

Revised Application For Site Certificate

Turner Energy Center



Submitted To: Oregon Energy Facility Siting Council

January 2003

Submitted By: **Turner Energy Center, LLC**

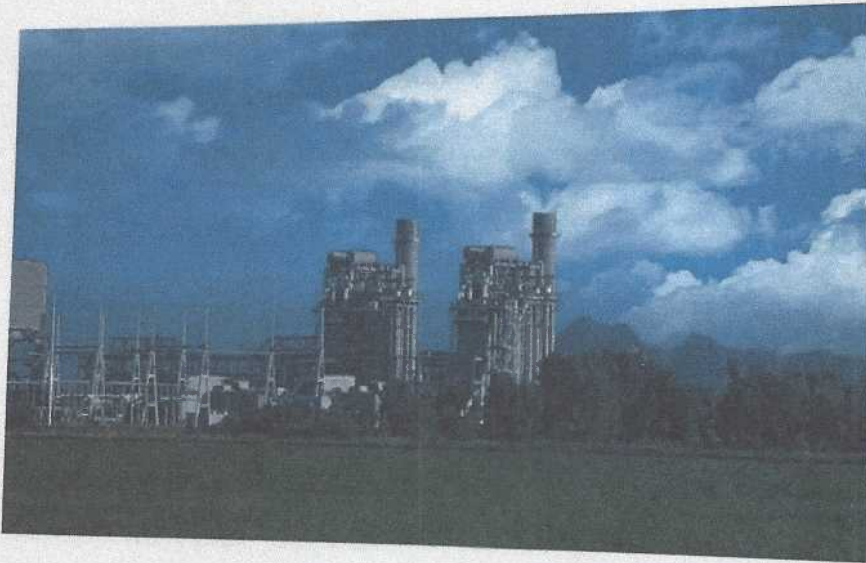


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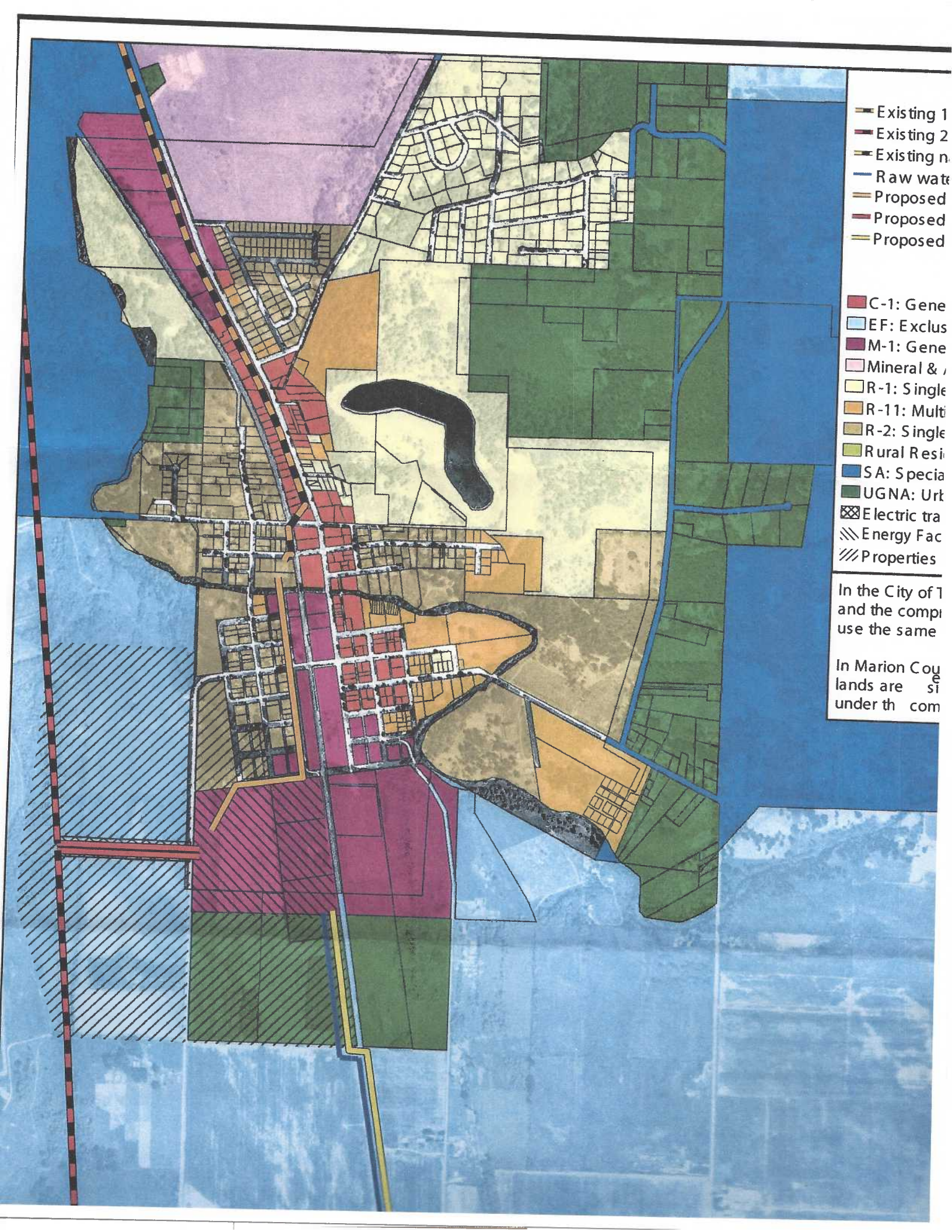
EXHIBIT M

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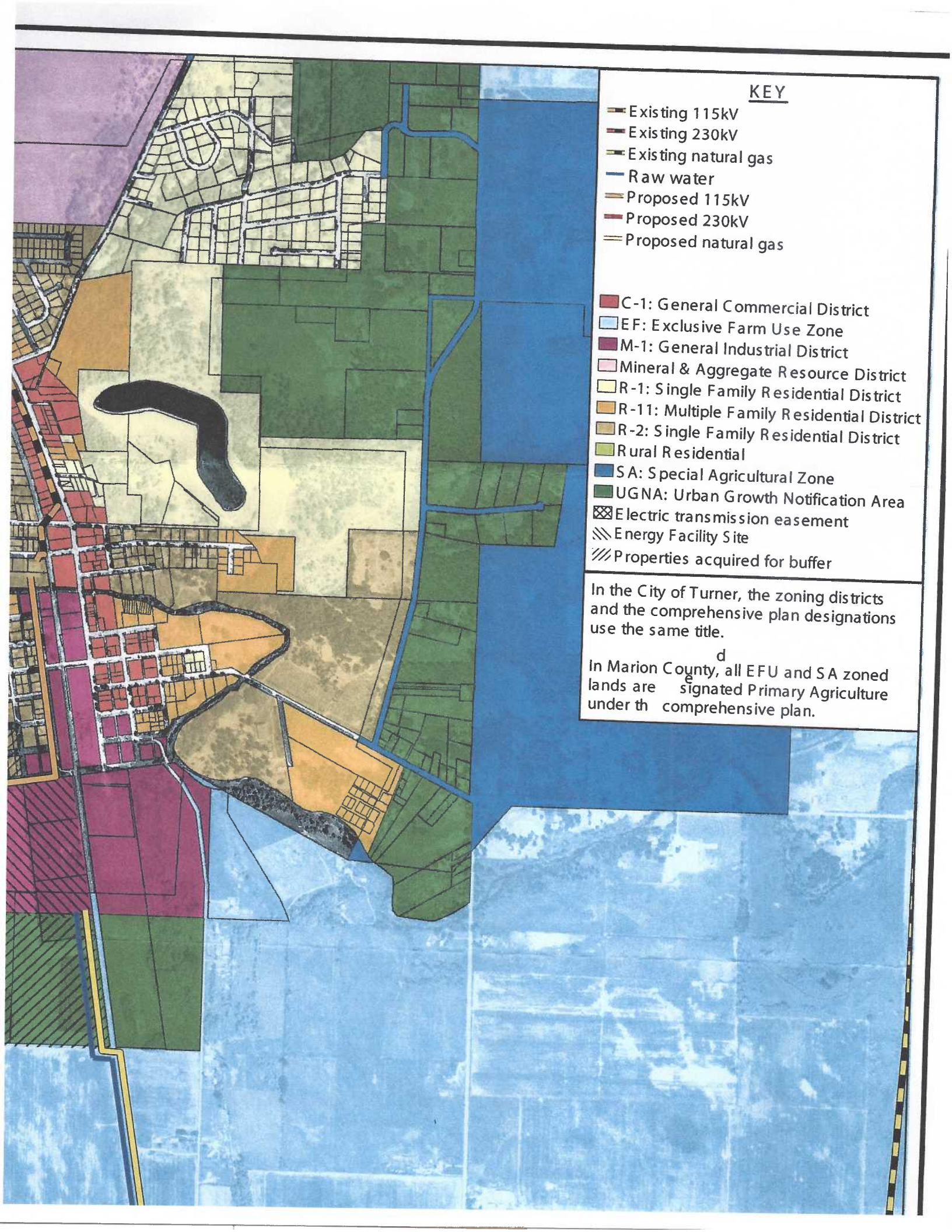


- Existing 1
- Existing 2
- Existing n
- Raw wat
- Proposed
- Proposed
- Proposed








- C-1: Gene
- EF: Exclus
- M-1: Gene
- Mineral &
- R-1: Single
- R-11: Multi
- R-2: Single
- Rural Resi
- SA: Specia
- UGNA: Urk
- Electric tra
- Energy Fac
- Properties














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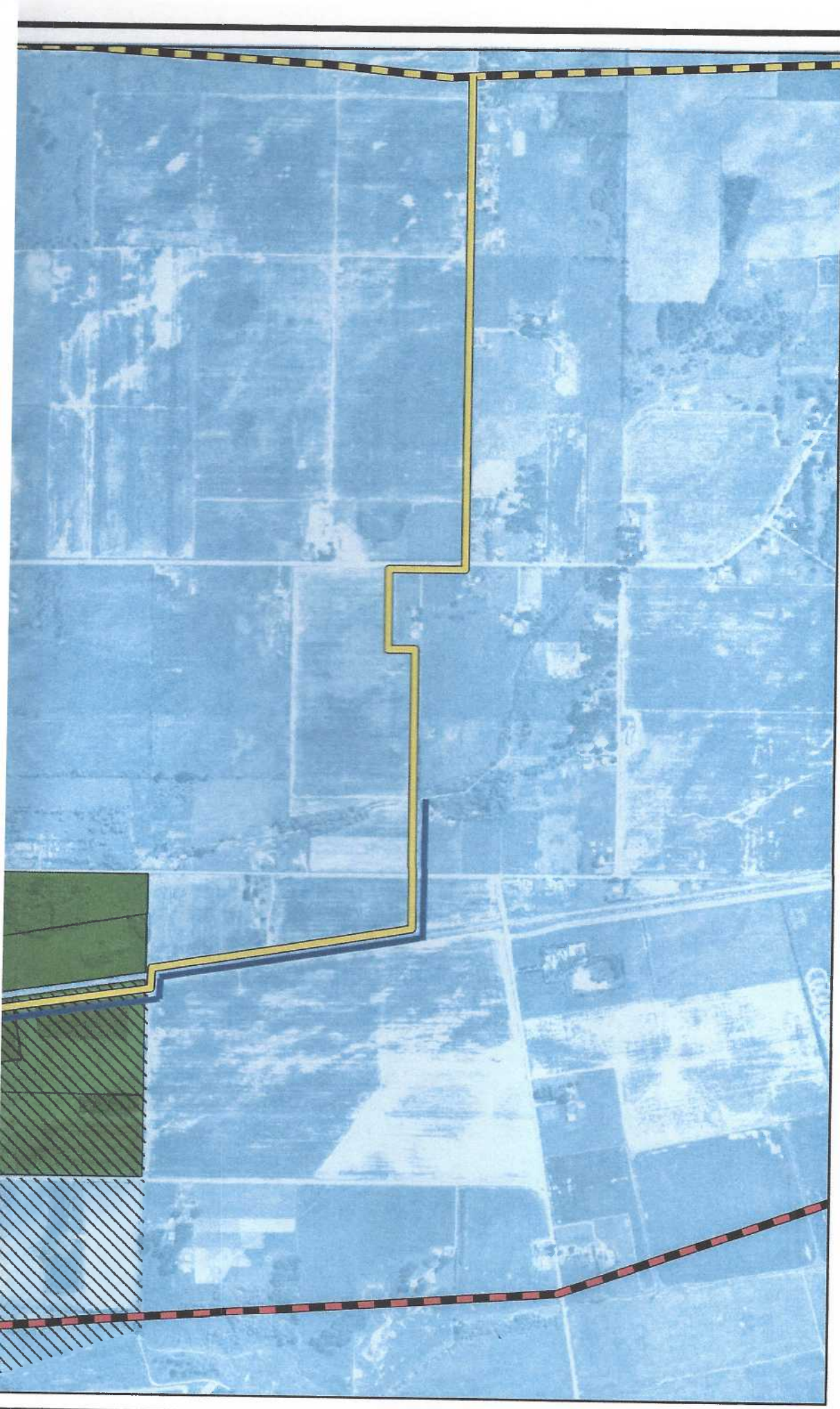
KEY

-  Existing 115kV
-  Existing 230kV
-  Existing natural gas
-  Raw water
-  Proposed 115kV
-  Proposed 230kV
-  Proposed natural gas

-  C-1: General Commercial District
-  EF: Exclusive Farm Use Zone
-  M-1: General Industrial District
-  Mineral & Aggregate Resource District
-  R-1: Single Family Residential District
-  R-11: Multiple Family Residential District
-  R-2: Single Family Residential District
-  Rural Residential
-  SA: Special Agricultural Zone
-  UGNA: Urban Growth Notification Area
-  Electric transmission easement
-  Energy Facility Site
-  Properties acquired for buffer

In the City of Turner, the zoning districts and the comprehensive plan designations use the same title.

^d
 In Marion County, all EFU and SA zoned lands are designated Primary Agriculture under the comprehensive plan.



Project No.: Z01-016
 Attachment: K-1
 Date: 10-30-02

Data derived from USGS Turner, OR 1994 DOQQ



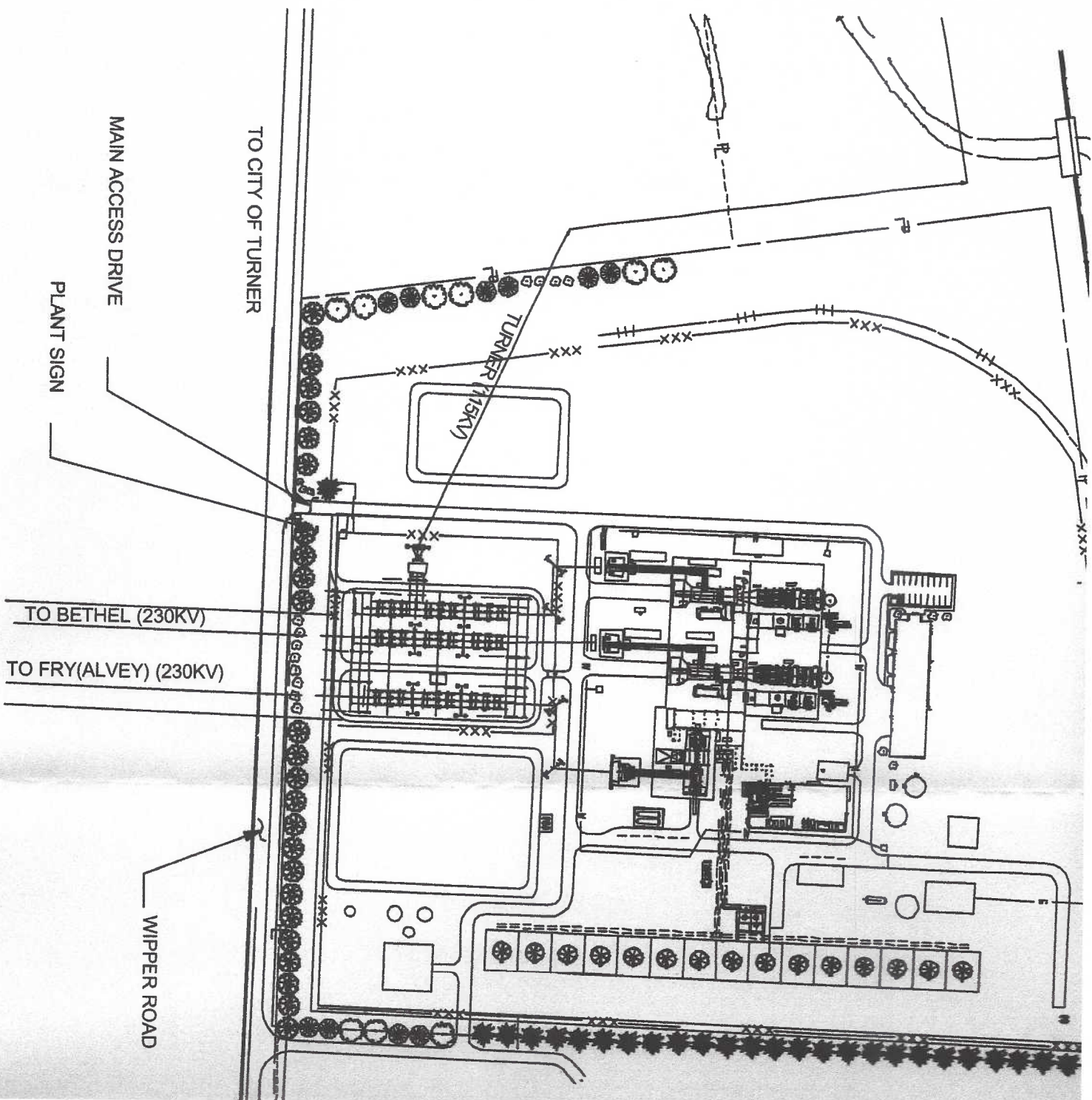
Miles 0.4
 Kilometers 0.4

Calpine/Turner Energy Center

Comprehensive Plan Designation and
 Zone Maps of Project and Adjacent Property

Zia Engineering and Environmental Consultants, Inc.
 755 S. Telshor Blvd., Suite E-12
 Las Cruces, New Mexico 88011
 (505) 532-1526 phone
 (505) 532-1587 fax





TO CITY OF TURNER
MAIN ACCESS DRIVE
PLANT SIGN

TO BETHEL (230KV)
TO FRY (ALVEY) (230KV)

WIPPER ROAD

TURNER (15KV)

EXHIBIT AA
ELECTRIC AND MAGNETIC FIELDS ASSOCIATED WITH
TRANSMISSION LINES

Exhibit AA provides information about electric and magnetic fields generated by electrical transmission lines, and provides evidence to support a finding by the Council supporting OAR 345-024-0090, which states:

To issue a site certificate for a facility that includes any high voltage transmission line under Council jurisdiction, the Council must find that the applicant:

Can design, construct, and operate the proposed transmission line so that alternating current electric fields do not exceed 9 kV per meter at one meter above the ground surface, in areas accessible to the public;

Can design, construct, and operate the proposed transmission line so that induced currents resulting from the transmission line and related or supporting facilities will be as low as reasonably achievable.

The information presented below demonstrates compliance with this standard.

The exhibit is arranged in accordance with the application requirements contained in OAR 345-021-0010 (1) (aa).

Regulatory Citation

If the proposed facility includes an electric transmission line:

Information about the expected electric and magnetic fields, including:

(i) The distance in feet from the proposed center line of each proposed transmission line to the edge of the right-of-way;

Response

The Energy Facility is situated approximately 1,500 feet east of the PacifiCorp-owned Bethel-Fry 230 kV electrical transmission line and approximately 2,100 feet south of PGE's 115 kV Turner Substation. The proposed interconnection consists of looping the 230 kV electrical transmission line into the Energy Facility's new substation and interconnecting into

Table AA-1

Distance of Structures from Centerlines of Transmission Line ROWs

Type		Type	
Residence	Approximate Distance From Centerline (feet)	Residence	Approximate Distance From Centerline (feet)
1	75	8	50
2	50	9	110
3	60	10	60
4	55	11	40
5	200	12	60
6	120	13	50
7	120		

Type		Type	
Industrial or Commercial	Distance From Centerline	Industrial or Commercial	Distance From Centerline
14	90	19	100
15	190	20	25
16	40	21	25
17	25	22	20
18	190		

Note: All structures were cited from aerial photography with no verification as to occupancy

Regulatory Citation

(iv) At representative locations along each proposed transmission line, a graph of the predicted electric and magnetic fields levels from the proposed center line to 200 feet on either side of the proposed center line.

Response

The graphs of the predicted electric and magnetic field levels from the proposed center lines to 200 feet on either side are included in Attachments AA-4 through AA-7. There were no structures within 200 feet of the centerline of the proposed 230 kV loop to the Bethel-Fry line.

transmission interconnection will be designed to meet all national, state, and local code clearance requirements. Since the designer must take into consideration many different situations, the generalized dimensions provided in the figures of this report should be regarded as reference for the electric and magnetic field calculations only and not absolute.

The electric field depends upon line voltage, which remains nearly constant for an electrical transmission line during normal operation. A worst-case voltage of 121 kV (115 kV + 5%) is used for calculating electric fields for the 115 kV electrical transmission lines and 242 kV (230 kV + 5%) for the 230 kV looped electrical transmission lines. In normal operation the voltage on the power lines should be within plus or minus 5% of the nominal voltage, 115 or 230 kV. The magnetic field is proportional to line loading (amperes), which varies as the system operators change power plant generation for increases or decreases in demand for electrical power. For the purpose of calculating worst-case magnetic fields, the Western System Coordinating Council's 2001-series heavy winter power flow for the year 2005 was used.² Two scenarios were developed: 1) without the Energy Facility operating and 2) with the Energy Facility operating at a maximum net winter generation of 670 MW.

Line loading values assumed for the electromagnetic field (EMF) studies were based on the above-described power flow study. The ampacity of the 230 kV electrical transmission lines from the Energy Facility to the Bethel and Fry electrical transmission lines will be 1184 amps as will the 115 kV electrical transmission line from the Energy Facility to the Turner Substation. The Turner–Turner Tap 115 kV electrical transmission line will have an ampacity of 993 amps. The following tables summarize the results.

Line	Line Loads Pre-TEC (Amps)	Line Loads With-TEC (Amps)	Line Conductor		Conductor Ampacity @ 75° C (Amps)
			Type	Code Name	
TEC–Bethel 230 kV	115	819	1272 kcmil ACSR 45/7 Stranding	Bittern (230 kV Loop)	1184
TEC–Fry 230 kV		498	1272 kcmil ACSR 45/7 Stranding	Bittern (230 kV Loop)	1184
TEC–Turner 115 kV	N/A	579	1272 kcmil ACSR 45/7 Stranding	Bittern	1184
Turner–Turner Tap 115 kV	27	552	954 kcmil ACSR 45/7 Stranding	Rail	993

²This case was retrieved from the Federal Energy Regulatory Commission (FERC) website containing data filed to meet Form 715 requirements.

Regulatory Citation

An evaluation of alternate methods and costs of reducing radio interference likely to be caused by the transmission line in the primary reception area near interstate, U.S., and state highways.

Response

The 230 kV and 115 kV electrical transmission lines will be of standard design similar to other existing electrical transmission lines, and no radio interference is expected. Also, the new electrical transmission lines will not be located near an interstate, U.S., or other state highway. Therefore, an evaluation of alternate methods and costs of reducing radio interference does not apply.

CONCLUSIONS

The proposed design of the transmission lines for the Facility meets or exceeds all applicable OAR 345-024-0090 standards. Specifically, based on the proposed design criteria alternating current electric fields in areas accessible to the public will not exceed nine kV per meter at one meter above the ground surface.

REFERENCES

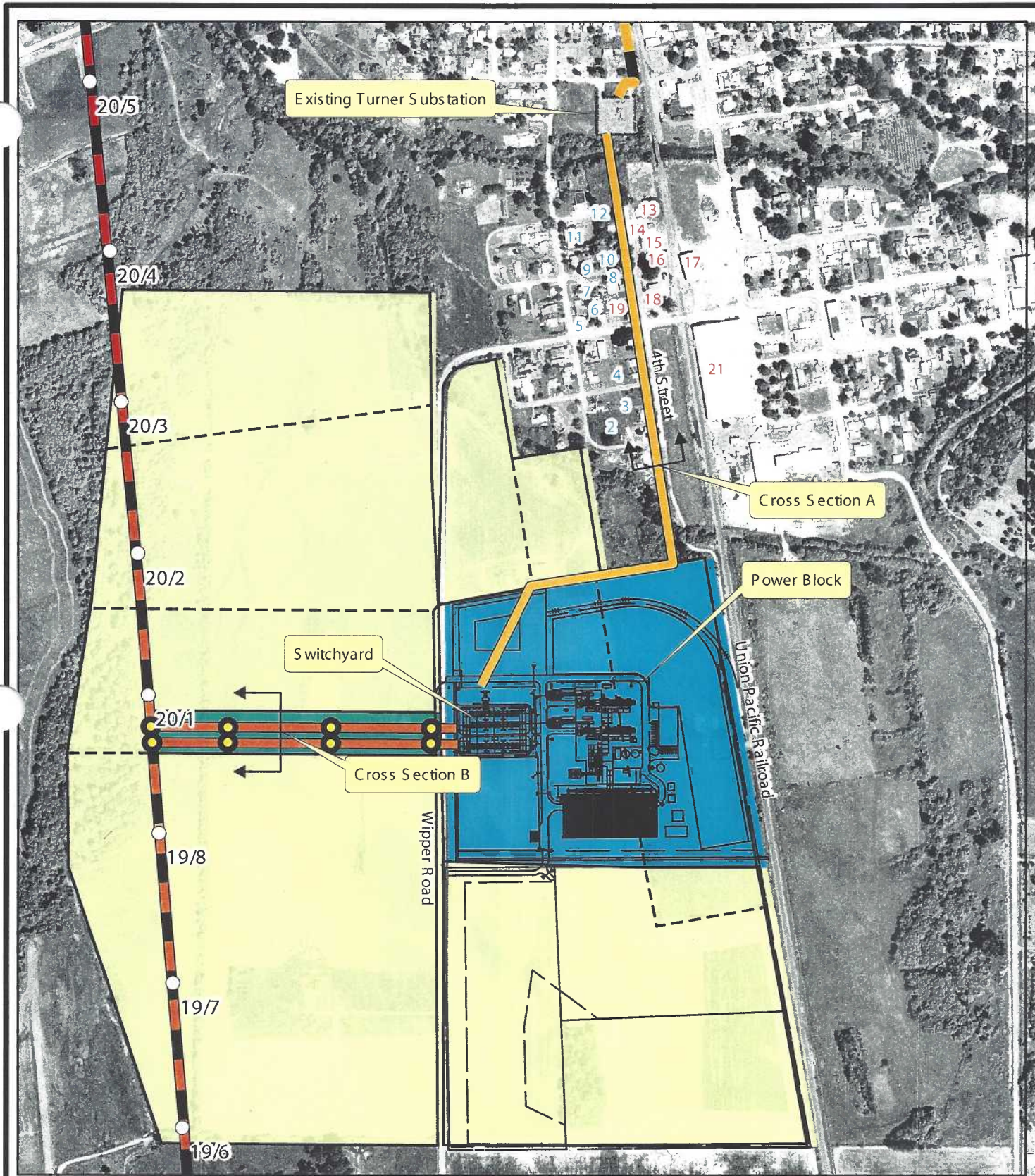
Transmission Line Electric and Magnetic Field and Radio Interference Study for Turner Energy Center, Turner, Oregon, Commonwealth Associates, Inc. November, 2001

Personal Communication with Janet Krohn, CAI, 11-15-01, 11-16-01 and 11-19-01

ATTACHMENTS

- AA-1 Transmission Line Routes and Structures within 200 feet
- AA-2 115 kV Transmission Line Cross Section
- AA-3 230 kV Transmission Line Cross Section
- AA-4 115 kV Transmission Line Electrical Field
- AA-5 230 kV Transmission Line Electrical Field
- AA-6 115 kV Transmission Line Magnetic Field
- AA-7 230 kV Transmission Line Magnetic Field

Attachment AA-1



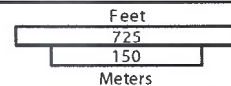
Zia Engineering and Environmental Consultants, Inc.
 755 S. Telshor Blvd., Suite E-12
 Las Cruces, New Mexico 88011
 (505) 532-1526 phone
 (505) 532-1587 fax

Turner Energy Center
 Electrical Transmission Lines, EMF
 Cross-Sections & Structures within 200 Feet

- Electric transmission easement
- Energy facility site
- Properties acquired for buffer
- Residential building
- Commercial building
- Existing 115 kV
- Proposed 115 kV
- Existing 230 kV
- Proposed 230 kV

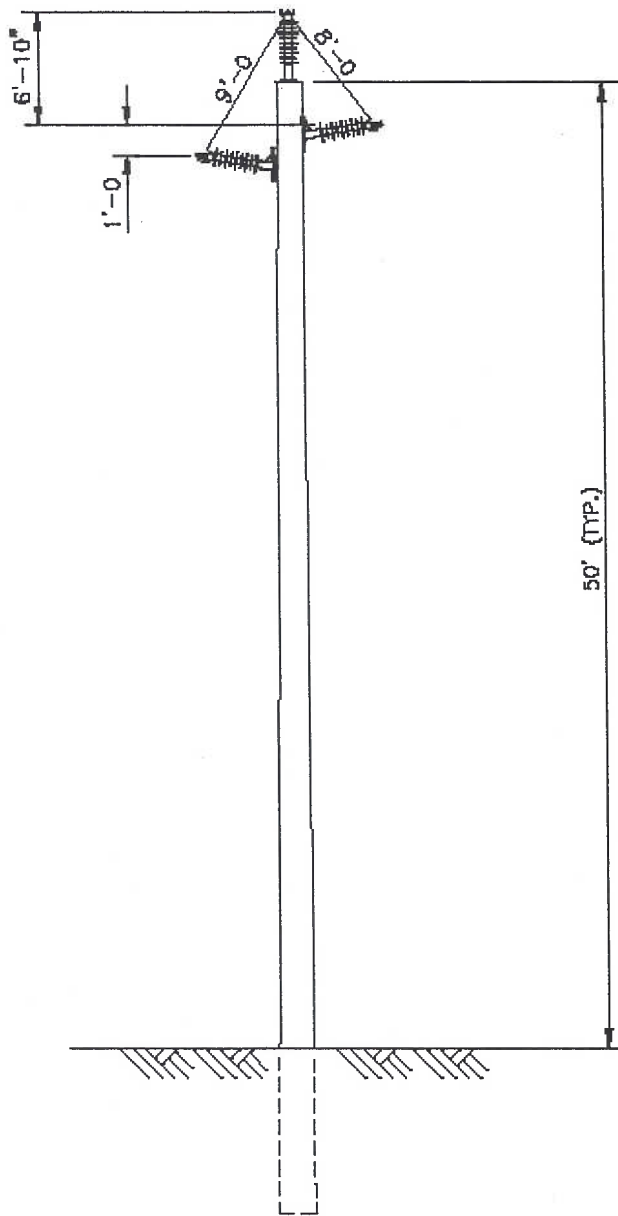
Data derived from 1994 Turner, OR USGS DOQQ

Project No.: Z01-016
 Attachment No.: AA-1
 Date: 01-10-03



Note: The power block configuration has changed to include a cooling tower instead of an air-cooled condenser. However, the transmission lines and switchyard have not changed.

Attachment AA-2



CALPINE

115kV STRUCTURE; WOOD POLE
 SINGLE CIRCUIT
 TANGENT TRIANGULAR STRUCTURE

Prepared by
CAI Commonwealth Associates Inc.
 Jackson, Michigan
 Engineers Consultants Construction Managers

11/20/01

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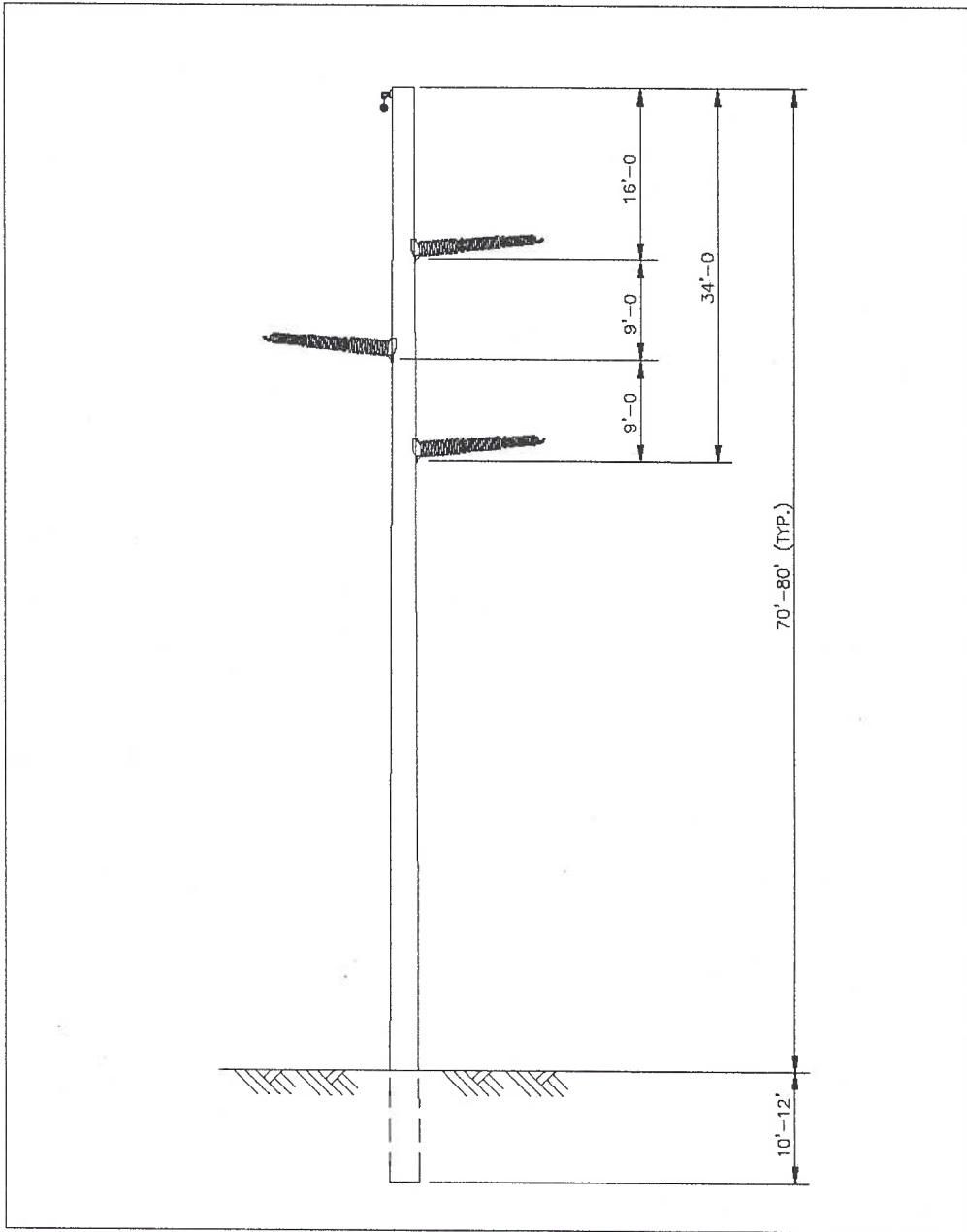


**Zia Engineering & Environmental
 Consultants, Inc.**
 755 S. Telshor Blvd., Suite E-12
 Las Cruces, New Mexico 89011
 phone: (505) 532 - 1526
 fax: (505) 532 - 1587

Figure Name: Cross Section 115 kV Line
Project Name: Calpine Turner Energy Center
Exhibit AA-EMF Issues


Project No.: Z01-016
 Date: November 15, 2001
 Attachment: AA-2

Attachment AA-3



CALPINE 230kV STRUCTURE; STEEL POLE SHIELDED, SINGLE-CIRCUIT TANGENT POST INSULATORS	Prepared by CAI Commonwealth Associates Inc. Jackson, Michigan Engineers Consultants Construction Managers
	11/20/01

CAD FILENAME: N:\DWG\CLPINE\172036\STR_1.DWG

 Zia Engineering & Environmental Consultants, Inc. 755 S. Telshor Blvd., Suite E-12 Las Cruces, New Mexico 88011 phone: (505) 532 - 1526 fax: (505) 532 - 1587	Figure Name: Cross Section 230 kV Line Project Name: Calpine Turner Energy Center Exhibit AA-EMF Issues	Project No.: Z01-016
		Date: November 20, 2001
		Figure No: AA-3

Attachment AA-4

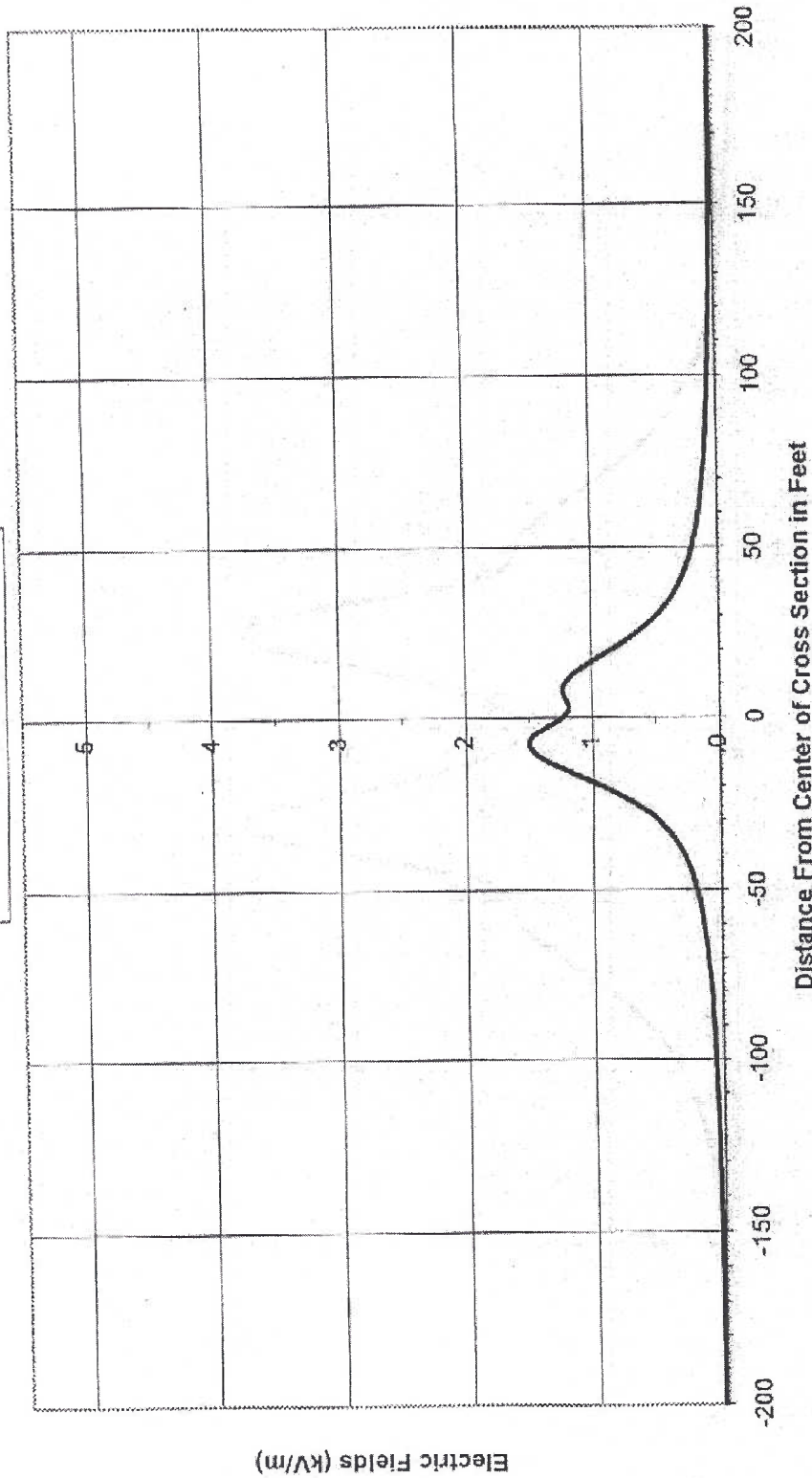
Cross Section A

Electric Field (kV/m)

115 kV Line

121 kV (115 + 5%) Conditions

— With-TEC



Prepared by: Commonwealth Associates, Inc.

Project No.: Z01-016

Date: November 15, 2001

Attachment: AA-4

Figure Name: Cross Section A 115 kV Line Electrical Field

Project Name: Turner Energy Center EFSC Permitting-Exhibit AA

Zia Engineering & Environmental
Consultants, Inc.

755 S. Teishor Blvd., Suite E-12
Las Cruces, New Mexico 88011
phone: (505) 532 - 1526
fax: (505) 532 - 1587

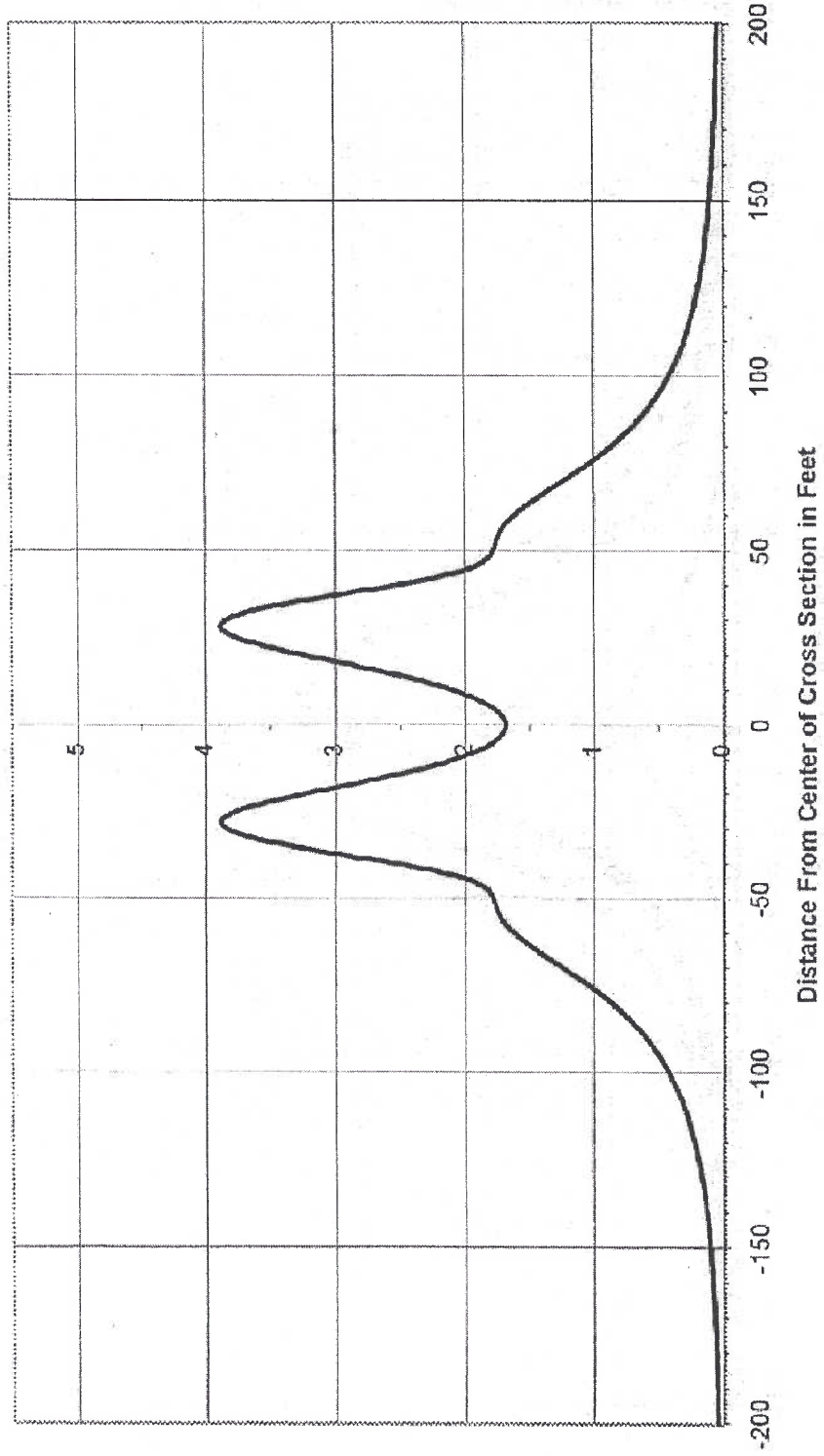


Attachment AA-5

Cross Section B

Electric Field (kV/m)
Two S/C 230 kV Lines
242 kV (230 + 5%) Conditions

— With-TEC



Prepared by: Commonwealth Associates, Inc.

**Zia Engineering & Environmental
Consultants, Inc.**

755 S. Telshor Blvd., Suite E-12
Las Cruces, New Mexico 88011
phone: (505) 532 - 1526
fax: (505) 532 - 1587

Figure Name: Cross Section B 230 kV Line Electrical Field

Project Name: Turner Energy Center EFSC Permitting-Exhibit AA

Project No.: Z01-016

Date: November 15, 2001

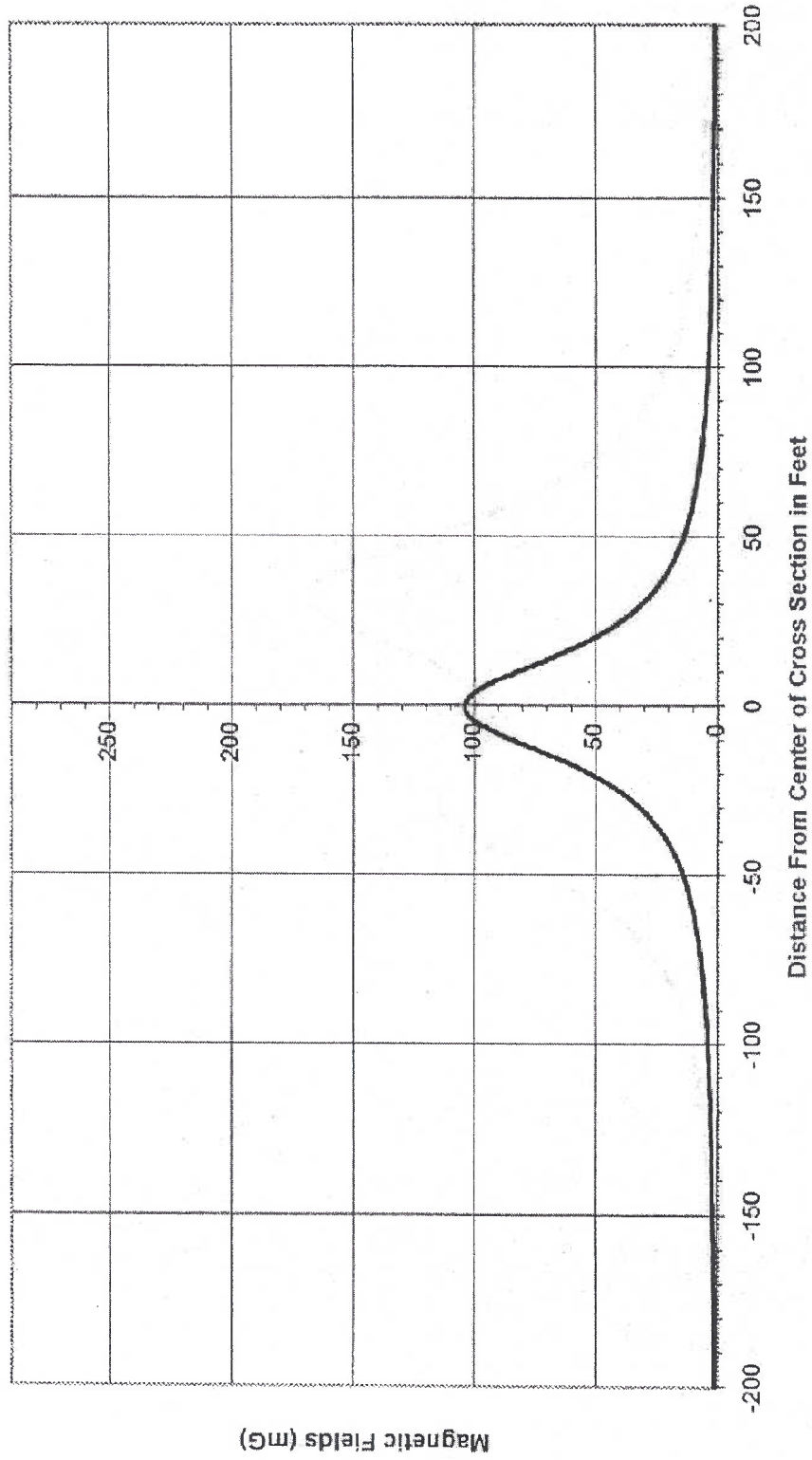
Attachment: AA-5

Attachment AA-6

Cross Section A

Magnetic Field (mG)
115 kV Line

— 579 Amps, With-TEC



Prepared by: Commonwealth Associates, Inc.

Project No.: Z01-016

Date: November 15, 2001

Attachment: AA-6

Figure Name: Cross Section A 115 kV Line Magnetic Field

Project Name: Turner Energy Center EFSC Permitting-Exhibit AA

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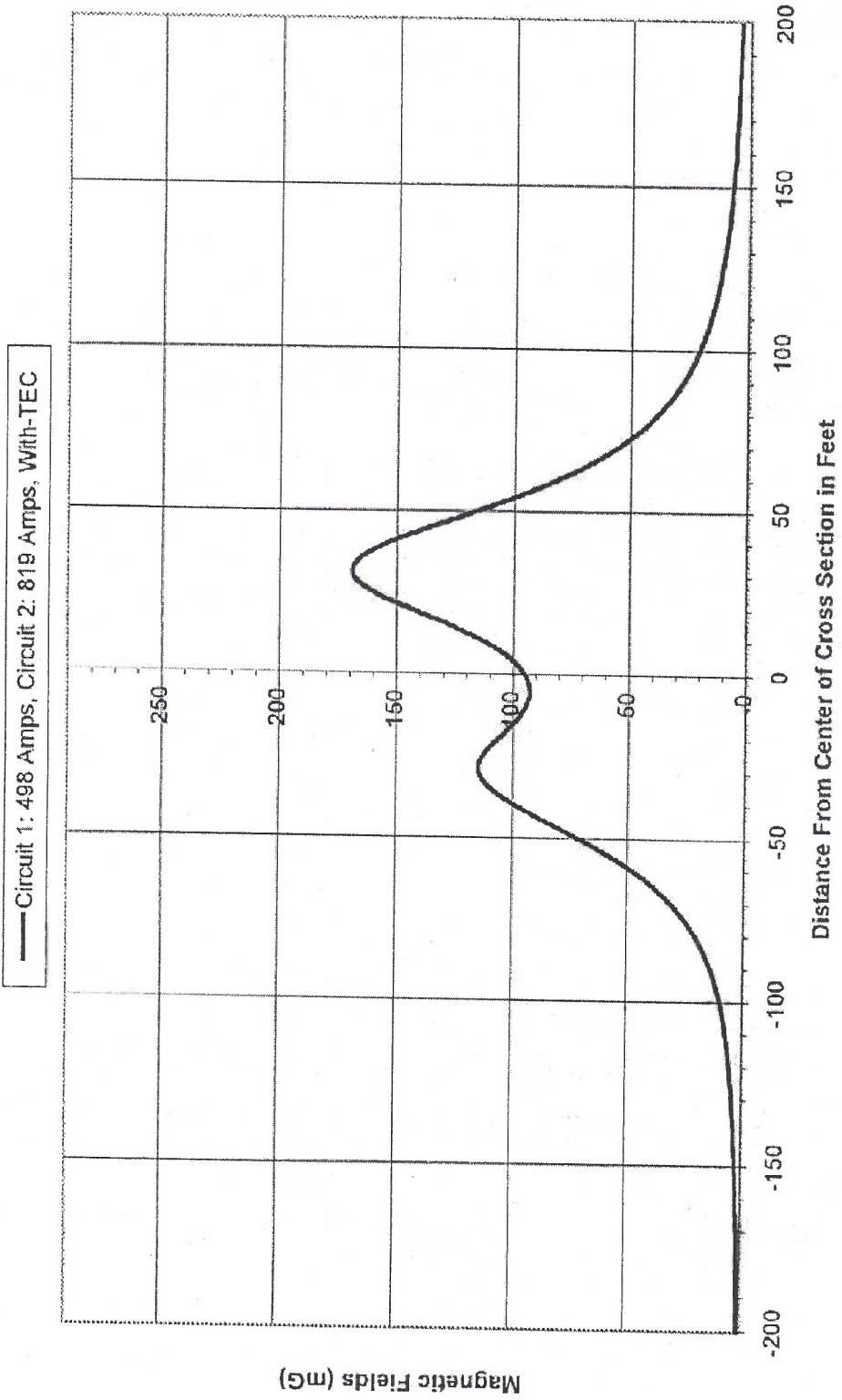
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Las Cruces, New Mexico 88011
phone: (505) 532 - 1526
fax: (505) 532 - 1587



Attachment AA-7

Cross Section B

Magnetic Field (mG)
Two S/C 230 kV Lines



Prepared by: Commonwealth Associates, Inc.

Zia Engineering & Environmental Consultants, Inc. 755 S. Teishor Blvd., Suite E-12 Las Cruces, New Mexico 88011 phone: (505) 532 - 1526 fax: (505) 532 - 1587	Figure Name: Cross Section B 230 kV Line Magnetic Field	Project No.: Z01-016
	Project Name: Turner Energy Center EFSC Permitting-Exhibit AA	Date: November 15, 2001
		Attachment: AA-7