Fletcher, Heald & Hildreth

1300 NORTH 17th STREET, 11th FLOOR
ARLINGTON, VIRGINIA 22209

OFFICE: (703) 812-0400
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MARK N. LIPP
(703) 812-0445
LIPP@FHHLAW.COM

June 6, 2022

Marlene H. Dortch, Esq.
Secretary
Federal Communications Commission
45 L Street, NE
Washington, DC 20554

Attention: Media Bureau

Re: **Application for License and Request for Program Test Authority**
Cumulus Licensing LLC
Station WCOA(AM), Pensacola, Florida
Facility Identifier Number 12142

Dear Ms. Dortch:

Transmitted herewith on behalf of Cumulus Licensing LLC ("Cumulus"), the licensee of Station WCOA(AM) identified above, is its application for a license to cover construction permit BP-20210319AAJ. As indicated in the associated Engineering Statement prepared by its technical consultant, this application corrects the coordinates of the existing towers and modifies the WCOA nighttime operation by eliminating the restricted efficiency and augmentations and reducing the power to 4.4 kilowatts.

The filing fees for this application totaling $1,905.00 will be paid once confirmation of submission is received from audiofilings@fcc.gov, which will include its identifying file number.

If there are any questions about his Application, please contact undersigned counsel for Cumulus Licensing LLC.

Sincerely,

Mark N. Lipp

Mark N. Lipp

Enclosures

cc: Mr. Jerome Manarchuck, Audio Division, Media Bureau, FCC

Federal Communications Commission
Washington, D. C. 20554

Approved by OMB
3060-0627
Expires 01/31/98

FOR FCC USE ONLY

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.)

FOR COMMISSION USE ONLY

FILE NO.

SECTION I - APPLICANT FEE INFORMATION

1. PAYOR NAME (Last, First, Middle Initial)

Cumulus Licensing LLC

MAILING ADDRESS (Line 1) (Maximum 35 characters)

780 Johnson Ferry Road, Suite 500

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Atlanta	Georgia	30342

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
404.949.0700	WCOA(AM)	12142

2. A. Is a fee submitted with this application? [✔] Yes [ ] No

B. If No, indicate reason for fee exemption (see 47 C.F.R. Section

[ ] Governmental Entity [ ] Noncommercial educational licensee [ ] Other (Please explain):

C. If Yes, provide the following information:

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in the "Mass Media Services Fee Filing Guide." Column (B) lists the Fee Multiple applicable for this application. Enter fee amount due in Column (C).

(A) FEE TYPE CODE	(B) FEE MULTIPLE	(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)	FOR FCC USE ONLY
MMR	0001	$ 645.00	

To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

(A)	(B)	(C)	FOR FCC USE ONLY
MOR	0001	$ 1,260.00	

ADD ALL AMOUNTS SHOWN IN COLUMN C, AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.

TOTAL AMOUNT REMITTED WITH THIS APPLICATION	FOR FCC USE ONLY
$ 1,905.00	

CLEAR ALL PAGES

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT Cumulus Licensing LLC		
MAILING ADDRESS 780 Johnson Ferry Road, Suite 500		
CITY Atlanta	STATE Georgia	ZIP CODE 30342

2. This application is for:

☑ Commercial ☐ Noncommercial

☑ AM Directional ☐ AM Non-Directional

Call letters	Community of License	Construction Permit File No.	Modification of Construction Permit File No(s).	Expiration Date of Last Construction Permit
WCOA	Pensacola, FL	BP-20210319AAJ	N/A	06/07/2024

3. Is the station now operating pursuant to automatic program test authority in accordance with 47 C.F.R. Section 73.1620?

☐ Yes ☑ No

If No, explain in an Exhibit.

Exhibit No. A

4. Have all the terms, conditions, and obligations set forth in the above described construction permit been fully met?

☑ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No.

5. Apart from the changes already reported, has any cause or circumstance arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect?

☐ Yes ☑ No

If Yes, explain in an Exhibit.

Exhibit No.

6. Has the permittee filed its Ownership Report (FCC Form 323) or ownership certification in accordance with 47 C.F.R. Section 73.3615(b)?

☐ Yes ☐ No

☑ Does not apply

If No, explain in an Exhibit.

Exhibit No.

7. Has an adverse finding been made or an adverse final action been taken by any court or administrative body with respect to the applicant or parties to the application in a civil or criminal proceeding, brought under the provisions of any law relating to the following: any felony; mass media related antitrust or unfair competition; fraudulent statements to another governmental unit; or discrimination?

☐ Yes ☑ No

If the answer is Yes, attach as an Exhibit a full disclosure of the persons and matters involved, including an identification of the court or administrative body and the proceeding (by dates and file numbers), and the disposition of the litigation. Where the requisite information has been earlier disclosed in connection with another application or as required by 47 U.S.C. Section 1.65(c), the applicant need only provide: (i) an identification of that previous submission by reference to the file number in the case of an application, the call letters of the station regarding which the application or Section 1.65 information was filed, and the date of filing; and (ii) the disposition of the previously reported matter.

Exhibit No.

CLEAR ALL PAGES

8. Does the applicant, or any party to the application, have a petition on file to migrate to the expanded band (1605-1705 kHz) or a permit or license either in the existing band or expanded band that is held in combination (pursuant to the 5 year holding period allowed) with the AM facility proposed to be modified herein?

☐ Yes ☑ No

If Yes, provide particulars as an Exhibit.

Exhibit No.

The APPLICANT hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because use of the same, whether by license or otherwise, and requests and authorization in accordance with this application. (See Section 304 of the Communications Act of 1934, as amended).

The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations and that all the exhibits are a material part hereof and are incorporated herein as set out in full in

CERTIFICATION

1. By checking Yes, the applicant certifies, that, in the case of an individual applicant, he or she is not subject to a denial of federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. Section 862, or, in the case of a non-individual applicant (e.g., corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits that includes FCC benefits pursuant to that section. For the definition of a "party" for these purposes, see 47 C.F.R. Section 1.2002(b).

☑ Yes ☐ No

2. I certify that the statements in this application are true, complete, and correct to the best of my knowledge and belief, and are made in good faith.

Name	Signature	
Richard S. Denning	Richard S. Denning	
Title	Date	Telephone Number
Executive VP and General Counsel	06/ 1 /2022	404.949.0700

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT AND THE PAPERWORK REDUCTION ACT

The solicitation of personal information requested in this application is authorized by the Communications Act of 1934, as amended. The Commission will use the information provided in this form to determine whether grant of the application is in the public interest. In reaching that determination, or for law enforcement purposes, it may become necessary to refer personal information contained in this form to another government agency. In addition, all information provided in this form will be available for public inspection. If information requested on the form is not provided, the application may be returned without action having been taken upon it or its processing may be delayed while a request is made to provide the missing information. Your response is required to obtain the requested authorization.

Public reporting burden for this collection of information is estimated to average 639 hours and 53 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, can be sent to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0627), Washington, D. C. 20554. Do NOT send completed forms to this address.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

Exhibit A

Station WCOA(AM), Pensacola, Florida, is not operating pursuant to automatic program test authority, in accordance with 47 C.F.R. Section 73.1620, because it operates in the directional mode at night. Please see the Engineering Exhibit prepared by James Sadler with Carl T. Jones Corporation for additional details.

Consulting Engineers
CTJC
CARL T. JONES CORPORATION

ENGINEERING EXHIBIT
IN SUPPORT OF AN
APPLICATION FOR STATION LICENSE
STATION WCOA – PENSACOLA, FLORIDA
1370 kHz – 5 kW-D, 4.4 kW-N, U, DA-N
Facility ID: 12142

Licensee: Cumulus Licensing LLC

MAY, 2022

7901 Yarnwood Court
Springfield, VA 22153-2899

tel: (703) 569-7704
fax: (703) 569-6417

email: info@ctjc.com
www.ctjc.com

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SECTION III OF FCC FORM 302-AM

ENGINEERING STATEMENT OF JAMES D. SADLER

FIGURE

SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant
Cumulus Licensing LLC

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☑ Station License ☐ Direct Measurement of Power

1. Facilities authorized in construction permit

Call Sign	File No. of Construction Permit (if applicable)	Frequency (kHz)	Hours of Operation	Power in kilowatts	
				Night	Day
WCOA	BP-20210319AAJ	1370	Unlimited	4.4	5

2. Station location

State	City or Town
Florida	Pensacola

3. Transmitter location

State	County	City or Town	Street address (or other identification)
FL	Escambia	Pensacola	3931 Hollywood Ave

4. Main studio location

State	County	City or Town	Street address (or other identification)
FL	Escambia	Pensacola	6565 North W Street

5. Remote control point location (specify only if authorized directional antenna)

State	County	City or Town	Street address (or other identification)
FL	Escambia	Pensacola	6565 North W Street

6. Has type-approved stereo generating equipment been installed? ☐ Yes ☑ No

7. Does the sampling system meet the requirements of 47 C.F.R. Section 73.68? ☑ Yes ☐ No ☐ Not Applicable

Attach as an Exhibit a detailed description of the sampling system as installed. Exhibit No. On File

8. Operating constants:

RF common point or antenna current (in amperes) without modulation for night system	RF common point or antenna current (in amperes) without modulation for day system
9.75	7.62

Measured antenna or common point resistance (in ohms) at operating frequency		Measured antenna or common point reactance (in ohms) at operating frequency	
Night	Day	Night	Day
50	86	-j8.2	+j241.1

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day	Night	Day	Night	Day
1 (E)	-131.0	----	0.89	----	----	----
2 (C)	0.0	----	1.00	----	----	----
3 (W)	+139.0	----	0.58	----	----	----

Manufacturer and type of antenna monitor: Potomac Instruments, Model 1901-3

SECTION III - Page 2

9. Description of antenna system ((f directional antenna is used, the information requested below should be given for each element of the array. Use separate sheets if necessary.)

Type Radiator	Overall height in meters of radiator above base insulator, or above base, if grounded.	Overall height in meters above ground (without obstruction lighting)	Overall height in meters above ground (include obstruction lighting)	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.
Uniform cross-section, guyed, vertical steel	58.5	59.7	59.7	Exhibit No. N/A

Excitation ☑ Series ☐ Shunt

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

North Latitude	30 °	26 '	58 "	West Longitude	87 °	15 '	47 "

If not fully described above, attach as an Exhibit further details and dimensions including any other antenna mounted on tower and associated isolation circuits. Exhibit No. N/A

Also, if necessary for a complete description, attach as an Exhibit a sketch of the details and dimensions of ground system. Exhibit No. On File

10. In what respect, if any, does the apparatus constructed differ from that described in the application for construction permit or in the permit?

None

11. Give reasons for the change in antenna or common point resistance.

N/A

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.

Name (Please Print or Type)	Signature (check appropriate box below)
James D. Sadler	
Address (include ZIP Code) Carl T. Jones Corporation 7901 Yarnwood Court Springfield, VA 22153	Date May 27, 2022 Telephone No. (Include Area Code) (703) 569-7704

☐ Technical Director ☐ Registered Professional Engineer

☐ Chief Operator ☑ Technical Consultant

☐ Other (specify)

Consulting Engineers
CTJC
CARL T. JONES CORPORATION

STATEMENT OF JAMES D. SADLER
IN SUPPORT OF AN
APPLICATION FOR STATION LICENSE
STATION WCOA – PENSACOLA, FLORIDA
1370 kHz – 5 kW-D, 4.4 kW-N, U, DA-N
FACILITY ID: 12142

Applicant: Cumulus Licensing LLC

I am a Technical Consultant, an employee in the firm of Cart T. Jones Corporation with offices located in Springfield, VA. My education and experience are a matter of record with the Federal Communications Commission.

GENERAL

This office has been authorized by Cumulus Licensing LLC ("Cumulus"), licensee of WCOA(AM), to prepare this engineering statement and the attached figures in support of an Application for License to cover outstanding Construction Permit, BP-20210319AAJ, ("the Construction Permit"). The Construction Permit authorizes Cumulus to reduce the height and correct the coordinates of the existing towers and modify the WCOA nighttime operation by eliminating the restricted efficiency and augmentations and reducing the power to 4.4 kilowatts. Following the modification of the towers, minor adjustment of the antenna matching networks and full proof of performance measurements were performed by Cumulus personnel. No change to the licensed antenna monitor parameters was required. This office was authorized by Cumulus to analyze the measurement data for compliance with the Construction Permit maximum radiation values and prepare an Application for License.

7901 Yarnwood Court
Springfield, VA 22153-2899
tel: (703) 569-7704
fax: (703) 569-6417
email: info@ctjc.com
www.ctjc.com

NON-DIRECTIONAL MEASUREMENTS

Non-directional operation at WCOA was accomplished by exciting tower #2 (center tower) and detuning the remaining two towers. The base impedance of tower #2 was measured at the J-Plug located in the output branch of the tower #2 ATU network. This location is immediately adjacent to the location of the base current ammeter toroidal current transformer. The non-directional impedance was measured by the Cumulus personnel, using a Delta Electronics, Model OIB-3, operating impedance bridge, and found to be Z = 86 +j 241.1 Ohms. The transmitter power was adjusted such that the unmodulated non-directional current at the base of tower #2 was 7.62 amperes, resulting in a non-directional operating power of 5,000 Watts. This power level was maintained throughout the non-directional measurement program.

A complete set of non-directional field strength measurements was performed along the four monitored radial paths and three additional radial paths. Computer mapping software was used by each measurement engineer in conjunction with a GPS receiver to identify and select measurement locations which were free of local obstructions. Determination of distance and bearing for all measurement locations was accomplished using GPS receivers. All non-directional measurements were performed during the period between two hours following local sunrise and two hours prior to local sunset to minimize the influence of skywave signals.

All field strength measurements contained in this application were performed by the following individuals: Ms. Kyra Ringer, Chief Operator of Station WCOA; Mr. Tom Ringer, contract engineer for Cumulus; Mr. Dale Holden, Chief Operator of Station WABD; Mr. Alan Lane, Chief Operator of Station WHBX; and Mr. Frank Giardina, Chief Operator of Station WJOX. Each of these individuals is experienced in performing field strength measurements on directional antenna systems.

A total of five field strength meters were employed to perform all of the measurements contained in this application. The manufacturer, model number, serial number and date of last calibration for each of the meters are tabulated below:

Manufacturer / Model	Serial No.	Calibration Date
Potomac Instruments / FIM-41	838	August 1992
Potomac Instruments / FIM-41	2008	February 2010
Potomac Instruments / FIM-41	2191	August 2003
Potomac Instruments / FIM-21	1158	November 1996
Potomac Instruments / PI4100	185	January 2022

The performance of the field strength meters was verified in the field by comparing measured signals at various full scale settings and verifying that all meters measured the same field strength within the manufacturers stated accuracy.

Non-directional field strength measurements were analyzed in accordance with the “best fit” method outlined in Section 73.186 of the FCC’s Rules. Graph 17 of Section 73.184 was employed to determine the inverse distance field strengths and conductivity values. A summary of the measured non-directional inverse distance fields associated with the nighttime full proof of performance is contained in Figure 2. A polar plot of the measured non-directional horizontal plane radiation pattern is shown in Figure 3. The measured non-directional field strength data and graphical plots of the data are contained in Figure 5.

NIGHTTIME DIRECTIONAL PATTERN ADJUSTMENT AND FIELD STRENGTH MEASUREMENTS

Upon completion of the non-directional measurement program, nighttime directional antenna system was adjusted, by Cumulus personnel, in accordance with the technical

specifications of the Construction Permit. The theoretical and measured operating parameters for the nighttime antenna system are tabulated in Figure 1. The nighttime common point impedance matching network was adjusted for Z = 50 -j 8.2 Ohms.[1] The common point current was adjusted to 9.75 amperes for an input power of 4,752 Watts. All nighttime directional measurements were performed during the period between two hours following local sunrise and two hours prior to local sunset to minimize the influence of skywave signals. The directional and non-directional field strength measurements were made over a short time interval to minimize the impact of seasonal variations in conductivity.

In order to determine the nighttime directional pattern inverse distance field for each radial bearing, the logarithm of the ratio of directional to non-directional field strength was calculated for each measurement location, and an average logarithm determined for each radial. The antilogarithm of the average was multiplied by the measured non-directional inverse distance field to determine the directional inverse distance field value.

Tabulations and graphical plots of the measured nighttime field strength data are contained in Figure 5. A summary of the measured nighttime directional inverse distance fields is contained in Figure 2. The measured directional horizontal plane radiation pattern is plotted on the polar graph contained in Figure 4.

MONITORING POINT LOCATIONS

The WCOA construction permit specifies four nighttime monitored radials; 18.4°, 201.6°, 276.6°, and 303.4°. Monitoring point locations were established during the nighttime directional proof of performance on each of the nighttime monitored radials. Photographs and detailed

[1] The reactance has been corrected for the operating frequency of 1370 kHz. The actual in-line bridge indicates a reactance of –j 6 Ohms.

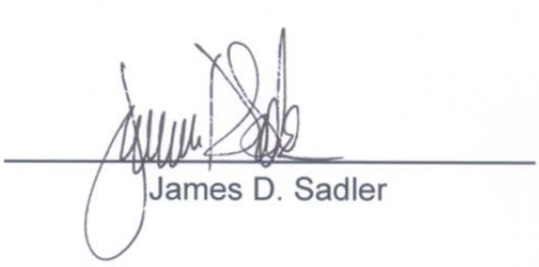
descriptions of each of the monitoring point locations are provided in Figure 6. Data pertinent to the establishment of the maximum field strength values at each of the daytime monitoring point locations are tabulated in Figure 7.

SUMMARY

It is submitted that the WCOA nighttime directional antenna system has been modified and adjusted in accordance with the technical specifications contained in FCC Construction Permit BP-20120319AAJ and all conditions of the construction permit have been satisfied.

This engineering statement, FCC Form 302-AM, Section III, and the attached figures were prepared by the undersigned or under the direct supervision of the undersigned and are believed to be true and correct.

Dated: May 27, 2022



TABULATION OF OPERATING PARAMETERS
STATION WCOA – PENSACOLA, FLORIDA
1370 kHz –5 kW-D, 4.4 kW-N, U, DA-N

Daytime Non-Directional Operation

Tower 2 Base Resistance (Ohms)	86
Tower 2 Base Current (amperes)	7.62
Antenna Input Power (Watts)	5,000

Nighttime Directional

	Tower 1	Tower 2	Tower 3
Theoretical Field Ratio	1.00	1.07	0.57
Theoretical Phase (deg.)	0.0	+135.0	-90.0
Spacing (deg.)	0.0	90.0	180.0
Orientation (deg. T)	0	290.0	290.0
Antenna Monitor Ratio	0.89	1.00	0.58
Antenna Monitor Phase (deg.)	-131.0	0.0	+139.0

Common Point Resistance (Ohms)	50.0
Common Point Current (amperes)	9.75
Antenna Input Power (Watts)	4,752

SUMMARY OF NIGHTTIME MEASURED FIELD STRENGTH DATA

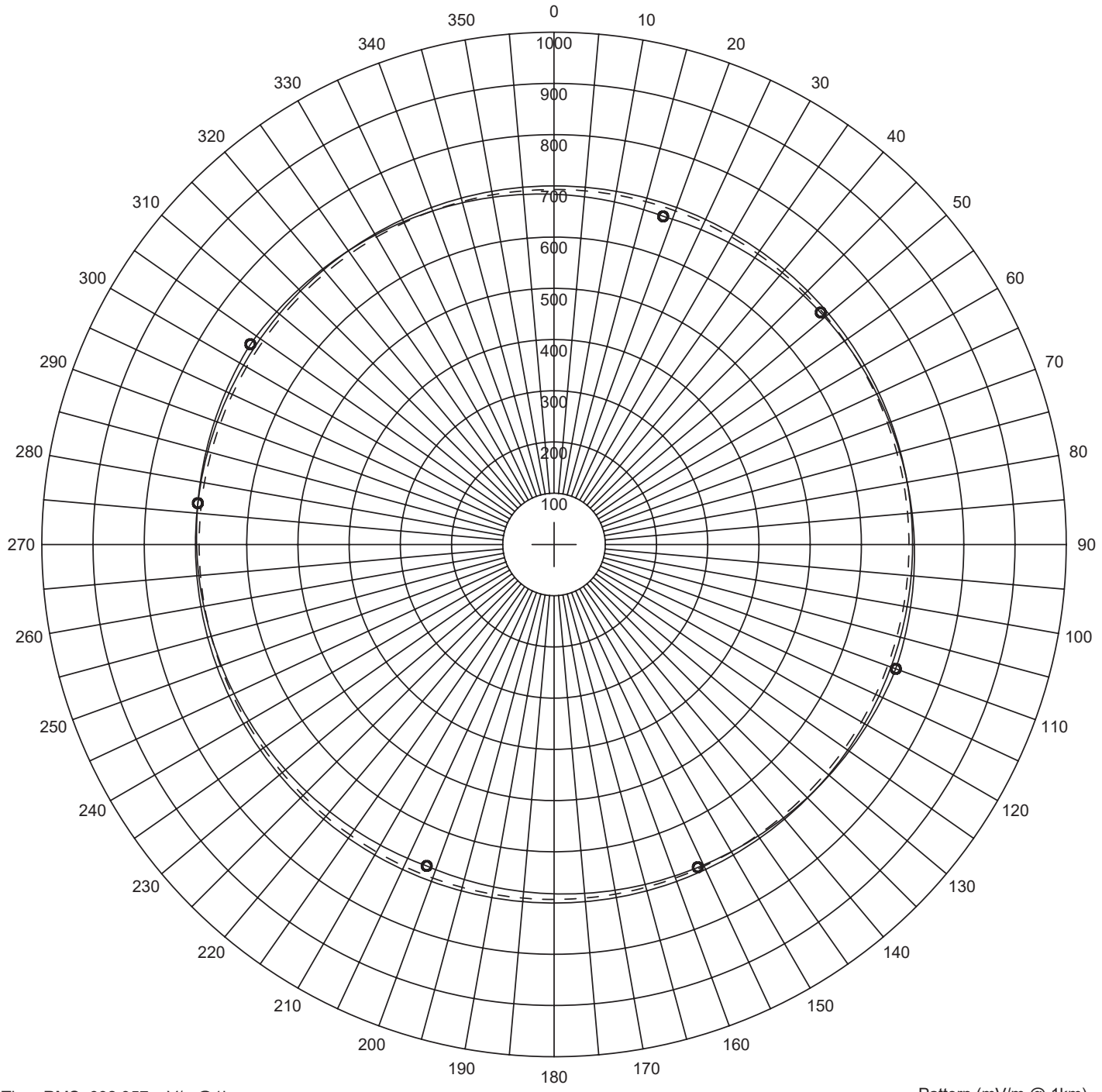
STATION WCOA - PENSACOLA, FLORIDA

1370 kHz, 5 kW-D, 4.4 kW-N, U, DA-N

Monitored Radial (deg. T.)	Daytime 5 kW ND Inverse Distance Field Strength (mV/m at 1 km)	DA-N/ND Antilog of Average Ratio	DA-N Measured Inverse Distance Field Strength (mV/m at 1 km)	Nighttime Standard Pattern Radiation (mV/m at 1 km)
18.4*	675.0	0.2379	160.6	194.0
49	690.0	0.9596	662.1	709.6
110	710.0	1.8604	1320.9	1395.9
156	690.0	1.1779	812.8	1012.3
201.6*	675.0	0.2345	158.3	194.0
276.6*	700.0	0.2617	183.2	194.0
303.4*	710.0	0.2330	165.5	194.0

*Monitored Radial

Figure 3



Theo RMS: 692.957 mV/m@1km
Meas RMS: 692.575 mV/m@1km

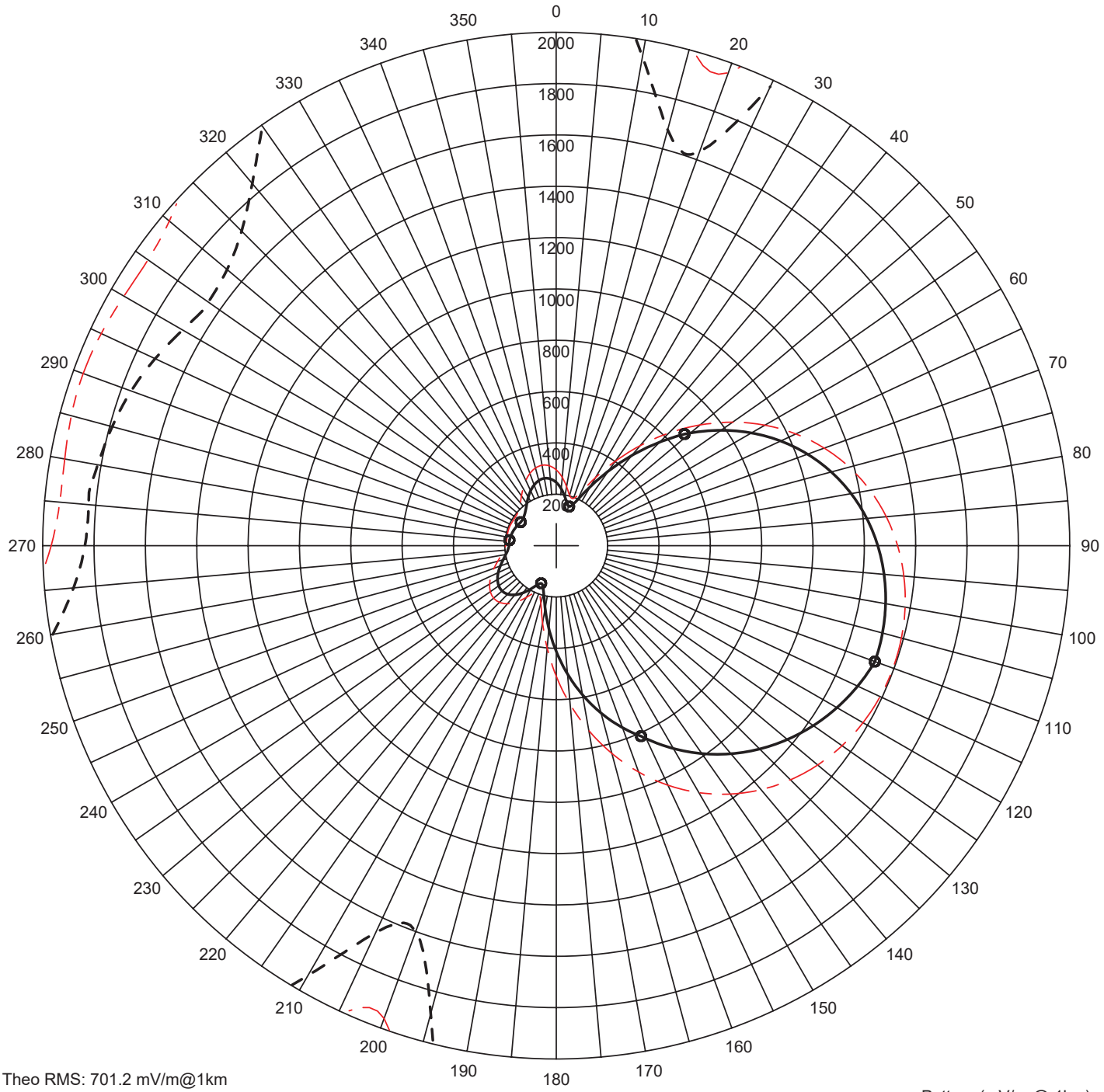
– – – – Pattern (mV/m @ 1km)
———— Meas Pat (mV/m@1km)

#	Field Ratio	Phase (deg)	Spacing (deg)	Orient (deg)	Height (deg)	Ref Swtch	TL Swtch	A (deg)	B (deg)	C (deg)	D (deg)
2	1.000	0.0	0.0	0.0	96.3	0	0	0.0	0.0	0.0	0.0

MEASURED NON-DIRECTIONAL HORIZONTAL PLANE RADIATION PATTERN
STATION WCOA - PENSACOLA, FLORIDA
1370 kHz - 5 kW-D, 4.4 kW-N, U, DA-N
MAY, 2022

Site Coordinates:
Lat: 30-26-58 N
Lng: 087-15-47 W
Tower Number 2
Power: 5.0 kW

Figure 4



Theo RMS: 701.2 mV/m@1km
Std RMS: 736.681 mV/m@1km
Meas RMS: 664.479 mV/m@1km
Q: 23.724 mV/m@1km

Pattern (mV/m @ 1km)
Meas Pat (mV/m@1km)
Pattern X10
Meas Pat X10

#	Field Ratio	Phase (deg)	Spacing (deg)	Orient (deg)	Height (deg)	Ref Swtch	TL Swtch	A (deg)	B (deg)	C (deg)	D (deg)
1	0.890	-131.0	0.0	0.0	96.3	0	0	0.0	0.0	0.0	0.0
2	1.000	0.0	90.0	290.0	96.3	0	0	0.0	0.0	0.0	0.0
3	0.580	139.0	180.0	290.0	96.3	0	0	0.0	0.0	0.0	0.0

Site Coordinates:

Lat: 30-26-58 N
Lng: 087-15-47 W

MEASURED AND AUTHORIZED NIGHTTIME DIRECTIONAL
HORIZONTAL PLANE RADIATION PATTERN
STATION WCOA - PENSACOLA, FLORIDA
1370 kHz - 5 kW-D, 4.4 kW-N, U, DA-N
MAY, 2022

TABULATION OF FIELD STRENGTH MEASUREMENT DATA
STATION WCOA - PENNSACOLA, FLORIDA
1370 kHz, 5 kW-D, 4.4 kW-N, U, DA-N

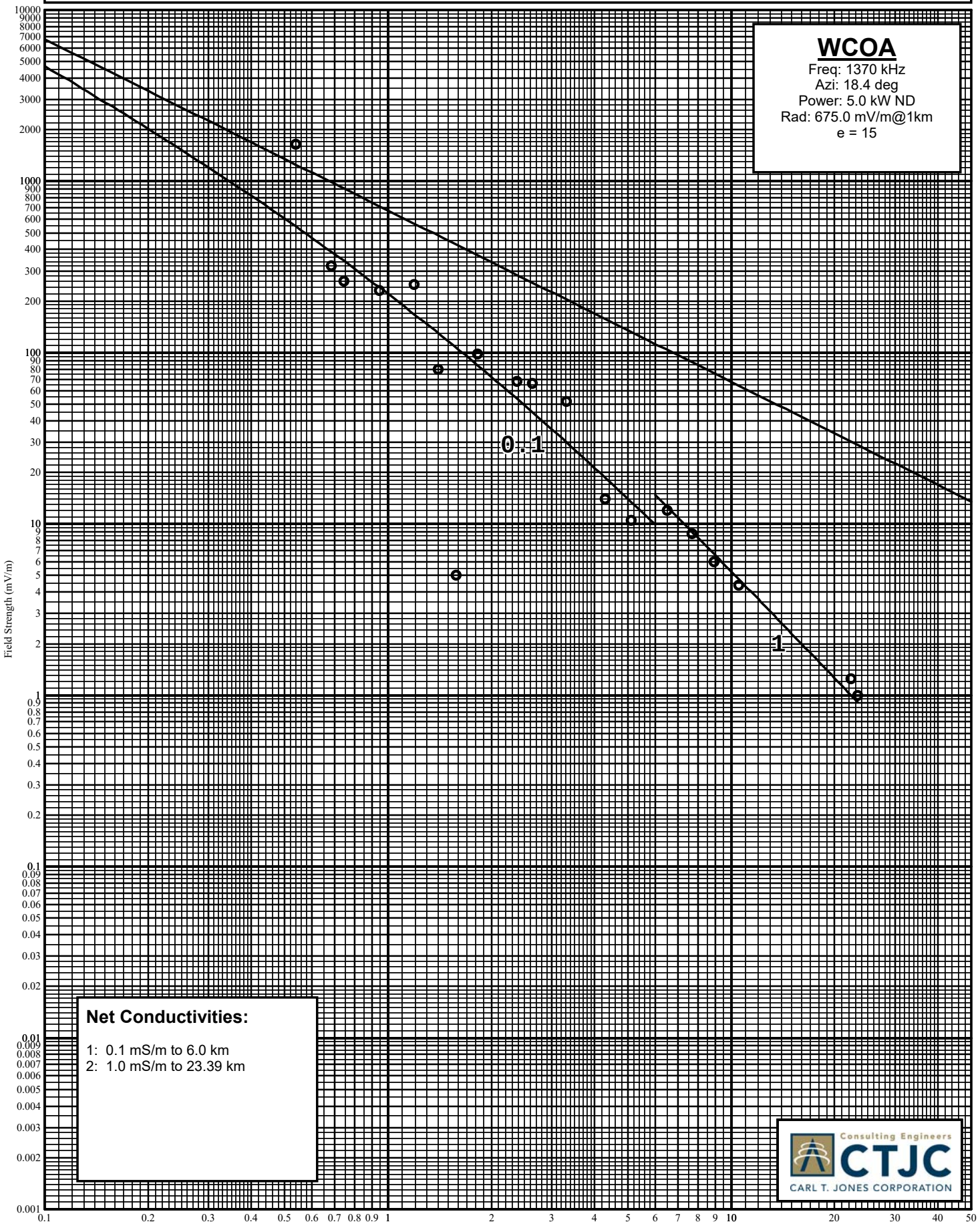
18.4 Degrees True Radial

		5 kW, ND			4.4 kW, DA-N				
Point Number	Distance (kilometers)	Date	Time (local)	Field Strength (mV/m)	Date	Time (local)	Field Strength (mV/m)	Ratio (DA-N/ND)	Log Ratio (DA-N/ND)
1	0.54	2/8/2022	1002	1650	- - -	- - -	- - -	- - -	- - -
2	0.68	2/8/2022	1008	320	- - -	- - -	- - -	- - -	- - -
3	0.74	2/8/2022	1015	260	- - -	- - -	- - -	- - -	- - -
4	0.95	2/8/2022	1022	230	- - -	- - -	- - -	- - -	- - -
5	1.19	2/8/2022	1030	250	- - -	- - -	- - -	- - -	- - -
6	1.40	2/8/2022	1035	80	- - -	- - -	- - -	- - -	- - -
7	1.58	2/8/2022	1040	5	- - -	- - -	- - -	- - -	- - -
8	1.82	2/8/2022	1048	98	- - -	- - -	- - -	- - -	- - -
9	2.38	2/8/2022	1050	68	2/9/2022	1129	11.5	0.1691	-0.7718
10	2.63	2/8/2022	1057	66	2/10/2022	1328	11.4	0.1727	-0.7626
11	3.31	2/8/2022	1108	52	2/9/2022	1135	11.4	0.2192	-0.6591
12 MP	4.29	2/8/2022	1117	14	2/9/2022	1143	3.85	0.2750	-0.5607
13	5.11	2/8/2022	1151	10.5	2/9/2022	1149	2.96	0.2819	-0.5499
14	6.52	2/8/2022	1209	12	2/9/2022	1200	3.00	0.2500	-0.6021
15	7.69	2/8/2022	1211	8.8	2/9/2022	1207	2.70	0.3068	-0.5131
16	8.90	2/8/2022	1219	6	2/9/2022	1211	1.66	0.2767	-0.5580
17	10.52	2/8/2022	1230	4.4	2/9/2022	1220	1.04	0.2364	-0.6264
18	22.35	2/8/2022	1300	1.25	2/9/2022	1309	0.33	0.2640	-0.5784
19	23.39	2/8/2022	1315	1	2/9/2022	1318	0.21	0.2100	-0.6778
							Average Ratio	0.2420	-0.6236
							Antilog of Average		0.2379

WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

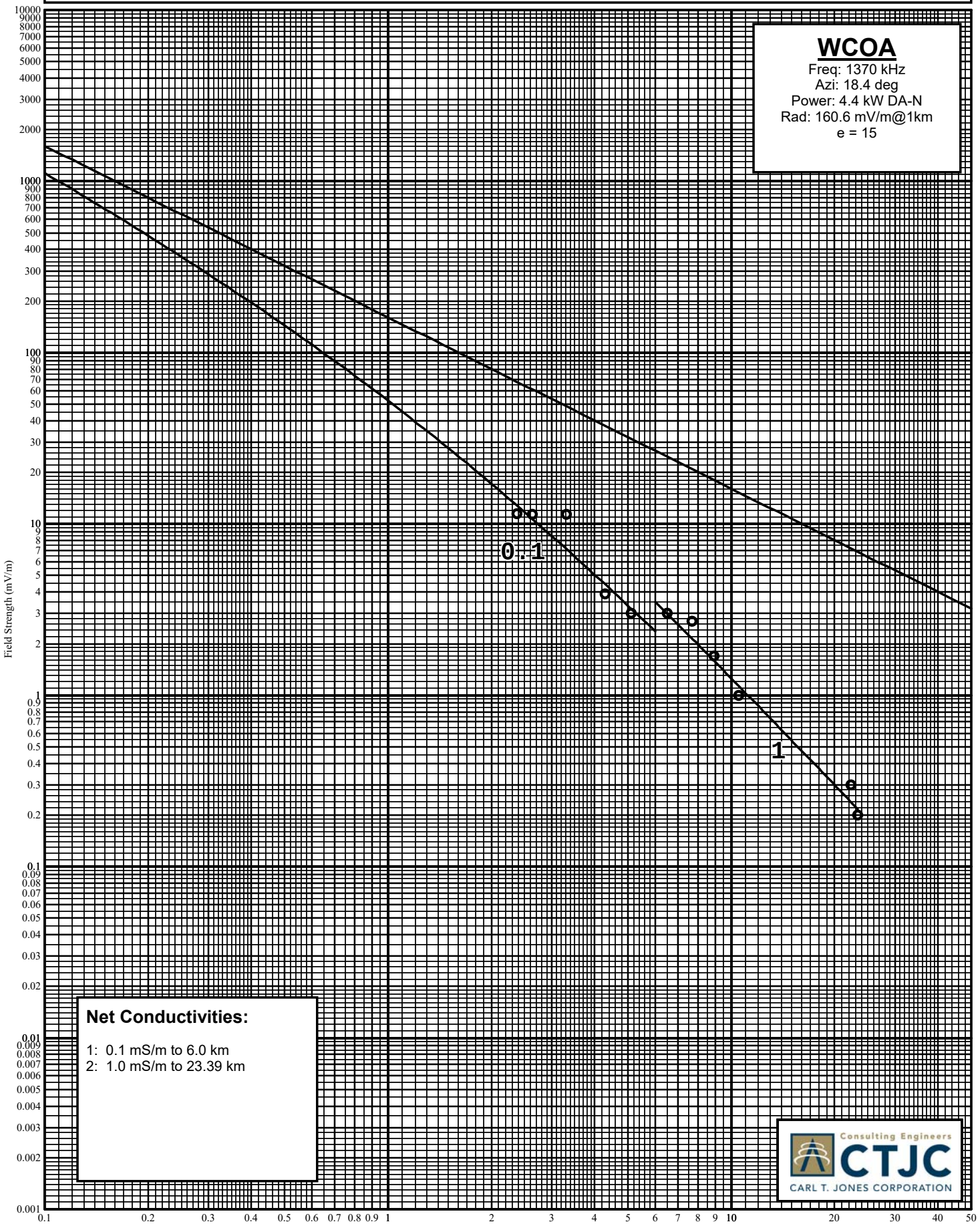
Figure 5
Sheet 2 of 22



WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

Figure 5
Sheet 3 of 22



TABULATION OF FIELD STRENGTH MEASUREMENT DATA
STATION WCOA - PENNSACOLA, FLORIDA
1370 kHz, 5 kW-D, 4.4 kW-N, U, DA-N

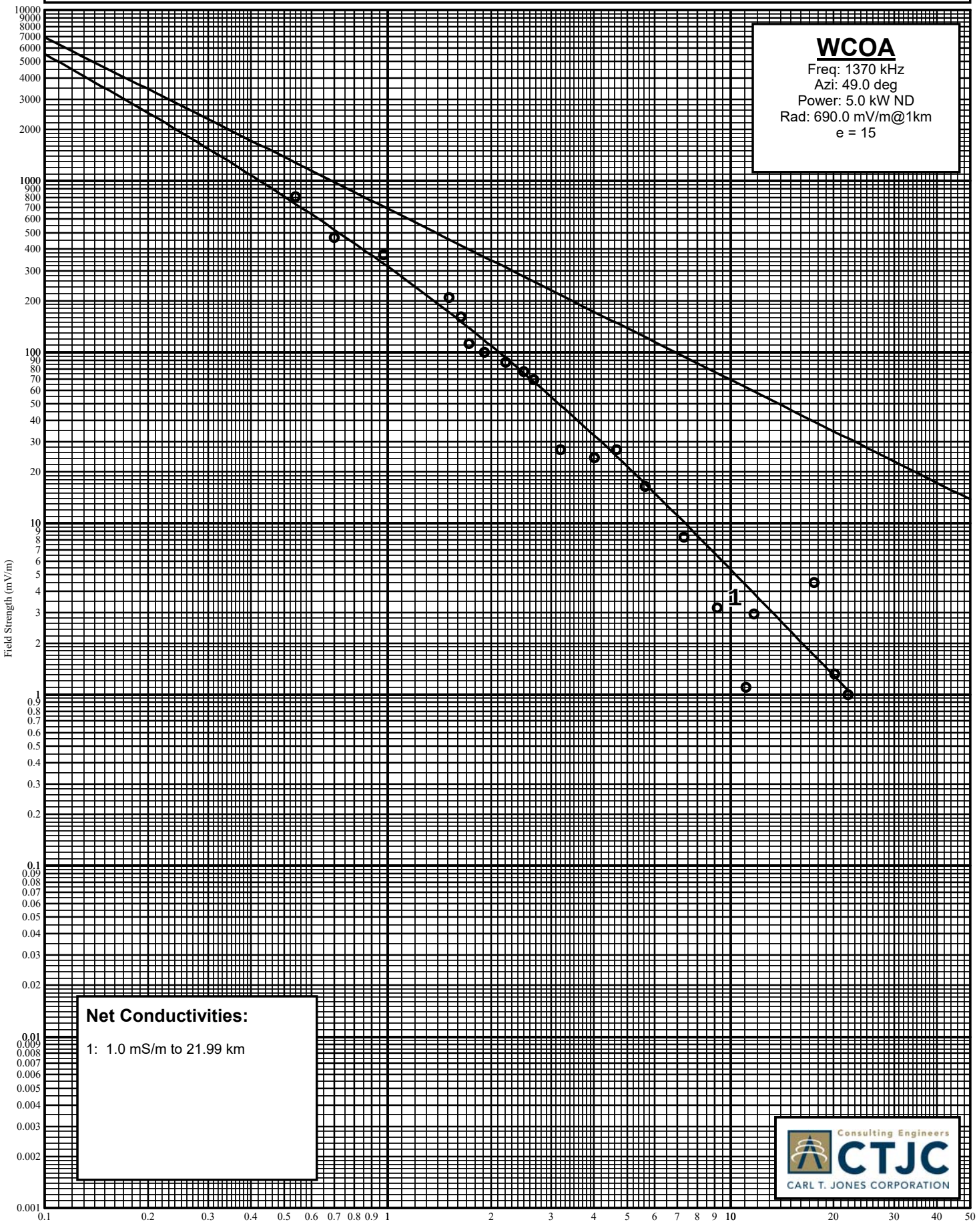
49 Degrees True Radial

		5 kW, ND			4.4 kW, DA-N				
Point Number	Distance (kilometers)	Date	Time (local)	Field Strength (mV/m)	Date	Time (local)	Field Strength (mV/m)	Ratio (DA-N/ND)	Log Ratio (DA-N/ND)
1	0.54	2/8/2022	1006	810	- - -	- - -	- - -	- - -	- - -
2	0.70	2/8/2022	1012	470	- - -	- - -	- - -	- - -	- - -
3	0.97	2/8/2022	1022	370	- - -	- - -	- - -	- - -	- - -
4	1.51	2/8/2022	1031	209	- - -	- - -	- - -	- - -	- - -
5	1.64	2/8/2022	1039	161	- - -	- - -	- - -	- - -	- - -
6	1.73	2/8/2022	1043	112	- - -	- - -	- - -	- - -	- - -
7	1.92	2/8/2022	1047	100	- - -	- - -	- - -	- - -	- - -
8	2.21	2/8/2022	1052	87	- - -	- - -	- - -	- - -	- - -
9	2.49	2/8/2022	1056	77	- - -	- - -	- - -	- - -	- - -
10	2.67	2/8/2022	1104	69	- - -	- - -	- - -	- - -	- - -
11	3.20	2/9/2022	833	27	2/9/2022	1230	31.7	1.1741	0.0697
12	4.02	2/9/2022	847	24.1	2/9/2022	1223	19.8	0.8195	-0.0864
13	4.66	2/9/2022	856	26.9	2/9/2022	1211	23.4	0.8699	-0.0605
14	5.64	2/9/2022	902	16.5	2/9/2022	1205	14.0	0.8485	-0.0714
15	7.32	2/9/2022	911	8.3	2/9/2022	1159	9.60	1.1566	0.0632
16	9.16	2/9/2022	924	3.2	2/9/2022	1149	3.74	1.1688	0.0677
17	11.11	2/9/2022	933	1.1	2/9/2022	1141	2.07	1.8818	0.2746
18	11.69	2/10/2022	1341	2.96	2/10/2022	1345	2.30	0.7770	-0.1096
19	17.53	2/9/2022	1015	4.5	2/9/2022	1117	3.54	0.7867	-0.1042
20	20.15	2/9/2022	1020	1.32	2/9/2022	1111	1.04	0.7879	-0.1035
21	21.99	2/9/2022	1030	1	2/9/2022	1102	0.73	0.7300	-0.1367
							Average Ratio	1.0001	-0.0179
							Antilog of Average		0.9596

WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

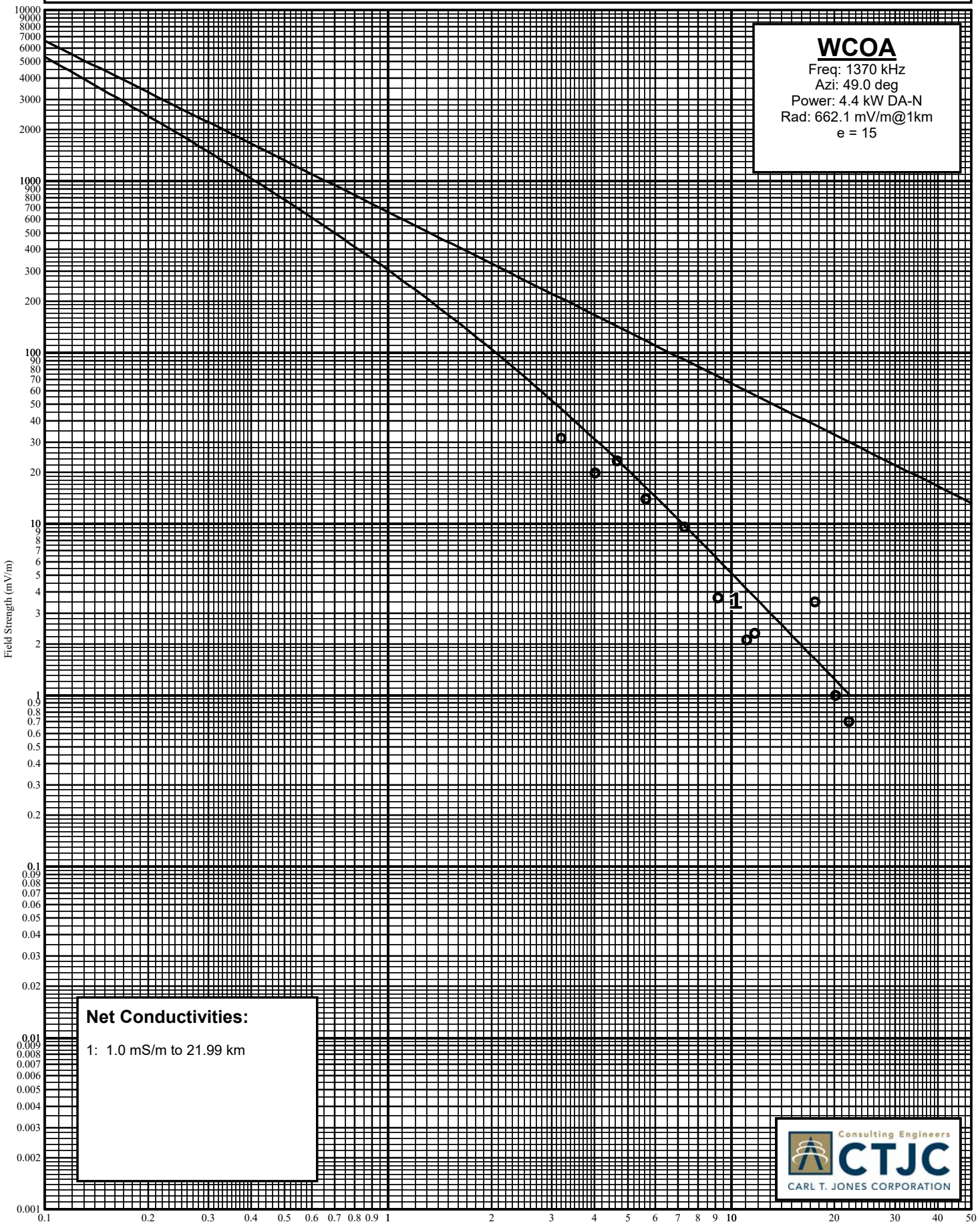
Figure 5
Sheet 5 of 22



WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

Figure 5
Sheet 6 of 22



TABULATION OF FIELD STRENGTH MEASUREMENT DATA
STATION WCOA - PENNSACOLA, FLORIDA
1370 kHz, 5 kW-D, 4.4 kW-N, U, DA-N

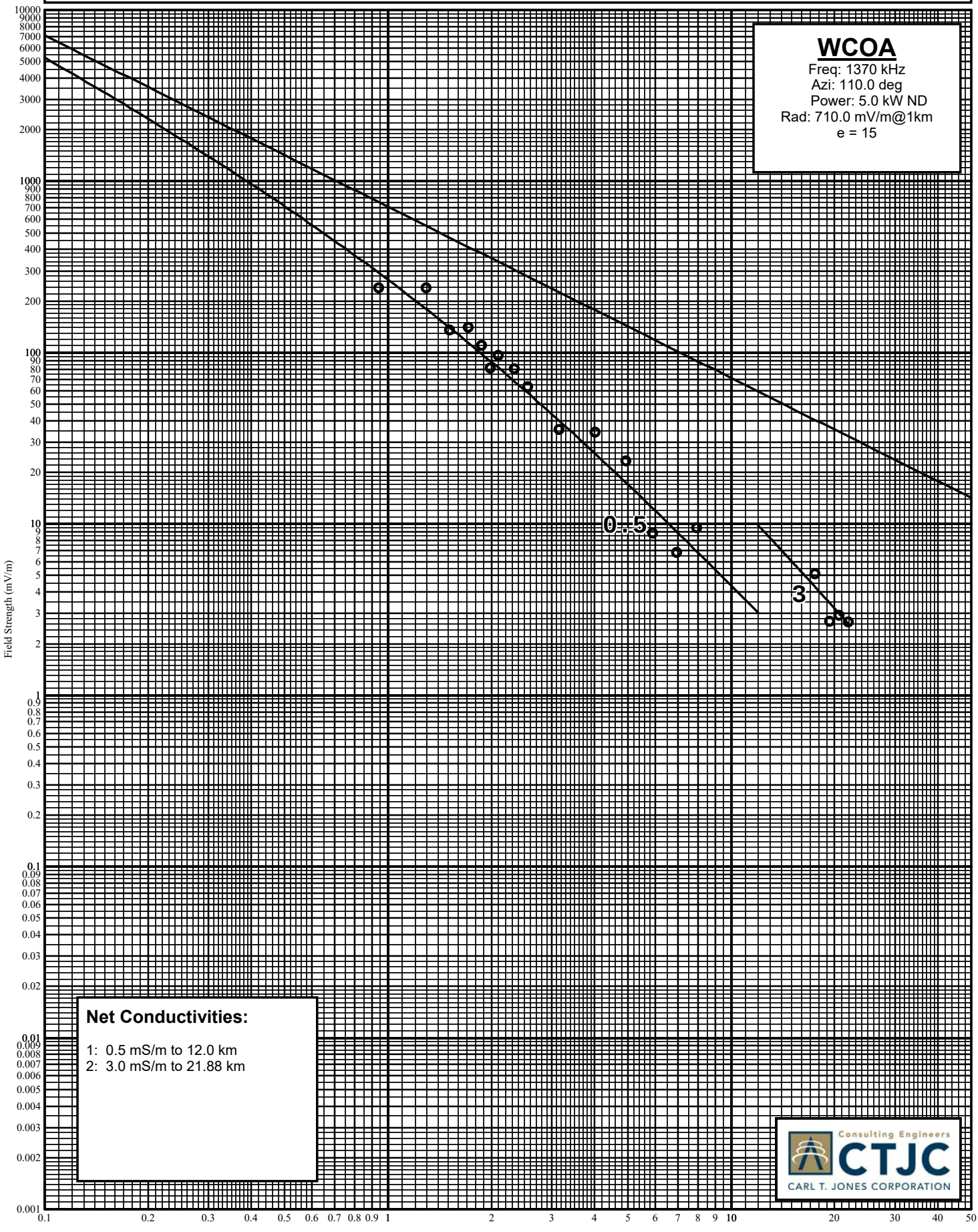
110 Degrees True Radial

		5 kW, ND			4.4 kW, DA-N				
Point Number	Distance (kilometers)	Date	Time (local)	Field Strength (mV/m)	Date	Time (local)	Field Strength (mV/m)	Ratio (DA-N/ND)	Log Ratio (DA-N/ND)
1	0.93	2/8/2022	1006	238	- - -	- - -	- - -	- - -	- - -
2	1.29	2/8/2022	1011	238	- - -	- - -	- - -	- - -	- - -
3	1.51	2/8/2022	1017	136	- - -	- - -	- - -	- - -	- - -
4	1.71	2/8/2022	1021	141	- - -	- - -	- - -	- - -	- - -
5	1.87	2/8/2022	1025	110	- - -	- - -	- - -	- - -	- - -
6	1.99	2/8/2022	1029	81.2	- - -	- - -	- - -	- - -	- - -
7	2.10	2/8/2022	1032	96	- - -	- - -	- - -	- - -	- - -
8	2.33	2/8/2022	1036	80.2	- - -	- - -	- - -	- - -	- - -
9	2.55	2/8/2022	1041	63.1	- - -	- - -	- - -	- - -	- - -
10	3.15	2/8/2022	1047	35.7	2/9/2022	1207	61	1.7087	0.2327
11	4.02	2/8/2022	1055	34.3	2/9/2022	1213	58	1.6910	0.2281
12	4.94	2/8/2022	1102	23.4	2/9/2022	1217	37.5	1.6026	0.2048
13	5.89	2/8/2022	1109	8.85	2/9/2022	1222	14.9	1.6836	0.2262
14	6.92	2/8/2022	1117	6.83	2/9/2022	1237	15.4	2.2548	0.3531
15	7.92	2/10/2022	1126	9.53	2/9/2022	1231	18.5	1.9412	0.2881
16	17.55	2/8/2022	1207	5.13	2/9/2022	1305	10.5	2.0468	0.3111
17	19.33	2/8/2022	1221	2.71	2/9/2022	1312	5.30	1.9557	0.2913
18	20.58	2/8/2022	1233	2.93	2/9/2022	1317	5.60	1.9113	0.2813
19	21.88	2/8/2022	1243	2.68	2/9/2022	1324	5.10	1.9030	0.2794
							Average Ratio	1.8699	0.2696
							Antilog of Average		1.8604

WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

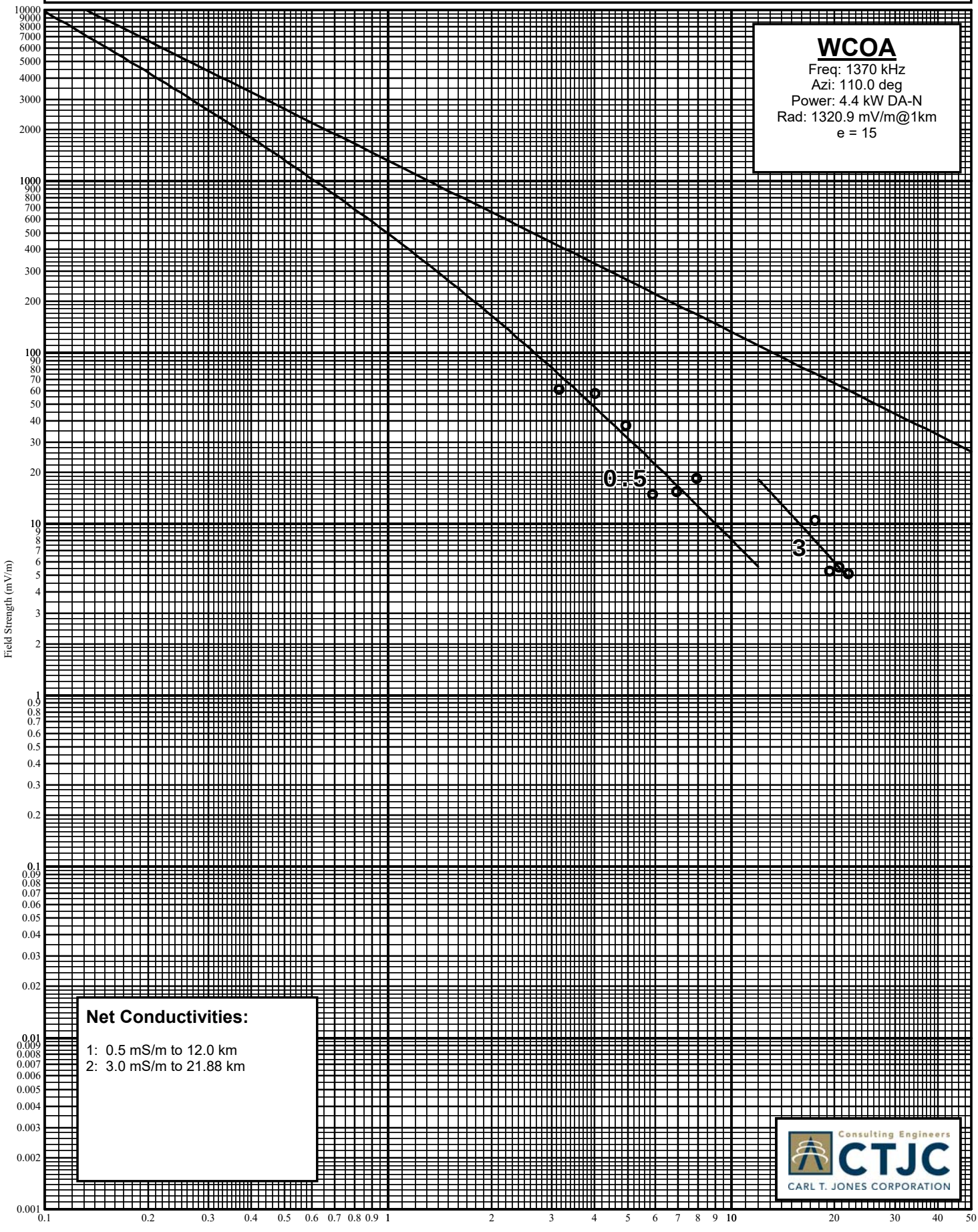
Figure 5
Sheet 8 of 22



WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

Figure 5
Sheet 9 of 22



TABULATION OF FIELD STRENGTH MEASUREMENT DATA
STATION WCOA - PENNSACOLA, FLORIDA
1370 kHz, 5 kW-D, 4.4 kW-N, U, DA-N

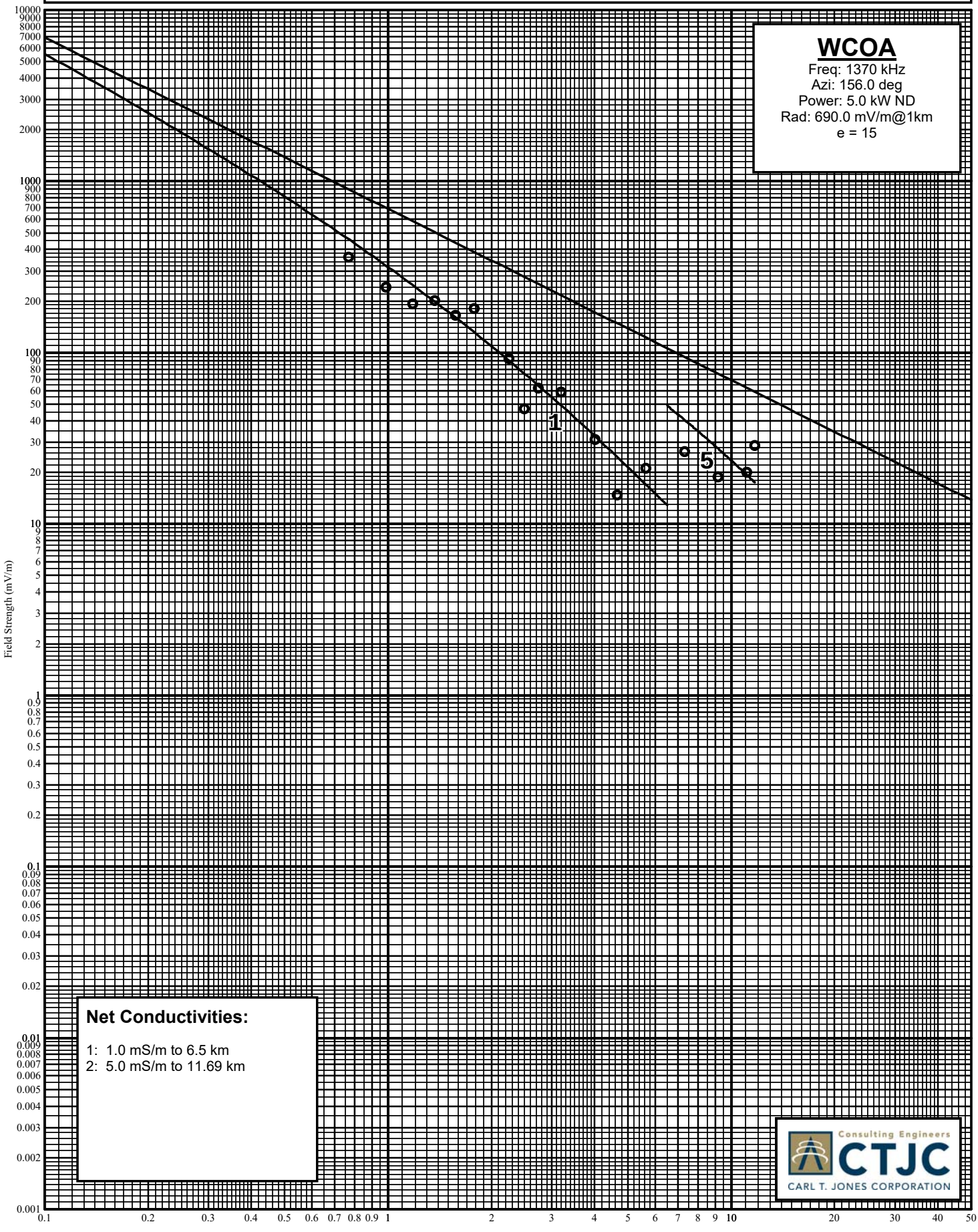
156 Degrees True Radial

		5 kW, ND			4.4 kW, DA-N				
Point Number	Distance (kilometers)	Date	Time (local)	Field Strength (mV/m)	Date	Time (local)	Field Strength (mV/m)	Ratio (DA-N/ND)	Log Ratio (DA-N/ND)
1	0.77	2/8/2022	923	360	- - -	- - -	- - -	- - -	- - -
2	0.98	2/8/2022	926	240	- - -	- - -	- - -	- - -	- - -
3	1.18	2/8/2022	940	193	- - -	- - -	- - -	- - -	- - -
4	1.37	2/8/2022	959	202	- - -	- - -	- - -	- - -	- - -
5	1.57	2/8/2022	1014	165	- - -	- - -	- - -	- - -	- - -
6	1.78	2/8/2022	1021	180	- - -	- - -	- - -	- - -	- - -
7	2.25	2/8/2022	1040	92	- - -	- - -	- - -	- - -	- - -
8	2.50	2/8/2022	1055	47	- - -	- - -	- - -	- - -	- - -
9	2.74	2/8/2022	1102	62	- - -	- - -	- - -	- - -	- - -
10	3.20	2/9/2022	831	58.7	2/9/2022	1120	65	1.1073	0.0443
11	4.02	2/9/2022	837	31	2/9/2022	1131	37	1.1935	0.0768
12	4.66	2/9/2022	842	14.8	2/9/2022	1135	17.5	1.1824	0.0728
13	5.64	2/9/2022	847	21.1	2/9/2022	1138	24.1	1.1422	0.0577
14	7.32	2/9/2022	851	26.5	2/9/2022	1142	30.7	1.1585	0.0639
15	9.16	2/9/2022	855	18.8	2/9/2022	1145	22.6	1.2021	0.0800
16	11.11	2/9/2022	901	20	2/9/2022	1150	25.1	1.2550	0.0986
17	11.69	2/9/2022	905	28.7	2/9/2022	1153	34.1	1.1882	0.0749
							Average Ratio	1.1787	0.0711
							Antilog of Average		1.1779

WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

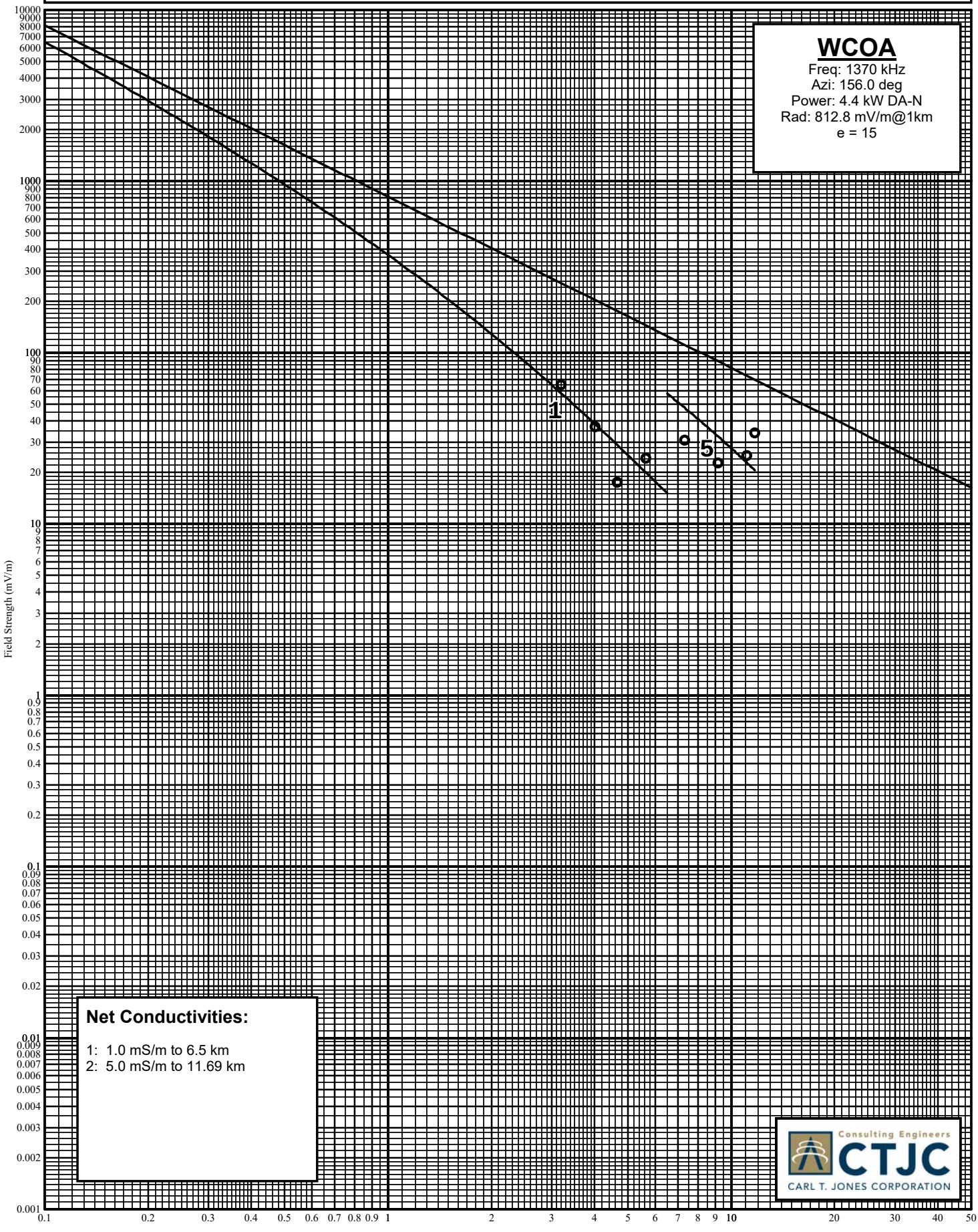
Figure 5
Sheet 11 of 22



WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

Figure 5
Sheet 12 of 22



TABULATION OF FIELD STRENGTH MEASUREMENT DATA
STATION WCOA - PENNSACOLA, FLORIDA
1370 kHz, 5 kW-D, 4.4 kW-N, U, DA-N

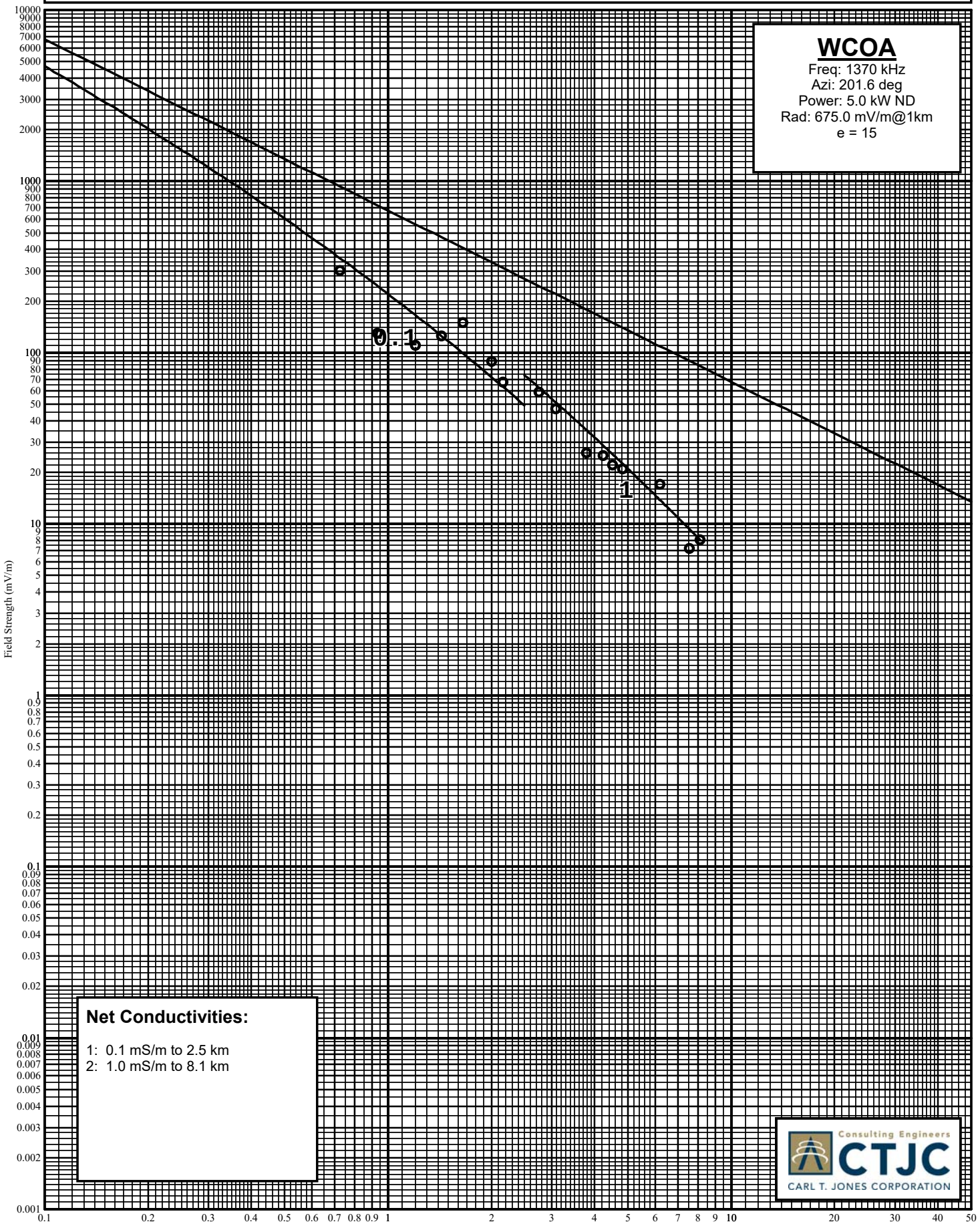
201.6 Degrees True Radial

		5 kW, ND			4.4 kW, DA-N				
Point Number	Distance (kilometers)	Date	Time (local)	Field Strength (mV/m)	Date	Time (local)	Field Strength (mV/m)	Ratio (DA-N/ND)	Log Ratio (DA-N/ND)
1	0.72	2/8/2022	1140	301	- - -	- - -	- - -	- - -	- - -
2	0.93	2/8/2022	1151	130	- - -	- - -	- - -	- - -	- - -
3	1.20	2/8/2022	1202	110	- - -	- - -	- - -	- - -	- - -
4	1.43	2/8/2022	1210	125	- - -	- - -	- - -	- - -	- - -
5	1.65	2/8/2022	1218	150	- - -	- - -	- - -	- - -	- - -
6	2.00	2/8/2022	1223	89	- - -	- - -	- - -	- - -	- - -
7	2.16	2/8/2022	1232	67	- - -	- - -	- - -	- - -	- - -
8	2.76	2/8/2022	1240	59	2/9/2022	1110	10.4	0.1763	-0.7538
9	3.08	2/8/2022	1256	47	2/9/2022	1120	11.4	0.2426	-0.6152
10 MP	3.79	2/8/2022	1304	26	2/9/2022	1126	7.50	0.2885	-0.5399
11	4.24	2/8/2022	1318	25	2/9/2022	1142	6.00	0.2400	-0.6198
12	4.50	2/8/2022	1324	22	2/9/2022	1153	6.80	0.3091	-0.5099
13	4.83	2/8/2022	1338	21	2/9/2022	1201	4.80	0.2286	-0.6410
14	6.20	2/8/2022	1351	17	2/9/2022	1251	3.65	0.2147	-0.6682
15	7.54	2/8/2022	1420	7.2	2/9/2022	1310	1.45	0.2014	-0.6960
16	8.10	2/8/2022	1435	8.1	2/9/2022	1325	1.92	0.2370	-0.6252
							Average Ratio	0.2376	-0.6299
							Antilog of Average		0.2345

WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

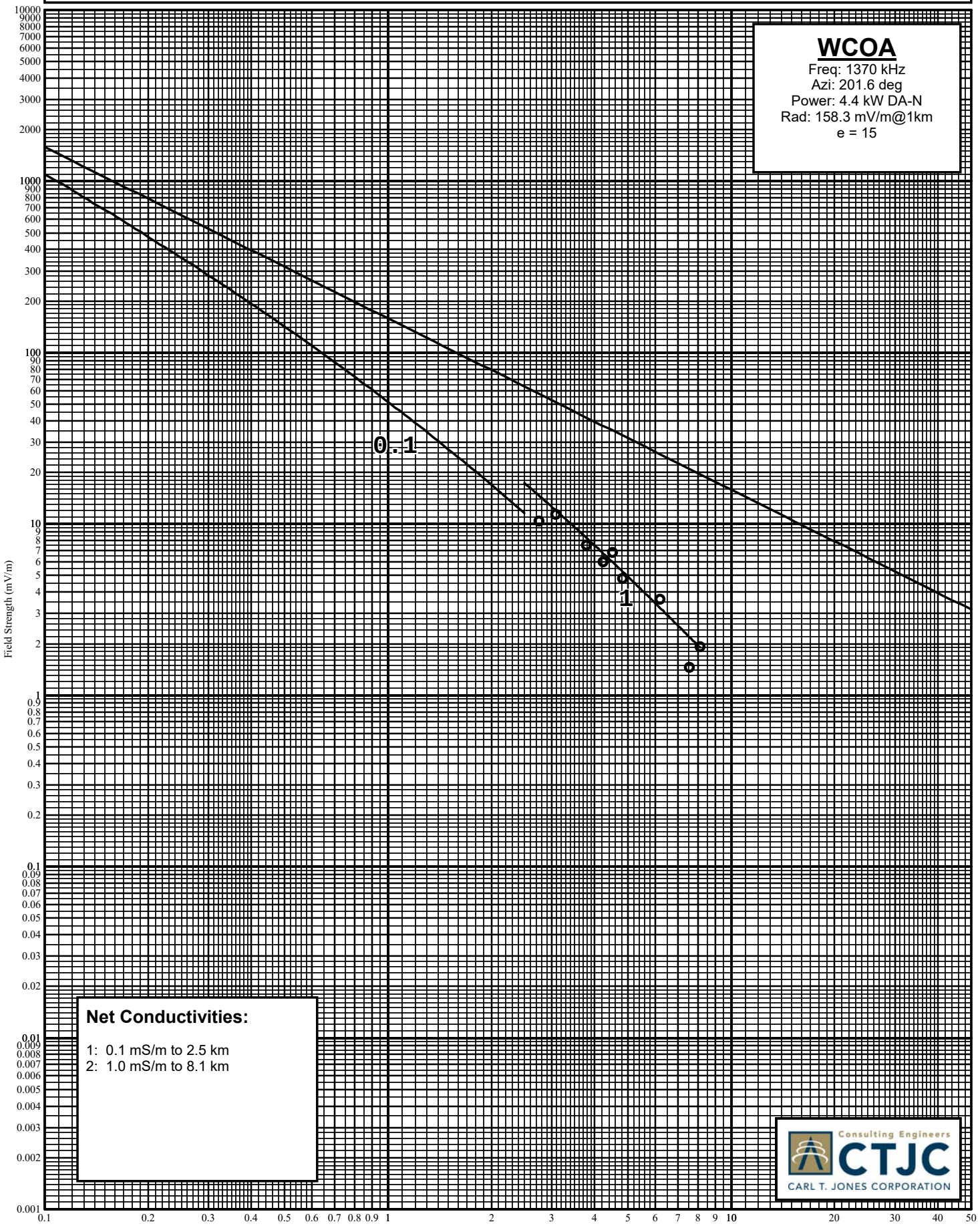
Figure 5
Sheet 14 of 22



WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

Figure 5
Sheet 15 of 22



TABULATION OF FIELD STRENGTH MEASUREMENT DATA
STATION WCOA - PENNSACOLA, FLORIDA
1370 kHz, 5 kW-D, 4.4 kW-N, U, DA-N

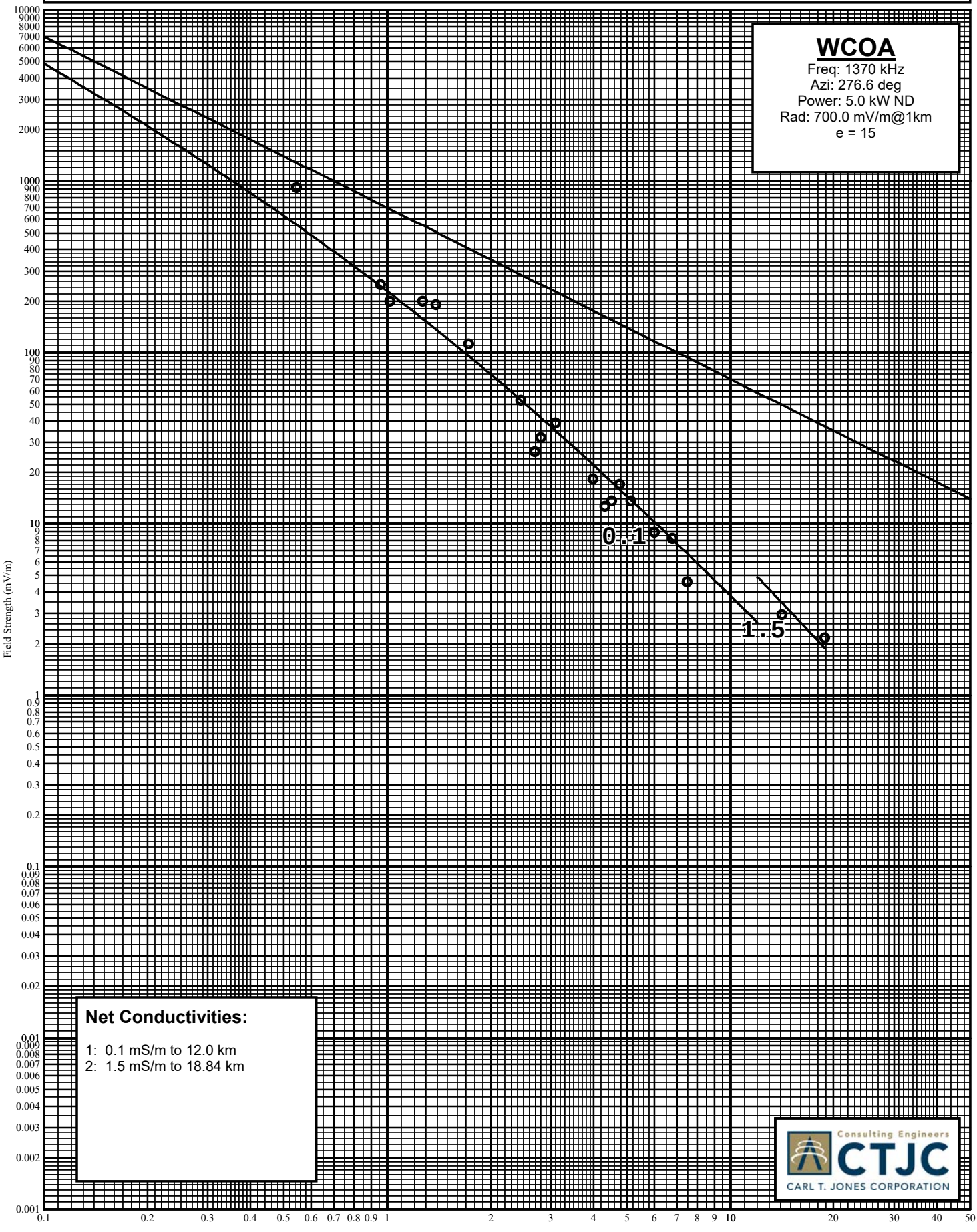
276.6 Degrees True Radial

		5 kW, ND			4.4 kW, DA-N				
Point Number	Distance (kilometers)	Date	Time (local)	Field Strength (mV/m)	Date	Time (local)	Field Strength (mV/m)	Ratio (DA-N/ND)	Log Ratio (DA-N/ND)
1	0.54	2/8/2022	1004	920	- - -	- - -	- - -	- - -	- - -
2	0.96	2/8/2022	1015	250	- - -	- - -	- - -	- - -	- - -
3	1.02	2/8/2022	1019	200	- - -	- - -	- - -	- - -	- - -
4	1.27	2/8/2022	1026	200	- - -	- - -	- - -	- - -	- - -
5	1.39	2/8/2022	1029	190	- - -	- - -	- - -	- - -	- - -
6	1.73	2/8/2022	1032	112	- - -	- - -	- - -	- - -	- - -
7	2.45	2/8/2022	1038	53	- - -	- - -	- - -	- - -	- - -
8	2.69	2/8/2022	1043	26.5	- - -	- - -	- - -	- - -	- - -
9	2.80	2/8/2022	1046	32	- - -	- - -	- - -	- - -	- - -
10	3.10	2/8/2022	1054	39	2/9/2022	1324	10.9	0.2795	-0.5536
11 MP	3.97	2/8/2022	1155	18.3	2/9/2022	1317	4.70	0.2568	-0.5904
12	4.31	2/8/2022	1204	12.7	2/9/2022	1313	3.95	0.3110	-0.5072
13	4.50	2/8/2022	1209	13.6	2/9/2022	1305	3.20	0.2353	-0.6284
14	4.75	2/8/2022	1216	17.1	2/9/2022	1258	4.30	0.2515	-0.5995
15	5.14	2/8/2022	1227	13.6	2/9/2022	1251	3.20	0.2353	-0.6284
16	6.01	2/8/2022	1236	8.9	2/9/2022	1245	2.70	0.3034	-0.5180
17	6.78	2/8/2022	1252	8.2	2/9/2022	1240	2.08	0.2537	-0.5958
18	7.49	2/8/2022	1259	4.6	2/9/2022	1236	1.25	0.2717	-0.5658
19	14.15	2/8/2022	1340	2.95	2/9/2022	1209	0.77	0.2610	-0.5833
20	18.84	2/8/2022	1450	2.15	2/9/2022	1100	0.50	0.2326	-0.6335
							Average Ratio	0.2629	-0.5822
							Antilog of Average		0.2617

WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

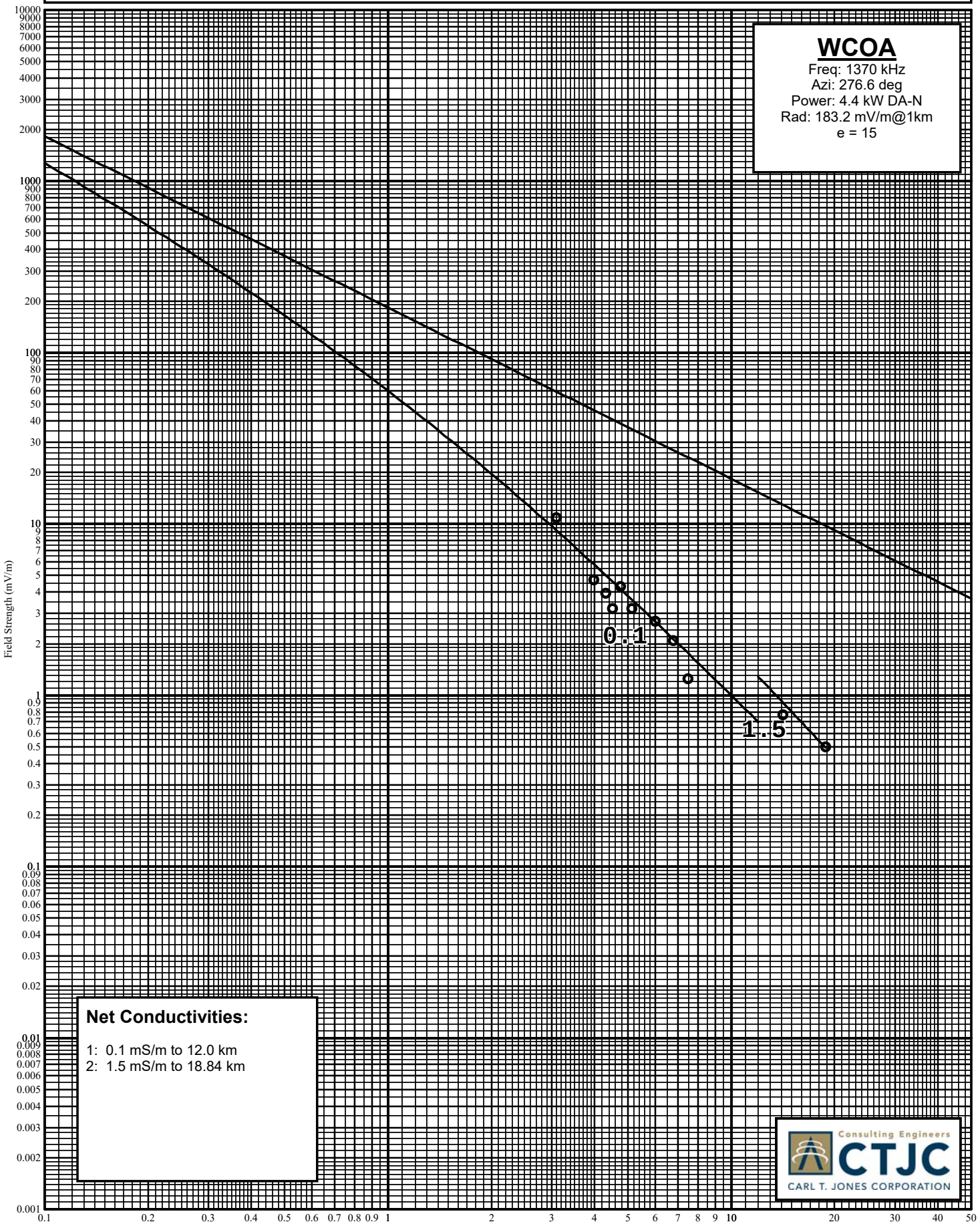
Figure 5
Sheet 17 of 22



WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

Figure 5
Sheet 18 of 22



TABULATION OF FIELD STRENGTH MEASUREMENT DATA
STATION WCOA - PENNSACOLA, FLORIDA
1370 kHz, 5 kW-D, 4.4 kW-N, U, DA-N

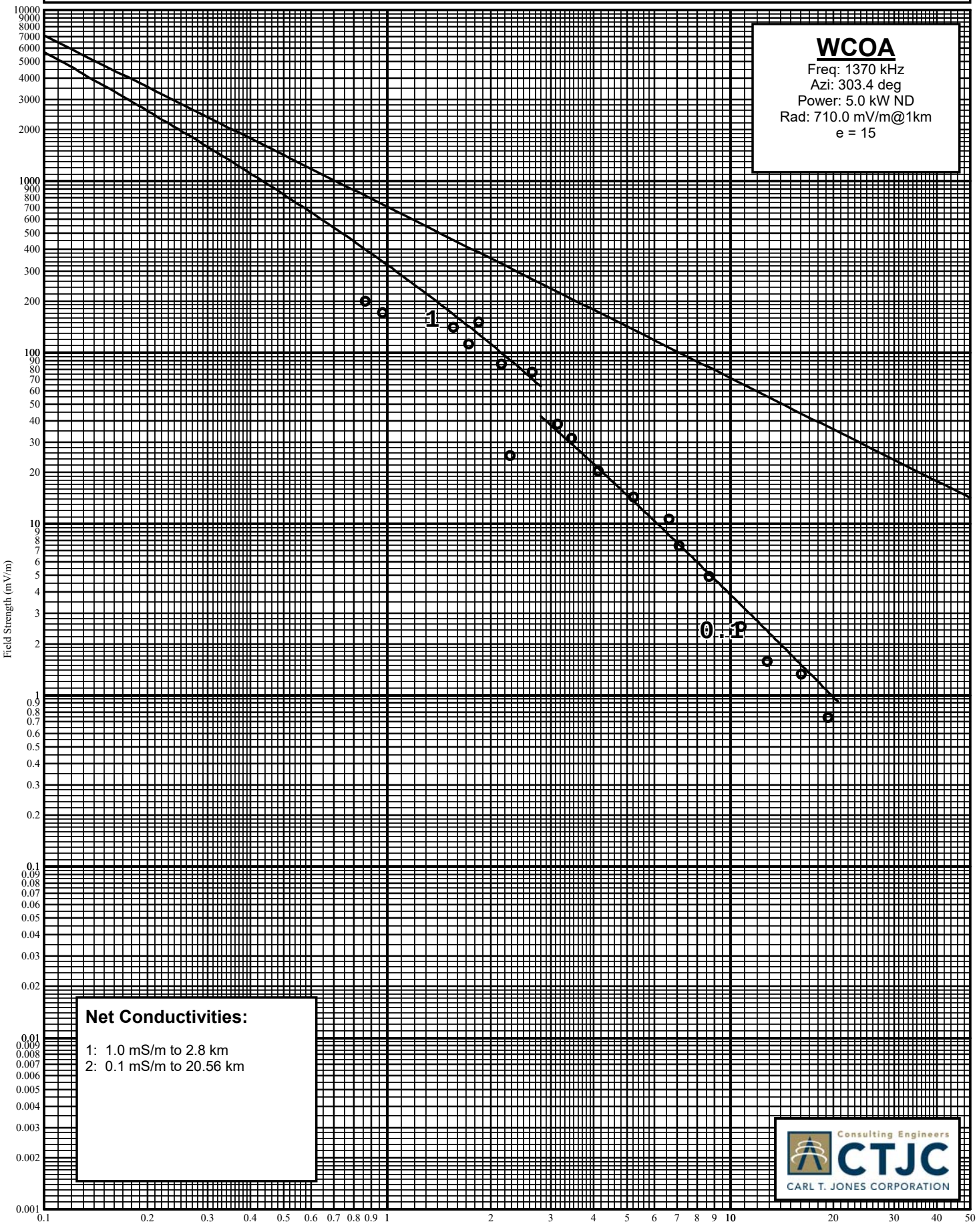
303.4 Degrees True Radial

		5 kW, ND			4.4 kW, DA-N				
Point Number	Distance (kilometers)	Date	Time (local)	Field Strength (mV/m)	Date	Time (local)	Field Strength (mV/m)	Ratio (DA-N/ND)	Log Ratio (DA-N/ND)
1	0.86	2/8/2022	1338	199	- - -	- - -	- - -	- - -	- - -
2	0.97	2/8/2022	1343	171	- - -	- - -	- - -	- - -	- - -
3	1.56	2/8/2022	1352	140	- - -	- - -	- - -	- - -	- - -
4	1.73	2/8/2022	1356	112	- - -	- - -	- - -	- - -	- - -
5	1.85	2/8/2022	1403	151	- - -	- - -	- - -	- - -	- - -
6	2.15	2/8/2022	1412	86	- - -	- - -	- - -	- - -	- - -
7	2.28	2/8/2022	1420	25	- - -	- - -	- - -	- - -	- - -
8	2.64	2/8/2022	1425	77	- - -	- - -	- - -	- - -	- - -
9	3.14	2/8/2022	1344	38.1	2/9/2022	1335	8.20	0.2152	-0.6671
10	3.45	2/8/2022	1348	31.6	2/9/2022	1340	7.60	0.2405	-0.6189
11 MP	4.12	2/8/2022	1357	20.4	2/9/2022	1356	3.65	0.1789	-0.7473
12	5.23	2/8/2022	1416	14.4	2/9/2022	1420	3.20	0.2222	-0.6532
13	6.64	2/8/2022	1433	10.7	2/9/2022	1440	2.86	0.2673	-0.5730
14	7.10	2/8/2022	1439	7.43	2/9/2022	1445	1.77	0.2382	-0.6230
15	8.68	2/8/2022	1448	4.94	2/9/2022	1451	1.30	0.2632	-0.5798
16	10.76	2/8/2022	1458	2.51	2/9/2022	1459	0.60	0.2390	-0.6215
17	12.80	2/8/2022	1505	1.57	2/9/2022	1501	0.43	0.2739	-0.5624
18	16.12	2/8/2022	1519	1.33	2/9/2022	1511	0.30	0.2256	-0.6467
19	19.29	2/8/2022	1504	0.74	2/9/2022	1523	0.16	0.2162	-0.6651
							Average Ratio	0.2346	-0.6326
							Antilog of Average		0.2330

WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

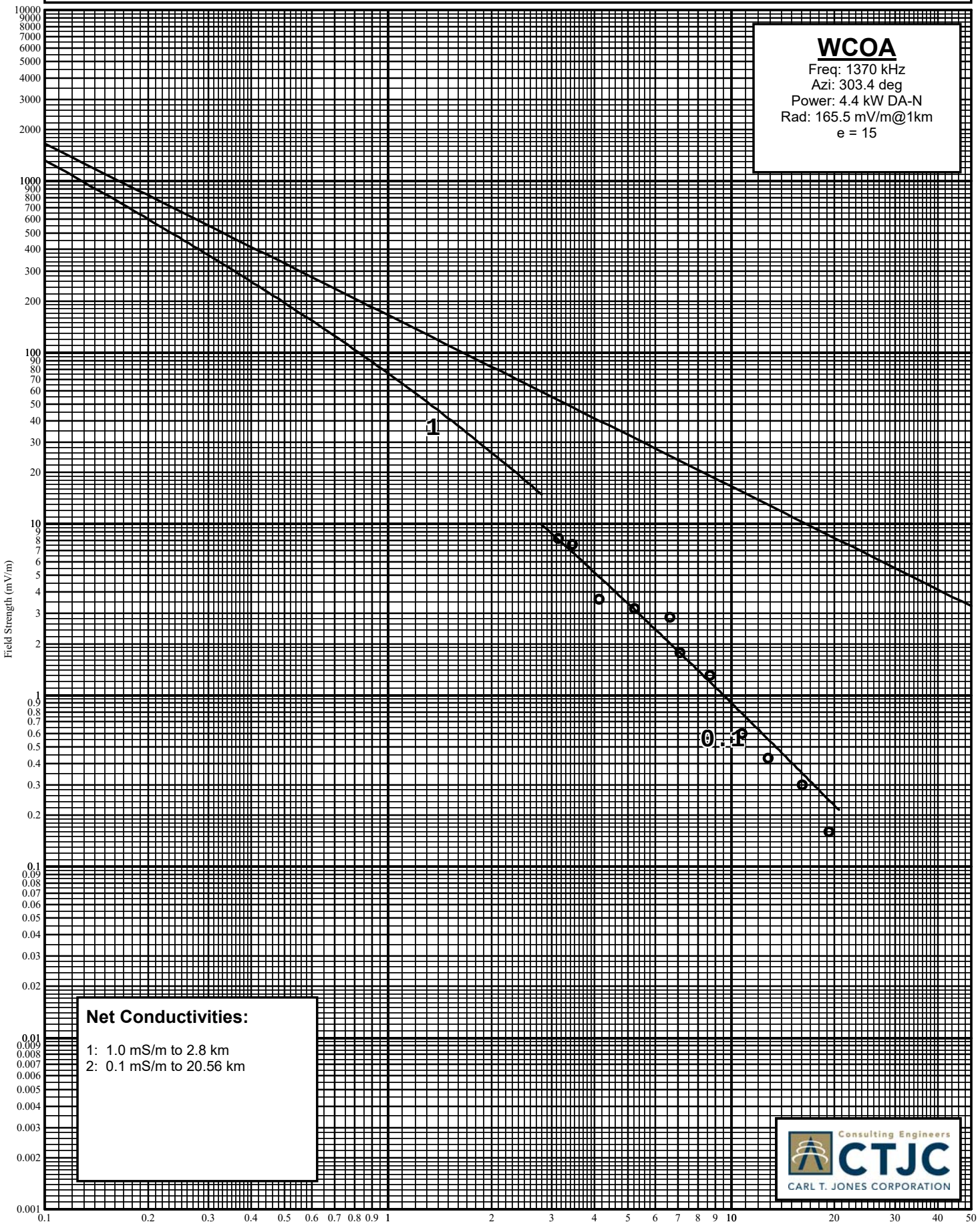
Figure 5
Sheet 20 of 22



WCOA AM Measured Field Strength

Shown With Matching Conductivity Curves

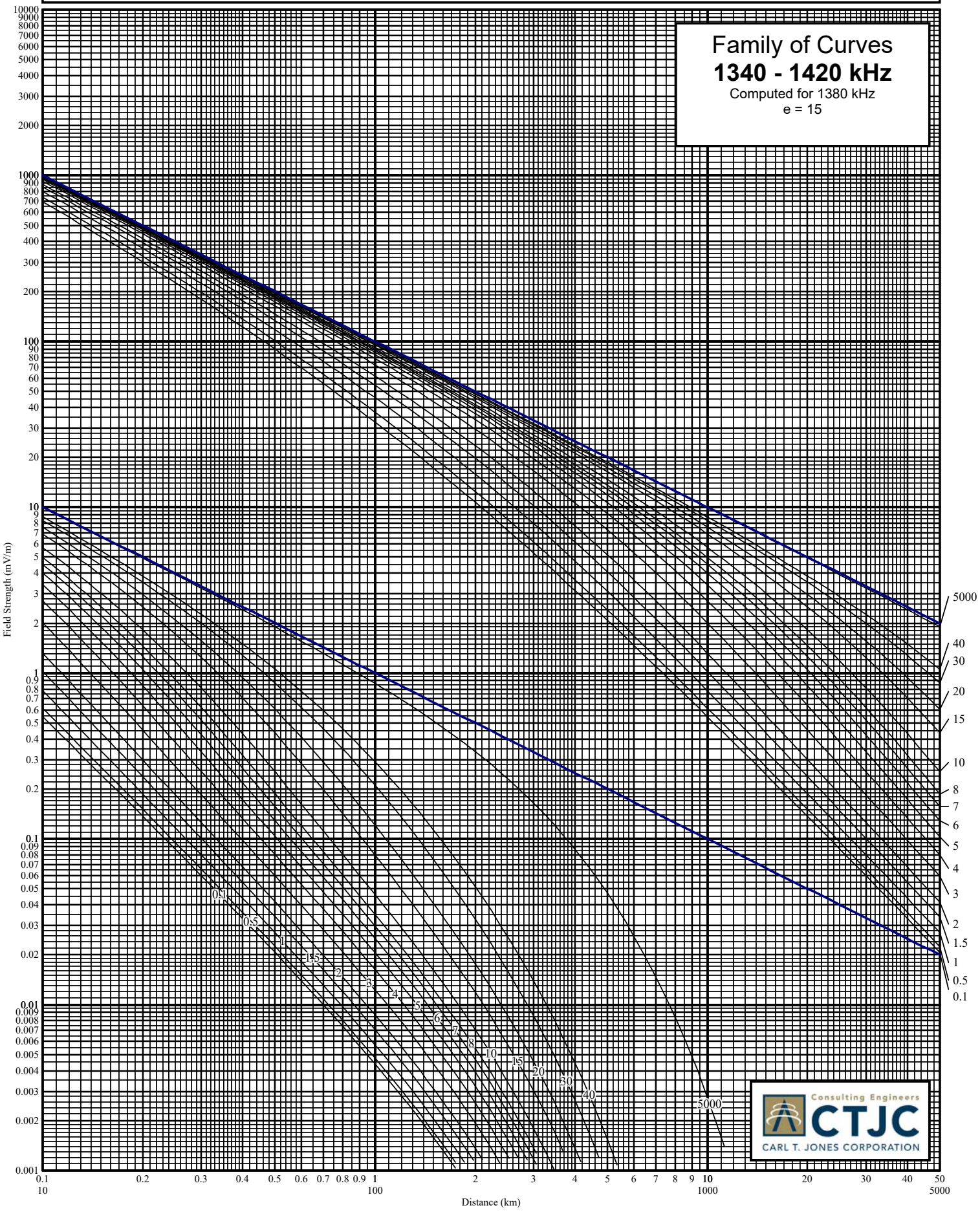
Figure 5
Sheet 21 of 22

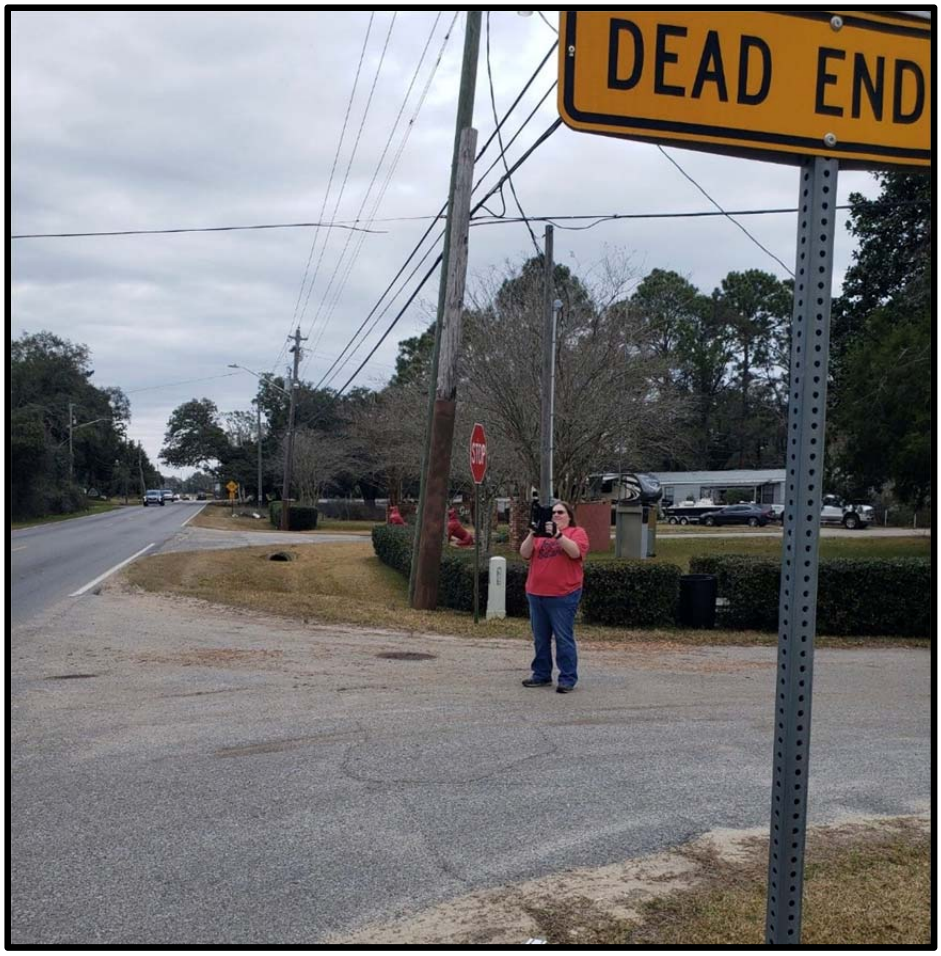


Groundwave Field Strength vs. Distance

Inverse Distance Field: 100.0 mV/m@1km

Figure 5
Sheet 22 of 22





18.4 Degrees True Radial

The measurement point is located near the stop sign on the northeast corner of N Palafox Street and Arthur Lane in Pensacola, Florida.

Point Number:	12
Distance from transmitter site:	4.29 km
Nighttime measured field strength:	3.85 mV/m

MONITORING POINT DESCRIPTIONS AND PHOTOGRAPHS
STATION WCOA – PENSACOLA, FLORIDA
1370 kHz – 5 kW-D, 4.4 kW-N, U, DA-N
MAY, 2022

201.6 Degrees True Radial

The measurement point is located near the stop sign on the northwest corner of N Jackson Street and 46th Avenue across from Rodriguez Barbershop in Pensacola, Florida.

Point Number:	10
Distance from transmitter site:	3.79 km
Nighttime measured field strength:	7.50 mV/m

MONITORING POINT DESCRIPTIONS AND PHOTOGRAPHS
STATION WCOA – PENSACOLA, FLORIDA
1370 kHz – 5 kW-D, 4.4 kW-N, U, DA-N
MAY, 2022

276.6 Degrees True Radial

The measurement point is located at the curb on the west side of Avondale Road across from mailbox for #5736 in Pensacola, Florida.

Point Number:	11
Distance from transmitter site:	3.97 km
Nighttime measured field strength:	4.70 mV/m

MONITORING POINT DESCRIPTIONS AND PHOTOGRAPHS
STATION WCOA – PENSACOLA, FLORIDA
1370 kHz – 5 kW-D, 4.4 kW-N, U, DA-N
MAY, 2022

303.4 Degrees True Radial

The measurement point is located on the north edge of the driveway on the west side of Community Drive adjacent to mailbox #6725 in Pensacola, Florida.

Point Number:	11
Distance from transmitter site:	4.12 km
Nighttime measured field strength:	3.65 mV/m

MONITORING POINT DESCRIPTIONS AND PHOTOGRAPHS
STATION WCOA – PENSACOLA, FLORIDA
1370 kHz – 5 kW-D, 4.4 kW-N, U, DA-N
MAY, 2022

SUMMARY OF DATA PERTINENT TO MONITORING POINT MAXIMA

STATION WCOA – PENSACOLA, FLORIDA

1370 kHz – 5 kW-D, 4.4 kW-N, U, DA-N

Nighttime Pattern

Radial (deg.T)	Point Number	Distance (kilometers)	Measured Field Strength (mV/m)	Measured IDF (mV/m)*	Authorized Standard Pattern Field (mV/m)*	Suggested Maximum Field Strength (mV/m)
18.4	12	4.29	3.85	160.6	194.0	4.65
201.6	10	3.79	7.50	158.3	194.0	9.19
276.6	11	3.97	4.70	183.2	194.0	4.98
303.4	11	4.12	3.65	165.5	194.0	4.28

*mV/m at one kilometer

Figure 7