitude 104° 38' 13" W

e. Height of completed Antenna Structure as reported to FAA
Overall Height above ground level: 428 ft.
Overall height above mean sea level: 5408 ft.

2. [ ] NOTIFICATION HAS NOT BEEN SUBMITTED TO FAA - The proposed antenna structure(s) covered in attached application being submitted to FCC has been analyzed under Part 77 of the FAA Regulations and it has been determined that notification to FAA is not required.

PART IV - Certification

I certify that all of the above statements are true, complete, and correct to the best of my knowledge.

Date Signed September 27, 1973 Signature of person certifying Oscar Leon Cuellar

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

Form Approved. Budget Bureau No. 04-R0001.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION

TO BE COMPLETED BY FAA

AERONAUTICAL STUDY NO.

1. NATURE OF STRUCTURE *(Complete both A and B below)*

A. *(Check one)*
[X] NEW CONSTRUCTION [ ] ALTERATION

B. *(Check one)*
[X] PERMANENT [ ] TEMPORARY *(State length of time)* _____ Mos.

2. NAME AND ADDRESS OF INDIVIDUAL, COMPANY, CORPORATION, ETC. PROPOSING THE CONSTRUCTION OR ALTERATION *(Number, Street, City, State and Zip Code)*

TO American Radio Corporation of Kansas
Radio Station KCSJ
2226 TV Lane
Pueblo, Colorado 81003

FAA WILL COMPLETE AND RETURN THIS FORM IF ONE OR MORE OF THE FOLLOWING IS APPLICABLE, OTHERWISE SEPARATE ACKNOWLEDGEMENT WILL BE ISSUED.

A. A STUDY OF THIS PROPOSAL HAS DISCLOSED THAT THE PROPOSED STRUCTURE:

[ ] DOES NOT REQUIRE A NOTICE TO FAA.

[ ] WOULD NOT EXCEED ANY STANDARD OF PART 77 AND WOULD NOT BE A HAZARD TO AIR NAVIGATION.

[ ] SHOULD BE MARKED AND LIGHTED PER FAA "OBSTRUCTION MARKING AND LIGHTING" ADVISORY CIRCULAR 70/7460-1.

[ ] REQUIRES SUPPLEMENTAL NOTICE. NOTICE FORM (FAA FORM 117-1) ENCLOSED.

B. COPY SENT TO FCC? [ ] YES [ ] NO

REVIEWING OFFICER	DATE

3. TYPE AND COMPLETE DESCRIPTION OF STRUCTURE

Standard Broadcast Directional Antenna System Consisting of 3 Towers 420 feet high. Space from Tower No. 1 to Tower No. 2 - 532.7684 feet on a bearing of 34.5° True. Space from Tower No. 1 to Tower No. 3 = 741.243 feet on a bearing of 79.5° True.

4. LOCATION OF STRUCTURE

A. COORDINATES *(To nearest second)*						B. NEAREST CITY OR TOWN, AND STATE	
LATITUDE			LONGITUDE			Pueblo	
°	'	"	°	'	"	(1) DISTANCE FROM 4B	(2) DIRECTION FROM 4B
38	21	30	104	38	13	4.8 MILES	North

C. NAME OF NEAREST AIRPORT, HELIPORT, OR SEAPLANE BASE	(1) DISTANCE FROM NEAREST POINT OF 4C AIRPORT	(2) DIRECTION FROM AIRPORT
Pueblo	7.7 miles	295° True

D. *DESCRIPTION OF LOCATION OF SITE WITH RESPECT TO HIGHWAYS, STREETS, AIRPORTS, PROMINENT TERRAIN FEATURES, EXISTING STRUCTURES, ETC. (Attach a highway, street, or any other appropriate map or scaled drawing showing the relationship of construction site to nearest airport(s). If more space is required, continue on a separate sheet of paper and attach to this notice.)*

Please see Aeronautical Study No. 73-RM-159-OE, dated June 11, 1973.
Exhibits already in your files hold true for description of site.
No change in coordinates or antenna height is proposed.

5. HEIGHT AND ELEVATION *(Complete A, B and C to the nearest foot)*		6. WORK SCHEDULE DATES
A. ELEVATION OF SITE ABOVE MEAN SEA LEVEL	4980'	A. WILL START immediately upon FCC grant
B. HEIGHT OF STRUCTURE INCLUDING APPURTENANCES AND LIGHTING *(if any)* ABOVE GROUND, OR WATER IF SO SITUATED	428'	B. WILL COMPLETE six months later
C. OVERALL HEIGHT ABOVE MEAN SEA LEVEL *(A + B)*	5408'	

7. OBSTRUCTION MARKINGS – The completed structure will be:	YES	NO
A. MARKED AS SPECIFIED IN THE FAA ADVISORY CIRCULAR 70/7460-1, OBSTRUCTION MARKING AND LIGHTING	X	
B. LIGHTED AS SPECIFIED IN THE FAA ADVISORY CIRCULAR 70/7460-1, OBSTRUCTION MARKING AND LIGHTING	X	

I HEREBY CERTIFY that all of the above statements made by me are true, complete, and correct to the best of my knowledge.

8. NAME AND TITLE OF PERSON FILING THIS NOTICE *(Type or Print)*	9. SIGNATURE *(In ink)*		
Oscar Leon Cuellar, P.E.		10. DATE OF SIGNATURE 9-14-73	11. TELEPHONE NO. *(Precede with area code)* 756-8456

Persons who knowingly and willfully fail to comply with the provisions of the Federal Aviation Regulations Part 77 are liable to a fine of $500 for the first offense, with increased Penalties thereafter as provided by Section 902(a) of the Federal Aviation Act of 1958 as amended.

FAA Form 7460-1 (11-68) SUPERSEDES FAA Form 117..

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

Exhibit No. E-1

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

ENGINEERING STATEMENT

Concerning a change in site and a change in the KCSJ Directional Antenna Array to operate with a different Daytime and Nighttime Directional Antenna system. This application does not involve a major change for there would be no change in frequency, power, hours of operation or station location.

American Radio Corporation of Kansas, licensee of Standard Broadcast Station KCSJ which operates unlimited time on 590 kHz, 1 kW-U, DA-1, Pueblo, Colorado, is filing an application to change the antenna site and specifying a new Daytime and Nighttime Directional Antenna System (DA-2). The Instant Engineering Report contains the pertinent data required by Section V-A of FCC Form 301.

The proposed transmitter and antenna system is to be located approximately 4.8 miles north of Pueblo and 1 mile west of U.S. Hwy 25. (See Exhibit No. E-4). The site location occupies the "NE 1/4 of the NW 1/4 of Section 35, Township 19, South Range 65W of the 6th P.M." The geographical coordinates of the center of the array and elevation were obtained from a U.S.G.S. Topographic Map 7.5 minute and are as follows:

N Latitude: 38° 21' 30"
W Longitude: 104° 38' 13"
Elevation AMSL: 4,980 feet

The proposed site has been approved by the Federal Aviation Agency (FAA). Aeronautical Study No. 73-RM-312-OE, dated 9/21/73.

Pueblo, with a population of 97,453 inhabitants as per U.S. 1970 Census, is rapidly extending in a west-northwest direction (presently a heavily populated area). Under present conditions due to the null of the symetrical pattern, this area is severely affected by poor service from KCSJ, both day and nighttime operation.

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1563 South Hudson Phone (303) 756-8456

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
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Pueblo, Colorado
September 1973

Engineering Statement (continued)

Considering the pertinent protections, it is imperative that KCSJ use three towers and a different Day and Nighttime Directional Antenna System, therefore, optimizing its service area. As a consequence of the improvement, the following requirements are fully met:

1. Full protection to all U.S., NARBA, and Mexico Standard Broadcast Stations.
2. The entire Pueblo city limits is covered by the proposed Daytime 25 mV/m Contour and by the proposed Nighttime 9.8 mV/m interference-free Contour. (See Exhibit No. E-4A)
3. The business district and industrial area is fully covered day and nighttime by a signal much better than 25 mV/m.
4. The proposed daytime operation would bring a new interference-free primary broadcast service (0.5 mV/m or better) to 31,573 inhabitants within an area of 3,529 square miles.
5. The proposed nighttime operation would bring a new nighttime service to 3,003 inhabitants within an area of 202 square miles. This area would be served by an interference-free contour of 9.8 mV/m or better.

All distances, bearings, mid-point latitude, vertical angles from FCC Figure 6A, NARBA Appendix F and Annex VIII from the U.S./Mexico agreement, Skywave field values from NARBA Appendix E and Annex X of the U.S./Mexico agreement, were taken directly from pertinent computer programs in a time-sharing service teletype.

The coordinates for the U.S. stations were taken from the official list for information setting forth notified assignments of standard broadcast stations.

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Engineering Statement (continued)

Likewise, the coordinates for the NARBA and Mexican Stations were taken from pertinent FCC Official Lists and are shown in Exhibit No. E-64. The directional antenna patterns from those existing stations which enter into the study considered in the instant report and which are on file with the Commission, are included herein as Exhibits No. E-67 through E-75.

Directional Antenna System

The instant report fully complies with Section 73.150 of the rules Both day and nighttime proposed "Standard Radiation Patterns" $(E\ (\Phi,\Theta)_{std}$, as well as both day and nighttime proposed Basic Patterns $(E\ (\Phi,\Theta)_{th}$ are included herein.

The proposed KCSJ nighttime "Standard Radiation Pattern" in the horizontal plane and pertinent "Azimuthal Radiation patterns for angles of elevation up to and including 60°, with separate patterns for each increment of 5°" are shown in Exhibits No. E-16 through E-17L.

The proposed KCSJ Nighttime "Standard Radiation Pattern" has been constructed in accordance with the following mathematical expression:

$$E\ (\Phi,\Theta)_{std} = 1.05\ [E\ (\Phi,\Theta)_{th} + Q^2]^{\frac{1}{2}}$$

where:

$E\ (\Phi,\Theta)_{std}$ represents the inverse distance fields at one mile in the horizontal and vertical planes. These values are shown in Exhibit No. E-18, pages 1, 2 and 3.

$E\ (\Phi,\Theta)_{th}$ represents the expression which determines the Basic Pattern shape and size. The Basic Pattern and pertinent values are shown in Exhibits No. E-14 and E-15, pages 1, 2 and 3.

The Basic Patterns both day and nighttime have been developed with a loss resistance of 1 ohm. The Q used in the above mathematical expression has been calculated as follows:

For the KCSJ Proposed Daytime Standard Radiation Pattern:

$$Q = 0.025\ F\ (\Theta)\ E_{rss} = 7.42\ F\ (\Theta)$$

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Engineering Statement (continued)

For the KCSJ Proposed Nighttime Standard Radiation Pattern:

$$Q = 0.025\ F\ (\theta)\ (P_{kw})^{\frac{1}{2}} = 6.0\ F\ (\theta)$$

This Q of 6.0 F (θ) was used for the Nighttime operation, because when calculated, assuming the Expression (0.025 F (θ) E_{rss}), this Q is much less than 6.0.

The expected RMS of the proposed Basic Patterns for both day and nighttime operation was determined by a graphical integration of the outflow of power from the array over an imaginary hemisphere shell having a radius of one mile. The results of this computation were then adjusted by assuming the insertion of a loss resistance of 1 (one) ohm in series with the base of each tower.

To maintain the proposed KCSJ nighttime RMS magnitude of 175 mV/m, the Operating Power will be kept to a level of 761 watts. The transmitter will be designed to give full compliance to section 73.40 of the rules, operating at this low level of 761 watts. Nevertheless, the proof-of-performance will indicate the final operating power.

Complete data and sample calculations of the directional array for both day and nighttime operation are shown in Exhibits No. E-9 and E-20, the formulae used is shown in Exhibit No. E-19.

The ground system detail is shown in Exhibit No. E-2. Thirty eight radials on the east and west sides of the array will be limited by property boundaries to an average length of 350 feet (76 electrical degrees). However, it is believed that this limitation is compensated by several of the 555 foot radials (120 electrical degrees) bonding the copper strap between towers.

Nighttime Channel Studies

The calculations of the nighttime limits to other co-channel stations from present and proposed KCSJ operations are supplied as Exhibits No.

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Engineering Statement (continued)

E-28 and E-29 of the instant report. The proposed KCSJ nighttime Standard Radiation Pattern was used in its entirety.

The calculation of existing RSS limits to co-channel stations in the direction where KCSJ will increase radiation are shown in Exhibits E-43 through E-62. In each case, the proposed limit from KCSJ is less than 50% of the existing RSS limit. The proposed KCSJ operation will not cause objectionable nighttime interference to any co-channel operation as determined in accordance with Section 73.182 of the rules.

In plotting the KSUB and KLBJ (KTBC) nighttime interference-free contours for the analysis of the Clipping Study, soil conductivity values shown in Figure M3 of the rules were used. For instance, KSUB is located in a soil conductivity of 30 mS/m. Even if it is assumed the first 20 miles on a soil conductivity of 5,000 mS/m (salt water) and the remainder of the distance on 30 mS/m, the additional difference to the contour distance would be 1.6 miles. Therefore, it is believed that values of soil conductivity shown in the proof-of-performance of these stations would make essentially no change in the calculation to the contour distance. See Exhibits No. E-63, pages 1 through 11; and E-63A, pages 1 through 6 for statement of method and basis used in determining location of contours and distances to coverage contours in miles by azimuth. It is proposed to increase the present KCSJ limit to XEFD, Mexico, D.F. Mexico, from 0.7738 mV/m to 0.8895 mV/m. Though no objectionable interference will be caused to this station, 70% of the present (2.4114 mV/m) XEFD nighttime limit amounts to 1.688 mV/m (See Exhibit No. E-62). The proposed KCSJ limit amounts to 0.8895 mV/m. Just to reach the magnitude of 1.68 mV/m (which still would be safe) it would require a radiation field of 617.6 mV/m. Notice that the maximum radiation toward the south from the proposed KCSJ nighttime Standard Radiation Pattern is 330 mV/m.

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF AMERICA
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Engineering Report (continued)

Daytime Study

The proposed KCSJ daytime operation will not cause interference or overlap of contours to any of the co-channel or adjacent channel stations. It is proposed to clear the present adjacent overlap of 0.5 mV/m contours with radio station KIIX or 600 kHz.

Notice in Exhibit No. E-12 the present KCSJ operation 0.5 mV/m in relation to KIIX 0.5 mV/m contour.

It is emphasized that in order to have a qualitative analysis between the present and proposed operation, considering of course the change in site, no measurements were used for the plotting of contours of the present KCSJ operation and the analysis is based between the KCSJ notified C.P. Directional Antenna Pattern DA-1 and the proposed KCSJ Directional Standard Radiation Pattern. The present KCSJ notified C.P. Pattern and measured pattern is enclosed herein as Exhibit No. E-67 pages 1, 2 and 3.

The proposed KCSJ daytime operation will reduce the interference presently received from WOW, Omaha, Nebraska. Presently there is an area of 4,093 square miles with a population of 12,807 inhabitants receiving interference from WOW. The KCSJ proposed operation will reduce this interference area to 2,744 square miles with a population of 9,414 inhabitants. See Exhibit No. E-27 for a statement of areas and population and basis therefore.

It is believed the instant report complies with all the FCC Engineering Rules of Allocation concerning Standard Broadcast Stations.

Respectfully submitted

Oscar Leon Cuellar

Oscar Leon Cuellar

September 27, 1973

AMERICAN RADIO CORPORATION OF KANSAS
RADIO STATION KCSJ
BR 1610

AFFIDAVIT

STATE OF COLORADO)
)
CITY AND COUNTY OF DENVER)

This AM Engineering Report of American Radio Corporation of Kansas, Licensee of Radio Station KCSJ, Pueblo, Colorado, requesting a change in site and a change in the Directional Antenna System was prepared by Oscar Leon Cuellar, P.E., Consulting Radio Engineer. I am a registered professional engineer in the states of Arizona and Colorado and my engineering qualifications are a matter of record with the Federal Communications Commission, having been accepted on many previous occasions. All data and statements contained herein are true and correct to the best of my knowledge and belief.

(SEAL) OSCAR LEON CUELLAR

Subscribed and sworn to me this 27th day of September 1973

NOTARY PUBLIC

My commission expires; August 11, 1976

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

Exhibit No. E-2

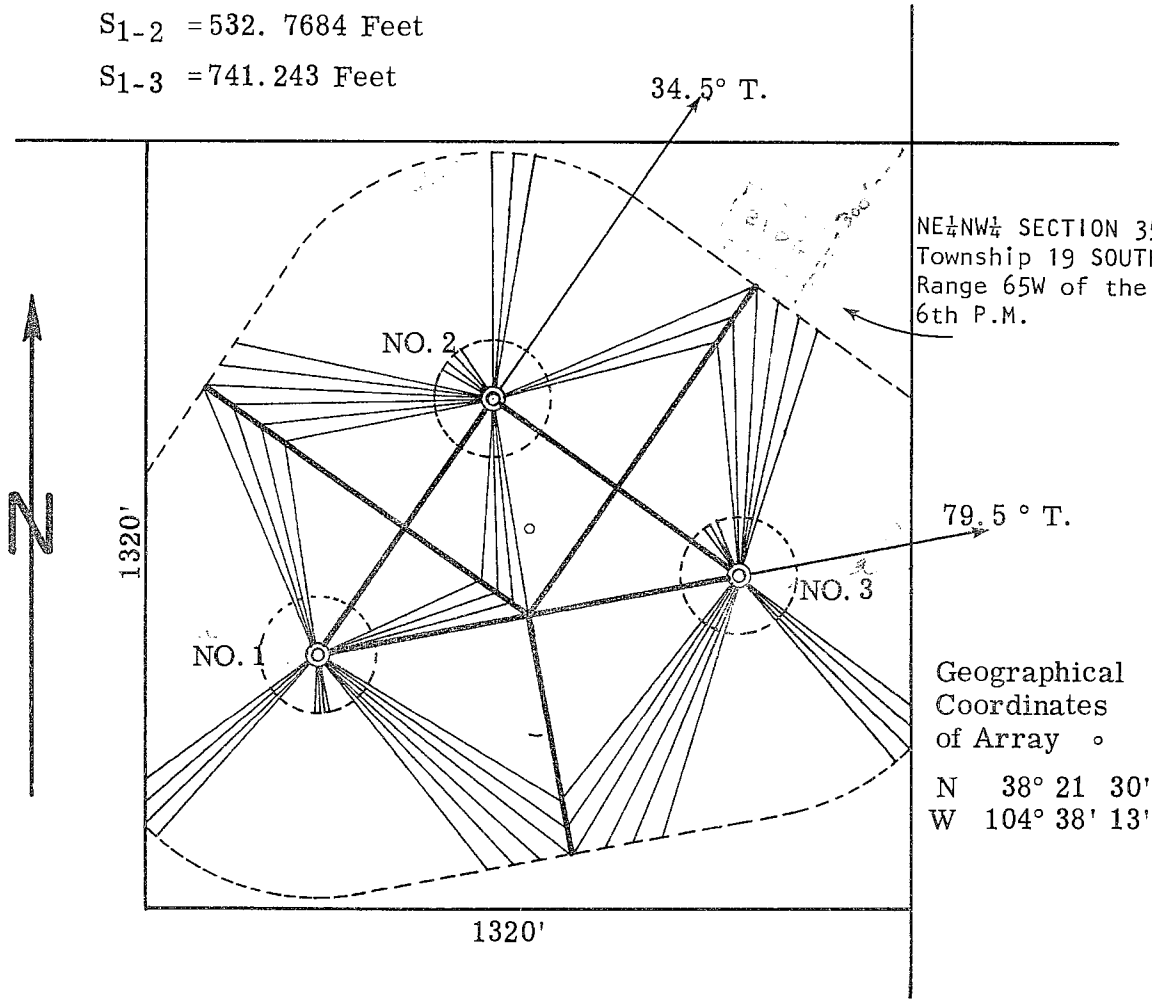
PROPERTY PLAT AND GROUND SYSTEM DETAILS

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

Distances Between
Adjacent Towers

S_{1-2} = 532. 7684 Feet

S_{1-3} = 741. 243 Feet



The ground system will consist of 120 copper wire radials 420 feet long (shorter where limited by property boundaries) and buried 6 to 8 inches beneath the surface and about each tower, they will be bonded to a 3" copper strap bisecting the towers. In addition, there will be 120 copper wire radials 100 feet long about each tower near the surface of the earth.

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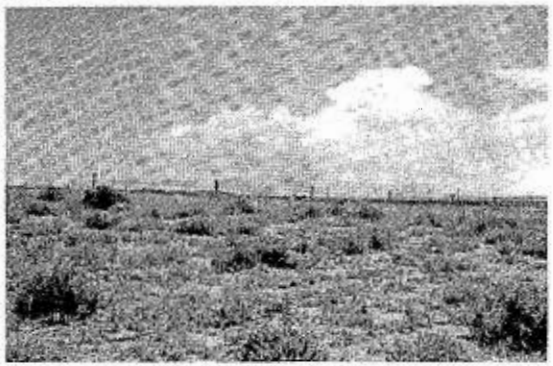
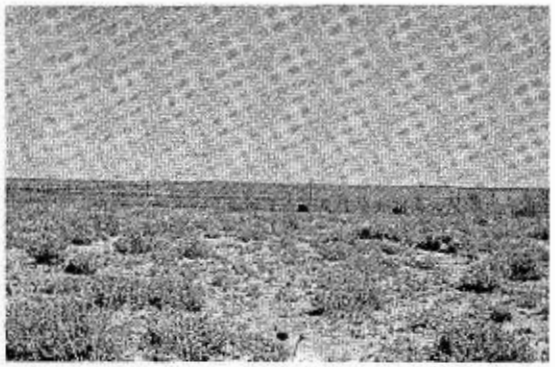
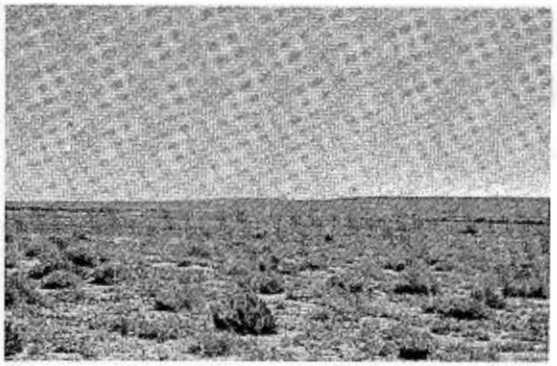
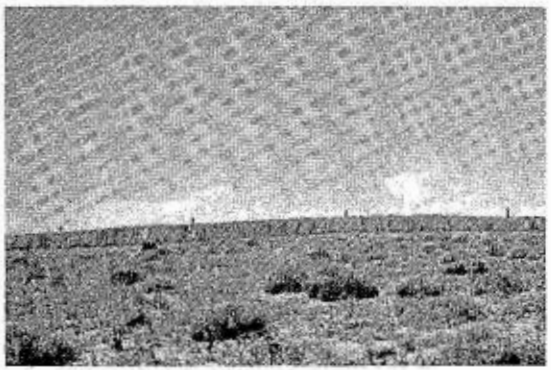








NW N NE

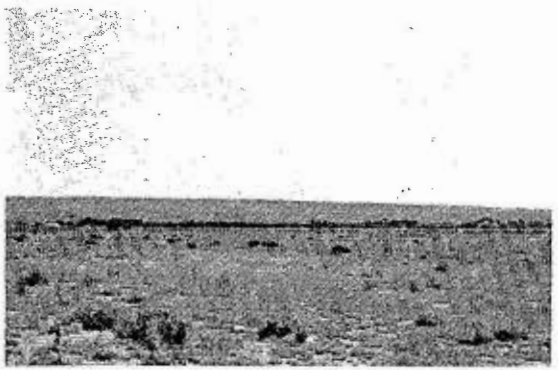
EXHIBIT NO. E-3

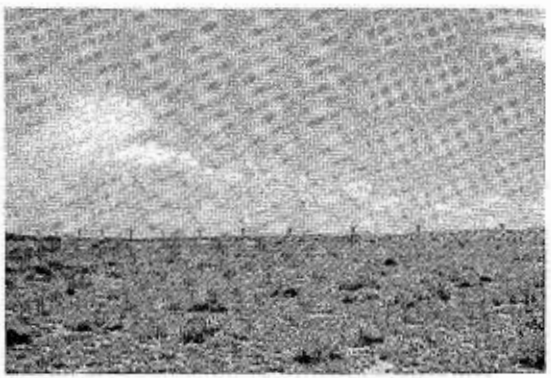
PHOTOGRAPHS TAKEN JULY 1973

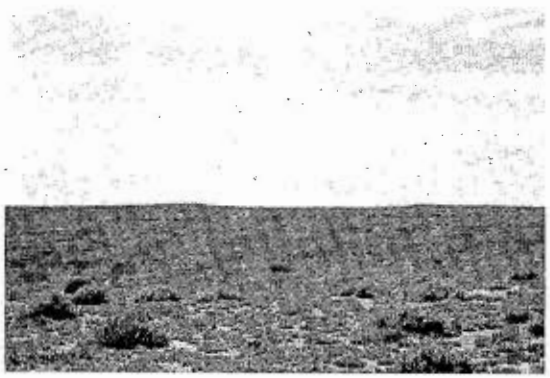
W E

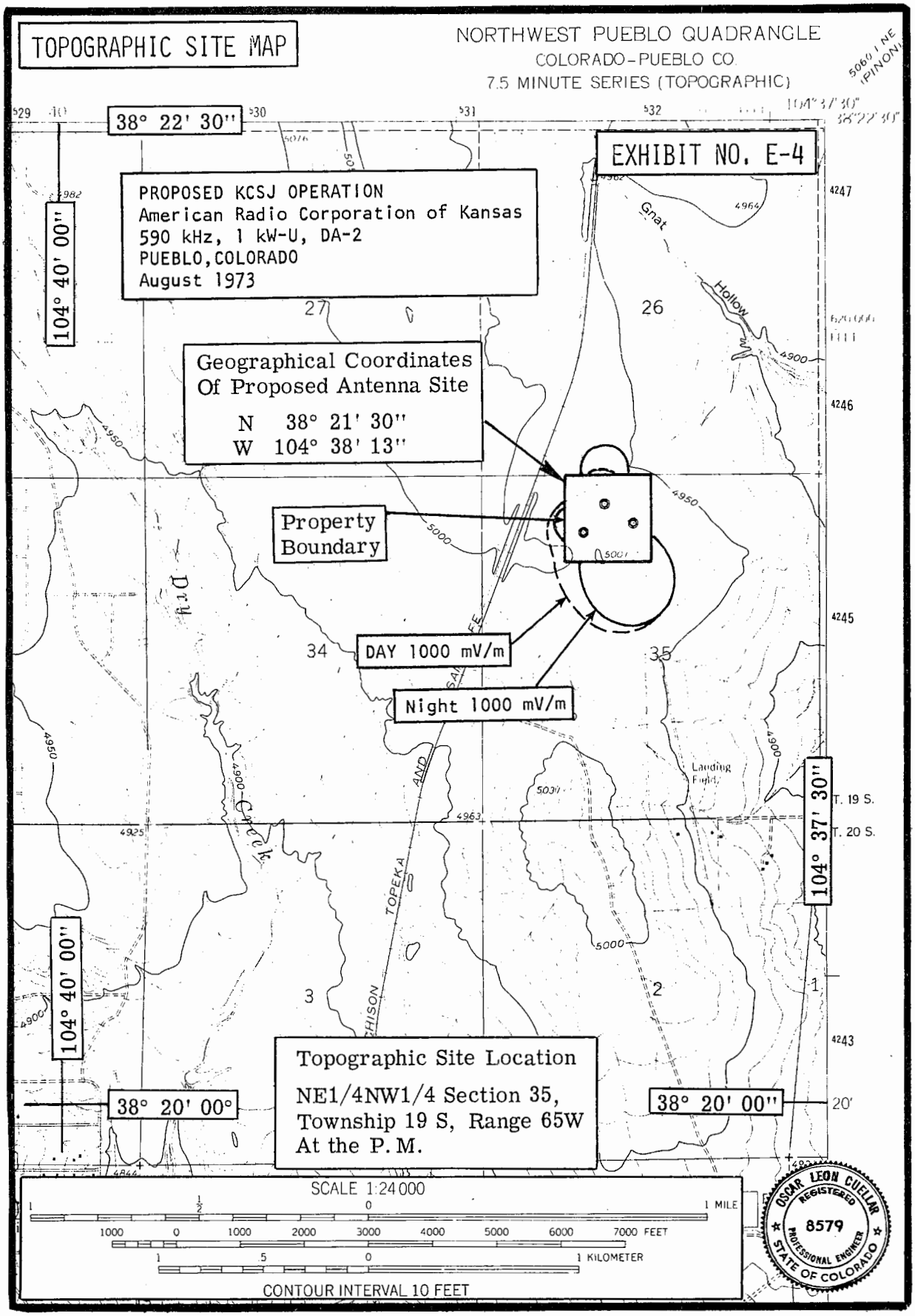
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
August 1973

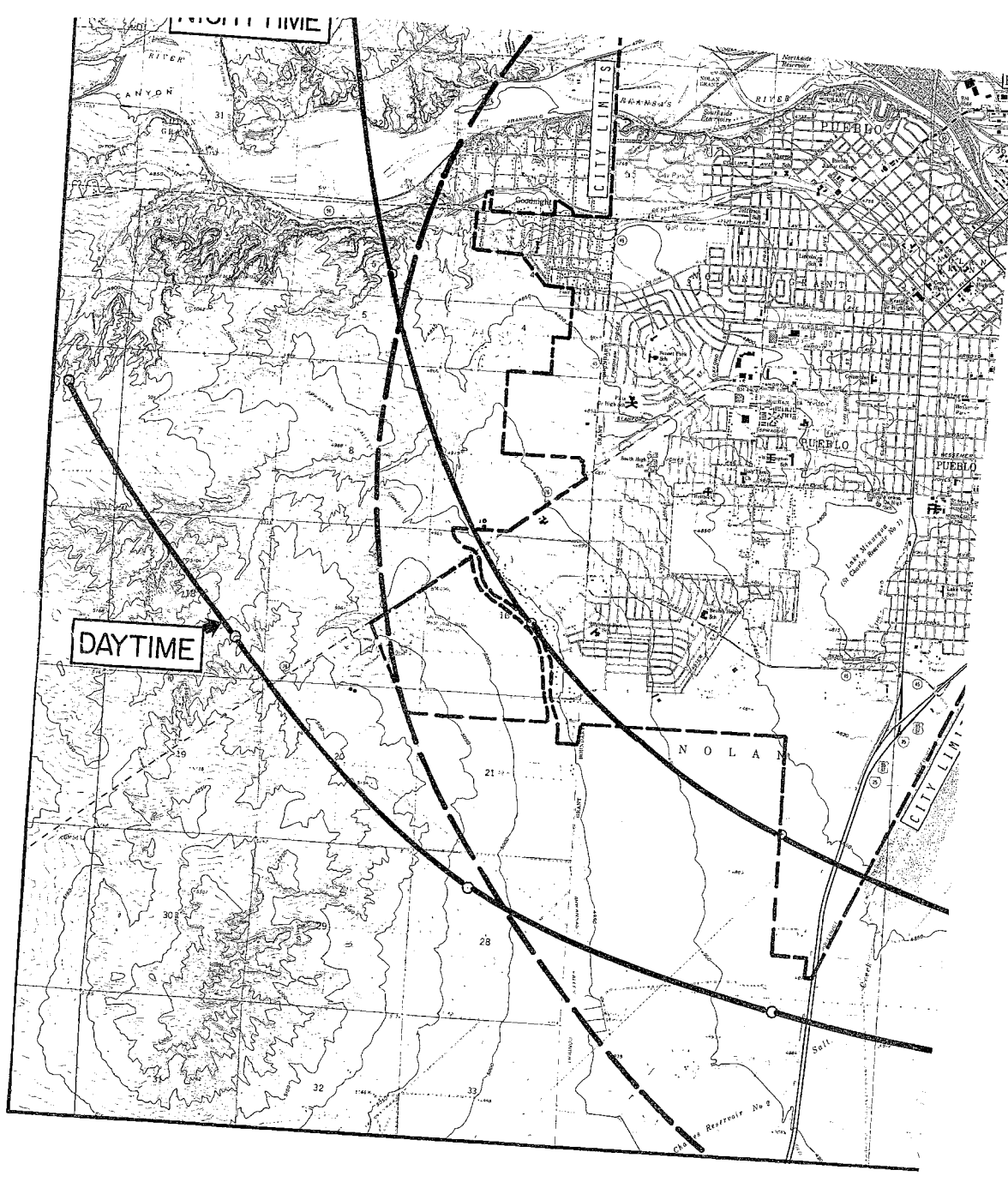
SW S SE

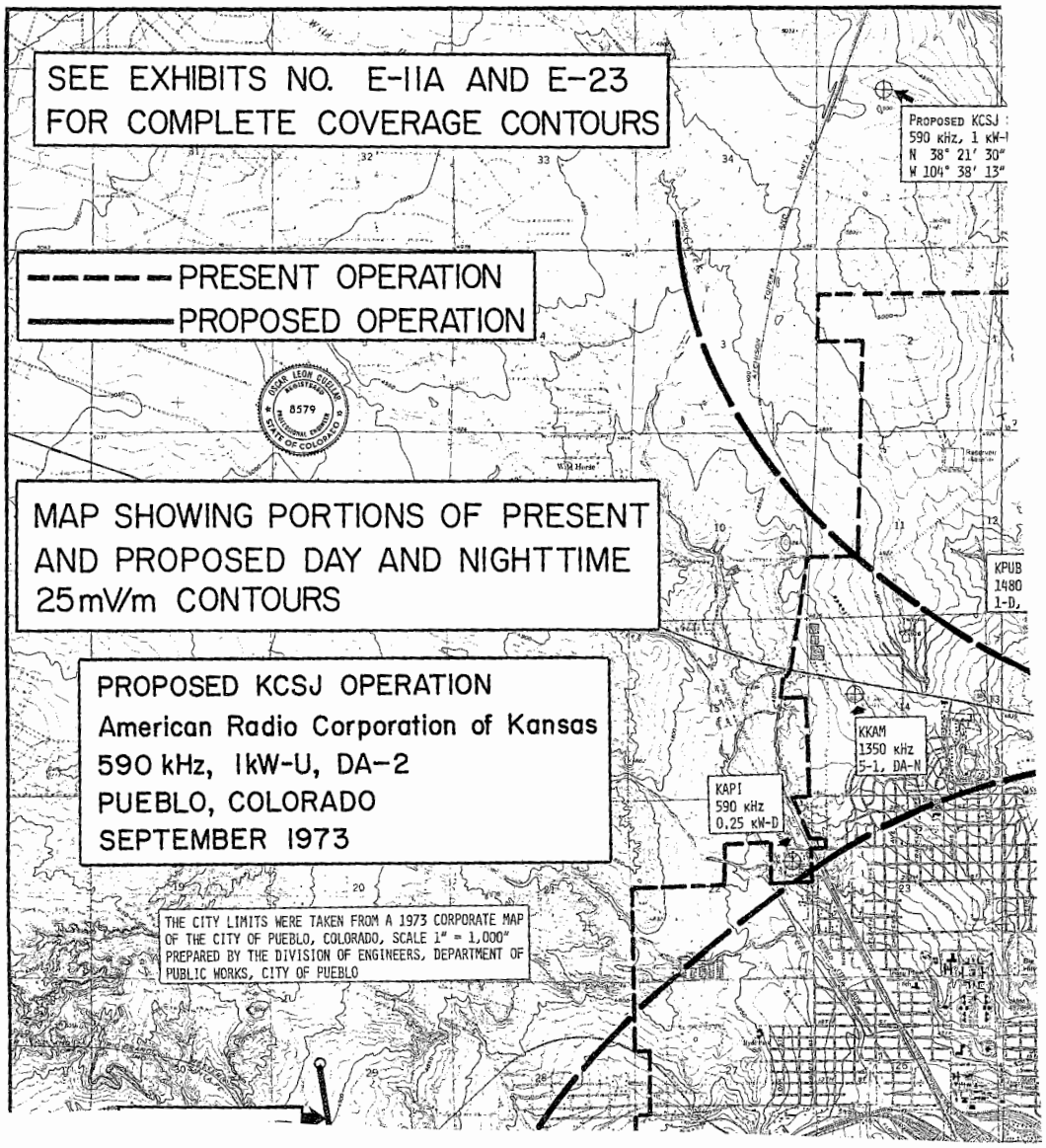


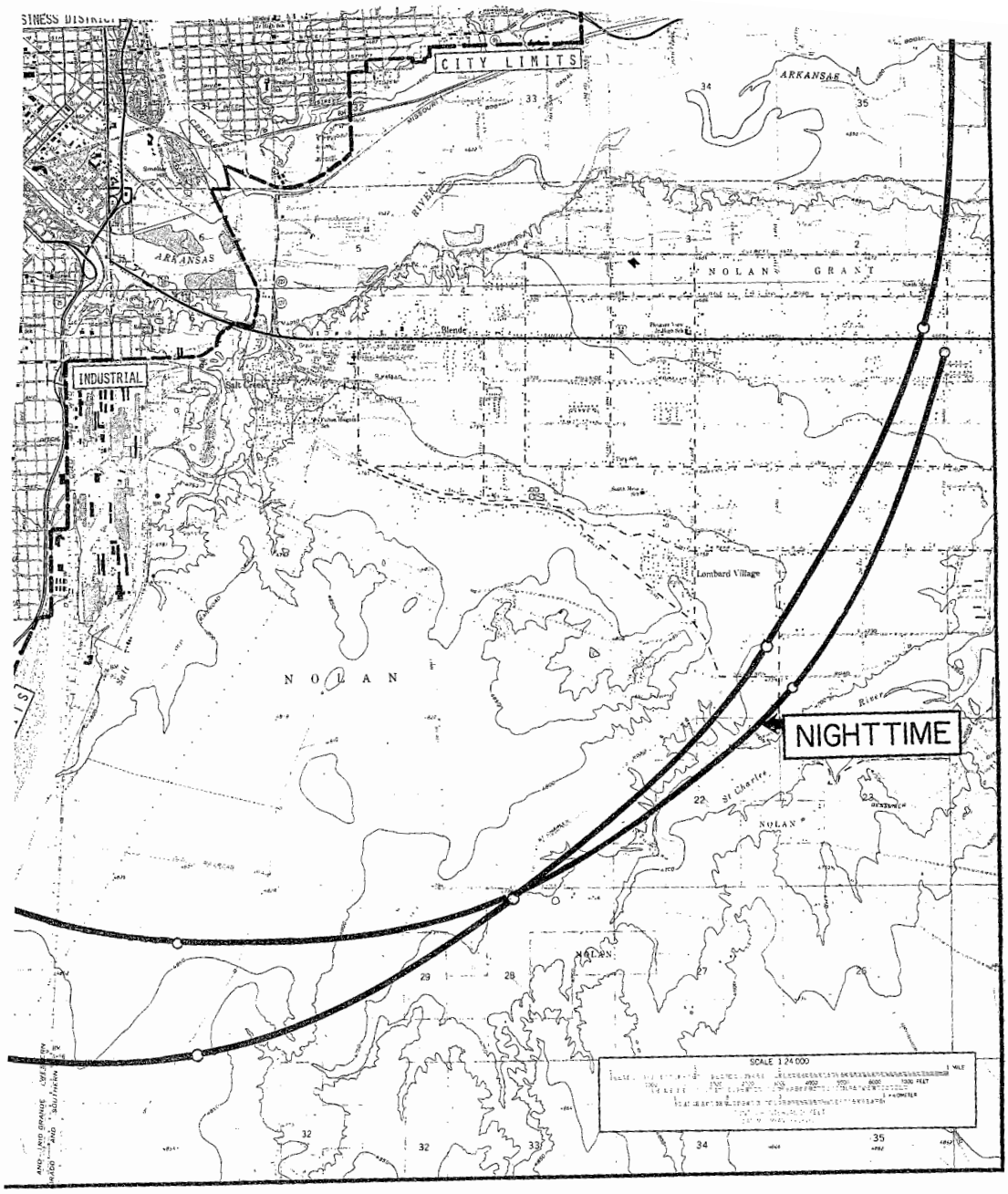





TOPOGRAPHIC SITE MAP
NORTHWEST PUEBLO QUADRANGLE
COLORADO-PUEBLO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
EXHIBIT NO. E-4
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
August 1973
Geographical Coordinates
Of Proposed Antenna Site
N 38° 21' 30"
W 104° 38' 13"
Property Boundary
DAY 1000 mV/m
Night 1000 mV/m
Topographic Site Location
NE1/4NW1/4 Section 35,
Township 19 S, Range 65W
At the P.M.
38° 22' 30"
38° 20' 00"
104° 40' 00"
104° 37' 30"
T. 19 S.
T. 20 S.
Gnat
Hollow
Dry
Creek
Landing Field
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO


NIGHTTIME
DAYTIME
CITY LIMITS
PUEBLO
NOLAN


SEE EXHIBITS NO. E-11A AND E-23
FOR COMPLETE COVERAGE CONTOURS
PRESENT OPERATION
PROPOSED OPERATION
MAP SHOWING PORTIONS OF PRESENT AND PROPOSED DAY AND NIGHTTIME 25mV/m CONTOURS
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1kW-U, DA-2
PUEBLO, COLORADO
SEPTEMBER 1973
THE CITY LIMITS WERE TAKEN FROM A 1973 CORPORATE MAP OF THE CITY OF PUEBLO, COLORADO, SCALE 1" = 1,000" PREPARED BY THE DIVISION OF ENGINEERS, DEPARTMENT OF PUBLIC WORKS, CITY OF PUEBLO
OSCAR LEON RIVELAND
8579
STATE OF COLORADO
PROPOSED KCSJ
590 kHz, 1 kW-
N 38° 21' 30"
W 104° 38' 13"
KPUB
1480
1-D,
KKAM
1350 kHz
5-1, DA-N
KAPI
590 kHz
0.25 kW-D


CITY LIMITS
INDUSTRIAL
ARKANSAS
RIVER
NOLAN
GRANT
Blende
Lombard Village
St Charles
NIGHTTIME
SCALE 1:24 000

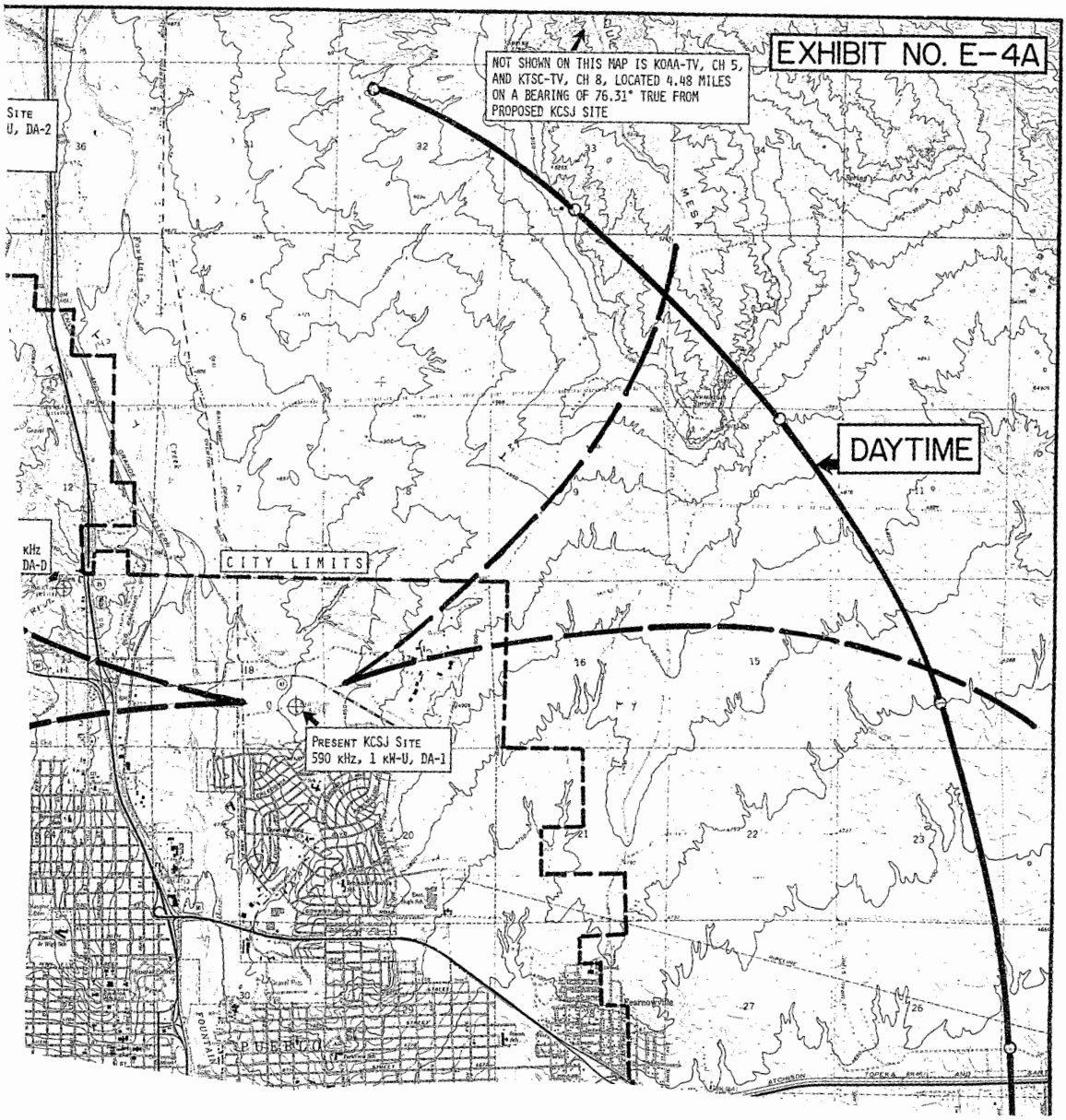


EXHIBIT NO. E-4A
NOT SHOWN ON THIS MAP IS KOAA-TV, CH 5, AND KTSC-TV, CH 8, LOCATED 4.48 MILES ON A BEARING OF 76.31° TRUE FROM PROPOSED KCSJ SITE
DAYTIME
CITY LIMITS
PRESENT KCSJ SITE
590 kHz, 1 kW-U, DA-1
PUEBLO
Site
U, DA-2
kHz
DA-D

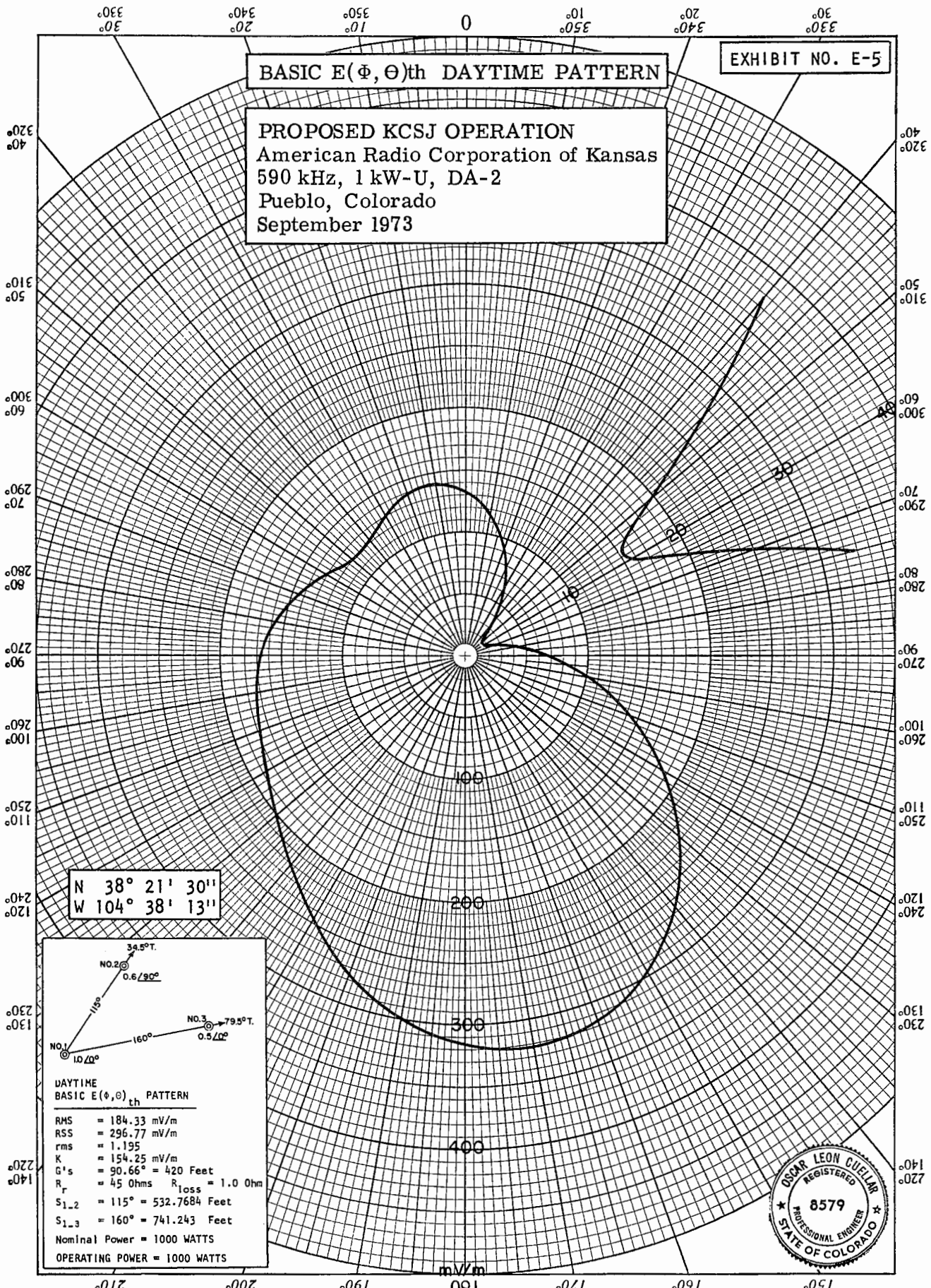


EXHIBIT NO. E-5
BASIC E(Φ, Θ)th DAYTIME PATTERN
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973
N 38° 21' 30"
W 104° 38' 13"
34.5°T.
NO.2
0.6/90°
115°
NO.3
79.5°T.
160°
0.5/0°
NO.1
1.0/0°
DAYTIME
BASIC E(Φ,Θ)th PATTERN
RMS = 184.33 mV/m
RSS = 296.77 mV/m
rms = 1.195
K = 154.25 mV/m
G's = 90.66° = 420 Feet
Rr = 45 Ohms Rloss = 1.0 Ohm
S1-2 = 115° = 532.7684 Feet
S1-3 = 160° = 741.243 Feet
Nominal Power = 1000 WATTS
OPERATING POWER = 1000 WATTS
OSCAR LEON CUELLAR
REGISTERED
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PROFESSIONAL ENGINEER
STATE OF COLORADO
mV/m
100
200
300
400
10
20
30
40
0
10°
20°
30°
40°
50°
60°
70°
80°
90°
100°
110°
120°
130°
140°
150°
160°
170°
180°
190°
200°
210°
220°
230°
240°
250°
260°
270°
280°
290°
300°
310°
320°
330°
340°
350°

COMPUTER TABULATION
DAYTIME DIRECTIONAL BASIC
PATTERN E (ϕ,θ)th;θ = 0°

Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

Daytime Directional Antenna Pattern Values

Azimuth (°T)	E (mV/m)	Azimuth (°T)	E (mV/m)	Azimuth (°T)	E (mV/m)
0	132.78	115	164.16	235	192.64
5	125.09	120	185.78	240	186.59
10	115.18	125	207.28	245	182.05
15	103.46	130	228.19	250	178.66
20	90.46	135	248.06	255	175.96
25	76.79	140	266.42	260	173.45
30	63.06	145	282.82	265	170.7
35	49.88	150	296.85	270	167.31
40	37.84	155	308.14	275	163.04
45	27.55	160	316.4	280	157.76
50	19.77	165	321.45	285	151.55
55	15.61	170	323.19	290	144.65
57.2	15.18	175	321.68	295	137.53
60	15.81	180	317.08	300	130.84
65	19.4	185	309.68	305	125.34
70	25.16	190	299.89	310	121.79
75	32.83	195	288.19	315	120.67
80	42.57	200	275.15	320	122.01
85	54.52	205	261.34	325	125.36
90	68.66	210	247.38	330	129.85
95	84.83	215	233.84	335	134.48
100	102.81	220	221.23	340	138.29
105	122.26	225	210.0	345	140.48
110	142.84	230	200.42	350	140.47
				355	137.94

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1563 South Hudson Phone (303) 756-8456

EXHIBIT NO. E-7

STANDARD RADIATION PATTERN
$E(\Phi,\Theta)_{std}$

(Daytime Horizontal Ground Plane)

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

DAYTIME PATTERN

DAYTIME
STANDARD RADIATION PATTERN
$\Theta=0°$

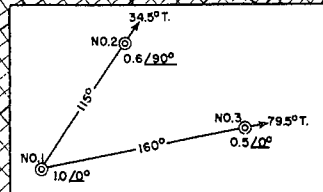
RMS=193.7 mV/m
RSS=311.86 mV/m

$E(\Phi,\Theta)_{std} = 1.05(E(\Phi,\Theta)_{th}^2 + Q^2)^{\frac{1}{2}}$

$Q = 0.025F(\Theta)296.77$ $Q = 7.42$

$P_{kW} = 1.0$

N 38° 21' 30"
W 104° 38' 13"



DAYTIME
BASIC $E(\Phi,\Theta)_{th}$ PATTERN

RMS	= 184.33 mV/m
RSS	= 296.77 mV/m
rms	= 1.195
K	= 154.25 mV/m
G's	= 90.66° = 420 Feet
R_r	= 45 Ohms R_{loss} = 1.0 Ohm
S_{1-2}	= 115° = 532.7684 Feet
S_{1-3}	= 160° = 741.243 Feet

Nominal Power = 1000 WATTS

OPERATING POWER = 1000 WATTS

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PROFESSIONAL ENGINEER
STATE OF COLORADO

mV/m

COMPUTER TABULATION
DAYTIME DIRECTIONAL STANDARD
RADIATION PATTERN E (ϕ,θ)std; $\theta = 0°$

Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

Daytime Directional Antenna Pattern Values

Azimuth (°T)	E (mV/m)	Azimuth (°T)	E (mV/m)	Azimuth (°T)	E (mV/m)
0	139.63	115	172.54	235	202.42
5	131.58	120	195.23	240	196.07
10	121.19	125	217.78	245	191.32
15	108.91	130	239.73	250	187.76
20	95.31	135	260.58	255	184.92
25	81.01	140	279.85	260	182.29
30	66.67	145	297.06	265	179.4
35	52.95	150	311.79	270	175.85
40	40.49	155	323.64	275	171.37
45	29.96	160	332.31	280	165.83
50	22.18	165	337.61	285	159.31
55	18.15	170	339.44	290	152.08
57.2	17.74	175	337.85	295	144.62
60	18.34	180	333.03	300	137.6
65	21.8	185	325.26	305	131.84
70	27.54	190	314.98	310	128.12
75	35.34	195	302.7	315	126.94
80	45.38	200	289.01	320	128.35
85	57.77	205	274.52	325	131.86
90	72.51	210	259.86	330	136.57
95	89.42	215	245.65	335	141.42
100	108.23	220	232.43	340	145.41
105	128.61	225	220.64	345	147.71
110	150.19	230	210.59	350	147.7
				355	145.04

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PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Daytime Array Data and Sample Calculations

Daytime Directional Antenna Data

Basic $E_{(\phi,\theta)_{th}}$ Day Pattern

S_{12} = 115° (522.7684 Feet) on a bearing of 34.5° True
S_{13} = 160° (741.2430 Feet) on a bearing of 79.5° True

Ψ_1 = 0° M_1 = 1.0
Ψ_2 = 90° M_2 = 0.6
Ψ_3 = 0° M_3 = 0.5
G's = 90.66° (420 Feet)

Operating Power = 1000 Watts

Radiation Resistance = 45 Ohms
Loss Resistance = 1.0 Ohm

Calculation of Pattern K

Substituting in Formula (3)

$$rms = \left| \begin{array}{l} 1^2 + 0.6^2 + 0.5^2 + \\ 2 \times 1 \times 0.6\ [\cos(90° - 0°)]\ (0.219781) + \\ 2 \times 1 \times 0.5\ [\cos\ (0° - 0°)]\ (-0.43454) + \\ 2 \times 0.6 \times 0.5\ [\cos\ (0° - 90°)]\ (0.23840) \end{array} \right|^{\frac{1}{2}}$$

$$rms = \left| \begin{array}{l} 1.61 + \\ 1.20\ (\cos\ (90°))\ (0.219781) + \\ 1.00\ (\cos\ (0°))\ (-0.181965) + \\ 0.60\ (\cos\ (-90°))\ (0.23840) \end{array} \right|^{\frac{1}{2}}$$

$$rms = \left| \begin{array}{l} 1.610000 \\ 0.000000 \\ -0.181965 \\ 0.000000 \end{array} \right|^{\frac{1}{2}} = [1.428035]^{\frac{1}{2}}$$

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

Calculation of Pattern K (Continued)

rms = 1.19500

Substituting in Formula (2)

K = 184.33/1.195

K = 154.25 mV/m

Toward WOW (Omaha, Nebraska) 0.5 mV/m Contour, a Random Bearing of 70° True; $\theta = 0°$

Substituting in Formula (1)

$$E = 154.25\ [1\ \underline{/0°} + 0.6\ \underline{/90° + 115° \cos [70° - 34.5°]} + 0.5\ \underline{/0° + 160° \cos [70° - 79.5°]}]$$

$$E = 154.25\ [1\ \underline{/0°} + 0.6\ \underline{/+183.624°} + 0.5\ \underline{/+157.8064°}]$$

$$E = 154.25 \begin{vmatrix} 1.00000 \\ -0.59881 - j0.03792 \\ -0.46295 + j0.18887 \end{vmatrix}$$

$$E = 154.25\ [0.06176 + j0.15095]$$

$$E = 154.25 \times 0.1631$$

$$E = 25.16 \text{ mV/m} = (\phi,\theta)_{th}$$

Standard Radiation Pattern $E(\phi,\theta)_{STD}$

Toward WOW (Omaha, Nebraska) 0.5 mV/m Contour, a Random Bearing of 70° True; $\theta = 0°$

$$E\ (\phi,\theta)_{STD} = 1.05\ [E\ (\phi,\theta)^2_{th} + Q^2]^{\frac{1}{2}}$$

$$Q = 0.025\ F\ (\theta)\ 296.77$$

$$Q = 7.42 \quad PkW = 1.0$$

$$E\ (\phi,\theta)_{STD} = 1.05\ [(25.16)^2 + (7.42)^2]^{\frac{1}{2}}$$

$$E\ (\phi,\theta)_{STD} = 1.05 \times 26.23$$

$$E\ (\phi,\theta)_{STD} = 27.54 \text{ mV/m}$$

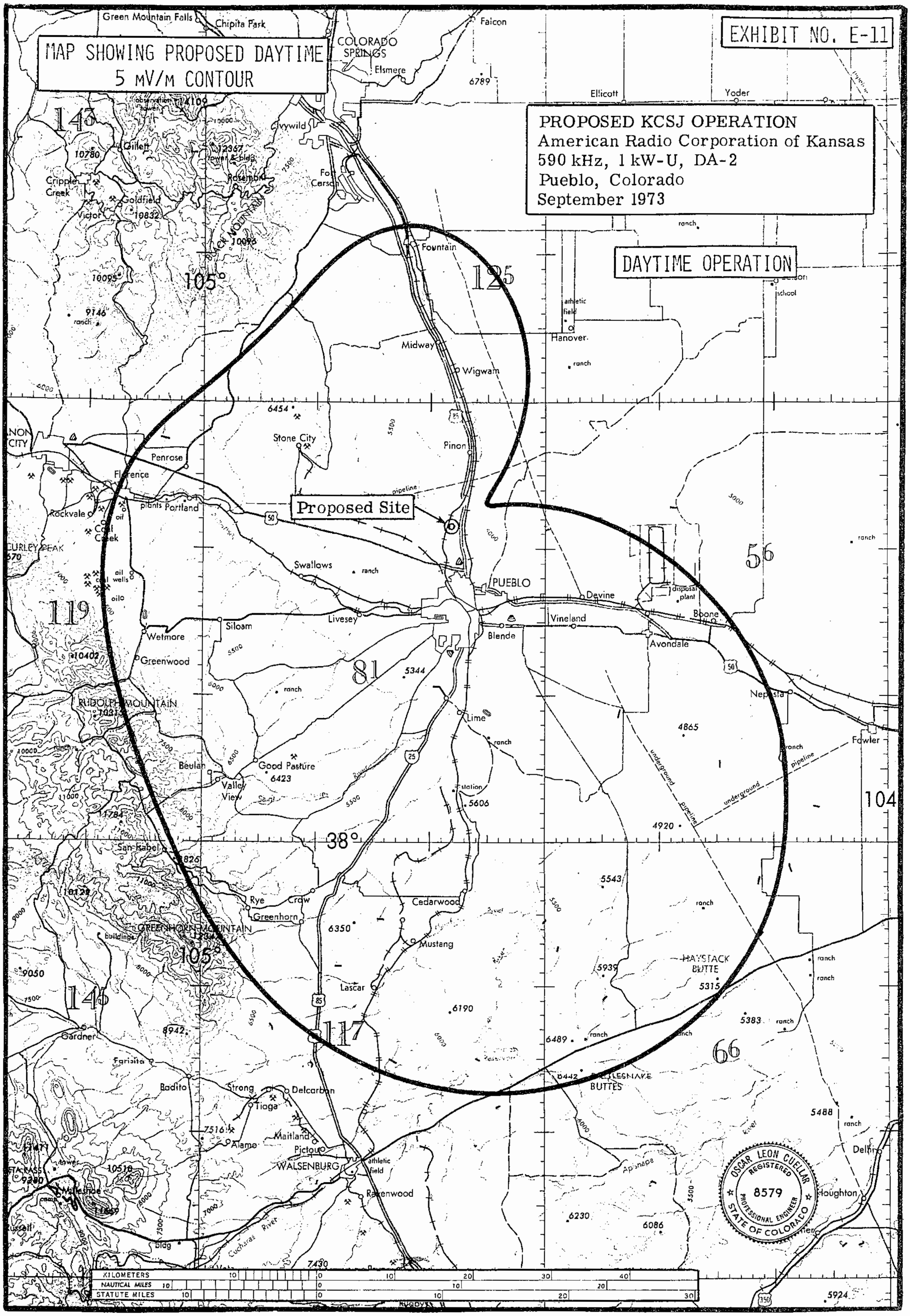
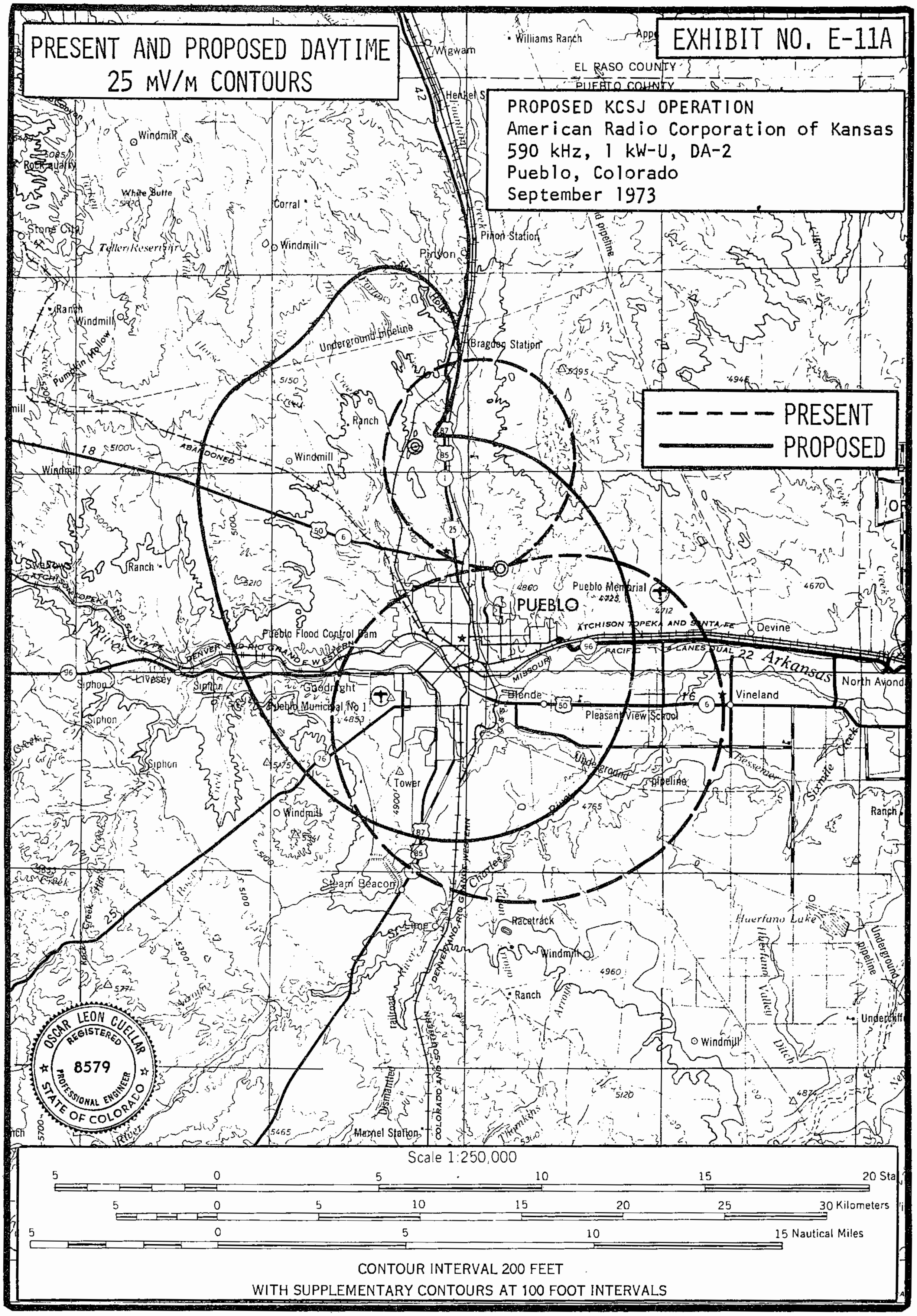
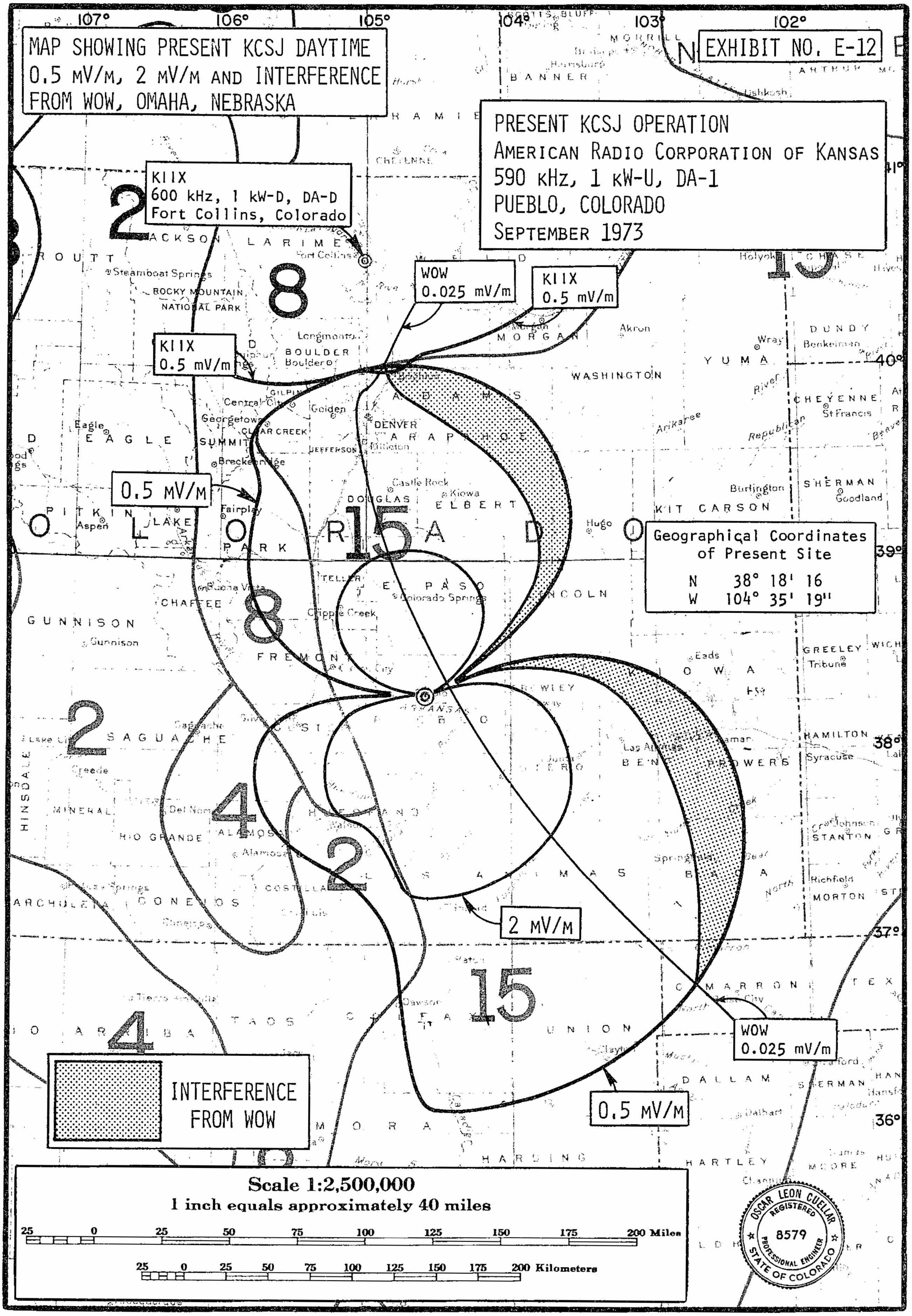


EXHIBIT NO. E-11
MAP SHOWING PROPOSED DAYTIME
5 mV/m CONTOUR
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973
DAYTIME OPERATION
Proposed Site
PUEBLO
COLORADO SPRINGS
Fountain
Midway
Wigwam
Pinon
Stone City
Penrose
Florence
Portland
Rockvale
Coal Creek
Swallows
Livesey
Siloam
Wetmore
Greenwood
Devine
Vineland
Blende
Boone
Avondale
Nepesta
Fowler
Lime
Beulah
Good Pasture
Valley View
San Isabel
Rye
Crow
Greenhorn
Cedarwood
Mustang
Lascar
HAYSTACK BUTTE
RATTLESNAKE BUTTES
Gardner
Badito
Strong
Delcarbon
Tioga
Maitland
Pictou
Alamo
WALSENBURG
Ravenwood
Hanover
Ellicott
Yoder
Falcon
Elsmere
Cripple Creek
Victor
Goldfield
Gillett
Rosemont
RUDOLPH MOUNTAIN
GREENHORN MOUNTAIN
BLACK MOUNTAIN
Green Mountain Falls
Chipita Park
Ivywild
Fort Carson
Houghton
105°
38°
104
125
56
119
143
81
146
117
66
KILOMETERS
NAUTICAL MILES
STATUTE MILES
OSCAR LEON CUELLAR
REGISTERED PROFESSIONAL ENGINEER
8579
STATE OF COLORADO


PRESENT AND PROPOSED DAYTIME
25 mV/m CONTOURS
EXHIBIT NO. E-11A
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973
PRESENT
PROPOSED
EL PASO COUNTY
PUEBLO COUNTY
PUEBLO
Pueblo Memorial
Pueblo Flood Control Dam
Pueblo Municipal No 1
Vineland
Devine
Blende
Pleasant View School
Goodnight
Steam Beacon
Racetrack
Pinon Station
Bragdon Station
Wigwam
Williams Ranch
Stone City
Teller Reservoir
White Butte
Rock quarry
Arkansas
Huerfano Lake
Huerfano Valley Ditch
Marnel Station
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO
Scale 1:250,000
20 Statute Miles
30 Kilometers
15 Nautical Miles
CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS


MAP SHOWING PRESENT KCSJ DAYTIME
0.5 MV/M, 2 MV/M AND INTERFERENCE
FROM WOW, OMAHA, NEBRASKA
EXHIBIT NO. E-12
PRESENT KCSJ OPERATION
AMERICAN RADIO CORPORATION OF KANSAS
590 KHZ, 1 KW-U, DA-1
PUEBLO, COLORADO
SEPTEMBER 1973
KIIX
600 kHz, 1 kW-D, DA-D
Fort Collins, Colorado
WOW
0.025 mV/m
KIIX
0.5 mV/m
KIIX
0.5 mV/m
0.5 MV/M
Geographical Coordinates
of Present Site
N 38° 18' 16
W 104° 35' 19"
2 MV/M
WOW
0.025 mV/m
0.5 MV/M
INTERFERENCE
FROM WOW
107° 106° 105° 104° 103° 102°
41° 40° 39° 38° 37° 36°
Scale 1:2,500,000
1 inch equals approximately 40 miles
25 0 25 50 75 100 125 150 175 200 Miles
25 0 25 50 75 100 125 150 175 200 Kilometers
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

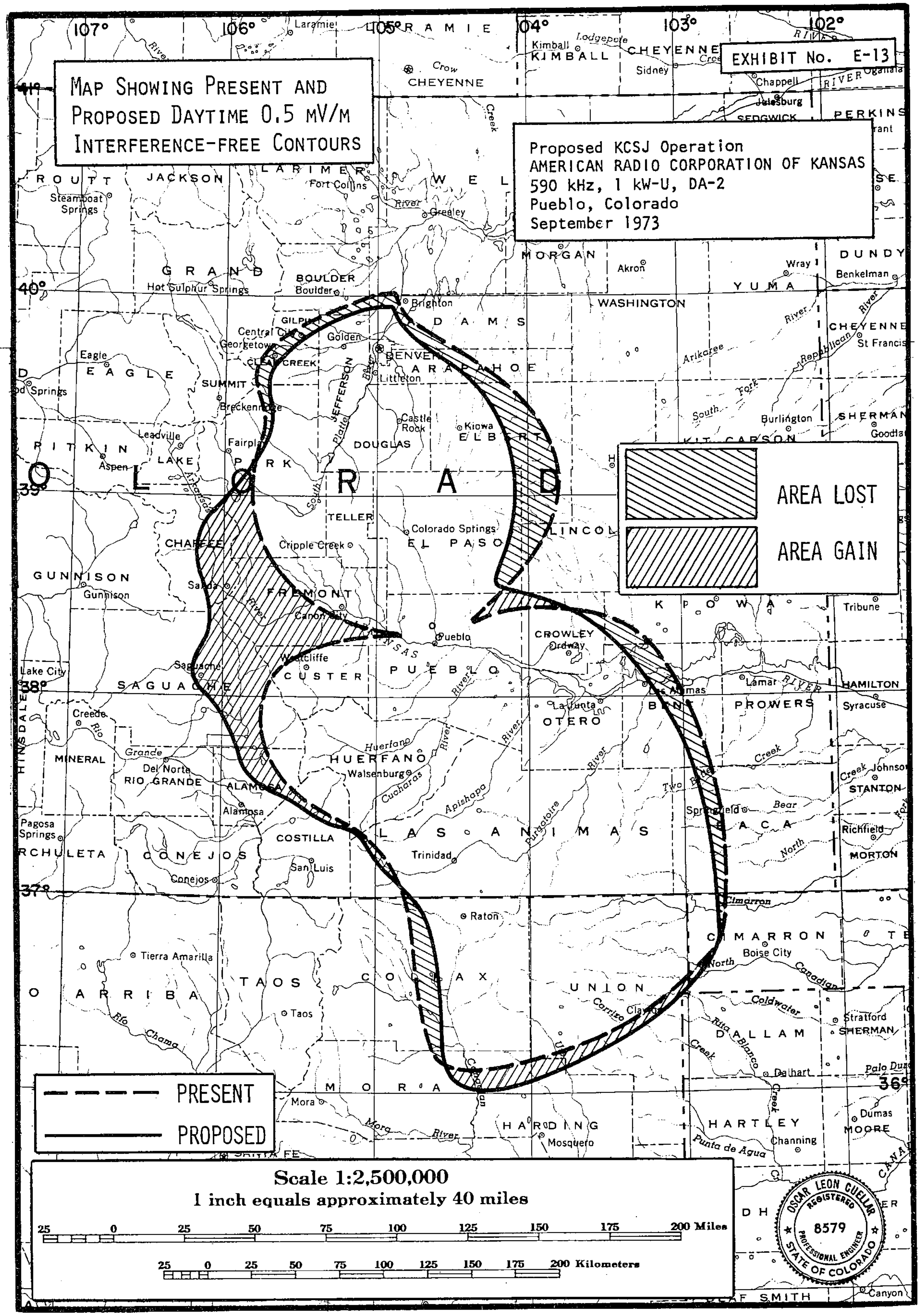


EXHIBIT No. E-13
MAP SHOWING PRESENT AND
PROPOSED DAYTIME 0.5 mV/M
INTERFERENCE-FREE CONTOURS
Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973
AREA LOST
AREA GAIN
PRESENT
PROPOSED
Scale 1:2,500,000
1 inch equals approximately 40 miles
25 0 25 50 75 100 125 150 175 200 Miles
25 0 25 50 75 100 125 150 175 200 Kilometers
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

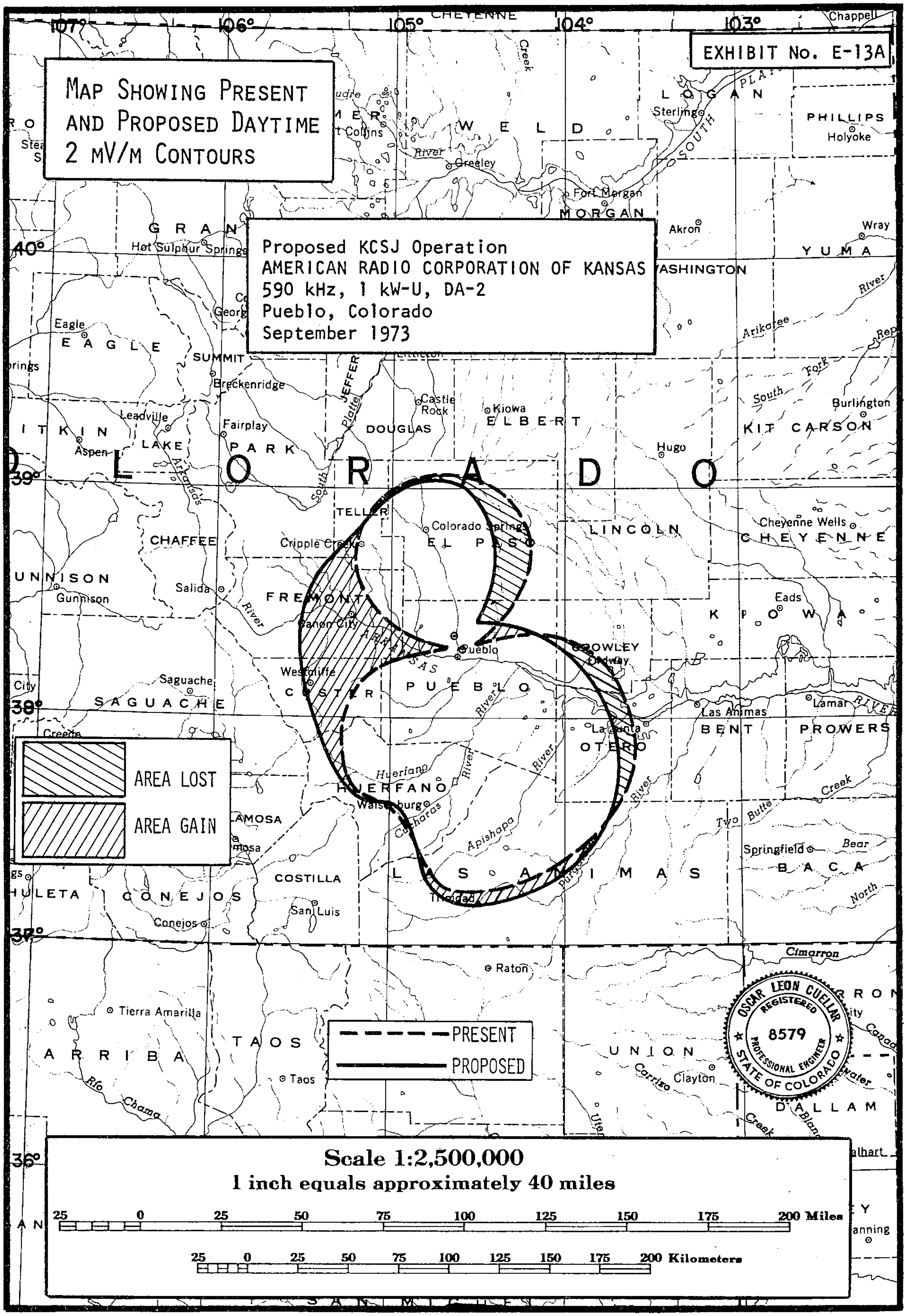
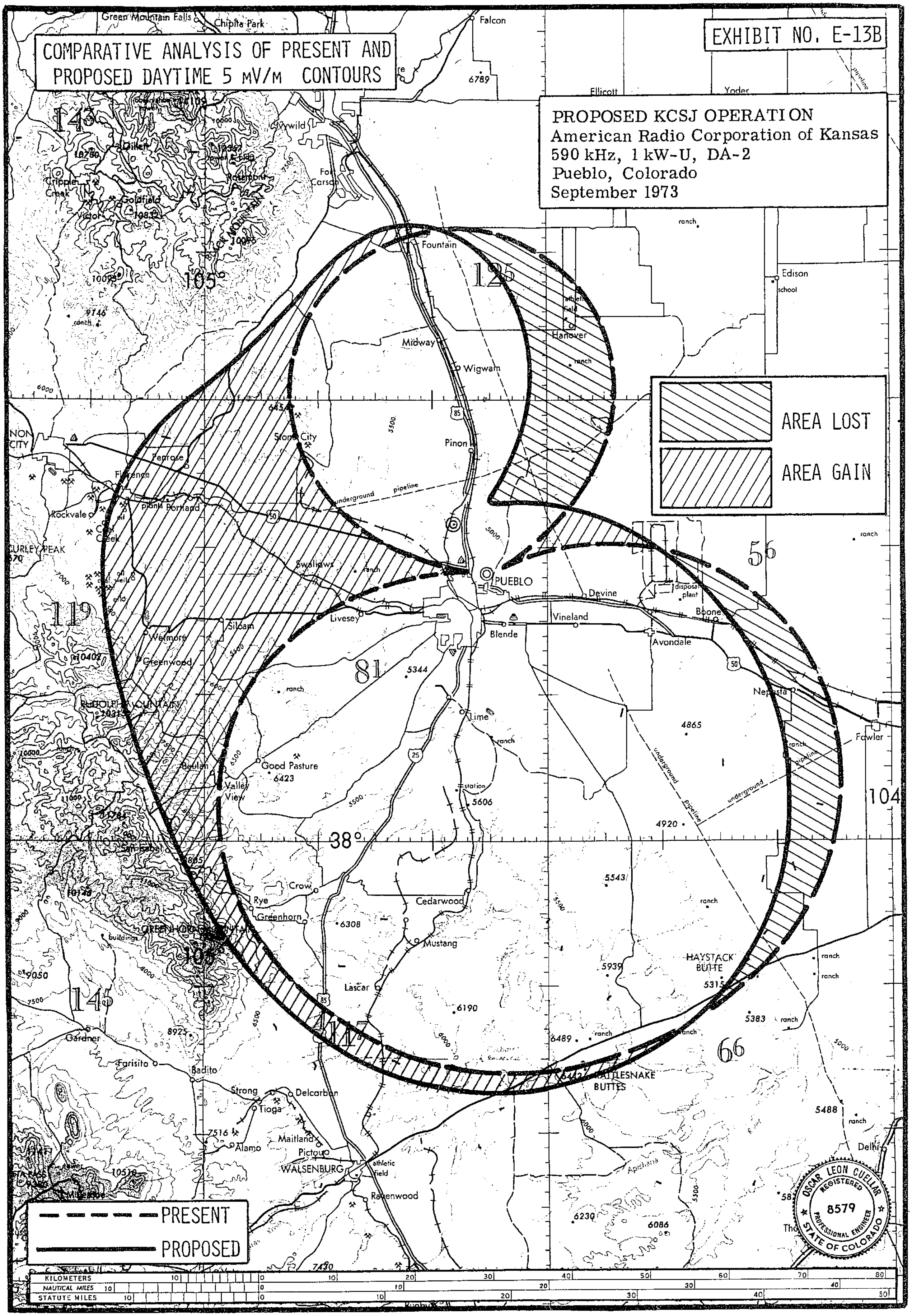


EXHIBIT No. E-13A
MAP SHOWING PRESENT
AND PROPOSED DAYTIME
2 mV/m CONTOURS
Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973
AREA LOST
AREA GAIN
PRESENT
PROPOSED
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO
Scale 1:2,500,000
1 inch equals approximately 40 miles
25 0 25 50 75 100 125 150 175 200 Miles
25 0 25 50 75 100 125 150 175 200 Kilometers
107° 106° 105° 104° 103°
40° 39° 38° 37° 36°
C O L O R A D O
Pueblo
Colorado Springs
Cañon City
Trinidad
Walsenburg
La Junta
Las Animas
Greeley
Fort Morgan
Sterling
Raton
Taos



COMPARATIVE ANALYSIS OF PRESENT AND PROPOSED DAYTIME 5 mV/m CONTOURS
EXHIBIT NO. E-13B
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973
AREA LOST
AREA GAIN
PRESENT
PROPOSED
KILOMETERS
NAUTICAL MILES
STATUTE MILES
Falcon
Ellicott
Yoder
Fountain
Edison
Hanover
Midway
Wigwam
Pinon
Stone City
Penrose
Florence
Portland
Rockvale
Swallows
PUEBLO
Devine
Vineland
Blende
Avondale
Boone
Livesey
Siloam
Wetmore
Greenwood
Nepesta
Fowler
Lime
Good Pasture
Beulah
Valley View
38°
Crow
Rye
Greenhorn
Cedarwood
Mustang
Lascar
HAYSTACK BUTTE
RATTLESNAKE BUTTES
Gardner
Farisita
Badito
Strong
Delcarbon
Tioga
Alamo
Maitland
Pictou
WALSENBURG
Ravenwood
Delhi
Goldfield
Victor
Cripple Creek
OSCAR LEON CUELLAR
REGISTERED PROFESSIONAL ENGINEER
8579
STATE OF COLORADO

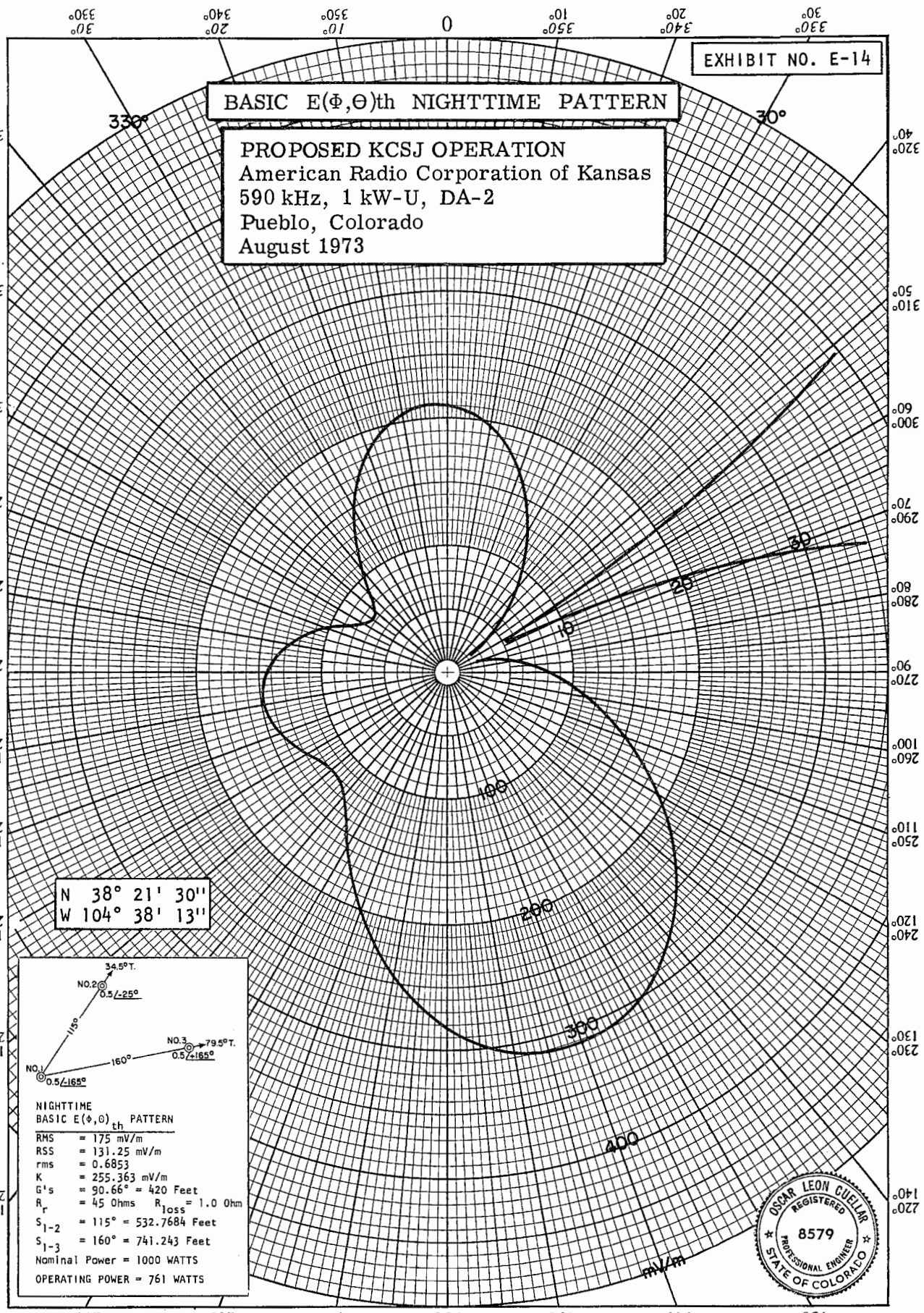


EXHIBIT NO. E-14
BASIC E(Φ,Θ)th NIGHTTIME PATTERN
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
N 38° 21' 30"
W 104° 38' 13"
34.5°T.
NO.2
0.5/-25°
115°
NO.3
79.5°T.
0.5/+165°
160°
NO.1
0.5/-165°
NIGHTTIME
BASIC E(Φ,0)th PATTERN
RMS = 175 mV/m
RSS = 131.25 mV/m
rms = 0.6853
K = 255.363 mV/m
G's = 90.66° = 420 Feet
Rr = 45 Ohms Rloss = 1.0 Ohm
S1-2 = 115° = 532.7684 Feet
S1-3 = 160° = 741.243 Feet
Nominal Power = 1000 WATTS
OPERATING POWER = 761 WATTS
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO
mV/m

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
August 1973

OSCAR LEON CUELLAR REGISTERED 8579 PROFESSIONAL ENGINEER STATE OF COLORADO

TABULATION OF NIGHTTIME BASIC PATTERN VALUES E(Ø,θ)TH

EXHIBIT NO. E-15

PAGE 1

BASIC PATTERN

	0	5	10	15	20	25	30	35	40	45	50	55	60	70	80
T= 0	210.45	208.60	203.12	194.29	182.51	168.33	152.36	135.30	117.84	100.63	84.26	69.21	55.80	34.17	17.30
T= 5	205.80	204.02	198.77	190.29	178.97	165.33	149.95	133.49	116.60	99.91	83.98	69.28	56.11	34.59	17.48
T= 10	196.89	195.24	190.36	182.47	171.93	159.20	144.81	129.37	113.49	97.73	82.63	68.61	55.95	34.88	17.65
T= 15	184.16	182.68	178.30	171.21	161.71	150.22	137.19	123.17	108.68	94.24	80.31	67.28	55.37	35.07	17.82
T= 20	168.19	166.91	163.13	157.00	148.77	138.78	127.42	115.14	102.39	89.59	77.15	65.37	54.44	35.18	17.98
T= 25	149.65	148.59	145.48	140.42	133.62	125.34	115.90	105.63	94.89	84.03	73.33	63.03	53.25	35.22	18.15
T= 30	129.26	128.44	126.03	122.12	116.84	110.41	103.05	94.99	86.50	77.79	69.05	60.39	51.89	35.24	18.31
T= 35	107.77	107.19	105.49	102.72	99.02	94.51	89.34	83.65	77.57	71.18	64.53	57.64	50.49	35.25	18.48
T= 40	85.91	85.55	84.52	82.87	80.72	78.16	75.26	72.05	68.51	64.54	60.07	54.97	49.16	35.30	18.66
T= 45	64.33	64.17	63.74	63.13	62.49	61.89	61.33	60.70	59.77	58.27	55.94	52.57	48.03	35.41	18.84
T= 50	43.62	43.61	43.66	44.00	44.84	46.28	48.19	50.23	51.93	52.81	52.48	50.66	47.22	35.62	19.04
T= 55	24.30	24.34	24.69	25.88	28.37	32.17	36.80	41.55	45.70	48.67	50.00	49.43	46.83	35.93	19.24
T= 60	7.66	7.27	7.07	9.45	14.72	21.56	28.90	35.90	41.90	46.34	48.80	49.03	46.95	36.39	19.46
T= 65	11.99	11.16	9.26	8.74	12.50	19.25	27.00	34.59	41.18	46.15	49.03	49.55	47.63	36.98	19.69
T= 70	26.38	25.75	24.21	22.83	23.19	26.30	31.62	37.81	43.62	48.14	50.74	51.03	48.87	37.73	19.94
T= 75	40.14	39.59	38.20	36.69	36.08	37.23	40.25	44.43	48.70	52.07	53.79	53.39	50.67	38.62	20.19
T= 80	53.39	52.92	51.69	50.23	49.25	49.37	50.80	53.17	55.70	57.55	58.00	56.55	52.97	39.64	20.46
T= 85	66.68	66.28	65.22	63.86	62.71	62.18	62.42	63.22	64.03	64.21	63.14	60.38	55.70	40.79	20.73
T= 90	80.65	80.30	79.36	78.06	76.73	75.62	74.83	74.19	73.32	71.76	69.02	64.75	58.79	42.03	21.01
T= 95	95.82	95.49	94.57	93.20	91.57	89.82	87.97	85.89	83.33	79.96	75.44	69.54	62.16	43.36	21.29
T= 100	112.55	112.19	111.17	109.55	107.43	104.85	101.82	98.22	93.89	88.63	82.25	74.62	65.74	44.74	21.57
T= 105	130.94	130.52	129.25	127.18	124.32	120.71	116.30	111.05	104.86	97.64	89.32	79.89	69.43	46.14	21.84

TABULATION OF NIGHTTIME BASIC PATTERN VALUES E(Ø,θ)TH

EXHIBIT NO. E-15

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
August 1973

OSCAR LEON CUELLAR * REGISTERED * 8579 * PROFESSIONAL ENGINEER * STATE OF COLORADO *

T= 110														
150.88	150.33	148.69	145.96	142.15	137.26	131.29	124.23	116.07	106.81	96.50	85.23	73.15	47.53	22.11
T= 115														
172.03	171.31	169.17	165.61	160.64	154.29	146.58	137.57	127.34	115.98	103.65	90.52	76.84	48.90	22.35
T= 120														
193.89	192.96	190.24	185.71	179.43	171.45	161.88	150.82	138.46	124.98	110.63	95.67	80.40	50.19	22.58
T= 125														
215.84	214.71	211.33	205.74	198.05	188.35	176.83	163.69	149.19	133.61	117.28	100.55	83.76	51.40	22.78
T= 130														
237.19	235.83	231.77	225.10	215.96	204.53	191.07	175.87	159.28	141.67	123.46	105.05	86.84	52.49	22.96
T= 135														
257.19	255.61	250.89	243.15	232.60	219.49	204.16	187.00	168.45	148.96	129.01	109.06	89.56	53.43	23.10
T= 140														
275.13	273.33	267.99	259.27	247.40	232.74	215.71	196.77	176.44	155.27	133.78	112.48	91.86	54.20	23.21
T= 145														
290.30	288.31	282.43	272.83	259.83	243.83	225.31	204.85	183.01	160.41	137.63	115.22	93.68	54.78	23.28
T= 150														
302.07	299.94	293.62	283.39	269.40	252.32	232.63	210.96	187.94	164.23	140.45	117.19	94.95	55.16	23.31
T= 155														
309.94	307.70	301.07	290.28	275.72	257.88	237.38	214.87	191.04	166.59	142.15	118.33	95.66	55.31	23.30
T= 160														
313.53	311.24	304.44	293.39	278.49	260.27	239.35	216.43	192.20	167.39	142.66	118.60	95.75	55.24	23.24
T= 165														
312.63	310.34	303.53	292.47	277.57	259.34	238.44	215.53	191.35	166.60	141.94	117.98	95.23	54.94	23.14
T= 170														
307.22	304.98	298.32	287.51	272.93	255.10	234.63	212.19	188.49	164.21	140.00	116.46	94.09	54.40	23.00
T= 175														
297.46	295.32	288.97	278.64	264.71	247.64	228.02	206.48	183.68	160.27	136.88	114.07	92.34	53.64	22.81
T= 180														
283.71	281.71	275.81	266.10	253.19	237.23	218.84	198.58	177.06	154.89	132.65	110.87	90.03	52.66	22.58
T= 185														
266.49	264.69	259.34	250.61	238.79	224.23	207.38	188.73	168.83	148.21	127.41	106.92	87.19	51.48	22.31
T= 190														
246.52	244.94	240.23	232.54	222.07	209.12	194.05	177.27	159.24	140.43	121.30	102.31	83.89	50.11	22.01
T= 195														
224.68	223.33	219.31	212.71	203.70	192.49	179.34	164.59	148.60	131.76	114.48	97.16	80.18	48.58	21.67
T= 200														
201.98	200.86	197.52	192.07	184.48	175.01	163.82	151.14	137.25	122.46	107.12	91.57	76.14	46.91	21.30
T= 205														
179.61	178.71	176.00	171.51	165.31	157.47	148.12	137.41	125.56	112.81	99.41	85.67	71.86	45.12	20.91
T= 210														
158.95	158.21	155.99	152.30	147.19	140.69	132.91	123.94	113.94	103.07	91.55	79.58	67.40	43.24	20.51
T= 215														
141.49	140.83	138.88	135.65	131.20	125.60	118.93	111.28	102.78	93.55	83.72	73.44	62.85	41.29	20.08
T= 220														
128.69	128.02	126.03	122.80	118.44	113.09	106.88	99.97	92.48	84.49	76.10	67.35	58.27	39.31	19.65
T= 225														
121.54	120.74	118.41	114.67	109.75	103.90	97.39	90.49	83.37	76.15	68.84	61.41	53.74	37.32	19.22
T= 230														
120.04	119.04	116.19	111.45	105.40	98.37	90.82	83.15	75.72	68.68	62.06	55.69	49.30	35.35	18.78
T= 235														
123.06	121.81	118.16	112.38	104.89	96.25	87.09	78.03	69.63	62.21	55.83	50.25	45.00	33.41	18.36
T= 240														
128.78	127.30	122.94	116.03	107.06	96.69	85.68	74.86	65.01	56.71	50.17	45.12	40.85	31.53	17.95
T= 245														
135.42	133.72	128.74	120.83	110.52	98.53	85.73	73.08	61.58	52.06	45.02	40.27	36.89	29.74	17.55

TABULATION OF NIGHTTIME BASIC PATTERN VALUES E(Ø,θ)TH

T= 250														
141.49	139.62	134.14	125.41	113.99	100.65	86.30	72.01	58.88	48.03	40.29	35.67	33.11	28.06	17.18
T= 255														
145.94	143.95	138.09	128.74	116.49	102.11	86.57	70.94	56.43	44.33	35.81	31.26	29.53	26.51	16.84
T= 260														
148.05	145.98	139.88	130.12	117.31	102.25	85.88	69.31	53.75	40.62	31.40	26.99	26.15	25.12	16.53
T= 265														
147.38	145.27	139.05	129.10	116.02	100.61	83.80	66.69	50.48	36.62	26.89	22.78	23.02	23.92	16.26
T= 270														
143.70	141.59	135.38	125.45	112.37	96.94	80.08	62.83	46.86	32.11	22.10	18.62	20.24	22.93	16.02
T= 275														
136.97	134.91	128.84	119.12	106.32	91.20	74.64	57.64	41.50	26.96	16.91	14.61	17.96	22.19	15.83
T= 280														
127.39	125.41	119.60	110.29	98.03	83.52	67.62	51.23	35.56	21.20	11.22	11.13	16.44	21.72	15.68
T= 285														
115.40	113.55	108.11	99.39	87.91	74.33	59.40	43.98	28.91	15.13	5.01	9.20	15.99	21.53	15.57
T= 290														
101.86	100.17	95.21	87.27	76.81	64.43	50.83	36.76	22.98	10.23	1.79	10.24	16.78	21.63	15.51
T= 295														
88.28	86.79	82.42	75.42	66.22	55.36	43.50	31.38	19.91	10.79	6.99	13.89	18.70	22.00	15.48
T= 300														
77.23	75.97	72.29	66.41	58.72	49.74	40.10	30.64	22.50	17.36	16.61	18.87	21.50	22.61	15.50
T= 305														
72.39	71.38	68.42	63.71	57.60	50.54	43.12	36.06	30.17	26.22	24.50	24.44	24.88	23.43	15.55
T= 310														
76.71	75.88	73.44	69.55	64.47	58.57	52.27	46.07	40.47	35.89	32.53	30.26	28.59	24.42	15.63
T= 315														
89.57	88.78	86.43	82.67	77.68	71.75	65.22	58.46	51.87	45.81	40.53	36.13	32.44	25.52	15.75
T= 320														
107.80	106.91	104.28	100.04	94.37	87.55	79.89	71.75	63.53	55.62	48.33	41.88	36.29	26.68	15.88
T= 325														
128.29	127.23	124.11	119.06	112.29	104.12	94.88	85.00	74.90	65.02	55.74	47.36	40.02	27.87	16.04
T= 330														
148.84	147.59	143.88	137.89	129.88	120.20	109.26	97.55	85.54	73.74	62.59	52.44	43.51	29.05	16.21
T= 335														
167.89	166.45	162.17	155.25	146.02	134.88	122.31	108.86	95.09	81.54	68.71	57.00	46.69	30.17	16.38
T= 340														
184.32	182.70	177.91	170.19	159.88	147.46	133.47	118.53	103.24	88.20	73.96	60.95	49.47	31.20	16.57
T= 345														
197.27	195.51	190.33	181.97	170.83	157.41	142.32	126.21	109.74	93.55	78.21	64.19	51.81	32.14	16.75
T= 350														
206.15	204.31	198.87	190.10	178.41	164.34	148.53	131.65	114.40	97.45	81.37	66.66	53.65	32.95	16.94
T= 355														
210.59	208.72	203.18	194.24	182.34	168.01	151.90	134.70	117.12	99.82	83.39	68.34	54.99	33.63	17.12

OSCAR LEON CUELLAR REGISTERED PROFESSIONAL ENGINEER 8579 STATE OF COLORADO

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
August 1973

EXHIBIT NO. E-15

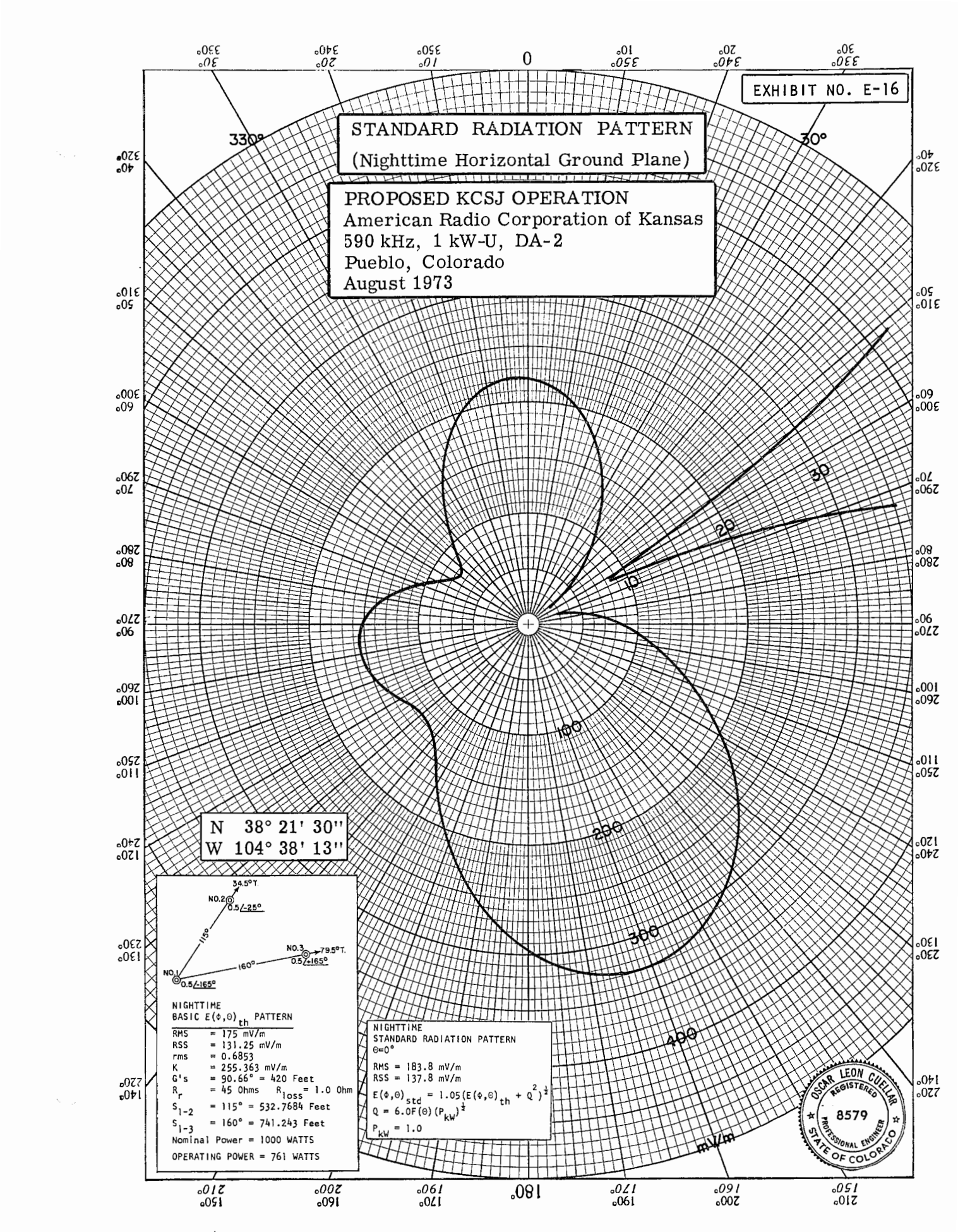


EXHIBIT NO. E-16
STANDARD RADIATION PATTERN
(Nighttime Horizontal Ground Plane)
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
N 38° 21' 30"
W 104° 38' 13"
34.5°T.
NO.2
0.5/-25°
115°
NO.3
79.5°T.
0.5/-165°
160°
NO.1
0.5/-165°
NIGHTTIME
BASIC E(φ,θ)th PATTERN
RMS = 175 mV/m
RSS = 131.25 mV/m
rms = 0.6853
K = 255.363 mV/m
G's = 90.66° = 420 Feet
Rr = 45 Ohms Rloss = 1.0 Ohm
S1-2 = 115° = 532.7684 Feet
S1-3 = 160° = 741.243 Feet
Nominal Power = 1000 WATTS
OPERATING POWER = 761 WATTS
NIGHTTIME
STANDARD RADIATION PATTERN
θ=0°
RMS = 183.8 mV/m
RSS = 137.8 mV/m
E(φ,θ)std = 1.05(E(φ,θ)th + Q²)½
Q = 6.0F(θ)(PkW)½
PkW = 1.0
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO
10
20
30
100
200
300
400
mV/m

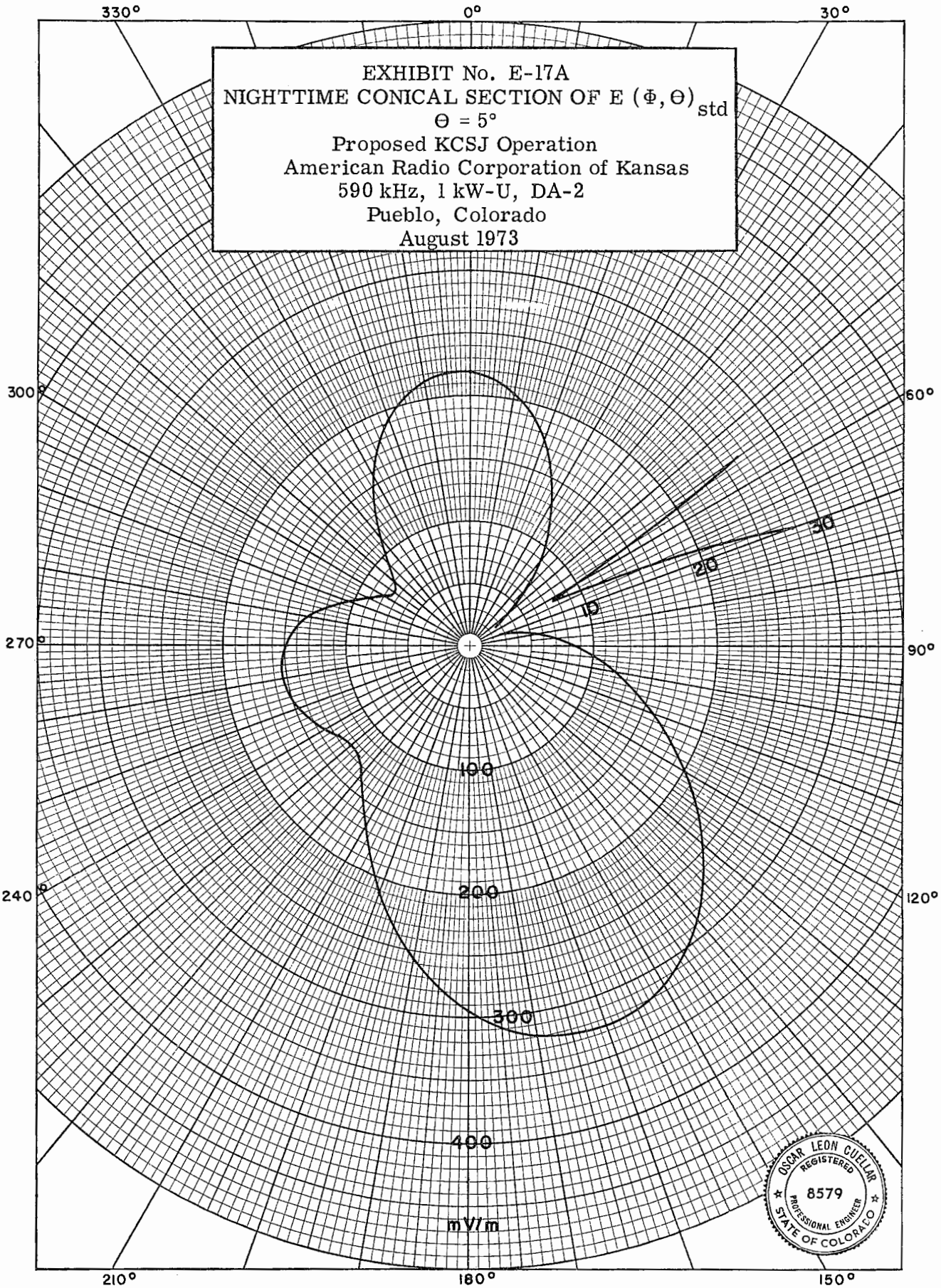


EXHIBIT No. E-17A
NIGHTTIME CONICAL SECTION OF E (Φ, Θ) std
Θ = 5°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
10
20
30
100
200
300
400
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

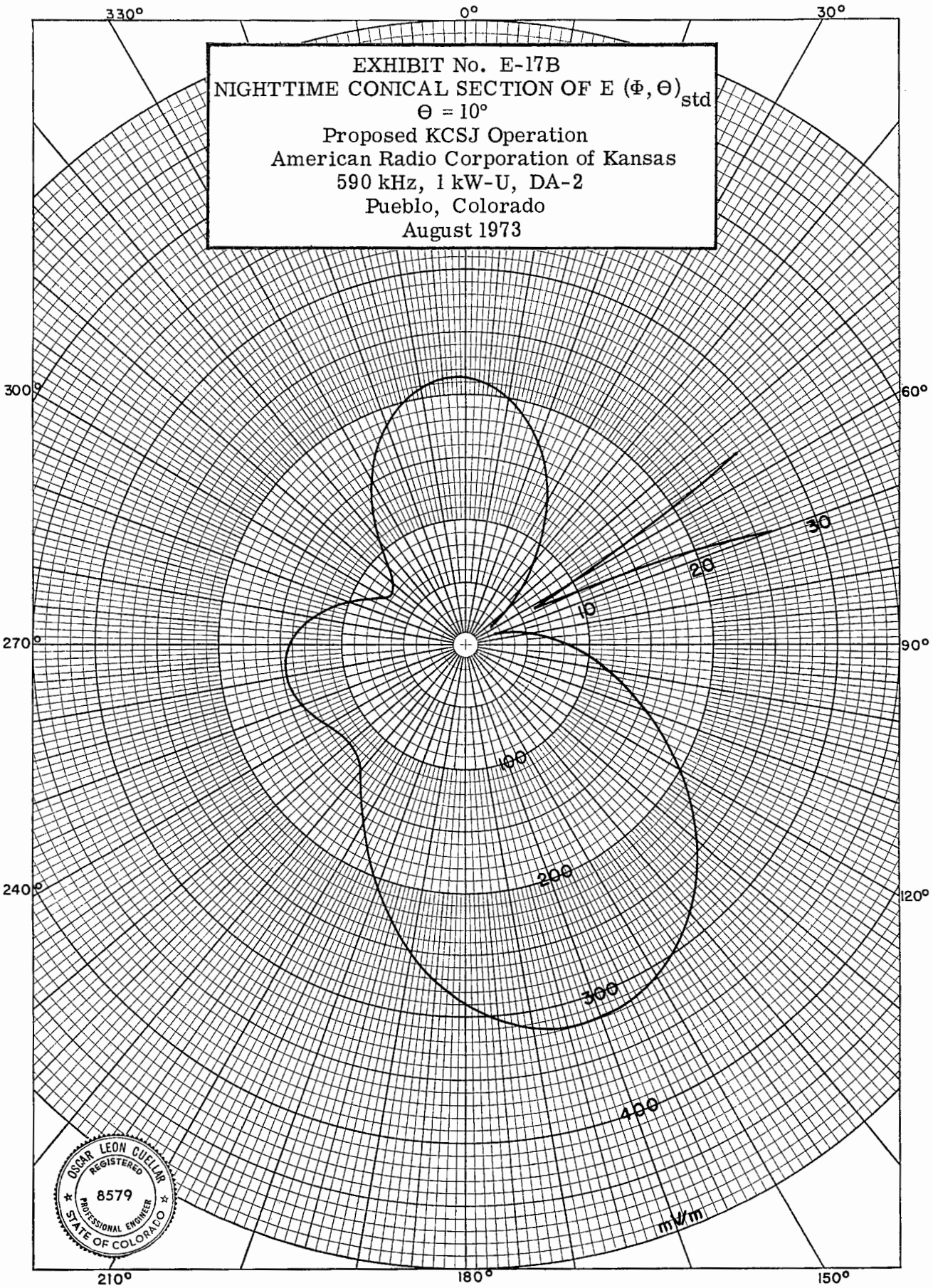


EXHIBIT No. E-17B
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ = 10°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
330°
0°
30°
300°
60°
270°
90°
240°
120°
210°
180°
150°
10
20
30
100
200
300
400
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

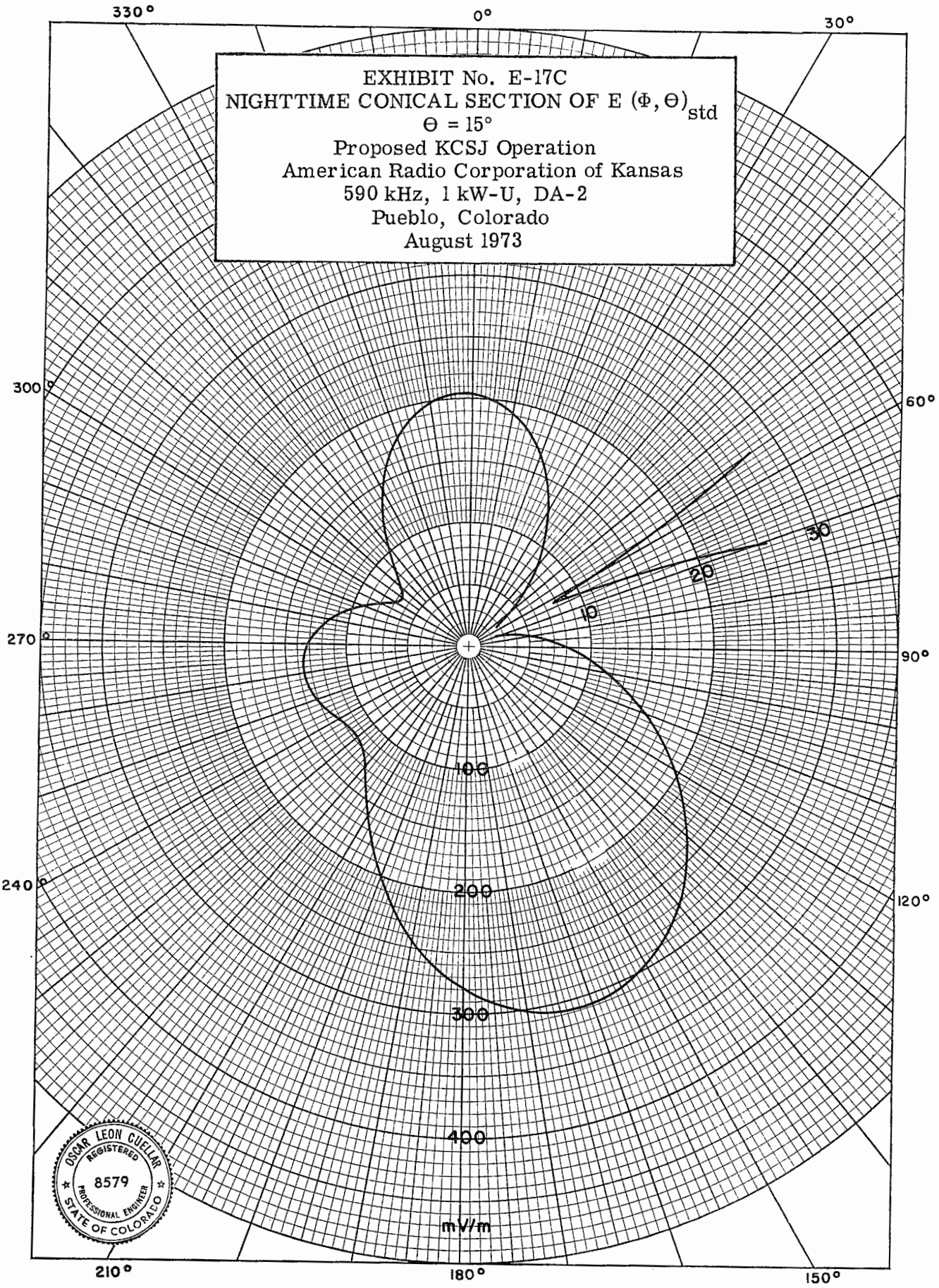


EXHIBIT No. E-17C
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ = 15°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
330°
0°
30°
300°
60°
270°
90°
240°
120°
210°
180°
150°
10
20
30
100
200
300
400
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

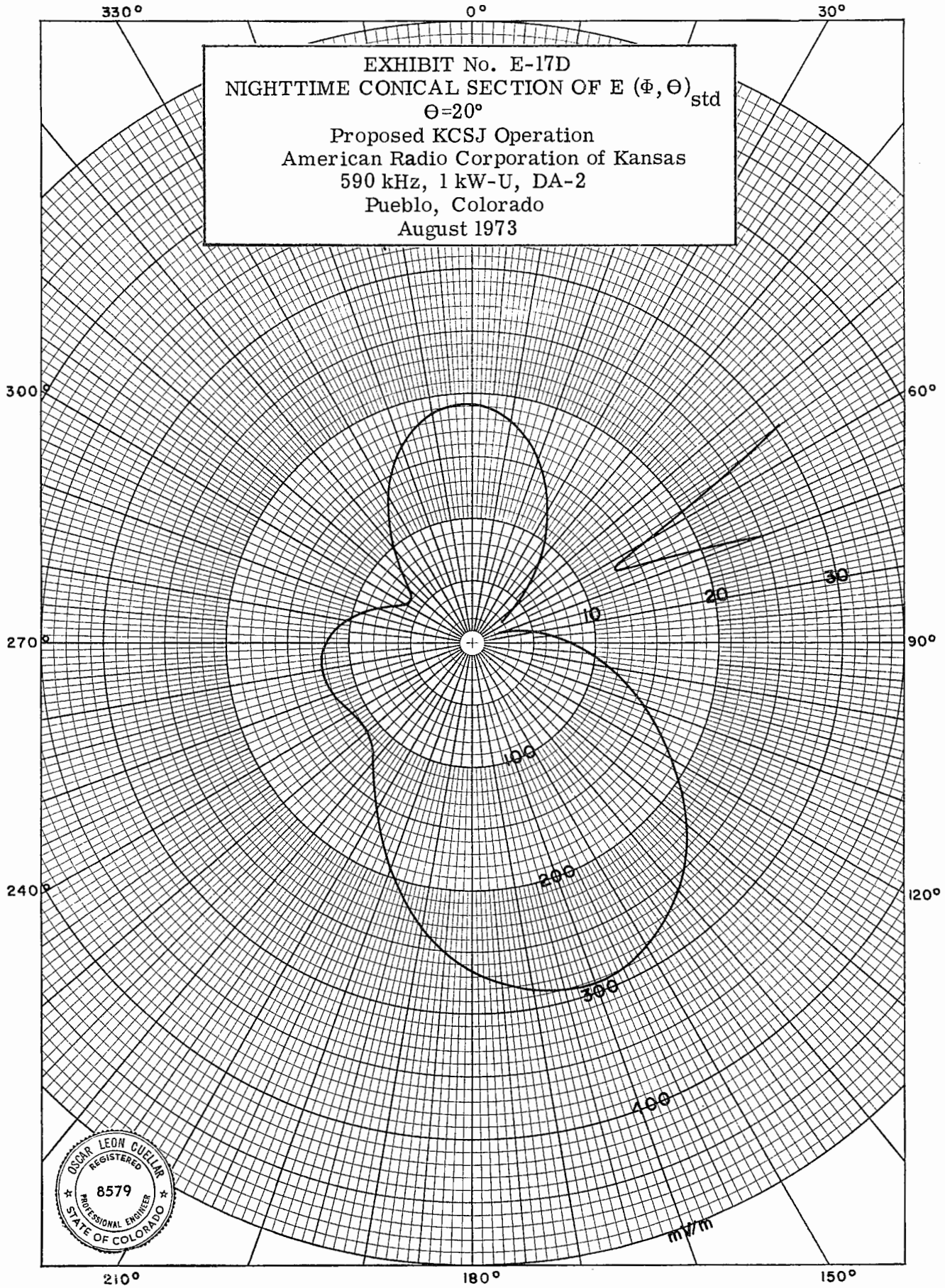


EXHIBIT No. E-17D
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=20°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
330°
0°
30°
300°
60°
270°
90°
240°
120°
210°
180°
150°
10
20
30
100
200
300
400
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

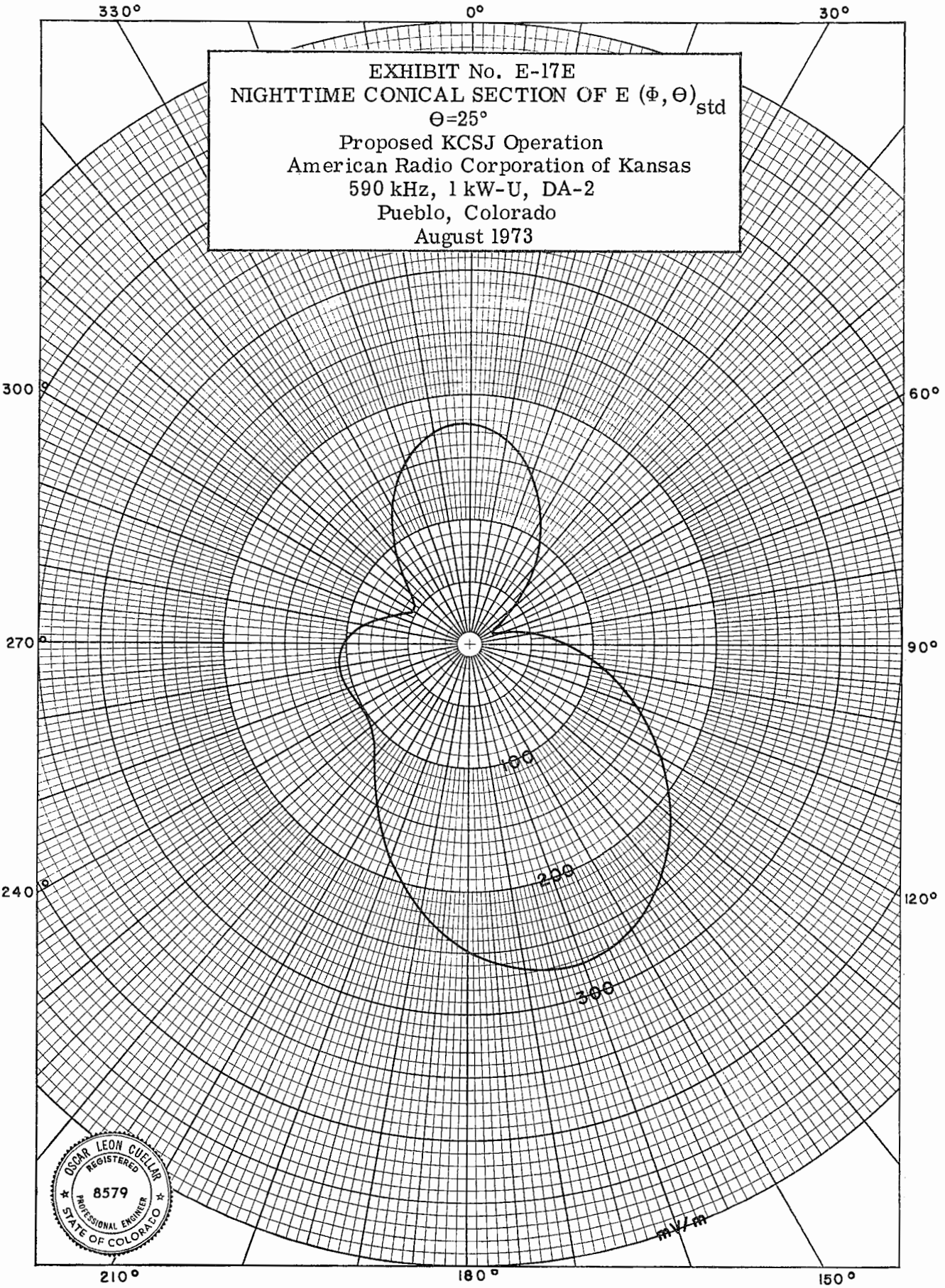


EXHIBIT No. E-17E
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=25°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
330°
0°
30°
300°
60°
270°
90°
240°
120°
210°
180°
150°
100
200
300
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

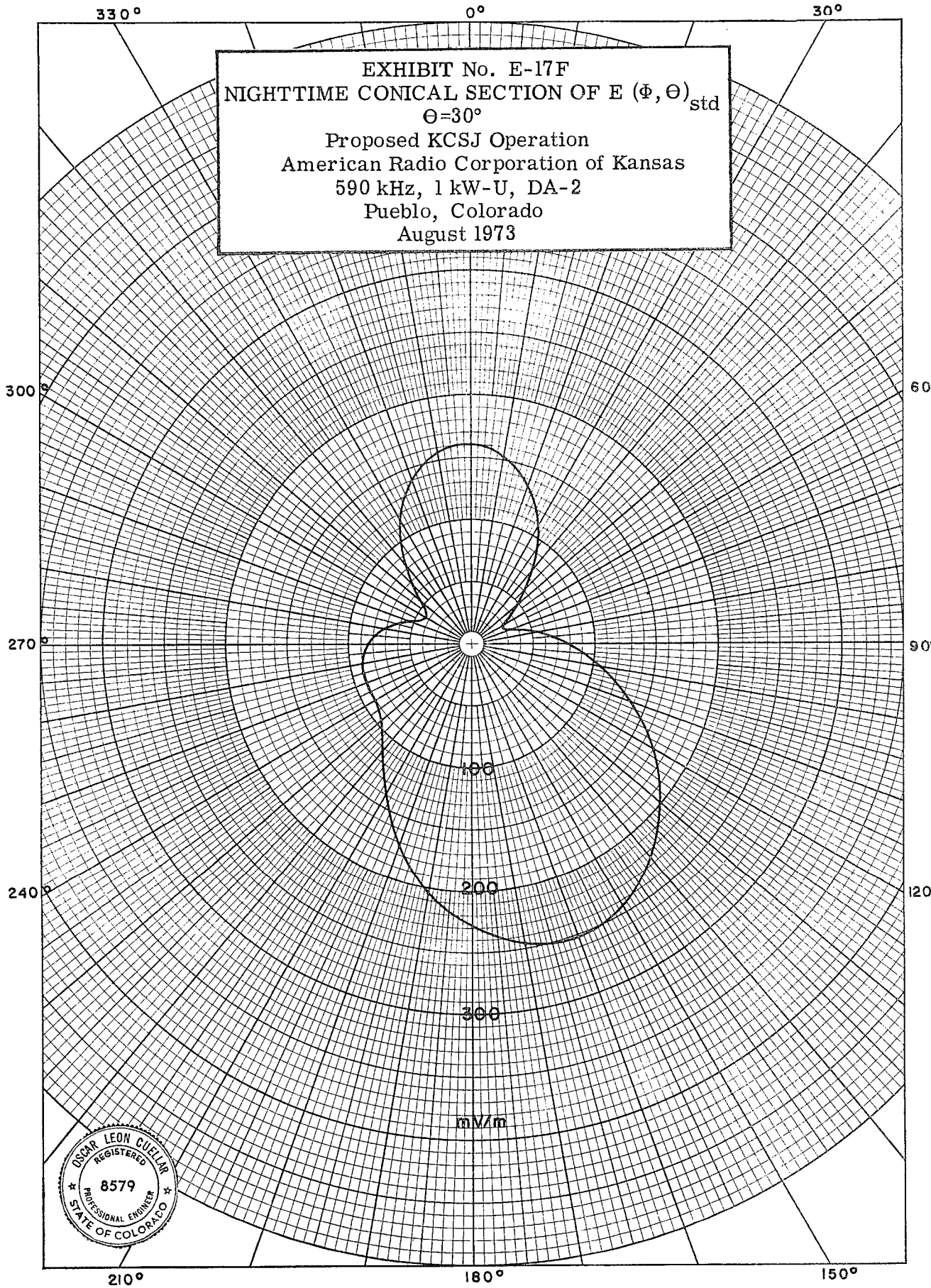


EXHIBIT No. E-17F
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=30°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
330°
0°
30°
300°
60°
270°
90°
240°
120°
210°
180°
150°
100
200
300
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

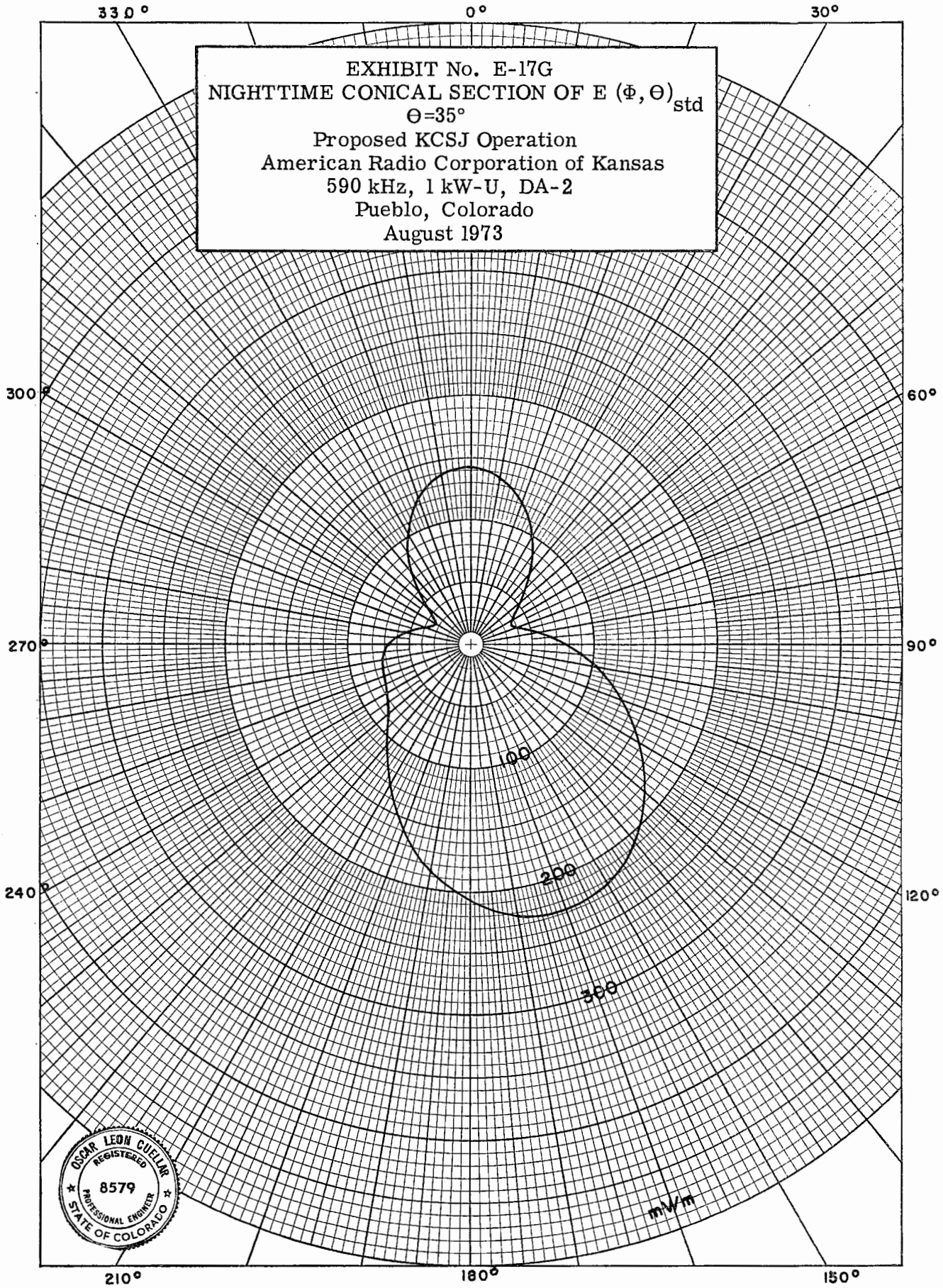


EXHIBIT No. E-17G
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=35°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
330°
0°
30°
300°
60°
270°
90°
240°
120°
210°
180°
150°
100
200
300
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

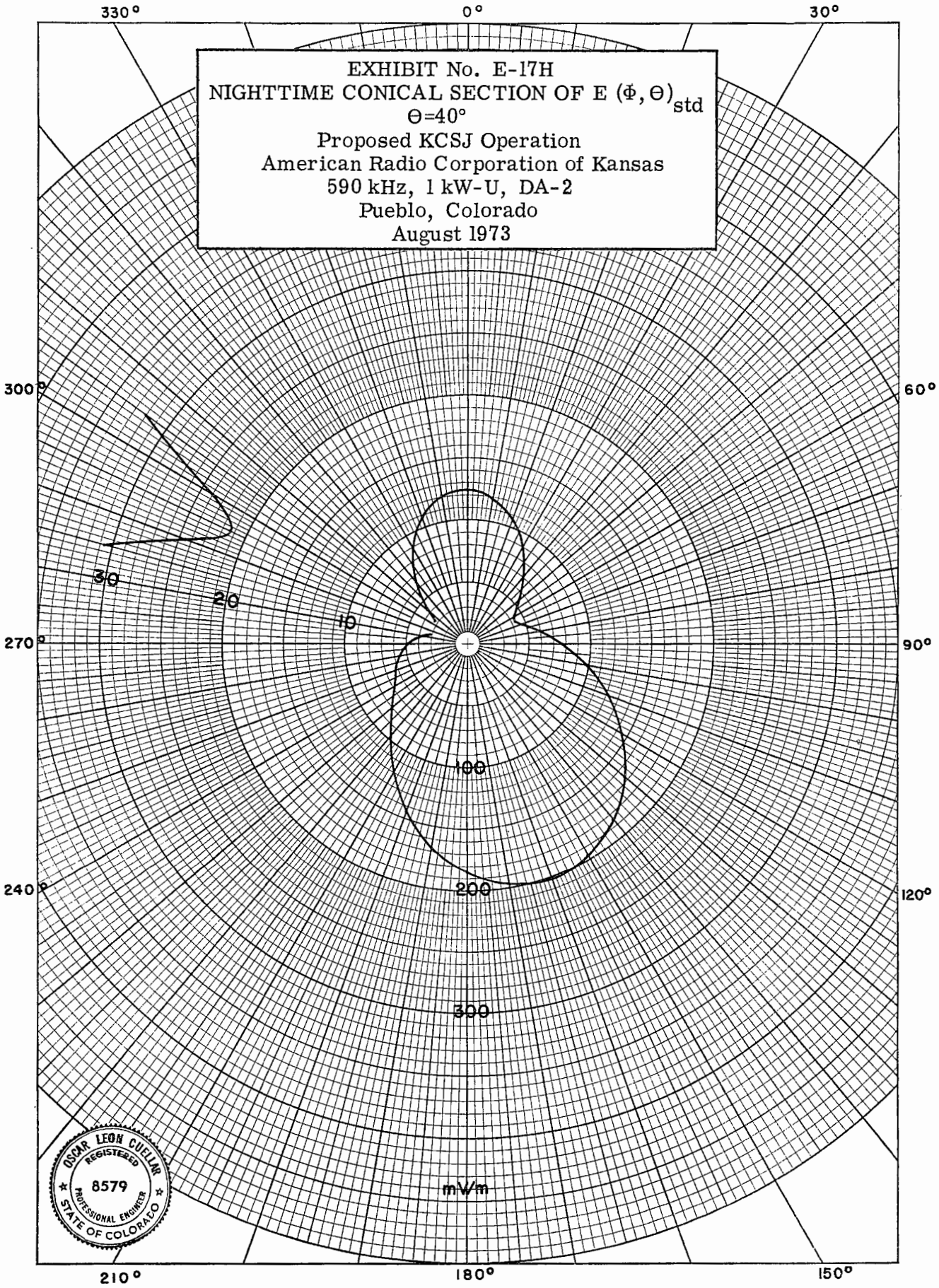


EXHIBIT No. E-17H
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=40°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
330°
0°
30°
300°
60°
270°
90°
240°
120°
210°
180°
150°
30
20
10
100
200
300
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

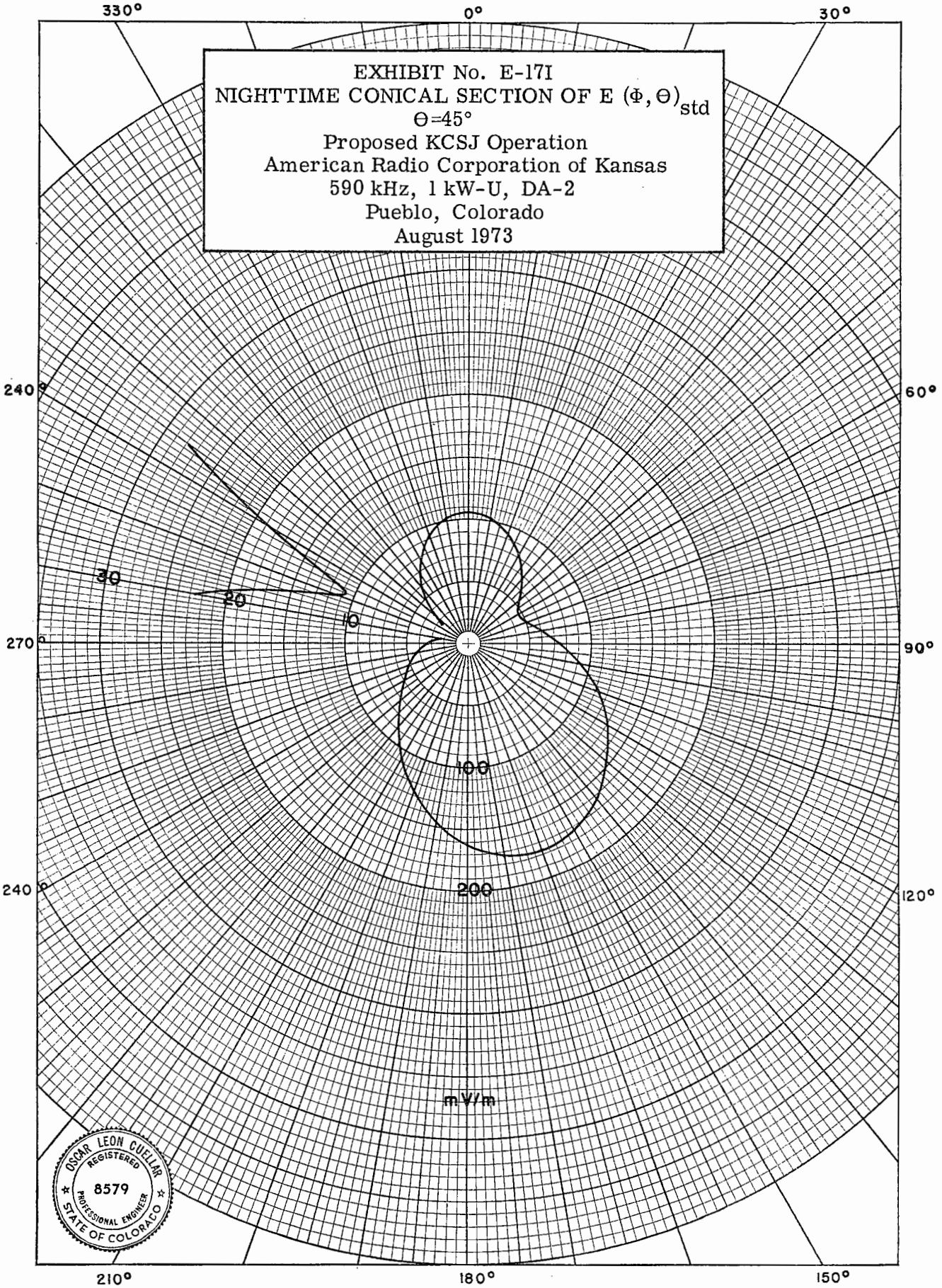


EXHIBIT No. E-17I
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=45°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
330°
0°
30°
240°
60°
270°
90°
240°
120°
210°
180°
150°
30
20
10
100
200
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

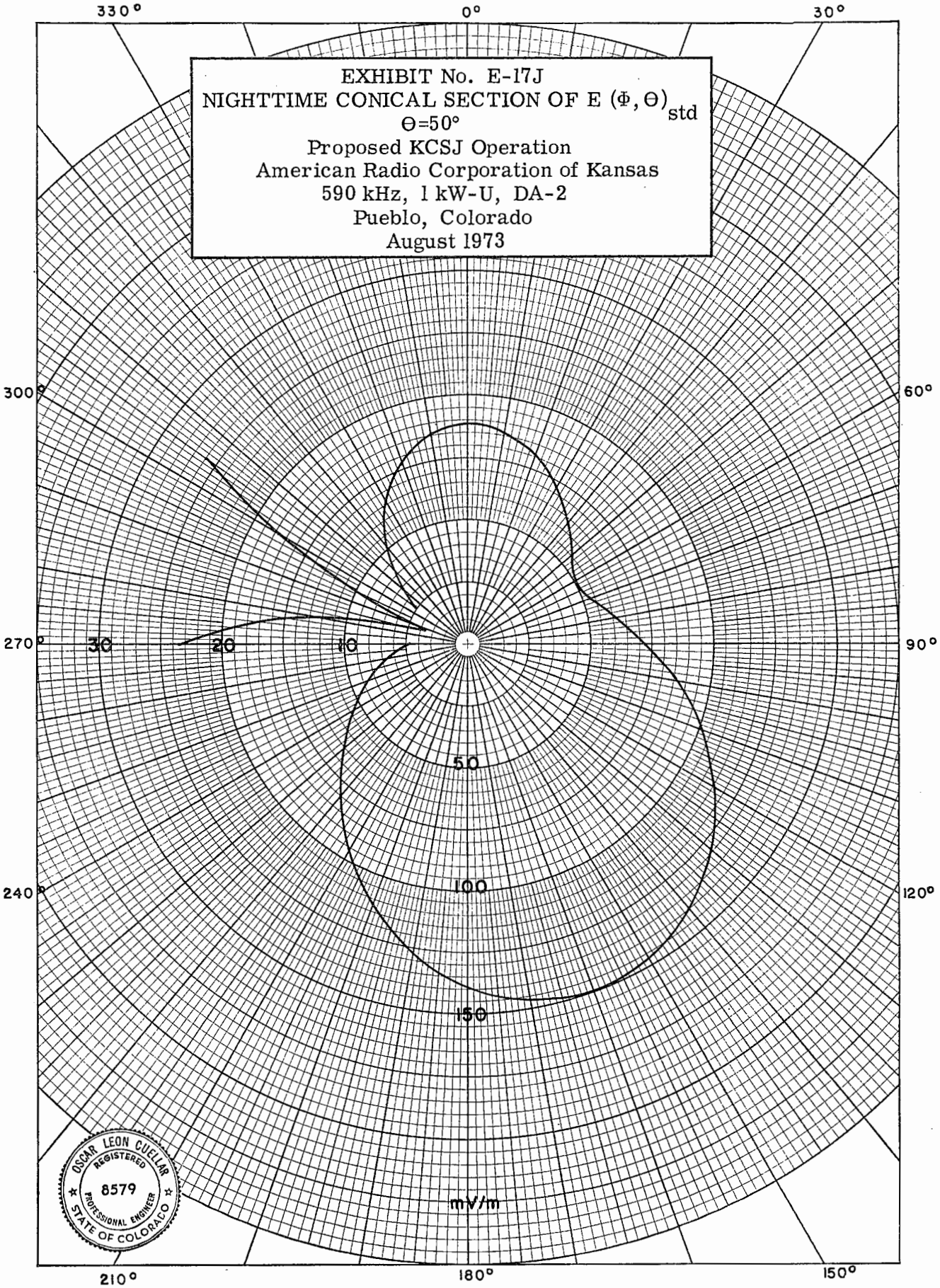


EXHIBIT No. E-17J
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=50°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
330°
0°
30°
300°
60°
270°
90°
240°
120°
210°
180°
150°
30
20
10
5.0
100
150
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

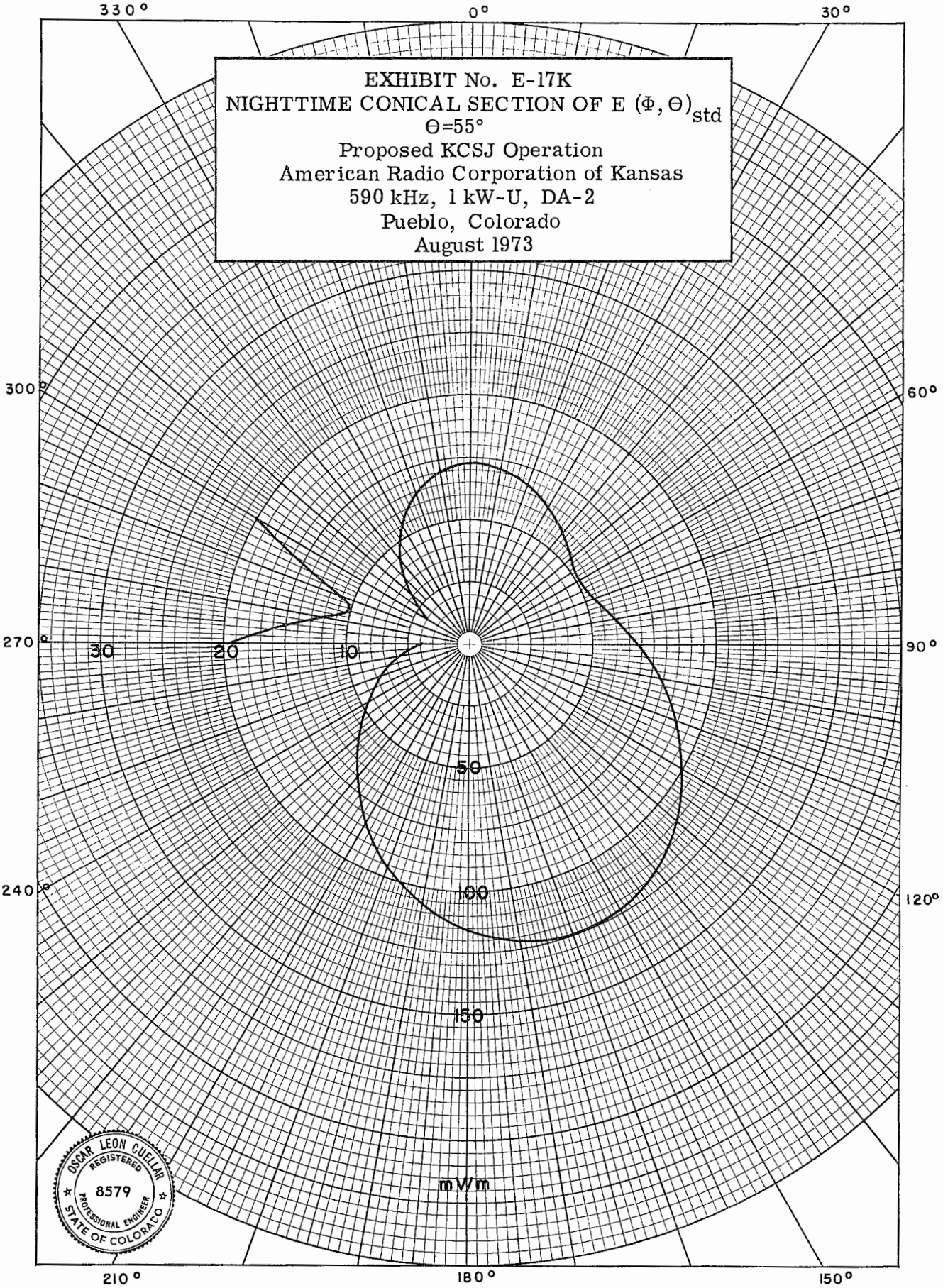


EXHIBIT No. E-17K
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=55°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
330°
0°
30°
300°
60°
270°
90°
240°
120°
210°
180°
150°
30
20
10
50
100
150
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

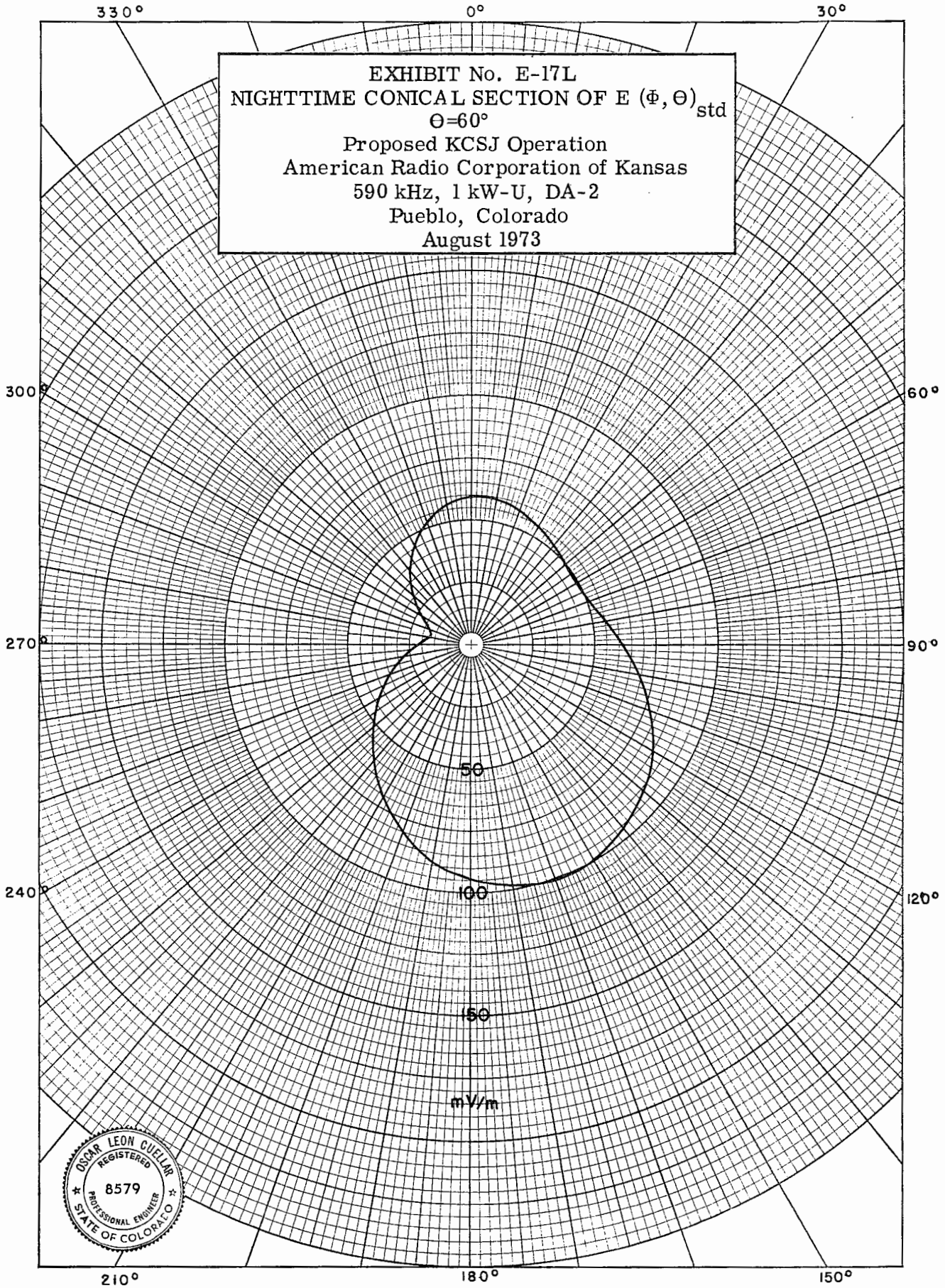


EXHIBIT No. E-17L
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=60°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973
330°
0°
30°
300°
60°
270°
90°
240°
120°
210°
180°
150°
50
100
150
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
August 1973

TABULATION OF NIGHTTIME STANDARD RADIATION PATTERN VALUES E(Ø,θ)STD

EXHIBIT NO. E-18

PAGE 1

STANDARD RADIATION PATTERN

Ø

θ	0	5	10	15	20	25	30	35	40	45	50	55	60	70	80
T= 0	221.06	219.12	213.37	204.09	191.72	176.83	160.06	142.15	123.81	105.73	88.54	72.73	58.65	35.93	18.19
T= 5	216.18	214.31	208.80	199.89	188.01	173.68	157.53	140.24	122.50	104.96	88.25	72.81	58.97	36.35	18.37
T= 10	206.83	205.10	199.97	191.69	180.62	167.24	152.14	135.93	119.24	102.70	86.84	72.11	58.81	36.67	18.55
T= 15	193.48	191.92	187.32	179.87	169.90	157.82	144.15	129.42	114.19	99.03	84.40	70.71	58.20	36.87	18.73
T= 20	176.71	175.37	171.40	164.96	156.31	145.82	133.89	120.99	107.60	94.16	81.09	68.71	57.22	36.98	18.90
T= 25	157.26	156.15	152.88	147.57	140.42	131.72	121.80	111.01	99.73	88.32	77.08	66.25	55.97	37.02	19.07
T= 30	135.87	135.01	132.48	128.36	122.82	116.06	108.32	99.86	90.93	81.77	72.58	63.49	54.55	37.04	19.25
T= 35	113.33	112.73	110.93	108.03	104.13	99.38	93.95	87.97	81.57	74.85	67.85	60.60	53.08	37.05	19.43
T= 40	90.42	90.05	88.96	87.22	84.95	82.25	79.19	75.80	72.06	67.89	63.17	57.80	51.68	37.11	19.61
T= 45	67.84	67.67	67.21	66.56	65.86	65.21	64.61	63.91	62.91	61.31	58.84	55.28	50.50	37.22	19.81
T= 50	46.23	46.21	46.26	46.58	47.43	48.90	50.86	52.96	54.70	55.59	55.21	53.28	49.65	37.44	20.01
T= 55	26.28	26.31	26.64	27.82	30.34	34.22	38.98	43.88	48.19	51.26	52.62	51.99	49.24	37.77	20.23
T= 60	10.22	9.87	9.65	11.59	16.50	23.29	30.77	38.00	44.22	48.82	51.36	51.57	49.37	38.24	20.45
T= 65	14.08	13.29	11.51	10.96	14.33	20.94	28.82	36.63	43.46	48.62	51.60	52.12	50.08	38.87	20.70
T= 70	28.41	27.76	26.15	24.70	25.02	28.15	33.60	39.98	46.81	50.70	53.39	53.67	51.39	39.65	20.95
T= 75	42.62	42.04	40.58	38.98	38.31	39.47	42.57	46.89	51.32	54.82	56.59	56.14	53.27	40.58	21.22
T= 80	56.41	55.91	54.62	53.08	52.03	52.13	53.59	56.03	58.65	60.56	61.00	59.46	55.68	41.66	21.50
T= 85	70.30	69.88	68.76	67.32	66.09	65.51	65.74	66.55	67.38	67.54	66.39	63.47	58.54	42.86	21.79
T= 90	84.91	84.55	83.55	82.13	80.77	79.59	78.74	78.04	77.11	75.45	72.55	68.06	61.79	44.17	22.08
T= 95	100.81	100.46	99.49	98.05	96.32	94.47	92.51	90.31	87.51	84.05	79.29	73.08	65.32	45.56	22.37
T= 100	118.34	117.97	116.89	115.19	112.95	110.23	107.03	103.24	98.69	93.15	86.44	78.42	69.07	47.01	22.67

TABULATION OF NIGHTTIME STANDARD RADIATION PATTERN VALUES E(Ø,θ)STD

EXHIBIT NO. E-18

PAGE 2

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
August 1973

OSCAR LEON CUELLAR REGISTERED PROFESSIONAL ENGINEER 8579 STATE OF COLORADO

T= 105															
137.63	137.18	135.85	133.67	130.67	126.86	122.22	116.70	110.19	102.59	93.85	83.94	72.94	60.48	48.48	22.95
T= 110															
158.55	157.97	156.24	153.37	149.36	144.23	137.95	130.53	121.95	112.22	101.38	89.54	76.86	63.94	49.94	23.23
T= 115															
180.74	179.99	177.74	173.90	168.77	162.09	154.00	144.53	133.78	121.84	108.89	95.10	80.72	65.97	51.37	23.49
T= 120															
203.68	202.72	199.85	195.09	188.49	180.11	170.05	158.44	145.45	131.29	116.21	100.50	84.46	68.46	52.73	23.72
T= 125															
226.72	225.53	221.96	216.11	208.03	197.85	185.75	171.95	156.71	140.35	123.20	105.62	87.94	70.00	54.00	23.94
T= 130															
249.13	247.70	243.44	236.46	226.83	214.83	200.68	184.72	167.30	148.81	129.68	110.34	91.22	72.14	55.14	24.12
T= 135															
270.13	268.46	263.50	255.38	244.30	230.53	214.48	196.41	176.92	156.46	135.50	114.56	94.07	74.12	56.12	24.27
T= 140															
288.95	287.07	281.46	272.29	259.84	244.44	226.55	206.66	185.51	163.08	140.51	118.15	96.49	76.09	56.93	24.39
T= 145															
304.88	302.79	296.62	286.54	272.88	256.08	236.64	215.14	192.41	168.48	144.55	121.02	98.39	77.54	57.54	24.46
T= 150															
317.24	315.00	308.36	297.54	282.93	264.99	244.32	221.56	197.38	172.48	147.52	123.09	99.74	77.94	57.94	24.49
T= 155															
325.50	323.15	316.18	304.85	289.56	270.83	249.32	225.67	200.64	174.96	149.30	124.29	100.47	78.10	58.10	24.46
T= 160															
329.27	326.86	319.72	308.12	292.47	273.34	251.37	227.30	202.06	175.81	149.83	124.57	100.57	78.03	58.03	24.42
T= 165															
328.33	325.91	318.77	307.16	291.50	272.37	250.41	226.36	200.97	174.97	149.08	123.92	100.02	77.71	57.71	24.31
T= 170															
322.65	320.29	313.30	301.94	286.63	267.91	246.41	222.85	197.96	172.47	147.05	122.32	98.83	77.15	57.15	24.16
T= 175															
312.40	310.15	303.48	292.64	278.00	260.08	239.46	216.86	192.91	168.33	143.77	119.82	97.00	75.35	55.35	23.97
T= 180															
297.96	295.87	289.66	279.56	265.91	249.15	229.83	208.56	185.97	162.68	139.33	116.46	94.57	73.82	55.32	23.72
T= 185															
279.89	277.99	272.58	263.21	250.79	235.50	217.81	198.23	177.35	155.67	133.83	112.31	91.59	71.98	54.08	23.44
T= 190															
258.93	257.26	252.32	244.24	233.24	219.64	203.82	186.20	167.26	147.50	127.41	107.47	88.12	69.65	52.65	23.12
T= 195															
236.00	234.58	230.36	223.43	213.96	202.19	188.38	172.89	156.19	138.40	120.25	102.06	84.23	67.04	51.04	22.77
T= 200															
212.17	210.99	207.49	201.73	193.79	183.85	172.05	158.77	144.18	128.64	112.53	96.19	79.99	64.29	49.29	22.39
T= 205															
188.70	187.75	184.90	180.19	173.67	165.43	155.61	144.36	131.91	118.51	104.44	90.00	75.50	61.41	47.41	21.98
T= 210															
167.02	166.24	163.90	160.05	154.65	147.83	139.65	130.23	119.72	108.30	96.19	83.60	70.82	58.43	45.43	21.55
T= 215															
148.70	148.01	145.95	142.56	137.88	131.99	124.96	116.94	108.01	98.31	87.96	77.17	66.04	54.89	43.59	21.10
T= 220															
135.27	134.56	132.48	129.08	124.50	118.87	112.34	105.08	97.20	88.81	79.93	70.76	61.24	51.52	41.52	20.65
T= 225															
127.77	126.93	124.48	120.55	115.38	109.23	102.30	95.13	87.65	80.05	72.37	64.55	56.49	48.23	39.23	20.20
T= 230															
126.20	125.15	122.06	117.17	110.82	103.44	95.50	87.44	79.62	72.23	65.26	58.56	51.85	45.15	37.15	19.74
T= 235															
129.36	128.05	124.22	118.15	110.28	101.21	91.50	82.07	73.24	65.44	58.73	52.66	47.32	42.12	35.12	19.56
T= 240															
135.37	133.81	129.24	121.98	112.56	101.67	90.11	78.75	68.40	59.68	52.80	47.47	42.58	38.15	33.15	18.86

TABULATION OF NIGHTTIME STANDARD RADIATION PATTERN VALUES E(Ø,θ)STD

EXHIBIT NO. E-18

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
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T= 245																	
142.33	140.55	135.32	127.01	116.18	103.60	90.14	76.89	64.80	54.81	47.41	42.39	38.82	31.28	18.45			
T= 250																	
148.70	146.74	140.98	131.81	119.82	105.82	90.74	75.76	61.98	50.59	42.45	37.58	34.87	29.51	18.06			
T= 255																	
153.37	151.27	145.13	135.31	122.45	107.36	91.04	74.64	59.41	46.71	37.76	32.97	31.11	27.89	17.70			
T= 260																	
155.58	153.40	147.00	136.76	123.32	107.50	90.32	72.93	56.61	42.83	33.16	28.50	27.58	26.43	17.38			
T= 265																	
154.88	152.66	146.13	135.69	121.96	105.78	88.14	70.18	53.16	38.65	26.45	24.11	24.32	25.17	17.09			
T= 270																	
151.01	148.80	142.28	131.85	116.13	101.94	84.24	66.14	48.88	33.94	23.47	19.79	21.41	24.14	16.85			
T= 275																	
143.96	141.79	135.42	125.22	111.79	95.91	78.54	60.71	43.58	28.59	18.10	15.65	19.04	23.37	16.64			
T= 280																	
133.90	131.83	125.73	115.96	103.09	87.87	71.16	54.00	37.38	22.60	12.30	12.08	17.46	22.87	16.48			
T= 285																	
121.33	119.39	113.68	104.54	92.49	78.23	62.56	46.42	30.67	16.37	6.33	10.14	17.00	22.68	16.37			
T= 290																	
107.14	105.37	100.16	91.83	80.85	67.87	53.61	38.89	24.52	11.44	3.99	11.18	17.81	22.78	16.30			
T= 295																	
92.91	91.35	86.76	79.41	69.77	58.39	45.94	33.29	21.35	12.00	10.67	14.91	19.61	23.15	16.28			
T= 300																	
81.33	80.02	76.15	69.99	61.93	52.51	42.42	32.53	24.02	18.65	17.79	20.05	22.73	23.61	16.30			
T= 305																	
76.27	75.21	72.10	67.17	60.75	53.35	45.57	38.16	31.47	27.61	25.97	25.64	26.24	24.67	16.35			
T= 310																	
80.79	79.92	77.35	73.27	67.94	61.74	55.13	48.61	42.72	37.89	34.34	31.92	30.13	25.75	16.44			
T= 315																	
94.26	93.43	90.96	87.01	81.77	75.54	68.67	61.57	54.64	48.26	42.70	38.06	34.17	26.85	16.56			
T= 320																	
113.36	112.43	109.67	105.21	99.26	92.09	84.04	75.49	65.85	58.53	50.87	44.08	38.26	28.07	16.70			
T= 325																	
134.85	133.74	130.46	125.15	118.05	109.46	99.76	89.38	78.77	68.38	58.63	49.82	42.10	29.32	16.86			
T= 330																	
156.41	155.09	151.20	144.91	136.50	126.32	114.84	102.53	89.93	77.53	65.81	55.15	45.76	30.55	17.04			
T= 335																	
176.40	174.88	170.39	163.14	153.43	141.73	128.53	114.41	99.94	85.71	72.23	59.93	49.09	31.72	17.22			
T= 340																	
193.64	191.93	186.91	178.80	167.97	154.93	140.24	124.55	108.49	92.70	77.73	64.07	52.01	32.61	17.42			
T= 345																	
207.23	205.38	199.94	191.14	179.46	165.37	149.58	132.60	115.31	98.30	82.19	67.47	54.46	33.79	17.61			
T= 350																	
216.55	214.61	208.90	199.69	187.42	172.64	156.04	138.32	120.20	102.40	85.51	70.06	56.40	34.64	17.81			
T= 355																	
221.21	219.24	213.43	204.05	191.54	176.50	159.58	141.52	123.05	104.88	87.63	71.82	57.79	35.35	18.00			

THREE ELEMENT ANTENNA FORMULAE

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

Formulae Used

$$E=K\,F_{(\Theta)}\,[M_1\angle\Psi_1 + M_2\angle\Psi_2 + S_{12}\cos(°T-A)\cos\Theta + M_3\angle\Psi_3 + S_{13}\cos(°T-B)\cos\Theta] \quad (1)$$

$$K=RMS/rms \quad (2)$$

$$rms=\left|\begin{array}{l} M_1^2 + M_2^2 + M_3^2 + \\ 2M_1M_2[\cos(\Psi_2 - \Psi_1)]\ Jo(S_{12}\cos\Theta) + \\ 2M_1M_3[\cos(\Psi_3 - \Psi_1)]\ Jo(S_{13}\cos\Theta) + \\ 2M_2M_3[\cos(\Psi_3 - \Psi_2)]\ Jo(S_{23}\cos\Theta) \end{array}\right|^{\frac{1}{2}} \quad (3)$$

$$F_{(\ )} = \frac{\cos(G\sin\Theta) - \cos G}{\cos\Theta\,(1-\cos G)} \quad (4)$$

K = A constant used to convert unit pattern values to actual unabsorbed radiation field in mV/m at a distance of one mile from the antenna.

M = The relative field ratio of a single tower. Subscript number refers to the tower designated by the same number.

Ψ = Electrical phasing of a single tower. Subscript number refers to the tower designated by the same number.

S = Spacing of towers in electrical degrees. Subscript numbers refer to the spacing between towers designated by the same numbers.

°T= Azimuth Bearing Degrees True

A = 34.5°

B = 79.5°

(°T-A) = Azimuth angle of departure from the sub-ordinate reference line in the out of line array.

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Three Element Antenna Formulae (Continued)

Θ = Vertical angle. In the horizontal plan $\Theta = 0°$.

RMS = The expected ground plant efficiency of the array in mV/m at a distance of one mile from the antenna.

rms = Unit root mean square value of the directional antenna pattern.

$J(S \cos \Theta)$ = Bessell function of first kind and Zero order of tower spacing.

G = Height of antenna "vertical lead" in electrical degrees.

Tower Line - Bearing East of North in the direction of Tower 1 through Tower 2 = 34.5° and in the direction of Tower 1 through Tower 3 = 79.5°.

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Array Data and Sample Calculations

Nighttime Directional Antenna Data

Basic $E_{(\Phi,\Theta)_m}$ Pattern

S_{12} = 115° (522.7684 Feet) on a bearing of 34.5° True
S_{13} = 160° (741.2430 Feet) on a bearing of 79.5° True

Ψ_1 = -165° M_1 = 0.5
Ψ_2 = -25° M_2 = 0.5
Ψ_3 = +165° M_3 = 0.5

G_s^1 = 90.66° (420 Feet)

Operating Power = 761 Watts

Radiation Resistance = 45 Ohms
Loss Resistance = 1.0 Ohm

Calculation of Pattern K

Substituting in Formula (3)

$$rms = \left| \begin{array}{l} .5^2 + .5^2 + .5^2 + \\ 2x.5x.5[\cos(-25°(-165°))](0.219781) + \\ 2x.5x.5[\cos(165-(-165))](-0.181965) + \\ 2x.5x.5[\cos(165-(-25))](0.23840) \end{array} \right|^{\frac{1}{2}}$$

$$rms = \left| \begin{array}{l} 0.75 \\ 0.5(\cos 140°)(0.219781) + \\ 0.5(\cos\ 330°)(-0.181965) + \\ 0.5(\cos\ 190°)(0.23840) \end{array} \right|^{\frac{1}{2}}$$

$$rms = \left| \begin{array}{l} 0.75000 \\ -0.08418 \\ -0.07879 \\ -0.11739 \end{array} \right|^{\frac{1}{2}} = [0.46964]^{\frac{1}{2}}$$

rms= 0.6853

Substituting in Formula (2)

$K = 175/0.6853$

$K = 255.363$ mV/m

In the Direction of KTBC, Austin, Texas, Direct Radial at 142.48° True
$\Theta = 0°$

Substituting in Formula (1)

$$E = 255.363[0.5\angle -165° + 0.5\angle -25° + 115° \cos(142.48° - 34.5°) + 0.5\angle +165° + 160\cos(142.48° - 79.5°)\ ]$$

$$E = 255.363[0.5\angle -165° + 0.5\angle -60.498 + 0.5\angle +237.6896°]$$

$$E = 255.363 \begin{vmatrix} -0.48296 - j0.12941 \\ +0.24621 - j0.43518 \\ -0.26728 - j0.42258 \end{vmatrix}$$

$E = 255.363\ [-0.50403 - j0.98717]$

$E = 255.363 \times 1.1084$

$E = 283.04$ mV/m $= E\ (\phi,\theta)_{th}$

In the direction of KTBC, Austin, Texas, Direct Radial at 142.48° True.
$\Theta_1 = 5.18°$

Substituting in Formula (4)

$$F_{(\Theta)} = \frac{\cos(90.66° \sin 5.18°)}{\cos 5.18°(1-\cos 90.66°)}$$

$$F_{(\Theta)} = \frac{\cos(90.66 \times 0.09028)}{.99592\ (1 + 0.01164)}$$

$$F_{(\Theta)} = \frac{\cos(8.1849)}{0.99579} = \frac{0.98982}{0.99579}$$

$F_{(\Theta)} = 0.994$

Substituting in Formula (1)

$$E = 253.831[0.5\angle -165° + 0.5\angle -25° + 115° \cos 107.98 \cos 5.18° + 0.5\angle +165 + 160 \cos 62.98 \cos 5.18°]$$

$$E = 253.831[0.5\angle -165° + 0.5\angle -25° - 35.3534° + 0.5\angle +165° + 72.393°]$$

$$E = 253.831[0.5\angle -165° + 0.5\angle -60.3534° + 0.5\angle +237.393°]$$

$$E = 253.831 \begin{vmatrix} -0.48296 - j0.12941 \\ +0.24732 - j0.43454 \\ -0.26948 - j0.42117 \end{vmatrix}$$

$$E = 253.831\ [-0.50512 - j0.98512]$$

$$E = 253.831 \times 1.10707$$

$$E = 281.01 \text{ mV/m} = E(\Phi,\Theta)_{th}$$

Standard Radiation Pattern $E(\Phi,\Theta)_{STD}$

$$E(\Phi,\Theta)_{STD} = 1.05(E(\Phi,\Theta)_{th}^2 + Q^2)^{\frac{1}{2}}$$

$$Q = 6.0F(\Theta)(P_{kw})^{\frac{1}{2}}$$

In the direction of KTBC, Austin, Texas Direct Radial at 142.48° True
$\Theta = 0°$

$$E(\Phi,\Theta)_{th} = 283.04 \text{ mV/m}$$

$$Q = 6$$

$$E(\Phi,\Theta)_{STD} = 1.05((283.04)^2 + 36)^{\frac{1}{2}}$$

$$E(\Phi,\Theta)_{STD} = 1.05 \times 283.1036$$

$$E(\Phi,\Theta)_{STD} = 297.26 \text{ mV/m}$$

In the Direction of KTBC Austin, Texas Direct Radial at 142.48° True
$\Theta_1 = 5.18°$

$$E(\Phi,\Theta)_{STD} = 1.05((281.01)^2 + (6x.994)^2)^{\frac{1}{2}}$$

$$E(\Phi,\Theta)_{STD} = 1.05 \times 281.07 = 295.12 \text{ mV/m}$$

EXHIBIT NO. E-21A

VERTICAL RADIATION PATTERNS

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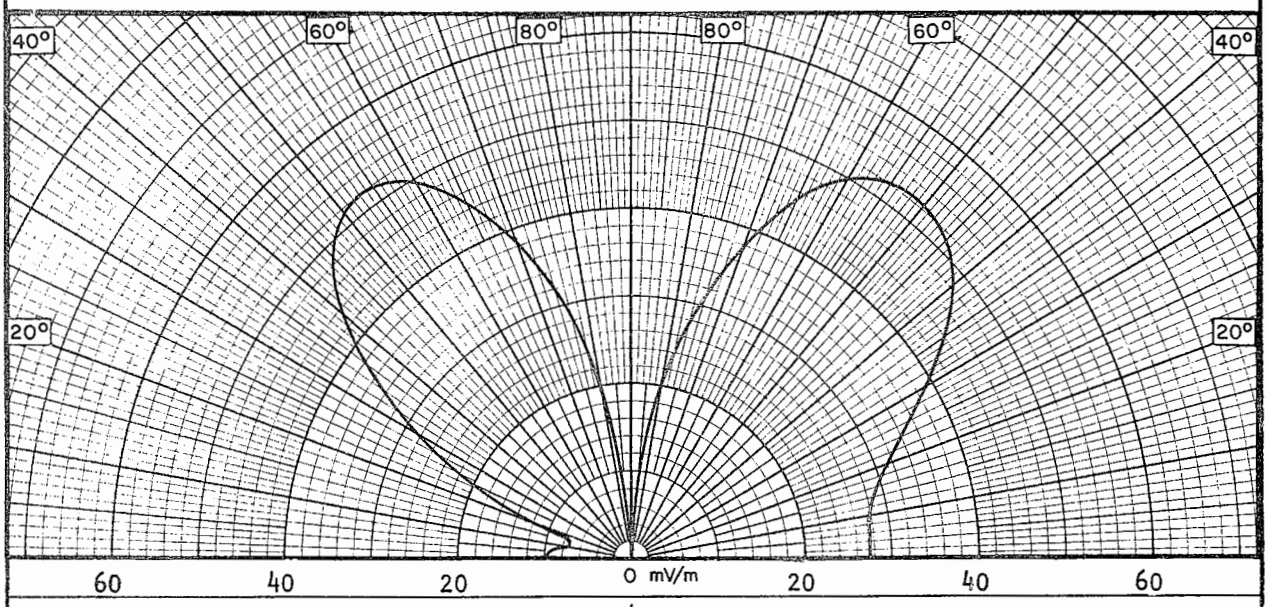
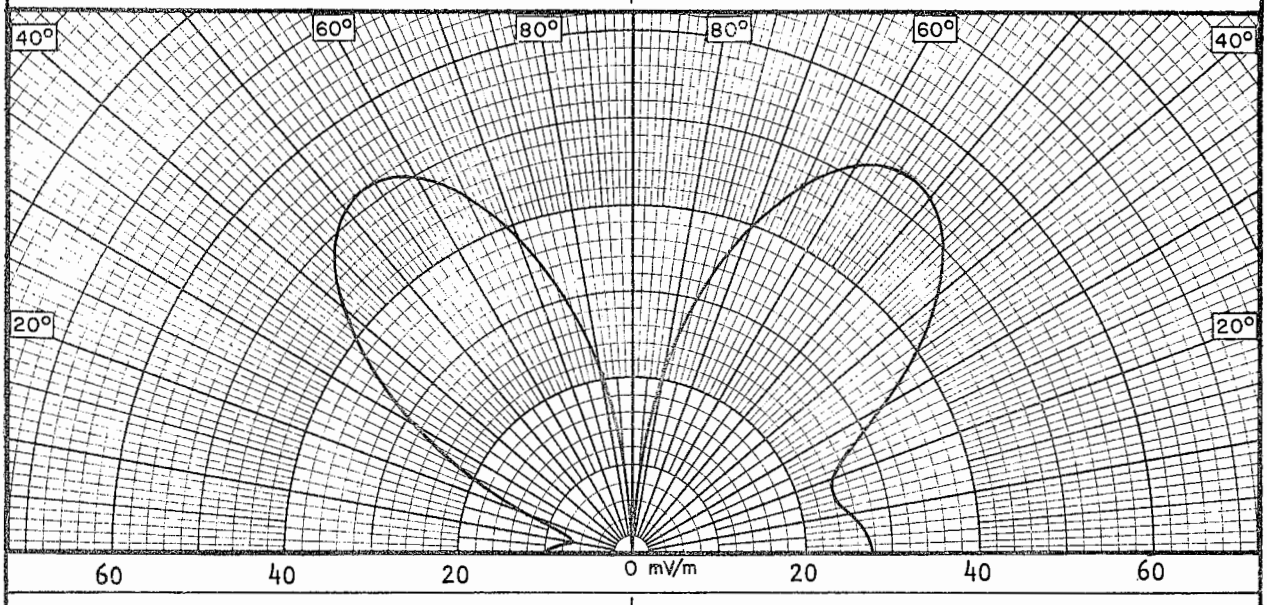
August 1973



Toward WOW Direct Radial
At 63.24° True θ_1 = 8.34° θ_2 = 14.26°

Toward WOW Point A
At 54.58° True θ_1 = 9.37° θ_2 = 15.86°



Toward WOW Point B
At 63.17° True θ_1 = 11.07° θ_2 = 18.69°

Toward WOW Point C
At 69.78° True θ_1 = 10.2° θ_2 = 17.29°

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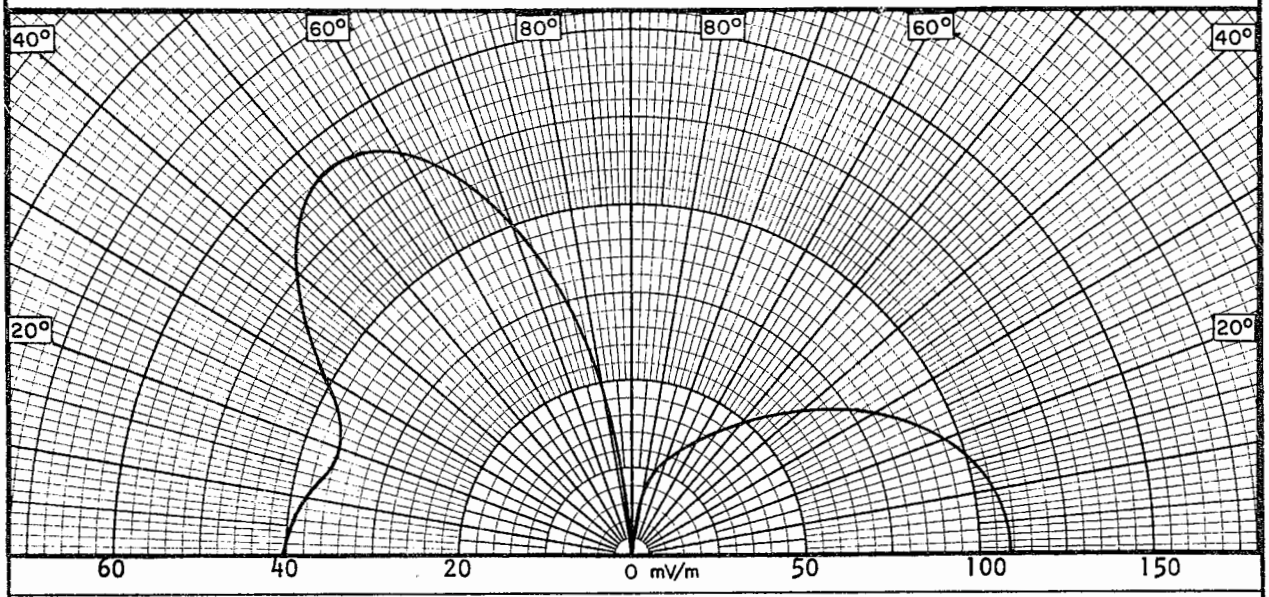
EXHIBIT NO. E-21B

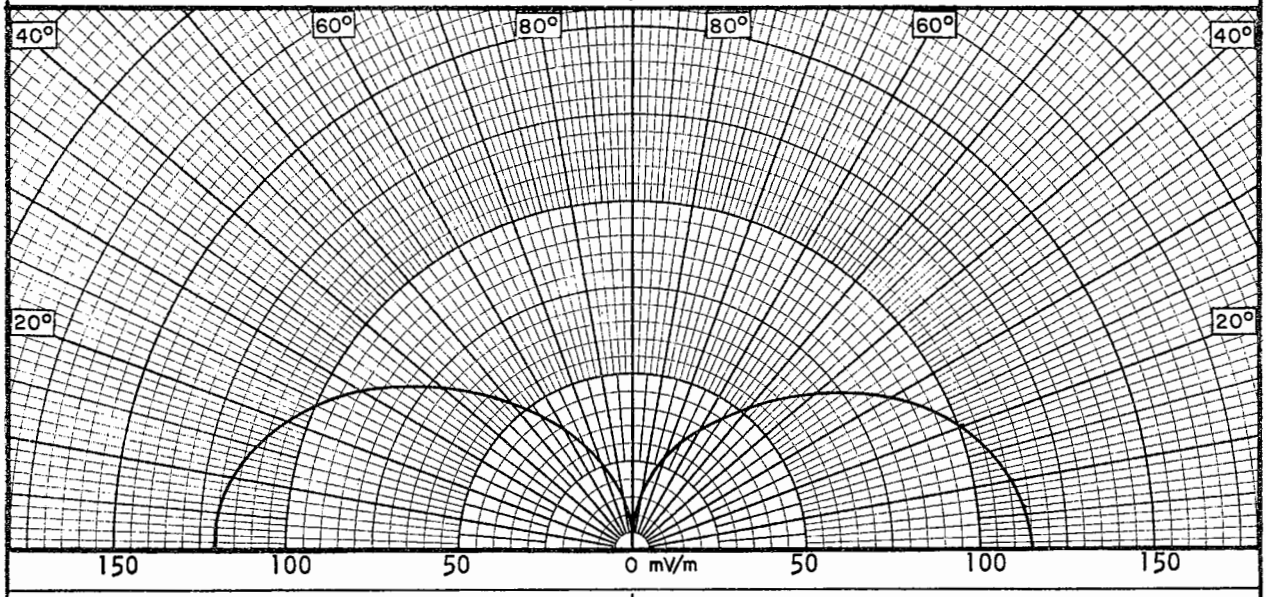
VERTICAL RADIATION PATTERNS

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



Toward WOW Point D
At 74.15° True θ_1 = 8.33° θ_2 = 14.24°

Toward KHQ Direct Radial
At 319.04° True θ_1 = 2.61° θ_2 = 5.79°



Toward KHQ Point A
At 321.89° True θ_1 = 2.76° θ_2 = 5.9°

Toward KHQ Point B
At 320.44° True θ_1 = 3.06° θ_2 = 6.31°

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EXHIBIT NO. E-21C

VERTICAL RADIATION PATTERNS

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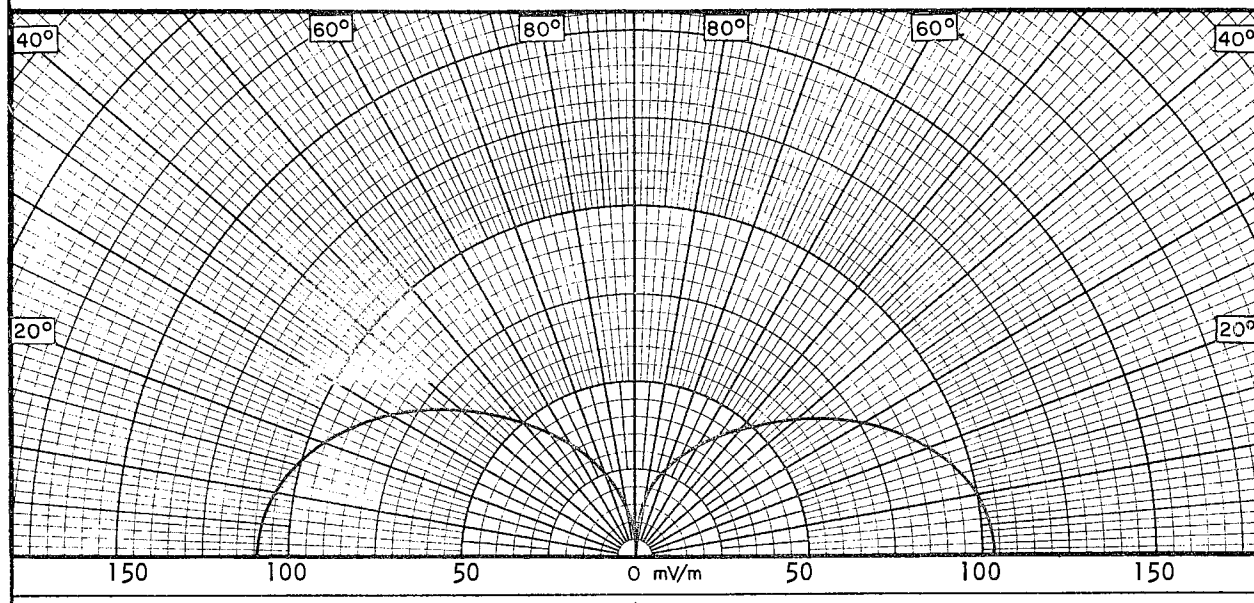
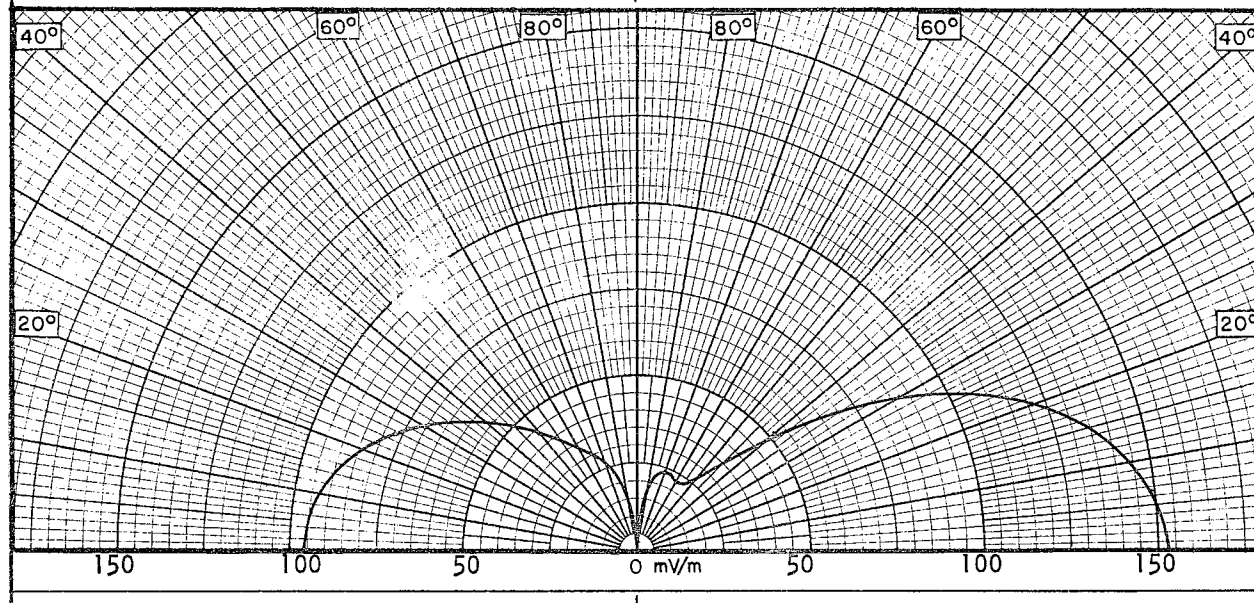


Toward KHQ Point C
At 319.02° True Θ_1 = 2.95° Θ_2 = 6.17°

Toward KHQ Point D
At 317.56° True Θ_1 = 3.26° Θ_2 = 6.6°



Toward KHQ Point E
At 315.6° True Θ_1 = 3° Θ_2 = 6.23°

Toward KSUB Direct Radial
At 267.04° True Θ_1 = 9.22° Θ_2 = 15.6°

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EXHIBIT NO. E-21D

VERTICAL RADIATION PATTERNS

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
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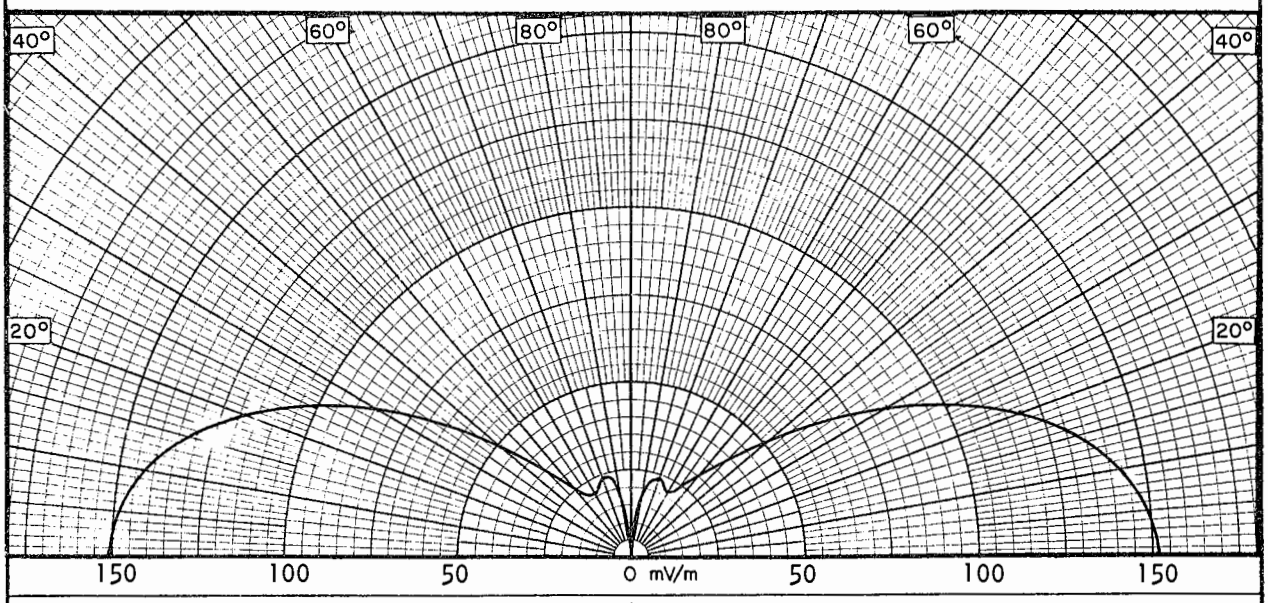
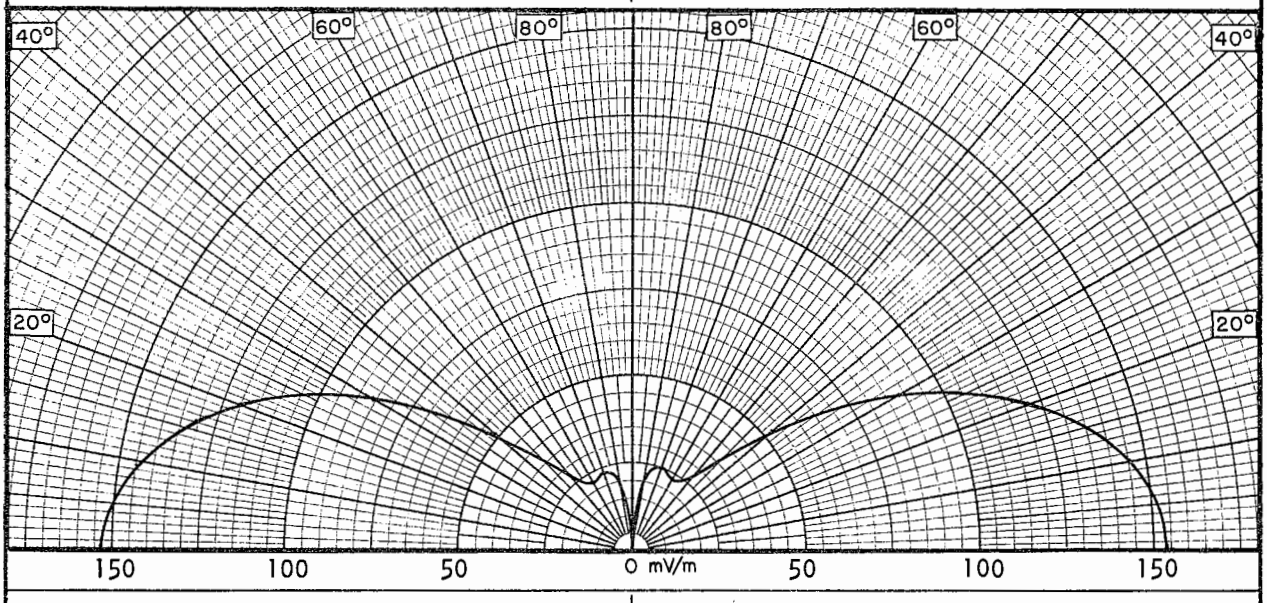


Toward KSUB Point A
At 269.2° True θ_1 = 9.43° θ_2 = 15.95°

Toward KSUB Point B
At 268.37° True θ_1 = 9.64° θ_2 = 16.3°



Toward KSUB Point C
At 267.03° True θ_1 = 9.65° θ_2 = 16.32°

Toward KSUB Point D
At 265.65° True θ_1 = 9.7° θ_2 = 16.41°

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EXHIBIT NO. E-21E

VERTICAL RADIATION PATTERNS

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American Radio Corporation of Kansas
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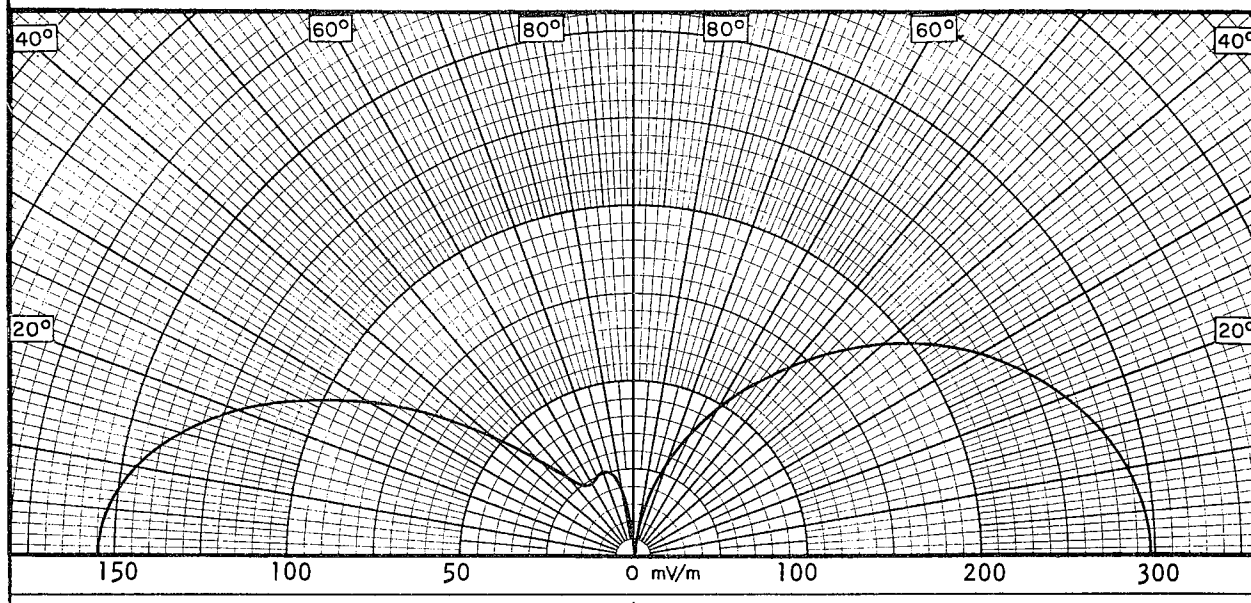
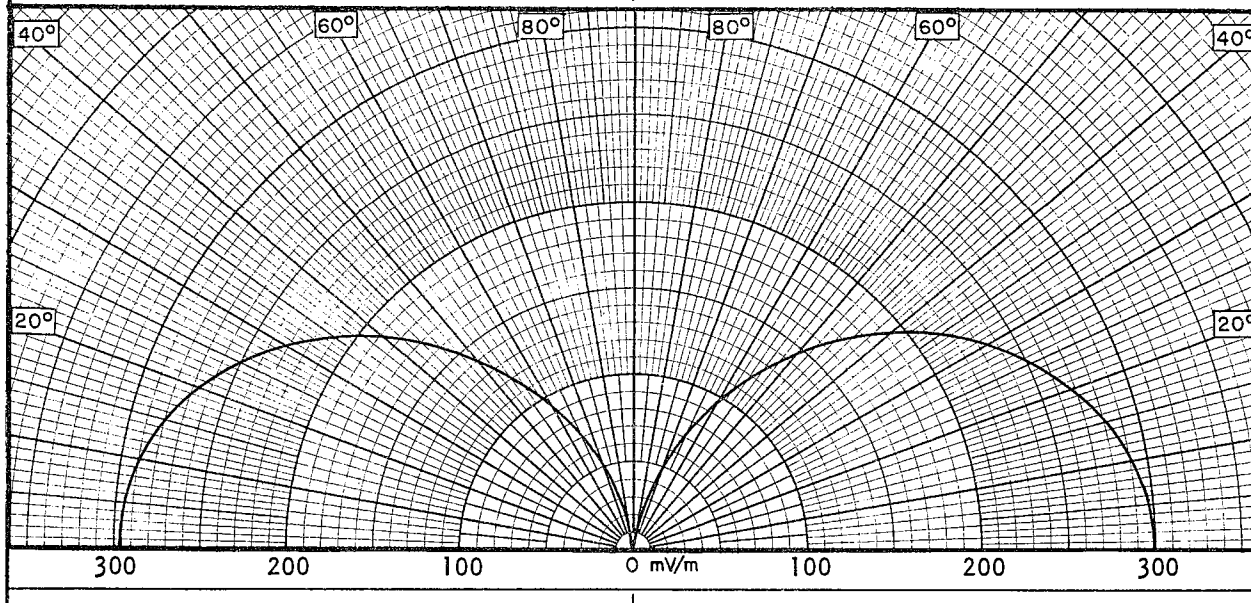


Toward KSUB Point E
At 264.7° True θ_1 = 9.59° θ_2 = 16.22°

Toward KTBC Direct Radial
At 142.48° True θ_1 = 5.18° θ_2 = 9.25°



Toward KTBC Point A
At 143.0° True θ_1 = 5.53° θ_2 = 9.77°

Toward KTBC Point B
At 143.54° True θ_1 = 5.41° θ_2 = 9.58°

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EXHIBIT NO. E-21F

VERTICAL RADIATION PATTERNS

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
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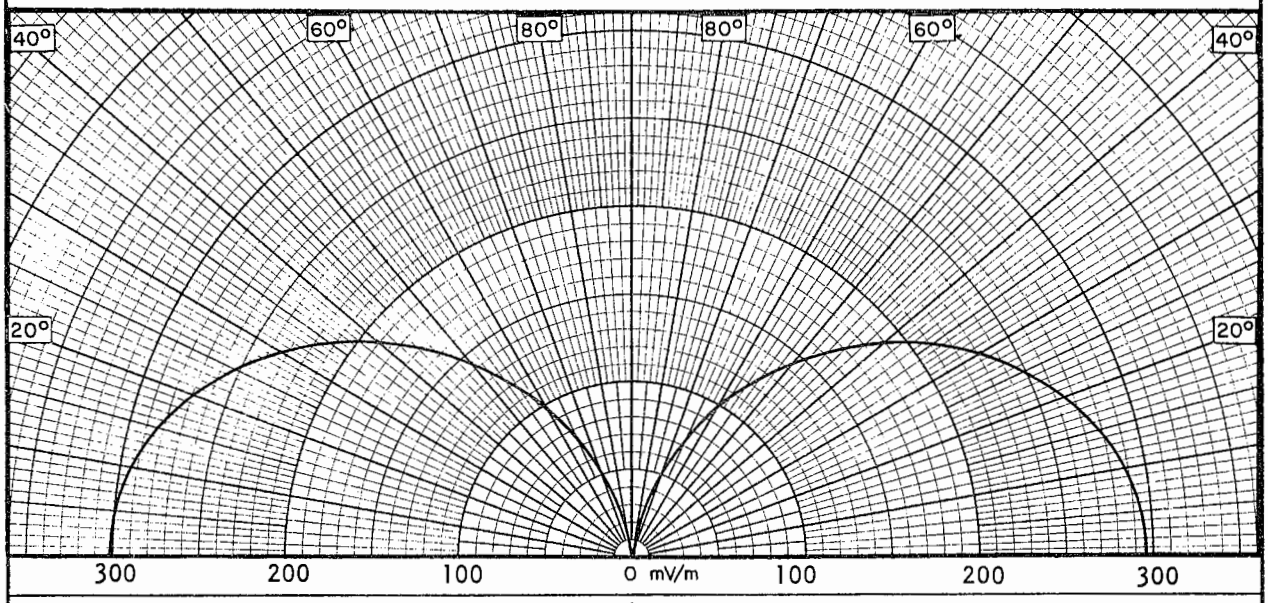
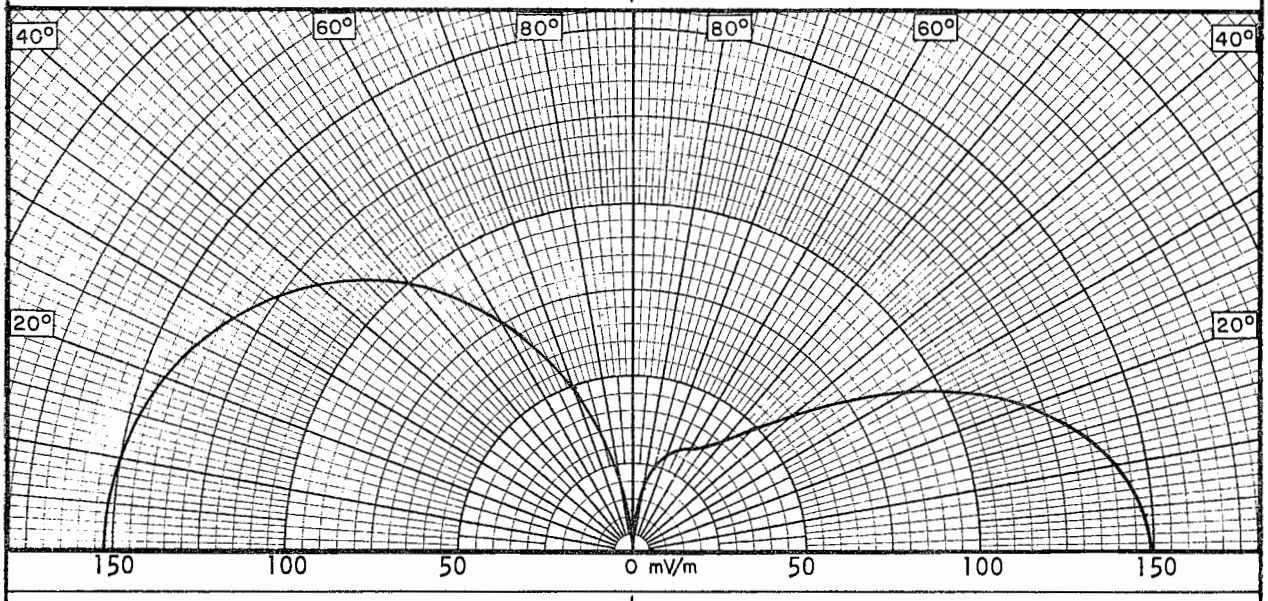


Toward KTBC Point C
At 144.1° True θ_1 = 5.16° θ_2 = 9.21°

Toward KTBC Point D
At 142.32° True θ_1 = 5.48° θ_2 = 9.69°



Toward KBHS Direct Radial
At 108.82° True θ_1 = 5.02° θ_2 = 9.02°

Toward KFXM Direct Radial
At 251.07° True θ_1 = 4.19° θ_2 = 7.89°

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EXHIBIT NO. E-21G

VERTICAL RADIATION PATTERNS

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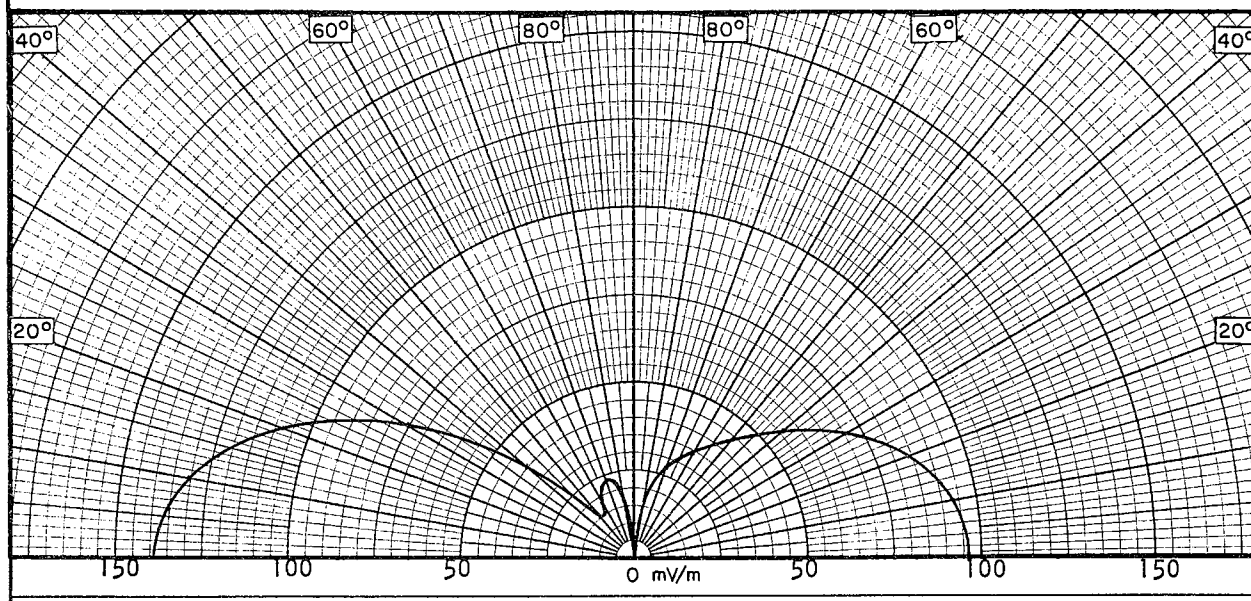
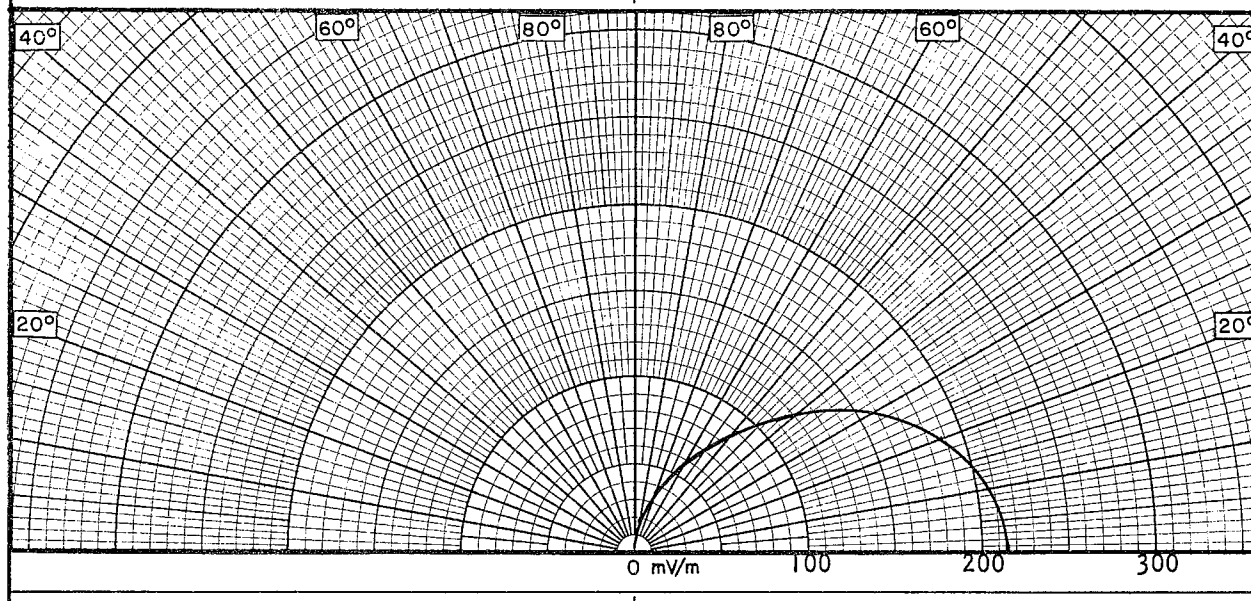


Toward KTHO Direct Radial
At 277.46° True θ_1 = 3.45° θ_2 = 6.87°

Toward KID Direct Radial
At 315.74° True θ_1 = 7.9° θ_2 = 13.51°



Toward CFAR Direct Radial
At 5.64° True θ_1 = 0.5° θ_2 = 2.97°

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EXHIBIT NO. E-21H

VERTICAL RADIATION PATTERNS

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
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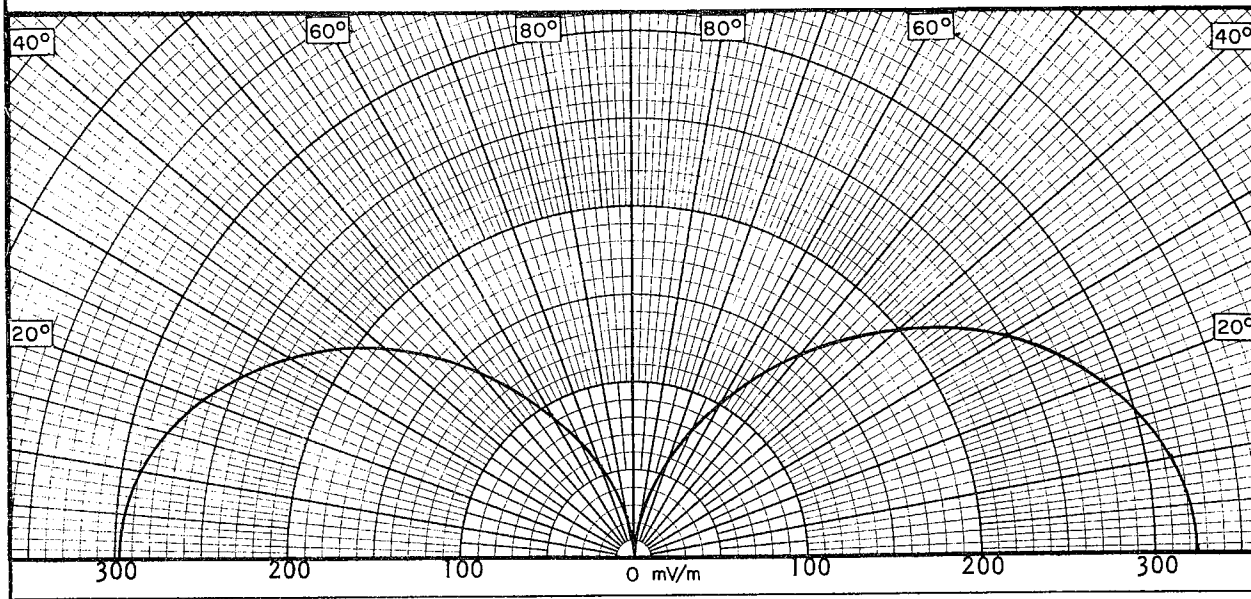
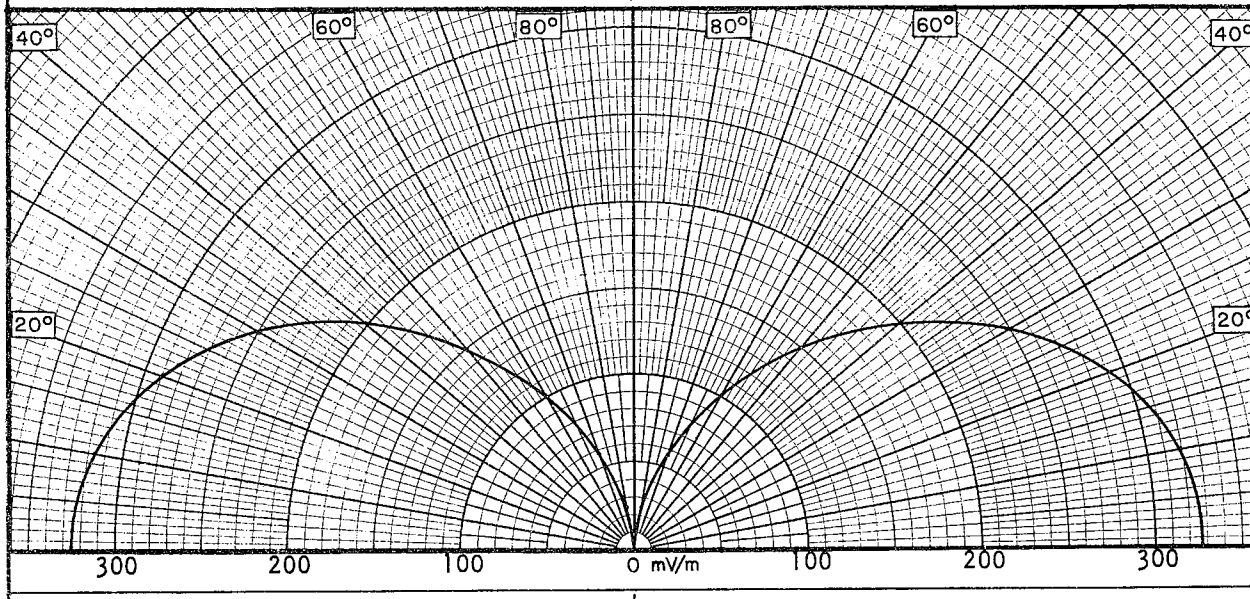


Toward XEE Direct Radial
At 180.03° True θ = 2.97°

Toward XEDF Direct Radial
At 153.94° True θ = 3.61°



Toward XEHQ Direct Radial
At 156.23° True θ = 6.39°

Toward XEPH Direct Radial
At 164.24° True θ = 0°

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

Exhibit No. E-22A

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

Tabulation of Standard Nighttime Field Intensity Vertical Radiation Values in The Direction of Pertinent Stations

To: WOW Direct Radial at 63.24° True

θ (Degrees)	E (mV/m)
0	9.93
8.34	7.86
10	7.31
14.26	7.47
20	12.99
30	28.67
40	43.34
50	51.34
60	49.76
70	38.63
80	20.61

To: WOW Point A at 54.58° True

θ (Degrees)	E (mV/m)
0	27.86
9.37	28.15
10	28.22
15.86	29.64
20	31.69
30	39.87
40	48.65
50	52.79
60	49.26
70	37.74
80	20.21

To: WOW Point B at 63.17° True

θ (Degrees)	E (mV/m)
0	9.81
10	7.19
11.07	6.95
18.69	11.31
20	12.99
30	28.69
40	43.34
50	51.33
60	49.75
70	38.62
80	20.61

To: WOW Point C at 69.78° True

θ (Degrees)	E (mV/m)
0	27.77
10	25.51
10.2	25.43
17.24	23.93
20	24.46
30	33.28
40	45.84
50	53.28
60	51.32
70	39.61
80	20.94

To: WOW Point D at 74.15° True

θ (Degrees)	E (mV/m)
0	40.24
8.33	38.72
10	38.17
14.24	36.78
20	36.01
30	40.86
40	50.26
50	55.95
60	52.91
70	40.41
80	21.17

To: KHQ Direct Radial at 319.04° True

θ (Degrees)	E (mV/m)
0	109.42
2.61	109.17
5.79	108.21
10	105.84
20	95.74
30	81.02
40	64.51
50	49.32
60	37.43
70	27.83
80	16.67

All Values are Based on the Standard Radiation Pattern

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Exhibit No. E-22B

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

Tabulation of Standard Nighttime Field Intensity Vertical Radiation Values in The Direction of Pertinent Stations

To: KHQ Point A at 321.89° True

θ (Degrees)	E (mV/m)
0	121.35
2.76	121.04
5.90	119.97
10	117.42
20	106.31
30	90.00
40	71.42
50	53.86
60	39.70
70	28.54
80	16.76

To: KHQ Point B at 320.44° True

θ (Degrees)	E (mV/m)
0	115.40
3.06	114.84
6.31	113.69
10	111.45
20	100.89
30	85.42
40	67.92
50	51.57
60	38.55
70	28.18
80	16.71

To: KHQ Point C at 319.02° True

θ (Degrees)	E (mV/m)
0	119.34
2.95	109.02
6.17	107.96
10	105.76
20	95.67
30	80.96
40	64.47
50	49.29
60	37.42
70	28.54
80	16.76

To: KHQ Point D at 317.56° True

θ (Degrees)	E (mV/m)
0	103.56
3.26	103.19
6.6	102.05
10	100.12
20	90.43
30	76.42
40	60.9
50	46.92
60	36.24
70	27.47
80	16.63

To: KHQ Point E at 315.6° True

θ (Degrees)	E (mV/m)
0	96.33
3	96.03
6.23	95.03
10	93.01
20	83.73
30	70.46
40	56.10
50	43.70
60	34.65
70	26.99
80	16.57

To: KSUB Direct Radial at 267.04° True

θ (Degrees)	E (mV/m)
0	153.69
9.22	146.22
10	144.93
15.6	132.97
20	120.7
30	86.76
40	51.54
50	26.46
60	23.08
70	24.72
80	16.99

All Values are Based on the Standard Radiation Pattern

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
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Exhibit No. E- 22C

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1kW-U, DA-2
Pueblo, Colorado
August 1973

Tabulation of Standard Nighttime Field Intensity Vertical Radiation Values in The Direction of Pertinent Stations

To: KSUB Point A at 269.2° True

θ (Degrees)	E (mV/m)
0	151.85
9.43	144.05
10	143.10
15.95	130.28
20	118.91
30	84.98
40	49.63
50	24.29
60	21.84
70	24.29
80	16.88

To: KSUB Point B at 268.37° True

θ (Degrees)	E (mV/m)
0	152.62
9.64	144.48
10	143.87
16.3	130.12
20	119.66
30	85.71
40	50.39
50	25.13
60	22.31
70	24.45
80	16.92

To: KSUB Point C at 267.03° True

θ (Degrees)	E (mV/m)
0	153.70
9.65	145.52
10	144.93
16.32	131.13
20	120.71
30	86.77
40	51.55
50	26.47
60	23.09
70	24.73
80	16.99

To: KSUB Point D at 265.65° True

θ (Degrees)	E (mV/m)
0	154.56
9.7	146.31
10	145.8
16.41	131.77
20	121.61
30	87.73
40	52.68
50	27.82
60	23.92
70	25.03
80	17.06

To: KSUB Point E at 264.70° True

θ (Degrees)	E (mV/m)
0	155.01
9.59	146.95
10	146.27
16.22	132.76
20	122.11
30	88.32
40	53.41
50	28.74
60	24.5
70	25.24
80	17.11

To: KTBC Direct Radial at 142.48° True

θ (Degrees)	E (mV/m)
0	297.26
5.18	295.12
9.25	290.50
10	289.37
20	266.65
30	231.83
40	188.94
50	142.00
60	97.5
70	57.26
80	24.43

All Values are Based on the Standard Radiation Pattern

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Exhibit No. E- 22D

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

Tabulation of Standard Nighttime Field Intensity Vertical Radiation Values in The Direction of Pertinent Stations

To: KTBC Point A at 143.0° True

θ (Degrees)	E (mV/m)
0	298.90
5.53	296.44
9.77	291.29
10	290.93
20	268.00
30	232.87
40	189.65
50	143.06
60	97.70
70	57.32
80	24.44

To: KTBC Point B at 143.54° True

θ (Degrees)	E (mV/m)
0	300.57
5.41	298.19
9.58	293.17
10	292.52
20	269.36
30	233.92
40	190.37
50	143.48
60	97.89
70	57.39
80	24.44

To: KTBC Point C at 144.1° True

θ (Degrees)	E (mV/m)
0	302.25
5.16	300.07
9.21	295.35
10	294.12
20	270.74
30	234.99
40	191.09
50	143.90
60	98.09
70	57.45
80	24.45

To: KTBC Point D at 142.32° True

θ (Degrees)	E (mV/m)
0	296.75
5.48	294.37
9.69	289.35
10	288.88
20	266.23
30	231.51
40	188.71
50	142.51
60	97.44
70	57.24
80	24.43

To: KBHS Direct Radial at 108.82° True

θ (Degrees)	E (mV/m)
0	153.48
5.02	152.93
9.02	151.72
10	151.32
20	144.88
30	134.20
40	119.16
50	99.6
60	75.93
70	57.26
80	24.43

To: KFXM Direct Radial at 251.07° True

θ (Degrees)	E (mV/m)
0	149.87
4.19	148.47
7.89	144.95
10	142.03
20	120.05
30	90.88
40	61.43
50	41.43
60	34.04
70	29.15
80	17.98

All Values are Based on the Standard Radiation Pattern

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PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

Tabulation of Standard Nighttime Field Intensity Vertical Radiation Values in The Direction of Pertinent Stations

To: KTHO Direct Radial at 277.46° True

Θ (Degrees)	E (mV/m)
0	139.36
3.45	138.35
6.87	135.37
10	130.98
20	107.78
30	75.11
40	40.63
50	15.29
60	18.14
70	23.09
80	16.56

To: KID Direct Radial at 315.74° True

Θ (Degrees)	E (mV/m)
0	96.82
7.9	94.73
10	93.49
13.51	90.83
20	84.19
30	70.87
40	56.44
50	43.93
60	34.77
70	27.03
80	16.58

To: CFAR Direct Radial at 5.64° True

Θ (Degrees)	E (mV/m)
0	215.22
0.5	215.22
2.97	214.57
10	207.90
20	187.26
30	157.00
40	122.19
50	88.13
60	58.98
70	36.41
80	18.4

All values are based on the Standard Radiation Pattern

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Exhibit No. E-22F

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

Tabulation of Standard Nighttime Field Intensity Vertical Radiation Values in The Direction of Pertinent Stations

To: XEE Direct Radial at 180.03° True

Θ (Degrees)	E (mV/m)
0	297.86
2.97	297.12
10	289.57
20	265.82
30	229.77
40	185.92
50	139.30
60	94.55
70	55.32
80	23.72

To: XEDF Direct Radial at 153.94° True

Θ (Degrees)	E (mV/m)
0	324.11
3.61	322.89
10	314.87
20	288.46
30	248.48
40	200.12
50	149.02
60	100.37
70	58.09
80	24.49

To: XEHQ Direct Radial at 156.23° True

Θ (Degrees)	E (mV/m)
0	326.85
6.39	322.99
10	317.46
20	290.63
30	250.09
40	201.14
50	149.55
60	100.56
70	58.11
80	24.47

To: XEPH Direct Radial at 164.24° True

Θ (Degrees)	E (mV/m)
0	328.78
0	328.78
10	319.21
20	291.90
30	250.75
40	201.24
50	149.28
60	100.15
70	57.77
80	24.33

All values are based on the Standard Radiation Pattern

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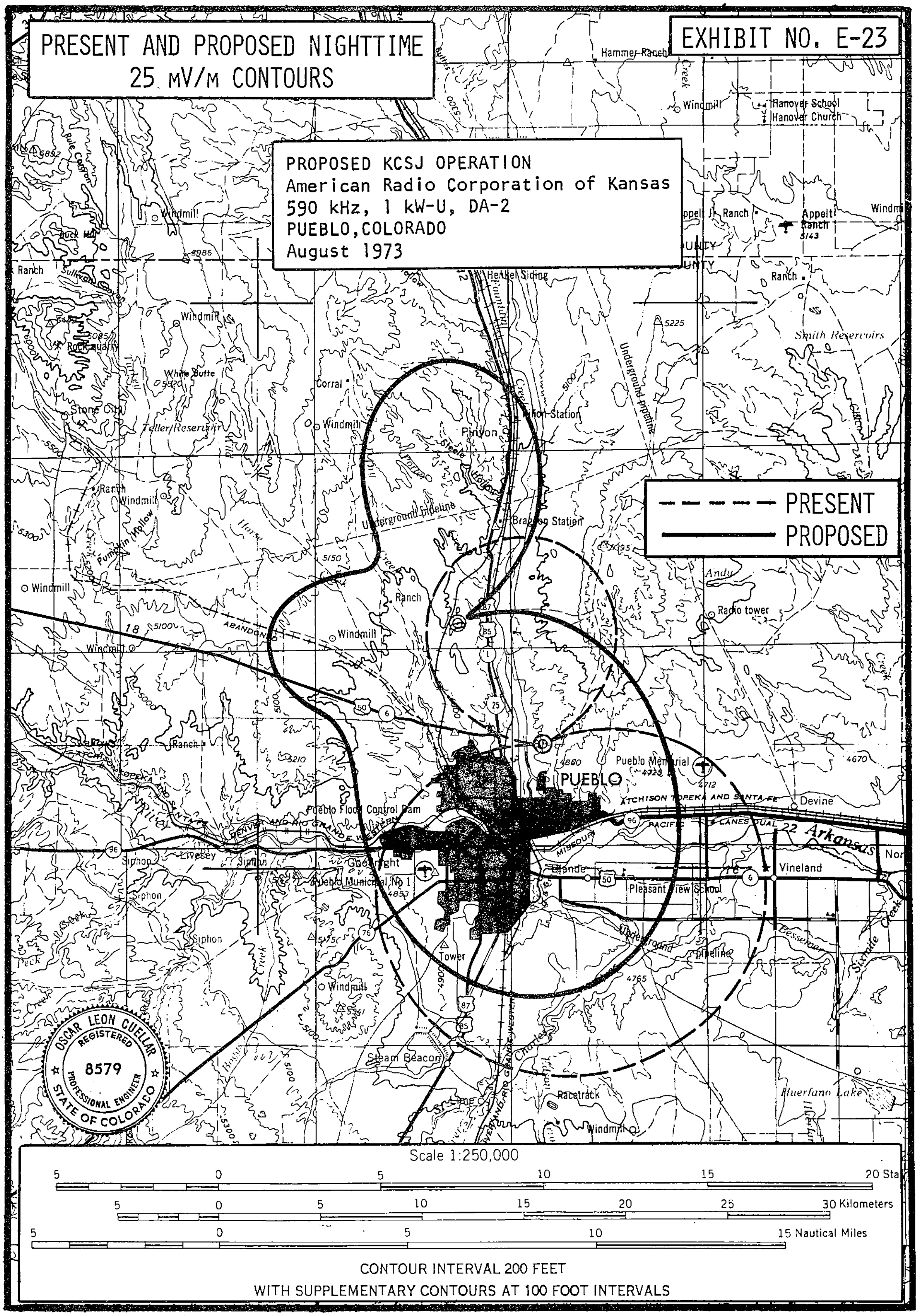
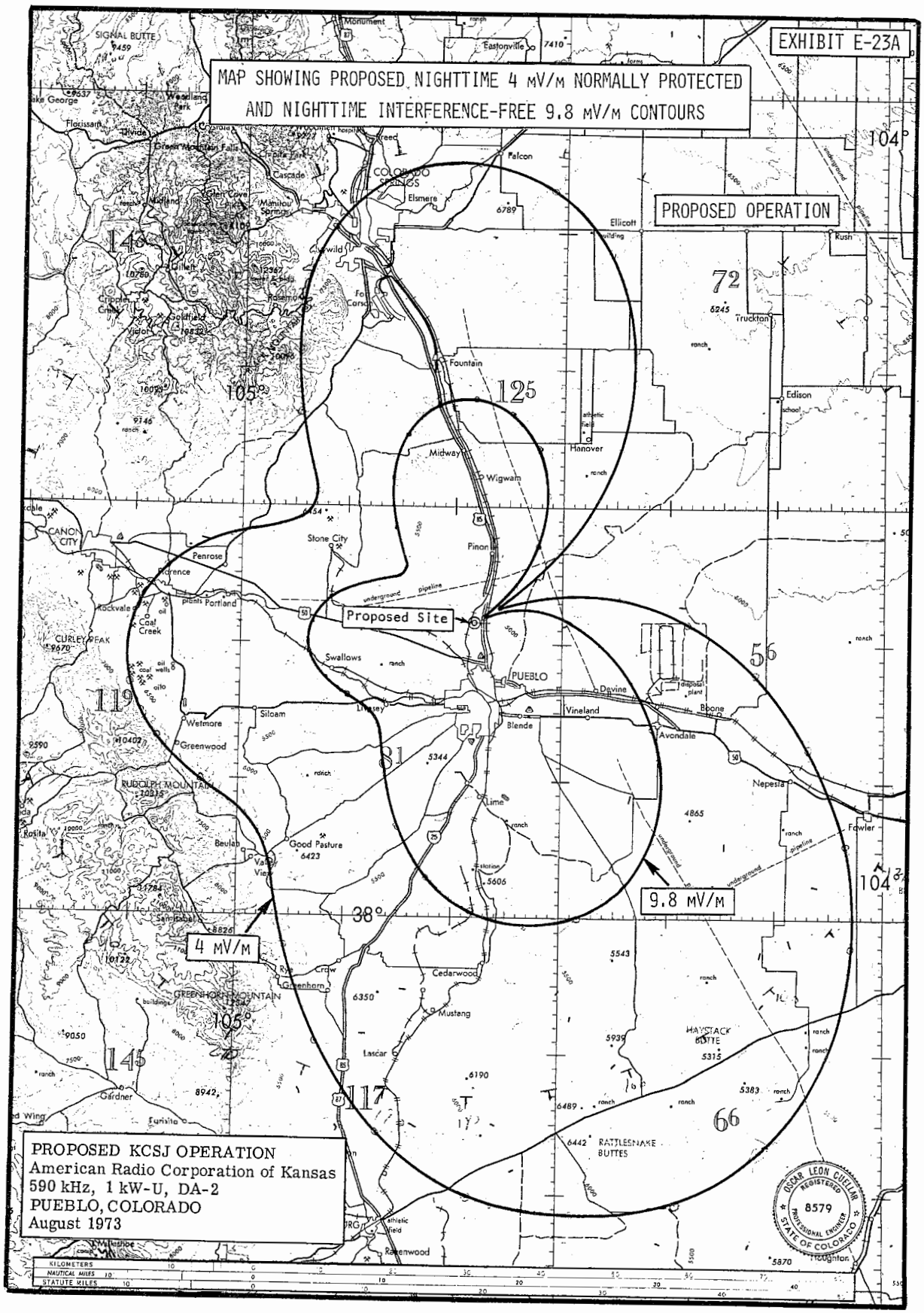

PRESENT AND PROPOSED NIGHTTIME
25 mV/m CONTOURS
EXHIBIT NO. E-23
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
August 1973
PRESENT
PROPOSED
PUEBLO
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO
Scale 1:250,000
20 Statute Miles
30 Kilometers
15 Nautical Miles
CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS

EXHIBIT E-23A

MAP SHOWING PROPOSED NIGHTTIME 4 mV/m NORMALLY PROTECTED AND NIGHTTIME INTERFERENCE-FREE 9.8 mV/m CONTOURS



PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
August 1973

OSCAR LEON CUELLAR
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PROFESSIONAL ENGINEER
STATE OF COLORADO

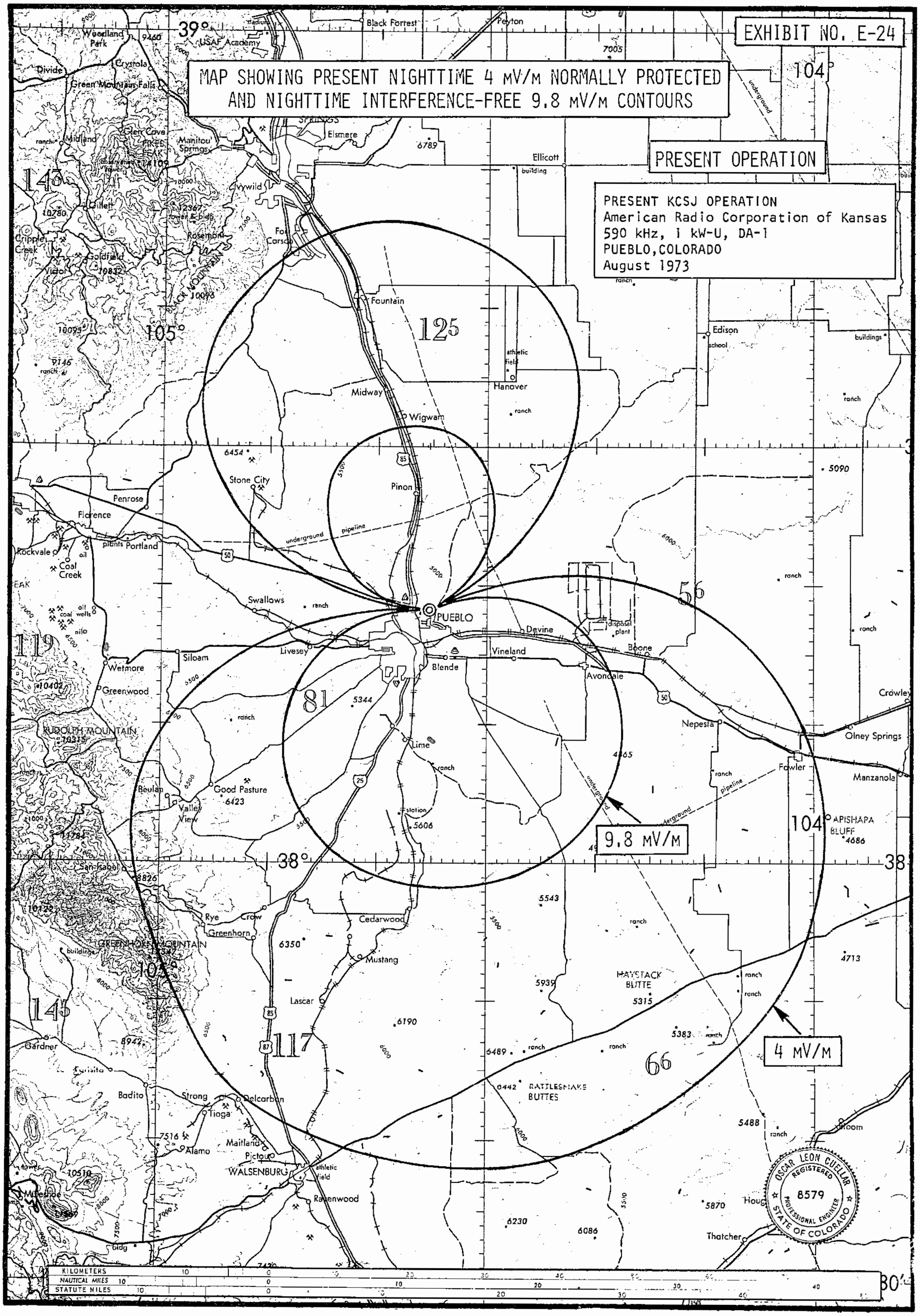
EXHIBIT NO. E-24
MAP SHOWING PRESENT NIGHTTIME 4 mV/m NORMALLY PROTECTED
AND NIGHTTIME INTERFERENCE-FREE 9.8 mV/m CONTOURS
PRESENT OPERATION
PRESENT KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-1
PUEBLO, COLORADO
August 1973
9.8 mV/m
4 mV/m
PUEBLO
Fountain
Hanover
Midway
Wigwam
Pinon
Stone City
Penrose
Florence
Portland
Rockvale
Coal Creek
Swallows
Livesey
Siloam
Wetmore
Greenwood
Devine
Vineland
Boone
Avondale
Blende
Lime
Nepesta
Fowler
Olney Springs
Manzanola
Crowley
Edison
Ellicott
Elsmere
Peyton
Black Forrest
USAF Academy
Woodland Park
Crystola
Divide
Green Mountain Falls
Manitou Springs
Midland
Gillett
Cripple Creek
Goldfield
Victor
Rosemont
Fort Carson
Beulah
Good Pasture
Valley View
San Isabel
Rye
Crow
Greenhorn
Cedarwood
Mustang
Lascar
Gardner
Badito
Strong
Delcarbon
Tioga
Alamo
Maitland
Pictou
WALSENBURG
Ravenwood
Thatcher
APISHAPA BLUFF
HAYSTACK BUTTE
RATTLESNAKE BUTTES
RUDOLPH MOUNTAIN
GREENHORN MOUNTAIN
BLACK MOUNTAIN
39°
38°
104°
105°
125
81
56
66
KILOMETERS
NAUTICAL MILES
STATUTE MILES
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

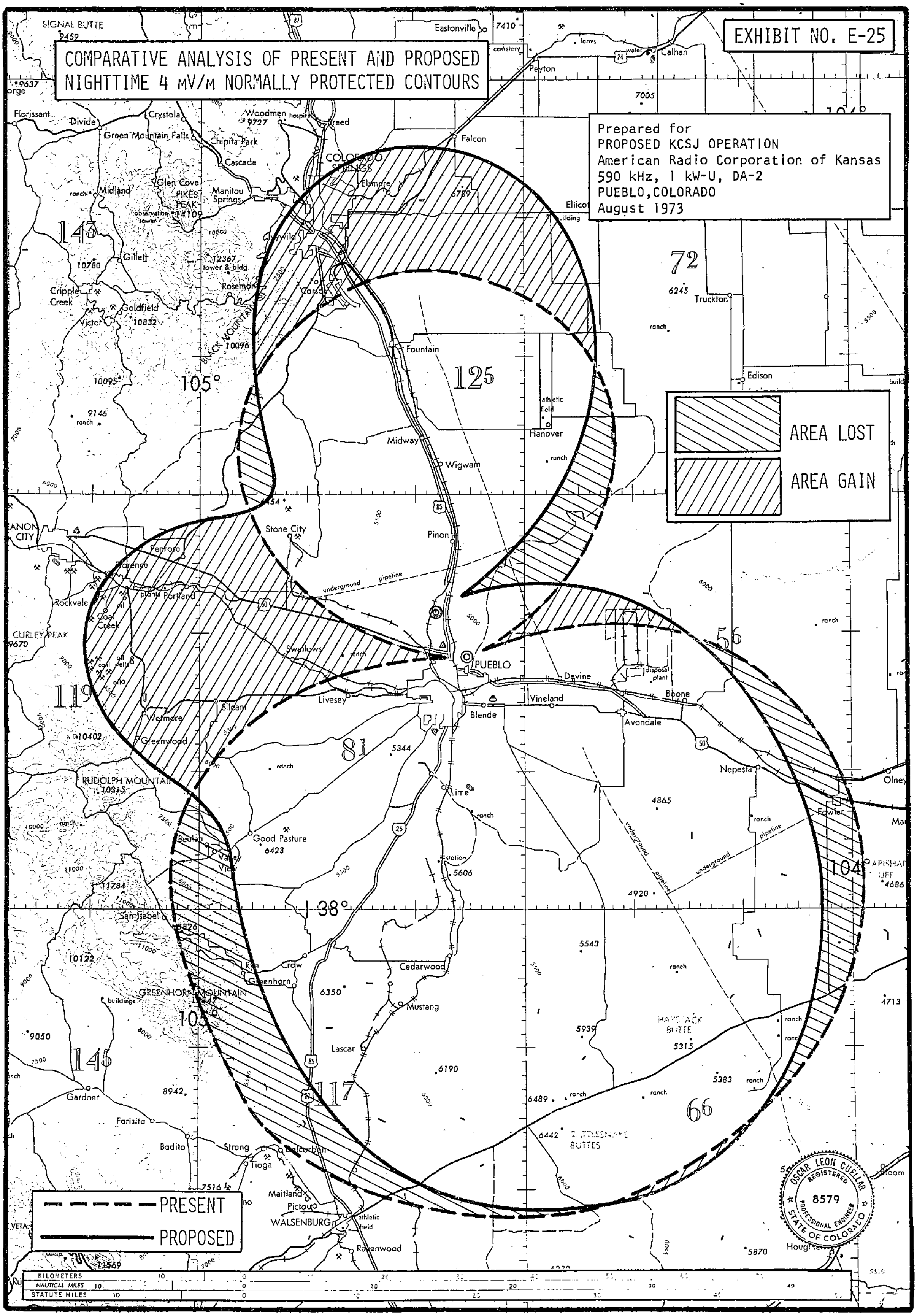
EXHIBIT NO. E-25
COMPARATIVE ANALYSIS OF PRESENT AND PROPOSED
NIGHTTIME 4 mV/m NORMALLY PROTECTED CONTOURS
Prepared for
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
August 1973
AREA LOST
AREA GAIN
PRESENT
PROPOSED
COLORADO SPRINGS
Fountain
PUEBLO
Walsenburg
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO
KILOMETERS
NAUTICAL MILES
STATUTE MILES

COMPARATIVE ANALYSIS OF PRESENT AND PROPOSED NIGHTTIME 9.80 mV/m INTERFERENCE-FREE CONTOURS

EXHIBIT NO. E-26

Prepared for
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
August 1973

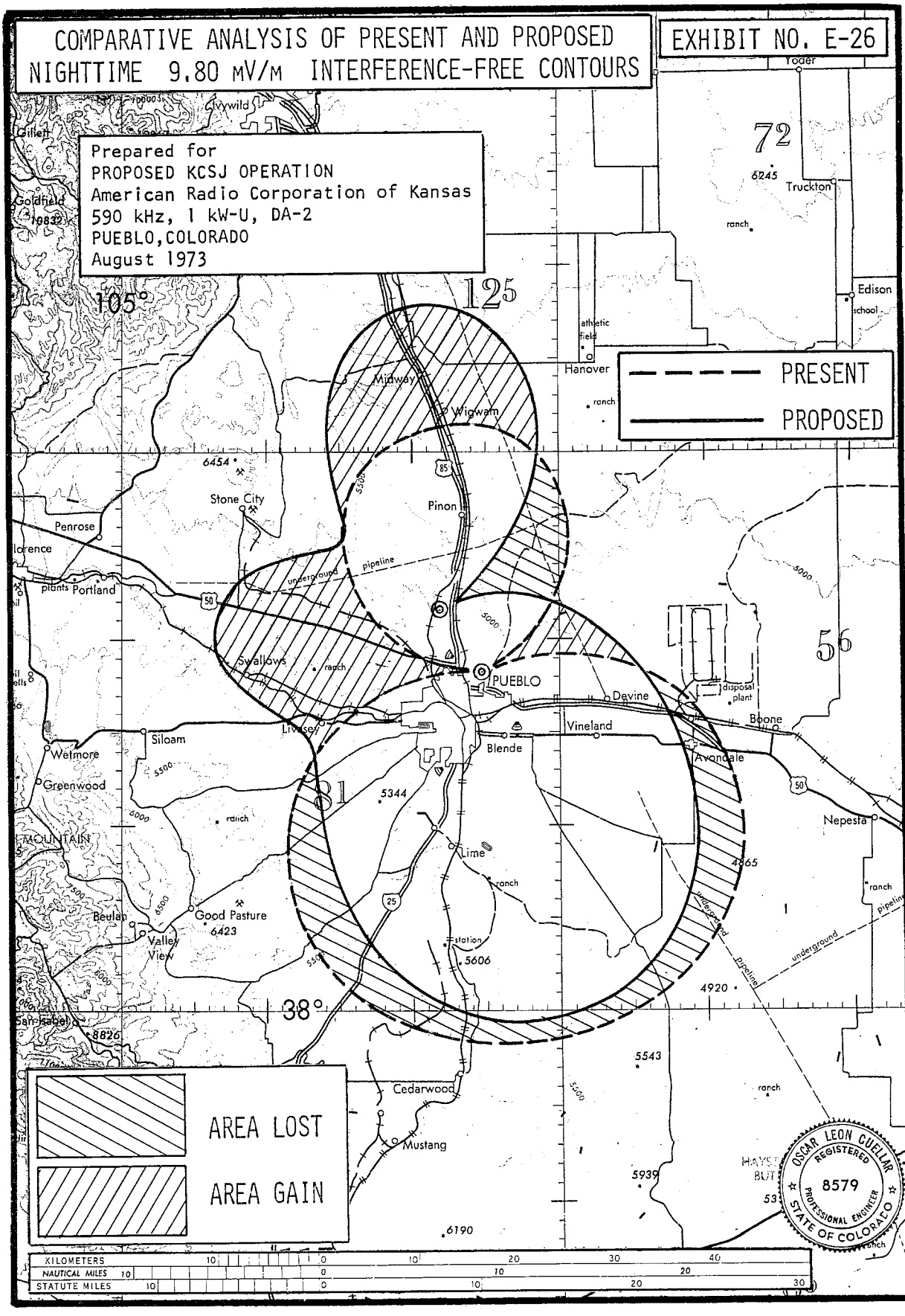

Exhibit No. E-27

September 1973

STATEMENT OF AREAS AND POPULATION AND BASIS THEREFORE

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Present Daytime Operation

Contour mV/m	Area (Sq. Mi.)	Population
1000 (Blanket Contour)	--	--
25	129.2	103,465
5	2,139	117,700
2	7,496	363,378
0.5 (Normally Protected Daytime Contour)	31,990	463,896
Interference from WOW	4,093	12,807
Interference-free	27,897	452,737
Percentage of Interference	12.79%	2.75%

Proposed Daytime Operation

1000 (Blanket Contour)	0.12	None
25	155.9	106,092
5	2,467	123,900
2	8,280	385,460
0.5 (Normally Protected Daytime Contour)	31,520	469,133
Interference from WOW	2,744	9,414
Interference-free	28,776	459,719
Percentage of Interference	8.71%	2.0%

Analysis of Daytime Area Lost

Contour mV/m	Area (Sq. Mi.)	Population
25	44.7	2,382
5	256	349
2	840	10,504
0.5 (Interference-free)	2,650	24,591

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Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

STATEMENT OF AREAS AND POPULATION (continued)

Analysis of Daytime Area Gained

Contour mV/m	Area (Sq. Mi.)	Population
25	71.4	5,009
5	584	6,549
2	1,624	32,586
0.5 (Interference-free)	3,529	31,573

Present Nighttime Operation

Contour mV/m	Area (Sq. Mi.)	Population
1000 (Blanket Contour)	--	--
25	129.2	103,465
9.8 (Interference-free)	708	111,314
4 (Normally Protected)	2,989	158,845
Percentage of Interference	23.69%	29.92%

Proposed Nighttime Operation

Contour mV/m	Area (Sq. Mi.)	Population
1000 (Blanket Contour)	0.1	None
25	142	103,817
9.8 (Interference-free)	766	111,687
4 (Normally Protected)	3,230	272,235
Percentage of Interference	23.72%	58.97%

Analysis of Nighttime Area Lost

Contour mV/m	Area (Sq. Mi.)	Population
25	49.1	2,127
9.8	144	2,630
4	401	8,460

Analysis of Nighttime Area Gained

25	61.9	2,479
9.8	202	3,003
4	642	104,930

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

STATEMENT OF AREAS AND POPULATION (continued)

Method and Basis Used in Determining Areas and Population

Areas were determined by the use of a standard Polar Planimeter. There is no population within the proposed Blanket Contour. All population figures were based upon the 1970 U.S. Census Data and were determined by plotting the contours on a 1970 U.S. Census County Division Map and totalling the population of the CD's included in each.

Uniform distribution of population was assumed in each CD. Cities over 2,500 population, and portions of urbanized areas which would receive less than a 2 mV/m signal were not included.

EXHIBIT No. E-28

CALCULATION OF NIGHTTIME LIMITS
FROM
PRESENT KCSJ OPERATION

	KBHS	KFXM	KTHO	WDLP	WPLO	KID	WRTH	WVLK	WEEI	WJMS
STATUTE MILES	700.9	765.8	830.2	1217.5	1171.1	527.2	783.4	1084.5	1774.8	921.6
MID-POINT LATITUDE	36.4	36.2	38.6	34.2	36.1	40.9	38.6	38.2	40.4	42.4
AZIMUTH ANGLE	295.58	251.43	277.71	111.78	99.12	315.85	82.32	84.47	70.10	47.91
RADIATION ON GROUND	79.52	98.43	30 *	192.34	148.24	141.9*	80.68	89.7	30 *	60.19
MIN-MAX VERT ANG (ΔΘ)	5.07-9.09	4.17-7.87	3.42-6.82	0-2.2	0.25-2.71	7.81-13.63	3.96-7.57	1.02-3.55	0-0	2.47-5.55
MAX RADIATION WITHIN (ΔΘ)	78.57	98.03	29.5*	192.34	148.23	138*	80.41	89.68	30 *	60.01
SKYWAVE FIELD	0.0710	0.0596	0.049	0.01785	0.0198	0.1078	0.0565	0.0243	0.0065	0.0377
LIMIT (mV/m)	1.1157	1.1685	0.2891	0.5292	0.5870	2.975	0.9086	0.4358	0.039	0.4525

	WKZO	WOW	WROW	WGTM	KUGN	WARM	WMBS	KTBC	KSUB	WLVA
STATUTE MILES	1038.0	501.0	1637.1	1469.5	1038.0	1530.4	1332.5	684.1	469.4	1380.6
MID-POINT LATITUDE	40.3	39.8	40.5	37.0	41.2	39.9	39.1	34.3	38.0	37.9
AZIMUTH ANGLE	68.36	62.75	69.69	88.76	298.55	72.64	77.56	142.49	267.54	84.60
RADIATION ON GROUND	30 *	30 *	30 *	107.45	89.36	30.4*	60.52	289	40 *	90.24
MIN-MAX VERT ANG (ΔΘ)	1.43-4.06	8.35-14.28	0-0	0-0	1.43-4.06	0-0	0-1.03	5.24-9.34	9.16-15.51	0-0.6
MAX RADIATION WITHIN (ΔΘ)	29.9*	28.9*	30 *	107.45	89.28	30.4*	60.52	288	40 *	90.24
SKYWAVE FIELD	0.0272	0.1148	0.0078	0.01095	0.0272	0.00955	0.0139	0.0740	0.124	0.0128
LIMIT (mV/m)	0.1626	0.6635	0.0468	0.2353	0.4857	0.0581	0.1682	4.2624	0.992	0.2310

	KHQ	XEE	XEFD	XEHQ	XEPH	CFNL	CFTK	CFAR	CKEY	CKRS
STATUTE MILES	909.7	988.3	933.0	734.5	1347.0	1629.7	1582.6	1147.0	1359.2	1799.8
MID-POINT LATITUDE	43.0	--	--	--	--	--	--	--	--	--
AZIMUTH ANGLE	319.1	180.21	154.01	211.45	164.33	336.27	322.77	5.53	66.33	56.42
RADIATION ON GROUND	149*	279.62	276.95	235*	282.41	168.33	156*	164.57	30 *	30 *
MIN-MAX VERT ANG (ΔΘ)	2.57-5.73	3.01	3.67	6.42	0	0-0	0-0	0.46-2.93	0-0.79	0-0
MAX RADIATION WITHIN (ΔΘ)	148.5*	278.91	275.9	230*	282.41	168.33	156*	164.55	30 *	30 *
SKYWAVE FIELD	0.0387	0.0339	0.0397	0.0695	0.0137	0.00837	0.0089	0.0215	0.0133	0.0066
LIMIT (mV/m)	1.1494	1.891	2.191	3.197	0.7738	0.2818	0.2777	0.7076	0.0798	.0360

OSCAR LEON CUELLAR REGISTERED 8579 PROFESSIONAL ENGINEER STATE OF COLORADO

* MEOV Values

All values are based on Notified
C.P. Pattern Docket No. 6814

Calculation of Nighttime Limits
From
PRESENT KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-1
Pueblo, Colorado
August 1973

EXHIBIT No. E-29

CALCULATION OF NIGHTTIME LIMITS
FROM
PROPOSED KCSJ OPERATION

	KBHS	KFXM	KTHO	WDLP	WPLO	KID	WRTH	WVLK	WEEI	WJMS
STATUTE MILES	704.5	764.6	827.1	1221.4	1174.3	522.7	785.5	1086.7	1776	921
MID-POINT LATITUDE	36.4	36.2	38.6	34.3	36.1	41	38.6	38.2	40.4	42.4
AZIMUTH ANGLE	108.82	251.07	277.46	111.87	99.24	315.74	82.58	84.64	70.20	48.16
RADIATION ON GROUND	153.48	149.88	139.36	166.72	115.56	96.82	63.53	69.28	28.99	54.03
MIN-MAX VERT ANG (ΔΘ)	5.02-9.02	4.19-7.89	3.45-6.87	0-2.16	0.22-2.69	7.9-13.51	3.93-7.53	1-3.53	0-0	2.47-5.56
MAX RADIATION WITHIN (ΔΘ)	152.93	148.48	138.35	166.72	115.56	94.73	63.24	69.27	28.99	54.01
SKYWAVE FIELD	0.0700	.0600	.0499	.0178	.01975	0.109	.0563	.0242	.00648	.0377
LIMIT (mV/m)	2.1410	1.7818	1.3807	0.5935	0.4565	2.0651	0.7121	0.3353	0.0369	0.4072

	WKZO	WOW	WROW	WGTM	KUGN	WARM	WMBS	KTBC	KSUB	WLVA
STATUTE MILES	1039.1	501.6	1638.3	1472.1	1033.9	1531.8	1334.2	688.6	467.0	1382.9
MID-POINT LATITUDE	40.4	39.8	40.5	37.0	41.2	39.9	39.1	34.3	38.0	37.9
AZIMUTH ANGLE	68.57	63.24	69.81	88.87	298.41	72.77	77.70	142.48	267.04	84.73
RADIATION ON GROUND	24.25	9.93	27.86	81.52	84.5	36.35	50.09	297.26	153.69	69.54
MIN-MAX VERT ANG (ΔΘ)	1.42-4.05	8.34-14.26	0-0	0-0	1.47-4.1	0-0	0-1.02	5.18-9.25	9.22-15.6	0-0.58
MAX RADIATION WITHIN (ΔΘ)	24.2	7.86	27.86	81.52	84.38	36.35	50.09	295.12	146.22	69.54
SKYWAVE FIELD	.0271	0.1149	.00779	.0109	.0278	0.0098	.0138	.0730	.1242	.0126
LIMIT (mV/m)	0.1312	0.1806	0.0434	0.1777	0.4692	0.0712	0.1382	4.3088	3.6321	0.1752

	KHQ	XEE	XEFD	XEHQ	XEPH	CFNL	CFTK	CFAR	CKEY	CKRS
STATUTE MILES	905.2	992	937.5	736.3	1351.3	1625.2	1578.0	1143.6	1360.1	1799.9
MID-POINT LATITUDE	43.0	--	--	--	--	--	--	--	--	--
AZIMUTH ANGLE	319.04	180.03	153.94	211.1	164.24	336.27	322.73	5.64	66.48	56.53
RADIATION ON GROUND	109.42	292.79	324.64	156.23	327.02	181.08	124.97	215.2	18.2	20.69
MIN-MAX VERT ANG (ΔΘ)	2.61-5.79	2.97	3.61	6.39	0	0-0	0-0	0.5-2.97	0-0.78	0-0
MAX RADIATION WITHIN (ΔΘ)	109.17	292.07	323.43	155.08	327.02	181.08	124.97	215.2	18.2	20.69
SKYWAVE FIELD	0.0392	.0335	.0392	.0692	.0136	.00843	.009	.0217	.0133	.0066
LIMIT (mV/m)	0.8559	1.9569	2.5357	2.1463	0.8895	0.3053	0.2249	0.9340	0.0484	0.0273

OSCAR LEON CUELLAR REGISTERED 8579 PROFESSIONAL ENGINEER STATE OF COLORADO

Values of Radiation Taken from the Standard Radiation Pattern

$$E(\Phi,\Theta)_{std} = 1.05(E(\Phi,\Theta)^2_{th} + Q^2)^{\frac{1}{2}}$$

$$Q = 6 \cdot F(\Theta) \cdot (PkW)^{\frac{1}{2}} \; ; \quad PkW = 1.0$$

CALCULATION OF NIGHTTIME LIMITS
FROM
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado

August 1973

E-29

Exhibit No. E-30

CALCULATION OF NIGHTTIME LIMITS TO PRESENT KCSJ OPERATION

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

TO: PRESENT KCSJ	FROM	
CALL	WOW	KHQ
Statute Miles	501.0	909.7
Mid-point Latitude	39.8	43.0
Azimuth Angle	248.26	130.34
Radiation on Ground	433.8	523.24
Min-Max Vert. Angle ($\Delta\theta$)	8.35-14.28	2.57-5.73
Max. Radiation Within ($\Delta\theta$)	426.56	521.26
Skywave Field	0.1148	0.0387
Limit (mV/m)	*9.794	4.035

* Present KCSJ Nighttime interference-free contour=9.794 mV/m

Notice that KHQ 4.035 mV/m is excluded from the count for it is less than 4.897 or 50% of 9.794.

See Exhibits Nos. E-49 and E-50 for WOW and KHQ Vertical Radiation Patterns.

The rounded figure of 9.8 mV/m has been taken for the present Coverage Nighttime-interference-free service.

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Exhibit No. E-31

CALCULATION OF NIGHTTIME LIMITS TO PROPOSED KCSJ OPERATION

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

TO: PROPOSED KCSJ	FROM	
CALL	WOW	KHQ
Statute Miles	501.6	905.2
Mid-point Latitude	39.8	43
Azimuth Angle	248.78	130.31
Radiation on Ground	433.8	523.24
Min-Max Vert. Angle ($\Delta\Theta$)	8.34-14.26	2.61-5.79
Max. Radiation Within ($\Delta\Theta$)	426.57	521.19
Skywave Field	0.1149	0.0392
Limit (mV/m)	*9.8026	4.0861

* Proposed Nighttime interference-free Contour=9.80 mV/m

Notice that KHQ 4.0861 mV/m is excluded from the count for it is less than 4.9 or 50% of 9.80 mV/m.

The rounded figure of 9.80 mV/m has been taken for the Proposed Coverage Contour Nighttime-interference-free service.

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EXHIBIT NO. E-32

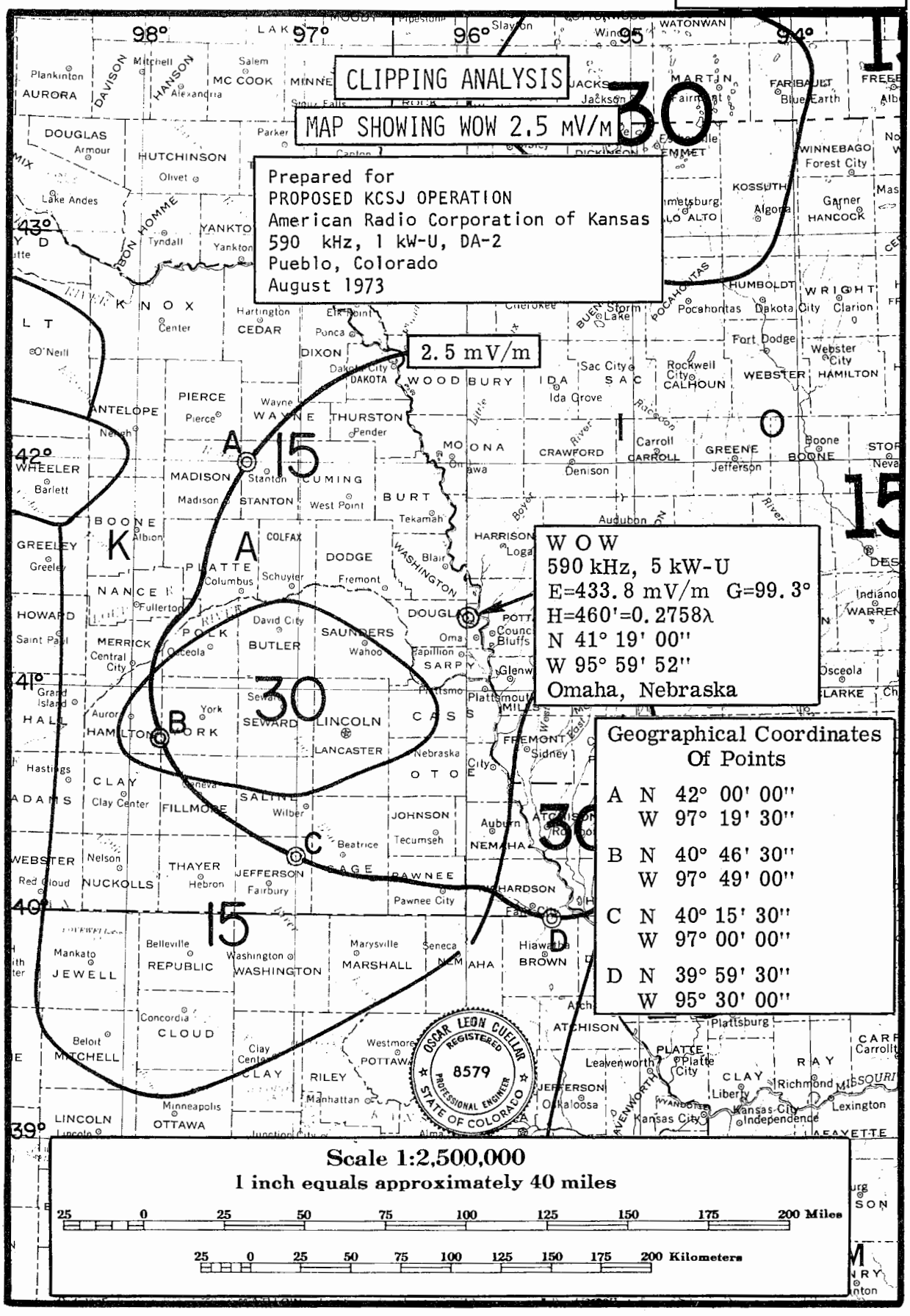

Exhibit No. E-33

NIGHTTIME LIMITS TO WOW
OMAHA, NEBRASKA

PREPARED FOR
PROPOSED KCSJ OPERATION
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
AUGUST 1973

TO WOW	FROM			
CALL	KHQ	KSUB	WPLO	KCSJ
Statute Miles	1135.5	947.7	821.6	501.6
Mid-Point Latitude	44.47	39.51	37.57	39.8
Azimuth Angle	Non-Dir	69.35	312.43	63.24
Radiation on Ground	523.24	161	100	9.93
Min-Max Vert. Angle ($\Delta\Theta$)	0.57-3.04	2.23-5.19	3.51-6.95	8.34-14.26
Max. Radiation Within ($\Delta\Theta$)	523.14	161.48	100	7.86
Skywave Field	0.01770	0.0347	0.510	0.1149
Limit (mV/m)	*1.852	*1.1207	1.02	0.1806

* Nighttime Limit to WOW, RSS=2.165 mV/m
Therefore, the WOW normally protected nighttime contour is 2.5 mV/m.

PATTERN USED: KSUB Theoretical Nighttime Pattern Figure 1 (R & C - 10/45) adjusted to KSUB Measured Nighttime Pattern Figure 2 dated February 10, 1950

WPLO measured Nighttime Directional Antenna Pattern Figure 7 dated December 1963 and WPLO notified C.P. Pattern Figure 4 July 1967

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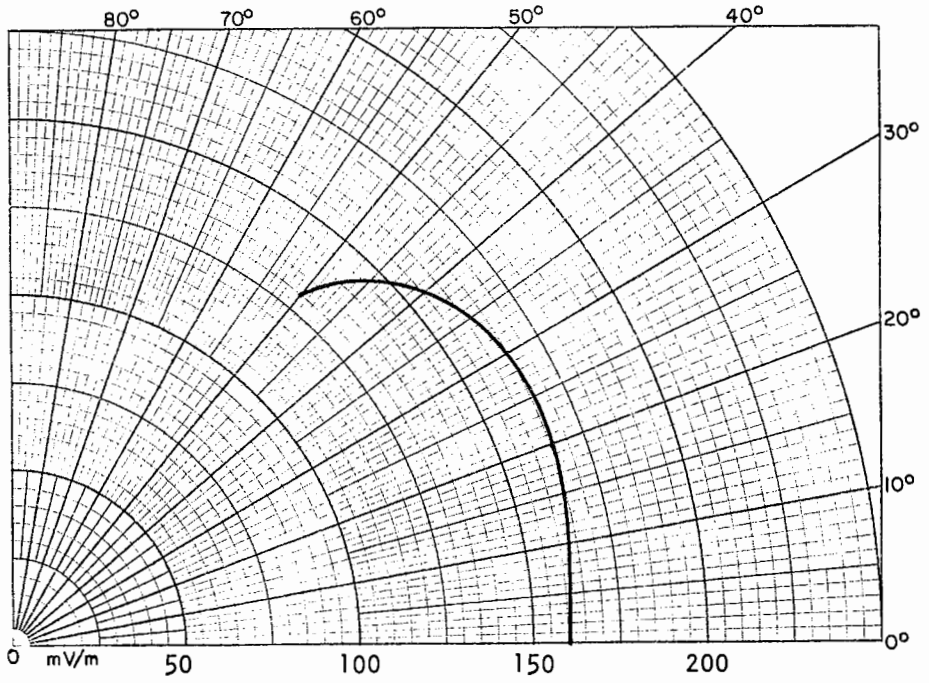
VERTICAL RADIATION PATTERN KSUB

In The Direction Of WOW Direct Radial At 69.35° True

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



KSUB
590 kHz, 1 kW-U, DA-N
Cedar City, Utah

Θ (Degrees)	E (mV/m)
0	161.0
2.23	161.10
5.19	161.48
10	162.65
20	165.76
30	165.32
40	155.09
50	130.83
60	93.65

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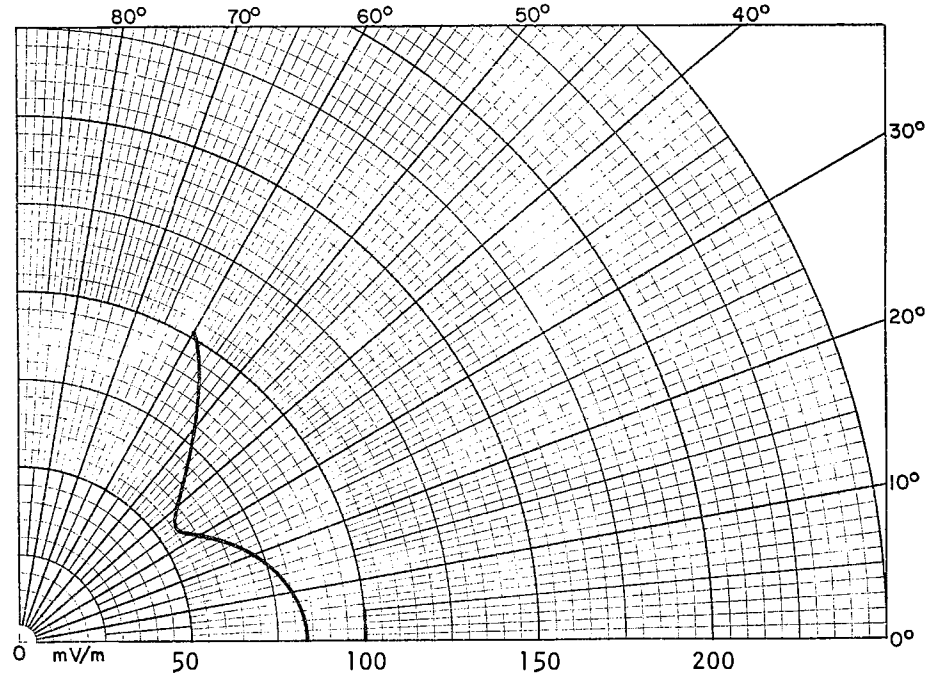
VERTICAL RADIATION PATTERN WPLO

In The Direction Of WOW At 312.43° True

Prepared for
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



KPLO
590 kHz, 5 kW-U, DA-N
Atlanta, Georgia

Θ (Degrees)	E (mV/m)	MEOV (mV/m)
0	82.98	100
3.51	82.65	100
6.95	81.68	
10	80.29	
20	72.22	
30	61.55	
40	60.78	
50	79.95	
60	102.42	

PATTERN USED: WPLO measured nighttime directional antenna Pattern Figure 7 dated December 1963 and WPLO Notified C.P. Pattern Figure 4 dated July 1967

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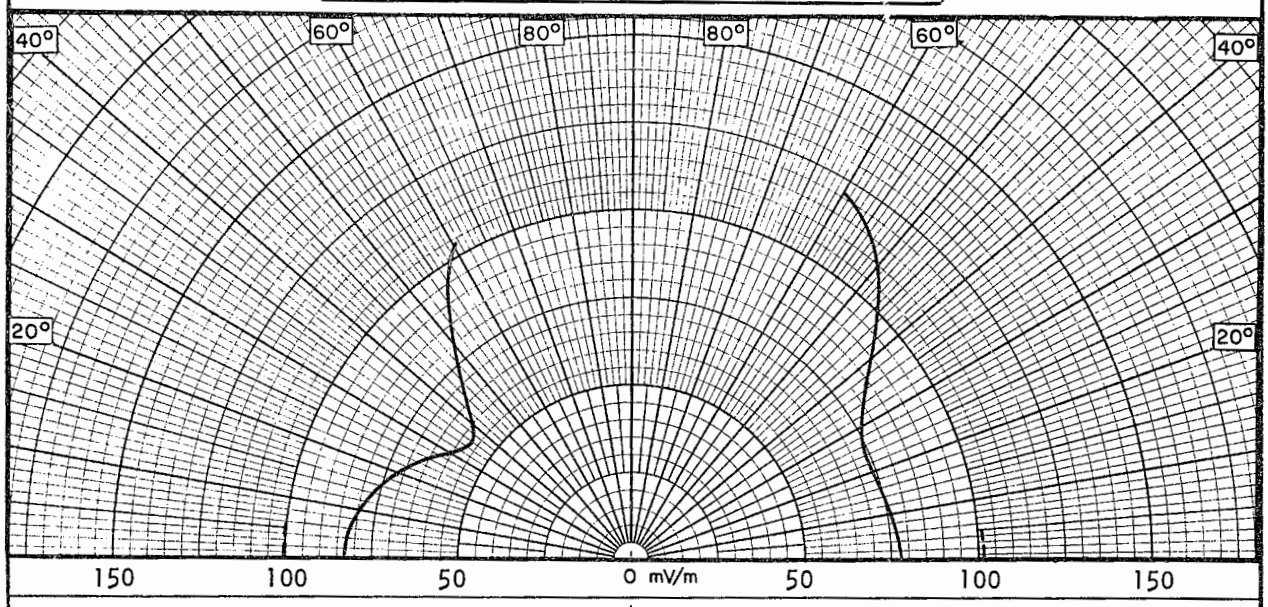
EXHIBIT NO. E-34A

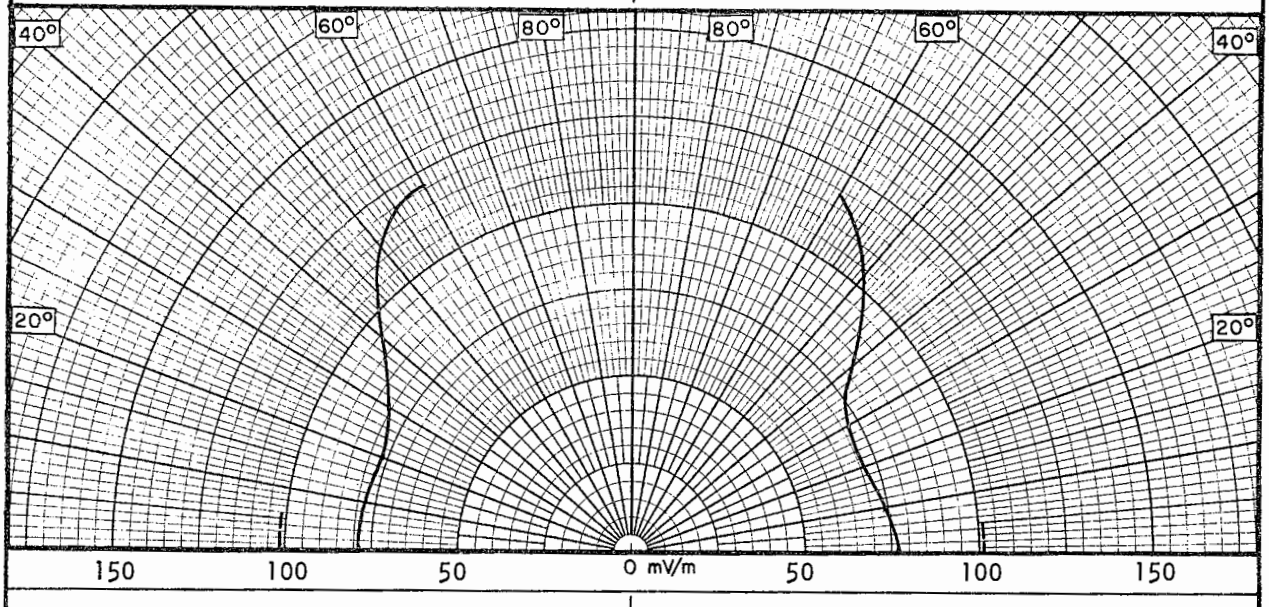
VERTICAL RADIATION PATTERNS FROM WPLO
IN THE DIRECTION OF WOW, OMAHA, NEBRASKA

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



Toward WOW Point A at 312.41° True
Θ_1=2.61° Θ_2=5.8°

Toward WOW Point B at 306.88° True
Θ_1=2.89° Θ_2=6.07°



Toward WOW Point C at 306.14° True
Θ_1=3.45° Θ_2=6.86°

Toward WOW Point D at 307.86° True
Θ_1=4.38° Θ_2=8.16

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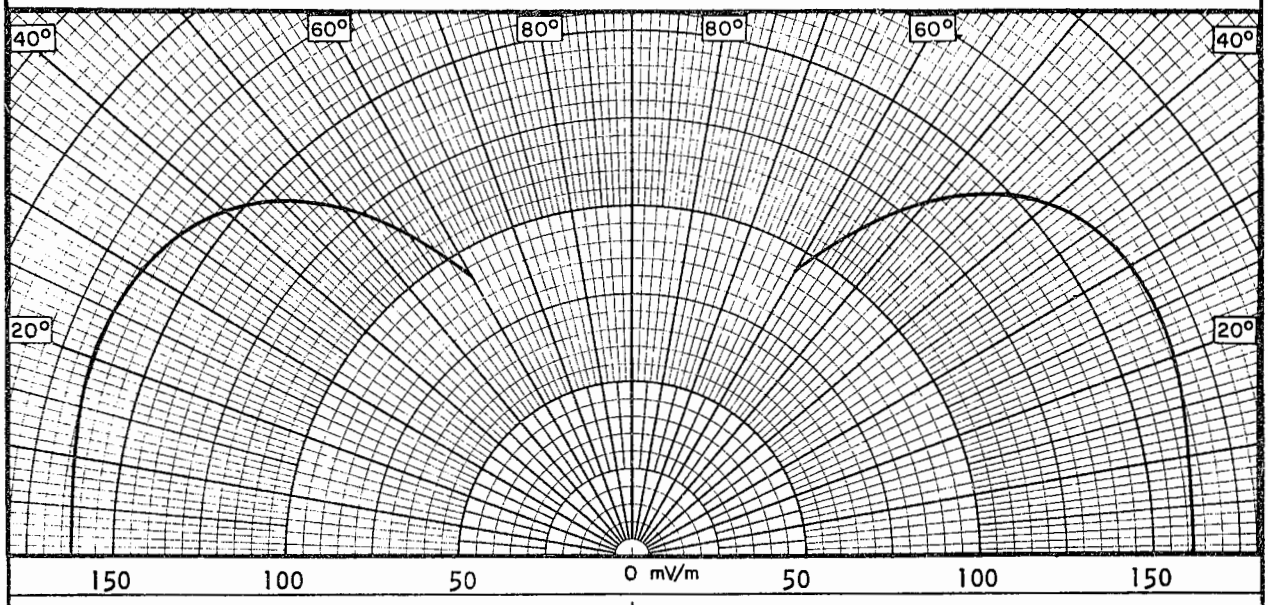
EXHIBIT NO. E-34B

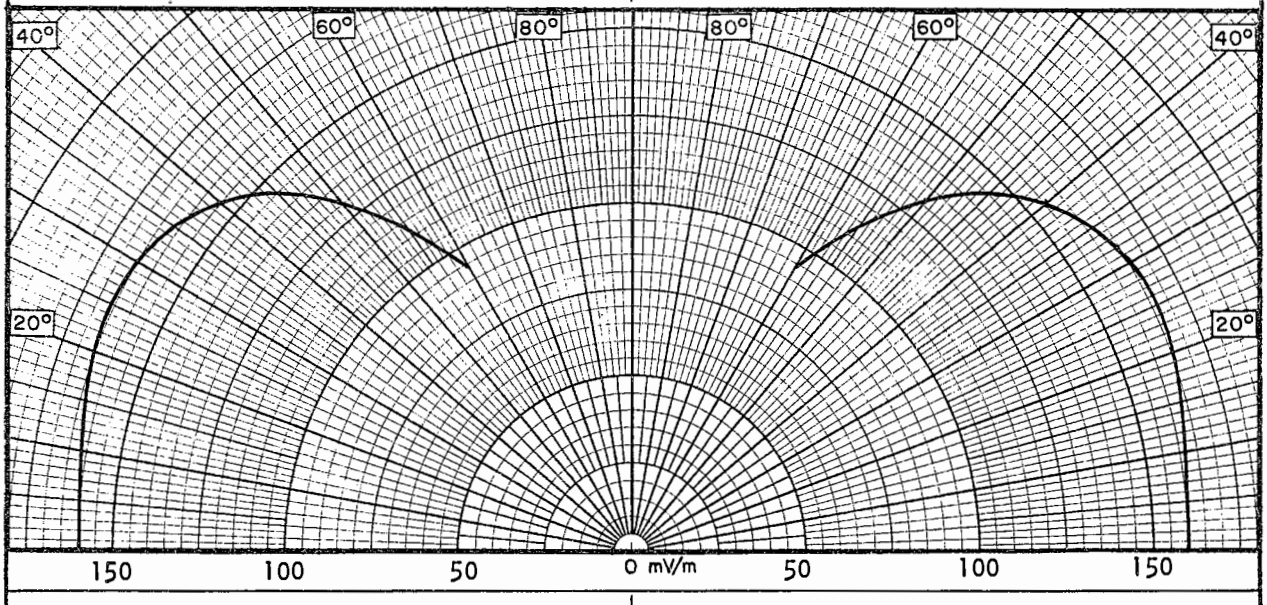
VERTICAL RADIATION PATTERNS FROM KSUB
IN THE DIRECTION OF WOW, OMAHA, NEBRASKA

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



Toward WOW Point A at 65.55° True
θ_1=2.81° θ_2=5.96°

Toward WOW Point B at 70.71° True
θ_1=3.23° θ_2=6.55°



Toward WOW Pont C at 73.46° True
θ_1=2.86° θ_2=6.03

Toward WOW Pont D at 75.05° True
θ_1=2.1° θ_2=4.98°

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TABULATION OF WPLO VERTICAL RADIATION PATTERN VALUES IN THE DIRECTION OF WOW

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

To: WOW Point A
at 312.41° True

Θ (Degrees)	E (mV/m)	MEOV (mV/m)
0	82.94	100
2.61	82.75	100
5.8	82.03	
10	80.24	
20	72.19	
30	61.56	
40	60.85	
50	80.05	
60	102.49	

To: WOW Point B
at 306.88° True

Θ (Degrees)	E (mV/m)	MEOV (mV/m)
0	77.33	101.5
2.89	77.22	101.5
6.07	76.85	
10	76.09	
20	74.06	
30	76.68	
40	89.62	
50	109.26	
60	122.55	

To: WOW Point C
at 306.14° True

Θ (Degrees)	E (mV/m)	MEOV (mV/m)
0	78.66	102
3.45	78.54	102
6.86	78.21	
10	77.79	
20	76.90	
30	81.07	
40	94.71	
50	113.65	
60	125.39	

To: WOW Point D
at 307.86° True

Θ (Degrees)	E (mV/m)	MEOV (mV/m)
0	76.64	101
4.38	76.30	101
8.16	75.49	
10	74.95	
20	71.41	
30	71.71	
40	83.28	
50	103.66	
60	118.84	

PATTERN USED: WPLO measured nighttime directional antenna Pattern Figure 7 dated December 1963 and WPLO Notified C.P. Pattern Figure 4 dated July 1967

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TABULATION OF KSUB VERTICAL RADIATION PATTERN VALUES IN THE DIRECTION OF WOW

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

To: WOW Point A at 65.55° True

Θ (Degrees)	E (mV/m)
0	162
2.81	162.13
5.96	162.54
10	163.43
20	165.92
30	164.65
40	153.67
50	129.06
60	92.06

To: WOW Point B at 70.71° True

Θ (Degrees)	E (mV/m)
0	161
3.23	161.19
6.55	161.77
10	162.71
20	165.99
30	165.76
40	155.70
50	131.50
60	94.21

To: WOW Point C at 73.46° True

Θ (Degrees)	E (mV/m)
0	160
2.86	160.16
6.03	160.68
10	161.78
20	165.26
30	165.32
40	155.55
50	131.57
60	94.36

To: WOW Point D at 75.05° True

Θ (Degrees)	E (mV/m)
0	160
2.1	160.09
4.98	160.48
10	161.81
20	165.34
30	165.47
40	155.77
50	131.80
60	94.56

PATTERN USED: KSUB Theoretical Nighttime Pattern Figure 1 (R & C - 10/45) adjusted to KSUB Measured Nighttime Pattern Figure 2 dated February 10, 1950

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CLIPPING ANALYSIS FOR WOW

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

CALL	POINT A KHQ	KSUB	WPLO	KCSJ	POINT B KHQ	KSUB	WPLO	KCSJ
Statute Miles	1052.7	890.4	904.8	460.5	1073.8	848.0	882.3	399.7
Mid-Point Latitude	44.81	39.85	37.91	40.18	44.20	39.24	37.30	39.57
Azimuth Angle	Non-Dir	65.55	312.41	54.58	Non-Dir	70.71	306.88	63.17
Radiation On Ground	523.24	162	100	27.86	523.24	161	101.5	9.81
Min-Max Vert. Angle (Δθ)	1.3-3.89	2.81-5.96	2.61-5.8	9.37-15.86	1.11-3.66	3.23-6.55	2.89-6.07	11.07-18.69
Max Radiation Within (Δθ)	522.73	162.54	100	29.64	522.87	161.77	101.5	11.31
Skywave Field	0.0229	0.0413	0.03965	0.1265	0.0224	0.04695	0.04265	0.1475
Limit (mV/m)	*2.394	*1.3426	0.8089	0.7499	*2.342	*1.519	0.8660	0.3336

* RSS = 2.745 mV/m

* RSS = 2.7915 mV/m

CALL	POINT C KHQ	KSUB	WPLO	KCSJ	POINT D KHQ	KSUB	WPLO	KCSJ
Statute Miles	1129.2	885.5	827.5	428.7	1205.6	962.8	749.6	502.0
Mid-Point Latitude	43.94	38.98	37.04	39.31	43.80	38.85	36.91	39.18
Azimuth Angle	Non-Dir	73.46	306.14	69.78	Non-Dir	75.05	307.86	74.15
Radiation On Ground	523.24	160	102	27.77	523.24	160	101	40.24
Min-Max Vert. Angle (Δθ)	0.62-3.1	2.86-6.03	3.45-6.86	10.2-17.24	0-2.33	2.1-4.98	4.38-8.16	8.33-14.24
Max Radiation Within (Δθ)	523.12	160.68	102	25.43	523.24	160.48	101	38.72
Skywave Field	0.01895	0.0419	0.0501	0.1368	0.01510	0.0354	0.0626	0.1148
Limit (mV/m)	*1.9826	*1.3465	1.022	0.6958	*1.5802	*1.1362	*1.2645	0.2636

* RSS = 2.3966 mV/m

* RSS = 2.321 mV/m

PATTERN USED: WPLO measured nighttime directional antenna Pattern Figure 7 dated December 1963 and WPLO Notified C.P. Pattern Figure 4 dated July 1967

KSUB Theoretical Nighttime Pattern Figure 1 (R & C - 10/45) adjusted to KSUB Measured Nighttime Pattern Figure 2 dated February 10, 1950

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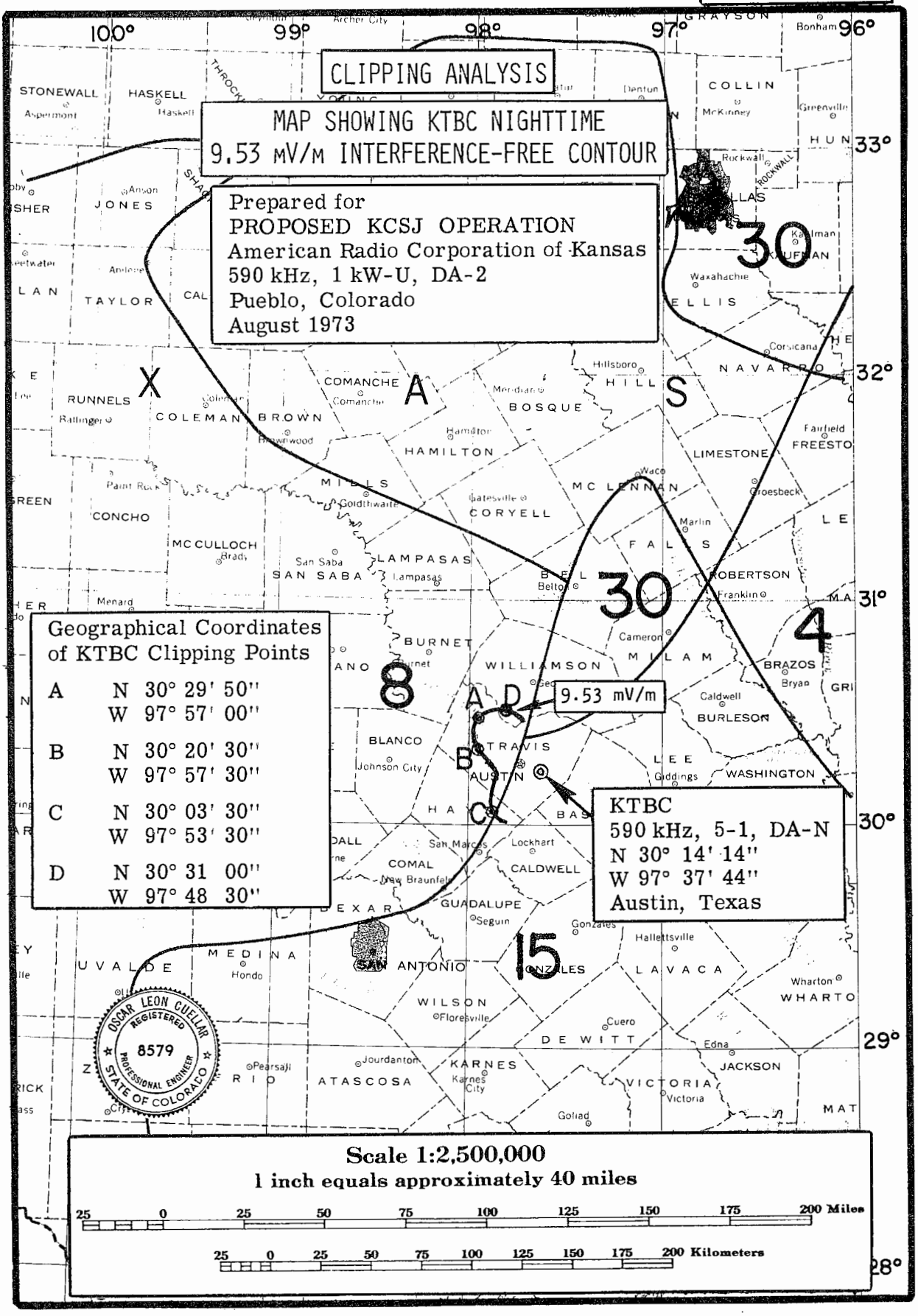
Exhibit No. E-37



NIGHTTIME LIMITS TO KTBC
AUSTIN, TEXAS

PREPARED FOR
PROPOSED KCSJ OPERATION
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
AUGUST 1973

TO KTBC

CALL	FROM WPLO	WOW	XEPH
Statute Miles	817.6	771.0	754.5
Mid-Point Latitude	32	35.8	24.8
Azimuth (Degrees True)	255.98	187.30	6.75
Radiation on Ground	790	433.80	391.3
Min. - Max. Vert. Ang. ($\Delta\theta$)	3.56-7.01	4.11-7.78	4.32-8.07
Max. Rad. Within ($\Delta\theta$)	787.77	432.03	389.78
Skywave Field	0.0512	0.0587	0.0610
Limit	*8.0668	*5.0720	4.7553

*Nighttime Limit to KTBC; RSS = 9.5288 mV/m

NOTICE that XEPH is not included in the KTBC RSS because 4.7553 mV/m is less than 4.7644 which figure is 50% of 9.5288 mV/m.

PATTERN USED: WPLO measured nighttime directional antenna Pattern Figure 7 dated December 1963 and WPLO notified C.P. Pattern Figure 4 July 1967

Note: The rounded figure of 9.53 mV/m has been used to plot the KTBC Ground Wave interference-free Contour.

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

CLIPPING ANALYSIS FOR KTBC

Prepared For
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

CALL	POINT A				POINT B			
	WPLO	WOW	XEPH	KCSJ	WPLO	WOW	XEPH	KCSJ
Statute Miles	829.3	755.5	770.2	663.1	833.4	766.02	759.4	671.9
Mid-Point Latitude	32.16	35.9	24.95	34.43	32.08	35.83	24.87	34.35
Azimuth Angle	257.63	Non-Dir.	Non-Dir.	143.0	256.94	Non-Dir.	Non-Dir.	143.54
Radiation On Ground	790	433.8	391.3	298.9	790	433.8	391.3	300.57
Min-Max Vert. Angle (Δθ)	3.43-6.83	4.31-8.05	4.12-7.79	5.53-9.77	3.38-6.77	4.17-7.86	4.25-7.98	5.41-9.58
Max Radiation Within (Δθ)	787.9	431.86	389.91	296.44	787.97	431.98	389.82	298.19
Skywave Field	0.0498	0.0618	0.059	0.0780	0.0491	0.0598	0.061	0.0762
Limit (mV/m)	*7.8475	*5.3378	4.601	4.624	*7.738	*5.166	*4.756	4.544
	* RSS = 9.4908 mV/m				* RSS = 10.442 mV/m			

CALL	POINT C				POINT D			
	WPLO	WOW	XEPH	KCSJ	WPLO	WOW	XEPH	KCSJ
Statute Miles	836.7	785.1	740	690.5	820.9	753.1	772.4	666.6
Mid-Point Latitude	31.94	35.69	24.73	34.21	32.17	35.92	24.96	34.44
Azimuth Angle	255.58	Non-Dir.	Non-Dir.	144.14	257.52	Non-Dir.	Non-Dir.	142.32
Radiation On Ground	789	433.8	391.3	302.25	790	433.8	391.3	296.75
Min-Max Vert. Angle (Δθ)	3.35-6.72	3.93-7.54	4.51-8.33	5.16-9.21	3.52-6.96	4.34-8.09	4.09-7.75	5.48-9.69
Max Radiation Within (Δθ)	787.04	432.18	389.64	300.07	787.8	431.83	389.93	294.37
Skywave Field	0.0490	0.0564	0.0640	0.0730	0.0511	0.0619	0.0581	0.0775
Limit (mV/m)	*7.713	*4.875	*4.987	4.381	*8.0513	*5.346	4.531	4.563
	* RSS = 10.398 mV/m				* RSS = 9.664 mV/m			

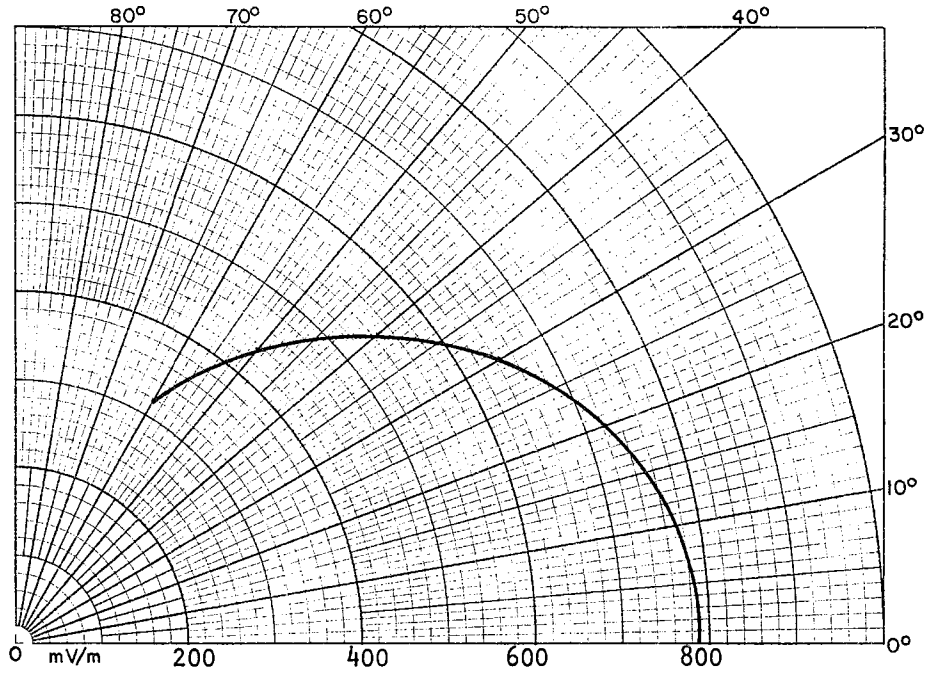
PATTERN USED: WPLO measured nighttime directional antenna Pattern Figure 7 dated December 1963 and WPLO Notified C. P. Pattern Figure 4 dated July 1967

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

VERTICAL RADIATION PATTERN WPLO

Direct Radial To KTBC At 255.98° True

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



WPLO
590 kHz, 5 kW-U, DA-N
Atlanta, Georgia

Tabulation of Vertical Radiation Pattern Values

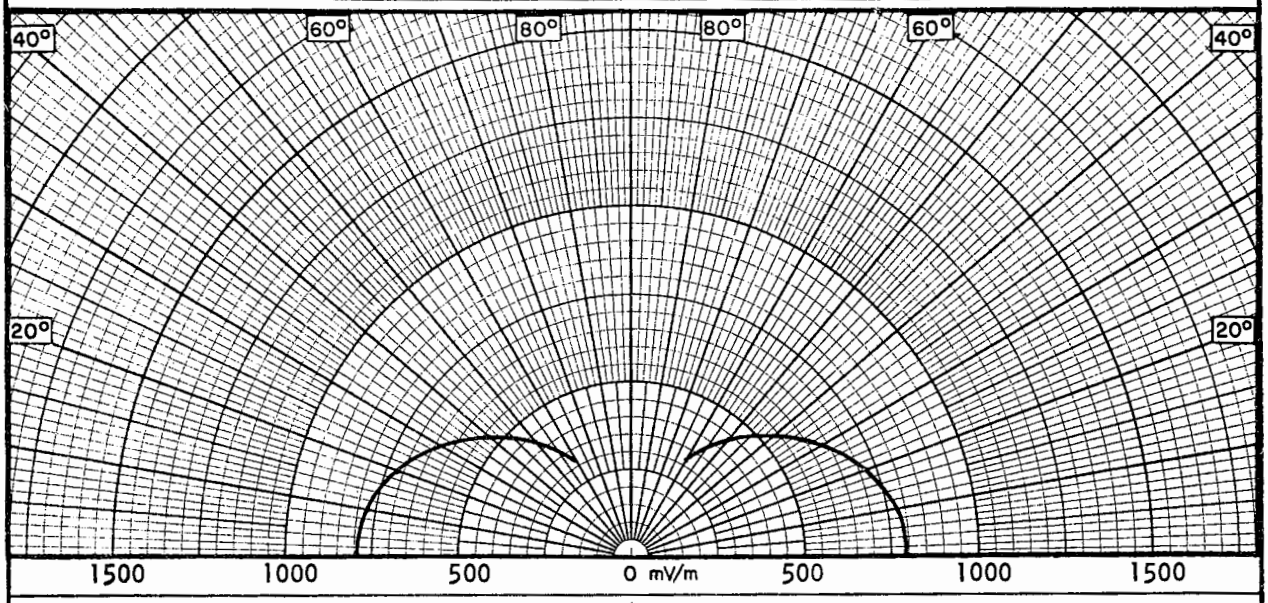
Θ (Degrees)	E (mV/m)
0	790
3.56	787.77
7.01	781.39
10	772.57
20	722.16
30	646.94
40	545.29
50	434.33
60	318.75

PATTERN USED: WPLO measured nighttime directional antenna Pattern Figure 7 dated December 1963 and WPLO Notified C.P. Pattern Figure 4 dated July 1967

EXHIBIT NO. E-40B

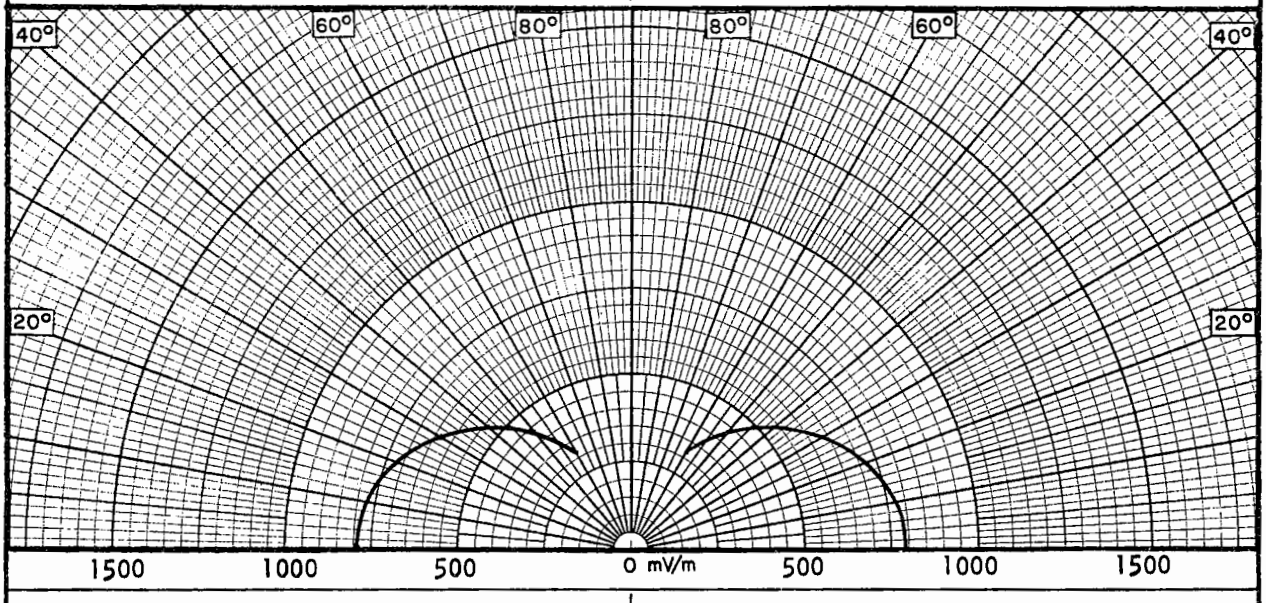
VERTICAL RADIATION PATTERNS FROM WPLO
IN THE DIRECTION OF KTBC, AUSTIN, TEXAS

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



Toward KTBC Point A at 257.63° True
θ_1=3.43° θ_2=6.83°

Toward KTBC Point B at 256.94° True
θ_1=3.38° θ_2=6.77°



Toward KTBC Point C at 255.58° True
θ_1=3.35° θ_2=6.72°

Toward KTBC Point D at 257.52° True
θ_1=3.52° θ_2=6.96°

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1563 South Hudson Phone (303) 756-8456

TABULATION OF WPLO VERTICAL RADIATION PATTERN VALUES IN THE DIRECTION OF KTBC

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

To: KTBC Point A
at 257.63° True

Θ (Degrees)	E (mV/m)
0	790
3.43	787.90
6.83	781.67
10	772.24
20	720.96
30	641.73
40	542.37
50	431.33
60	316.32

To: KTBC Point B
at 256.94° True

Θ (Degrees)	E (mV/m)
0	790
3.38	787.97
6.77	781.88
10	772.37
20	721.43
30	642.59
40	534.50
50	432.48
60	317.08

To: KTBC Point C
at 255.58° True

Θ (Degrees)	E (mV/m)
0	789
3.35	787.04
6.72	781.14
10	771.68
20	721.58
30	643.74
40	545.51
50	434.64
60	319.05

To: KTBC Point D
at 257.52° True

Θ (Degrees)	E (mV/m)
0	790
3.52	787.80
6.96	781.40
10	772.26
20	721.03
30	641.86
40	542.53
50	431.50
60	316.50

PATTERN USED: WPLO measured nighttime directional antenna Pattern Figure 7 dated December 1963 and WPLO Notified C.P. Pattern Figure 4 dated July 1967

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EXHIBIT NO. E-42

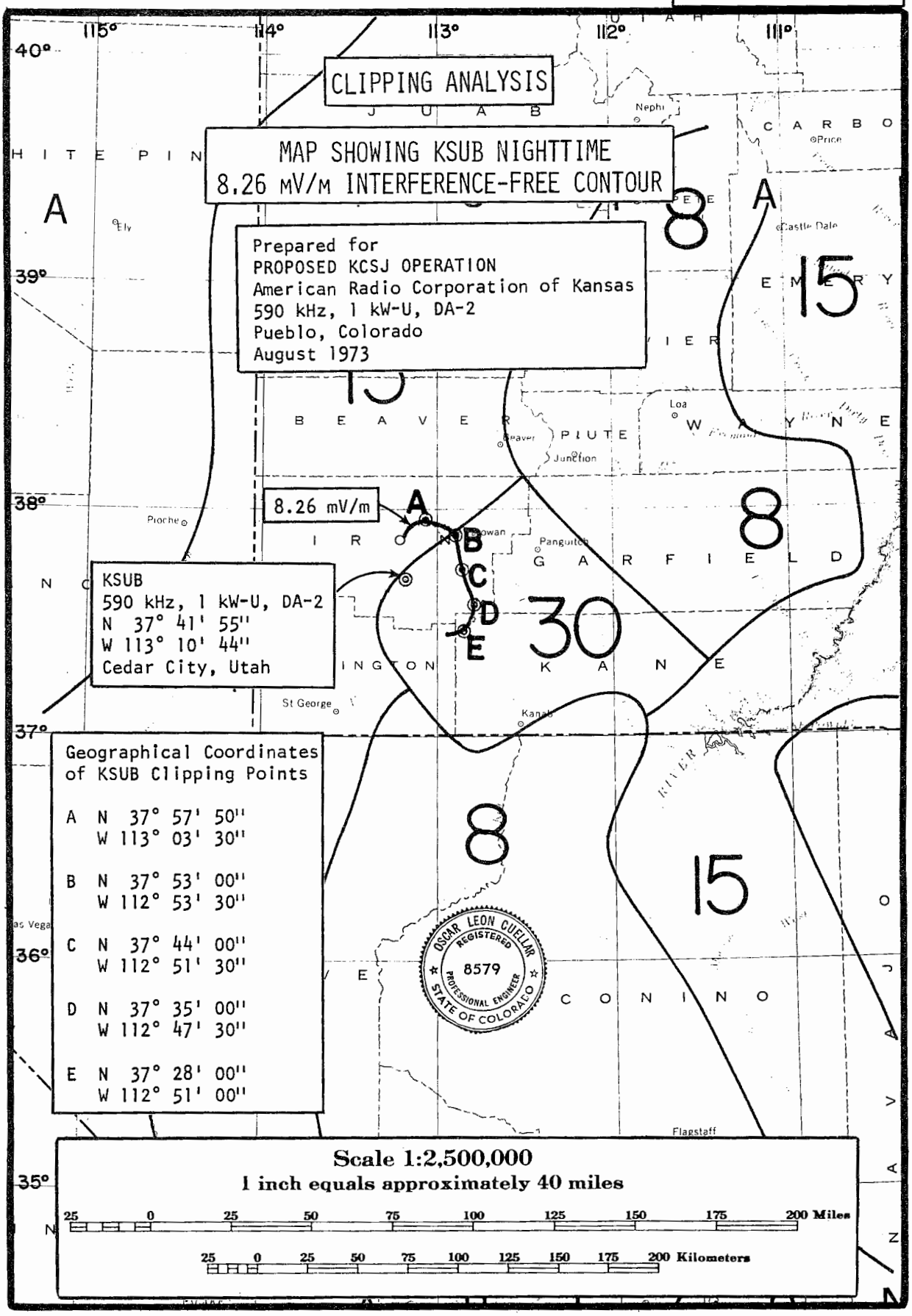

Exhibit No. E- 43

NIGHTTIME LIMITS TO KSUB
CEDAR CITY, UTAH

PREPARED FOR
PROPOSED KCSJ OPERATION
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
AUGUST 1973

TO KSUB

CALL	FROM KHQ	FROM KFXM	FROM XEHQ
Statute Miles	717.3	340.5	611.1
Mid-Point Latitude	42.7	35.9	33.4
Azimuth (Degrees True)	161.28	41.42	348.24
Radiation On Ground mV/m	523.24	136.5	214.33
Min. - Max. Vert. Ang. ($\Delta\theta$)	4.83-8.76	13.3-22.41	6.31-10.95
Max. Rad. Within ($\Delta\theta$) mV/m	516.24	130.83	212.65
Skywave Field	0.0679	0.1668	0.089
Limit	*7.010	*4.3645	3.785

* Nighttime Limit to KSUB; RSS = 8.2576 mV/m

PATTERN USED: KFXM nighttime horizontal directional antenna Pattern No. 460330 adjusted to measured KFXM Pattern Figure No. 11 dated "Received 1-28-48" San Bernardino, Ca.

Note; The value of 8.26 mV/m has been used to plot the KSUB Ground Wave interference-free contour

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
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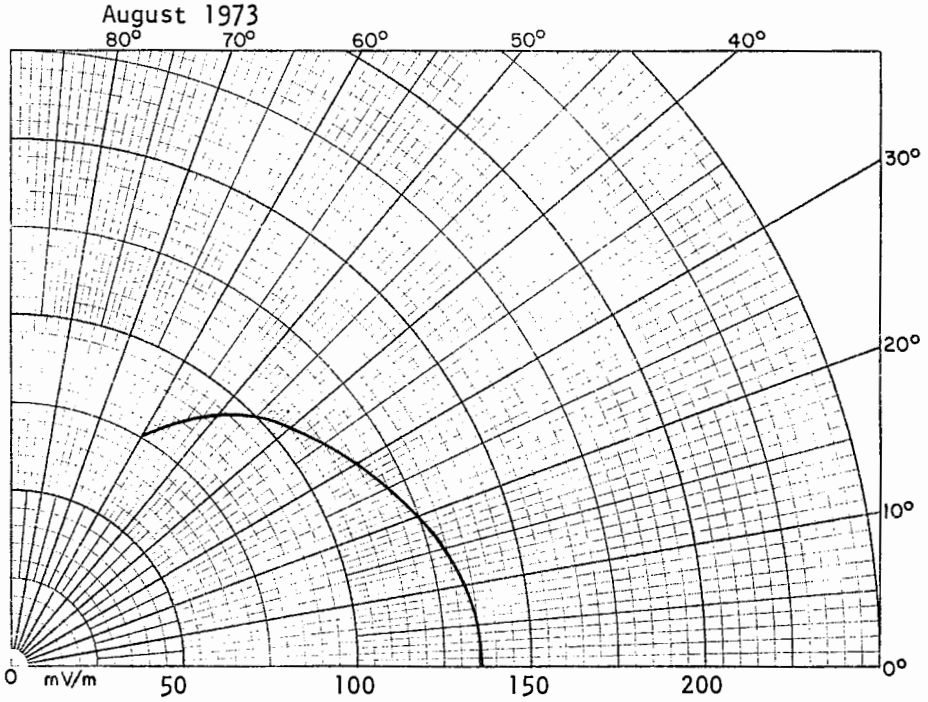
Exhibit No. E-44

VERTICAL RADIATION PATTERN KFXM

Direct Radial to KSUB at 41.42° True

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



KFXM
590 kHz, 1 kW-U, DA-2
San Bernardino, California
August 1973

Vertical Radiation Pattern Values

θ (Degrees)	E (mV/m)
0	136.50
10	133.18
13.3	130.83
20	124.84
22.41	122.48
30	114.95
40	105.23
50	93.56
60	76.16

Pattern Used: KFXM nighttime horizontal directional antenna Pattern No. 460330 adjusted to measured KFXM Pattern Figure No. 11 dated "Received 1-28-48"

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

CLIPPING ANALYSIS FOR KSUB

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

CALL	POINT A KHQ	KFXM	XEHQ	KCSJ	POINT B KHQ	KFXM	XEHQ	KCSJ
Statute Miles	701.6	358.3	627.5	458.2	709.6	360.6	620.3	449.8
Mid-Point Latitude	42.79	36.02	33.51	38.16	42.75	35.98	33.47	38.12
Azimuth Angle	160.35	40.15	349.21	269.20	159.78	41.81	349.92	268.37
Radiation On Ground	523.24	137.5	214.33	151.85	523.24	136.5	214.33	152.62
Min-Max Vert. Angle (Δθ)	5.06-9.08	12.55-21.16	6.05-10.56	9.43-15.95	4.94-8.92	12.46-21.01	6.17-10.73	9.64-16.3
Max Radiation Within (Δθ)	515.59	132.16	212.8	144.05	515.95	131.54	212.73	144.48
Skywave Field	0.0713	0.161	0.085	0.127	0.0698	0.159	0.087	0.131
Limit (mV/m)	*7.352	*4.255	3.618	3.6589	*7.203	*4.183	3.702	3.7854
	*RSS = 8.4945 mV/m				*RSS = 8.329 mV/m			

CALL	POINT C KHQ	KFXM	XEHQ	KCSJ	POINT D KHQ	KFXM	XEHQ	KCSJ
Statute Miles	720.0	354.5	609.7	449.3	731.0	350.1	598.9	447.3
Mid-Point Latitude	42.67	35.90	33.40	38.05	42.60	35.83	33.32	37.97
Azimuth Angle	159.88	43.19	349.9	267.03	159.85	44.83	350.05	265.65
Radiation On Ground	523.24	136	214.33	153.7	523.24	135	214.33	154.56
Min-Max Vert. Angle (Δθ)	4.79-8.71	12.71-21.41	6.33-10.99	9.65-16.32	4.64-8.5	12.89-21.72	6.51-11.26	9.7-16.41
Max Radiation Within (Δθ)	516.38	131.1	212.65	145.52	516.8	130.29	212.55	146.31
Skywave Field	0.0675	0.162	0.0898	0.1312	0.0656	0.163	0.0918	0.1315
Limit (mV/m)	*6.971	*4.248	3.819	3.8184	*6.780	*4.247	3.902	3.848
	*RSS = 8.163 mV/m				*RSS = 8.000 mV/m			

PATTERN USED: KFXM nighttime horizontal directional antenna Pattern No. 460330 adjusted to measured KFXM Pattern Figure No. 11 dated "Received 1-28-48" San Bernardino, Ca.

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Exhibit No. E-45B

NIGHTTIME LIMITS TO KSUB
POINT E

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

TO KSUB POINT E

CALL	FROM KHQ	KFXM	XEHQ	KCSJ
Statute Miles	737.8	342.3	591.6	451.8
Mid-Point Latitude	42.54	35.77	33.26	37.91
Azimuth Angle	160.27	45.46	349.60	264.70
Radiation On Ground	523.24	135	214.33	155.01
Min. - Max. Vert. Angle (Δθ)	4.54-8.37	13.22-22.27	6.63-11.45	9.59-16.22
Max. Radiation Within (Δθ)	517.07	130.18	212.49	146.95
Skywave Field	0.064	0.166	0.0935	0.129
Limit (mV/m)	*6.618	*4.322	*3.973	3.7913

* Nighttime Limit to KSUB Point E; RSS = 8.846 mV/m

KCSJ Values of Radiation are based on the Standard Radiation Pattern

PATTERN USED: KFXM nighttime horizontal directional antenna Pattern No. 460330 adjusted to measured KFXM Pattern Figure No. 11 dated "Received 1-28-48" San Bernardino, Ca.

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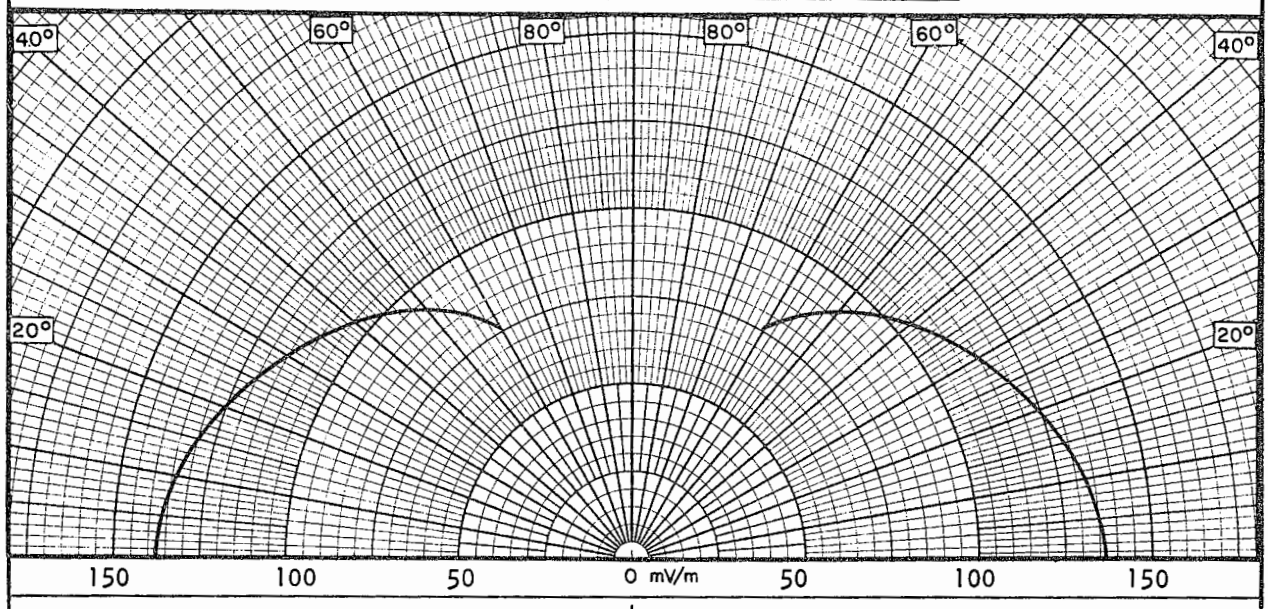
EXHIBIT NO. E-46A

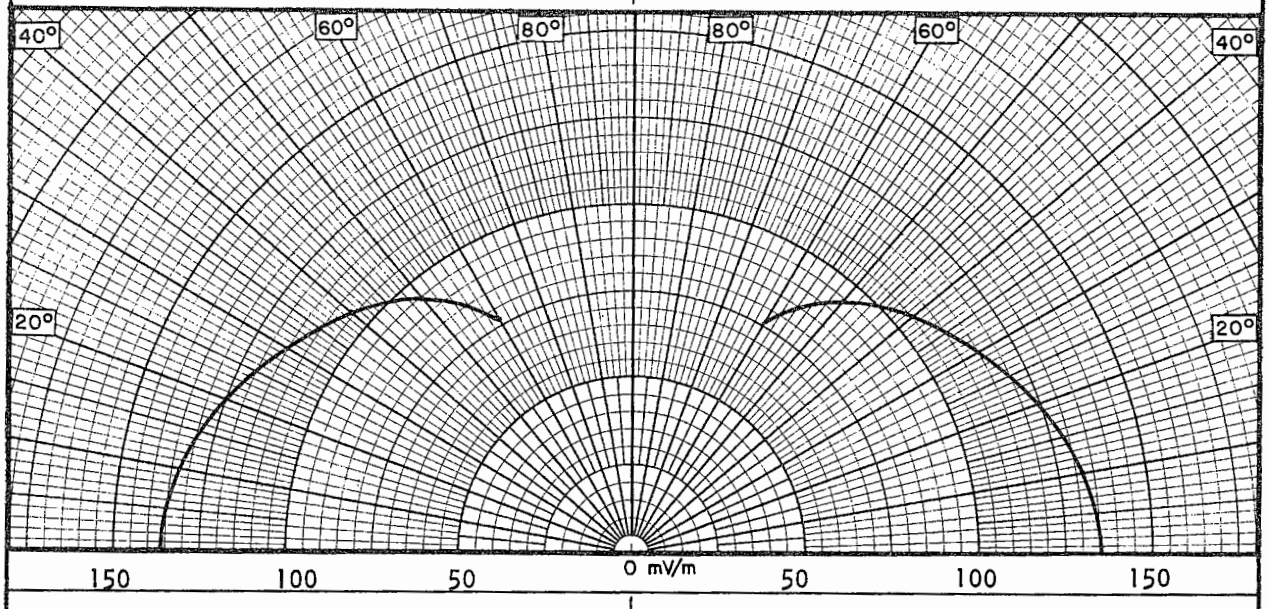
VERTICAL RADIATION PATTERNS FROM KFXM
IN THE DIRECTION OF KSUB, CEDAR CITY, UTAH

Prepared for
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



To KSUB Point A at 40.15° True
Θ_1=12.55° Θ_2=21.16°

To KSUB Point B at 41.81° True
Θ_1=12.46° Θ_2=21.01°



To KSUB Point C at 43.19° True
Θ_1=12.71° Θ_2=21.41°

To KSUB Point D at 44.83° True
Θ_1=12.89° Θ_2=21.72°

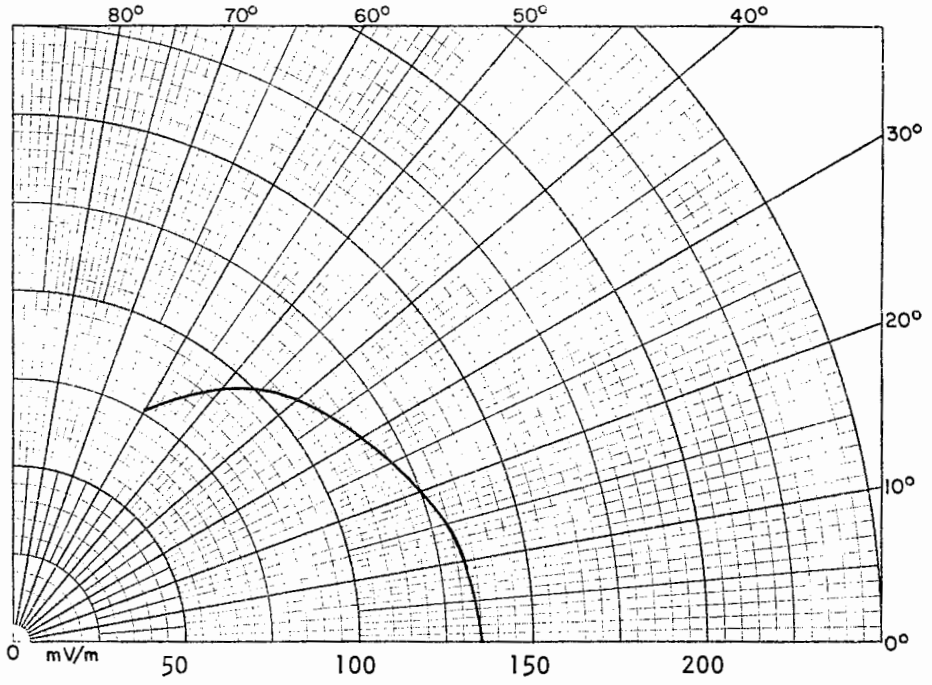
OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

Exhibit No. E-46B

CLIPPING STUDY FOR KSUB

Vertical Radiation Pattern from KFXM in the Direction of Point E at 45.46° True

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



KFXM
590 kHz, 1 kW-U, DA-2
San Bernardino, California
August 1973

Vertical Radiation Pattern Values

Θ (Degrees)	E (mV/m)
0	135.0
10	132.14
13.22	130.18
20	124.95
22.27	123.01
30	116.12
40	106.69
50	94.50
60	76.39

Pattern Used: KFXM nighttime horizontal directional antenna Pattern No. 460330 adjusted to measured KFXM Pattern Figure No. 11 dated "Received 1-28-48"

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

Exhibit No. E-46C

TABULATION OF KFXM VERTICAL RADIATION PATTERN VALUES IN THE DIRECTION OF KSUB

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

To: KSUB Point A
at 40.15° True

Θ (Degrees)	E (mV/m)
0	137.50
10	134.03
12.55	132.16
20	125.30
21.16	124.12
30	115.02
40	105.15
50	93.57
60	76.31

To: KSUB Point B
at 41.81° True

Θ (Degrees)	E (mV/m)
0	136.50
10	133.23
12.46	131.54
20	124.99
21.01	124.02
30	115.19
40	105.49
50	93.76
60	76.27

To: KSUB Point C
at 43.19° True

Θ (Degrees)	E (mV/m)
0	136.0
10	132.90
12.71	131.10
20	125.04
21.41	123.73
30	115.60
40	106.02
50	94.12
60	76.39

To: KSUB Point D
at 44.83° True

Θ (Degrees)	E (mV/m)
0	135.0
10	132.08
12.89	130.29
20	124.72
21.72	123.21
30	115.73
40	106.29
50	94.21
60	76.24

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1563 South Hudson Phone (303) 756-8456

EXHIBIT NO. E-47

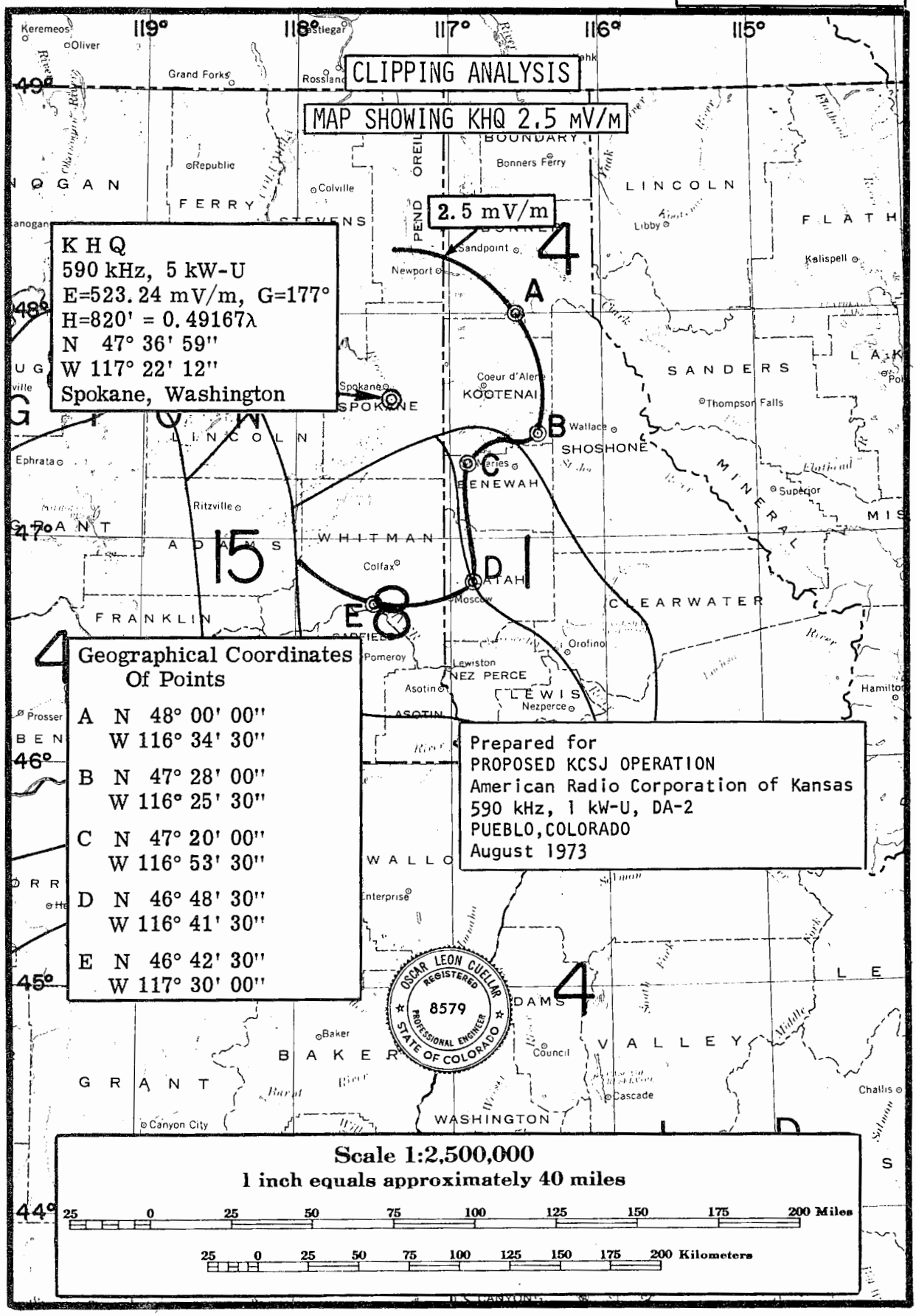


Exhibit No. E-48

NIGHTTIME LIMITS TO KHQ
SPOKANE, WASHINGTON

PREPARED FOR
PROPOSED KCSJ OPERATION
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
AUGUST 1973

TO KHQ DIRECT RADIAL

	FROM		
CALL	KFXM	WOW	KCSJ
Statute Miles	935.9	1135.5	905.2
Mid-Point Latitude	40.84	44.47	42.99
Azimuth Angle	359.79	299.74	319.04
Radiation On Ground	133.75	433.8	109.42
Min. - Max. Vert. Angle ($\Delta\Theta$)	2.34-5.35	0.57-3.04	2.61-5.79
Max. Radiation Within ($\Delta\Theta$)	133.56	433.77	109.17
Skywave Field	0.0357	0.0179	.0394
Limit (mV/m)	*0.9536	*1.553	0.8603

*KFXM nighttime limit RSS = 1.8224 mV/m

PATTERN USED: KFXM nighttime horizontal directional antenna Pattern No. 460330 adjusted to measured KFXM Pattern Figure No. 11 dated "Received 1-28-48" San Bernardino, Ca.

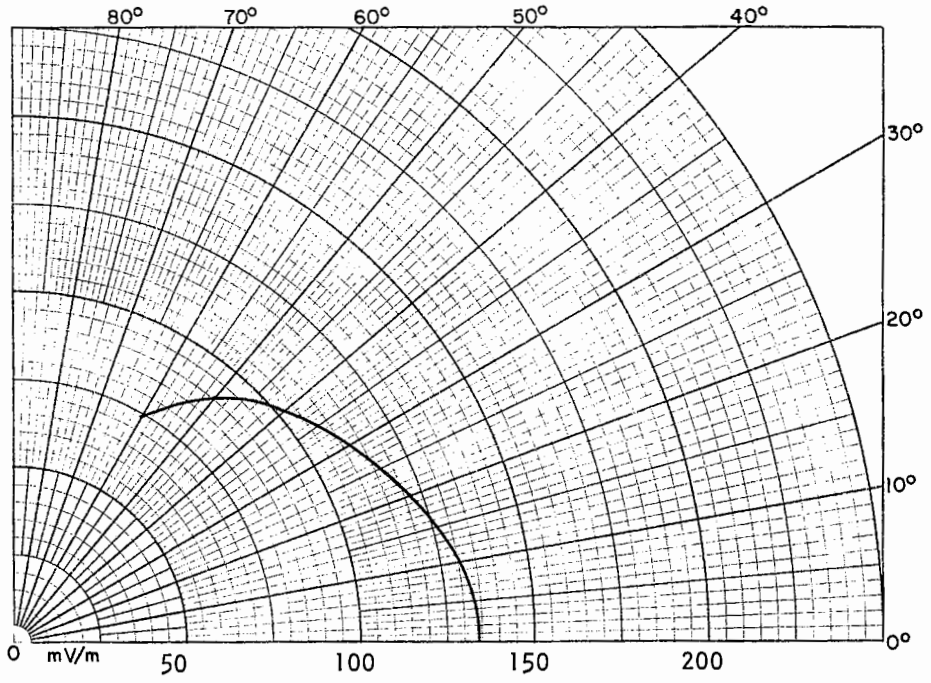
OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

Exhibit No. E-49A

VERTICAL RADIATION PATTERN KFXM

Direct Radial to KHQ at 359.79° True

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



KFXM
590 kHz, 1 kW-U, DA-2
San Bernardino, California
August 1973

Vertical Radiation Pattern Values

Θ (Degrees)	E (mV/m)
0	133.75
2.34	133.56
5.35	133.55
10	130.38
20	121.91
30	111.92
40	102.33
50	91.05
60	74.26

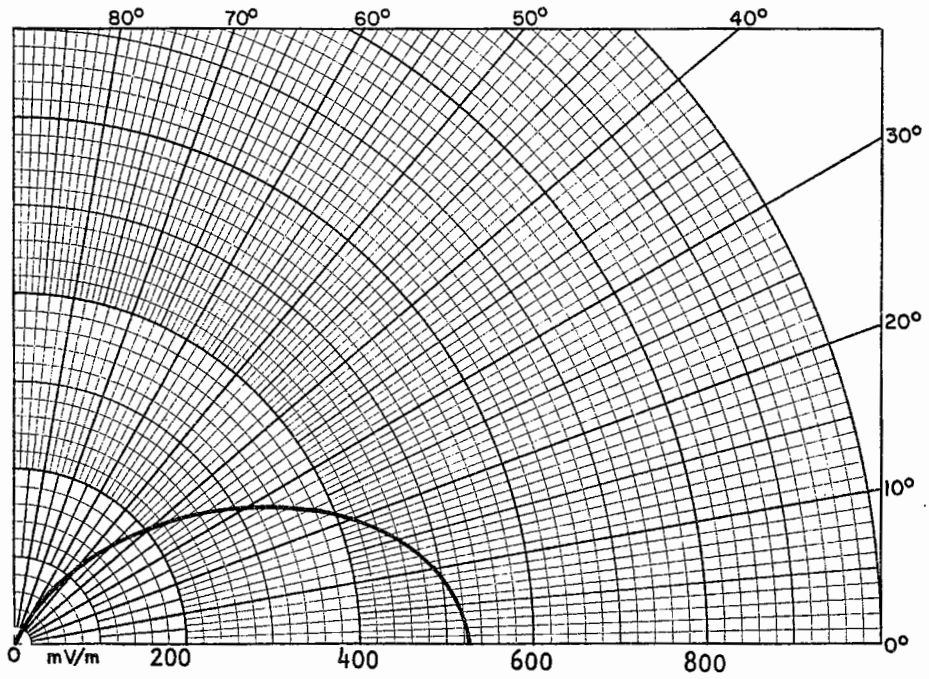
Pattern Used: KFXM nighttime horizontal directional antenna Pattern No. 460330 adjusted to measured KFXM Pattern Figure No. 11 dated "Received 1-28-48"

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

Exhibit No.E-50

VERTICAL RADIATION PATTERN KHQ

Prepared for
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



VERTICAL RADIATION PATTERN
RADIO STATION KHQ
590 KHZ, 5 KW-U
E=523.24 MV/M, G=177 DEGREES
SPOKANE, WASHINGTON
AUGUST 1973

ANGLE	F(V)	FIELD
0	1	523.24
2.61	.99609	521.19
10	.94406	493.97
20	.79361	415.25
30	.59208	309.8
40	.38896	203.52
50	.22128	115.78
60	.10544	55.17
70	.03946	20.65
80	.01024	5.36
90	0	0

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
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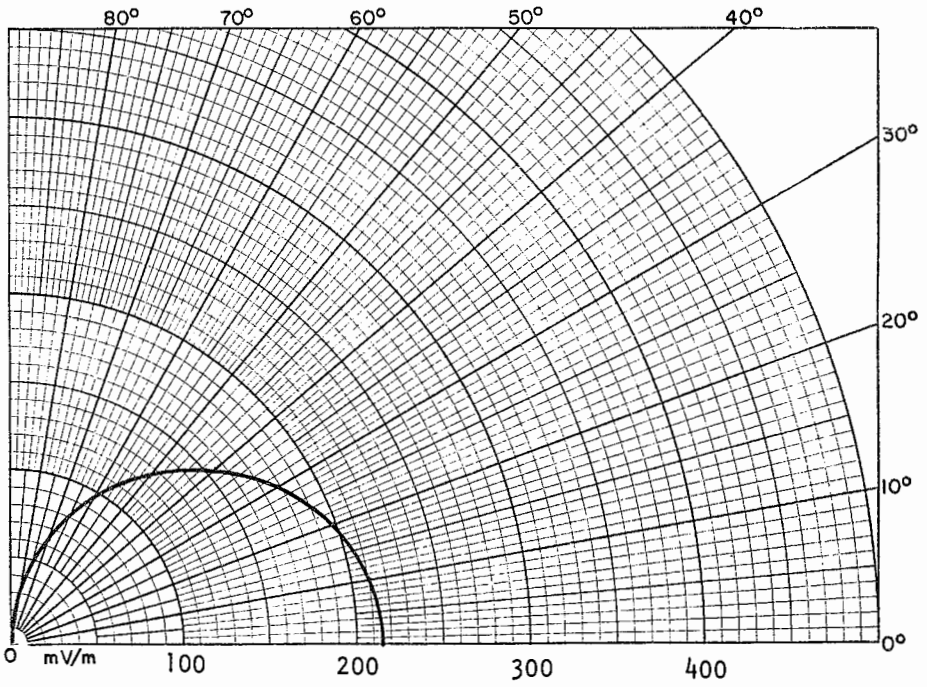
Exhibit No. E-51

VERTICAL RADIATION PATTERN XEHQ

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



RADIO STATION XEHQ
590 kHz, 1.5 kW-U
G = 72.31°, E = 214.33 mV/m
Hermosillo, Sonora, Mexico

VERTICAL RADIATION PATTERN VALUES

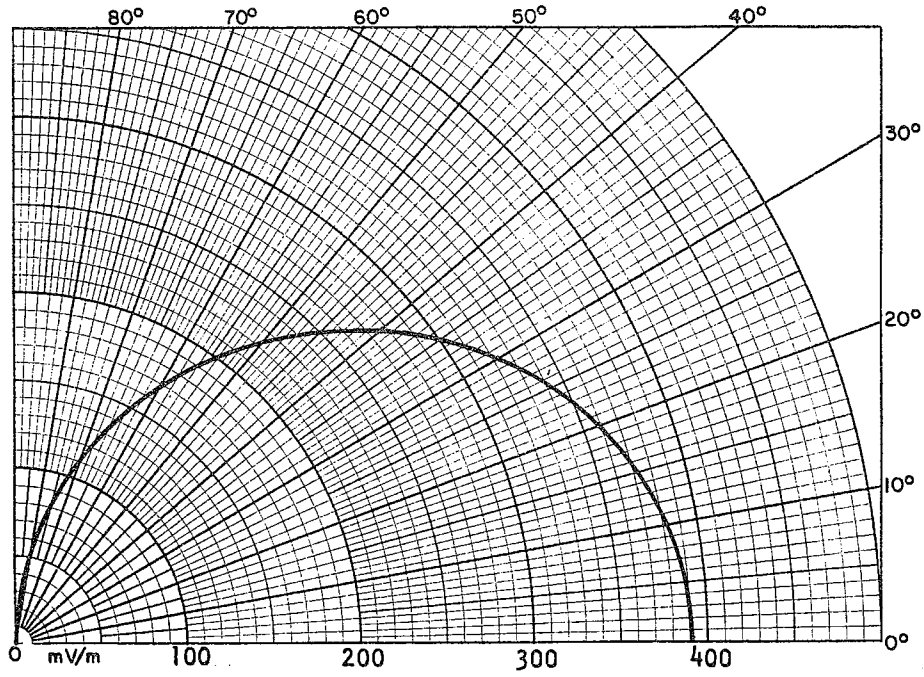
ANGLE	F (V)	FIELD
0	1	214.33
6.63	.99141	212.49
10	.98054	210.16
11.45	.97455	208.87
20	.92396	198.03
30	.83527	179.02
40	.72148	154.63
50	.59017	126.49
60	.44815	96.05
70	.30057	64.42
80	.15064	32.29
90	0	0

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

Exhibit No. E-52

VERTICAL RADIATION PATTERN XEPH

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



RADIO STATION XEPH
590 KHZ, 5 KW-U
G=81.38 DEGREES, E=391.3 MV/M
MEXICO, D.F.

VERTICAL RADIATION PATTERN VALUES

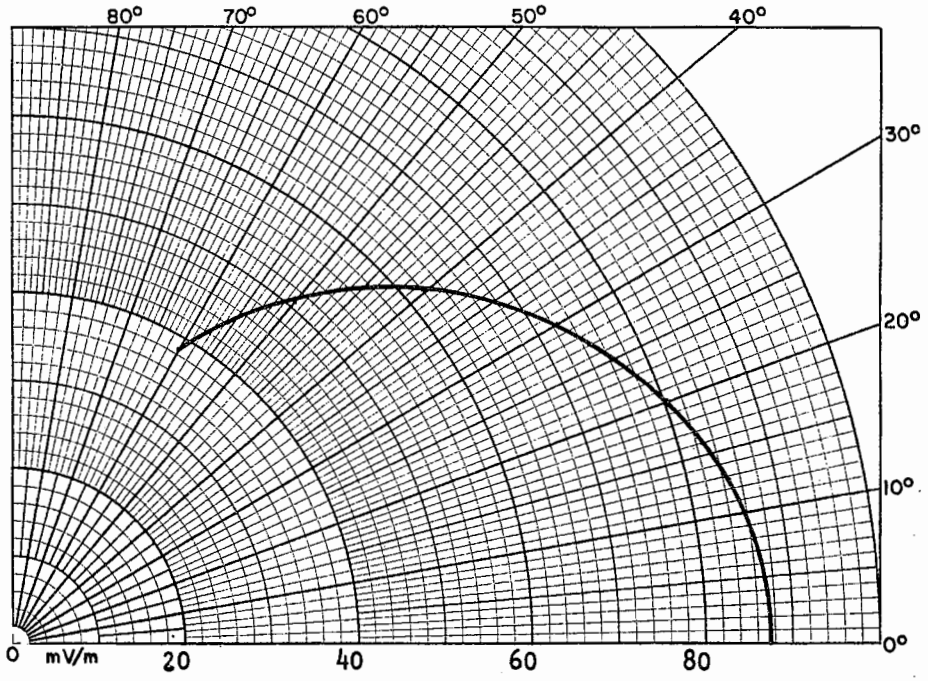
ANGLE	F(V)	FIELD
0	1	391.3
4.25	.99623	389.82
4.51	.99575	389.64
10	.97928	383.19
20	.91935	359.74
30	.82633	323.34
40	.70867	277.3
50	.57523	225.09
60	.43359	169.66
70	.28903	113.1
80	.14427	56.45
90	0	0

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

Exhibit No.E-52A

VERTICAL RADIATION PATTERN XEFD

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



RADIO STATION XEFD
RIO BRAVO, TAMAULIPAS, MEXICO
590 KHZ, 5 KW-D, 250 WATTS-N
E=87.5 MV/M, G=77.28 DEGREES
AUGUST 1973

VERTICAL RADIATION PATTERN VALUES

ANGLE	F(V)	FIELD
0	1	87.5
10	.97987	85.74
12.7	.96771	84.67
20	.92153	80.63
30	.83054	72.67
40	.7147	62.54
50	.58225	50.95
60	.44043	38.54

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CLIPPING ANALYSIS FOR KHQ

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

CALL	POINT A			POINT B		
	KFXM	WOW	KCSJ	KFXM	WOW	KCSJ
Statute Miles	963.1	1107.3	895.5	926.7	1090.3	865.3
Mid-Point Latitude	41.04	44.66	43.18	40.77	44.39	42.91
Azimuth Angle	2.01	301.58	321.89	2.54	299.81	320.44
Radiation On Ground	134.76	433.8	121.35	135	433.8	115.40
Min-Max Vert. Angle (Δθ)	2.1-4.98	0.82-3.32	2.76-5.9	2.42-5.48	0.97-3.49	3.06-6.31
Max Radiation Within (Δθ)	134.59	433.73	121.04	134.78	433.7	114.84
Skywave Field	0.0332	0.0196	.0406	.0370	0.0224	.0445
Limit (mV/m)	0.8937	*1.700	*0.9828	0.9974	*1.943	*1.0221
	*RSS = 1.9636 mV/m			*RSS = 2.195 mV/m		

CALL	POINT C			POINT D		
	KFXM	WOW	KCSJ	KFXM	WOW	KCSJ
Statute Miles	916.6	1109.0	875.5	880.6	1091.4	845.0
Mid-Point Latitude	40.70	44.33	42.85	40.44	44.06	42.58
Azimuth Angle	1.20	299.05	319.02	1.88	297.30	317.56
Radiation On Ground	134.38	433.8	119.34	134.7	433.8	103.56
Min-Max Vert. Angle (Δθ)	2.51-5.62	0.8-3.3	2.95-6.17	2.91-6.1	0.96-3.48	3.26-6.6
Max Radiation Within (Δθ)	134.15	433.73	109.02	134.38	433.7	103.19
Skywave Field	.0380	0.0197	.0428	0.0426	0.0223	.0475
Limit (mV/m)	*1.0195	*1.7089	0.9332	*1.1449	*1.9343	0.9803
	*RSS = 1.9899 mV/m			*RSS = 2.2477 mV/m		

PATTERN USED: KFXM nighttime horizontal directional antenna Pattern No. 460330 adjusted to measured KFSM Pattern Figure No. 11 dated "Received 1-28-48" San Bernardino, Ca.

Exhibit No. E-53A

Exhibit No. E-53B

CLIPPING ANALYSIS
POINT E

PREPARED FOR
PROPOSED KCSJ OPERATION
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
AUGUST 1973

TO KHQ

	POINT E		
CALL	KFXM	WOW	KCSJ
Statute Miles	873.2	1127.3	870.8
Mid-Point Latitude	40.39	44.01	42.53
Azimuth Angle	359.36	296.53	315.60
Radiation On Ground	133.57	433.8	96.33
Min. - Max. Vert. Angle (Δθ)	2.98-6.2	0.64-3.12	3.0-6.23
Max. Radiation Within (Δθ)	133.26	433.76	96.03
Skywave Field	0.0435	0.0183	.0436
Limit (mV/m)	*1.1594	*1.5876	0.8374

*Nighttime limit to KHQ Point E; RSS = 1.9659 mV/m

PATTERN USED: KFXM nighttime horizontal directional antenna Pattern No. 460330 adjusted to measured KFXM Pattern Figure No. 11 dated "Received 1-28-48" San Bernardino, Ca.

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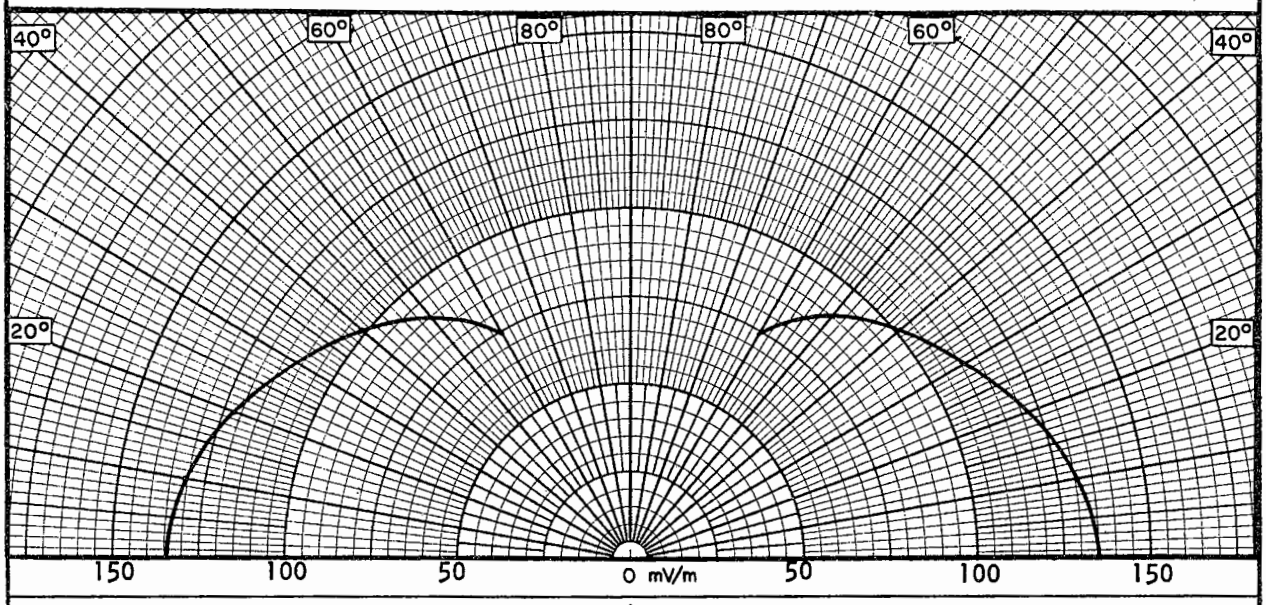
EXHIBIT NO. E-54A

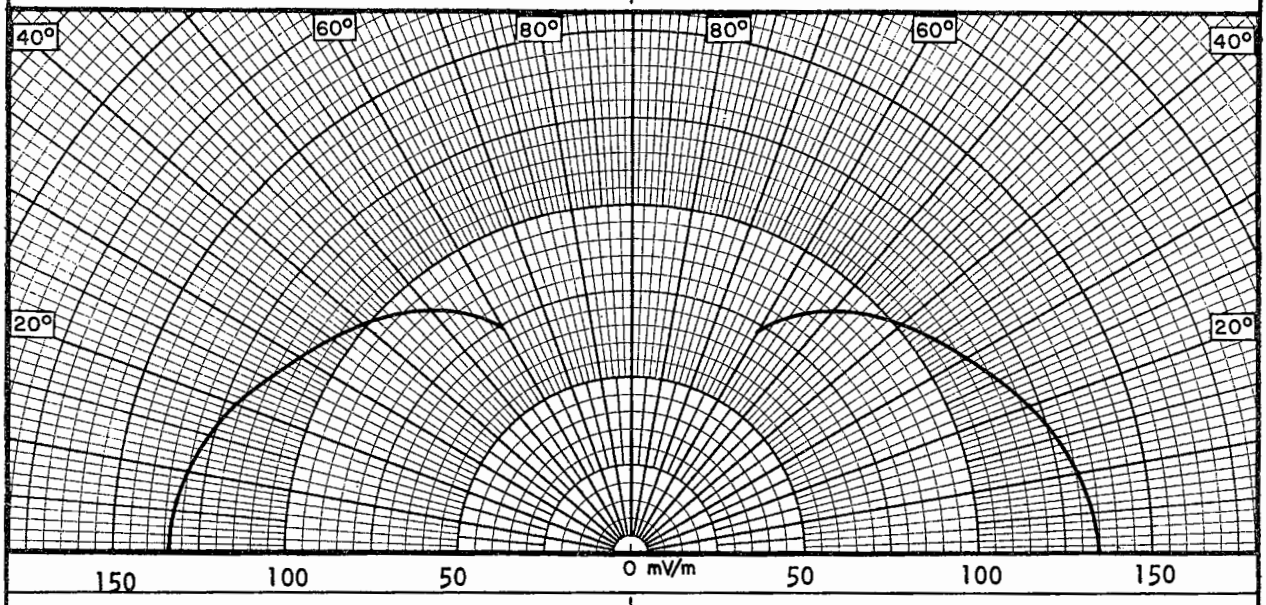
VERTICAL RADIATION PATTERNS FROM KFXM
IN THE DIRECTION OF KHQ, SPOKANE, WASHINGTON

Prepared for
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



Toward KHQ Point A at 2.01° True
θ_1=2.1° θ_2=4.98°

Toward KHQ Point B at 2.54° True
θ_1=2.42° θ_2=5.48°



Toward KHQ Point C at 1.2° True
θ_1=2.51° θ_2=5.62°

Toward KHQ Point D at 1.88° True
θ_1=2.91° θ_2=6.1°

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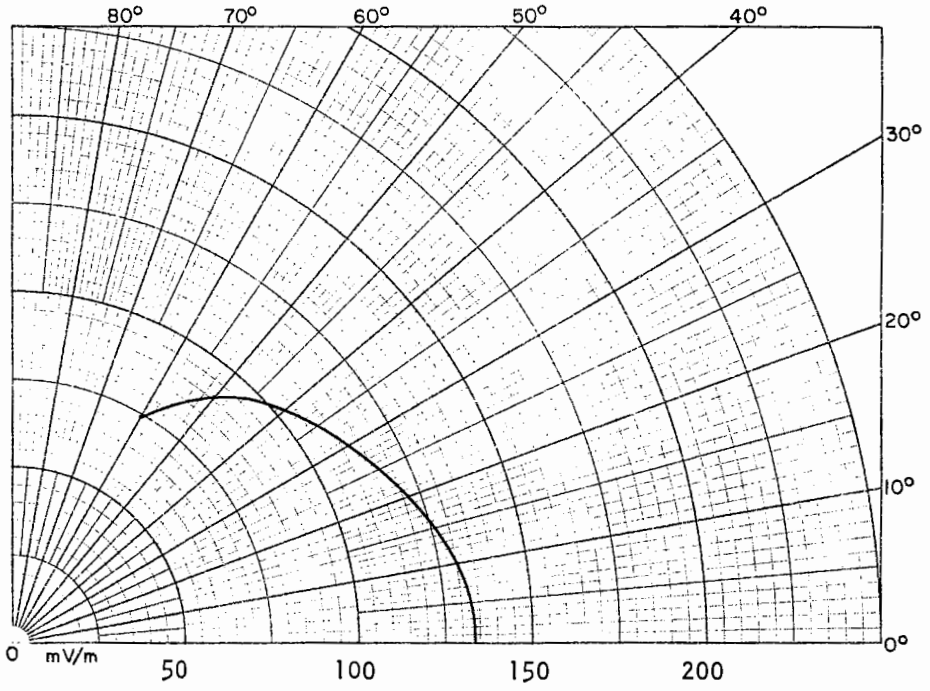
VERTICAL RADIATION PATTERN KFXM

In The Direction of KHQ Point E at 359.36° True

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



KFXM
590 kHz, 1 kW-U, DA-2
San Bernardino, California
August 1973

Vertical Radiation Pattern Values

Θ	E
0	133.57
2.98	133.26
6.2	132.25
10	130.24
20	121.89
30	112.02
40	102.47
50	91.15
60	74.29

Pattern Used: KFXM nighttime horizontal directional antenna pattern No. 460330 adjusted to measured KFXM Pattern Figure No. 11 dated "Received 1-28-48"

Exhibit No. E-55

TABULATION OF KFXM VERTICAL RADIATION PATTERN VALUES IN THE DIRECTION OF KHQ SPOKANE, WASHINGTON

Prepared For
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

To: KHQ Point A
at 2.01° True

Θ (Degrees)	E (mV/m)
0	134.76
2.1	134.59
4.98	133.83
10	131.14
20	122.08
30	111.49
40	101.67
50	90.57
60	74.10

To: KHQ Point B
at 2.54° True

Θ (Degrees)	E (mV/m)
0	135
2.42	134.78
5.48	133.87
10	131.34
20	122.14
30	111.41
40	101.53
50	90.47
60	74.06

To: KHQ Point C
at 1.2° True

Θ (Degrees)	E (mV/m)
0	134.38
2.51	134.15
5.62	133.23
10	130.85
20	122.01
30	111.64
40	101.90
50	90.74
60	74.16

To: KHQ Point D
at 1.88° True

Θ (Degrees)	E (mV/m)
0	134.70
2.91	134.38
6.10	133.32
10	131.1
20	122.07
30	111.52
40	101.71
50	90.60
60	74.11

PATTERN USED: KFXM nighttime theoretical antenna pattern Dated 460330 and KFXM measured Pattern Figure 11 dated (Rec'd. 1-28-48)

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1563 South Hudson Phone (303) 756-8456

NIGHTTIME LIMITS TO KFXM
SAN BERNARDINO, CALIFORNIA

Prepared for
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

TO KFXM

	FROM		
CALL	KHQ	KUGN	XEHQ
Statute Miles	935.9	758.3	511.0
Mid-Point Latitude	40.8	39.1	31.6
Azimuth (Degrees True)	Non-Dir.	154.04	Non-Dir.
Radiation on Ground mV/m	523.24	241.5	214.33
Min. - Max. Vert. Ang. ($\Delta\Theta$)	2.34-5.35	4.27-8.0	8.14-13.92
Max. Rad. Within ($\Delta\Theta$) mV/m	521.6	240.4	211.56
Skywave Field	0.0359	0.0714	0.1127
Limit	*3.745	*3.433	*4.768

*KFXM Nighttime Limit RSS = 7.010 mV/m

Present KCSJ Limit to KFXM = 1.1685 mV/m

Proposed KCSJ Limit to KFXM = 1.7818 mV/m

PATTERNS USED: KUGN Theoretical Nighttime Notified C.P. Pattern (R & C - 9/49) Adjusted to KUGN Measured Nighttime Pattern (3-28-61)

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
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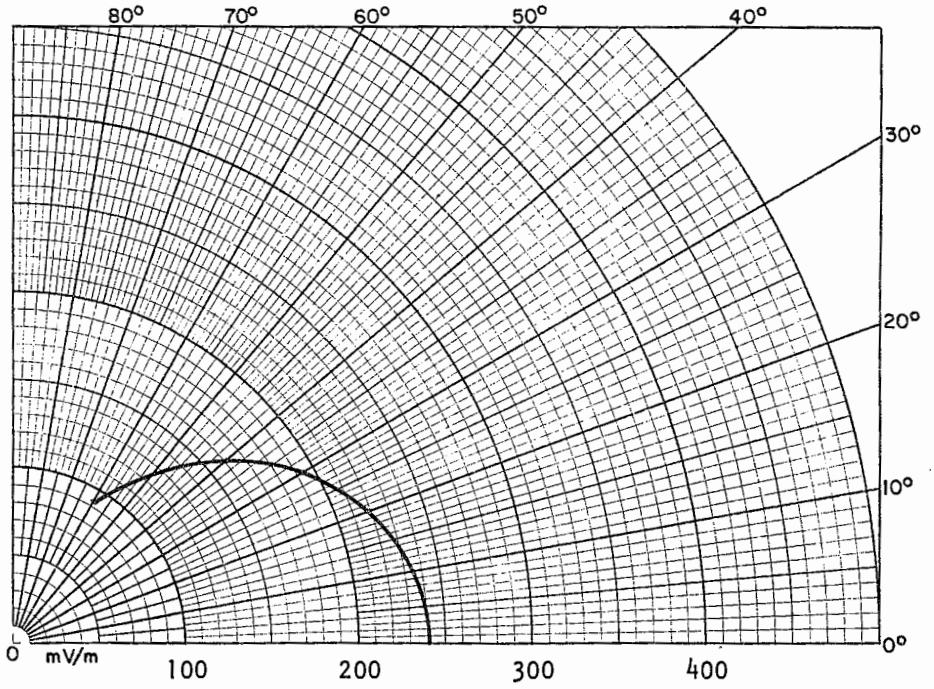
VERTICAL RADIATION PATTERN KUGN

Direct Radial to KFXM at 154.04° True

Prepared for
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973



KUGN
590 kHz, 5 kW-D, 1kW-N, DA-N
Eugene, Oregon

Tabulation of Vertical Radiation Pattern Values

Θ (Degrees)	E (mV/m)
0	241.5
4.27	240.4
8.0	237.7
10	235.6
20	219.7
30	193.8
40	161.3
50	126.8
60	92.1

PATTERN USED: KUGN Theoretical Nighttime Notified C.P. Pattern (R & C - 9/49) Adjusted to KUGN Measured Nighttime Pattern (3-28-61)

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

NIGHTTIME LIMITS TO KTHO
SOUTH LAKE TAHOE, CALIFORNIA

Prepared for
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

TO KTHO

CALL	FROM KHQ	FROM KUGN	FROM KSUB
Statute Miles	615	392.4	377.3
Mid-Point Latitude	43.3	41.5	38.3
Azimuth (Degrees True)	Non-Dir.	154.75	284.98
Radiation on Ground mV/m	523.24	243	211.5
Min. - Max. Vert. Ang. ($\Delta\theta$)	6.25-10.86	11.31-19.09	11.83-19.96
Max. Rad. Within ($\Delta\theta$)	511.61	235.4	208.7
Skywave Field	0.0880	0.148	0.1530
Limit	*9.004	*6.9678	*6.386

*KTHO Nighttime Limit RSS=13.05 mV/m

Present KCSJ limit to KTHO = 0.2891 mV/m

Proposed KCSJ limit to KTHO = 1.3807 mV/m

PATTERNS USED: KUGN Theoretical Nighttime Notified C.P. Pattern (R & C - 9/49)
Adjusted to KUGN Measured Nighttime Pattern (3-28-61)

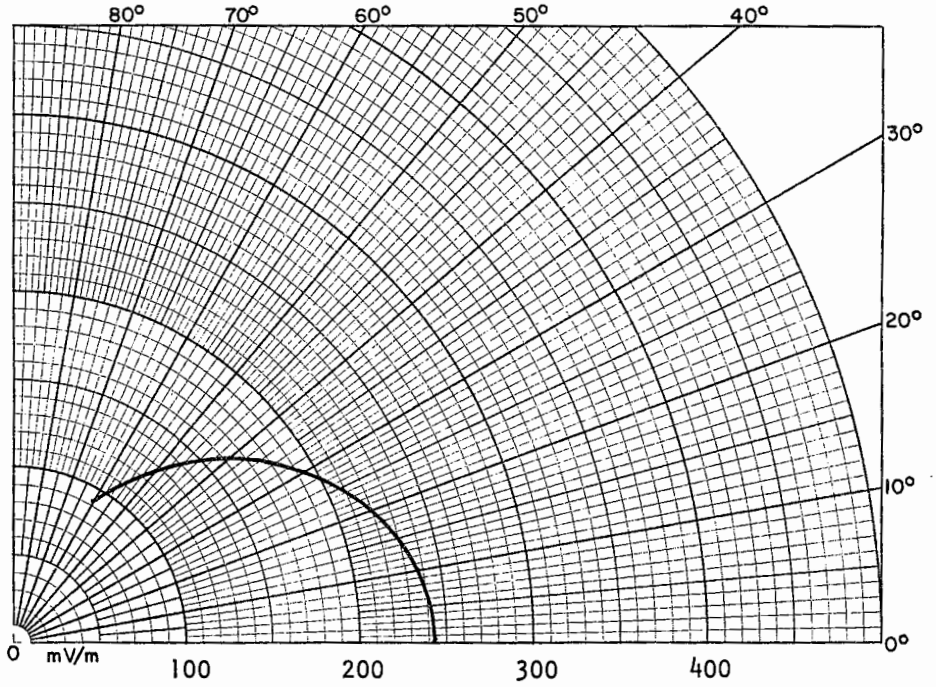
KSUB Theoretical Nighttime Pattern Figure 1 (R & C - 10/45)
Adjusted to KSUB Measured Nighttime Pattern Figure 2 dated
February 10, 1950

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

VERTICAL RADIATION PATTERN KUGN

Direct Radial to KTHO at 154.75° True

Prepared for
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973



KUGN
590 kHz, 5 kW-D, 1 kW-N, DA-N
Eugene, Oregon

Tabulation of Vertical Radiation Pattern Values

Θ (Degrees)	E (mV/m)
0	243
10	237.1
11.31	235.4
19.09	222.0
20	220.0
30	194.1
40	162.2
50	127.5
60	92.5

PATTERN USED: KUGN Theoretical Nighttime Notified C.P. Pattern (R & C - 9/49) Adjusted to KUGN Measured Nighttime Pattern (3-28-61)

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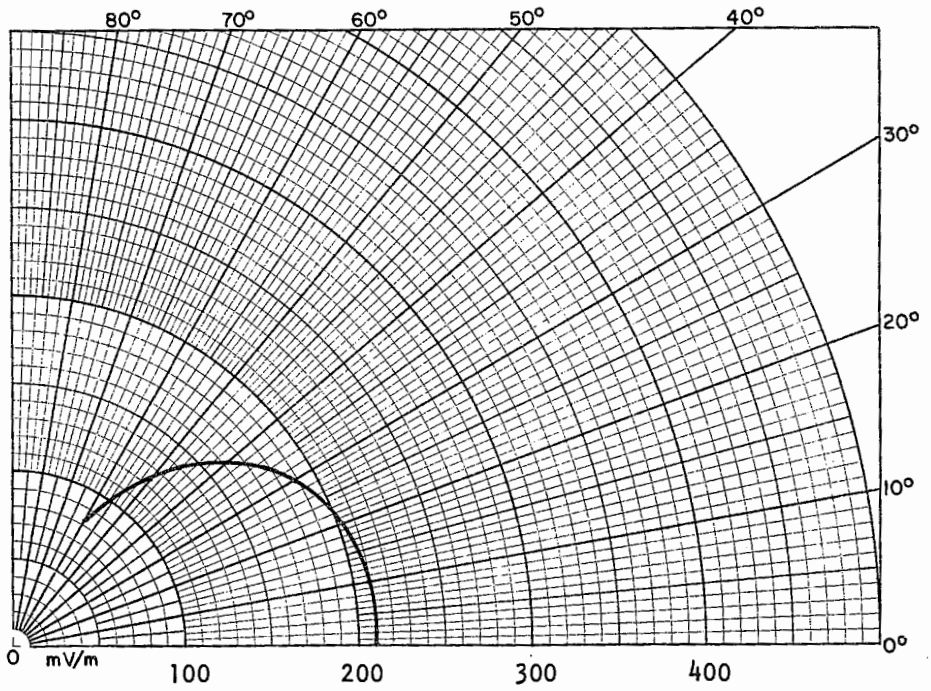
1563 South Hudson Phone (303) 756-8456

VERTICAL RADIATION PATTERN KSUB

Direct Radial to KTHO at 284.98° True

Prepared for
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973



KSUB
590 kHz, 1 kW-U, DA-N
Cedar City, Utah

Tabulation of Vertical Radiation Pattern Values

Θ (Degrees)	E (mV/m)
0	211.5
10	209.5
11.83	208.7
19.96	202.6
20	202.5
30	187.5
40	161.9
50	125.4
60	82.2

PATTERN USED: KSUB Theoretical Nighttime Pattern Figure 1 (R & C - 10/45) adjusted to KSUB Measured Nighttime Pattern Figure 2 dated February 10, 1950

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1563 South Hudson Phone (303) 756-8456

Exhibit No. E-58

NIGHTTIME LIMITS TO KID
IDAHO FALLS, IDAHO

PREPARED FOR
PROPOSED KCSJ OPERATION
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
AUGUST 1973

TO KID

CALL	FROM KHQ	FROM WOW
Statute Miles	384.5	825.3
Mid-Point Latitude	45.6	42.4
Azimuth (Degrees True)	Non-Dir.	Non-Dir.
Radiation On Ground mV/m	523.24	433.8
Min. - Max. Vert. Ang. ($\Delta\Theta$)	11.58-19.53	3.47-6.89
Max. Rad. Within ($\Delta\Theta$)	484.35	432.54
Skywave Field	0.147	0.0502
Limit	*14.24	4.343

*KID Nighttime Limit = 14.24 mV/m

Present KCSJ limit to KID = 2.975 mV/m

Proposed KCSJ limit to KID = 2.0651 mV/m

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1563 South Hudson Phone (303) 756-8456

Exhibit No. E-59

NIGHTTIME LIMITS TO WRTH
WOOD RIVER, ILLINOIS

PREPARED FOR
PROPOSED KCSJ OPERATION
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
AUGUST 1973

TO WRTH

CALL	FROM WOW
Statute Miles	353.2
Mid-Point Latitude	40.1
Azimuth (Degrees True)	Non-Dir.
Radiation On Ground mV/m	433.8
Min. - Max. Vert. Ang. ($\Delta\theta$)	12.76-21.5
Max. Rad. Within ($\Delta\theta$)	417.07
Skywave Field	0.163
Limit	*13.596

*WRTH Nighttime Limit = 13.596

Present KCSJ limit to WRTH = 0.9086 mV/m

Proposed KCSJ limit to WRTH = 0.7121 mV/m

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1563 South Hudson Phone (303) 756-8456

Exhibit No. E-60

NIGHTTIME LIMITS TO XEE
DURANGO, DURANGO, MEXICO

PREPARED FOR
PROPOSED KCSJ OPERATION
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
AUGUST 1973

TO XEE

CALL	FROM XEPH
Statute Miles	476.9
Mid-Point Latitude	--
Azimuth (Degrees True)	Non-Dir.
Radiation On Ground mV/m	391.3
Min. - Max. Vert. Ang. ($\Delta\Theta$)	12.14
Max. Rad. Within ($\Delta\Theta$)	379.4
Skywave Field	0.1361
Limit	*10.327

*XEE Nighttime Limit = 10.327 mV/m

KCSJ Present limit to XEE = 1.891 mV/m

KCSJ Proposed limit to XEE = 1.9569 mV/m

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1563 South Hudson Phone (303) 756-8456

Exhibit No. E-61

NIGHTTIME LIMITS TO XEFD
RIO BRAVO, TAMAULIPAS, MEXICO

PREPARED FOR
PROPOSED KCSJ OPERATION
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
AUGUST 1973

TO XEFD	FROM
CALL	XEPH
Statute Miles	459.4
Mid-Point Latitude	--
Azimuth (Degrees True)	Non-Dir.
Radiation On Ground mV/m	391.3
Min. - Max. Vert. Ang. ($\Delta\theta$)	12.7
Max. Rad. Within ($\Delta\theta$)	378.3
Skywave Field	0.1424
Limit	*10.774

*XEFD Nighttime Limit = 10.774 mV/m

KCSJ Present limit to XEFD = 2.191 mV/m

KCSJ Proposed limit to XEFD = 2.5357 mV/m

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1563 South Hudson Phone (303) 756-8456

Exhibit No. E-62

NIGHTTIME LIMITS TO XEPH
MEXICO, D.F.

PREPARED FOR
PROPOSED KCSJ OPERATION
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO
AUGUST 1973

TO XEPH

	FROM		
CALL	KTBC	XEFD	XEHQ
Statute Miles	754.5	459.4	998.1
Mid-Point Latitude	--	--	--
Azimuth (Degrees True)	187.38	Non-Dir.	Non-Dir.
Radiation On Ground mV/m	122	87.5	214.33
Min. - Max. Vert. Ang. ($\Delta\theta$)	6.11	12.7	2.9
Max. Rad. Within ($\Delta\theta$)	121	84.67	213.98
Skywave Field	0.0611	0.1424	0.0330
Limit	1.4786	*2.4114	1.4123

*XEPH Nighttime Limit = 2.4114 mV/m

KCSJ Present nighttime limit to XEPH = 0.7738 mV/m
KCSJ Proposed nighttime limit to XEPH = 0.8895 mV/m

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

STATEMENT OF METHOD AND BASIS USED
IN DETERMINING LOCATION OF CONTOURS

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Inverse Distance Field Values for Plotting Day and Nighttime Coverage Contours were taken from Proposed Standard Radiation Pattern Values E $(\phi,\theta)_{std}$ Exhibits No. E-8 and E-18

Ground Conductivity Source: FCC M3 Map 1960 Edition

PROPOSED KCSJ OPERATION

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
0	15	0-117.5
	8	Beyond 117.5
10	15	0-120
	8	Beyond 120
20	15	0-127
	8	Beyond 127
30	15	0-197
	8	197-244
	4	Beyond 244
40	15	All
50	15	All
57.2	15	All
60	15	All
61.7	15	All
70	15	All
80	15	0-211.5
	30	Beyond 211.5
90	15	0-222
	30	Beyond 222
100	15	0-227
	30	Beyond 227
110	15	0-199
	30	Beyond 199
120	15	0-189
	30	189-299
	15	Beyond 299
130	15	0-196
	30	196-294
	15	Beyond 294
140	15	0-217
	30	Beyond 217
150	15	0-247
	30	247-333
	15	333-403
	30	Beyond 403
160	15	All
170	15	0-401
	8	Beyond 401
180	15	0-83
	2	83-105
	15	105-243
	8	Beyond 243

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1563 South Hudson Phone (303) 756-8456

September 1973
AMERICAN RADIO CORPORATION OF KANSAS
Radio Station KCSJ
Pueblo, Colorado

Ground Conductivity Source (continued)

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
190	15	0-58.5
	2	58.5-143
	15	Beyond 143
200	15	0-46
	2	Beyond 46
210	15	0-37
	8	37-54.5
	2	54.5-87
	4	87-113
	2	113-147
	4	147-194
	15	Beyond 194
220	15	0-33.5
	8	33.5-58
	2	58-75
	4	75-115
	2	115-141
	4	141-197
	15	Beyond 197
230	15	0-31
	8	31-55.5
	4	55.5-111.5
	2	111.5-140
	4	140-204
	15	Beyond 204
240	15	0-30
	8	30-54
	4	54-108
	2	108-146
	4	Beyond 146
250	15	0-30
	8	30-56
	4	56-98
	2	98-169
	4	Beyond 169
260	15	0-31
	8	31-60.5
	4	60.5-82
	2	82-171
	4	Beyond 171
270	15	0-32.5
	8	32.5-68.5
	2	68.5-167
	15	Beyond 167
280	15	0-35
	8	35-76.5
	2	76.5-151.5
	8	151.5-180
	15	Beyond 180
290	15	0-38
	8	38-87
	2	87-160
	8	Beyond 160
300	15	0-43
	8	43-96
	2	Beyond 96
310	15	0-50
	8	50-107
	2	Beyond 107
320	15	0-63
	8	63-128
	2	Beyond 128
330	15	0-112
	8	112-163
	2	Beyond 163
340	15	0-114
	8	114-195
	2	Beyond 195

September 1973
AMERICAN RADIO CORPORATION OF KANSAS
Radio Station KCSJ
Pueblo, Colorado

Ground Conductivity Source (continued)

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
345	15	0-115
	8	115-193
	15	Beyond 193
350	15	0-115
	8	115-278
	15	Beyond 278

Present KCSJ Operation

Inverse Distance Field Used:

Azimuth °T	E mV/m	Azimuth °T	E mV/m
349	173.81	249-89	108.42
339-359	170.43	239-99	147.78
329-9	160.28	229-109	183.29
319-19	143.44	219-119	213.93
309-29	120.14	209-129	239.08
299-39	90.81	199-139	258.50
289-49	56.19	189-149	272.19
279-59	17.40	179-159	280.30
269-69	24.10	169	282.99
259-79	66.64		

Values taken from the KCSJ Notified C.P. Directional Antenna Pattern Docket No. 6814 and Enclosed Herein as Exhibit No. E-65

Ground Conductivity Source: FCC M3 Map 1960 Edition

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
9 -179	15	All
189	15	0-62
	2	Beyond 62
199	15	0-48
	2	Beyond 48
209	15	0-39
	8	39-48
	2	Beyond 48
219	15	0-34.5
	8	34.5-54.5
	2	Beyond 54.5
229	15	0-32
	8	32-56
	2	56-67
	4	Beyond 67
239	15	0-30

Ground Conductivity Source (continued)

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
249	15	0-30
	8	30-55
	4	Beyond 55
259	15	0-305
	8	Beyond 30.5
269	15	0-32.5
	8	Beyond 32.5
279	15	All
289	15	0-39
	8	Beyond 39
299	15	0-44
	8	Beyond 44
309	15	0-51
	8	Beyond 51
319	15	0-64
	8	Beyond 64
329	15	All
339	15	0-118.5
	8	Beyond 118.5
349	15	0-120
	8	Beyond 120
359	15	All

Radio Station WOW
590 kHz, 5 kW-U
Omaha, Nebraska

Inverse Distance Field Used: 433.8 mV/m at one mile for 5 kW (194 mV/m at 1 kW) taken from the FCC Official List

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
140	15	0-31
	30	31-83
	15	Beyond 83
150	15	0-35
	30	35-93.5
	15	Beyond 93.5
160	15	0-43.5
	30	Beyond 43.5
170	15	0-67
	30	Beyond 67
174-195	15	All
200	15	0-26.5
	30	26.5-38
	15	38-133.5
	30	Beyond 133.5
210	15	0-23
	30	23-47.5
	15	47.5-163.5
	30	Beyond 163.5
220	15	0-21.5
	30	21.5-63
	15	63-179
	30	Beyond 179

September 1973
AMERICAN RADIO CORPORATION OF KANSAS
Radio Station KCSJ
Pueblo, Colorado

Ground Conductivity Source (continued)

Radio Station WOW (continued)

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
230	15	0-21.5
	30	21.5-79
	15	79-174
	30	174-315
	15	Beyond 315
240	15	0-23
	30	23-93
	15	93-150
	30	150-291
	15	Beyond 291
250	15	0-24.5
	30	24.5-113
	15	113-136
	30	136-268
	15	Beyond 268
260	15	0-28.5
	30	28.5-102.5
	15	102.5-128.5
	30	128.5-255
	15	Beyond 255
265	15	0-31
	30	31-90
	15	90-126
	30	126-252
	15	252-370
	8	Beyond 370
270	15	0-36
	30	36-77
	15	77-125.5
	30	Beyond 125.5
276-360	15	All

Radio Station KTBC
590 kHz, 5 kW-D, 1 kW-N, DA-N
Austin, Texas

Inverse Distance Field Used:

Daytime Operation

420 mV/m at one mile for 5 kW (188 mV/m at one kW) taken from the Official List

Nighttime Operations

Bearing °T	E mV/m	Bearing °T	E mV/m
220	224	290	284
230	230	300	334
240	220	310	356
250	195	320	337
260	167	330	286
270	164	340	197
280	195		

September 1973
AMERICAN RADIO CORPORATION OF KANSAS
Radio Station KCSJ
Pueblo, Colorado

Ground Conductivity Source (continued)

Radio Station KTBC (continued)

Values taken from KLBJ measured Nighttime Directional Antenna Pattern Dated 640710 and Enclosed Herein on Exhibit No. E-66

Ground Conductivity Source: FCC M3 Map 1960 Edition

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
220	15	All
230	15	0-16.5
	8	Beyond 16.5
240	15	0-13
	8	Beyond 13
250	15	0-10.5
	8	Beyond 10.5
270	15	0-9
	8	Beyond 9
280	15	0-8
	8	Beyond 8
290	15	0-8
	8	Beyond 8
300	15	0-8.5
	8	Beyond 8.5
310	15	0-9
	8	Beyond 9
320	15	0-10
	8	10-239
	30	239-291
	15	Beyond 291
330	15	0-12
	8	12-100
	15	100-206
	8	206-224
	30	Beyond 224
340	15	0-13
	8	13-83
	15	83-213
	30	213-309
	15	309-408
	30	Beyond 408
260	15	0-9.5
	8	Beyond 9.5

Radio Station KSUB
590 kHz, 1 kW-U, DA-N
Cedar City, Utah

Inverse Distance Field Used:

Daytime

180 mV/m at one mile

September 1973
AMERICAN RADIO CORPORATION OF KANSAS
Radio Station KCSJ
Pueblo, Colorado

Ground Conductivity Source (continued)

Radio Station KSUB (continued)

Nighttime

Bearing °T	E mV/m	Bearing °T	E mV/m
0	146	80	162
10	197	100	180
20	220	110	204
25	222	120	217
30	220	125	220
40	207	130	217
50	184	140	197
60	168		

Values taken from the KSUB Measured Antenna Radiation Pattern Dated 2-28-50 Enclosed Herein as Exhibit No. E-67

Ground Conductivity Source: FCC M3 Map 1960 Edition

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
0	30	0-3
	8	Beyond 3
10	30	0-4
	8	Beyond 4
20	30	0-5
	8	Beyond 5
25	30	0-6
	8	Beyond 6
30	30	0-7
	8	Beyond 7
40	30	0-13
	8	Beyond 13
50	30	All
60	30	All
67	30	0-50
	8	50-115
	15	115-277
	8	Beyond 277
70	30	All
80	30	All
86	30	0-61
	8	61-139
	15	139-179
	4	Beyond 179
90	30	All
100	30	All
102.5	30	0-89
	8	89-96.5
	15	96.5-307
	4	Beyond 307
110-140	30	All

September 1973
AMERICAN RADIO CORPORATION OF KANSAS
Radio Station KCSJ
Pueblo, Colorado

Ground Conductivity Source (continued)

Radio Station KHQ
590 kW, 5 kW-U
Spokane, Washington

Inverse Distance Field Used: 523.24 mV/m at one mile for 5 kW (234 mV/m for 1 kW)

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
0-100	4	All
110	4	0-24
	1	Beyond 24
120	4	0-20
	1	Beyond 20
130	4	0-17.5
	1	Beyond 17.5
140	4	0-16
	8	16-29.5
	1	Beyond 29.5
150	4	0-15
	8	15-40.5
	1	Beyond 40.5
160	4	0-15
	8	Beyond 15
170	4	0-15.5
	8	Beyond 15.5
180	4	0-16.5
	8	Beyond 16.5
190	4	0-18
	8	Beyond 18
200	4	0-21.5
	8	Beyond 21.5
210	4	0-27
	8	Beyond 27

Radio Station KID
590 kHz, 5 kW-D, 1 kW-N, DA-N
Idaho Falls, Idaho

Inverse Distance Field Used: 418.1 mV/m at one mile for 5 kW (187 mV/m for 1 kW) Taken from the FCC Official List

Ground Conductivity Sourse: FCC M3 Map 1960 Edition

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
125	8	0-52
	2	52-72
	8	72-88
	15	88-281
	2	Beyond 281

September 1973
AMERICAN RADIO CORPORATION OF KANSAS
Radio Station KCSJ
Pueblo, Colorado

Ground Conductivity Source (continued)

Radio Station KID (continued)

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
132	8	0-99
	15	99-194
	8	194-202
	15	202-284
	8	284-319
	2	Beyond 319
138.5	8	0-117
	15	117-172
	8	172-232
	15	232-276
	8	276-335
	2	Beyond 335

Radio Station KUBC
580 kHz, 5 kW-D, 1 kW-N, DA-N
Montrose, Colorado

Inverse Distance Field Used: 420 mV/m at one mile for 5 kW (180 for 1 kW)
Taken from FCC Official List

Ground Conductivity Sourse: FCC Figure M3 Map 1960 Edition

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
40	15	0-8
	8	8-41
	2	Beyond 41
60	15	0-9
	8	9-23
	2	Beyond 23
90	15	0-11
	2	Beyond 11
110-130	15	0-11
	2	Beyond 11

Radio Station KDAV
580 kHz, 0.5 kW-D, DA-D
Lubbock, Texas

Inverse Distance Field Used:

Azimuth °T	E (mV/m)
330	150
340	148
350	137

Values Taken from the KDAV Measured Antenna Radiation Pattern FCC File No. BL-5108 Enclosed Herein as Exhibit No. E-68

September 1973
AMERICAN RADIO CORPORATION OF KANSAS
Radio Station KCSJ
Pueblo, Colorado

Ground Conductivity Source (continued)

Radio Station KDAV (continued)

Ground Conductivity Source: FCC Figure M3 Map 1960 Edition

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
330	15	0-53
	30	53-98
	15	Beyond 98
340	15	0-48
	30	48-115
	15	Beyond 115
350	15	0-44
	30	Beyond 44

Radio Station KIIX
600 kHz, 1 kW-D, DA-D
Fort Collins, Colorado

Inverse Distance Field Used:

Azimuth °T	E mV/m	Azimuth °T	E mV/m
101	122	180.5	37
125	60	205	60
149.5	36	229	122
165	39		

Values taken from KIIX (Formerly KZIX) Measured Pattern dated March 1968 and enclosed herein as Exhibit No. E-69

Ground Conductivity Source: FCC Figure M3 Map 1960 Edition

True Azimuth Degrees	Ground Conductivity Zone mS/m	Zone Miles
101	8	All
125	8	All
149.5*	20	0-20
	8	Beyond 20
165*	20	0-20
	8	20-38
	15	Beyond 38
180.5*	20	0-20
	8	Beyond 20
205	8	All
229*	10	0-7
	5	7-13
	2	13-16.5
	8	Beyond 16.5

* Measured Radials taken from the KIIX Proof-of-Performance 11-30-66

September 1973
AMERICAN RADIO CORPORATION OF KANSAS
Radio Station KCSJ
Pueblo, Colorado

Ground Conductivity Source (continued)

Computation of Contours

All distances to field intensity contours were computed using graphs No. 2 and 3 of Section 73.184 of the FCC Rules. Where a signal traversed a path over which different values of ground conductivity were involved, the equivalent distance method of computation as outlined in Section 73.183 (e) and (f) of the FCC Rules was used. The values of soil conductivity shown in the proof of performance of Radio Station KIIX were used for plotting the portion of the KIIX 0.5 mV/m contour. These values of soil conductivity were used because they greatly differ from those values shown in Figure M3 of the Rules.

DISTANCE TO COVERAGE CONTOURS
IN MILES BY AZIMUTH

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Proposed KCSJ Daytime Operation

Azimuth °T	0.025 mV/m Miles	0.5 mV/m Miles	2 mV/m Miles	5 mV/m Miles	25 mV/m Miles
0	277.5	107.6	46	22.7	5.25
10	266.5	100	41.6	20	4.64
20	217	87	34.9	16.3	3.64
30	250.5	71	26.3	11.9	2.62
40	226	51	17.2	7.4	1.54
50	182	32.9	9.9	4.2	0.88
57.2	167	27.6	8	3.4	0.69
60	169	28.3	8.3	3.5	0.72
70	198	38.3	12.3	5.18	1.08
80	241.5	55.1	19	8.2	1.80
90	286	74.3	28.1	12.9	2.85
100	326.5	94	38.2	18.1	4.10
110	374	112.5	48.2	24.3	5.60
120	382	127.5	58	29.8	7.20
130	398	141	66.5	34.9	8.70
140	437	151.5	73	39	10.10
150	418	157.5	78.2	42.5	11.10
160	403	162	80.7	44.5	11.80
170	405	163.5	82	45	12.20
180	329	162.5	81	44.5	11.80
190	256	86.7	64	42.8	11.35
200	194.7	75.5	53.8	40.1	10.30
210	217	77.5	56.5	37	9.40
220	217	78.1	54.9	33.7	8.42
230	217	82.4	52.2	31.5	7.74
240	212.9	79.7	49.9	29.8	7.20
250	196	80.2	48.8	28.9	6.90
260	194	86.1	48.2	28.2	6.70
270	189	77.9	47.7	27.3	6.45
280	199	81.9	46.6	26.1	6.15
290	196	87.4	45.7	24.3	5.72
300	164	85.5	45	22.3	5.15
310	165	84.6	43.3	21.2	4.91
320	182.7	89.2	43.4	21.2	4.91
330	211	106.5	45.5	22.1	5.14

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DISTANCE TO COVERAGE CONTOURS (continued)

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Proposed KCSJ Daytime Operation (continued

Azimuth °T	0.025 mV/m Miles	0.5 mV/m Miles	2 mV/m Miles	5 mV/m Miles	25 mV/m Miles
340	248	110	47.3	23.3	5.46
345	302	112	47.9	23.9	5.60
350	281	112	47.9	23.9	5.60

Proposed Nighttime KCSJ Operation

Azimuth °T	4 mV/m Miles	9.8 mV/m Miles	25 mV/m	Azimuth °T	4 mV/m Miles	9.8 mV/m Miles	25 mV/m
0	38.6	18.8	8.1	250	28.5	13.3	5.6
10	36.8	17.8	7.55	260	29.6	14.1	5.8
20	32.9	15.6	6.55	270	28.9	13.6	5.7
30	26.6	12.3	5.15	280	26.3	12.2	5.1
40	18.9	8.45	3.52	290	21.8	9.87	4.1
50	10.4	4.48	1.83	300	17.3	7.59	3.15
60	2.52	1.03	0.41	310	17.2	7.55	3.14
61.7	1.27	0.52	0.2	320	23	10.3	4.27
70	6.52	2.83	1.14	330	29.7	14.0	5.96
80	12.4	5.4	2.23	340	35.3	16.8	7.12
90	17.9	7.96	3.34	350	38.1	18.6	7.92
100	24.0	10.8	4.48				
110	30.1	14.2	6.0				
120	36.6	17.5	7.42				
130	42.2	21.0	8.80				
140	47.3	23.7	10.3				
150	50.02	25.6	11.4				
160	51.5	26.3	11.8				
170	50.1	25.9	11.5				
180	48	24.3	10.7				
190	43.4	21.8	9.6				
200	37.6	18.2	7.8				
210	31.4	14.8	6.2				
220	26.5	12.3	5.14				
230	25.1	11.5	4.8				
240	26.6	12.2	5.14				

DISTANCE TO COVERAGE CONTOURS (continued)

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Radio Station WOW
590 kHz, 5 kW-U
Omaha, Nebraska

Azimuth °T	0.025 mV/m Miles	0.5 mV/m Miles	2.5 mV/m Miles
140	- -	- -	95
150	- -	- -	94.5
160	- -	- -	97
170	- -	- -	89.5
180	- -	- -	85.4
190	- -	206.5	83
200	- -	201.5	85.4
210	- -	193.5	88.4
220	513	193	92
230	478	201.5	95.5
240	484	115	99.4
250	488	228	101.5
260	483	225.5	99.5
265	448.5	221	97
270	- -	214.5	90
280	- -	- -	83
290	- -	- -	83
300	- -	- -	83
310	- -	- -	83
320	- -	- -	83
330			
330	- -	- -	83
340	- -	- -	83
350	- -	- -	83

Radio Station KTBC
590 kHz, 5 kW-D, 1 kW-N, DA-N
Austin, Texas

Azimuth °T	0.025 mV/m Miles	0.5 mV/m Miles	9.531 mV/m Miles
220	- -	- -	19.4
230	- -	- -	19.5
240	- -	- -	18.1

DISTANCE TO COVERAGE CONTOURS (continued)

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Radio Station KTBC (continued

Azimuth °T	0.025 mV/m Miles	0.5 mV/m Miles	9.531 mV/m Miles
250	- -	- -	16.4
260	- -	- -	14.1
270	- -	- -	14
280	- -	- -	16
290	- -	- -	21.2
300	- -	- -	23.83
310	- -	- -	25
320	355	125.9	24.2
330	423	137	21.8
340	417	147	17

Radio Station KSUB
590 kHz, 1 kW-U, DA-N
Cedar City, Utah

Azimuth °T	0.025 mV/m Miles	0.5 mV/m Miles	8.26 mV/m Miles
0	- -	- -	13.8
10	- -	- -	17.7
20	- -	- -	19.2
25	- -	- -	19.5
30	- -	- -	19.4
40	- -	- -	20.1
50	- -	- -	20.2
60	- -	- -	18.7
67	314.5	102.5	- -
80	- -	- -	18
86	270	107.5	- -
100	- -	- -	20.2
102.5	346	135.5	- -
110	- -	- -	22.3
120	- -	- -	23.4
125	- -	- -	23.8
130	- -	- -	23.4
140	- -	- -	21.6

DISTANCE TO COVERAGE CONTOURS (continued)

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Radio Station KHQ
590 kHz, 5 kW-U
Spokane, Washington

Azimuth °T	2.5 mV/m Miles	Azimuth °T	2.5 mV/m Miles
0	45.7	110	34.0
10	45.7	120	31.6
20	45.7	130	29.6
30	45.7	140	36.0
40	45.7	150	47.1
50	45.7	160	62.5
60	45.7	170	62.2
70	45.7	180	61.8
80	45.7	190	61.0
90	45.7	200	59.3
100	45.7	210	56.3

Radio Station KID
590 kHz, 5 kW-D, 1 kW-N, DA-N
Idaho Falls, Idaho

Azimuth °T	0.025 mV/m Miles	0.5 mV/m Miles
125	291	128
132	353	137
138.5	339	121.5

Radio Station KUBC
580 kHz, 5 kW-D, 1 kW-N, DA-N
Montrose, Colorado

Azimuth °T	0.5 mV/m Miles	Azimuth °T	0.5 mV/m Miles
40	77.7	110	60.85
60	67.9	120	60.85
90	60.8	130	60.85
100	60.85		

DISTANCE TO COVERAGE CONTOURS (continued)

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Radio Station KDAV
580 kHz, 0.5 kW-D, DA-D
Lubbock, Texas

Azimuth °T	0.5 mV/m Miles
330	119.8
340	130.2
350	130.7

Radio Station KIIX
600 kHz, 1 kW-D, DA-D
Fort Collins, Colorado

Azimuth °T	0.5 mV/m Miles
101	68.5
125	47.8
149.5	38.7
165	41.3
180.5	39.2
205	47.8
229	63.0

Prepared for
Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

STANDARD BROADCAST STATIONS
CONSIDERED IN THE INSTANT REPORT
590 kHz CHANNEL

Call	City	State	Coordinates
KHAR	Anchorage	AK	N 61° 11' 07" W 149° 52' 10"
KBHS	Hot Springs	AR	N 34° 28' 20" W 92° 54' 35"
KFXM	San Bernardino	CA	N 34° 04' 18" W 117° 17' 50"
KTHO	South Lake Tahoe	CA	N 38° 55' 00" W 119° 57' 46"
WDLP	Panama City	FL	N 30° 10' 20" W 85° 36' 49"
WPLO	Atlanta	GA	N 33° 49! 34" W 84° 18' 56"
KGMB	Honolulu	HI	N 21° 17' 59" W 157° 51' 33"
KID	Idaho Falls	ID	N 43° 33' 35" W 111° 55' 15"
WRTH	Wood River	IL	N 38° 55' 43" W 90° 05' 08"
WVLK	Lexington	KY	N 38° 06' 42" W 84° 34' 36"
WEEI	Boston	MA	N 42° 24' 24" W 71° 05' 14"
WJMS	Ironwood	MI	N 46° 25' 25" W 90° 12' 30"
WKZO	Kalamazoo	MI	N 42° 21' 00" W 85° 33' 43"
WOW	Omaha	NB	N 41° 19' 00" W 95° 59' 52"

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Standard Broadcast Stations (continued)

Call	City	State	Coordinates
WROW	Albany	NY	N 42° 36' 41" W 73° 47' 10"
WGTM	Wilson	NC	N 35° 43' 04" W 78° 03' 33"
KUGN	Eugene	OR	N 44° 05' 48" W 123° 04' 18"
WARM	Scranton	PA	N 41° 28' 47" W 75° 52' 54"
WMBS	Uniontown	PA	N 39° 51' 35" W 79° 44' 44"
KTBC	Austin	TX	N 30° 14' 14" W 97° 37' 44"
KSUB	Cedar City	UT	N 37° 41' 55" W 113° 10' 44"
WLVA	Lynchburg	VA	N 37° 25' 39" W 79° 13' 23"
KHQ	Spokane	WA	N 47° 36' 59" W 117° 22' 12"
XEE	Durango (Dgo.)	MEX	N 24° 00' 04" W 104° 38' 44"
XEFD	Rio Bravo (Tams.)	MEX	N 25° 58' 36" W 98° 03' 15"
XEHQ	Hermosillo (Son.)	MEX	N 29° 03' 35" W 110° 54' 35"
XEPH	Mexico (D.F.)	MEX	N 19° 24' 00" W 99° 06' 23"
CFNL	Fort Nelson, B.C.	CAN	N 58° 48' 51" W 122° 42' 32"

Proposed KCSJ Operation
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973

Standard Broadcast Stations (continued)

Call	City	State	Coordinates
CFTK	Terrace, B.C.	CAN	N 54° 30' 05" W 128° 30' 50"
CFAR	Flin Flon, Manitoba	CAN	N 54° 48' 04" W 101° 51' 09.5"
VOCM	St. John's, Nfld.	CAN	N 47° 32' 38" W 52° 46' 44"
CKEY	Toronto, Ontario	CAN	N 43° 36' 33" W 79° 23' 20"
CKRS	Jonquiere, Quebec	CAN	N 48° 22' 15" W 71° 10' 20"
	580 kHz Channel		
KUBC	Montrose	CO	N 38° 25' 39.4" W 107° 52' 58"
KDAV	Lubbock	TX	N 33° 32' 00" W 101° 49' 14"
	600 kHz Channel		
KIIX	Ft. Collins	CO	N 40° 33' 52" W 105° 01' 15"

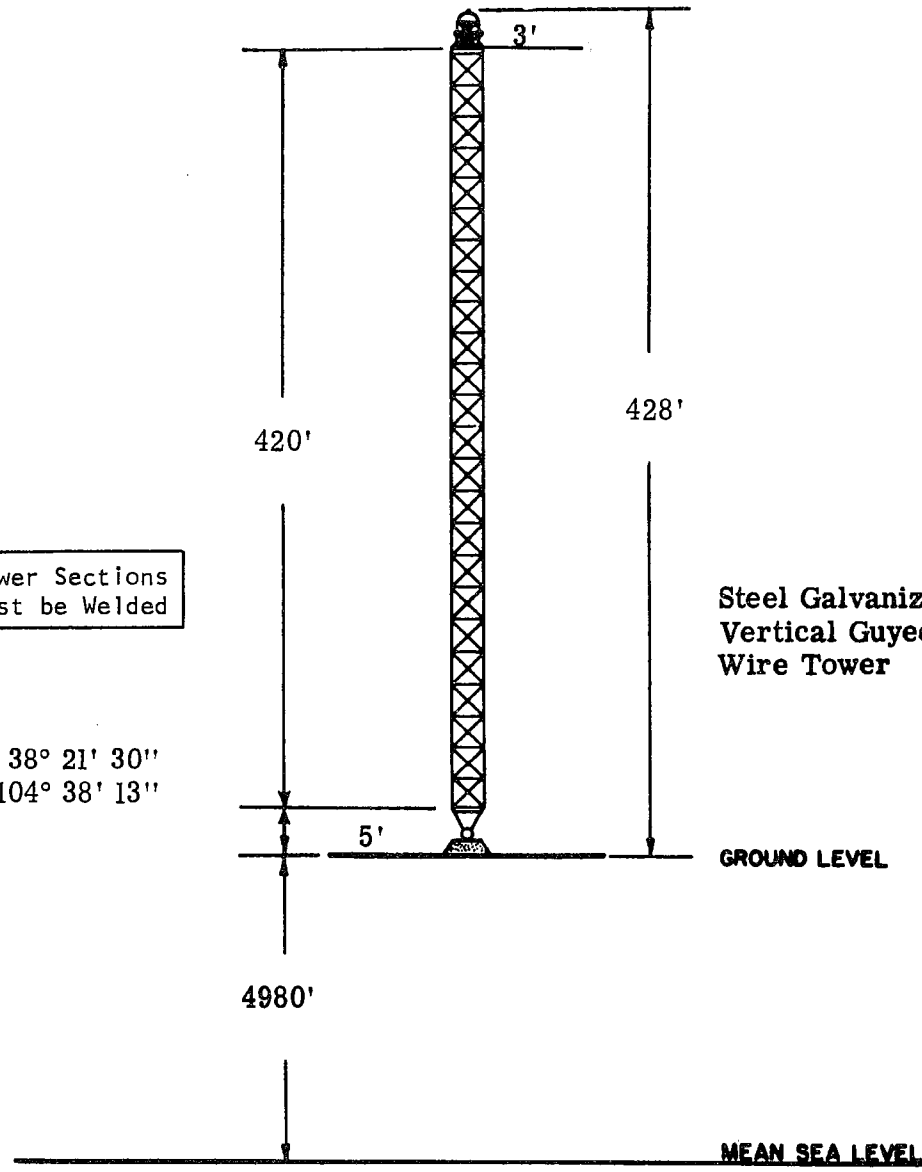
Information taken from the Official List of Notified Assignments of Standard Broadcast Stations of the United States of America, Canadian Official List of Notified Assignments, and the Mexican Official List of Notified Assignments.

Exhibit No. E-65

VERTICAL STRUCTURE

PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
August 1973

ALL THREE TOWERS SAME HEIGHT



Tower Sections Must be Welded

N 38° 21' 30"
W 104° 38' 13"

Steel Galvanized Vertical Guyed Wire Tower

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

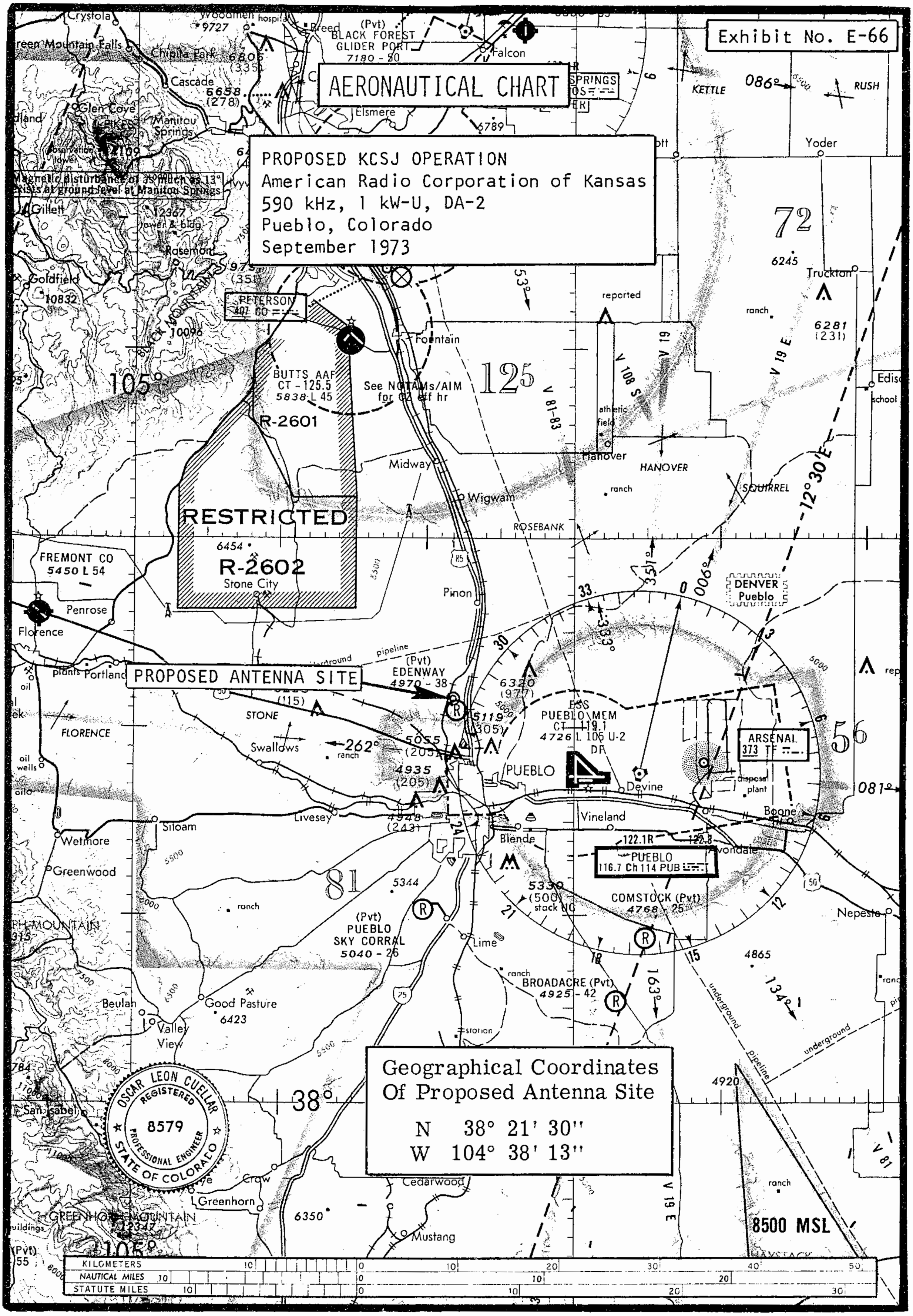
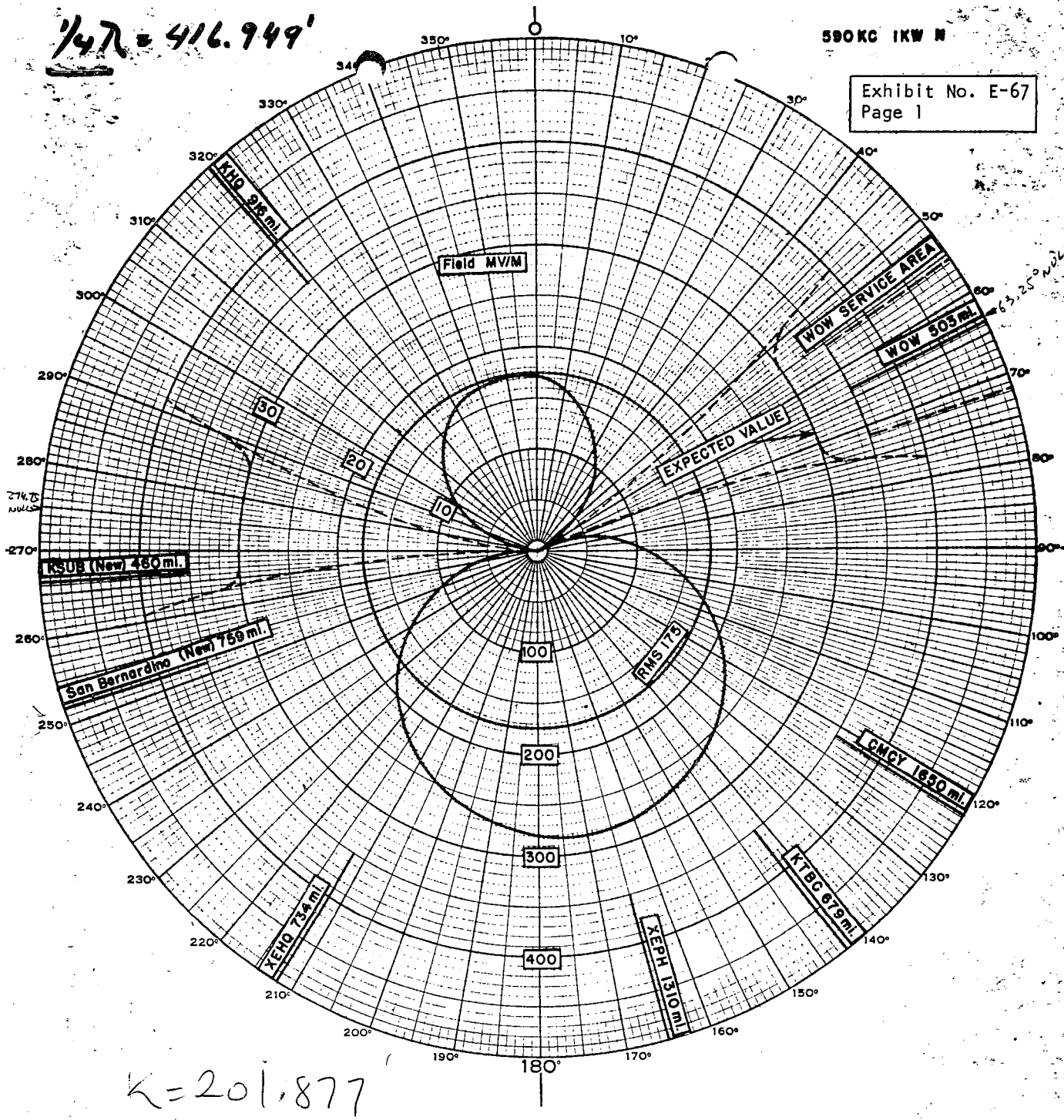


Exhibit No. E-66
AERONAUTICAL CHART
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
September 1973
PROPOSED ANTENNA SITE
Geographical Coordinates
Of Proposed Antenna Site
N 38° 21' 30"
W 104° 38' 13"
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO
RESTRICTED
R-2601
R-2602
BUTTS AAF
PUEBLO
PUEBLO MEM
FREMONT CO
ARSENAL
DENVER Pueblo
PETERSON
Fountain
Midway
Wigwam
Pinon
Penrose
Florence
Portland
Swallows
Livesey
Siloam
Wetmore
Greenwood
Beulah
Good Pasture
Valley View
San Isabel
Greenhorn
Cedarwood
Mustang
Lime
Blende
Vineland
Devine
Boone
Avondale
Nepesta
Hanover
Truckton
Yoder
Falcon
Elsmere
Cascade
Manitou Springs
Gillett
Goldfield
Rosemont
Stone City
8500 MSL
KILOMETERS
NAUTICAL MILES
STATUTE MILES

1/4λ = 416.949'

590 KC 1KW N

Exhibit No. E-67
Page 1

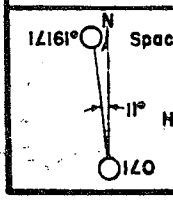


K=201,877

THE STAR BROADCASTING CO. INC.
PUEBLO, COLORADO

Exhibit No. ____
Docket No. 6814

590 KC
1000 WATTS
NIGHT



PROPOSED

DIRECTIONAL ANTENNA PATTERN

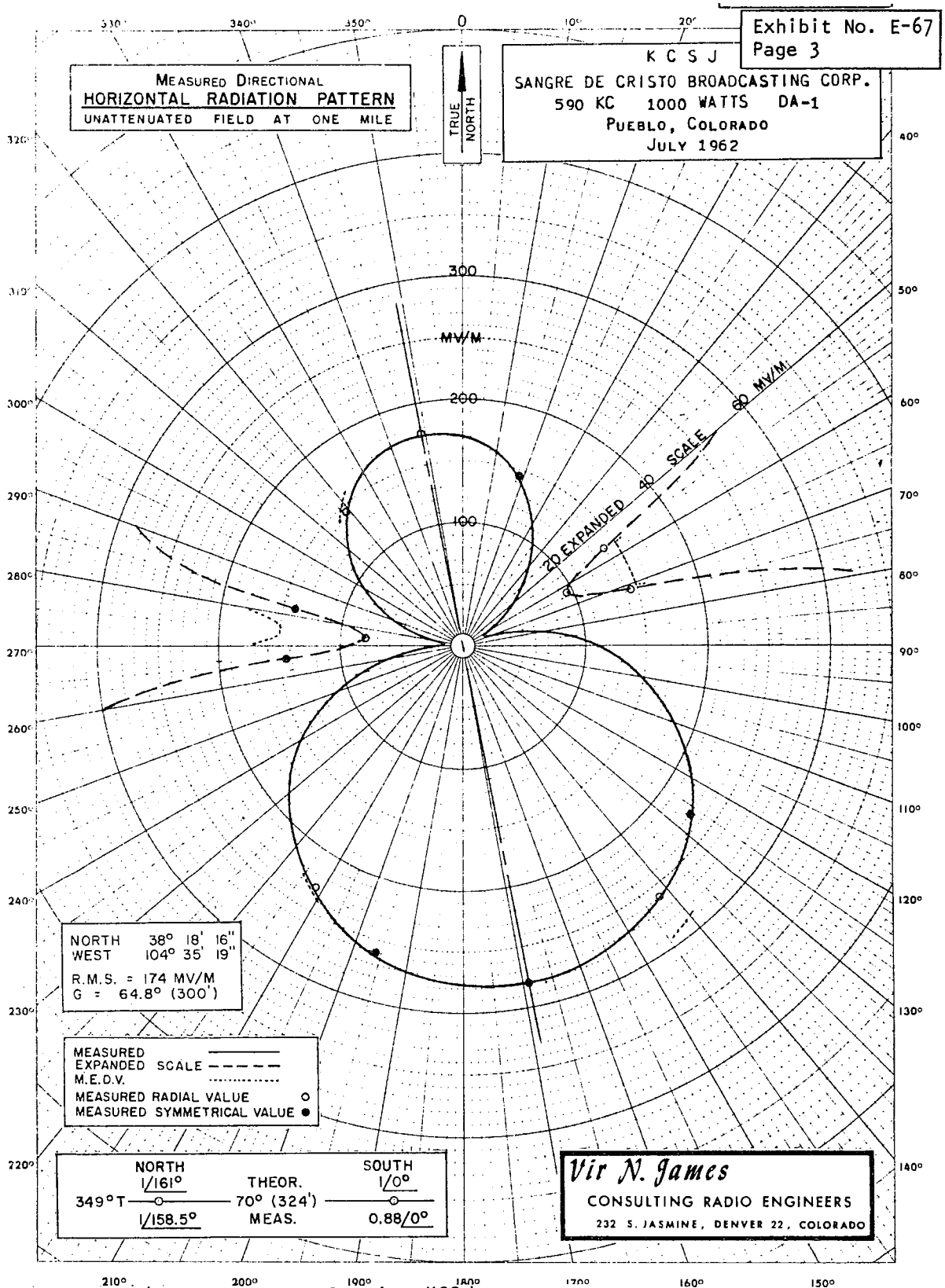
FRANK H. McINTOSH
Consulting Radio Engineer
Washington, D.C.

Measured Day & Night
(9-27-62ct)

Station KCSJ
Pueblo, Colorado

1kw,DA-1,U
590 kc

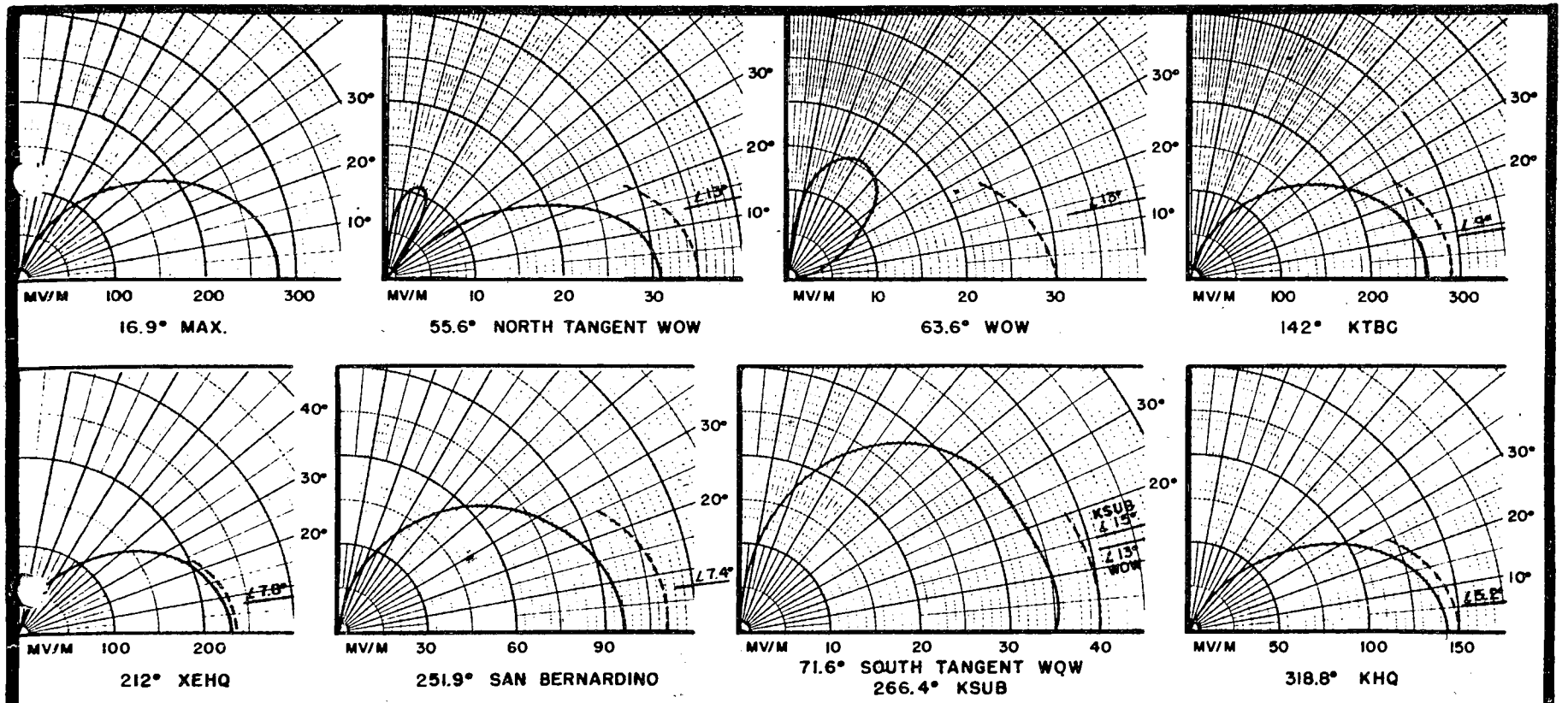
Exhibit No. E-67
Page 3



FCC File No. BZ-4753
Accepted 9-12-62

Station KCSJ
Pueblo, Colorado

590 kc



THE STAR BROADCASTING CO. INC.
PUEBLO, COLORADO

---+-- EXPECTED VALUE	ANGLES FROM TRUE NORTH	SKY WAVE PATTERNS

EXHIBIT NO. ____
DOCKET NO. 6814

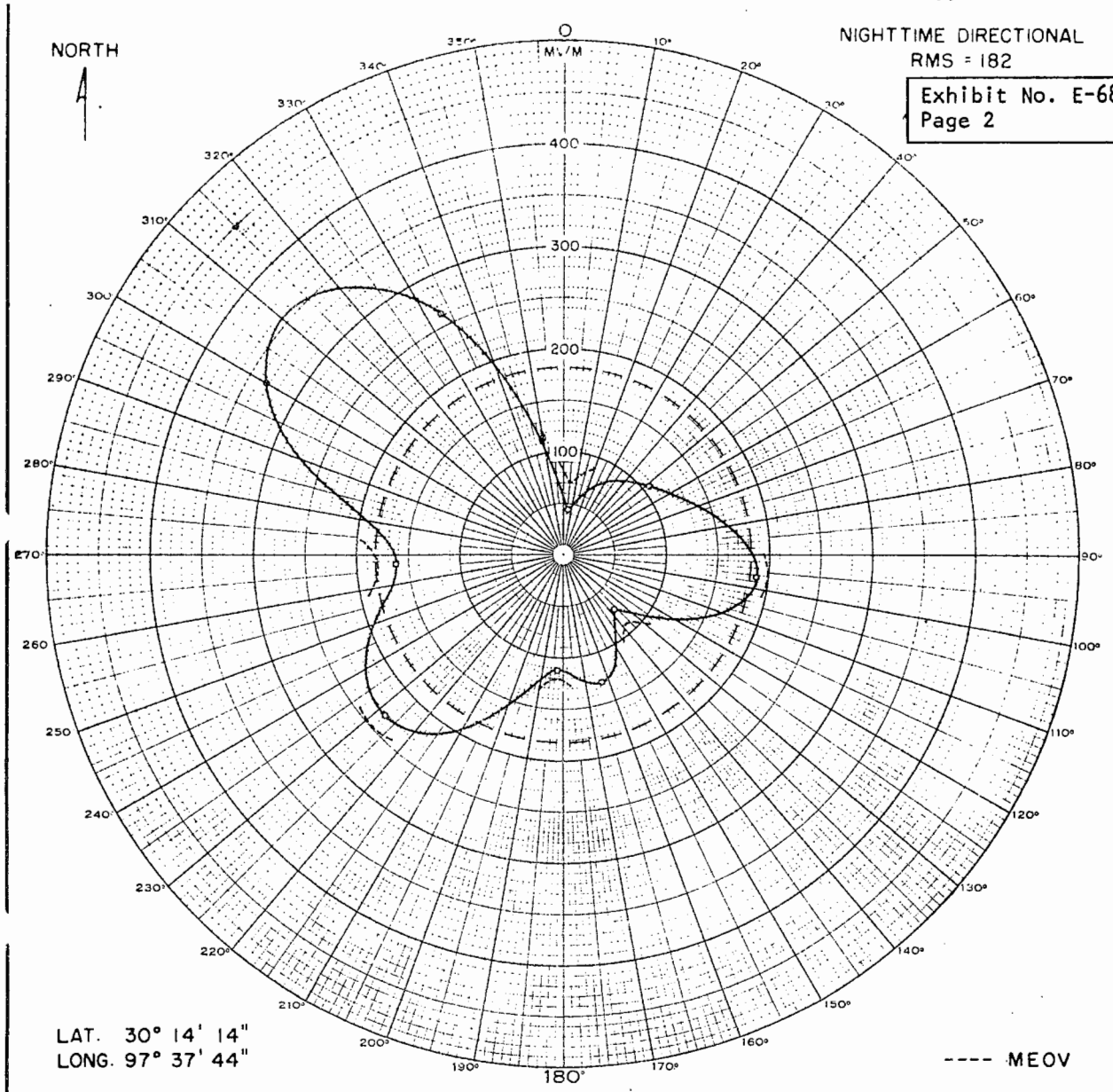
590 KC
1000 WATTS
NIGHT

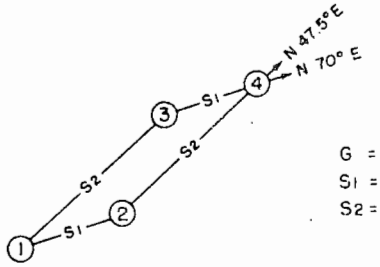
FRANK H. McINTOSH
Consulting Radio Engineer
Washington, D.C.

Measured Night
(1-28-65ct)

Station KTBC
Austin, Texas

1kw, 5kw-LS, DA-N, U
590 kc





G = 393' = 85°
S1 = 463' = 100°
S2 = 856' 185°

ANTENNA PARAMETERS

	THEORETICAL		INDICATED	
TOWER	FIELD	PHASE	FIELD	PHASE
1	1.00	0°	1.00	0°
2	.78	140°	.80	140°
3	.53	−35°	.55	−35°
4	.414	105°	.44	105°

PREPARED BY
THE FIRM OF A. EARL CULLUM, JR.
CONSULTING ENGINEERS

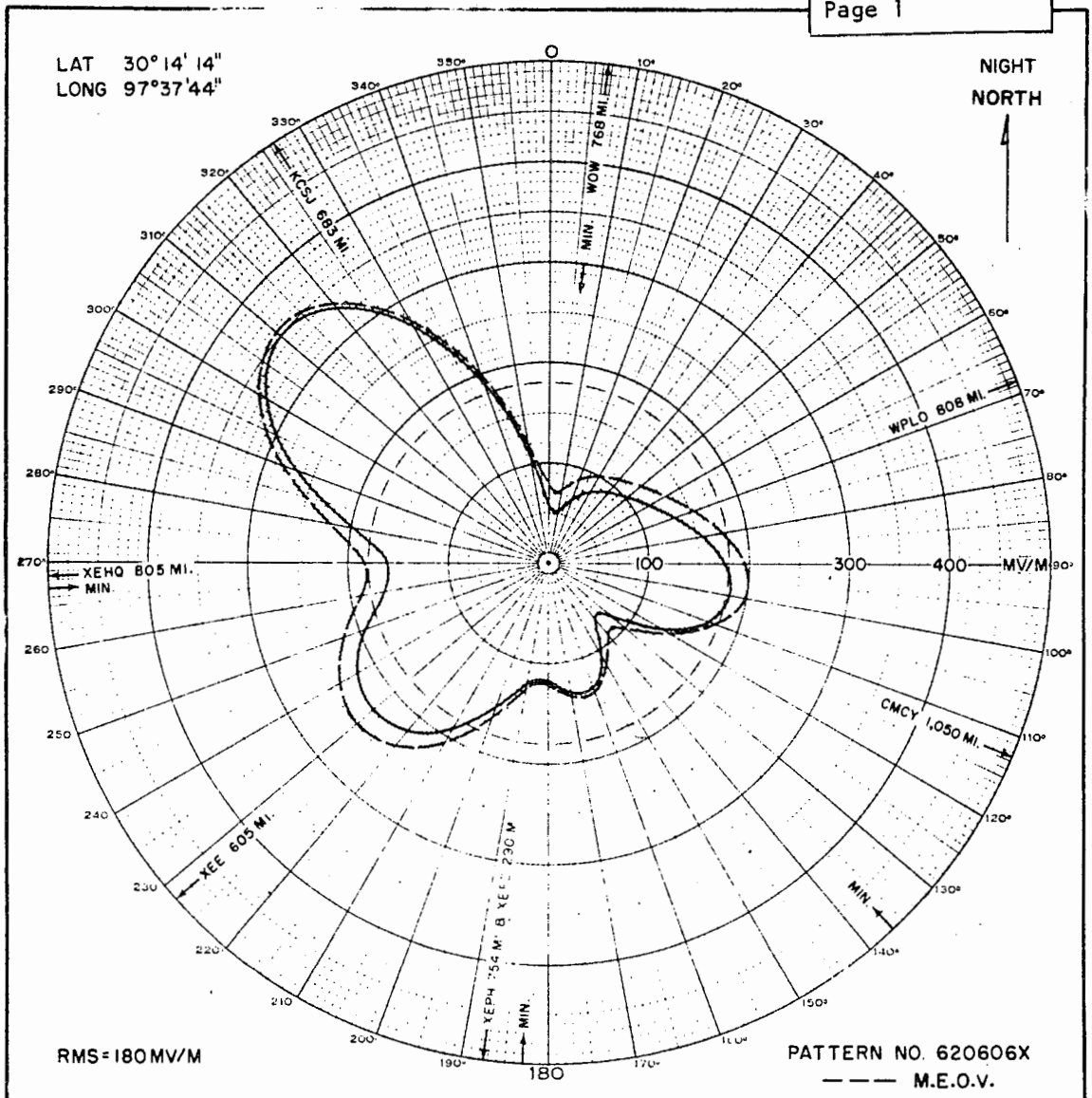
RADIO STATION KTBC
AUSTIN, TEXAS
640710 FIGURE 2B

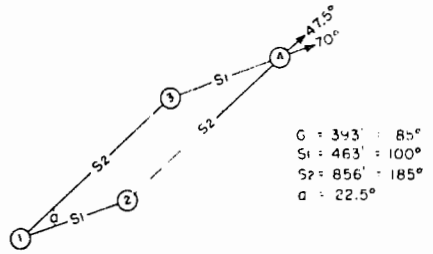
FCC File No. BL-10710
Accepted 12-22-64

Station KTBC
Austin, Texas

590 kc

Exhibit No. E-68
Page 1





TOWER	1	2	3	4
PHASE	0	140	-35	105
FIELD	1.00	.78	.53	.414

PREPARED BY
THE FIRM OF A. EARL CULLUM, JR.
CONSULTING ENGINEERS

RADIO STATION KTBC
590 KC 1 KW 5 KW-LS DA-N
620606.2X FIGURE 6A

PATTERN No.:
SUPERSEDES:

KSUB-590KC

Exhibit No. E-69
Page 1

CONSULTING · RADIO · ENGINEERS

R & C-10/45

256° (2) TRUE — 260° (1)
.65/+171° — 1/0°
G1=G2=65°

330 340 350 0 10 20 30

320 310 300 290 280 270 260 250 240 230 220

40 50 60 70 80 90 100 110 120 130 140

210 200 190 180 170 160 150

KHQ 721 MI.

RMS=181 MV/M

WOW 947 MI.

100 200 300 MV/M

XETG 618 MI.

FIG. 1

PROPOSED HORIZONTAL PLANE PATTERN

KSUB — CEDAR CITY, UTAH

590KC — 1KW-U — DA-N

RING & CLARK

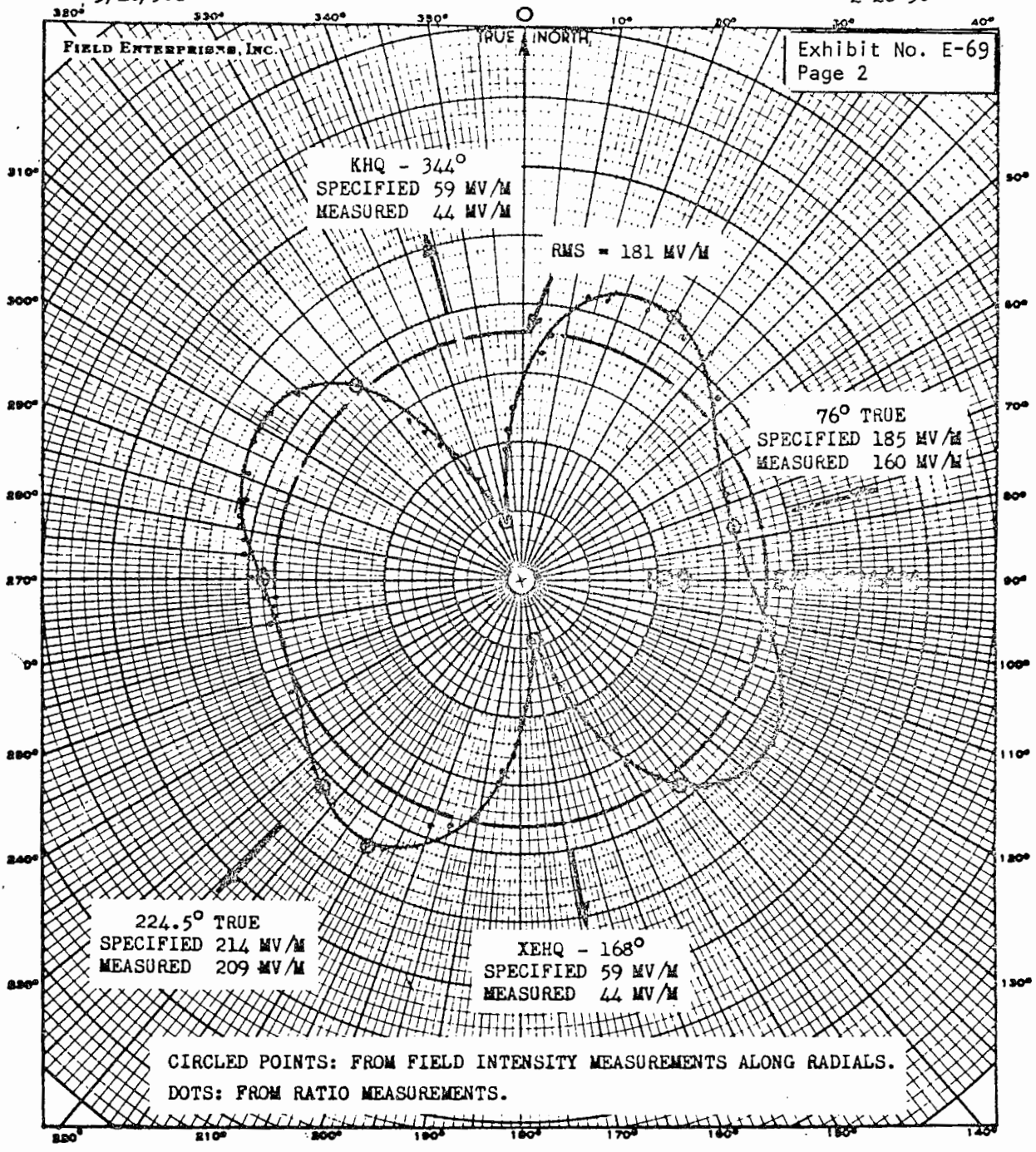
CONSULTING RADIO ENGINEERS

WASHINGTON, D. C.

MEASURED KSUB, CEDAR CITY, UTAH 1kw, DAN 590 kc
NIGHT

HORIZONTAL RADIATION PATTERN

3/10/50G 2-28-50



SITE: 37° 41' 55" N
113° 10' 44" W

DIRECTIONAL PATTERN

Engineer: Vincent C. Clayton
Chief Engineer KSL

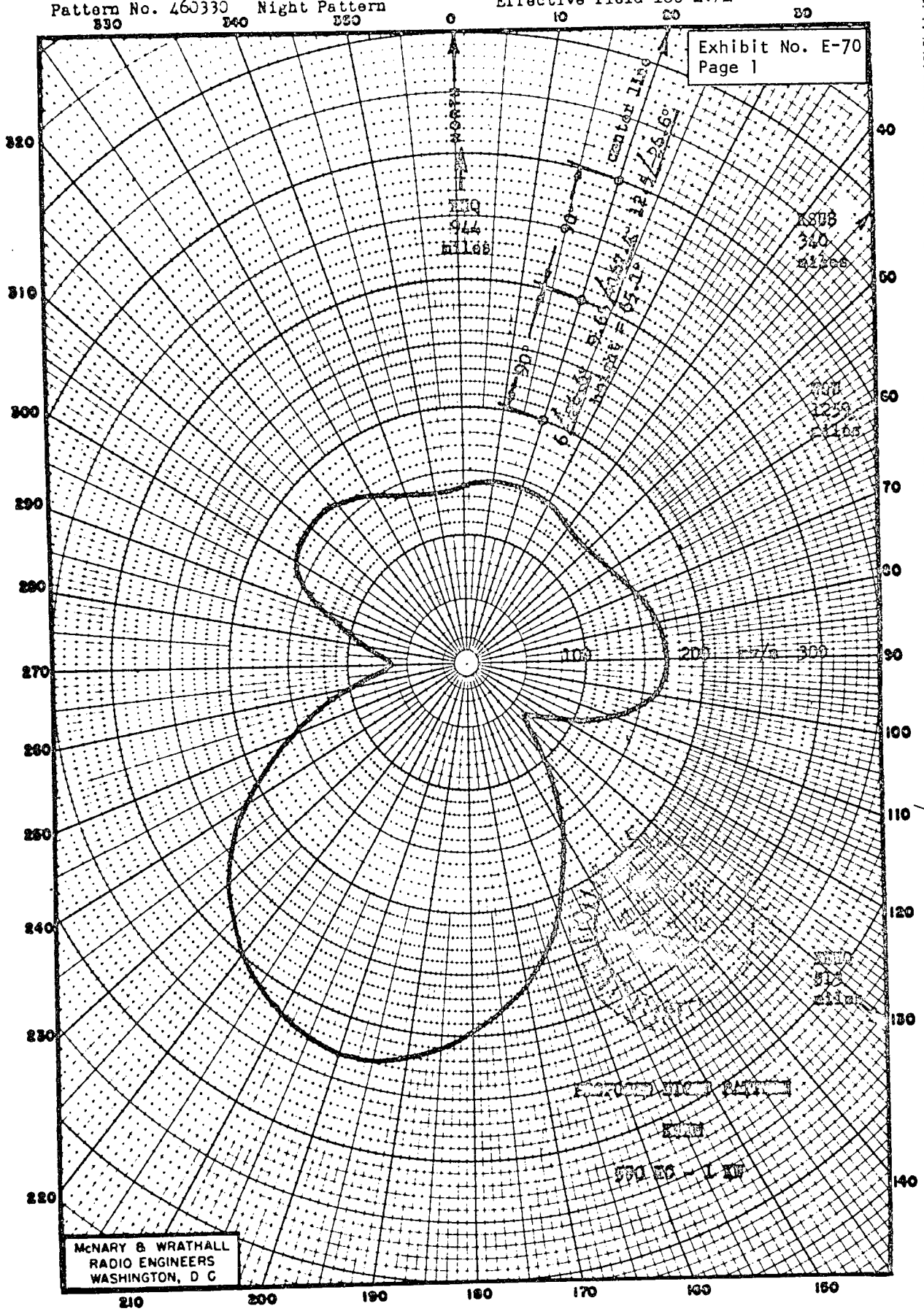
K S U B CEDAR CITY, UTAH
590 KC 1 KW

FEBRUARY 10, 1950

FIGURE 2
KSUB, CEDAR CITY, UTAH 590 kc

Pattern No. 460330 Night Pattern AM Effective field 180 mv/m 6812 - 2

Exhibit No. E-70
Page 1



Rec'd 1-28-48

Exhibit No. E-70
Page 2

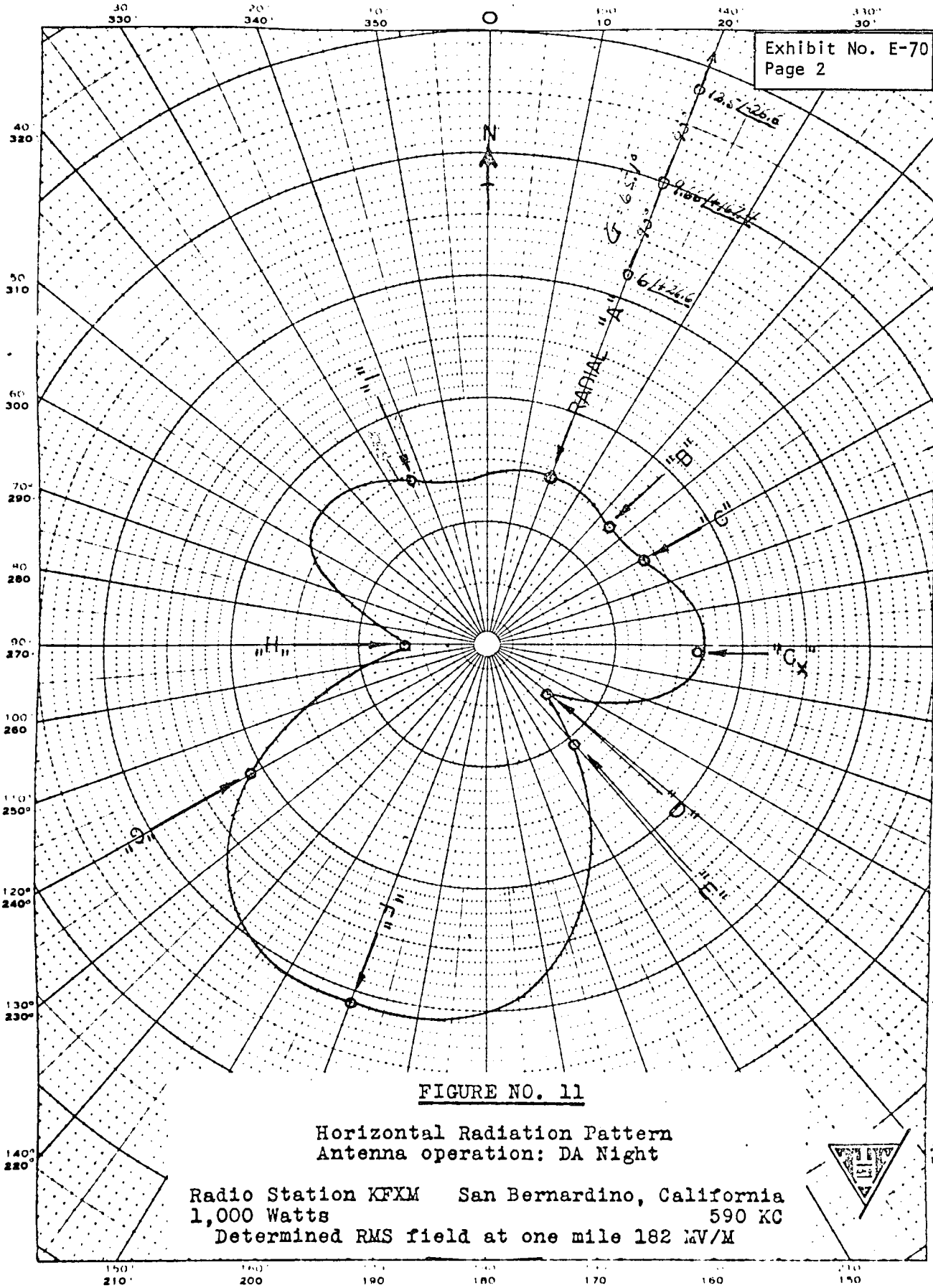


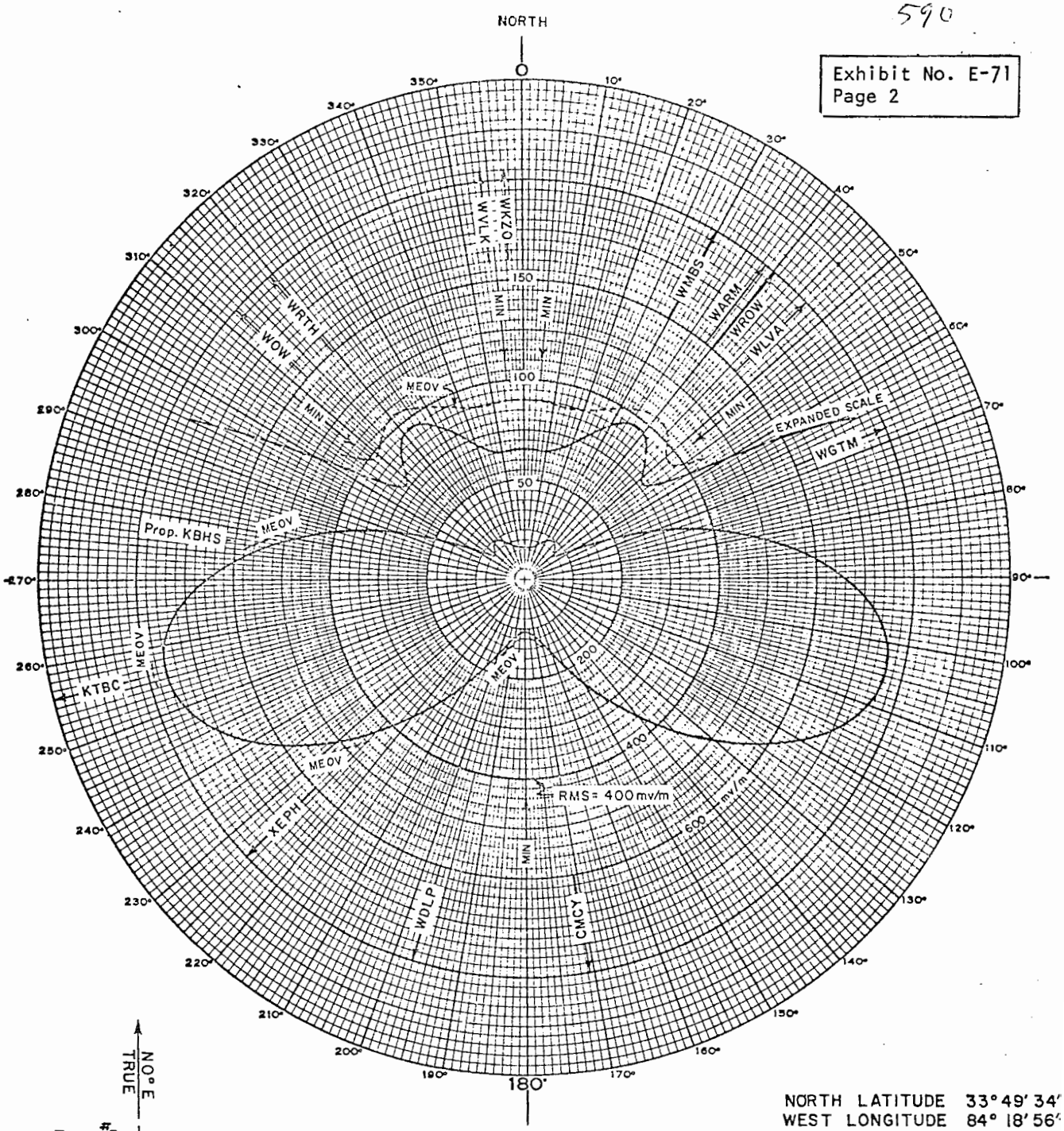
FIGURE NO. 11

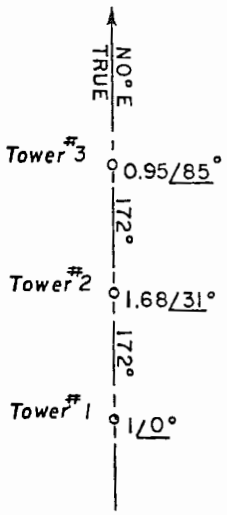
Horizontal Radiation Pattern
Antenna operation: DA Night

Radio Station KFXM San Bernardino, California
1,000 Watts 590 KC
Determined RMS field at one mile 182 MV/M

590

Exhibit No. E-71
Page 2





$h_1 = 65.9°$

$h_2 = 108°$

$h_3 = 65.9°$

NORTH LATITUDE 33° 49' 34"
WEST LONGITUDE 84° 18' 56"

FIGURE 4
PROPOSED NIGHTTIME HORIZONTAL PLANE
RADIATION PATTERN
WPLO 5 KW DA-N 590 KC
ATLANTA, GEORGIA

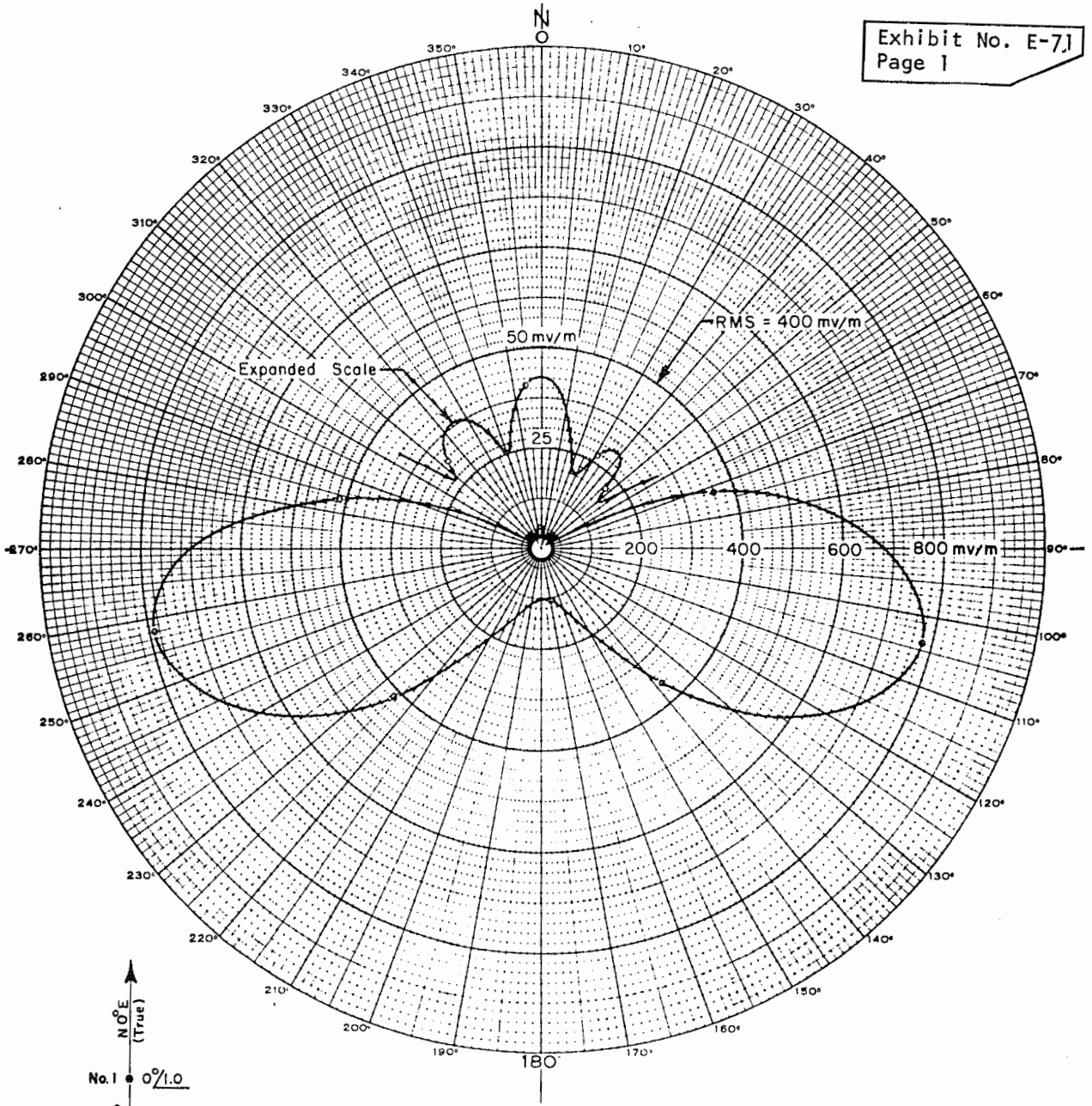
Prepared by
Lohnes and Culver Washington, D. C.
July, 1967

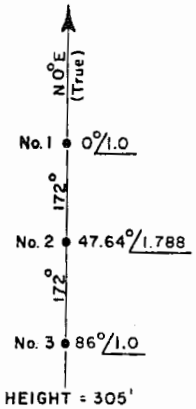
Measured Night
(4-24-64ct)

Station WPLO
Atlanta, Georgia

5kw,DA-N,U
590 kc

Exhibit No. E-7.1
Page 1





North Latitude 33° 49' 34"

West Longitude 84° 18' 56"

FIGURE 7
HORIZONTAL RADIATION PATTERN
(DA-NIGHT OPERATION)
PLOUGH BROADCASTING COMPANY, INC.
WPLO 5 KW-U, DA-N 590 KC
ATLANTA, GEORGIA

Prepared by
Lohnes and Culver *Washington 4, D.C.*
December 1963

FCC File No. BZ-5159
Accepted 3-26-64

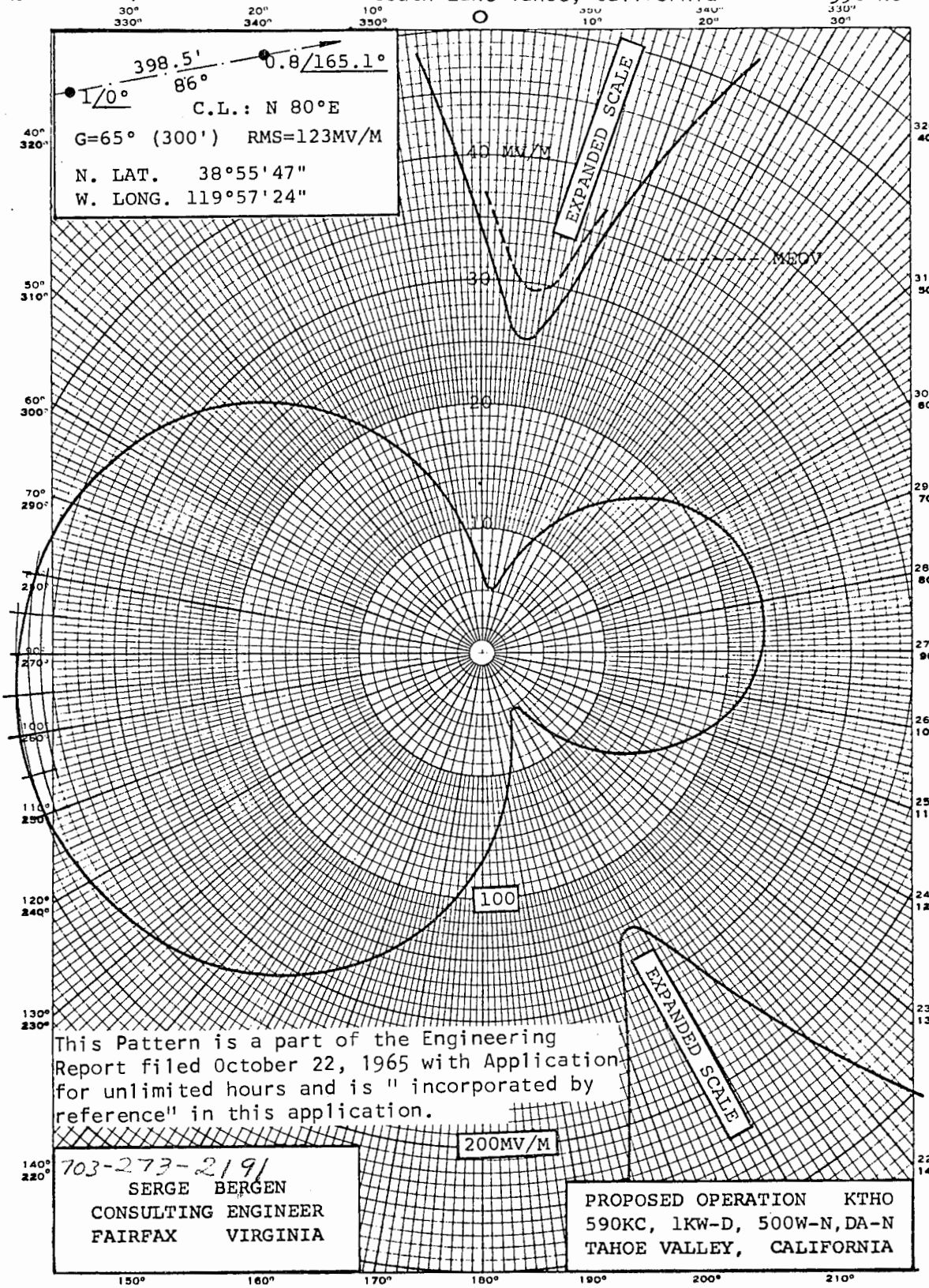
Station WPLO
Atlanta, Georgia

590 kc

Proposed Night
(9-26-68ct)

Station KTHO
South Lake Tahoe, California

500w, 1kw-LS, DA-N, U
590 kc



This Pattern is a part of the Engineering Report filed October 22, 1965 with Application for unlimited hours and is " incorporated by reference" in this application.

EUGENE DIETZGEN CO. MADE IN U. S. A.

NO. 340R-P DIETZGEN GRAPH PAPER POLAR CO-ORDINATE

FCC File BP-17946
Accepted 3-1-68

Station KTHO
South Lake Tahoe, California

590 kc

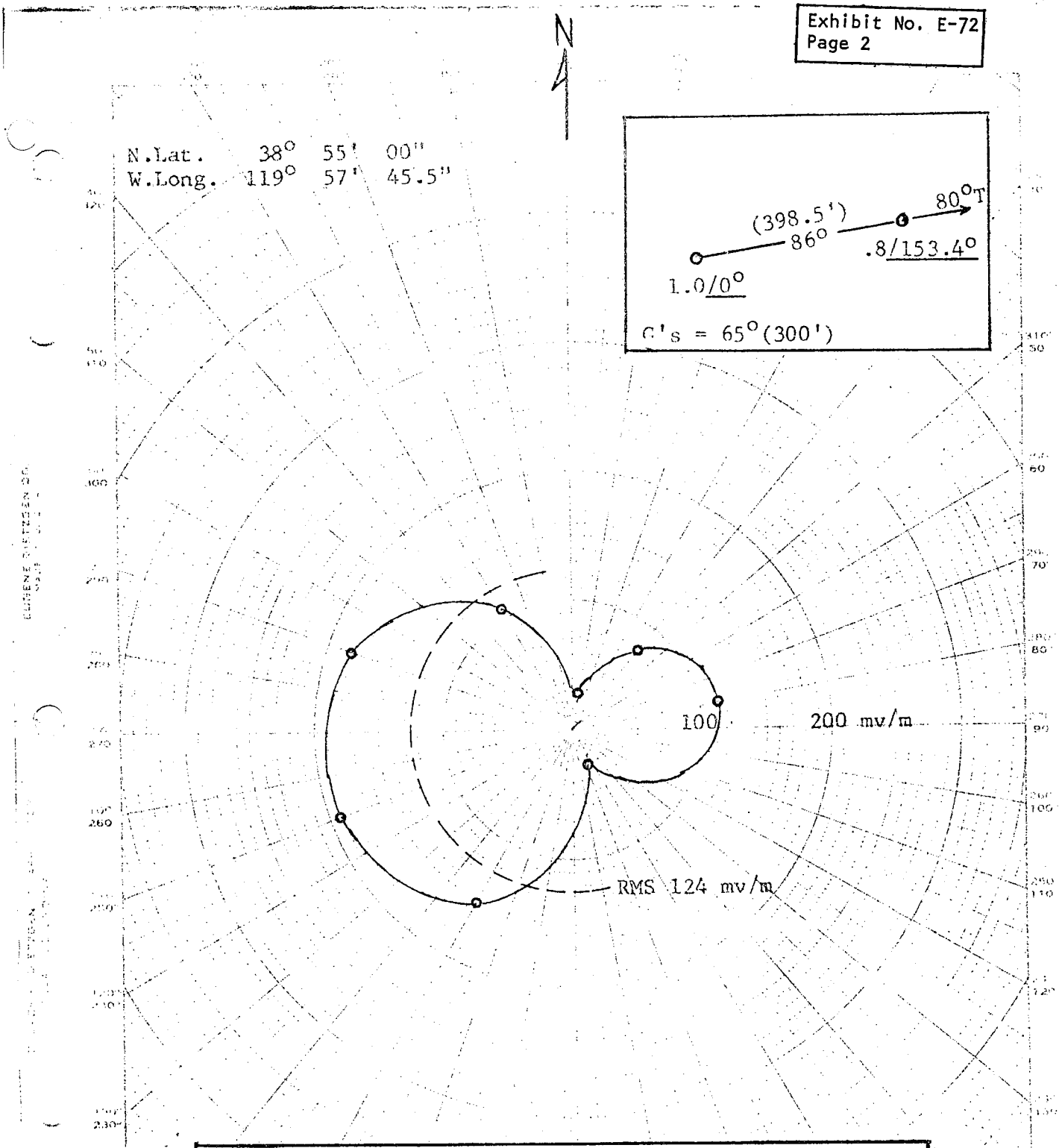


FIG. 2

MEASURED NIGHTTIME HORIZONTAL RADIATION
KTHO 590 KC 1 KW-D .5 KW-N DA
SOUTH LAKE TAHOE, CALIFORNIA

A.E.Towne Consulting Engineer Belmont, California

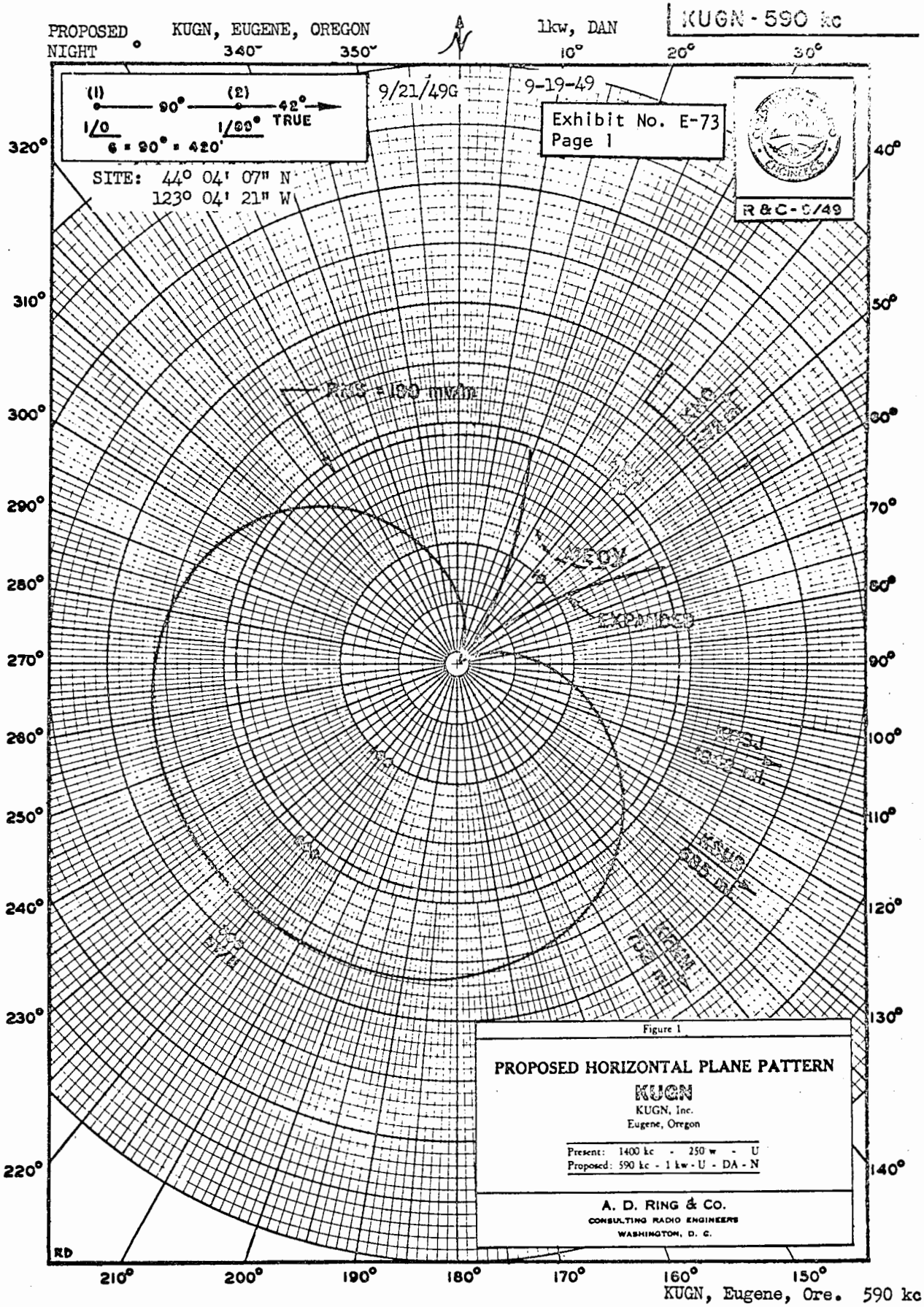


Figure 1

PROPOSED HORIZONTAL PLANE PATTERN

KUGN

KUGN, Inc.
Eugene, Oregon

Present:	1400 kc	- 250 w	-	U
Proposed:	590 kc	- 1 kw - U - DA	-	N

A. D. RING & CO.
CONSULTING RADIO ENGINEERS
WASHINGTON, D. C.

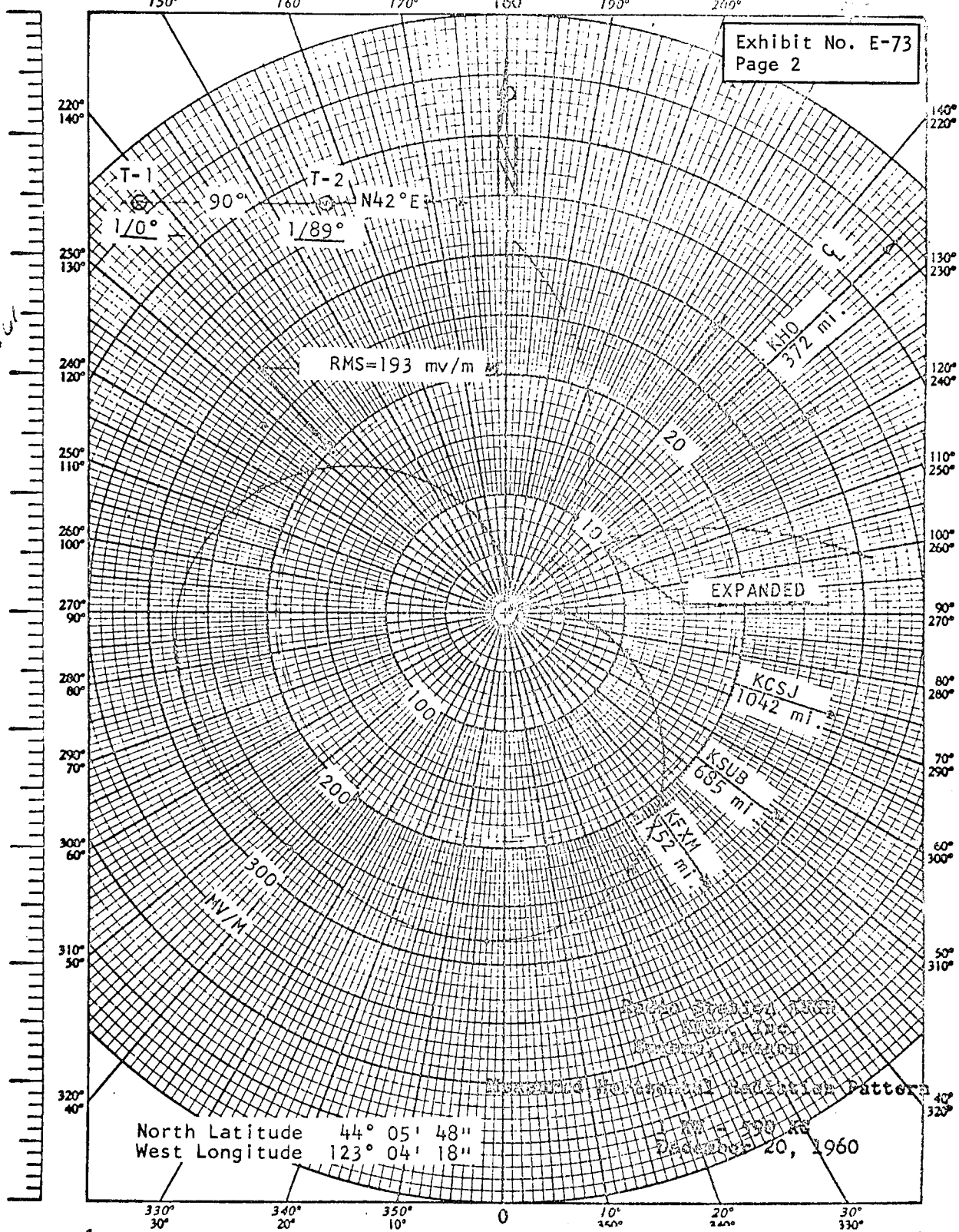
KUGN, Eugene, Ore. 590 kc

MEASURED NIGHT
(4-10-61g)

Station KUGN
Eugene, Oregon

1kw, 5kw-LS, DA-N,U
590 KC

Exhibit No. E-73
Page 2

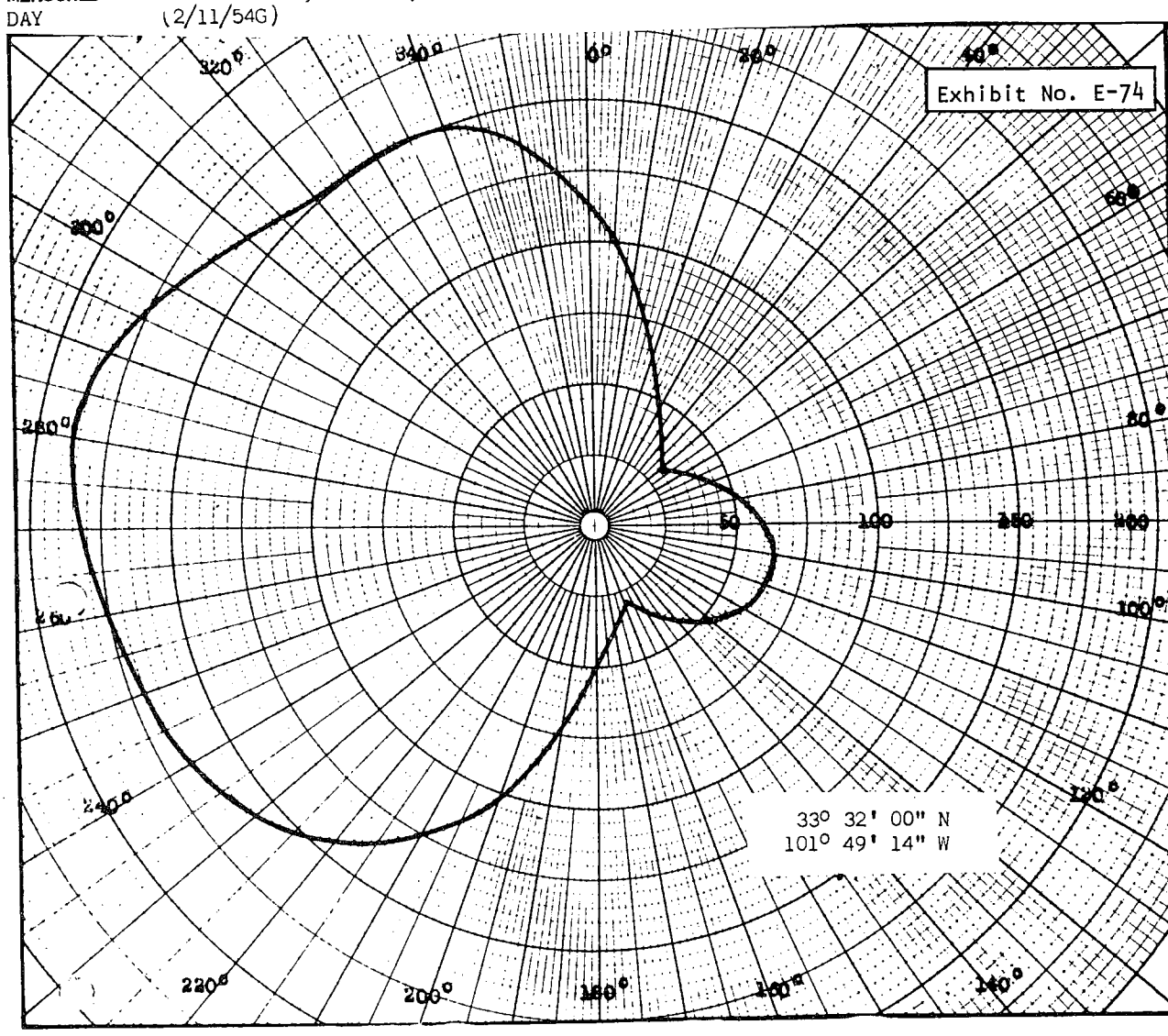


K&E POLAR CO-ORDINATE 359-31 KEUFFEL & ESSER CO.

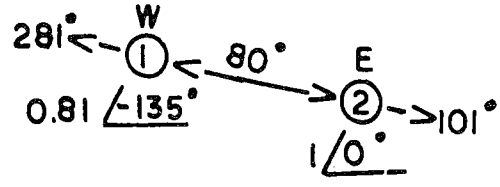
FCC File No. BL-8252
Accepted 3-28-61

KUGN
Eugene, Oregon

590 KC



ANTENNA LAYOUT

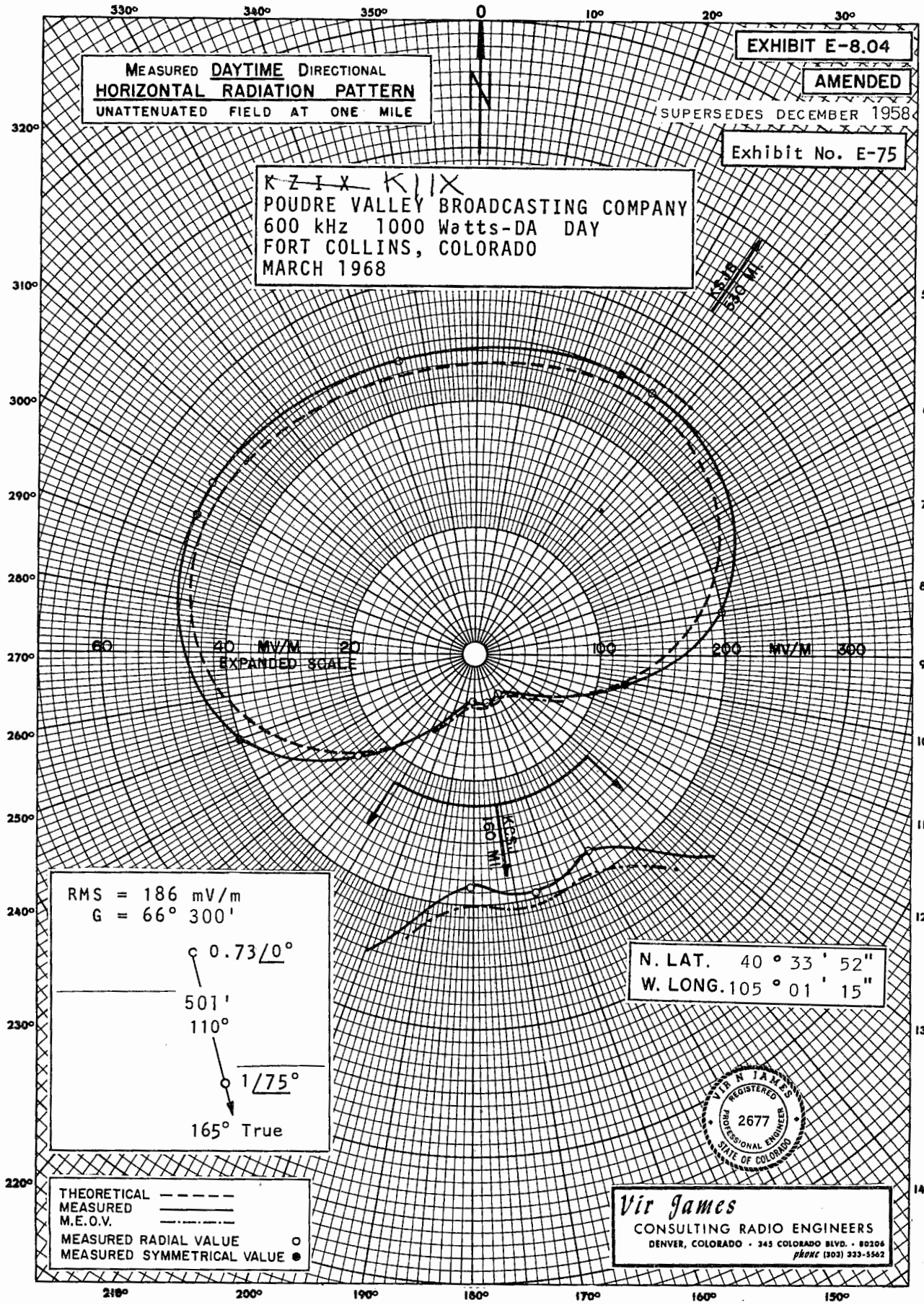


DIRECTIONAL ANTENNA PATTERN RESULTING FROM FIELD INTENSITY MEASUREMENTS

RADIO STATION K D A V
LUBBOCK, TEXAS

580 KC. 500 WATTS

STEWART & STEWART


MEASURED DAYTIME DIRECTIONAL
HORIZONTAL RADIATION PATTERN
UNATTENUATED FIELD AT ONE MILE
EXHIBIT E-8.04
AMENDED
SUPERSEDES DECEMBER 1958
Exhibit No. E-75
~~KZIX~~ KIIX
POUDRE VALLEY BROADCASTING COMPANY
600 kHz 1000 Watts-DA DAY
FORT COLLINS, COLORADO
MARCH 1968
N
330° 340° 350° 0 10° 20° 30°
320° 310° 300° 290° 280° 270° 260° 250° 240° 230° 220°
40° 50° 60° 70° 80° 90° 100° 110° 120° 130° 140°
210° 200° 190° 180° 170° 160° 150°
60 40 MV/M 20 EXPANDED SCALE 100 200 MV/M 300
RMS = 186 mV/m
G = 66° 300'
0.73/0°
501'
110°
1/75°
165° True
N. LAT. 40 ° 33 ' 52"
W. LONG. 105 ° 01 ' 15"
THEORETICAL
MEASURED
M.E.O.V.
MEASURED RADIAL VALUE
MEASURED SYMMETRICAL VALUE
VIR N. JAMES
REGISTERED
PROFESSIONAL ENGINEER
2677
STATE OF COLORADO
Vir James
CONSULTING RADIO ENGINEERS
DENVER, COLORADO · 345 COLORADO BLVD. · 80206
phone (303) 333-5562

GEN. MGR.'s COPY

ENGINEERING AMENDMENT TO APPLICATION FOR A CHANGE OF SITE AND CHANGE IN THE ANTENNA SYSTEM

BR 1610

KCSJ
AMERICAN RADIO CORPORATION OF KANSAS
590 kHz, 1 kW-U, DA-2
PUEBLO, COLORADO

NOVEMBER 1973

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

ENGINEERING AMENDMENT
Petition to Delete
Nighttime Standard
Radiation Pattern

Proposed KCSJ Operation
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973

This is an amendment to the KCSJ Engineering Report presently on file with the FCC.

This amendment is being filed at the request of the FCC as per telephone conferences with Messrs. Otis T. Hanson and Paul Palmer of the FCC Broadcast Facilities Division requesting deletion of the proposed KCSJ Nighttime Standard Radiation Pattern Exhibits No. E-16 and E-17A through E-17L.

Attached herewith are:

Exhibit No. E-16 (Amended)	Proposed Nighttime Basic Directional Antenna Pattern with MEOV
Exhibits No. E-17A through E-17L (Amended)	Proposed Nighttime Basic Conical Sections for every five degrees of elevation through 60 degrees with MEOV

These exhibits are to be inserted in the KCSJ Engineering Report in lieu of those exhibits with the same number which are requested to be deleted.

Please notice that the proposed Exhibit No. E-16 (Amended) is nothing more than the proposed Basic Pattern Exhibit No. E-14 with MEOV on it; and that the values of MEOV proposed on this amended exhibit, is nothing more than the exact values shown in the proposed Nighttime Standard Radiation Pattern to be deleted.

No other change has been requested by the Commission and no other change is being requested herein.

The undersigned respectfully apologizes to the Commission for the misunderstanding of Section 73.150 of the Rules. The undersigned thought that 73.150 (b), (1),(i) would apply to any of the innumerable U.S. broadcast stations which presently are compelled to operate at a lower value of RMS and must operate with minimum efficiency. Let me respectfully write that portion of 73.150 (b), (1), (i) which among other things reads as follows:

> "...An application proposing an antenna design incorporating a loss resistance greater than 1 ohm will be accepted only if it includes an adequate technical justification for employment of the greater value."

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

KCSJ as presently in operation was granted by the Commission permission to operate with minimum efficiency namely RMS=175 mV/m.

KCSJ, as well as a great majority of Standard Broadcast Stations in the U.S., cannot operate with full efficiency as rendered by their tower height and antenna design under the basis of one ohm loss resistance unless they violate 73.37 or 73.182.

The KCSJ Nighttime Standard Radiation Pattern Exhibit No. E-16, whose deletion is proposed, was designed under the predicate of 1 ohm "Lumped Loss Resistance". However, using 1 ohm "Lumped Loss Resistance" the RMS of this Standard Radiation Pattern came out to be 200.565 mV/m.

Here was the crucial point of misunderstanding to FCC 73.150 -- KCSJ under present standards cannot operate with an RMS of 200.565 mV/m. Further calculations showed that "incorporating a loss resistance greater than 1 ohm", namely 9.3343 ohms, KCSJ could operate fully protecting the U.S., NARBA, and Mexican Standard Broadcast Stations. The undersigned thought that the use of this resistor (9.3343 ohms) would be full "technical justification for the employment of a greater value".

Furthermore, under present standards it is obvious that the KCSJ Nighttime Standard Radiation Pattern may operate with this "Lumped loss resistor" inserted in the system and the transmitter rendering full output power of 1,000 watts or this resistor may be removed and lowering the transmitter output power to the specified operating power of 761 watts as shown in the KCSJ Proposed Nighttime Standard Radiation Pattern Exhibit No. E-16 now being deleted at the Commission's request.

The proposed KCSJ Nighttime Standard Radiation Pattern has been rejected because it specifies a power reduction, namely operating power = 761 watts. At this very instant, the undersigned still is in limbo, for then the meaning of 73.150 (b),(1),(i) is ambiguous.

Despite the fact that the KCSJ Engineering Report now on file with the Commission specifies a minor change, the undersigned wishes to comply with every rule of the Commission and in filing for the Standard Radiation Pattern, it was thought to relieve my client of a very heavy burden.

Let me once more respectfully state that if the proposed KCSJ Nighttime Standard Radiation Pattern has been rejected by the Commission for specifying an operating power of 761 watts or a

value of loss resistance greater than 1 ohm, under no circumstances will KCSJ, or innumerable standard broadcast stations in the U.S., ever be able to comply with FCC 73.150 unless the Commission decides a total waiver of FCC 73.37 or 73.182.

Respectfully submitted,

(Seal) Oscar Leon Cuellar

November 8, 1973

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

AMERICAN RADIO CORPORATION OF KANSAS
RADIO STATION KCSJ
BR 1610

AFFIDAVIT

STATE OF COLORADO)
)
CITY AND COUNTY OF DENVER)

This AM Engineering Amendment of American Radio Corporation of Kansas, Licensee of Radio Station KCSJ, Pueblo, Colorado, requesting deletion of the proposed Nighttime Standard Radiation Pattern and Pertinent Conical Sections, Exhibits No. E-16 and E-17A through E-17L, was prepared by Oscar Leon Cuellar, P.E., Consulting Radio Engineer. I am a registered professional engineer in the states of Arizona and Colorado and my engineering qualifications are a matter of record with the Federal Communications Commission, having been accepted on many previous occasions. All data and statements contained herein are true and correct to the best of my knowledge and belief.

(SEAL)

OSCAR LEON CUELLAR

Subscribed and sworn to me this 8th day of November 1973

My commission expires August 11, 1976

OSCAR LEON CUELLAR, P. E. Consulting Radio Engineer DENVER, COLORADO 80222
1563 South Hudson Phone (303) 756-8456

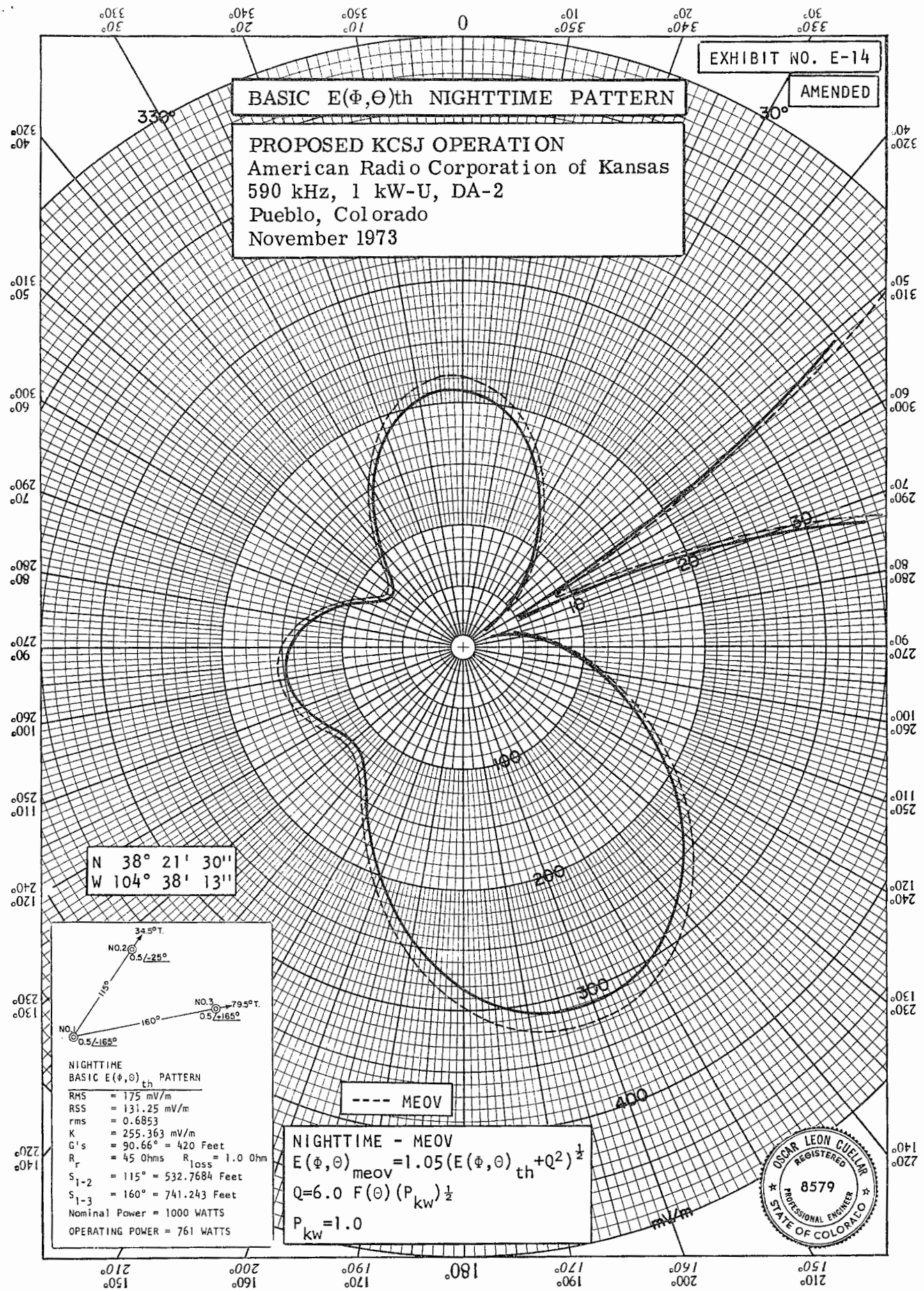


EXHIBIT NO. E-14
AMENDED
BASIC E(Φ,Θ)th NIGHTTIME PATTERN
PROPOSED KCSJ OPERATION
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973
N 38° 21' 30"
W 104° 38' 13"
34.5°T.
NO.2
0.5/-25°
115°
NO.3
79.5°T.
0.5/+165°
160°
NO.1
0.5/-165°
NIGHTTIME
BASIC E(Φ,Θ)th PATTERN
RMS = 175 mV/m
RSS = 131.25 mV/m
rms = 0.6853
K = 255.363 mV/m
G's = 90.66° = 420 Feet
Rr = 45 Ohms Rloss = 1.0 Ohm
S1-2 = 115° = 532.7684 Feet
S1-3 = 160° = 741.243 Feet
Nominal Power = 1000 WATTS
OPERATING POWER = 761 WATTS
---- MEOV
NIGHTTIME - MEOV
E(Φ,Θ)meov=1.05(E(Φ,Θ)th+Q²)½
Q=6.0 F(Θ)(Pkw)½
Pkw=1.0
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

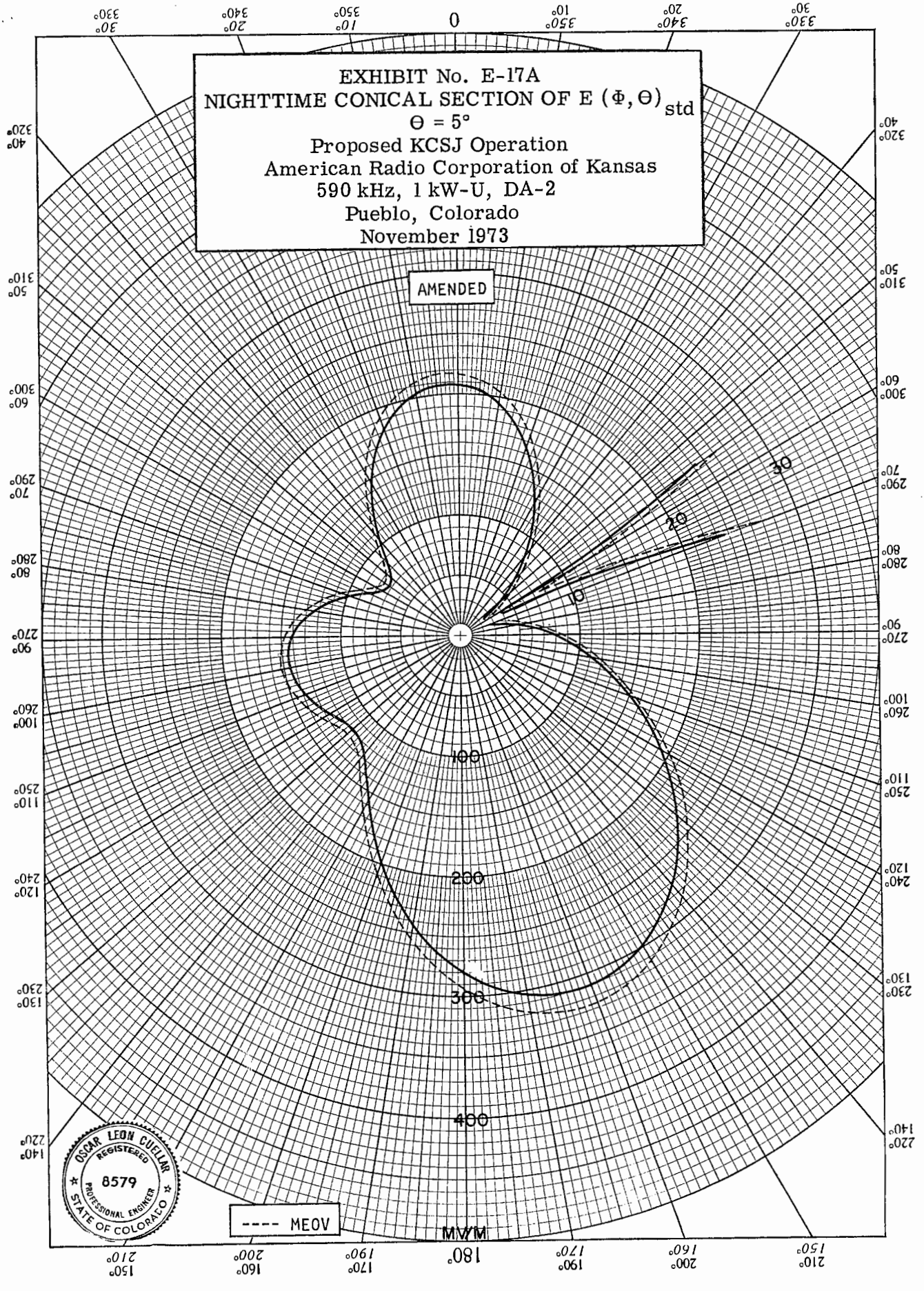


EXHIBIT No. E-17A
NIGHTTIME CONICAL SECTION OF E (Φ, Θ) std
Θ = 5°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973
AMENDED
0
10°
20°
30°
40°
50°
60°
70°
80°
90°
100°
110°
120°
130°
140°
150°
160°
170°
180°
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240°
250°
260°
270°
280°
290°
300°
310°
320°
330°
340°
350°
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400
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8579
PROFESSIONAL ENGINEER
STATE OF COLORADO
---- MEOV
MVM

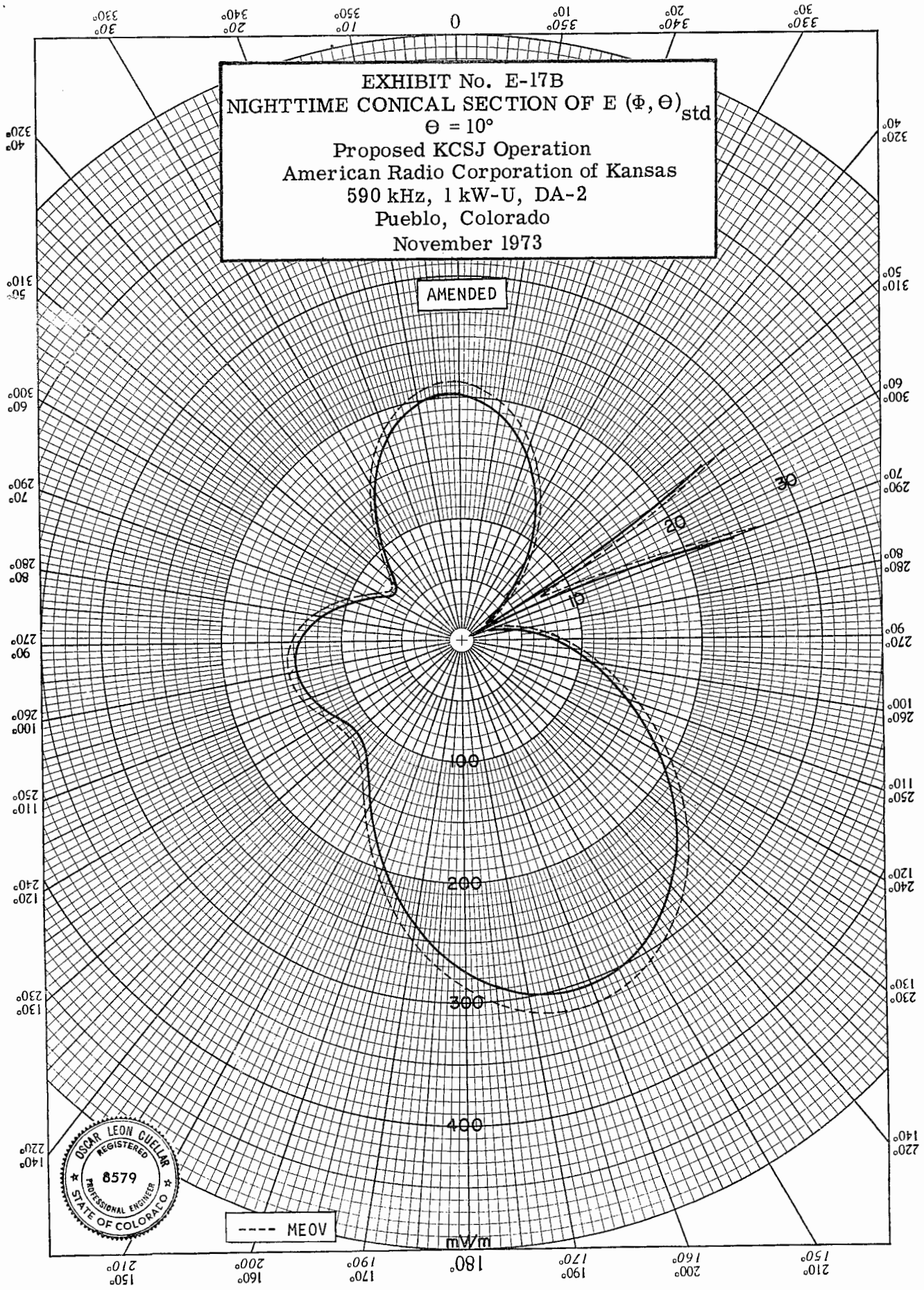
EXHIBIT No. E-17B
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ = 10°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973
AMENDED
0
10°
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70°
280°
80°
270°
90°
260°
100°
250°
110°
240°
120°
230°
130°
220°
140°
210°
150°
200°
160°
190°
170°
180°
30
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400
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO
---- MEOV
mV/m

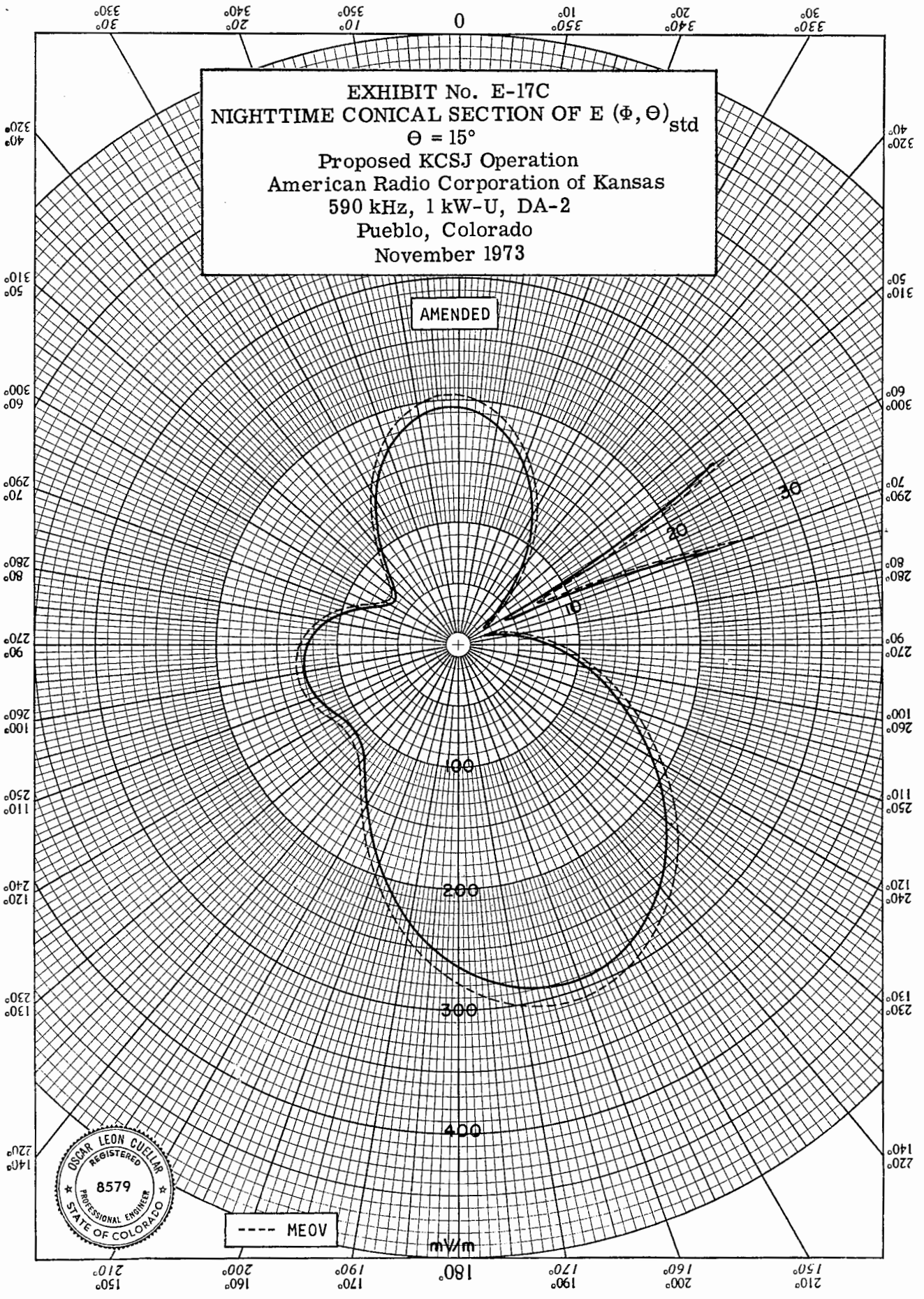
EXHIBIT No. E-17C
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ = 15°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973
AMENDED
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340°
350°
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mV/m
---- MEOV
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

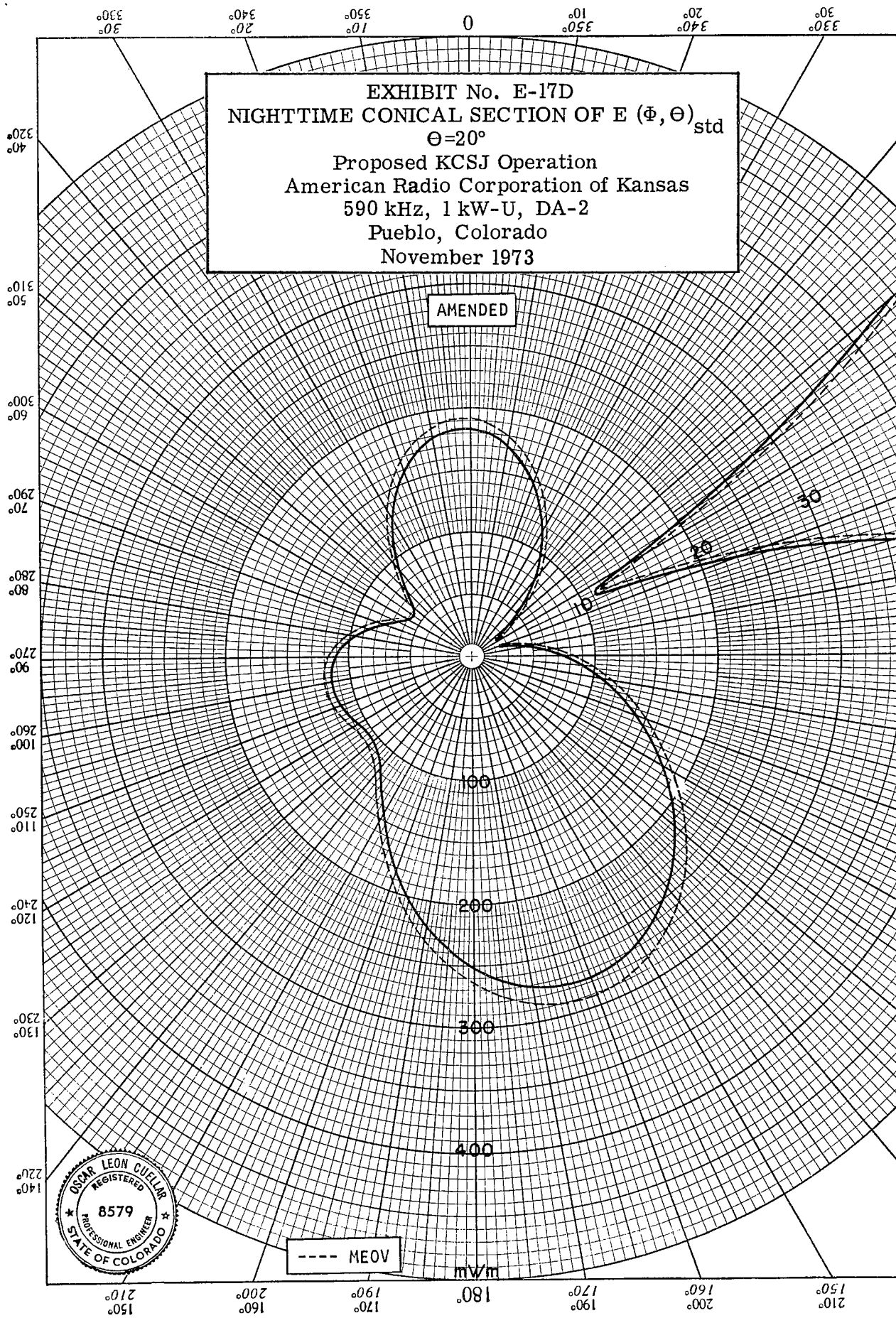
EXHIBIT No. E-17D
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=20°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973
AMENDED
0
10
20
30
100
200
300
400
180°
---- MEOV
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

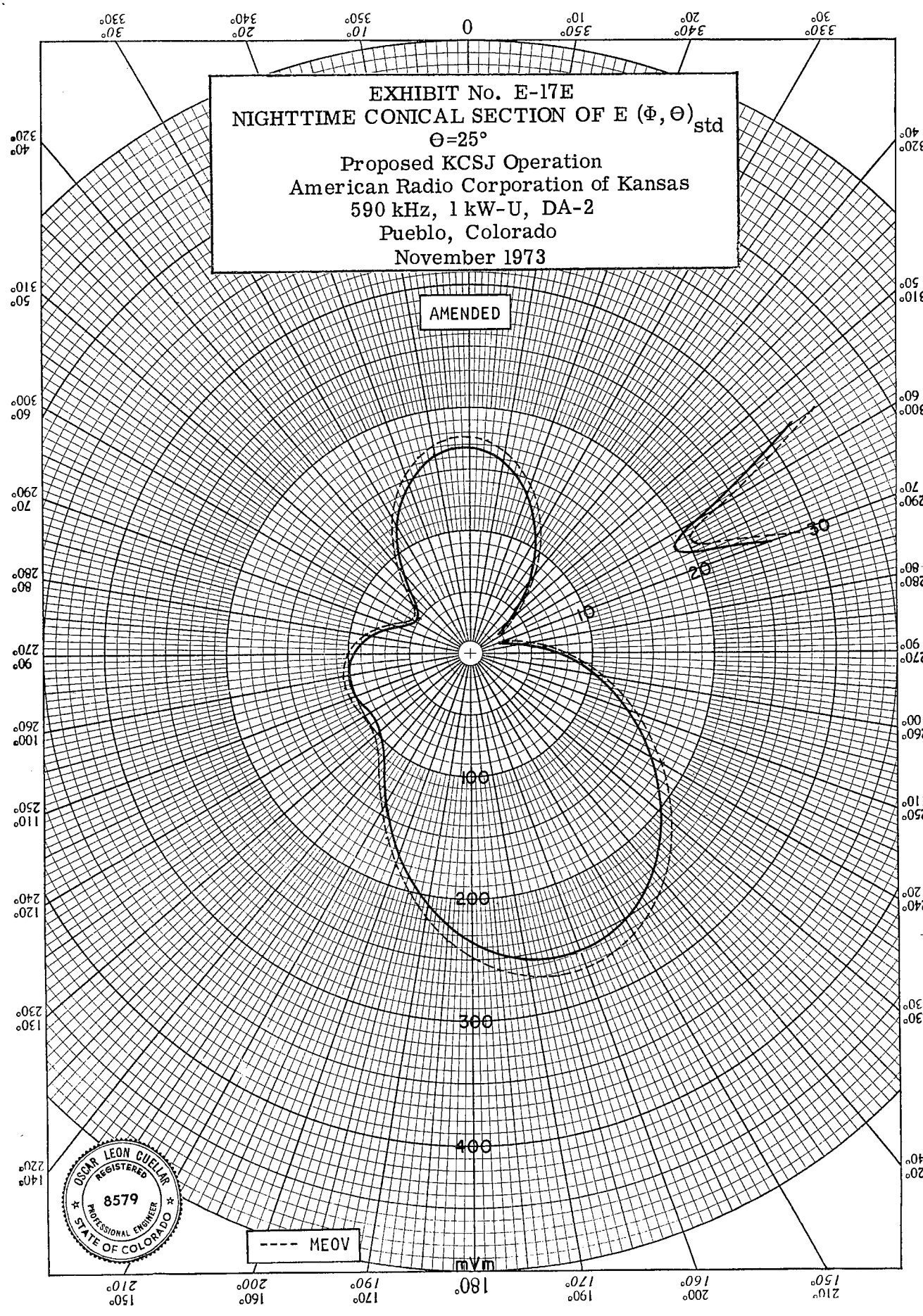
EXHIBIT No. E-17E
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=25°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973
AMENDED
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300°
310°
320°
330°
340°
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---- MEOV
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

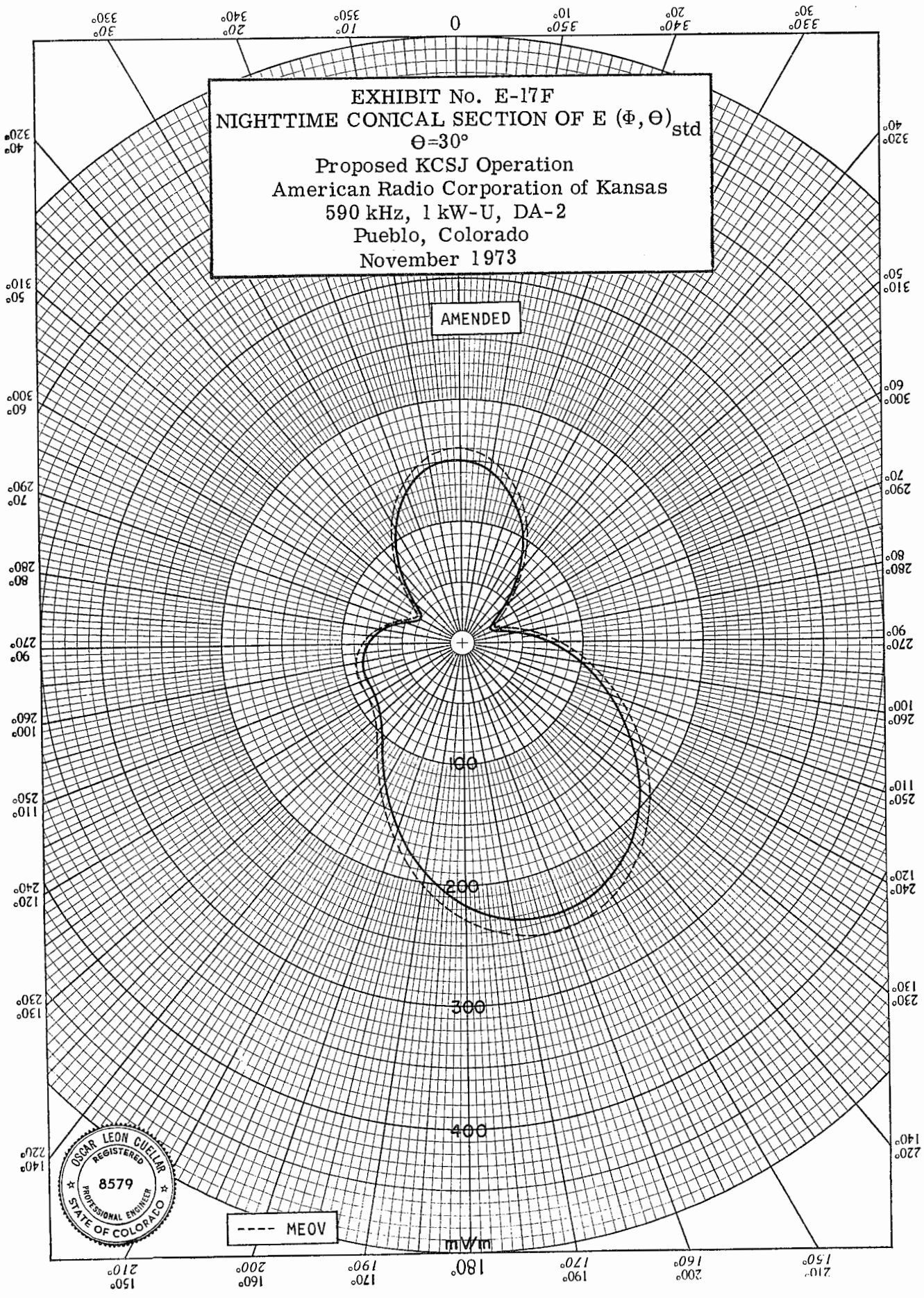
EXHIBIT No. E-17F
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=30°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973
AMENDED
100
200
300
400
---- MEOV
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

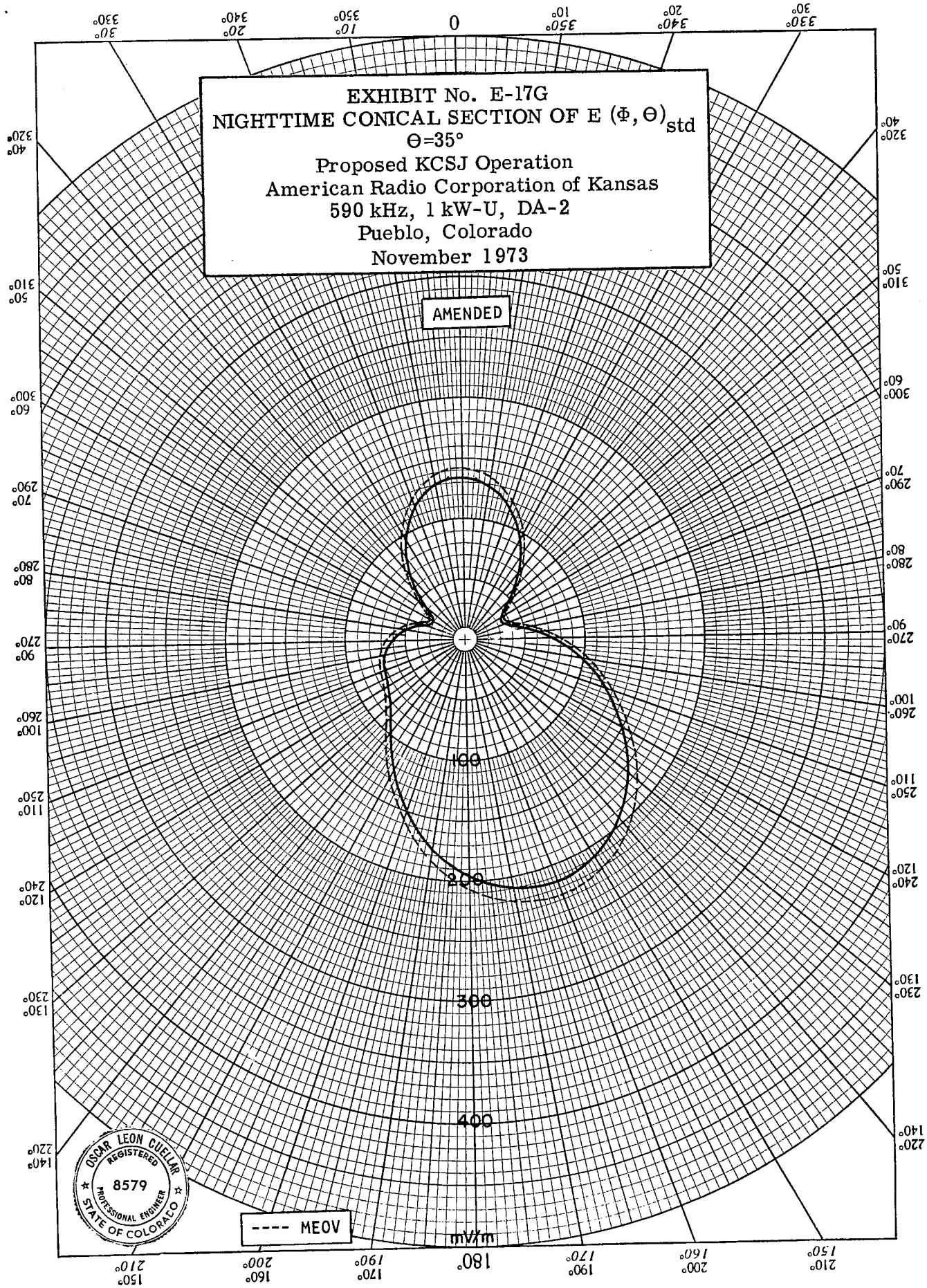
EXHIBIT No. E-17G
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=35°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973
AMENDED
100
200
300
400
---- MEOV
mV/m
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

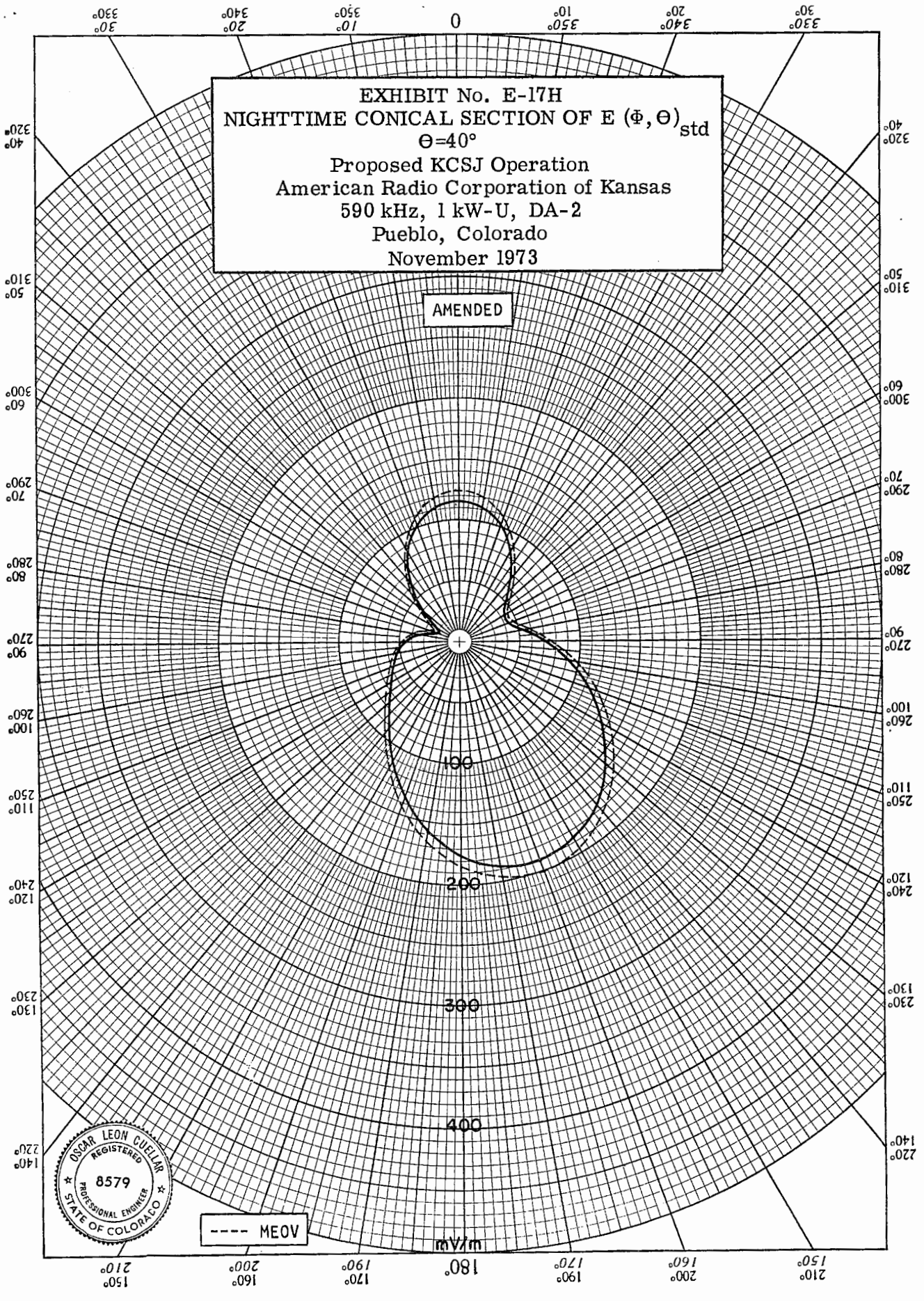
EXHIBIT No. E-17H
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=40°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973
AMENDED
100
200
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400
mV/m
---- MEOV
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

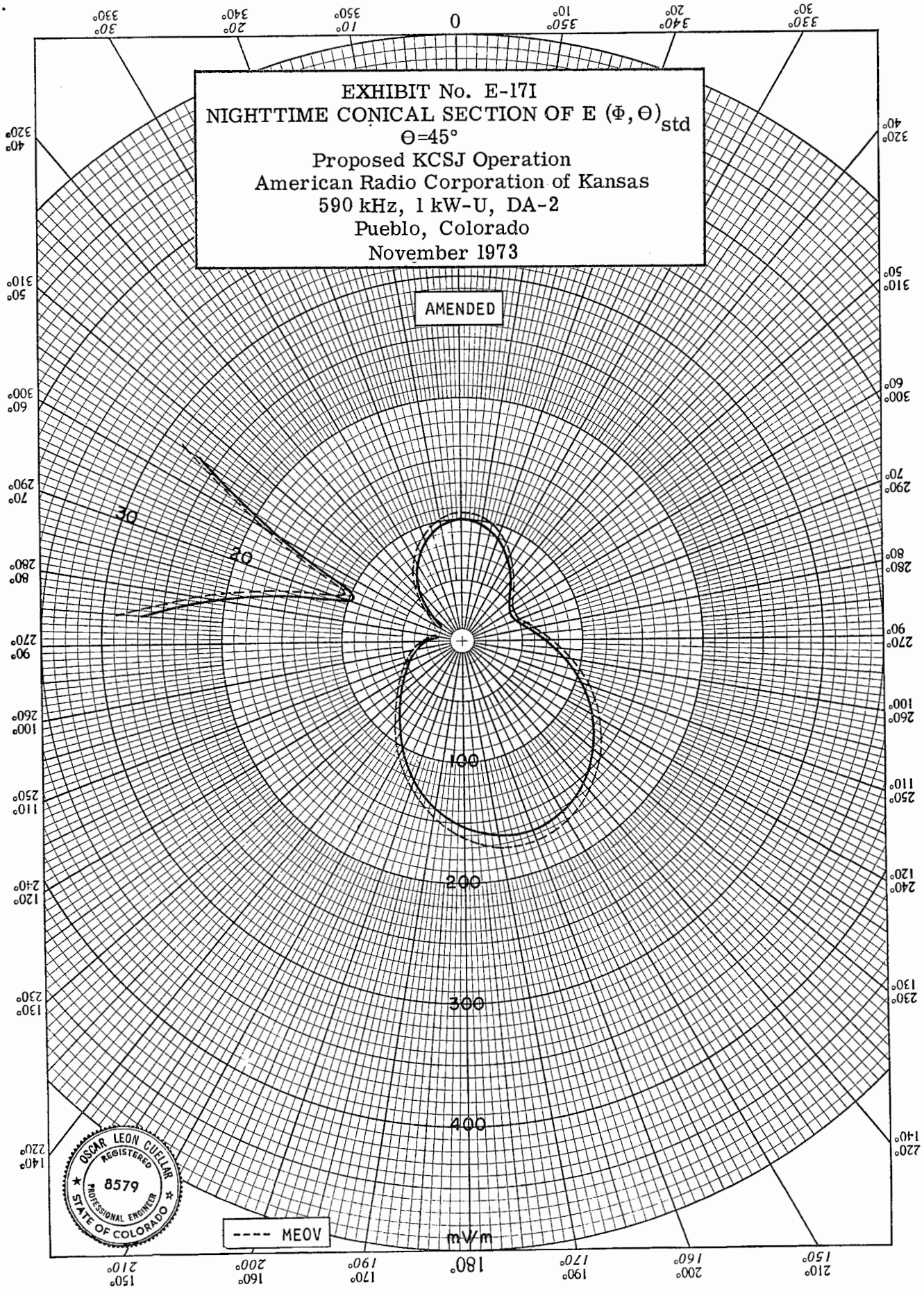
EXHIBIT No. E-17I
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=45°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973
AMENDED
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mV/m
---- MEOV
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

EXHIBIT No. E-17J
NIGHTTIME CONICAL SECTION OF E (Φ, Θ) std
Θ=50°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973
AMENDED
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mV/m
---- MEOV
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO

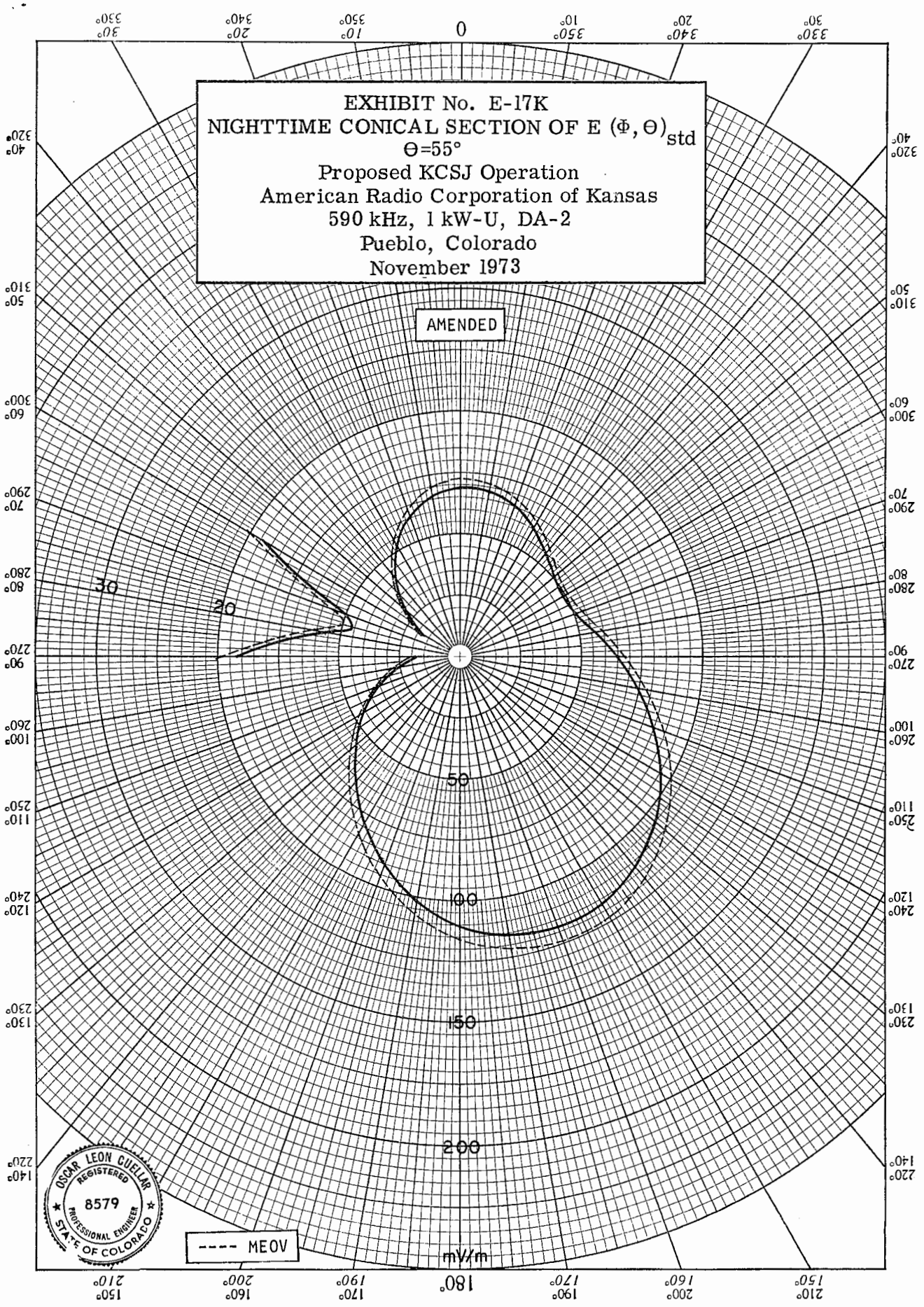
EXHIBIT No. E-17K
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=55°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973
AMENDED
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OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO
---- MEOV
mV/m

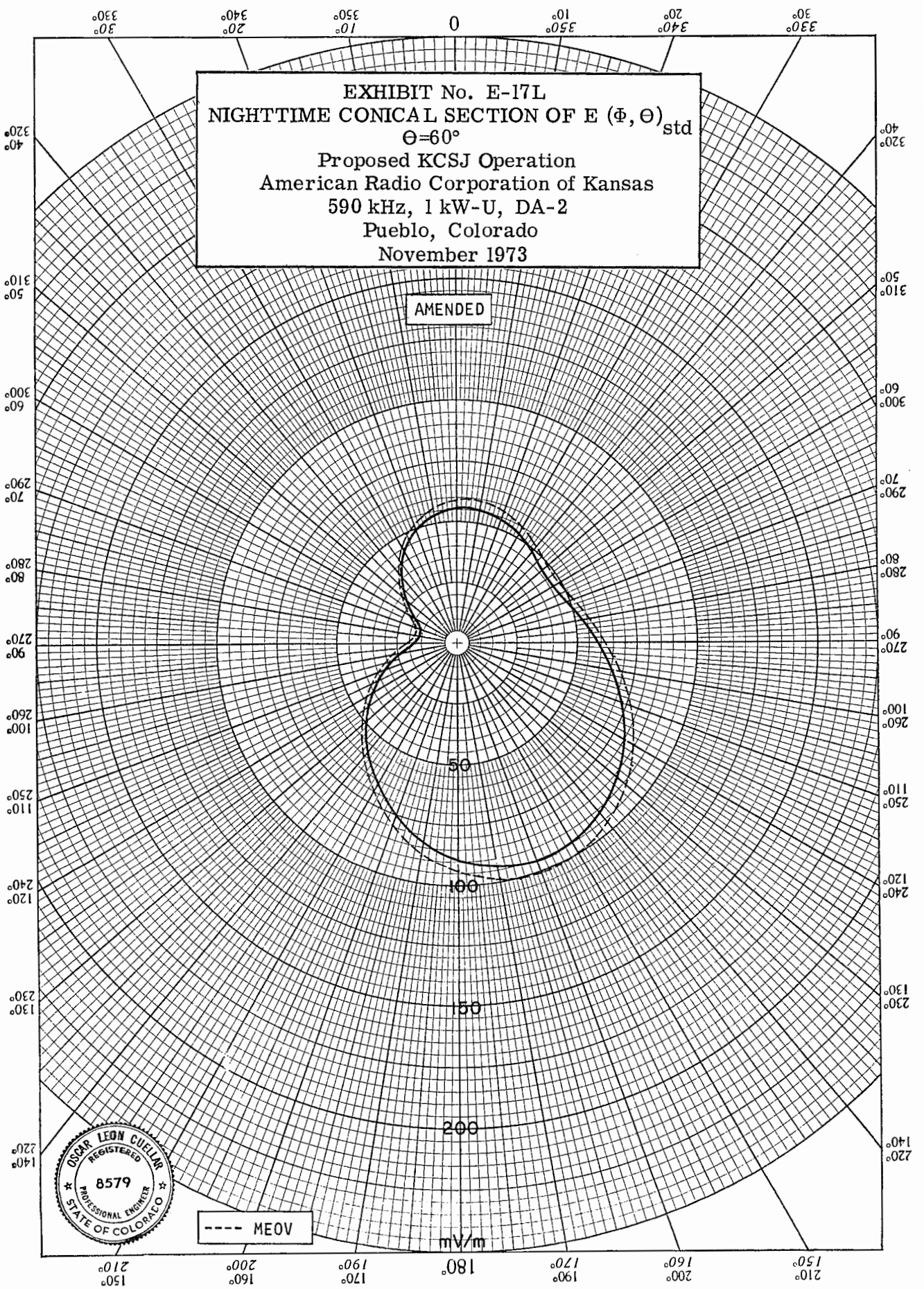
EXHIBIT No. E-17L
NIGHTTIME CONICAL SECTION OF E (Φ, Θ)std
Θ=60°
Proposed KCSJ Operation
American Radio Corporation of Kansas
590 kHz, 1 kW-U, DA-2
Pueblo, Colorado
November 1973
AMENDED
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200
mV/m
---- MEOV
OSCAR LEON CUELLAR
REGISTERED
8579
PROFESSIONAL ENGINEER
STATE OF COLORADO