Appendix A

Broadband Radio Service Relocation Zones

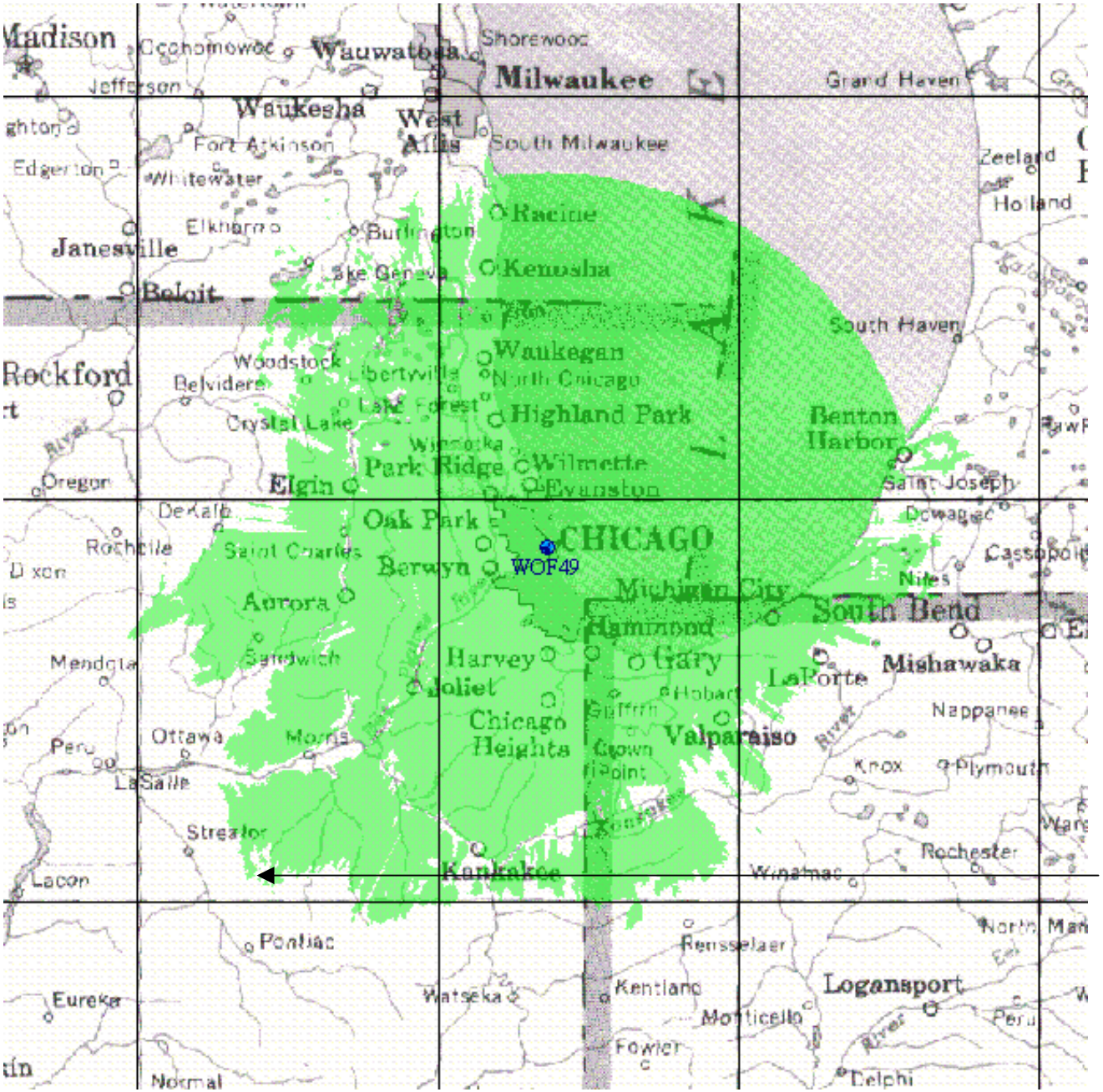
1G LOS Projections

Chicago

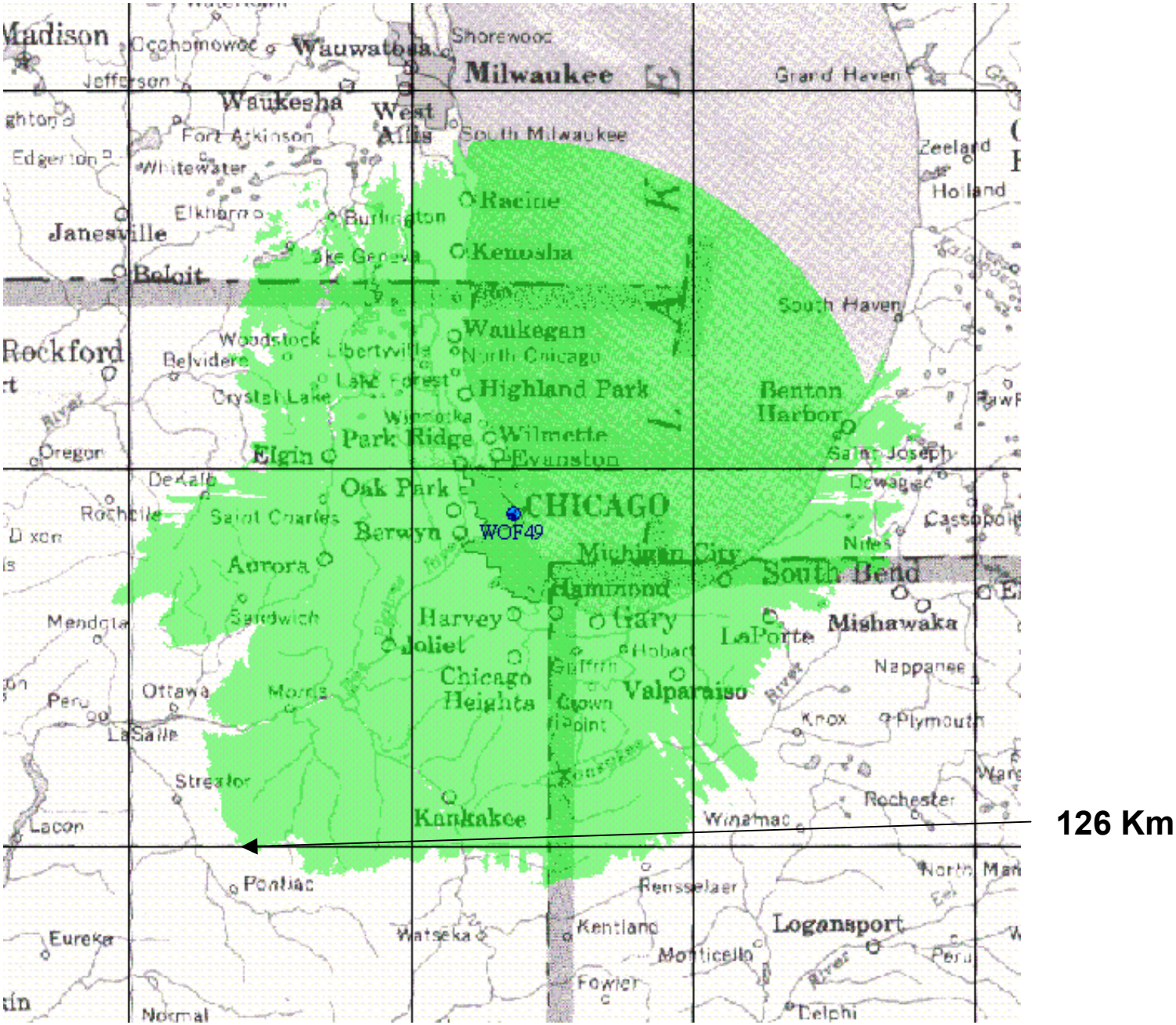
Sprint

Together with NEXTEL

Chicago Relocation Zone with 50 ft (15.24m) AWS Tower

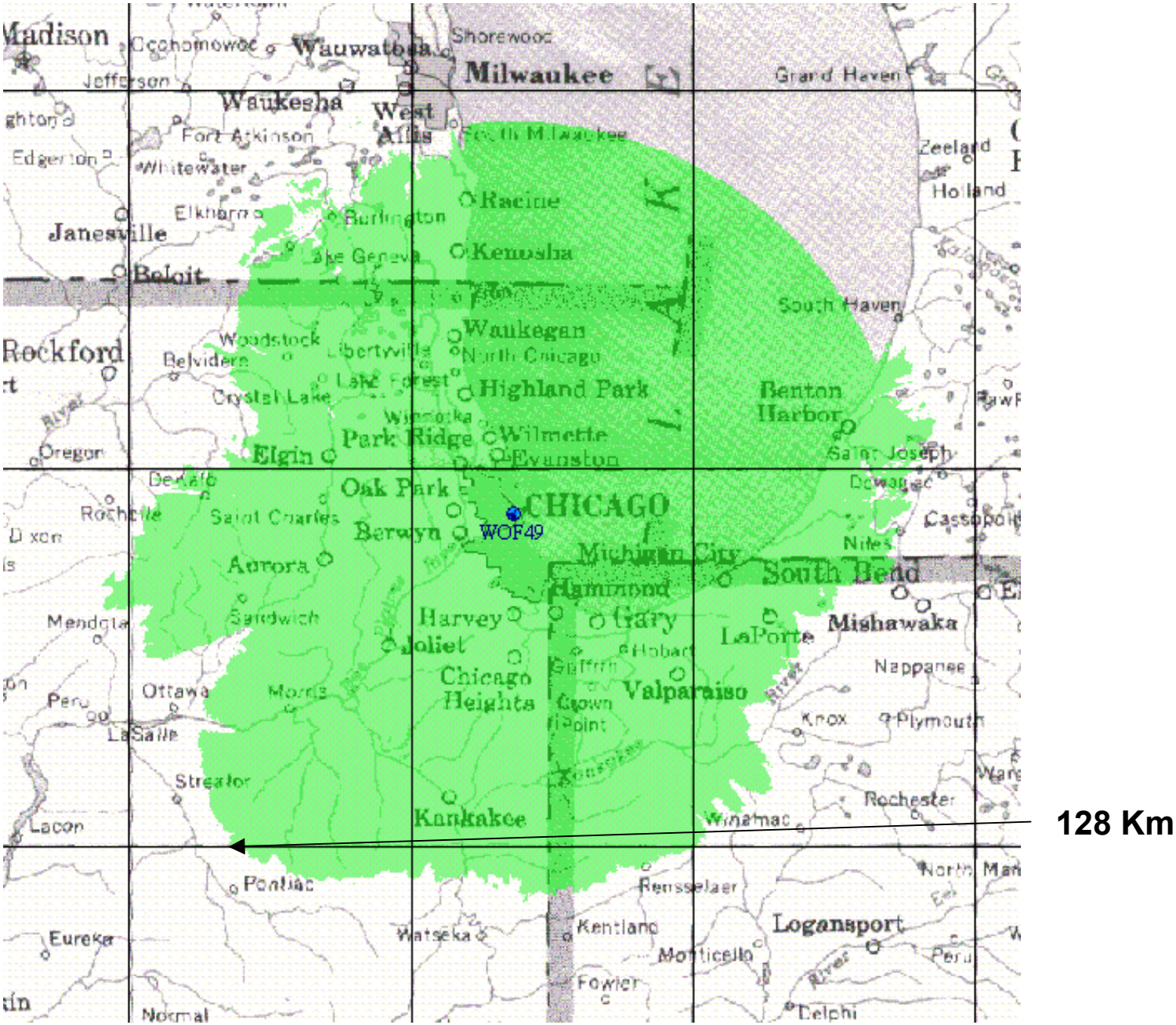


Chicago Relocation Zone with 100 ft (30.48m) AWS Tower



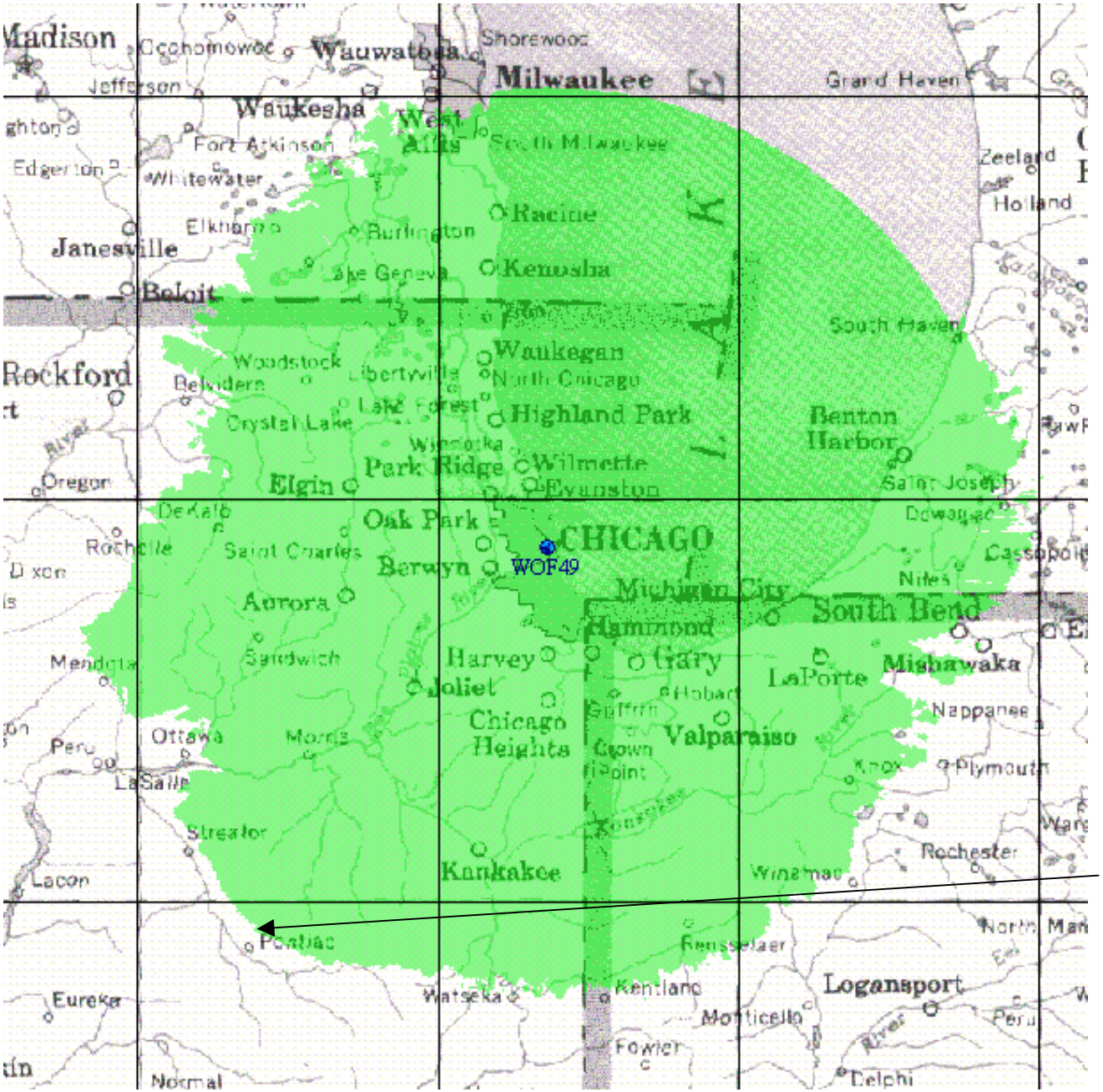
126 Km

Chicago Relocation Zone with 150 ft (45.72m) AWS Tower



128 Km

Chicago Relocation Zone with 300 ft (91.44m) AWS Tower



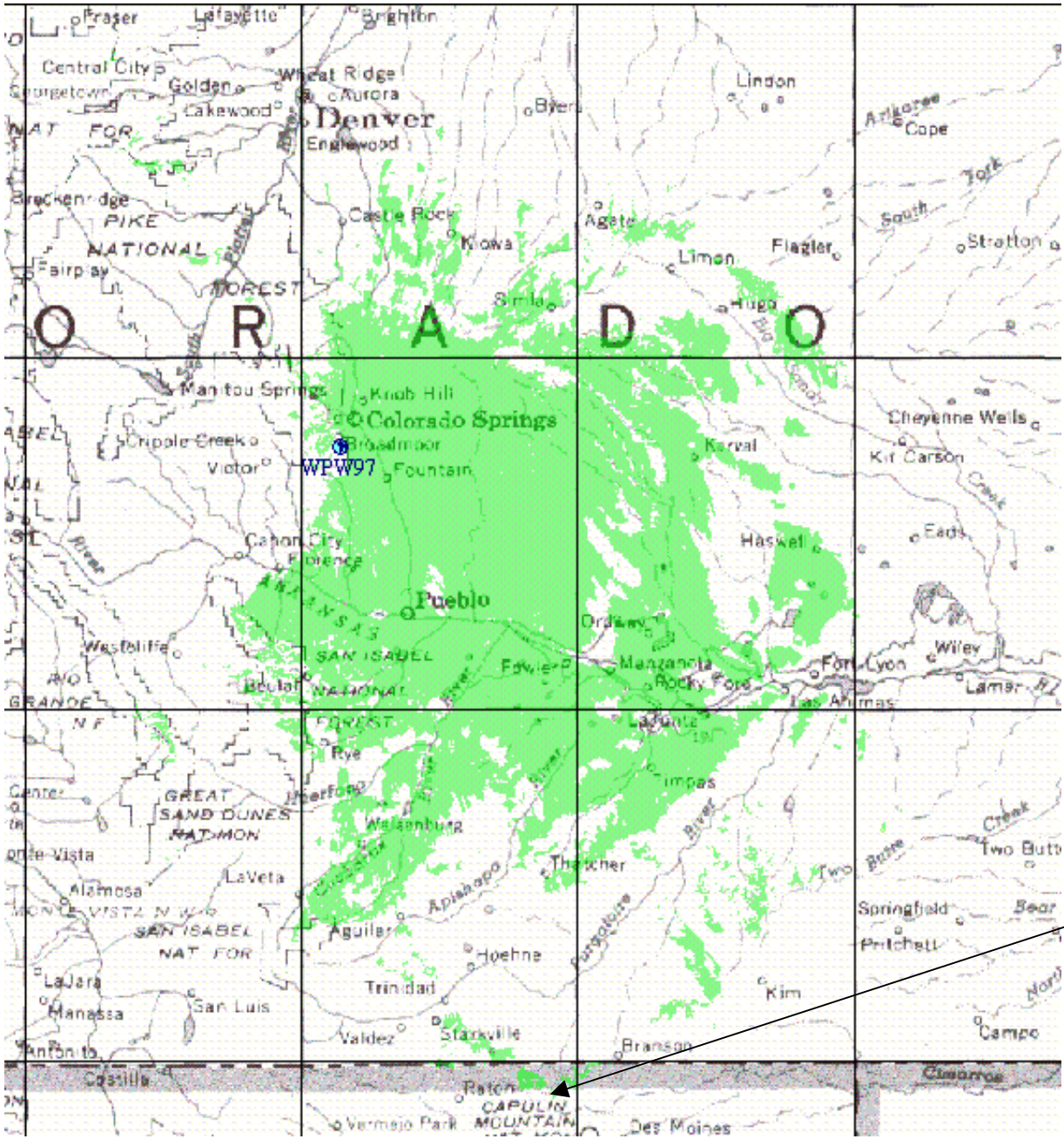
132 Km

1G LOS Projections

Colorado Springs

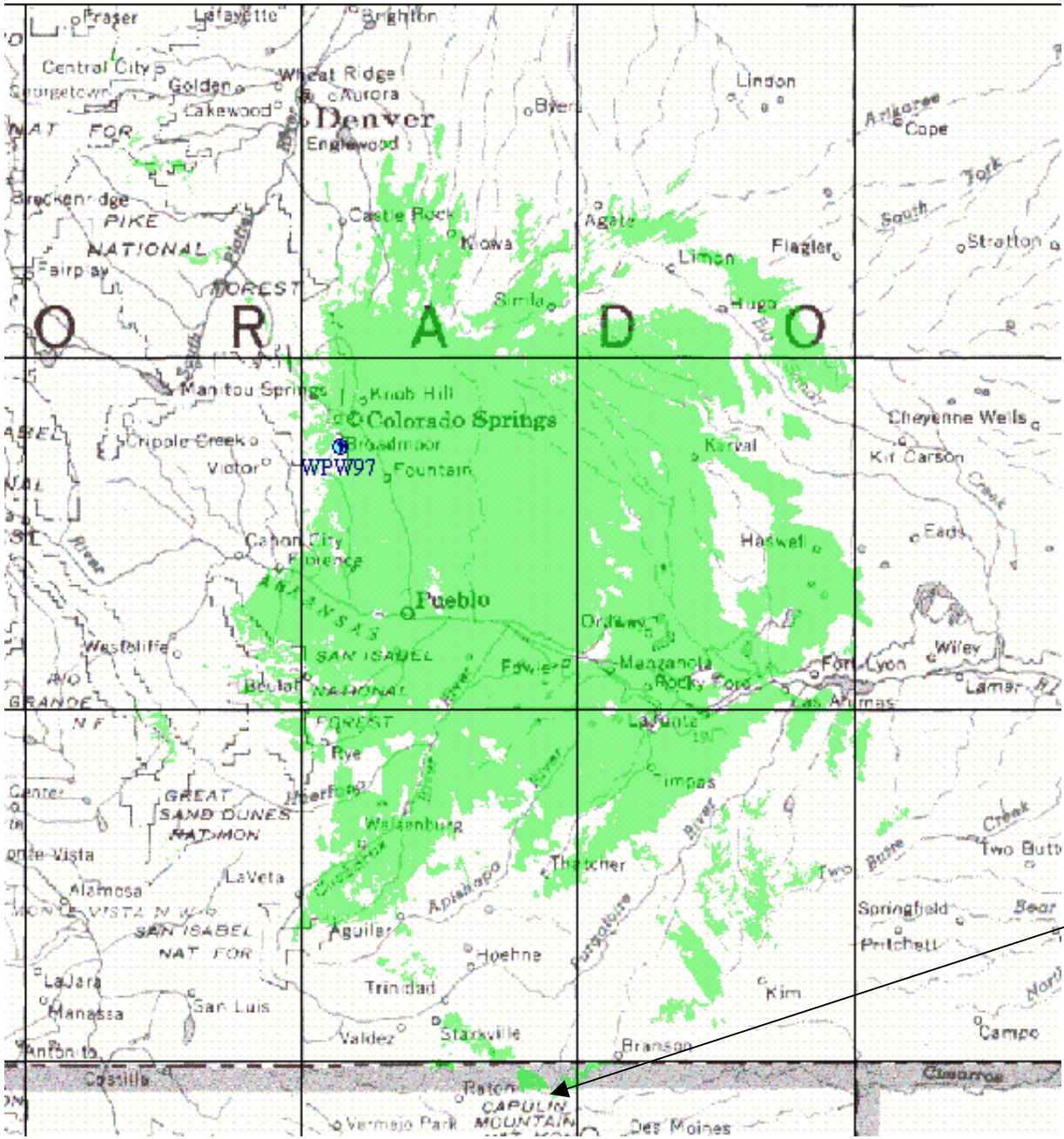
Sprint Together with NEXTEL

Colorado Springs Relocation Zone with 50 ft (15.24m) AWS Tower



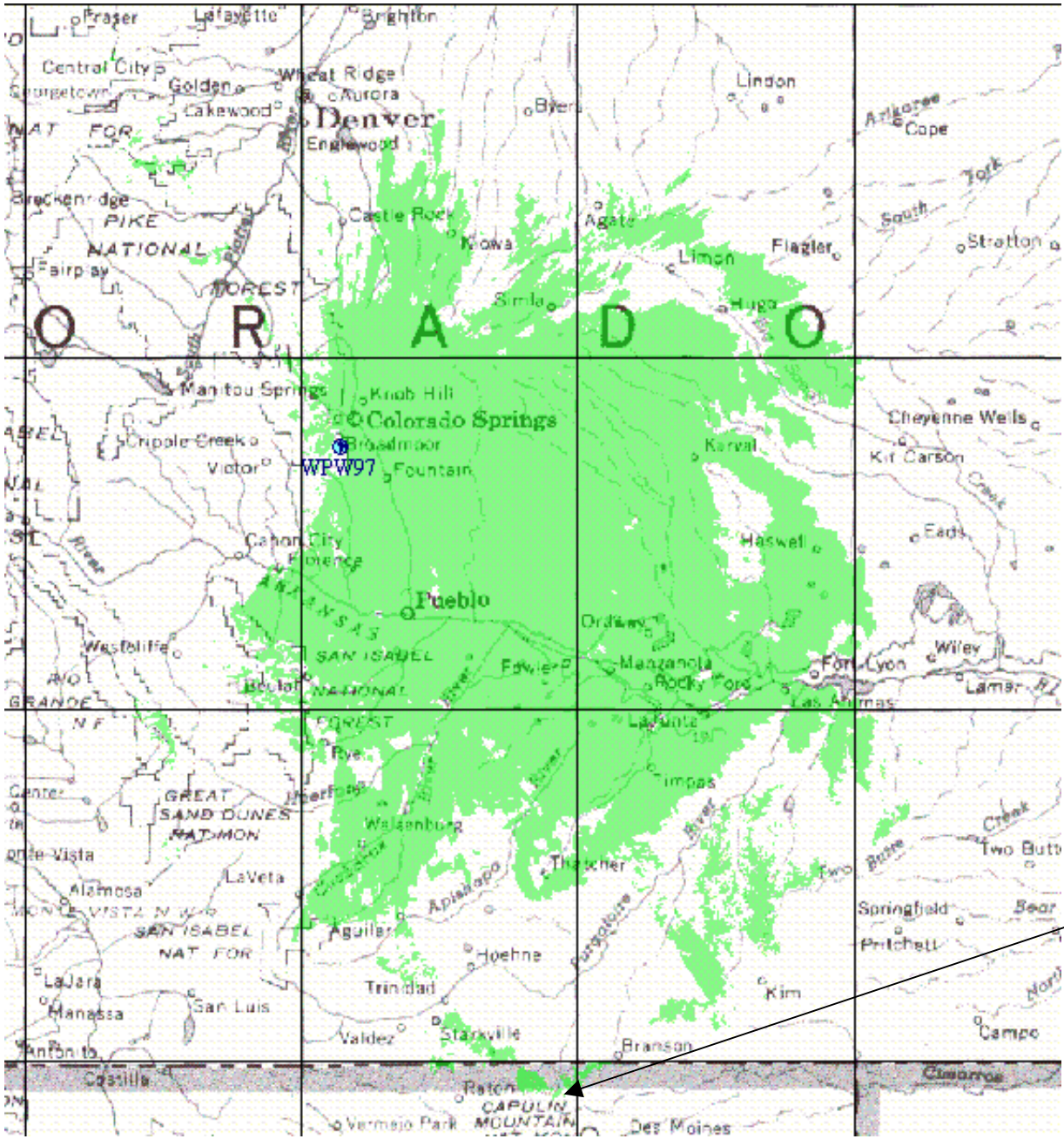
216 Km

Colorado Springs Relocation Zone with 100 ft (30.48m) AWS Tower



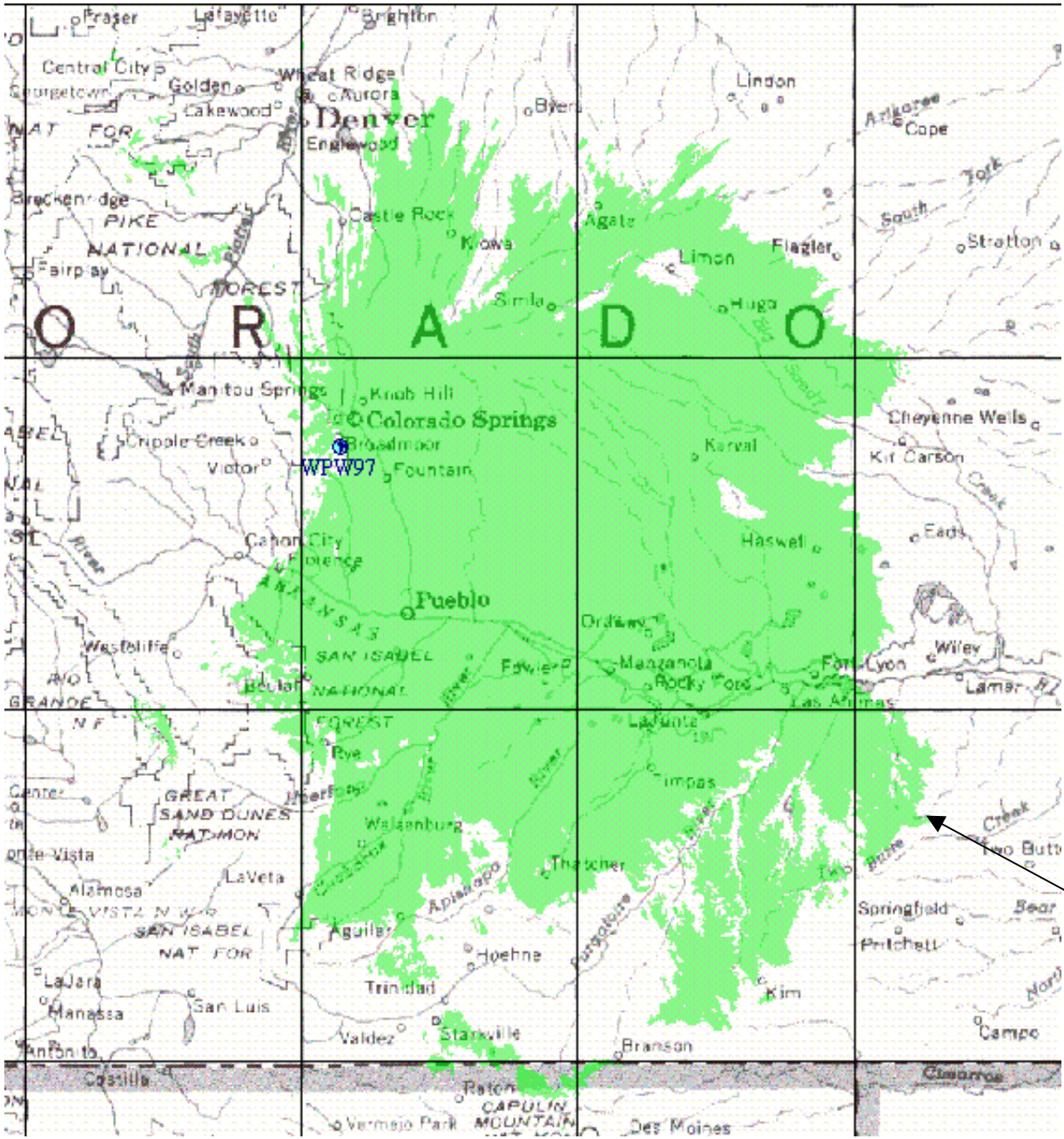
216 Km

Colorado Springs Relocation Zone with 150 ft (45.72m) AWS Tower



216 Km

Colorado Springs Relocation Zone with 300 ft (91.44m) AWS Tower



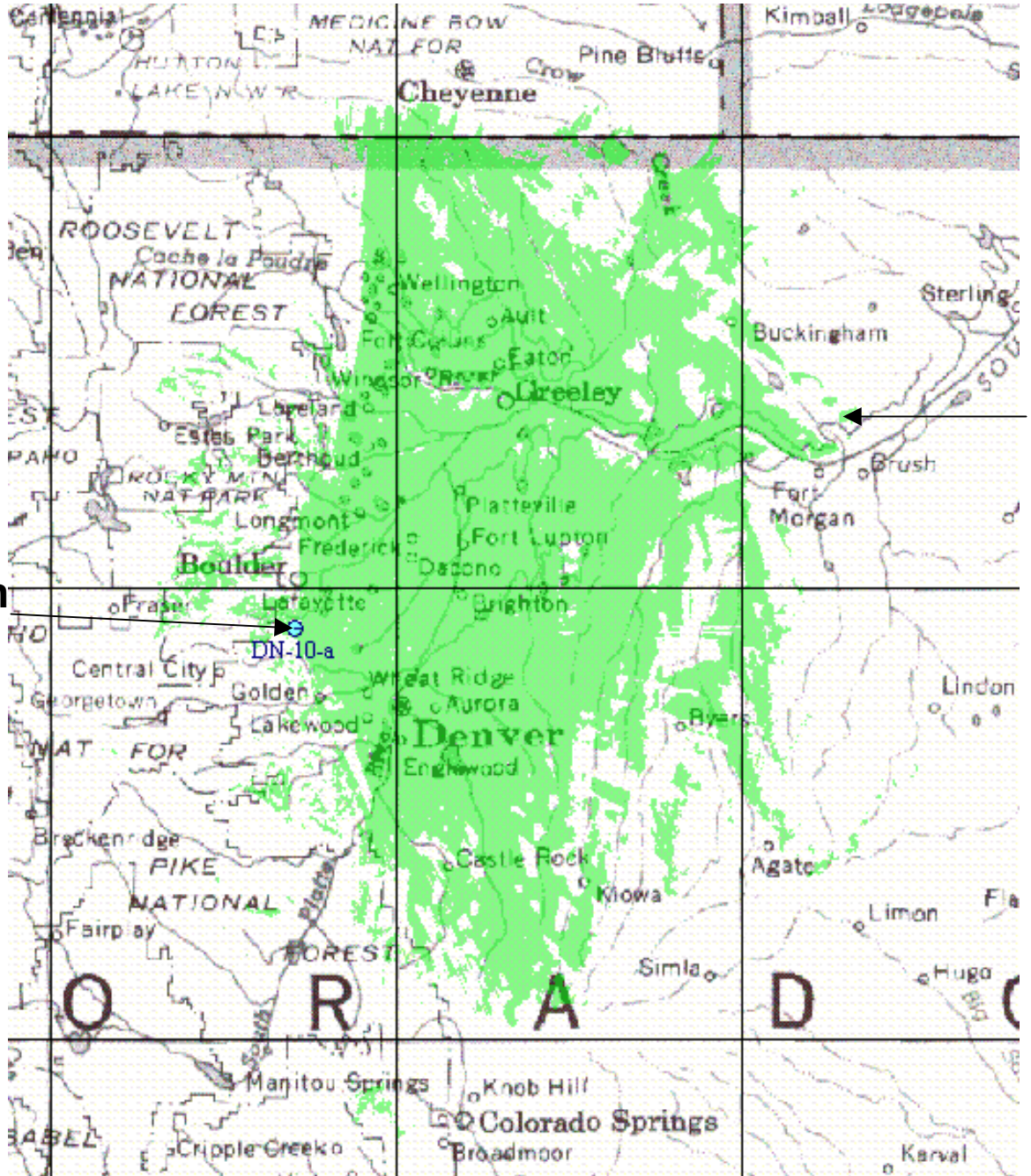
221 Km

1G LOS Projections

Denver

Sprint Together with NEXTEL

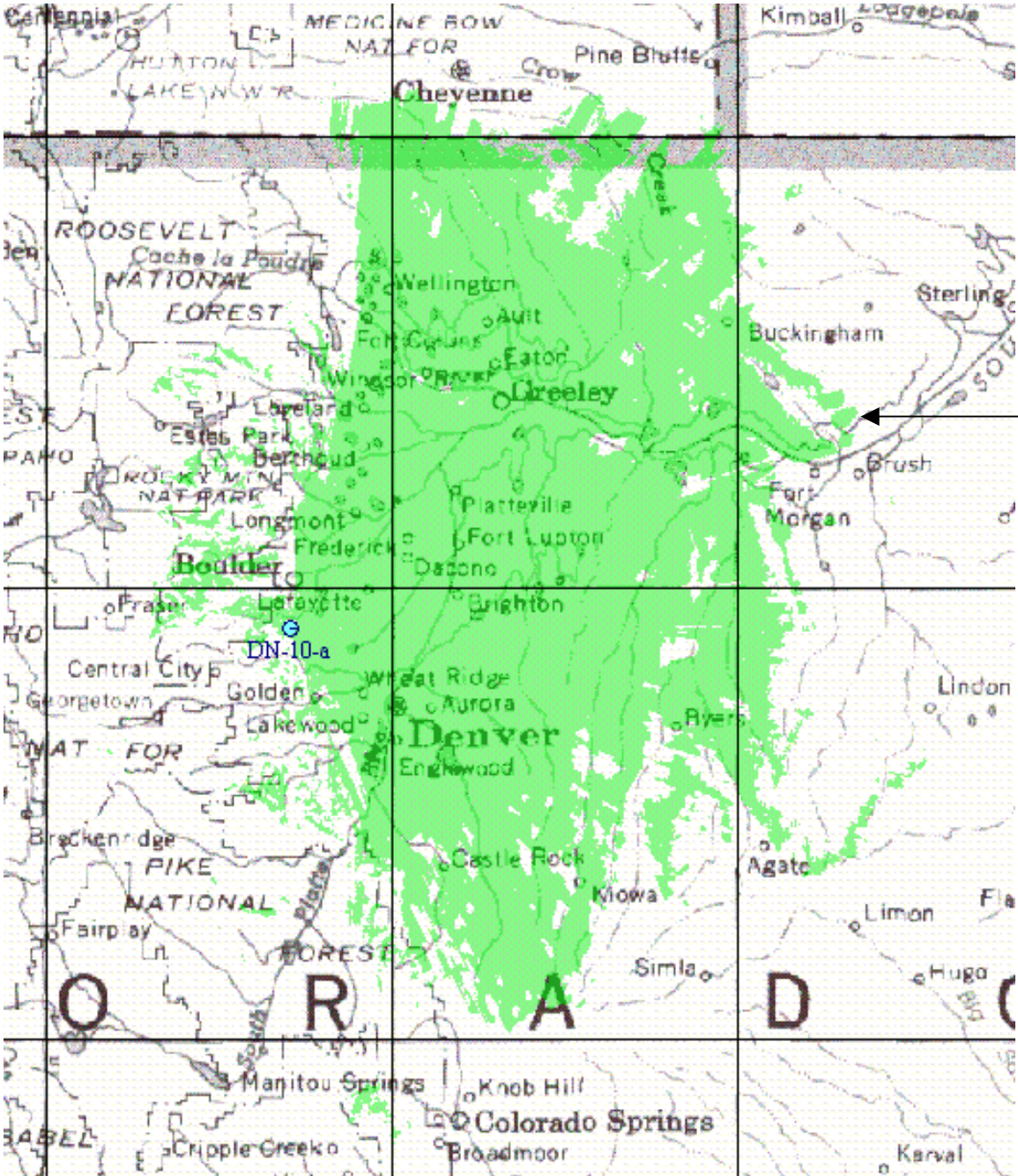
Denver LOS Projection at 50 ft Remote Height



148Km

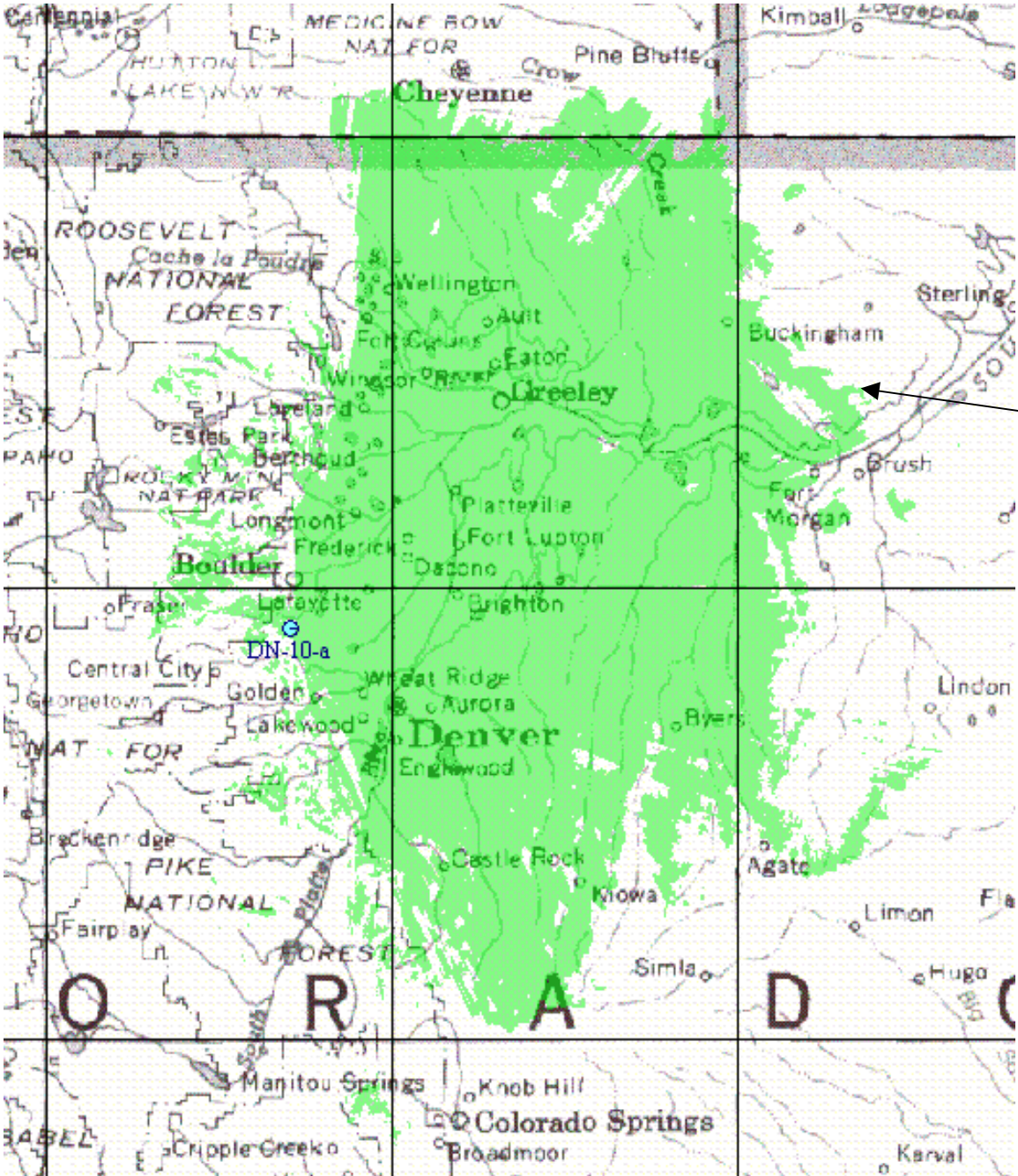
Site Elevation
2530m

Denver LOS Projection at 100 ft Remote Height



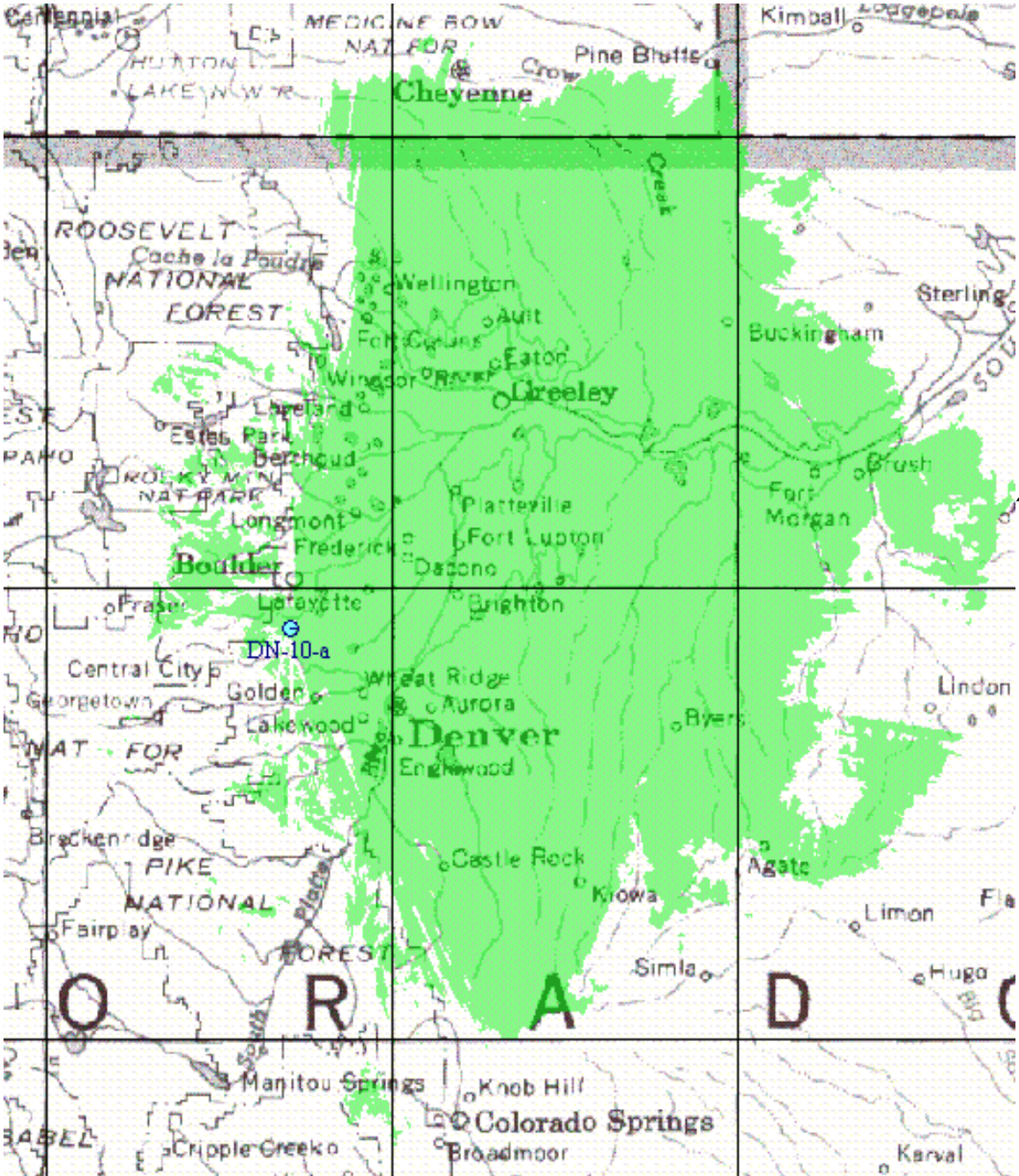
150Km

Denver LOS Projection at 150 ft Remote Height



152Km

Denver LOS Projection at 300 ft Remote Height



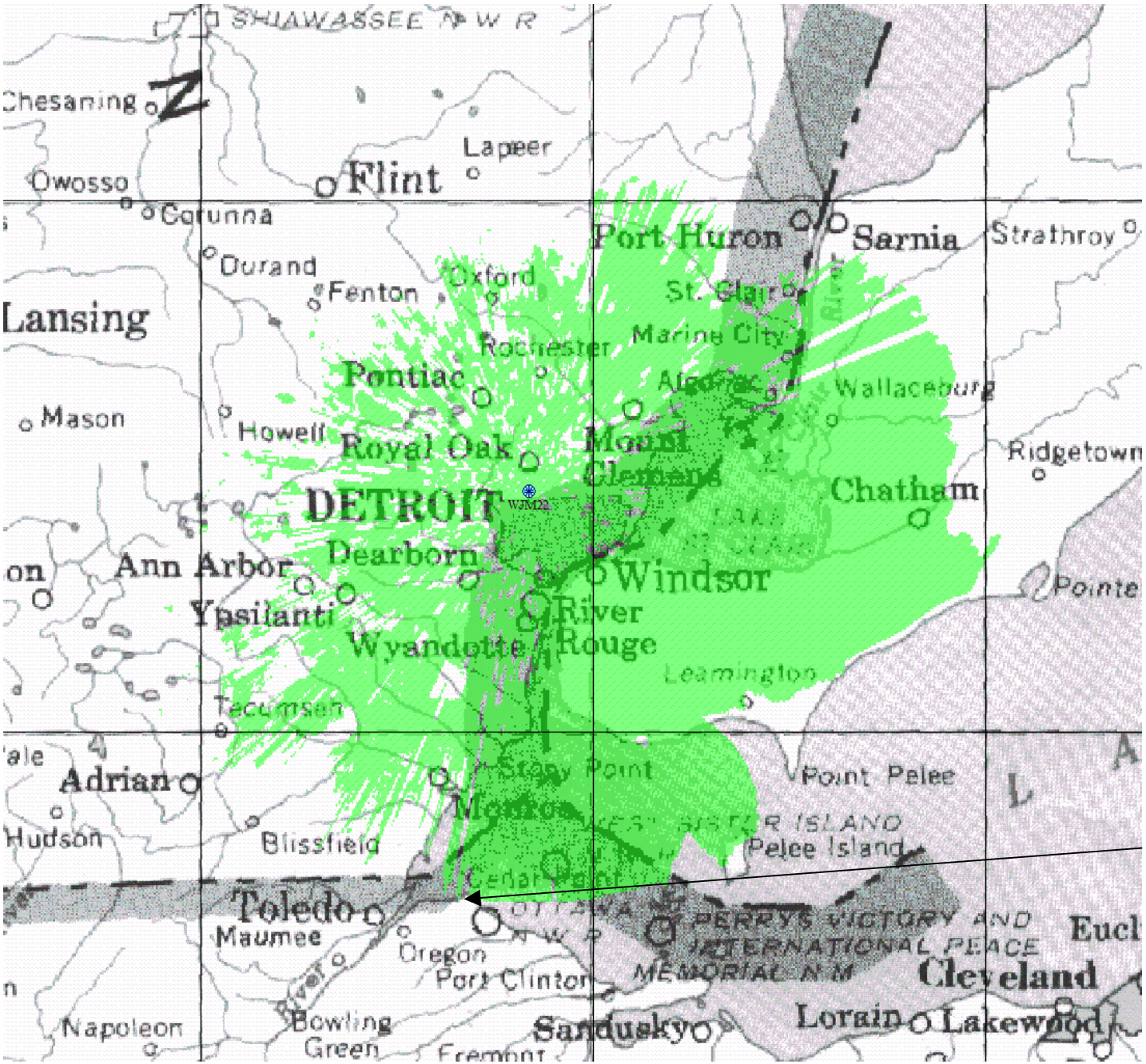
181Km

1G LOS Projections

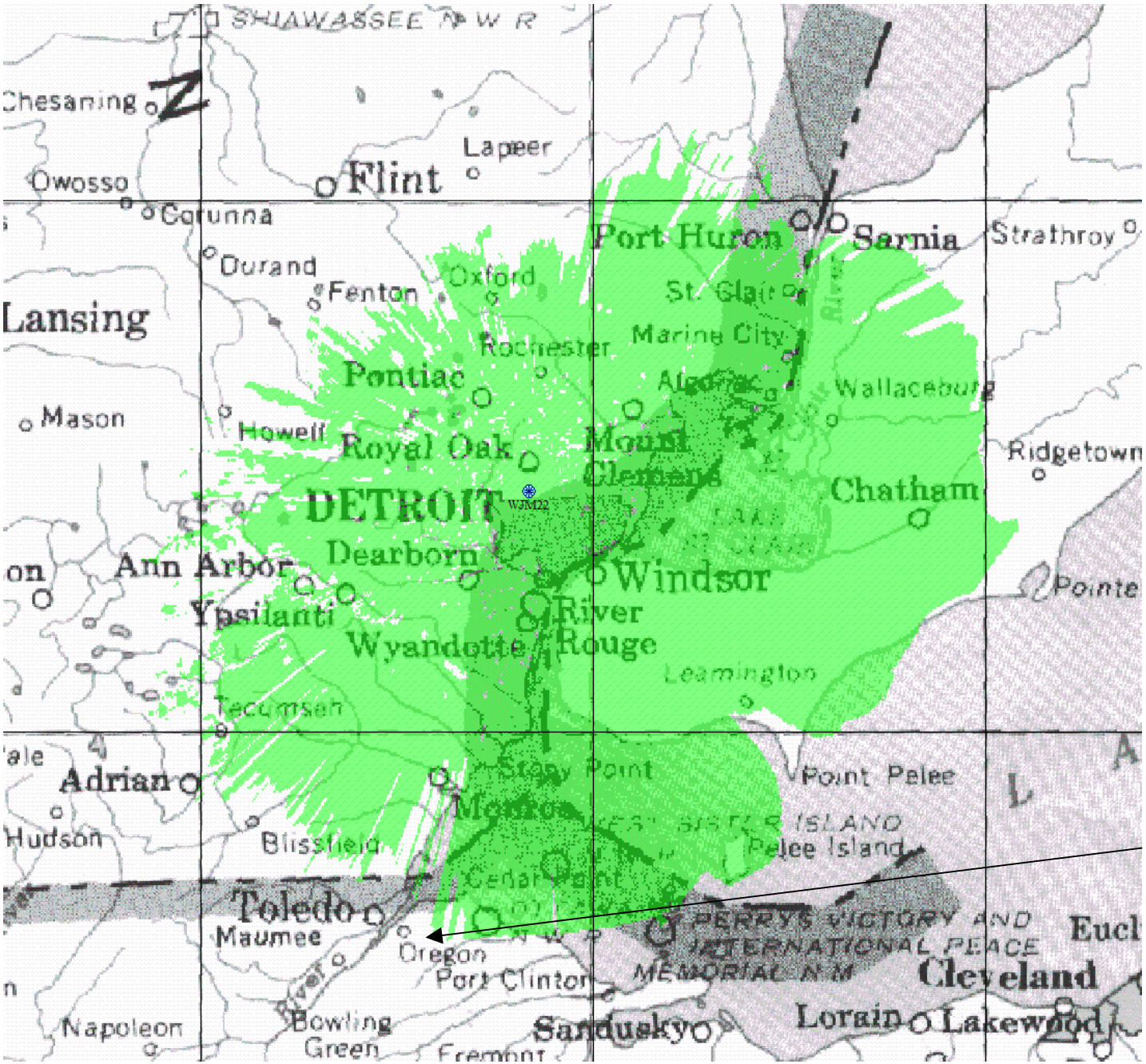
Detroit

Sprint Together with NEXTEL

Detroit Relocation Zone with 50 ft (15.24m) AWS Tower

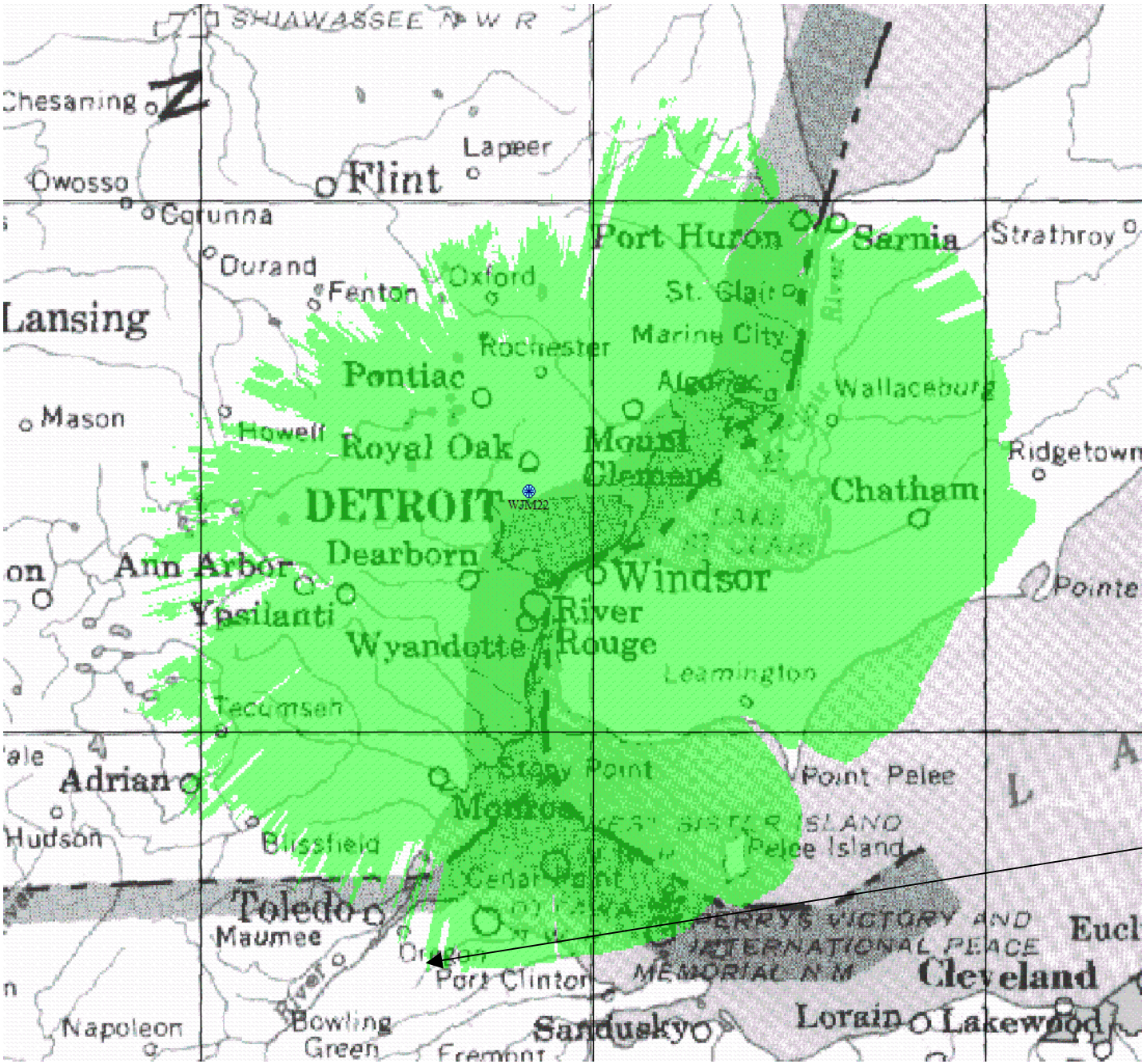


Detroit Relocation Zone with 100 ft (30.48m) AWS Tower

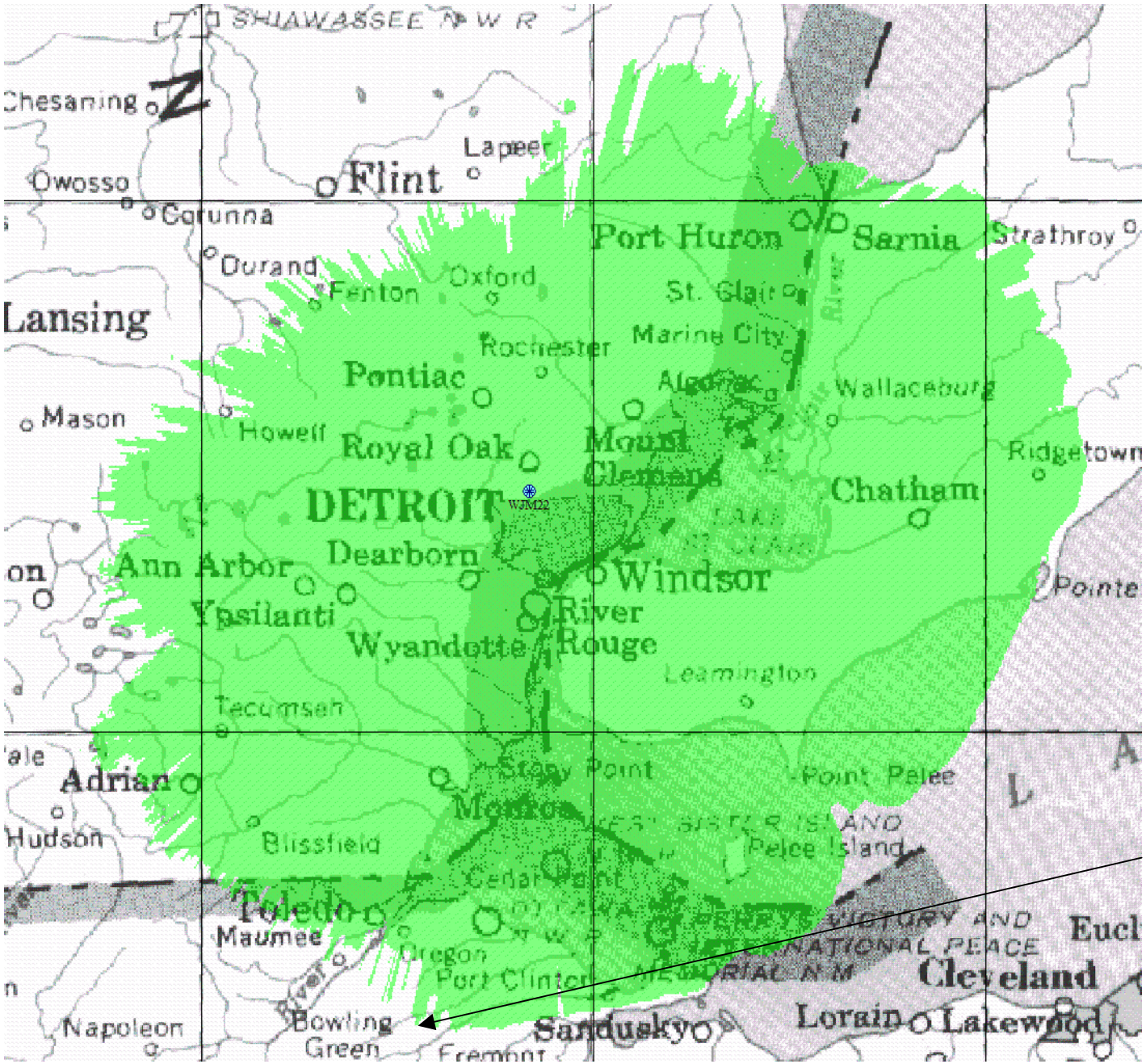


96 Km

Detroit Relocation Zone with 150 ft (45.72m) AWS Tower



Detroit Relocation Zone with 300 ft (91.44m) AWS Tower



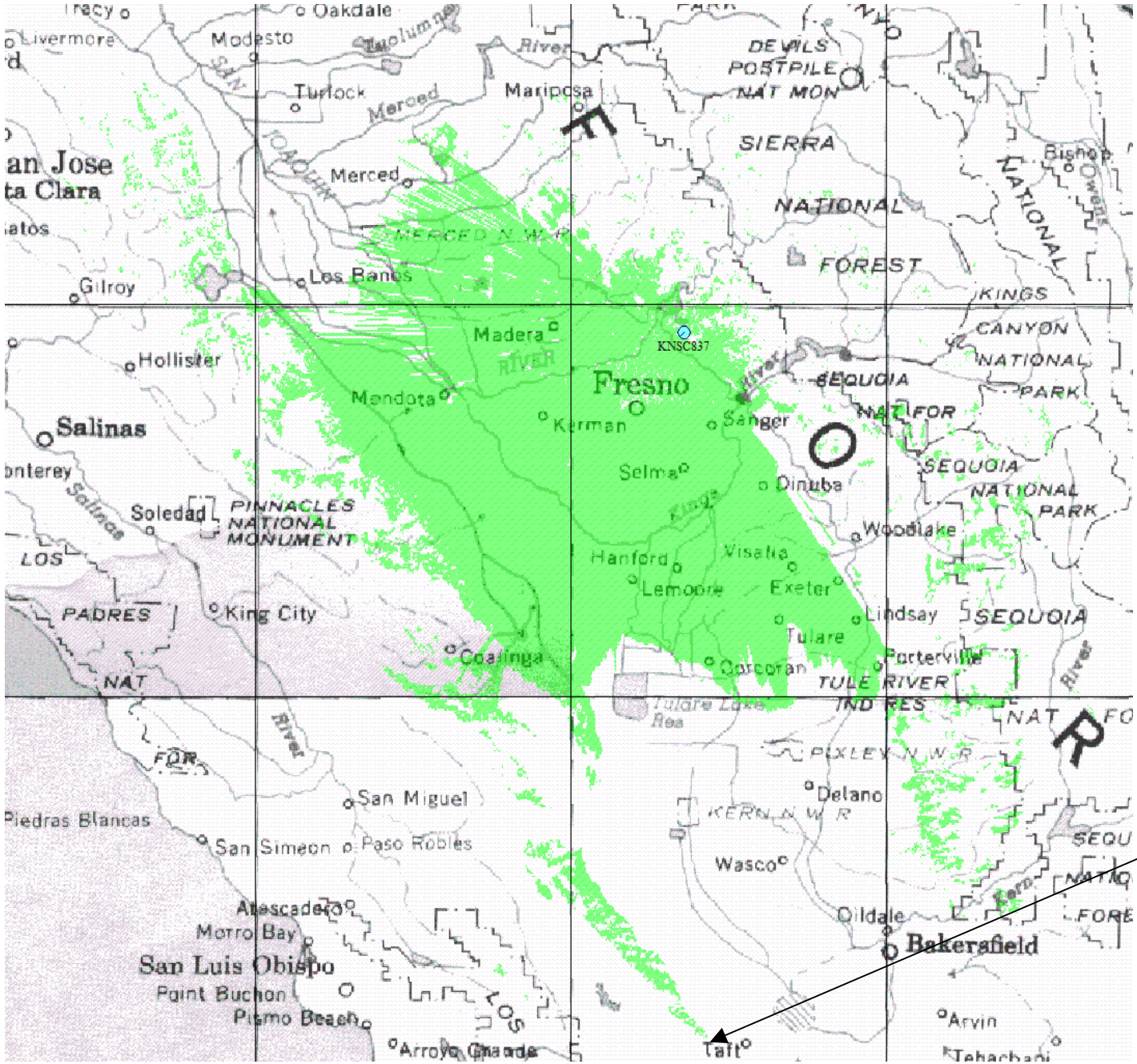
1G LOS Projections

Fresno

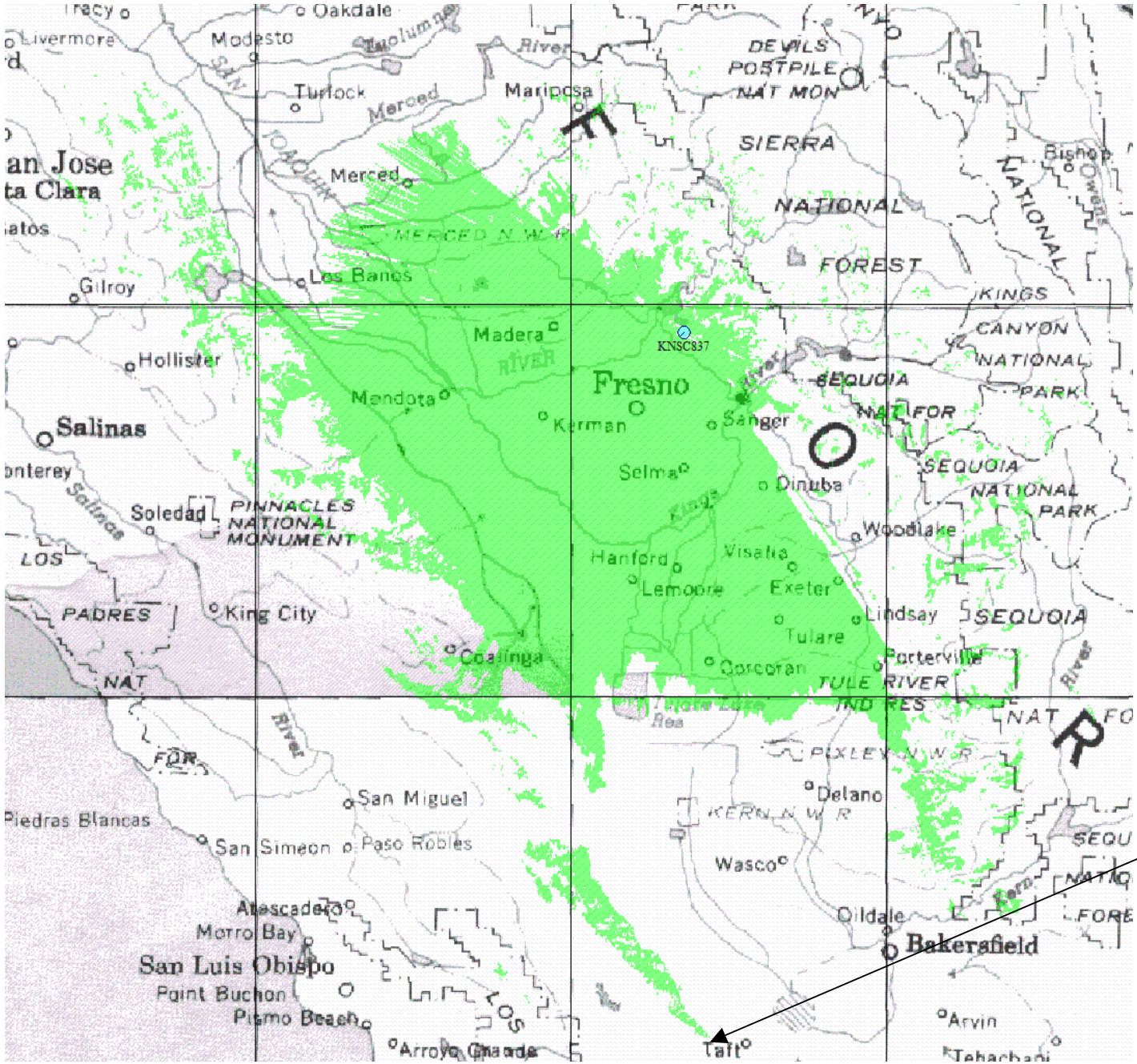
Sprint

Together with NEXTEL

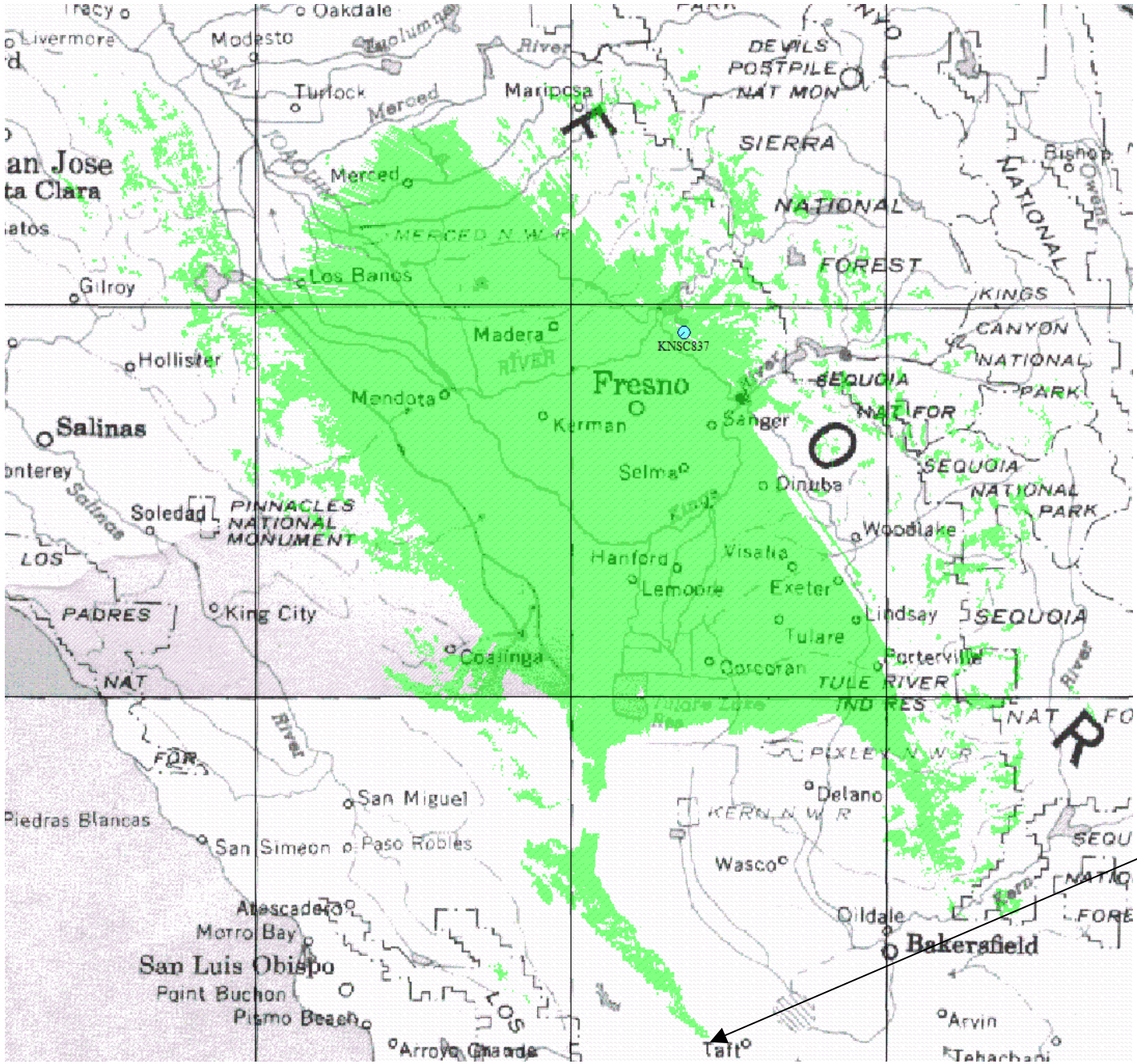
Fresno Relocation Zone with 50 ft (15.24m) AWS Tower



Fresno Relocation Zone with 100 ft (30.48m) AWS Tower

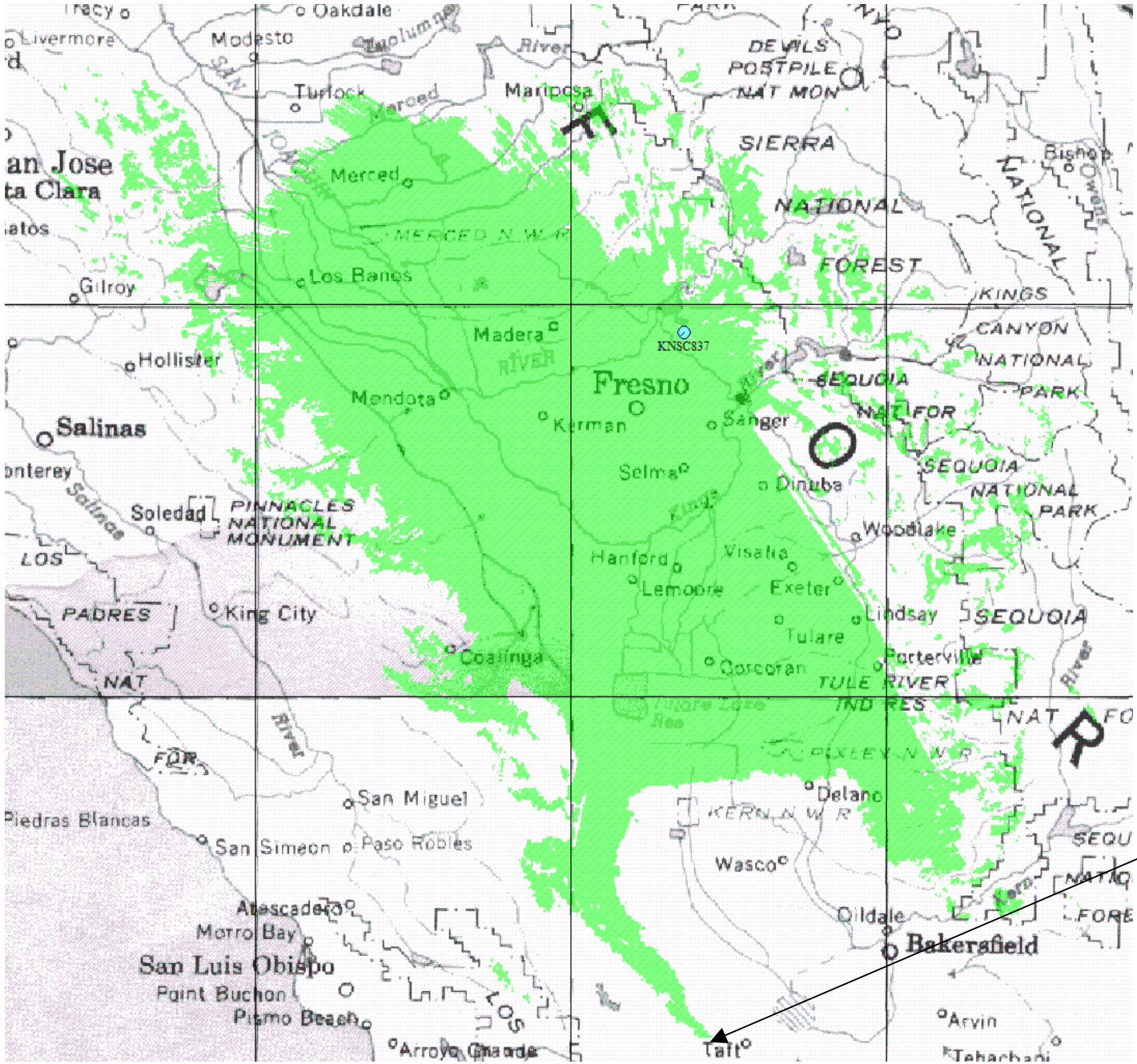


Fresno Relocation Zone with 150 ft (45.72m) AWS Tower



200 Km

Fresno Relocation Zone with 300 ft (91.44m) AWS Tower

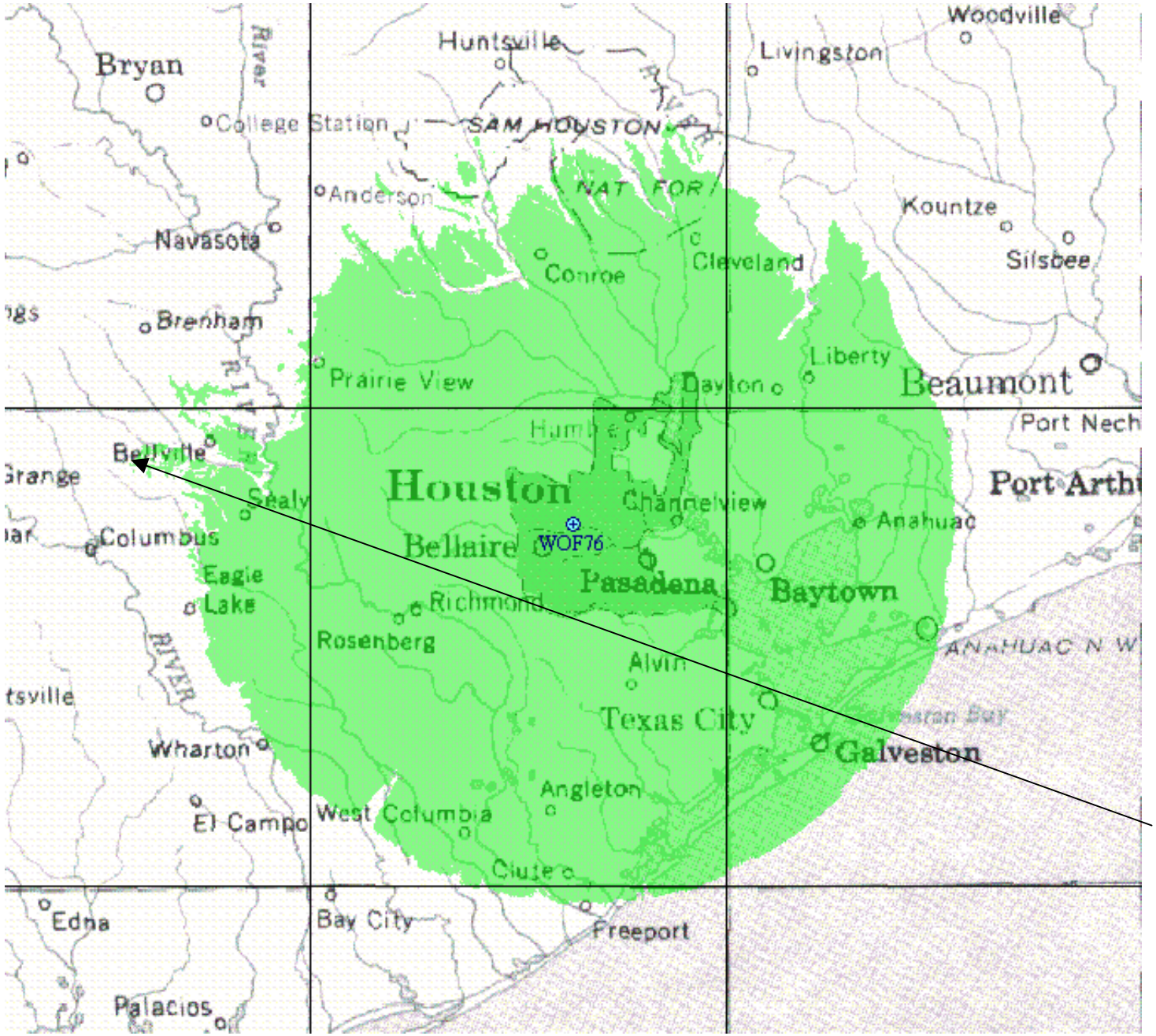


1G LOS Projections

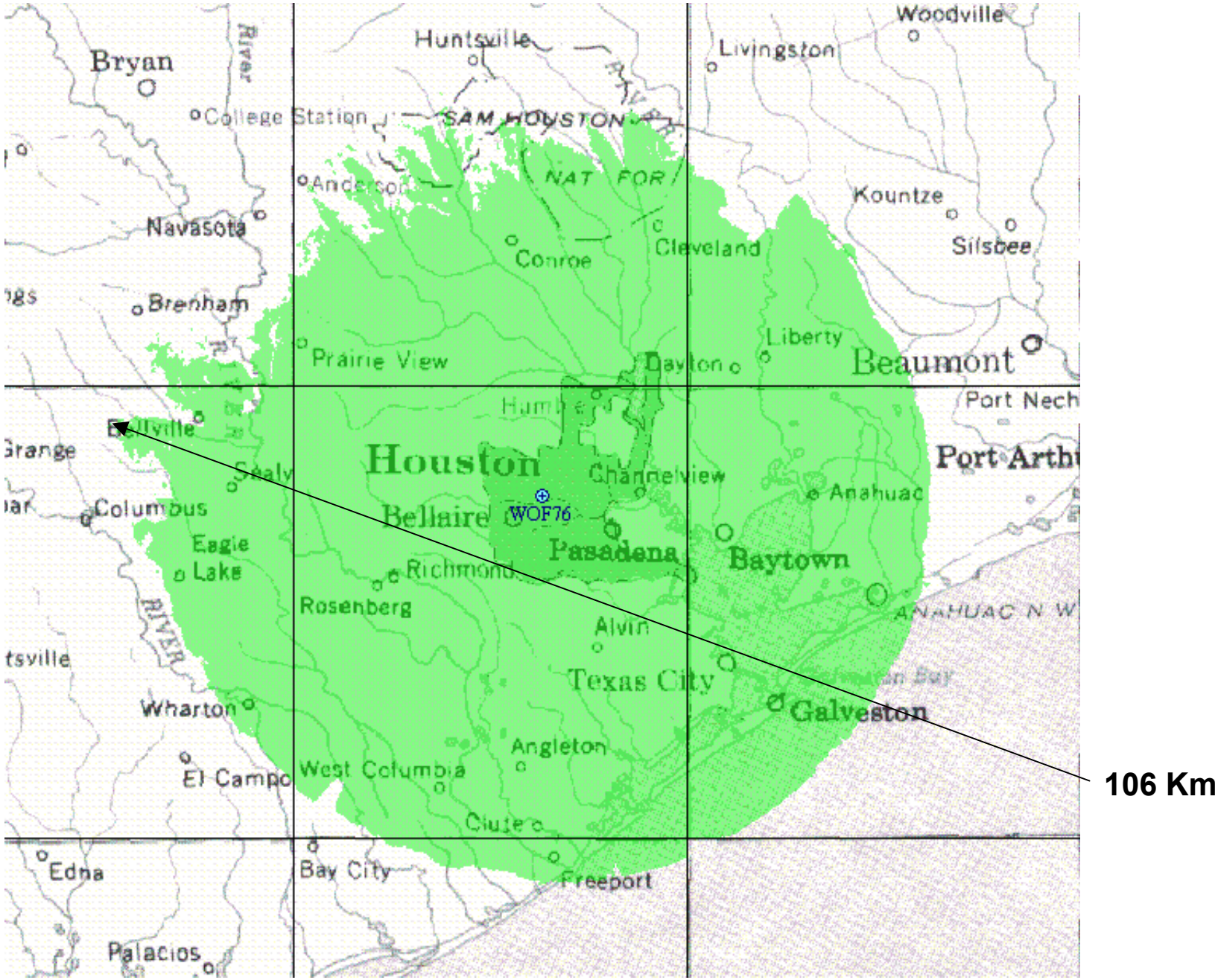
Houston

Sprint Together with NEXTEL

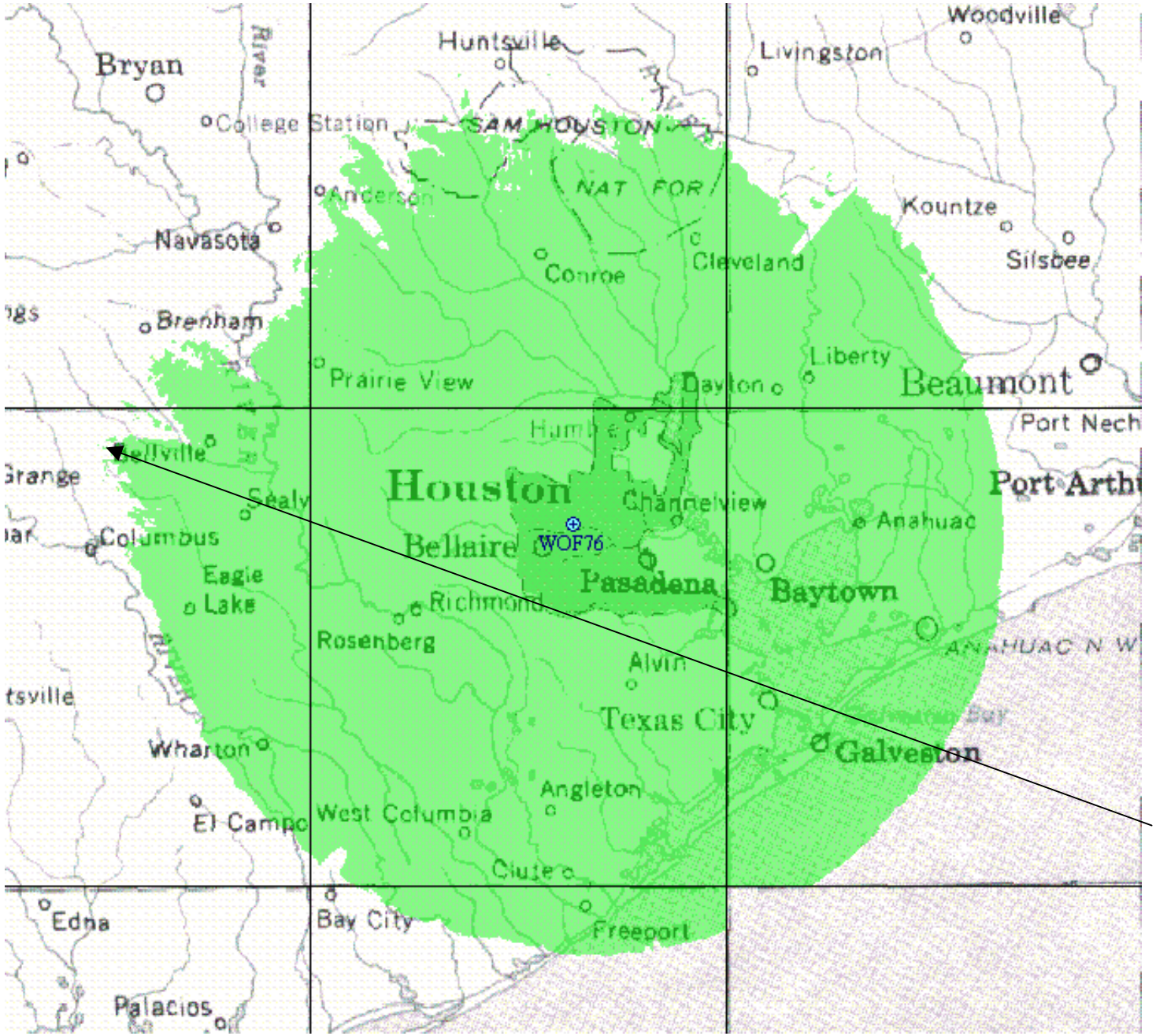
Houston Relocation Zone with 50 ft (15.24m) AWS Tower



Houston Relocation Zone with 100 ft (30.48m) AWS Tower

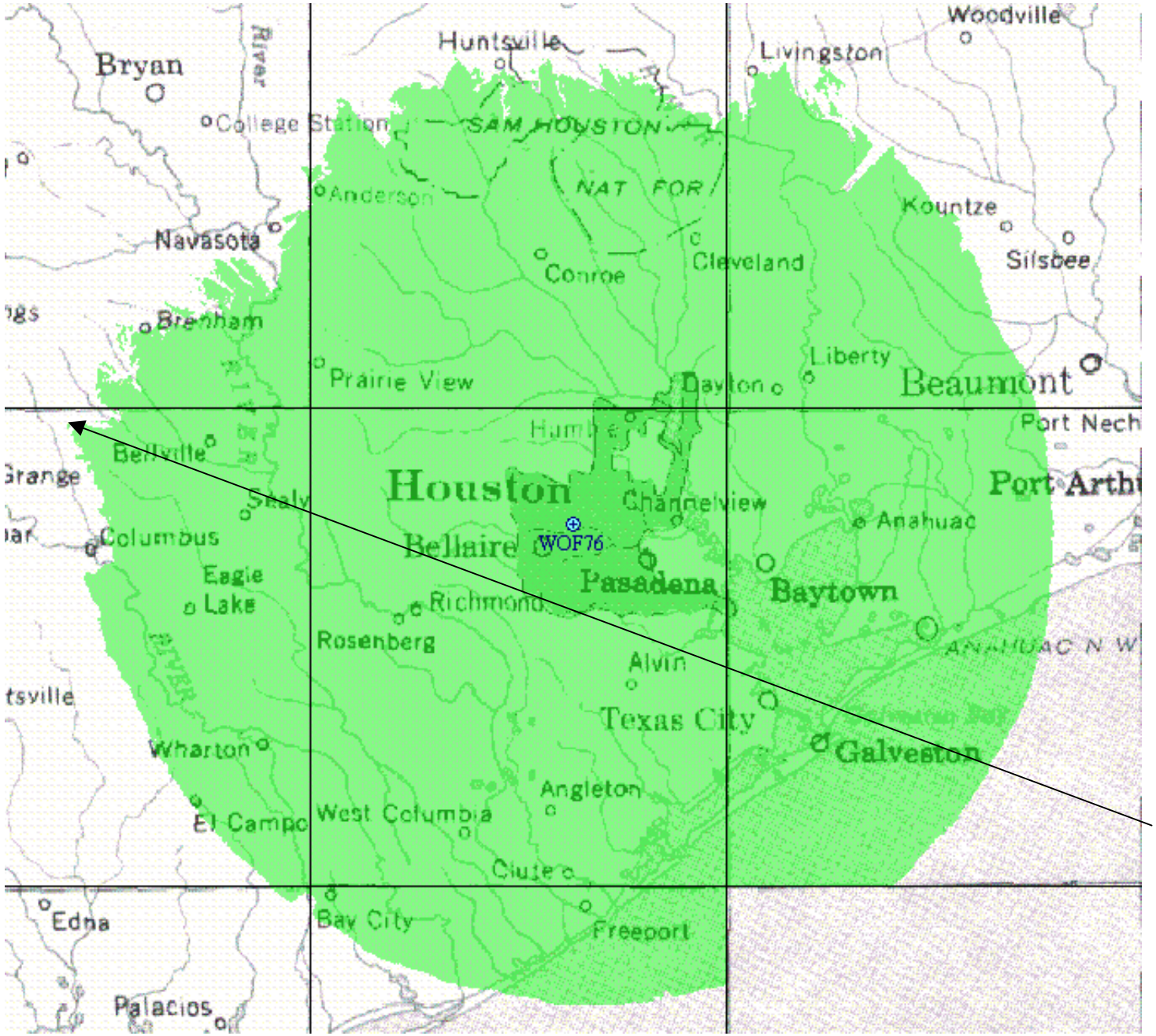


Houston Relocation Zone with 150 ft (45.72m) AWS Tower



109 Km

Houston Relocation Zone with 300 ft (91.44m) AWS Tower



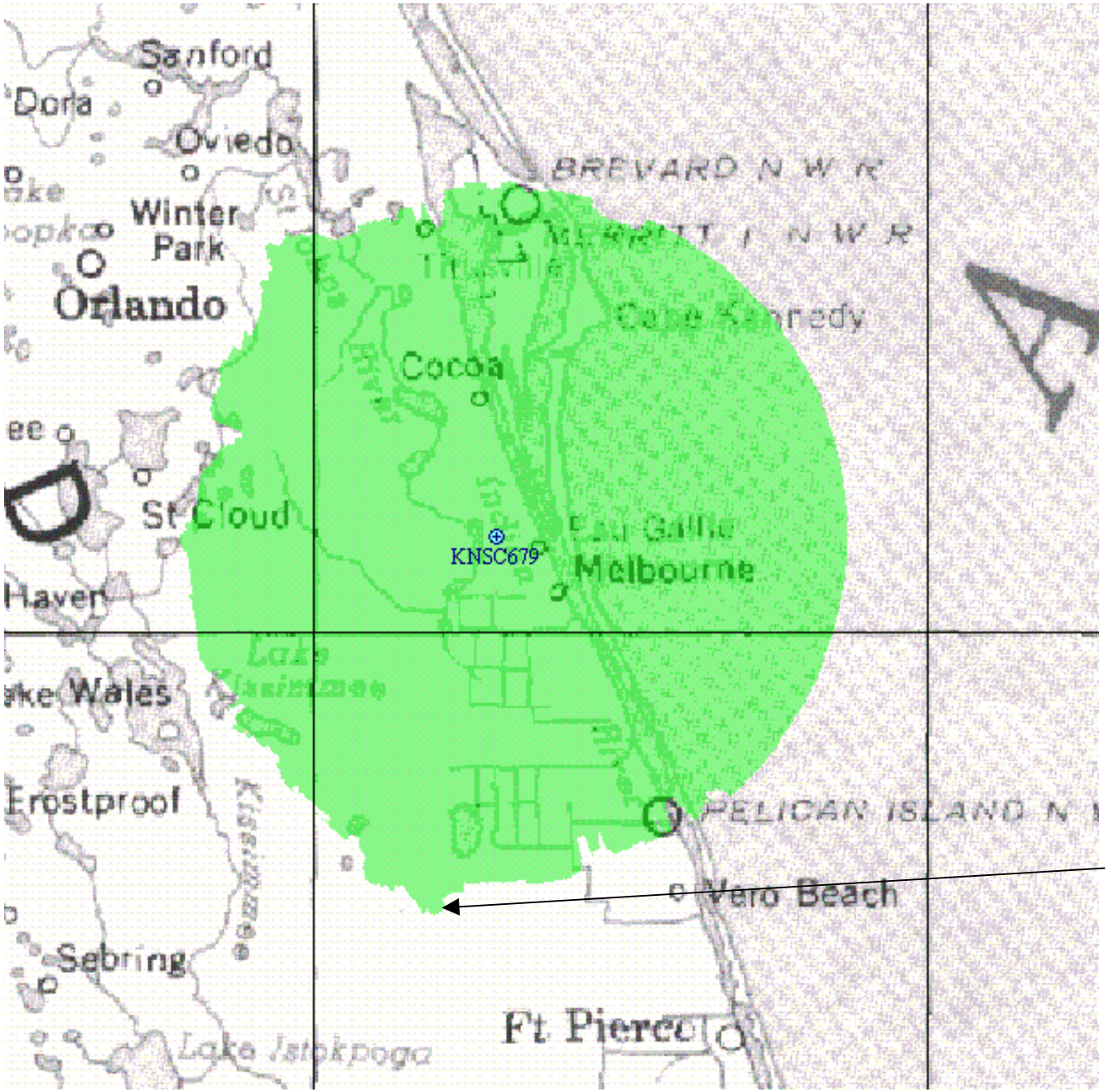
118 Km

1G LOS Projections

Melbourne

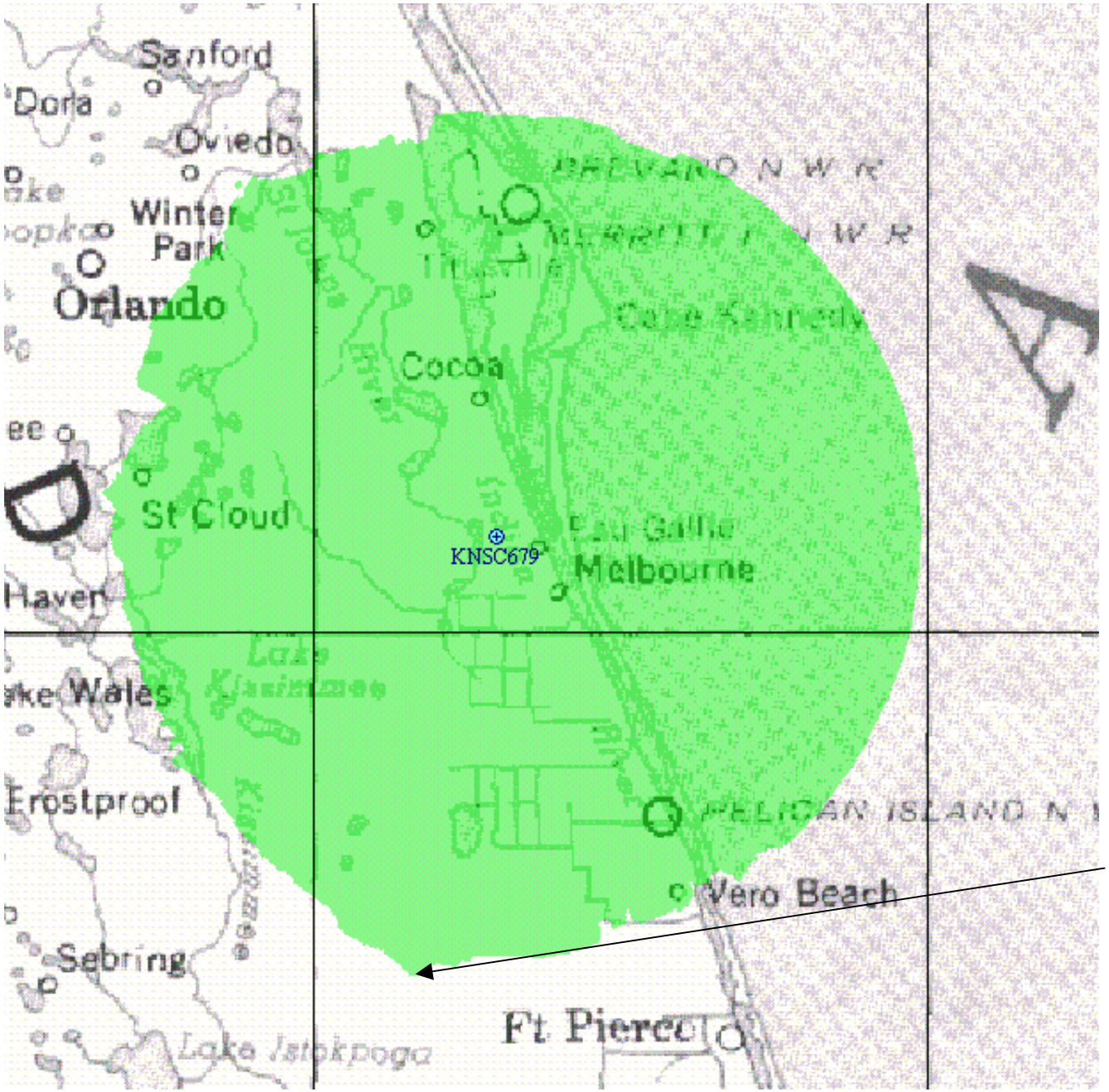
Sprint Together with NEXTEL

Melbourne LOS Projection at 50 ft Remote Height

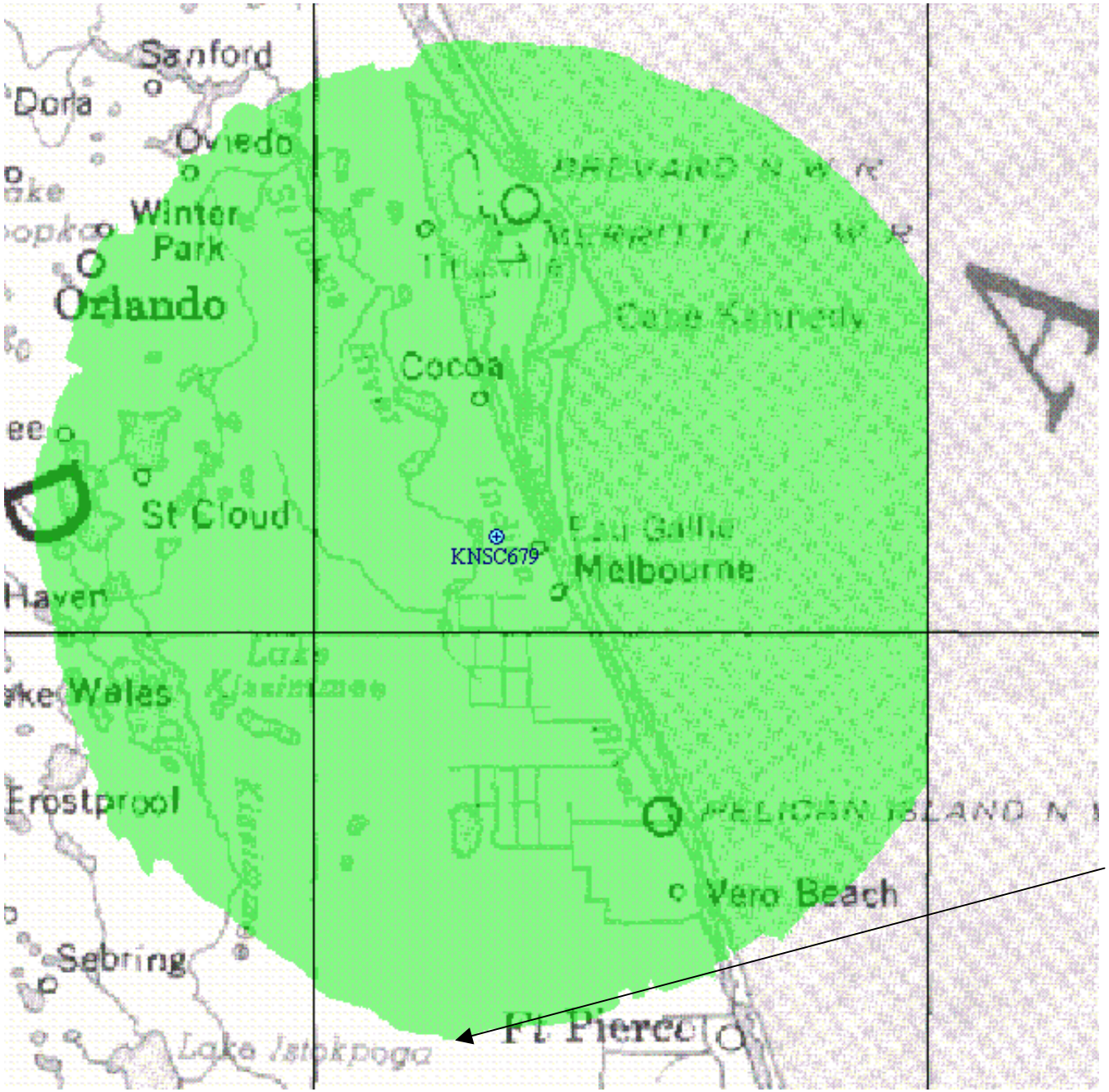


Melbourne LOS Projection at 100 ft Remote Height

Melbourne LOS Projection at 150 ft Remote Height



Melbourne LOS Projection at 300 ft Remote Height



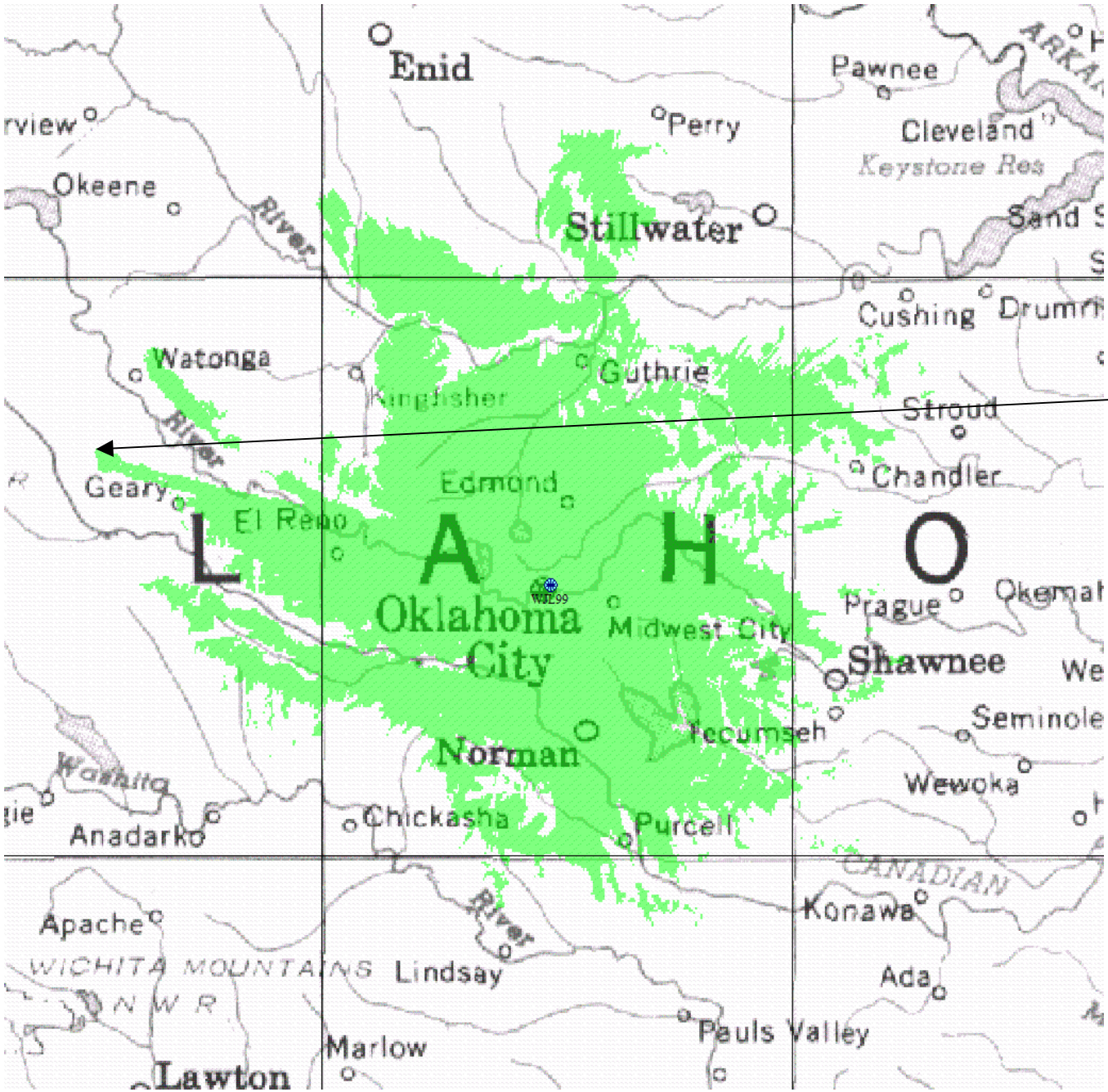
1G LOS Projections

Oklahoma City

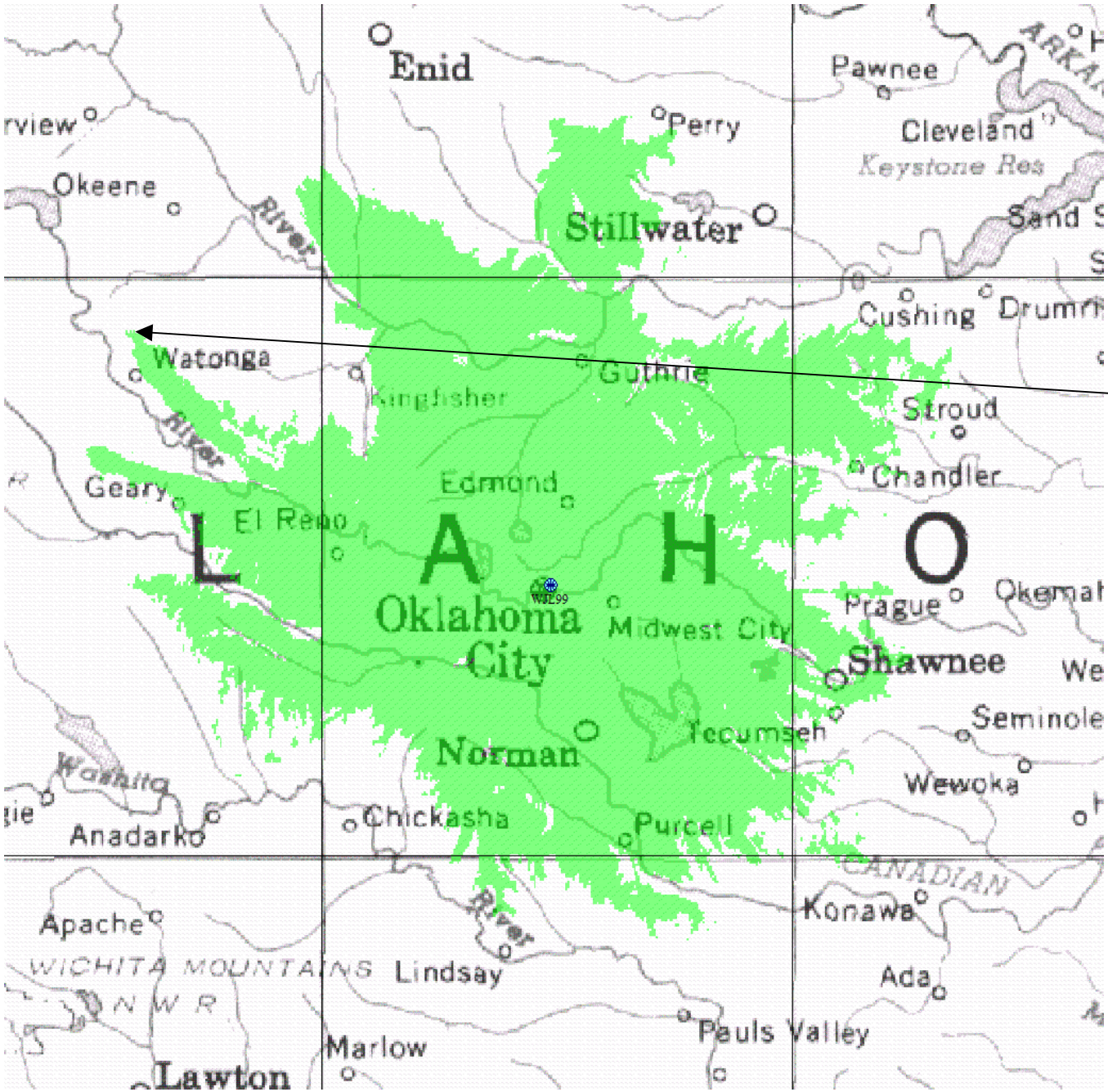
Sprint Together with NEXTEL

Oklahoma City Relocation Zone with 50 ft (15.24m) AWS Tower

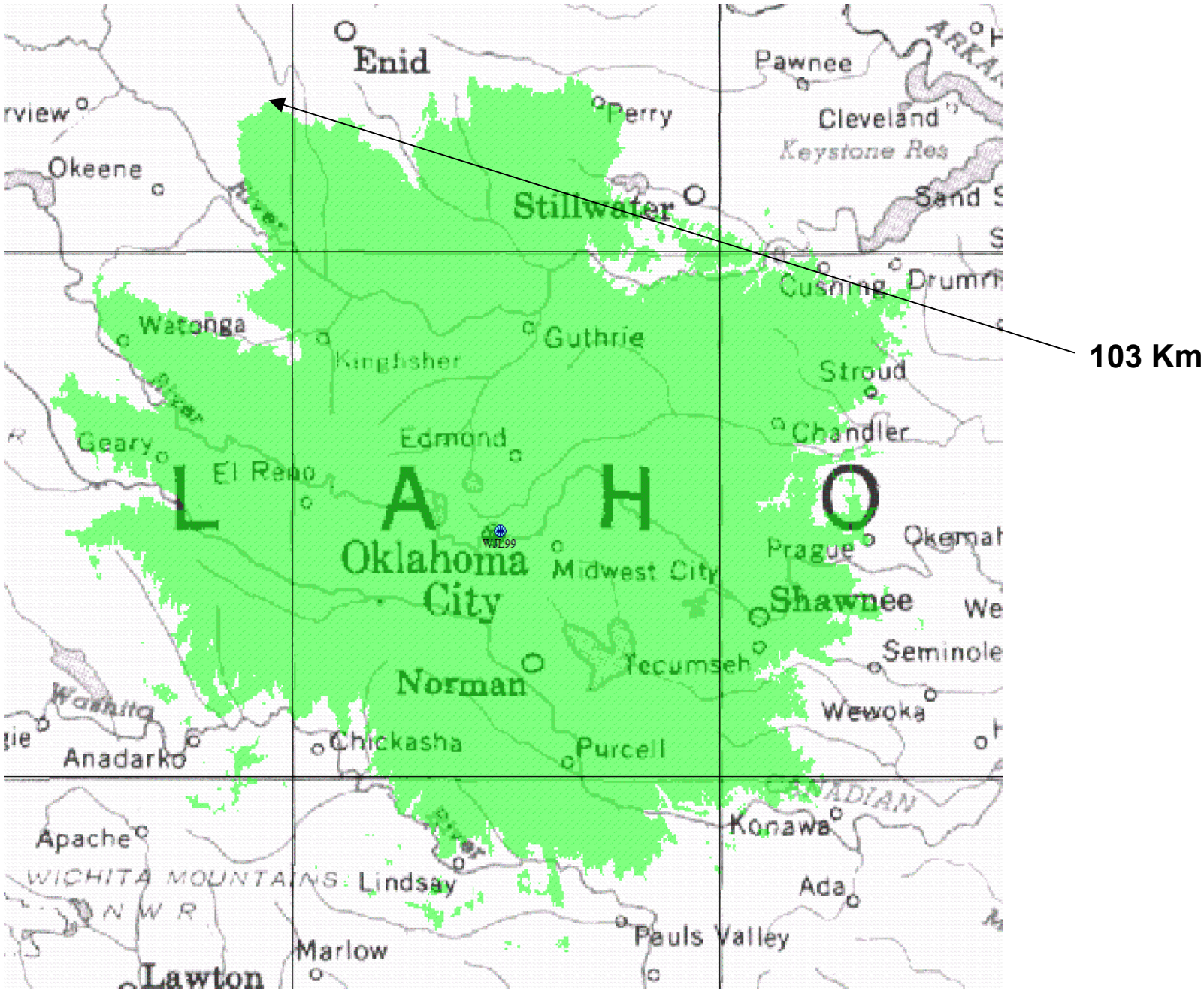
Oklahoma City Relocation Zone with 100 ft (30.48m) AWS Tower



Oklahoma City Relocation Zone with 150 ft (45.72m) AWS Tower



Oklahoma City Relocation Zone with 300 ft (91.44m) AWS Tower



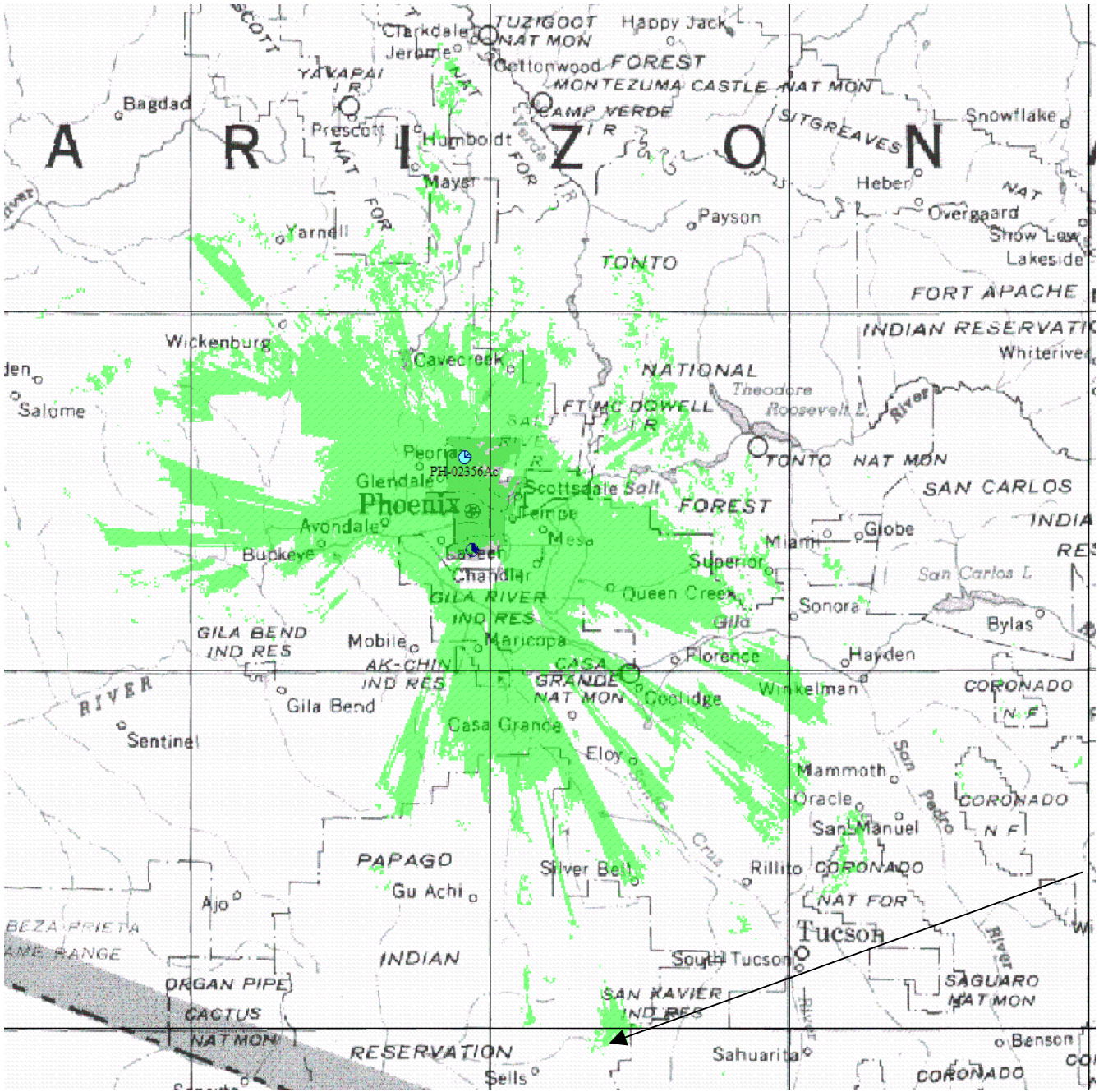
1G LOS Projections

Phoenix

Sprint

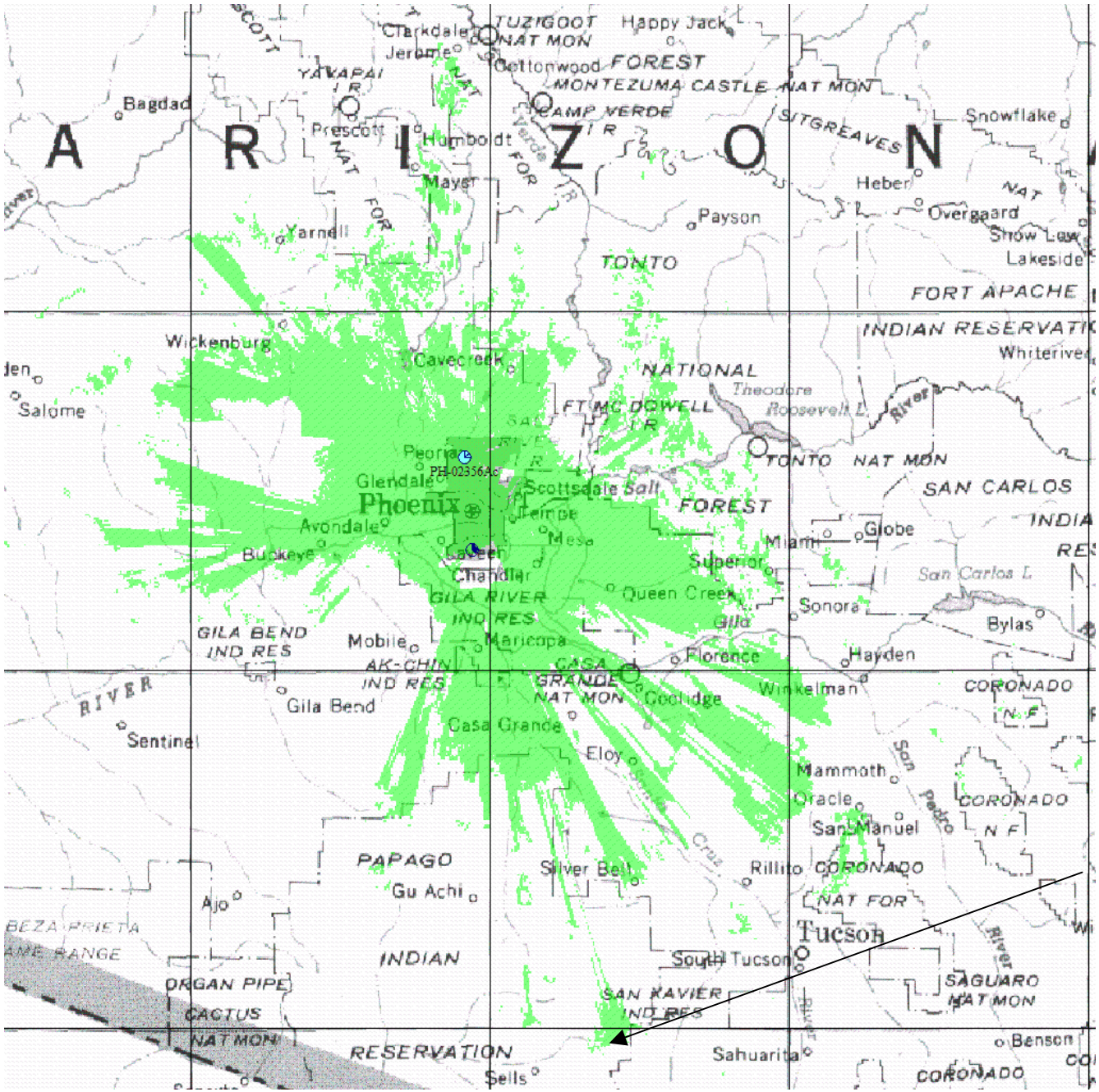
Together with NEXTEL

Phoenix Relocation Zone with 50 ft (15.24m) AWS Tower



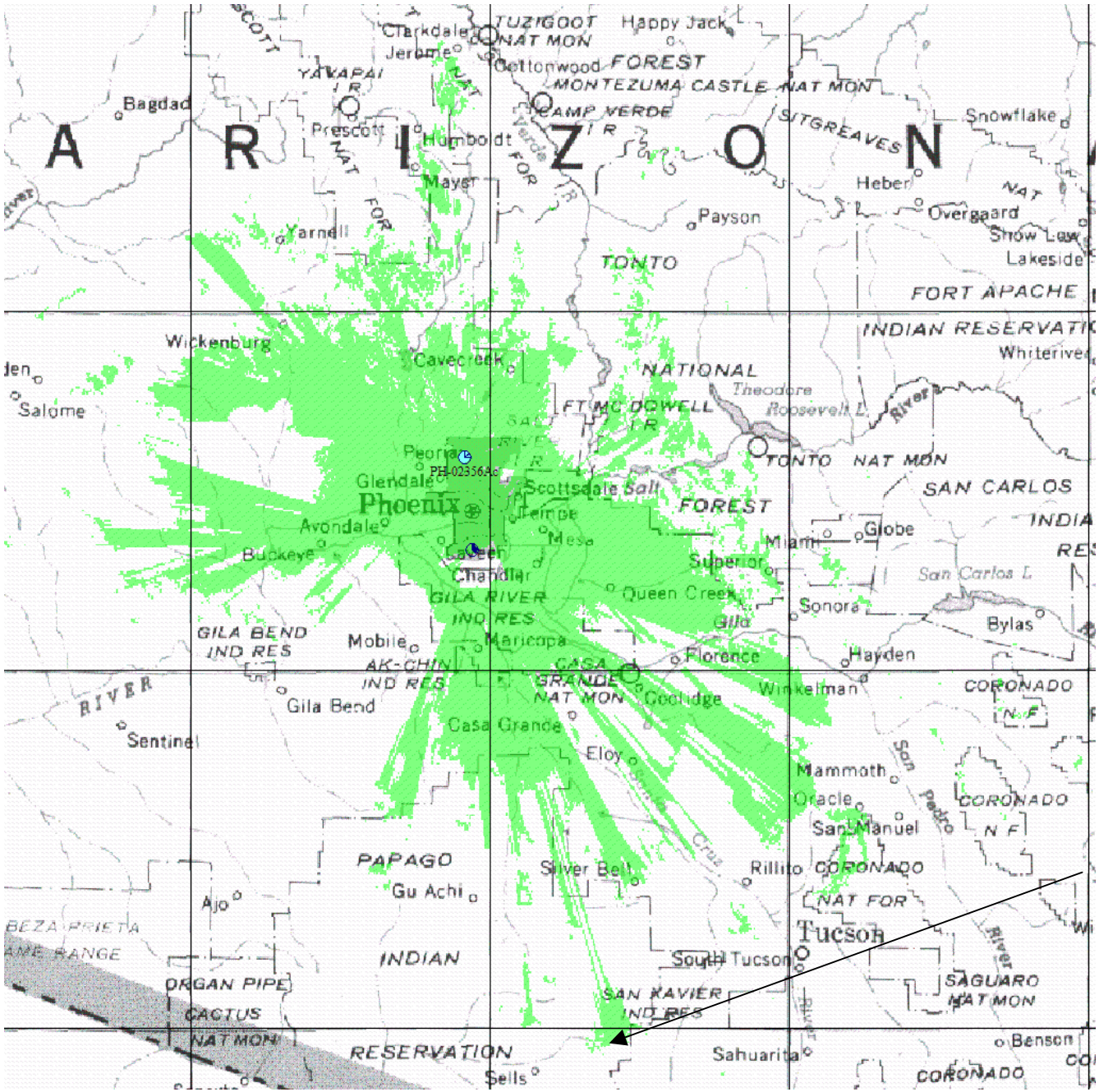
160 Km

Phoenix Relocation Zone with 100 ft (30.48m) AWS Tower



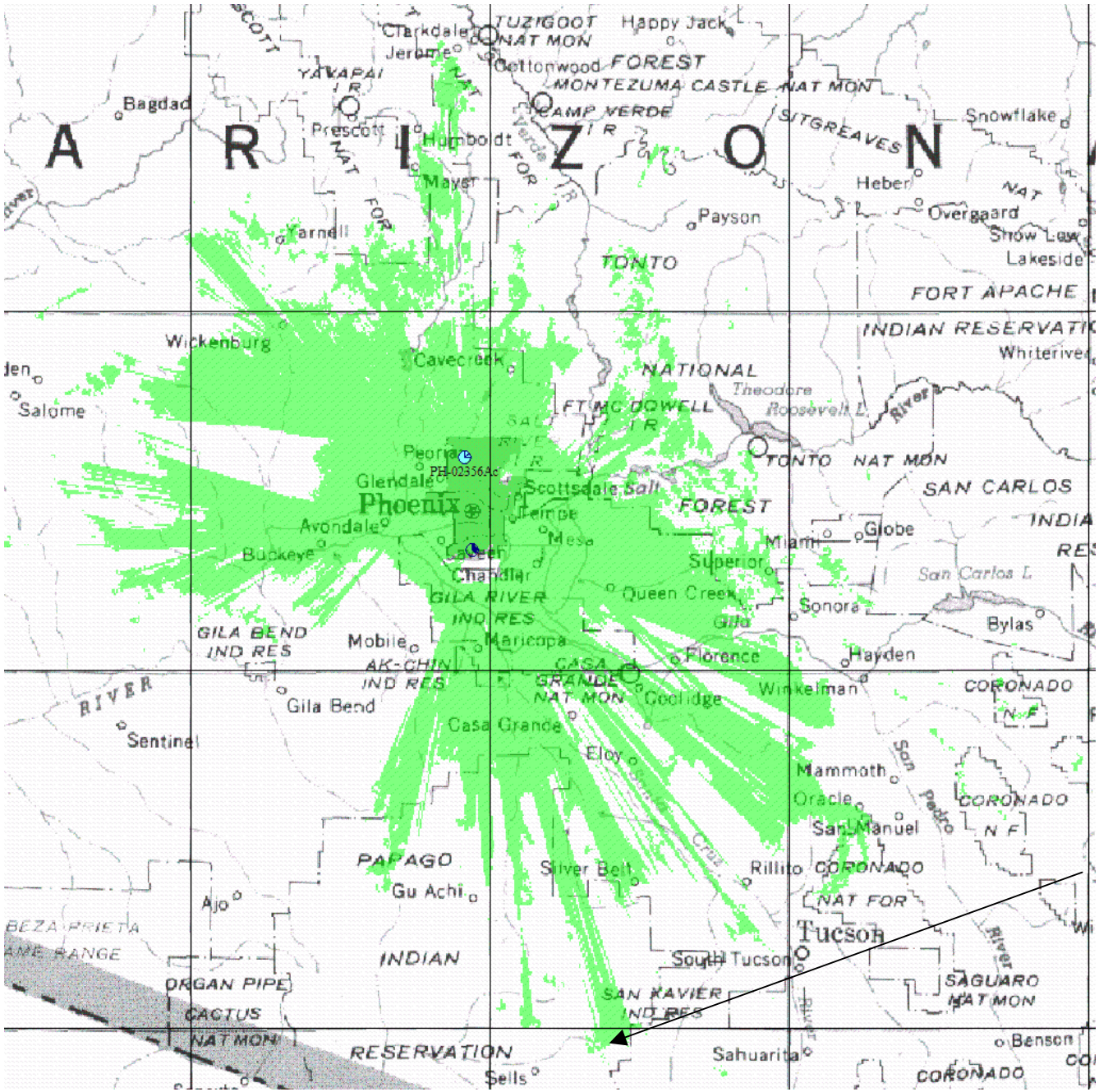
160 Km

Phoenix Relocation Zone with 150 ft (45.72m) AWS Tower



160 Km

Phoenix Relocation Zone with 300 ft (91.44m) AWS Tower



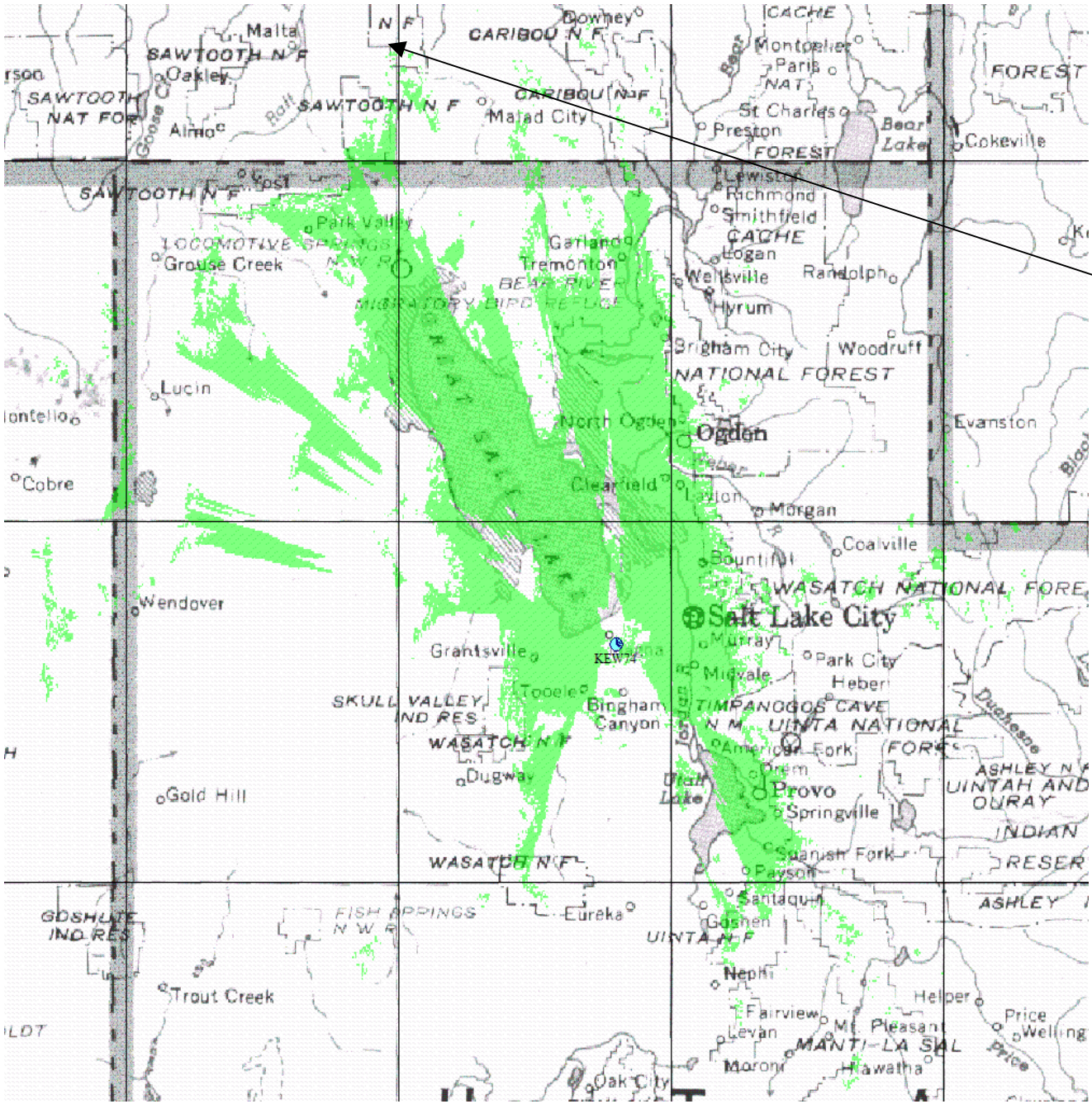
160 Km

1G LOS Projections

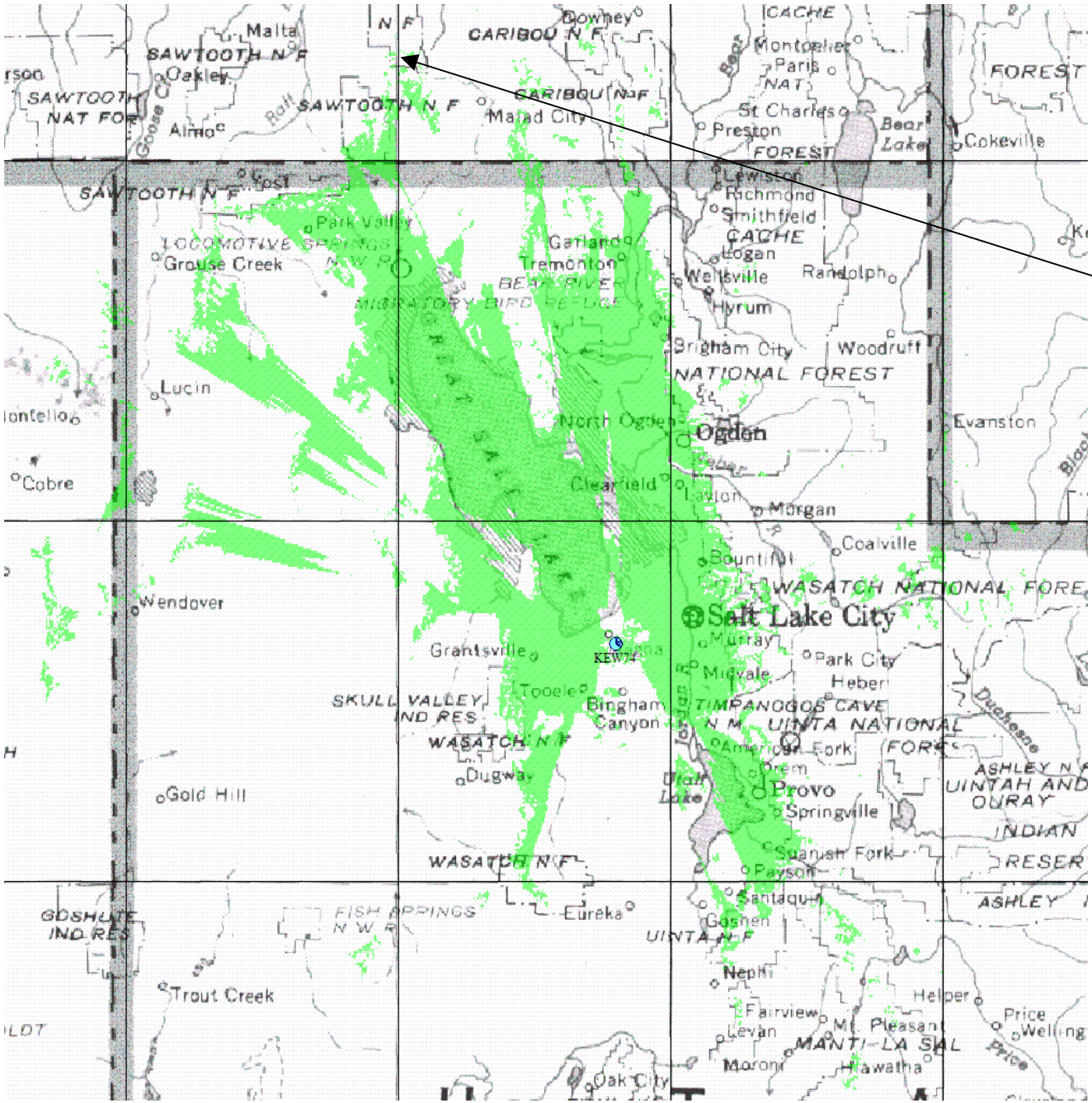
Salt Lake City

Sprint Together with NEXTEL

Salt Lake Relocation Zone with 50 ft (15.24m) AWS Tower

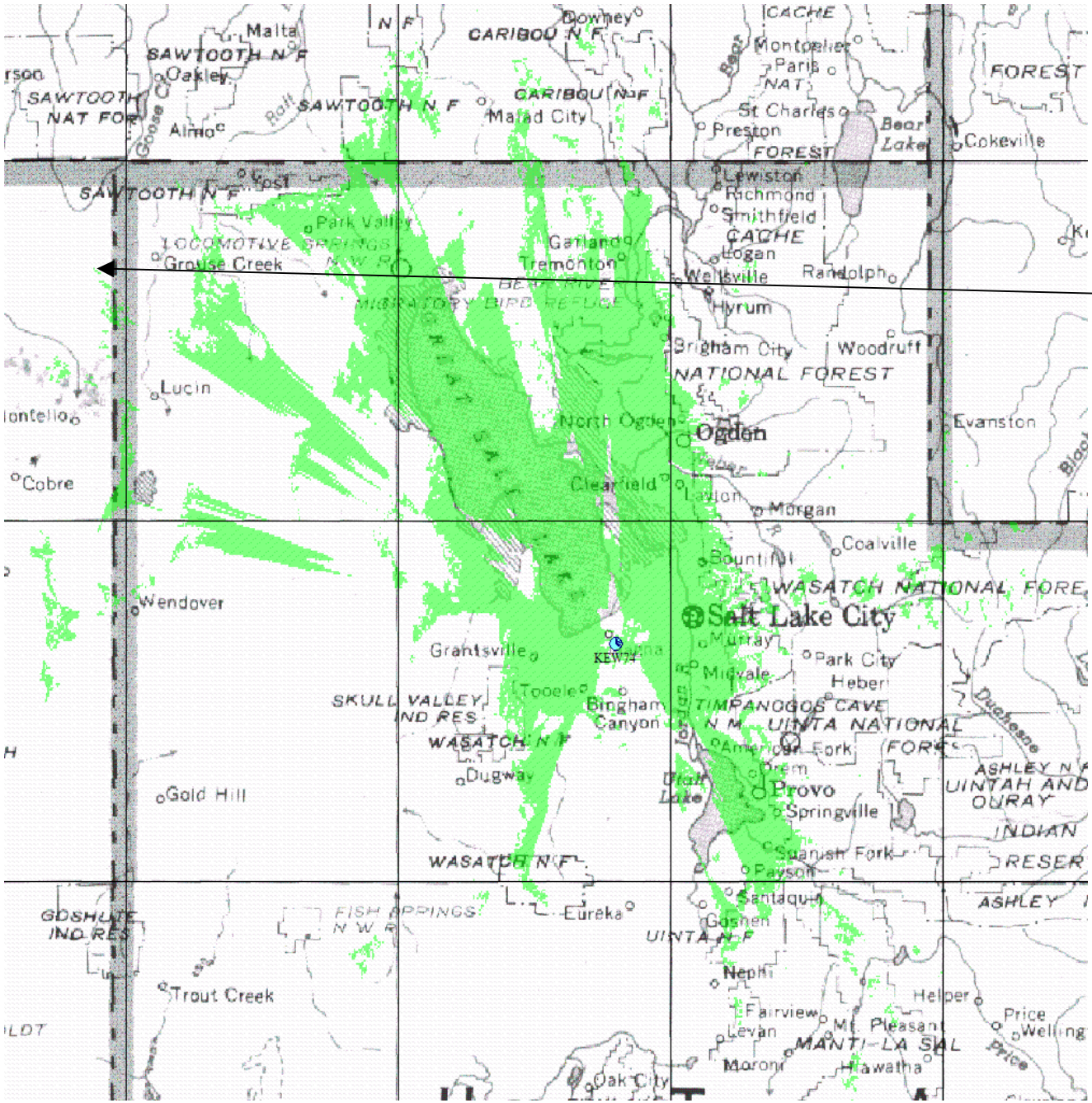


Salt Lake Relocation Zone with 100 ft (30.48m) AWS Tower

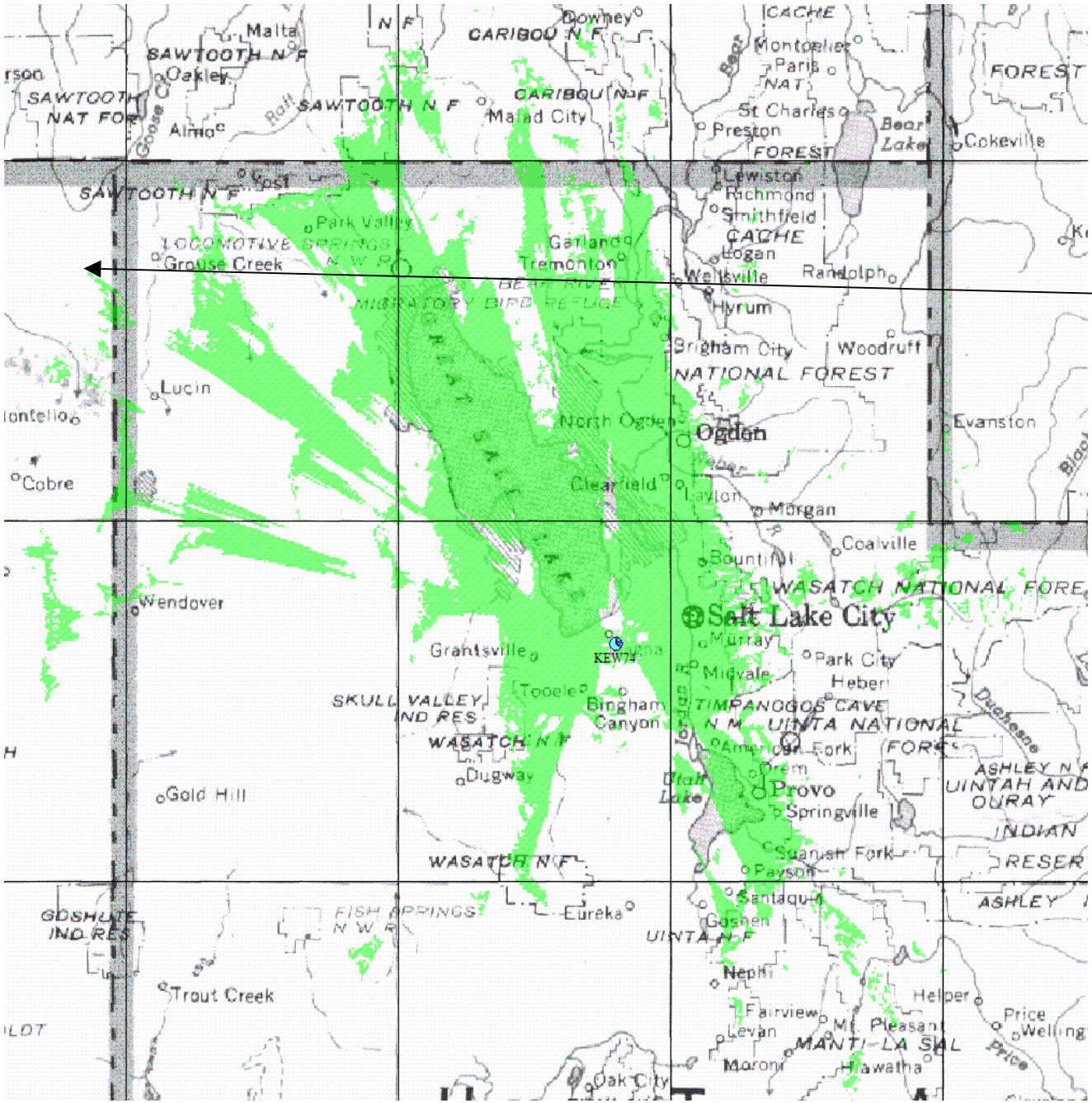


195 Km

Salt Lake Relocation Zone with 150 ft (45.72m) AWS Tower



Salt Lake Relocation Zone with 300 ft (91.44m) AWS Tower

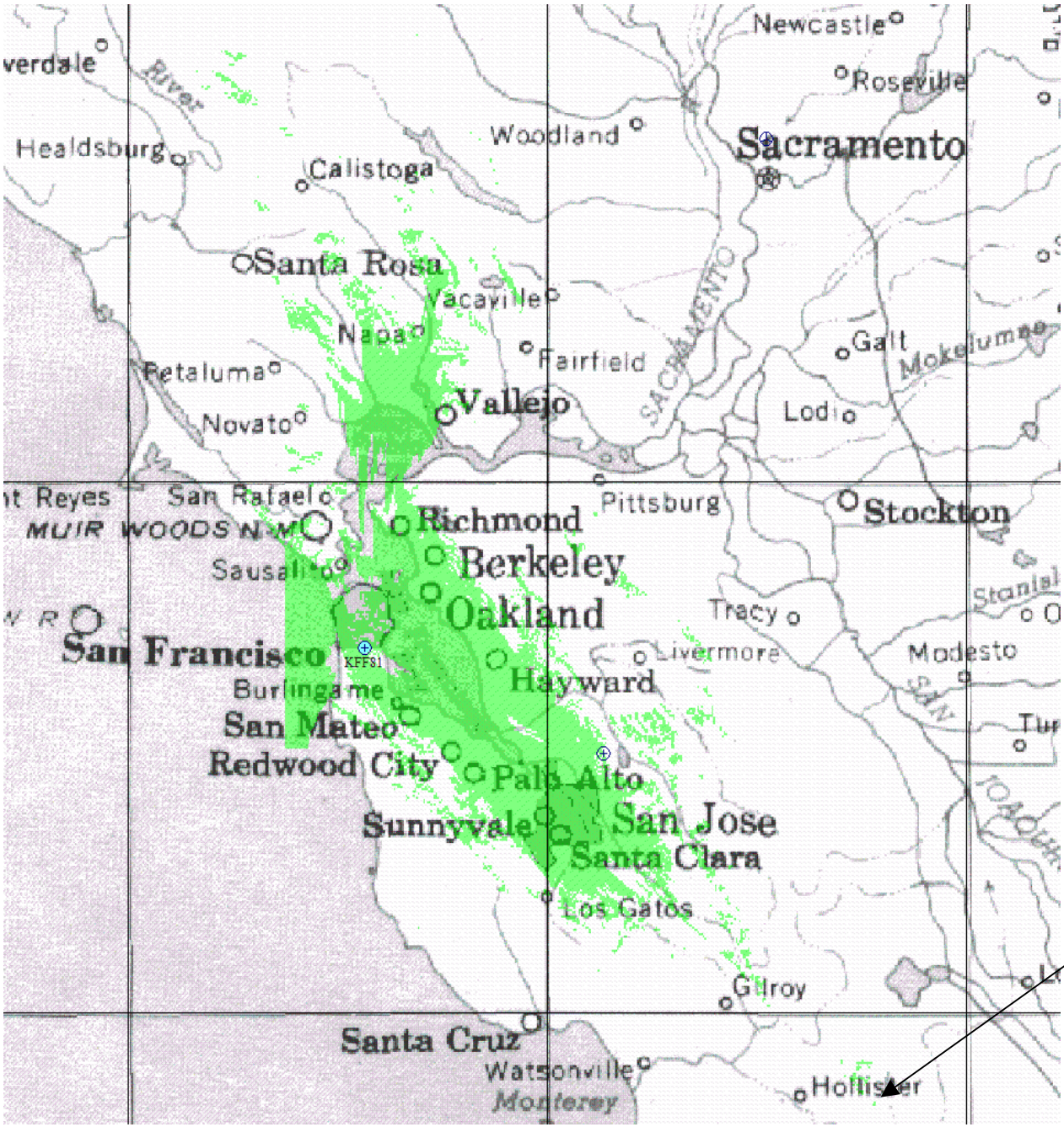


1G LOS Projections

San Francisco

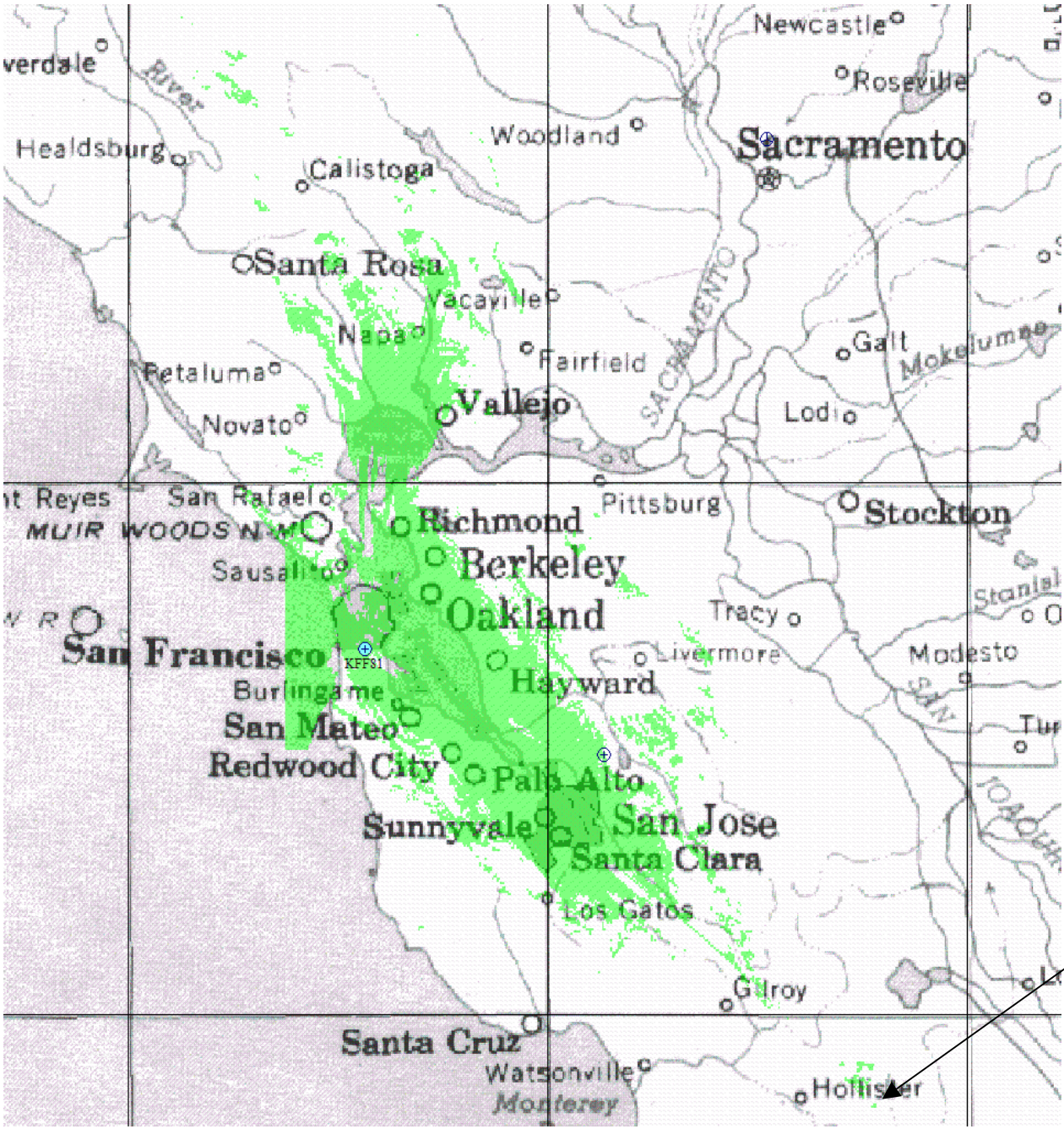
Sprint Together with NEXTEL

San Francisco Relocation Zone with 50 ft (15.24m) AWS Tower



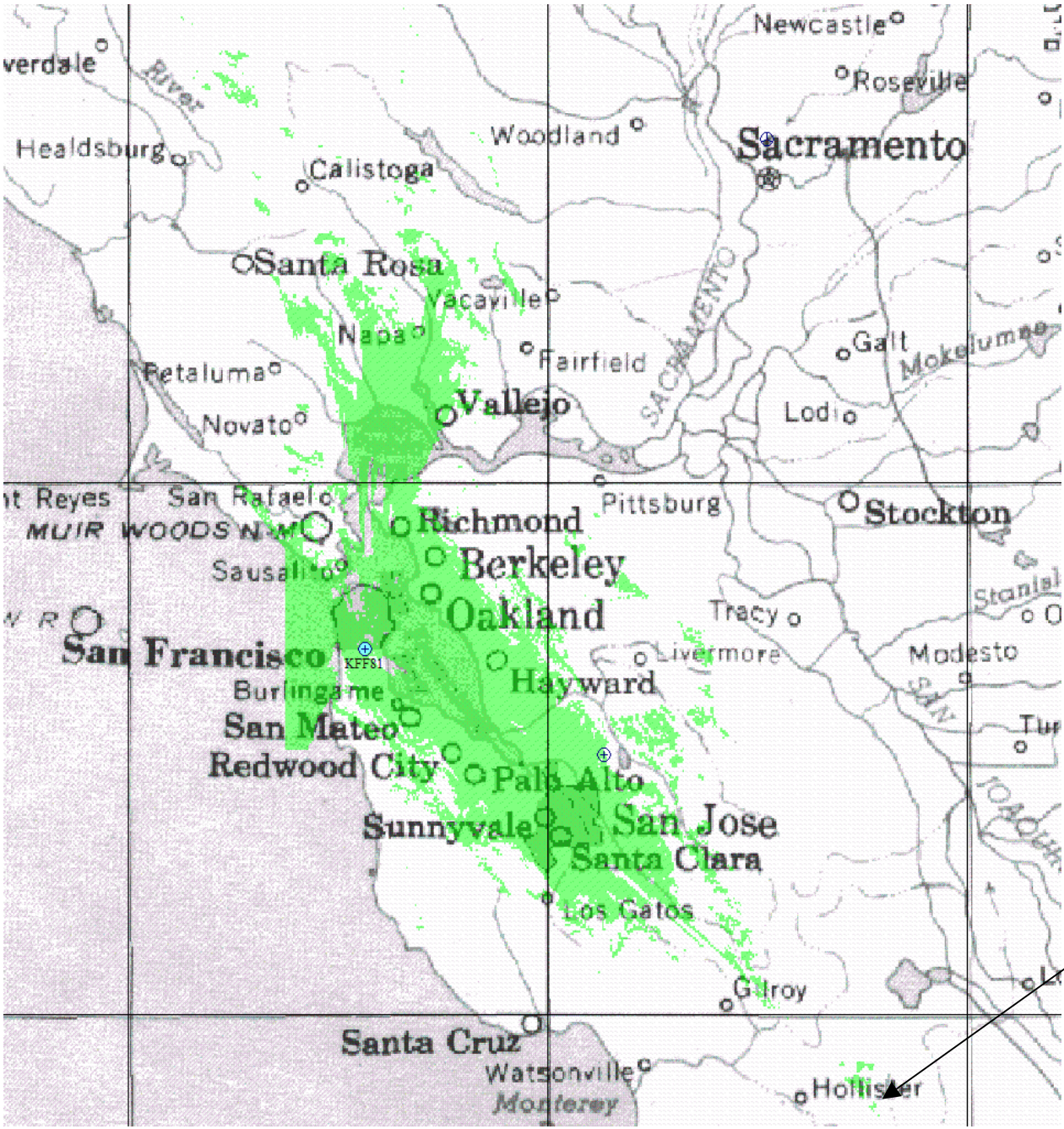
144 Km

San Francisco Relocation Zone with 100 ft (30.48m) AWS Tower



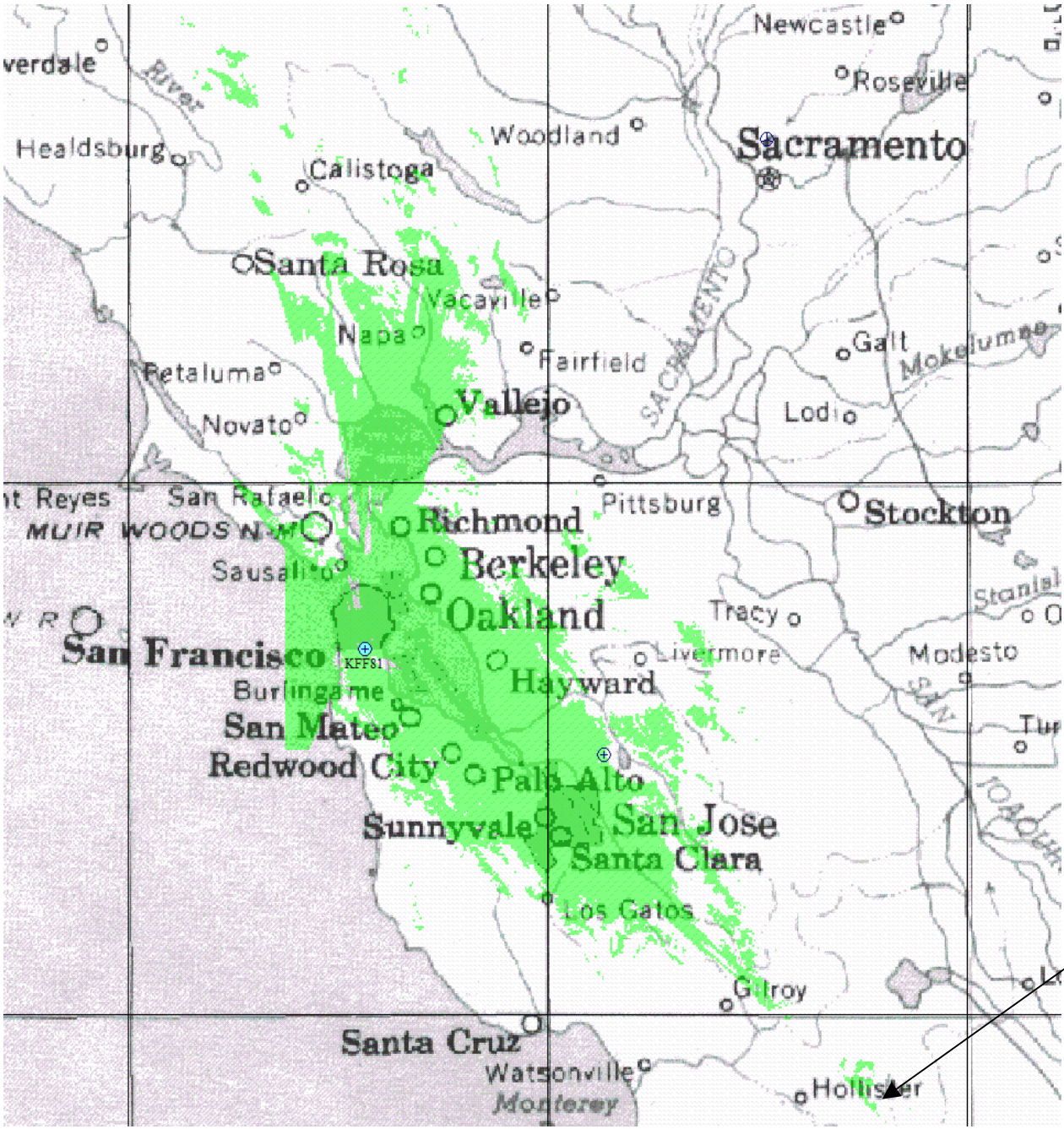
144 Km

San Francisco Relocation Zone with 150 ft (45.72m) AWS Tower



144 Km

San Francisco Relocation Zone with 300 ft (91.44m) AWS Tower



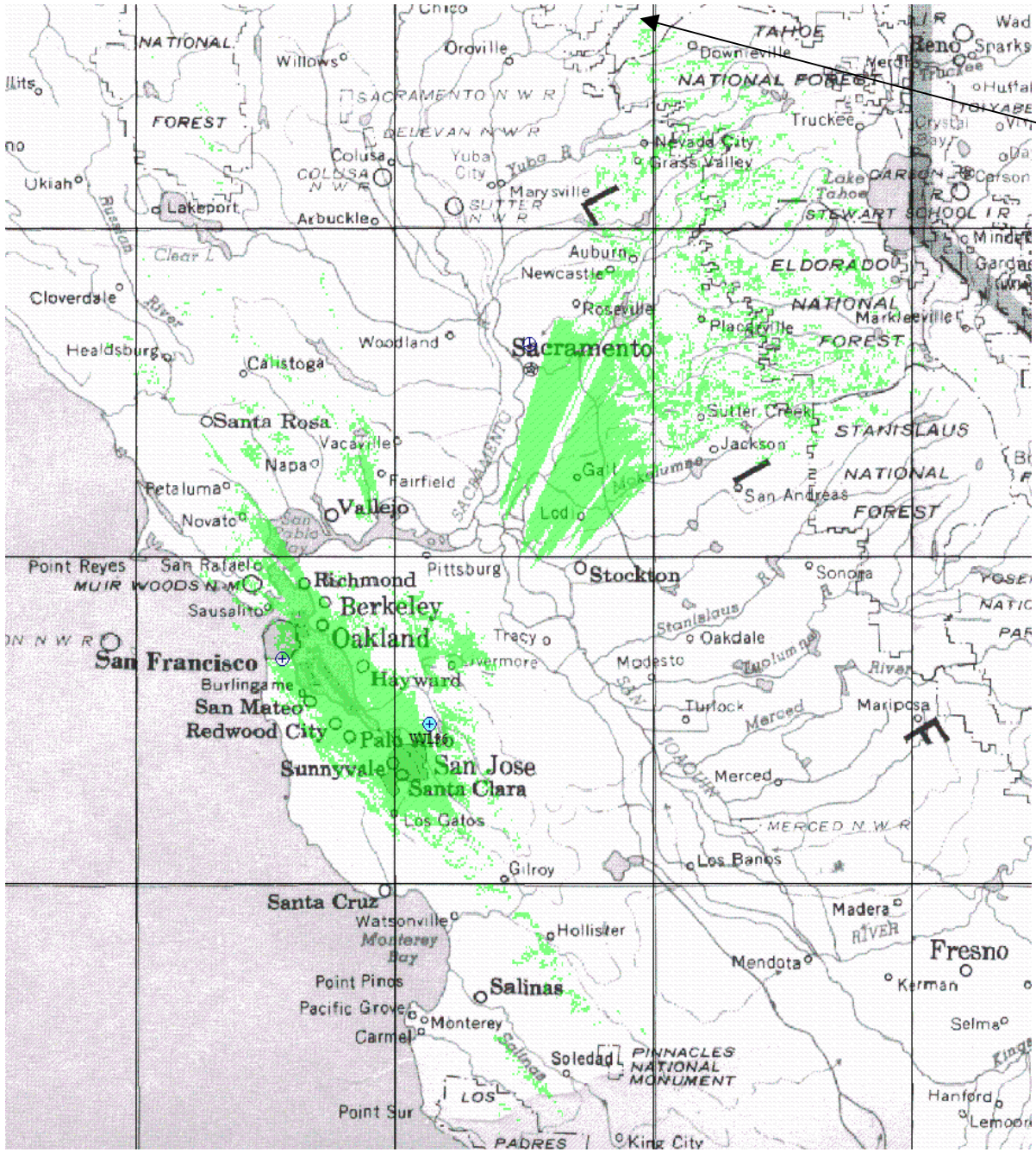
144 Km

1G LOS Projections

San Jose

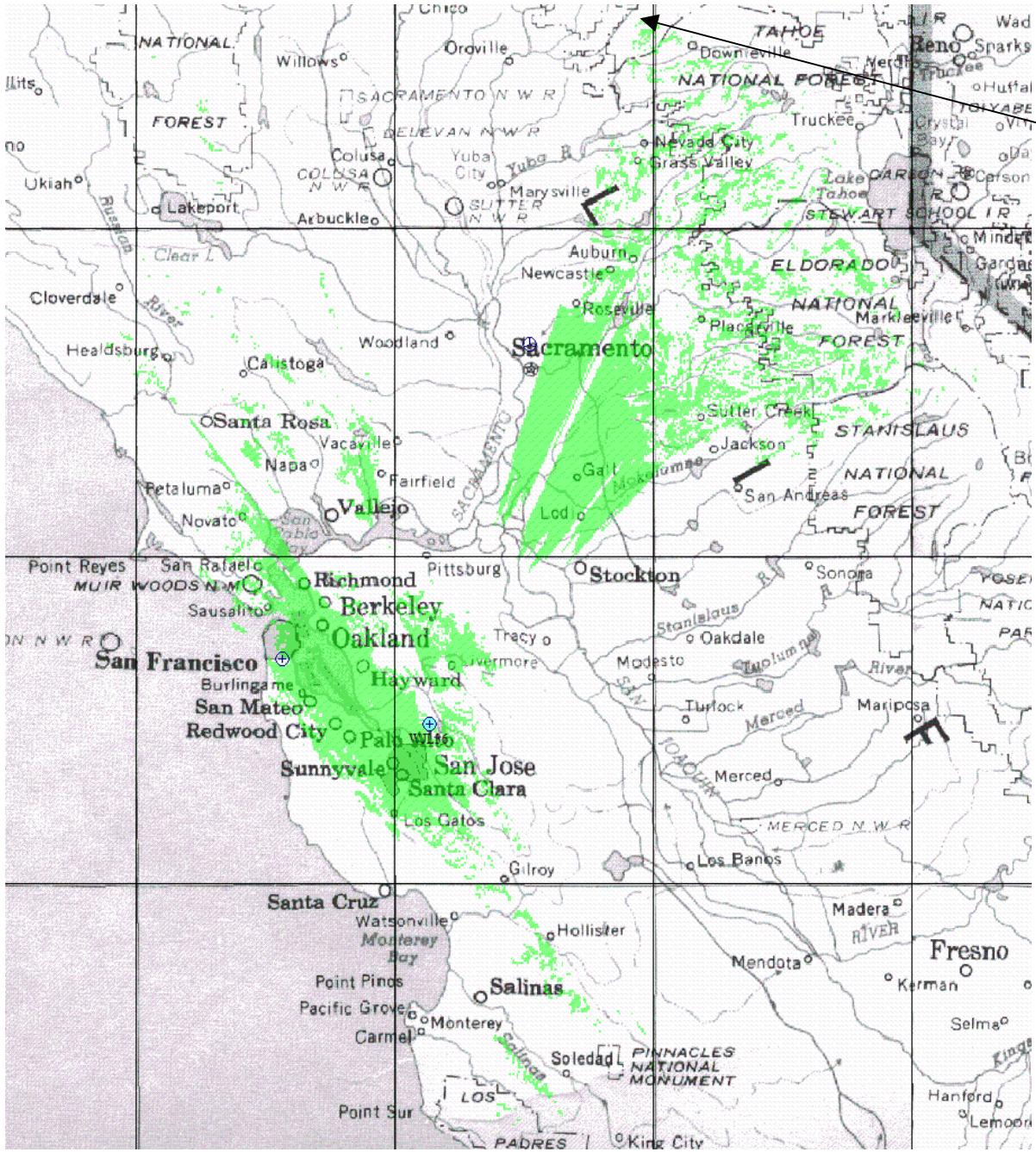
Sprint Together with NEXTEL

San Jose Relocation Zone with 50 ft (15.24m) AWS Tower



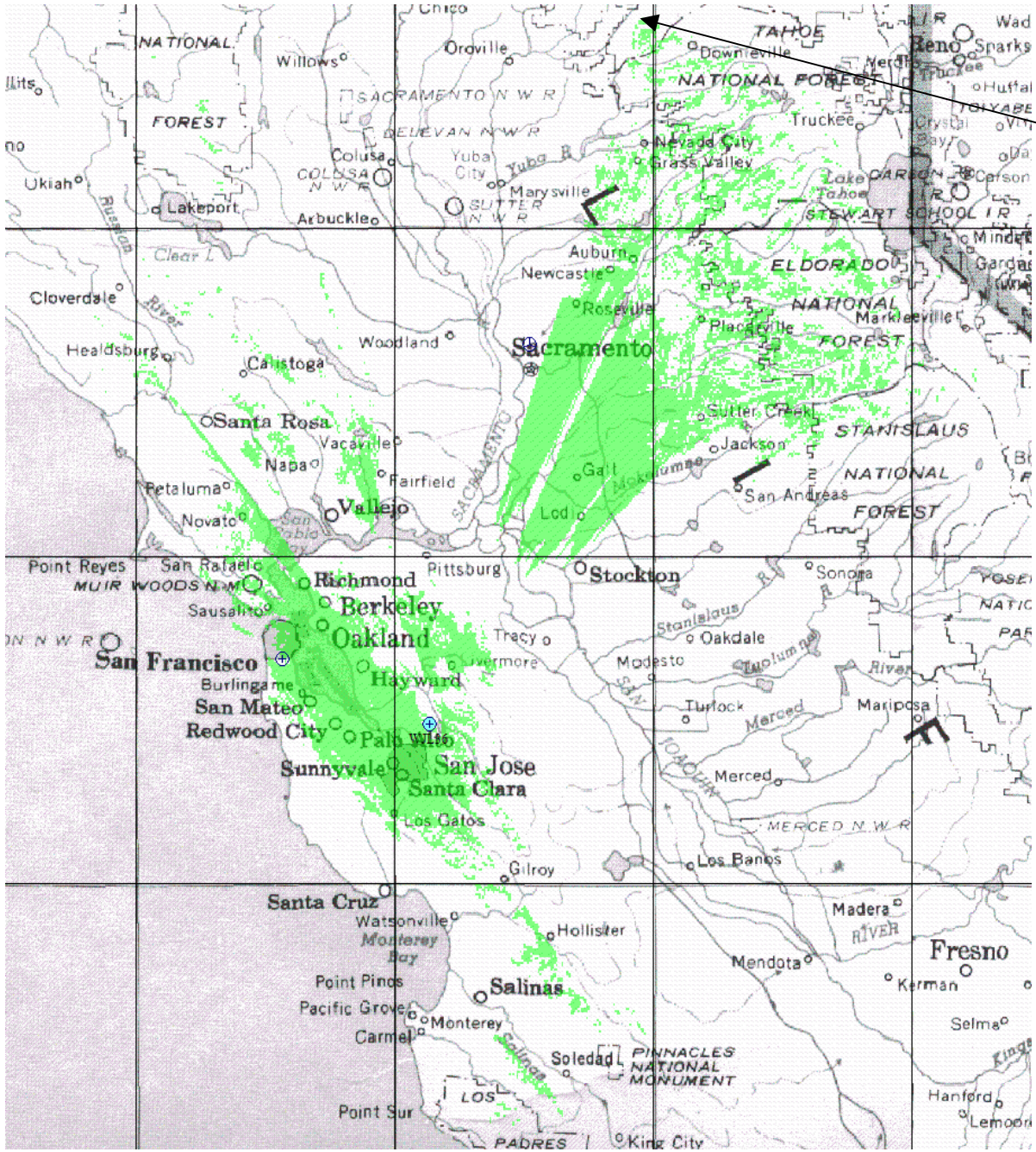
250 Km

San Jose Relocation Zone with 100 ft (30.48m) AWS Tower



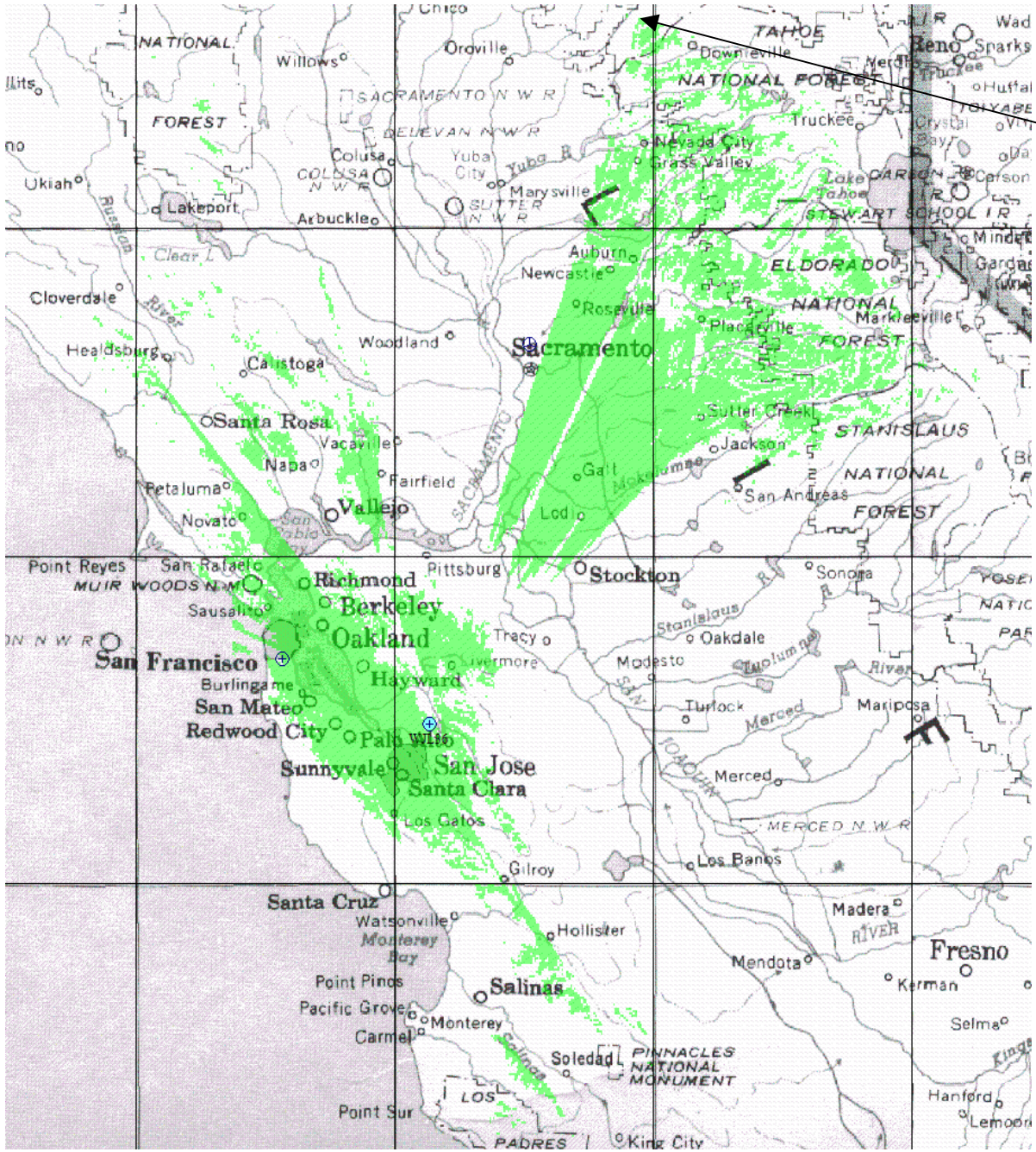
250 Km

San Jose Relocation Zone with 150 ft (45.72m) AWS Tower



250 Km

San Jose Relocation Zone with 300 ft (91.44m) AWS Tower

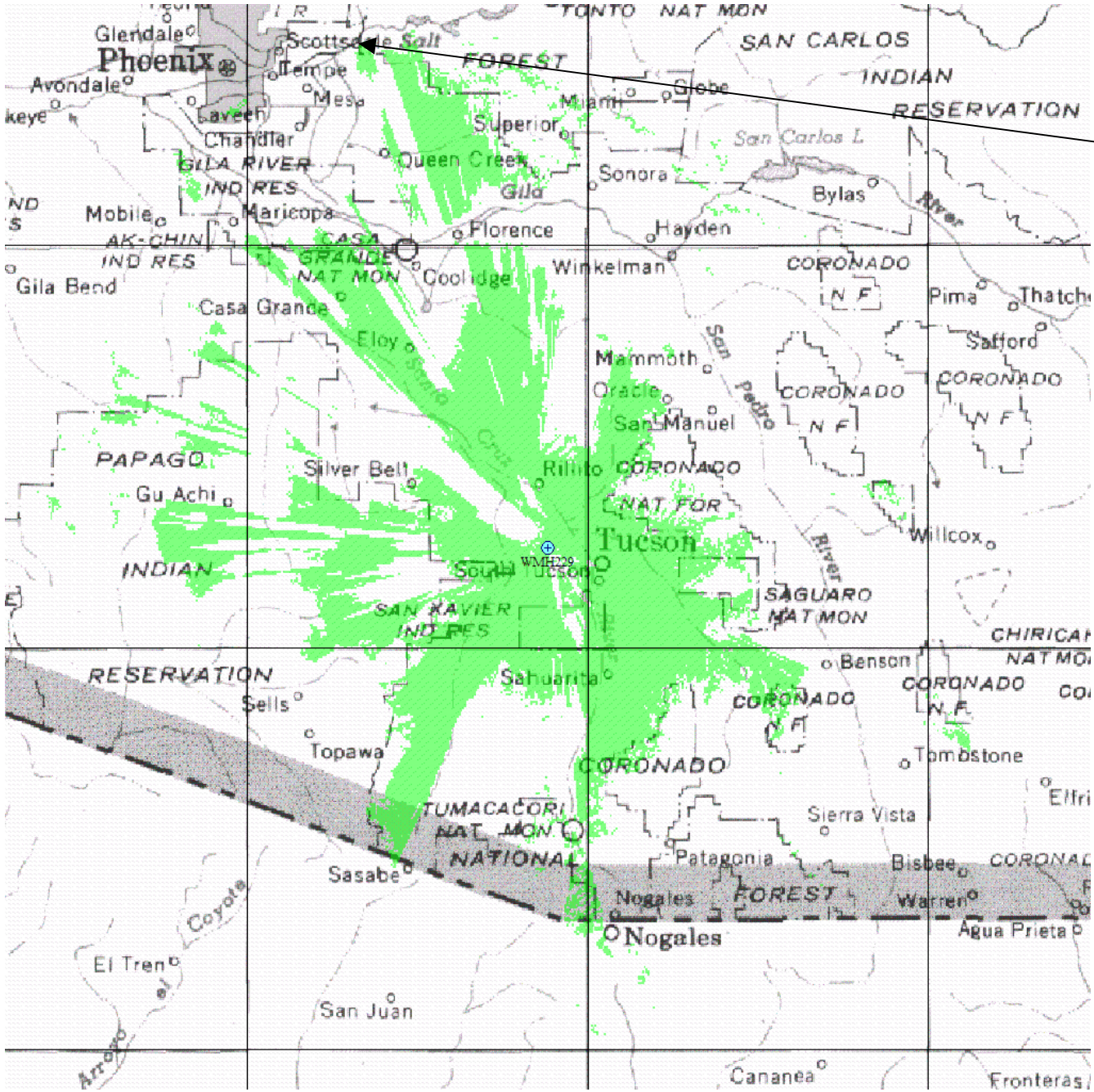

NATIONAL
FOREST
Willows
Oroville
SACRAMENTO N.W.R.
ELEVAN N.W.R.
Colusa
COLUSA N.W.R.
Yuba City
Marysville
SUTTER N.W.R.
Ukiah
Lakeport
Arbuckle
Clear L.
Cloverdale
Healdsburg
Calistoga
Woodland
Sacramento
Santa Rosa
Vacaville
Napa
Fairfield
Petaluma
Novato
Vallejo
Point Reyes
MUIR WOODS N.M.
San Rafaelo
Richmond
Berkeley
Oakland
Sausalito
San Francisco
Burlingame
Hayward
San Mateo
Redwood City
Palo Alto
Sunnyvale
San Jose
Santa Clara
Los Gatos
Gilroy
Santa Cruz
Watsonville
Monterey Bay
Point Pinos
Pacific Grove
Monterey
Carmel
Salinas
Hollister
Soledad
PINNACLES NATIONAL MONUMENT
Point Sur
LOS PADRES
King City
Auburn
Newcastle
Roseville
Placerville
Pittsburg
Stockton
Tracy
Livermore
Lodi
Galt
Sutter Creek
Jackson
San Andreas
Sonora
Oakdale
Modesto
Turlock
Merced
MERCED N.W.R.
Los Banos
Mariposa
Madera
Mendota
Fresno
Kerman
Selma
Hanford
Lemoore
TAHOE
Downieville
Truckee
Nevada City
Grass Valley
Lake Tahoe
CARSON
STEWART SCHOOL I.R.
ELDORADO
Markleeville
STANISLAUS
Reno
Sparks
Carson
Minden
Gardnerville
Huffaker
Crystal Bay
Wadsworth
Sacramento
Stanislaus
Tuolumne
Merced
San Joaquin
Mokelumne
Russian
Clear L.
Sacramento
Yuba
Kings
Salinas
San Pablo Bay
Stockton
Sacramento
Fresno
Modesto
Merced
Salinas
Monterey
Santa Cruz
San Francisco
San Jose

1G LOS Projections

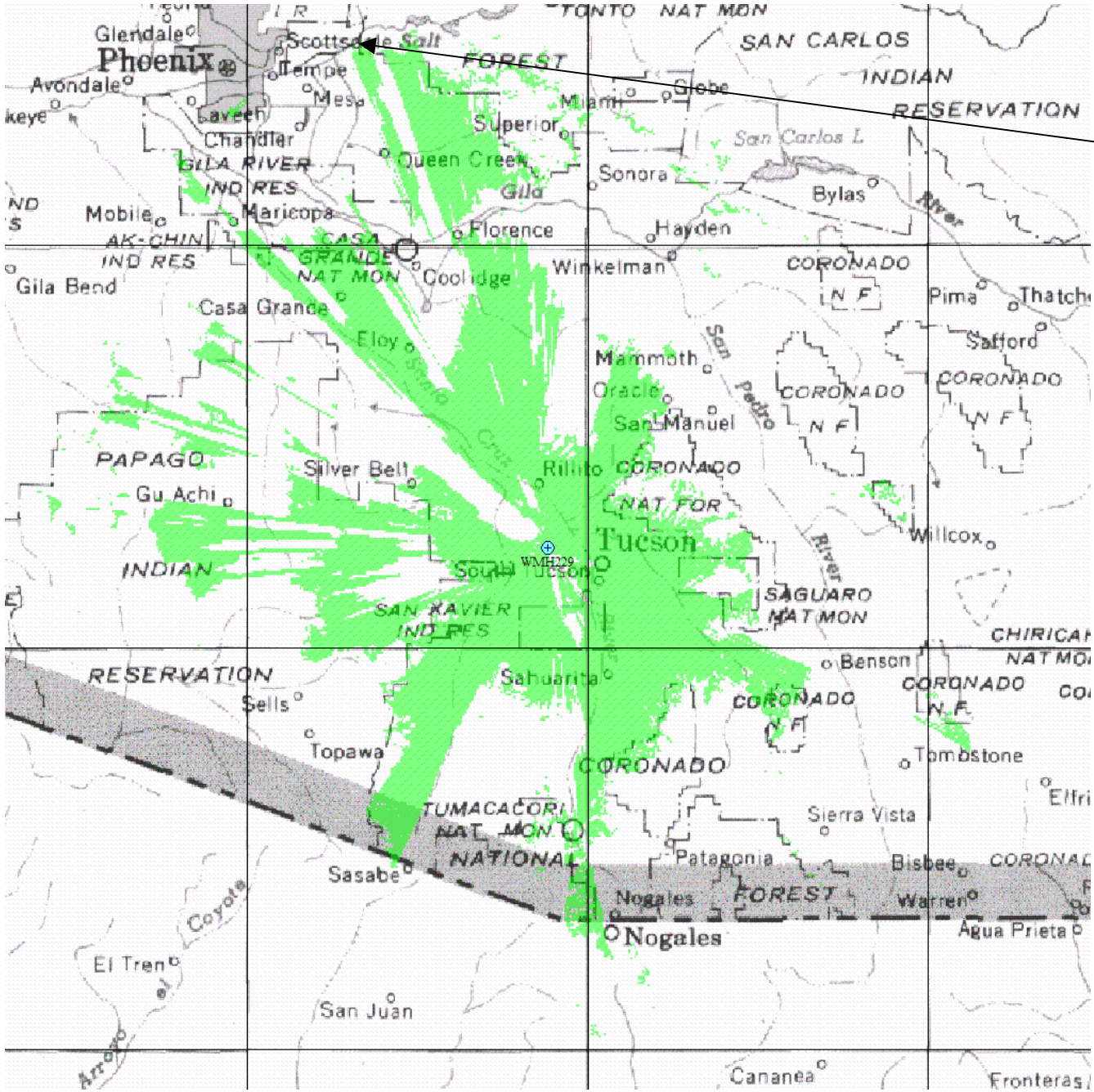
Tucson

Sprint Together with NEXTEL

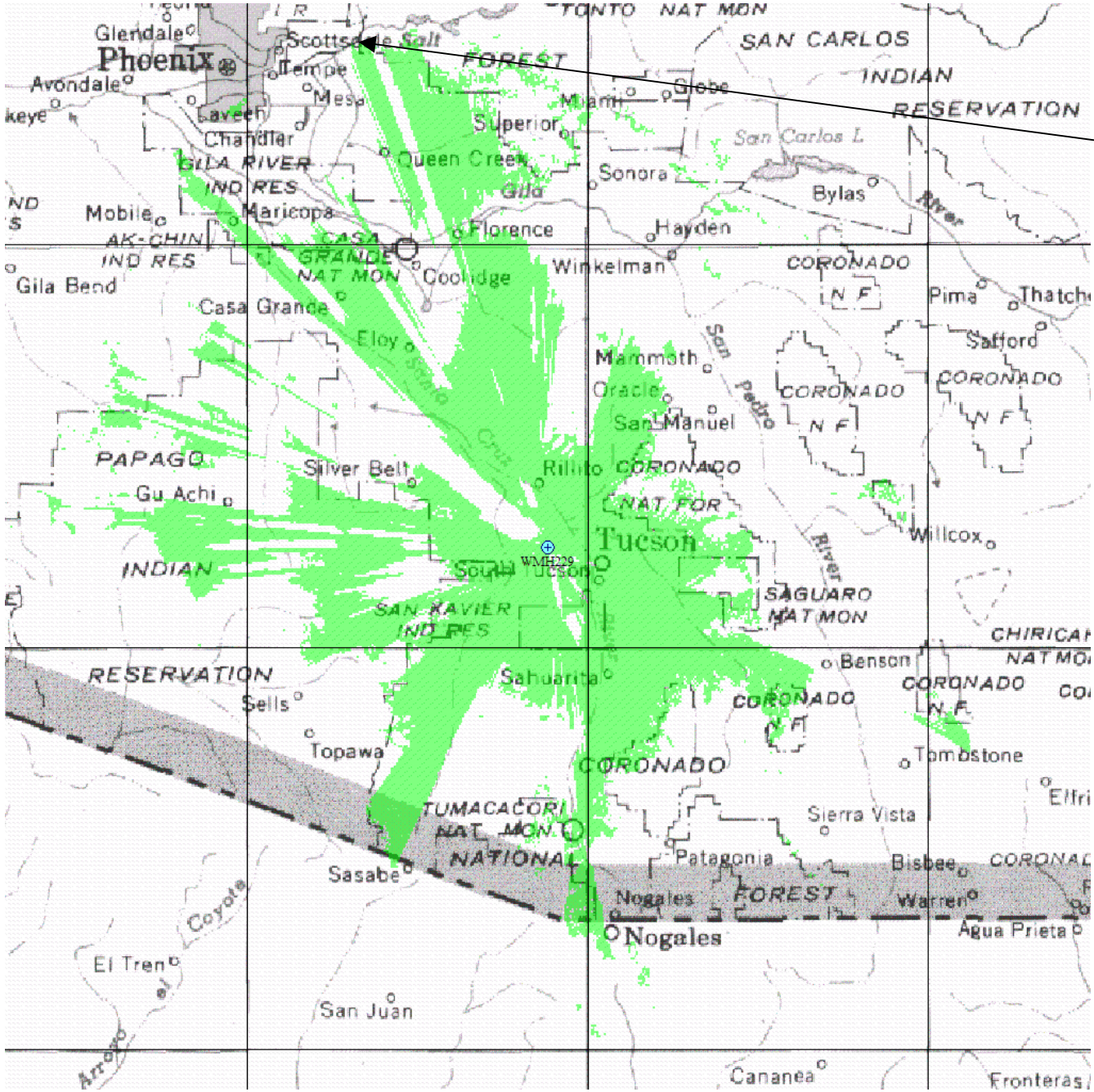
Tucson Relocation Zone with 50 ft (15.24m) AWS Tower



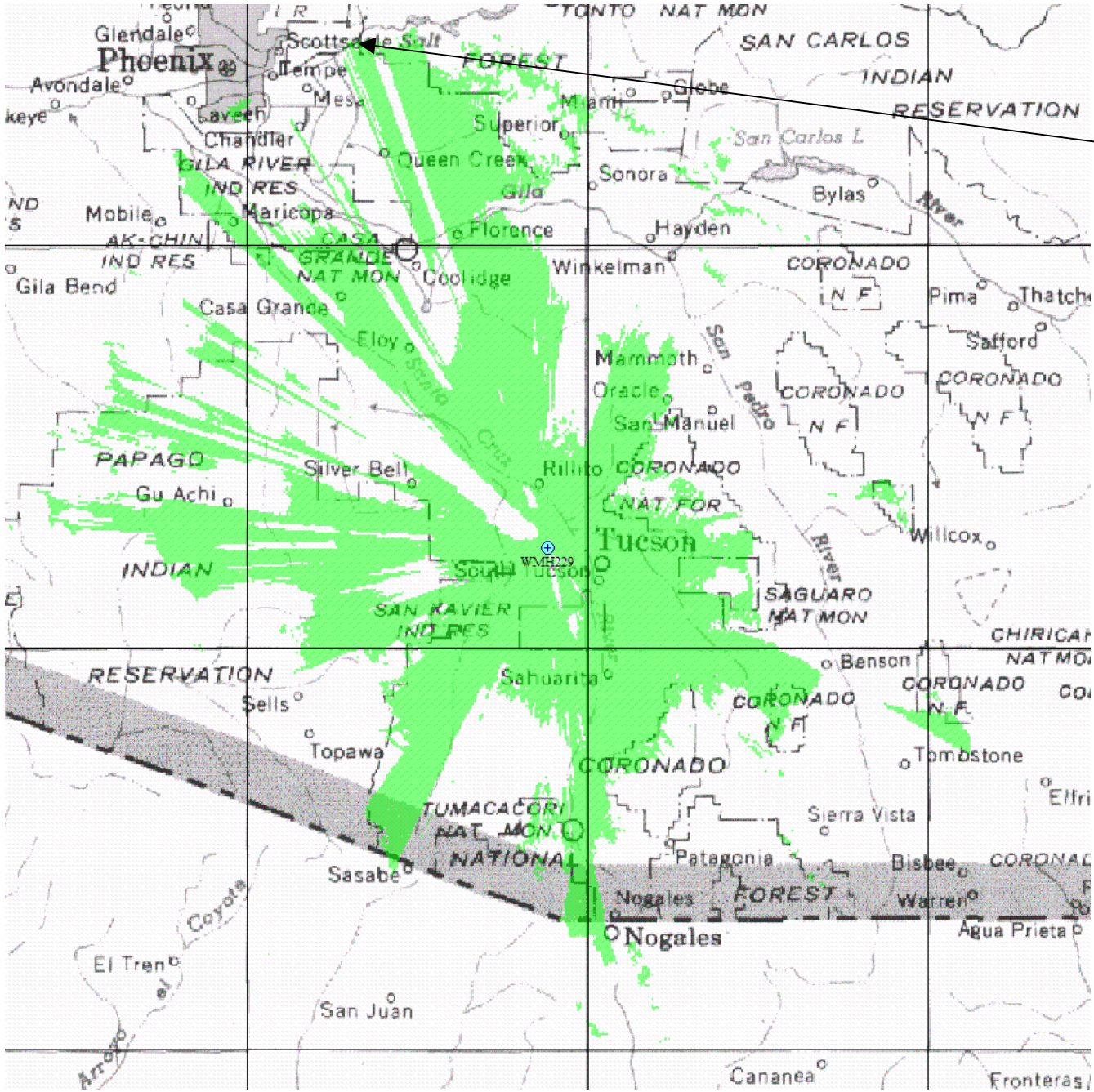
Tucson Relocation Zone with 100 ft (30.48m) AWS Tower



Tucson Relocation Zone with 150 ft (45.72m) AWS Tower



Tucson Relocation Zone with 300 ft (91.44m) AWS Tower



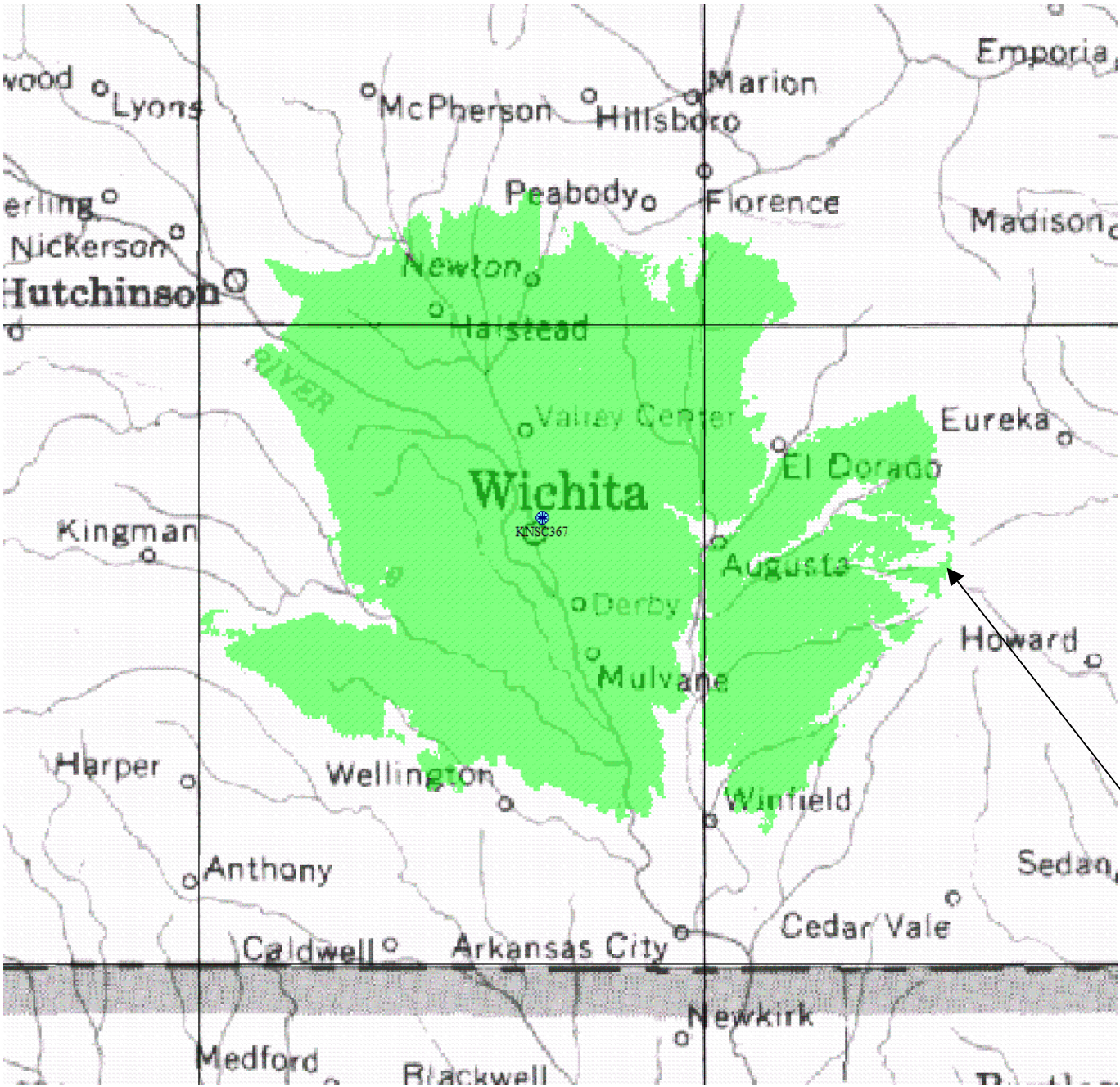
150 Km

1G LOS Projections

Wichita

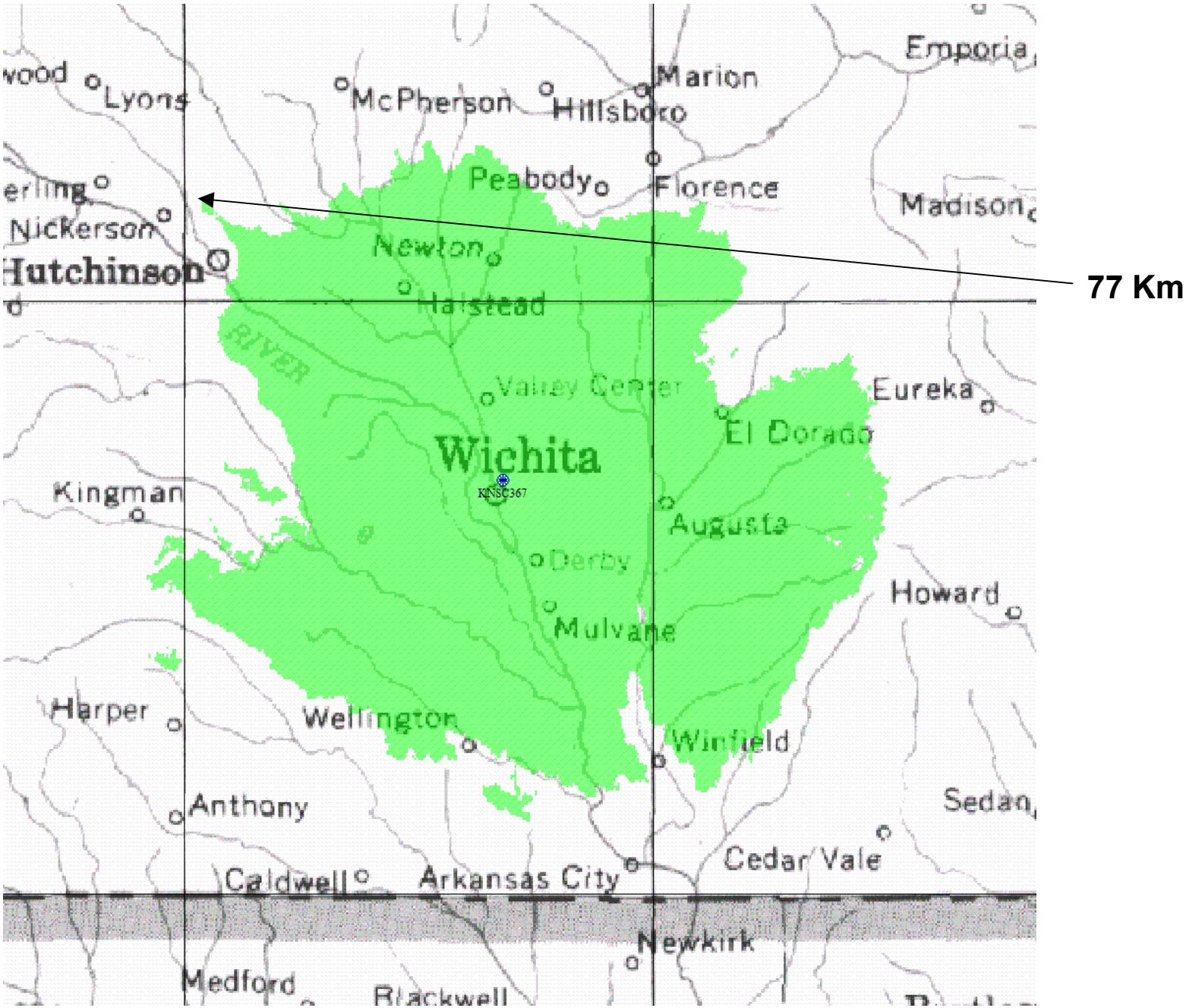
Sprint Together with NEXTEL

Wichita Relocation Zone with 50 ft (15.24m) AWS Tower

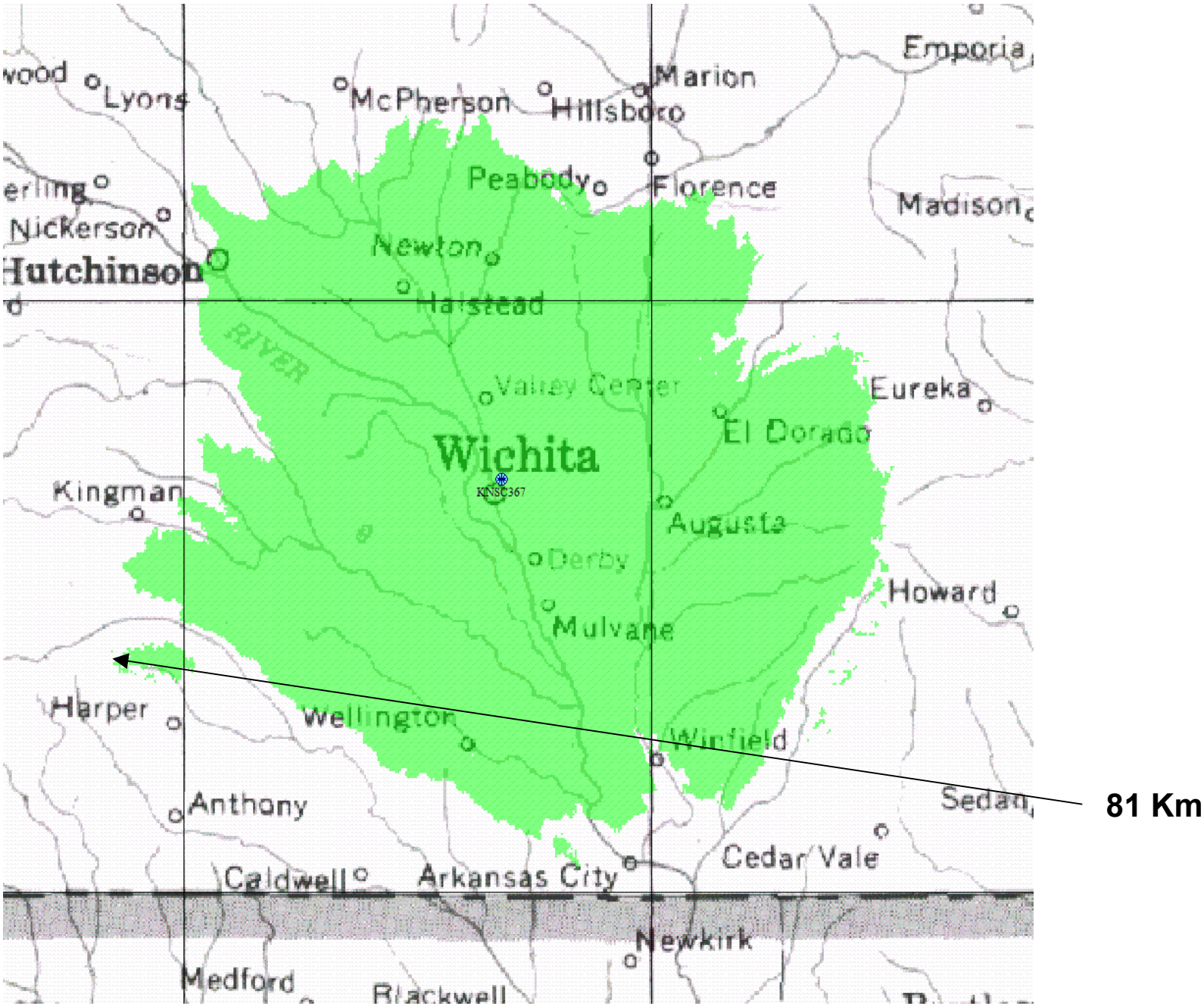


72 Km

Wichita Relocation Zone with 100 ft (30.48m) AWS Tower

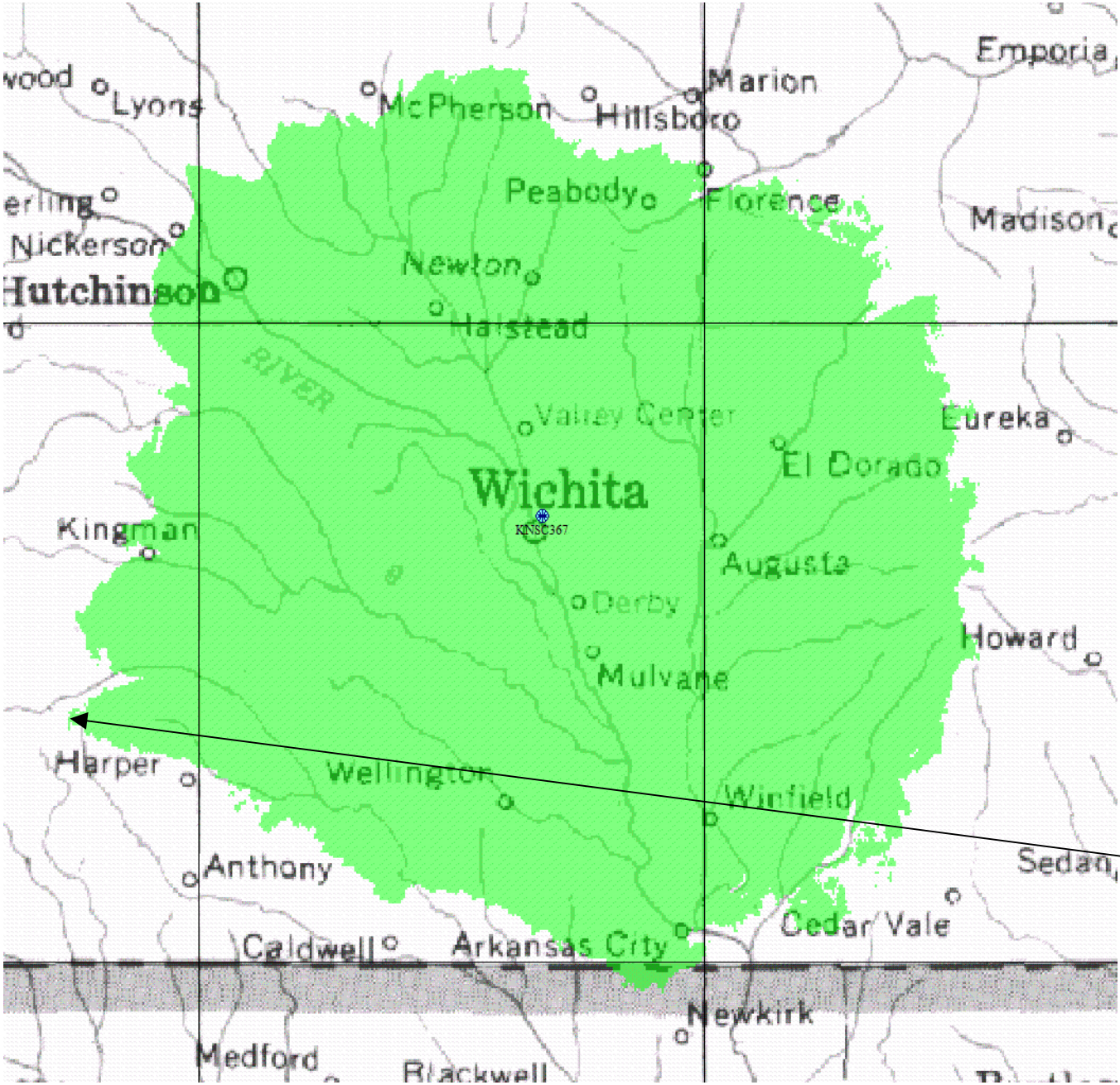


Wichita Relocation Zone with 150 ft (45.72m) AWS Tower



81 Km

Wichita Relocation Zone with 300 ft (91.44m) AWS Tower



90 Km

Appendix B

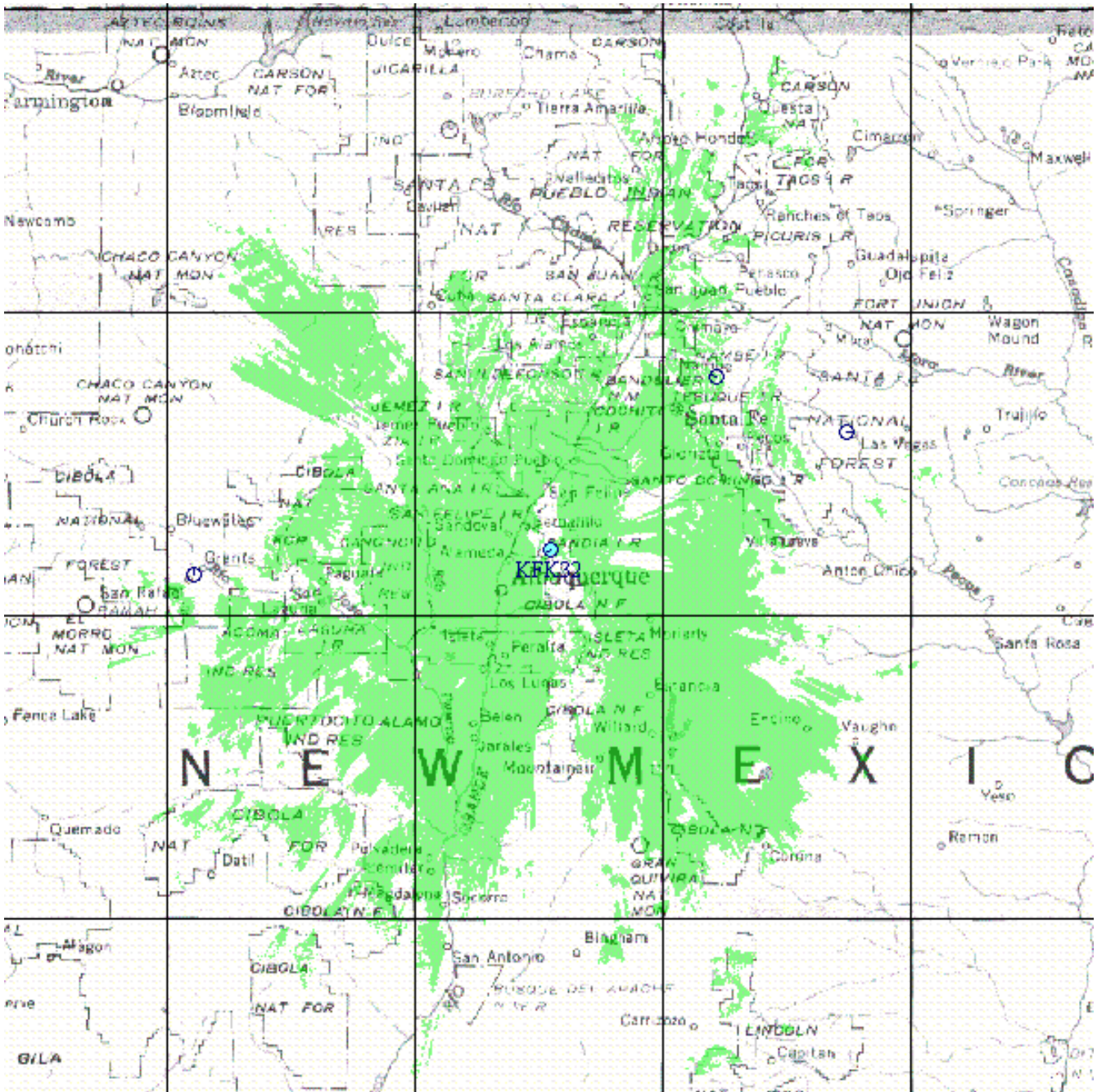
Legacy Video Relocation Zones

Sprint Nextel Downstream Video LOS Projections

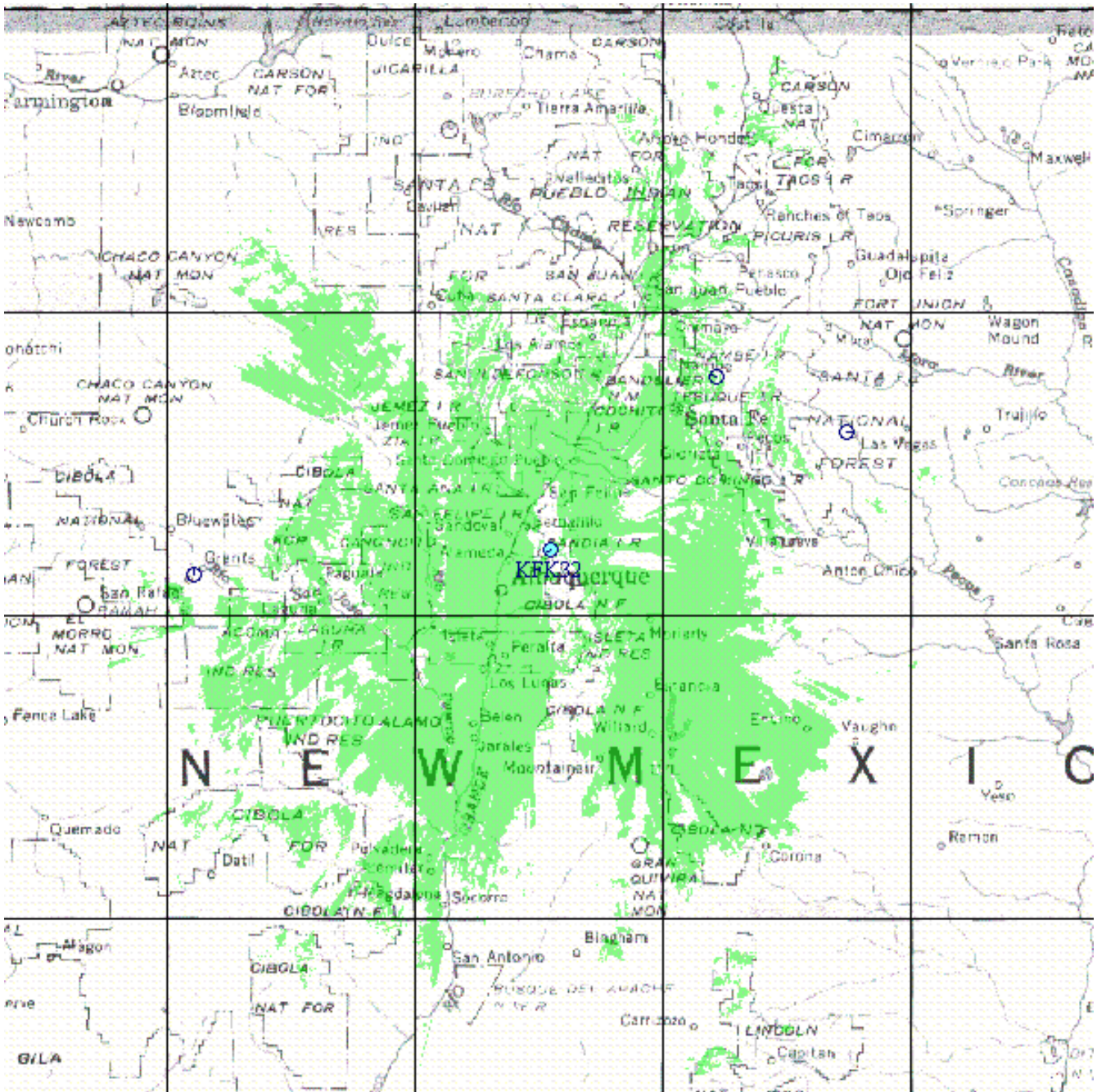
Sprint

Together with NEXTEL

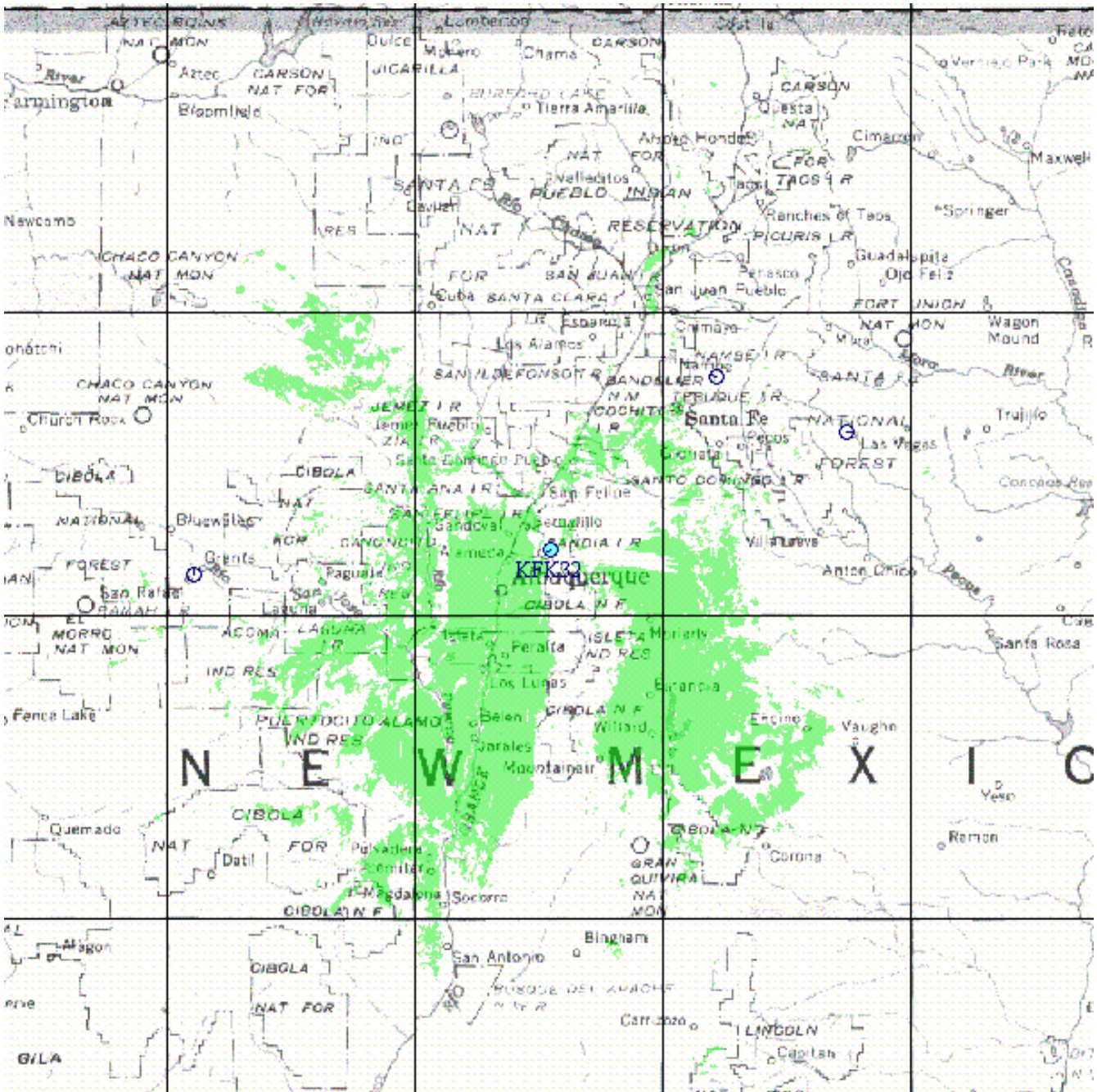
Albuquerque M1 Downstream LOS Projections using 50m Remote


KFK32
Albuquerque
Santa Fe
Farmington
Bloomfield
Aztec
Tierra Amarilla
Taos
Cimarron
Maxwell
Springer
Wagon Mound
Trujillo
Las Vegas
Bluewater
Grants
Anton Chico
Santa Rosa
Fence Lake
Quemado
Datil
Socorro
Belen
Los Lunas
Bernalillo
Corrales
Moriarty
Estancia
Encino
Vaughn
Ramon
Corona
Mountainair
Willard
Peralta
Bloomfield
Newcomb
Chaco Canyon Nat Mon
Church Rock
Cuba
Jemez Pueblo
Pecos
Ojo Feliz
Guadalupita
Ranchos de Taos
Chama
Dulce
Lumberton
Navajo Dam
Aztec Ruins Nat Mon
Carson Nat For
Jicarilla Ind Res
Santa Clara Pueblo
San Ildefonso Pueblo
Santo Domingo Pueblo
Cochiti Pueblo
Sandia Pueblo
Isleta Pueblo
Isleta Ind Res
Puerto de Luna
Cibola Nat For
Cibola N F
Gran Quivira Nat Mon
Sandoval
Valencia
Torrance
Lincoln
Capitan
San Antonio
Bingham
Carrizozo
Gila
Magdalena
Pueblo del Apache N W R
Fort Union Nat Mon
Pecos Nat Mon
Morro Nat Mon
Acoma Pueblo
Laguna Pueblo
Zuni Pueblo
Ojo Caliente
Tesuque Pueblo
Nambe Pueblo
Pojoaque Pueblo
Santa Ana Pueblo
San Felipe Pueblo
Santo Domingo Pueblo
Cochiti Pueblo
Jemez Pueblo
Sandia Pueblo
Isleta Pueblo

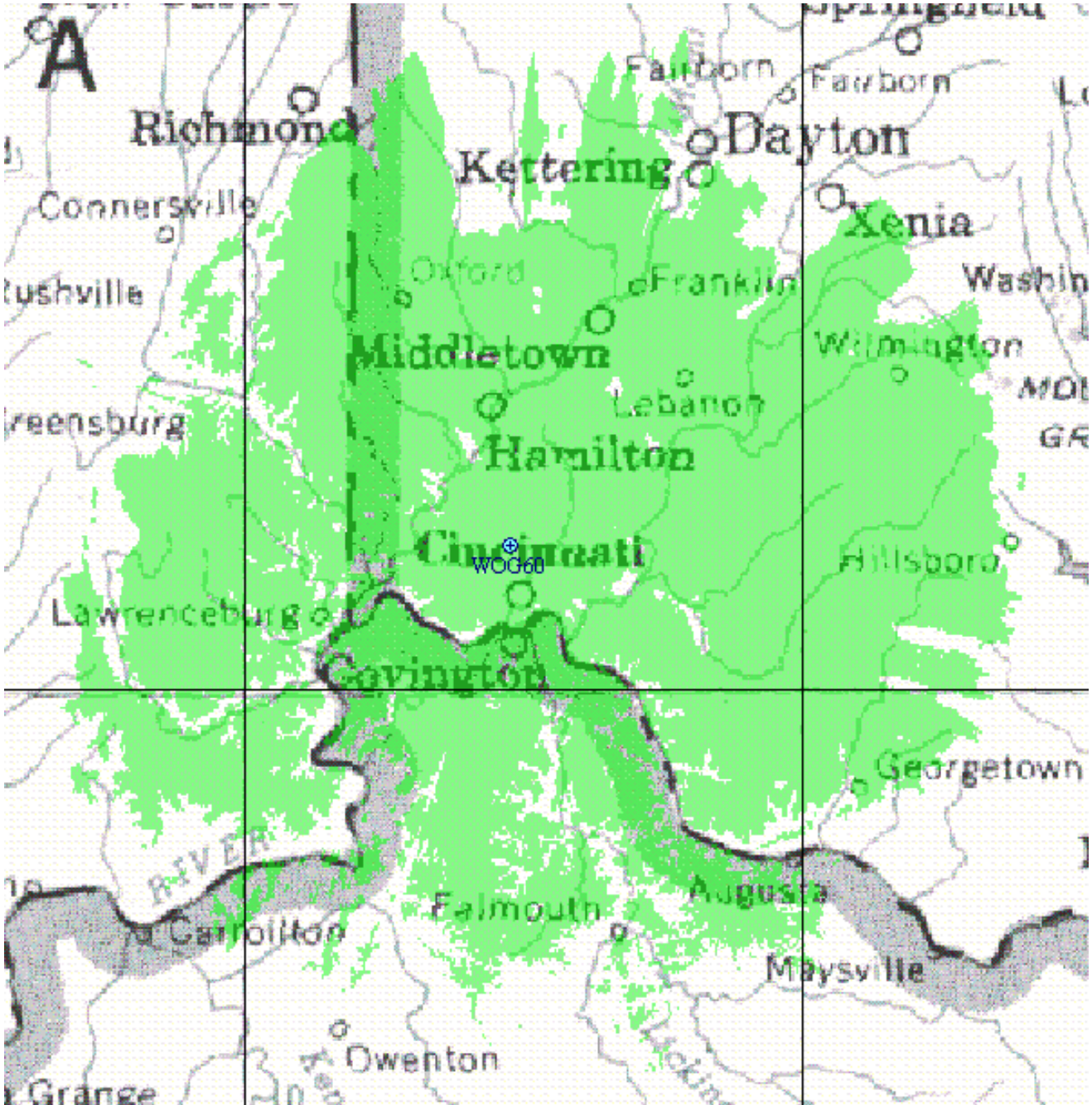
Albuquerque M1 Downstream LOS Projections using 30m Remote


KFK32
Albuquerque
Santa Fe
N E W M E X I C
Farmington
Bloomfield
Aztec
Tierra Amarilla
Taos
Cimarron
Maxwell
Springer
Newcomb
Chaco Canyon Nat Mon
Wagon Mound
Trujillo
Las Vegas
Church Rock
Bluewater
Grants
San Rafael
Anton Chico
Santa Rosa
Fence Lake
Vaughn
Quemado
Datil
Socorro
Ramon
Corona
Blagham
San Antonio
Carrizozo
Capitan
Magdalena
Belen
Los Lunas
Peralta
Moriarty
Mountainair
Willard
Estancia
Tijeras
Cuba
Jemez Pueblo
Zia Pueblo
Santo Domingo Pueblo
San Felipe Pueblo
Sandoval
Cochiti Pueblo
Pojoaque
Nambe
Tesuque
Ojo Feliz
Guadalupita
Ranchos de Taos
Pecos
Chama
Dulce
Lumberton
Cebolla
Ojo Caliente
Ojo Sarco
Mora
Abiquiu
Los Alamos
Jemez Springs
Cuba
Ghost Ranch

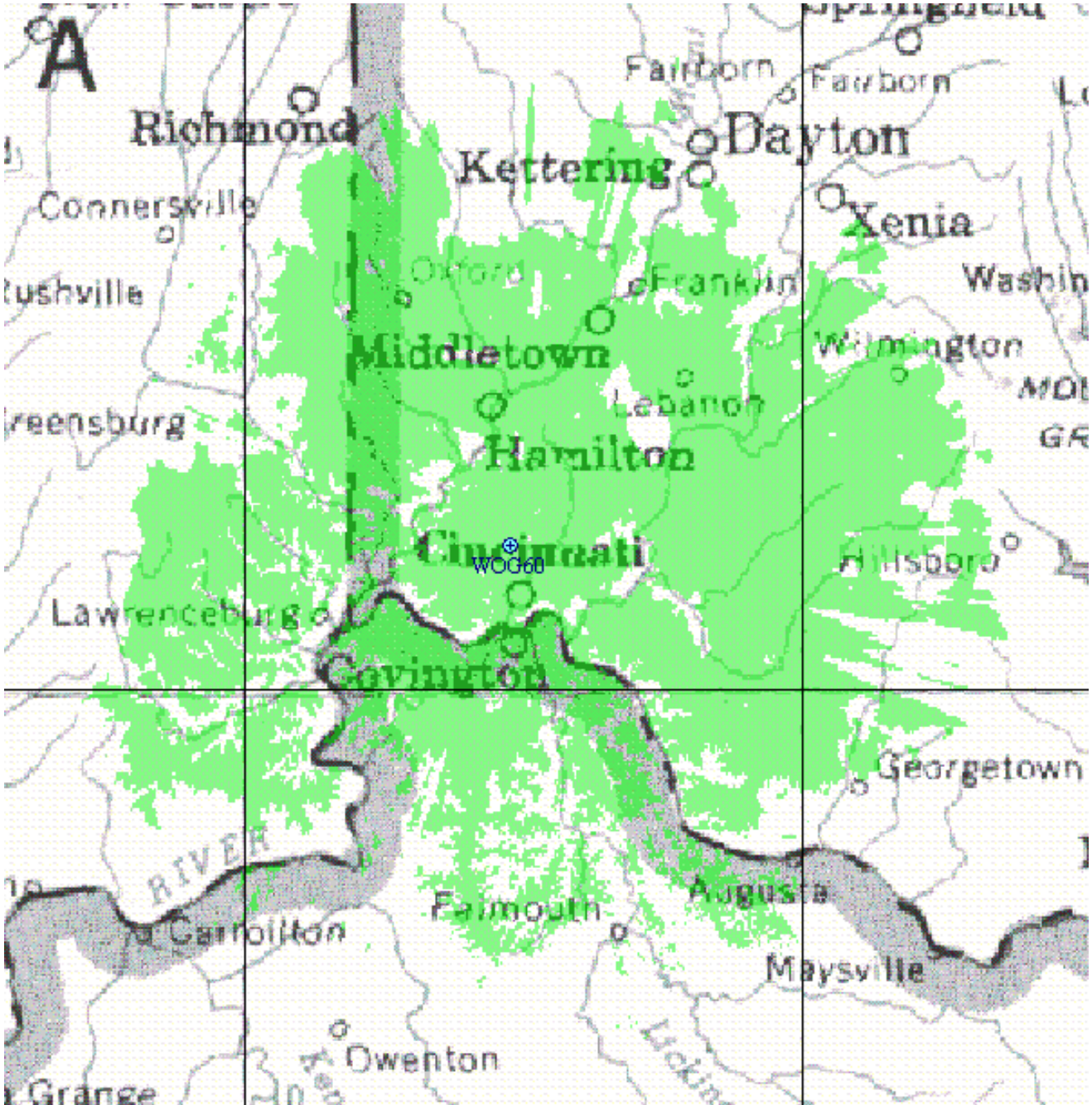
Albuquerque M1 Downstream LOS Projections using 9m Remote



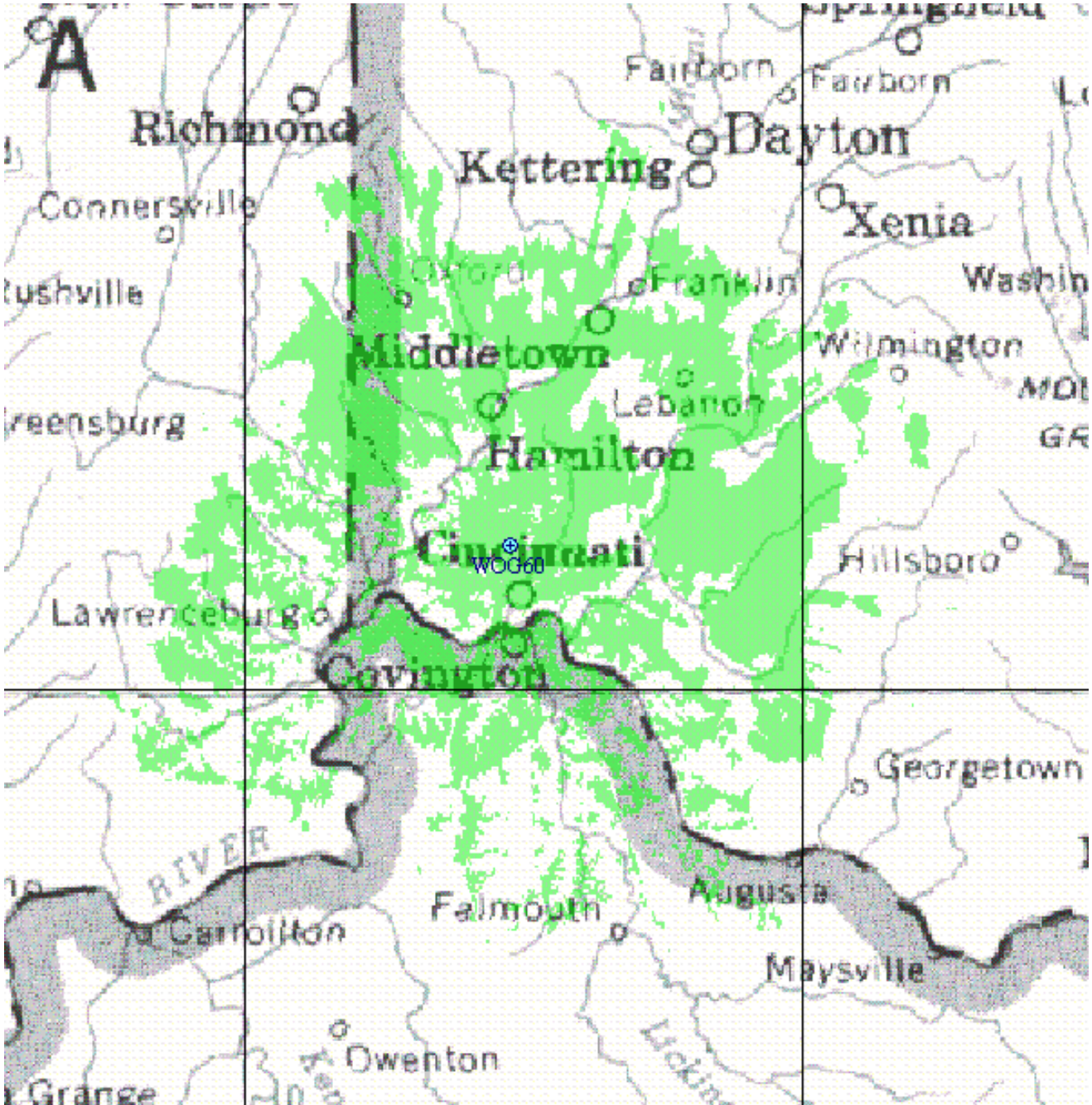
Cincinnati M1 Downstream LOS Projections using 50m Remote



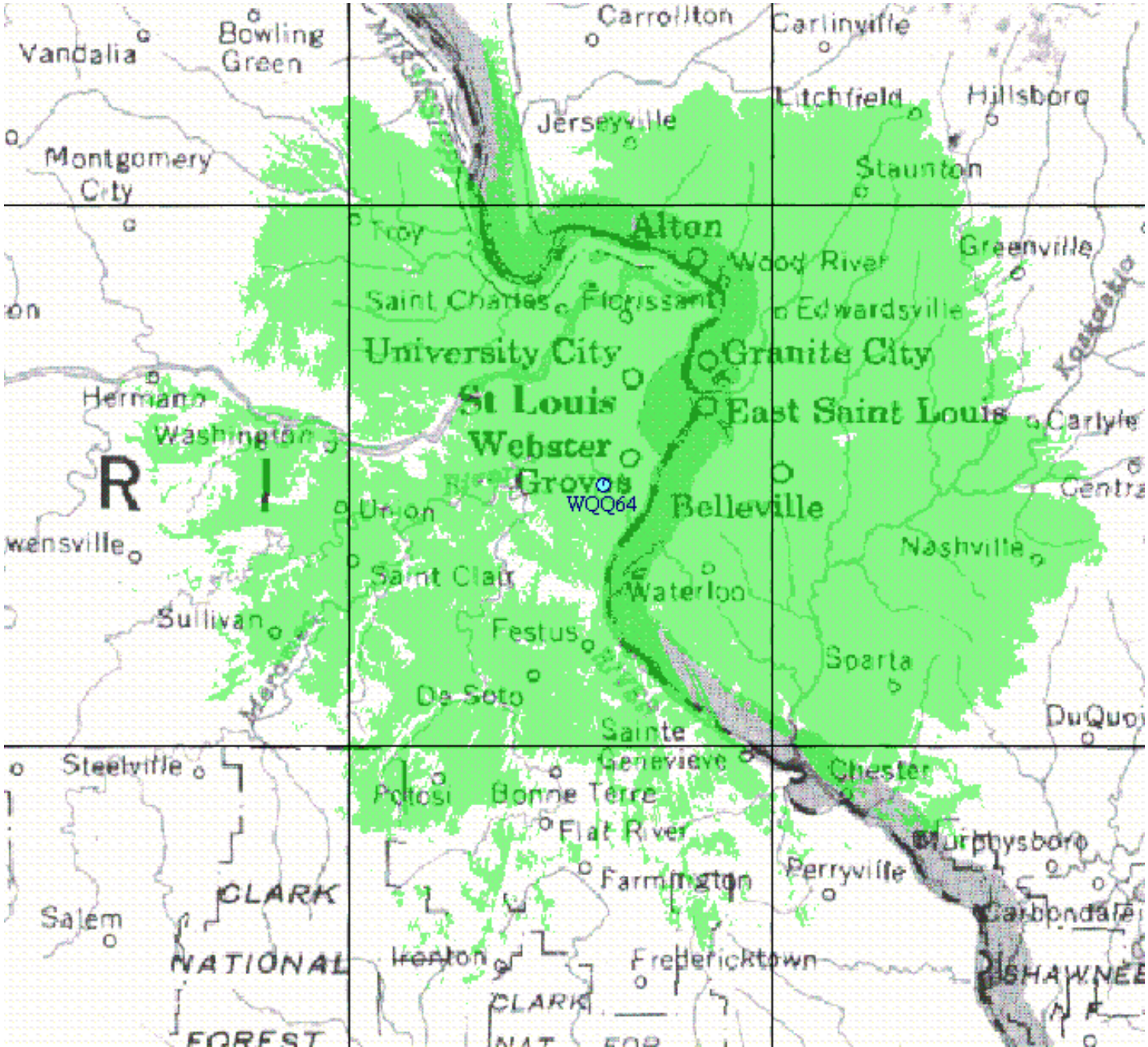
Cincinnati M1 Downstream LOS Projections using 30m Remote



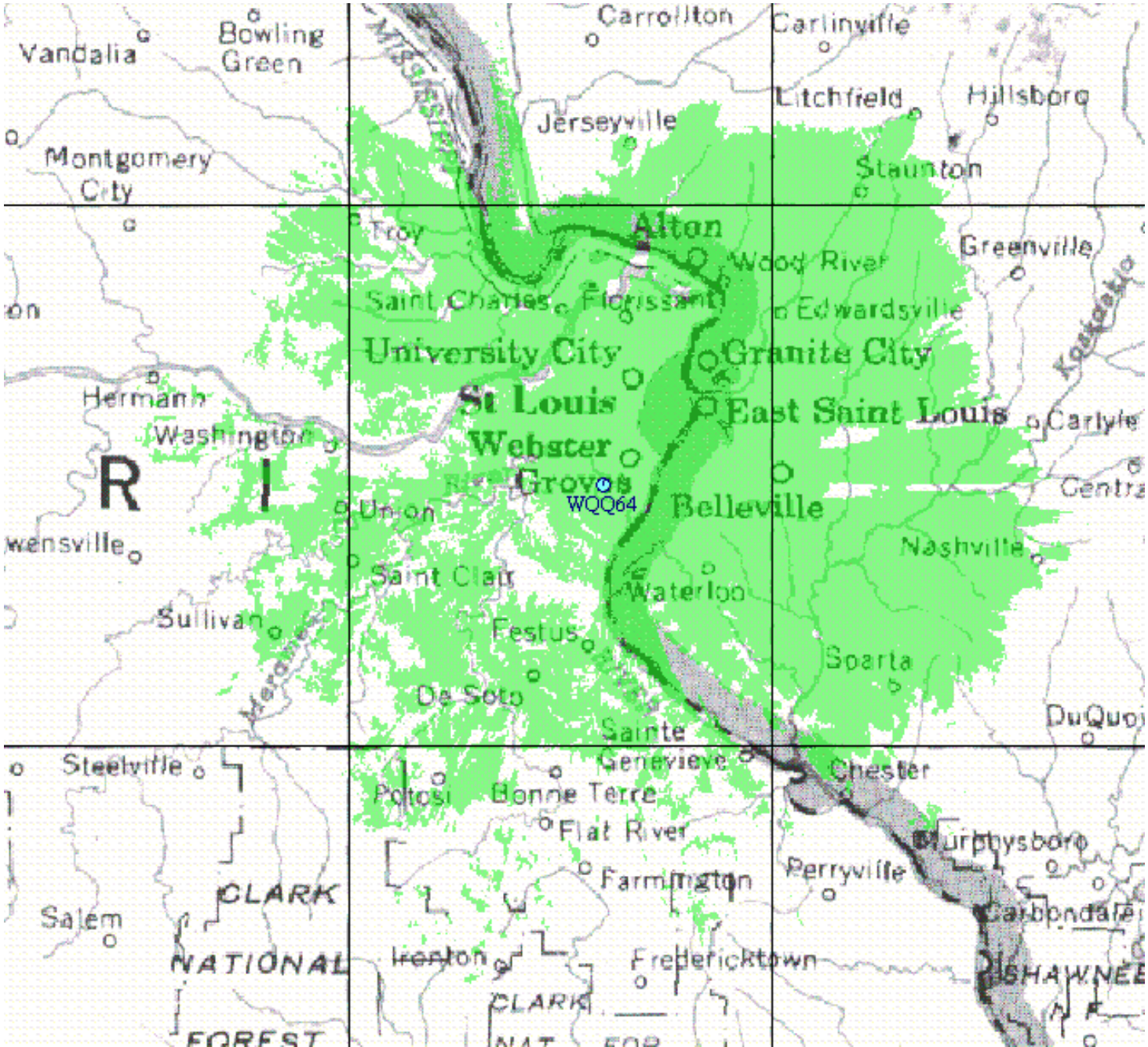
Cincinnati M1 Downstream LOS Projections using 9m Remote



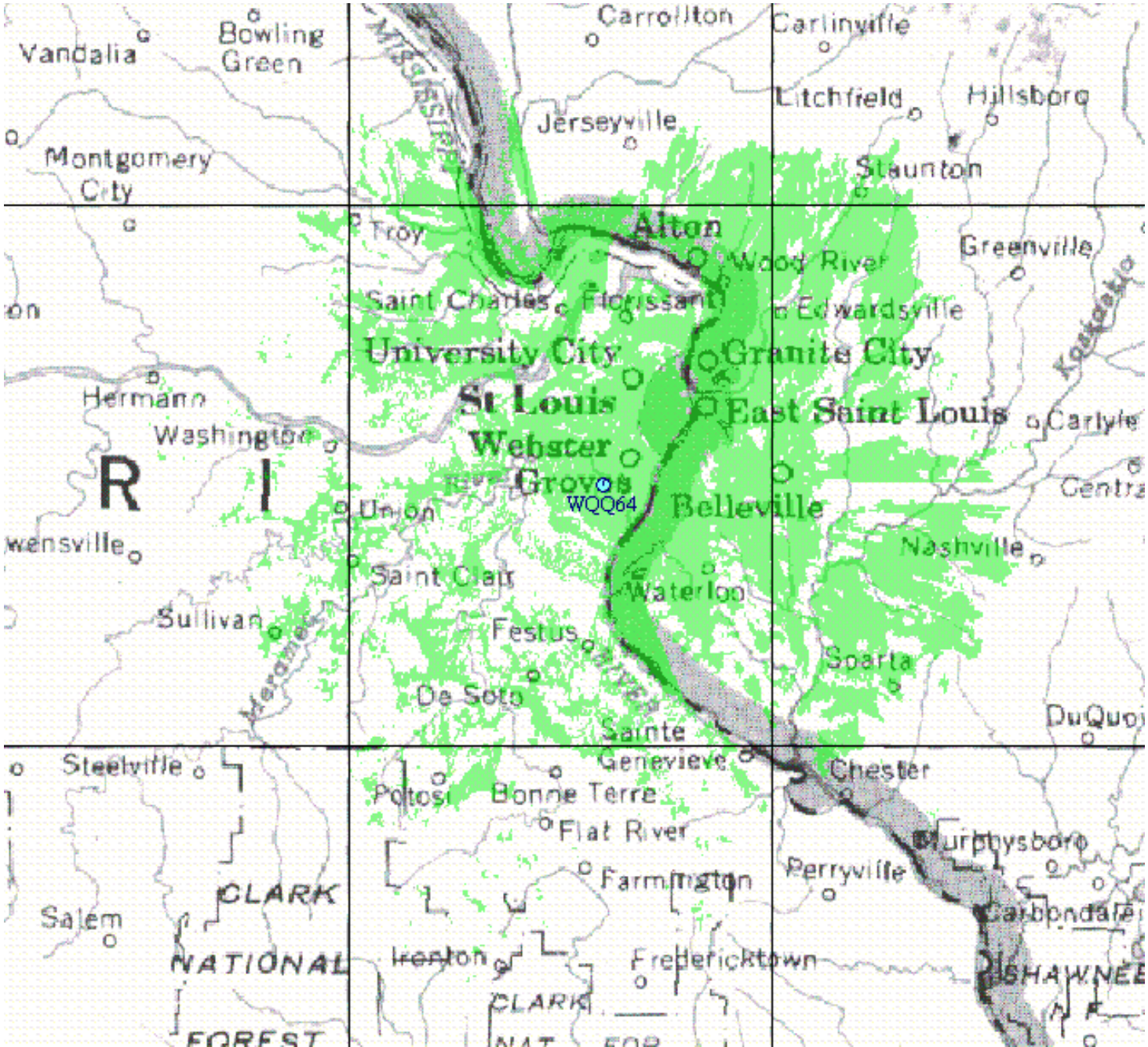
St. Louis M1 Downstream LOS Projections using 50m Remote



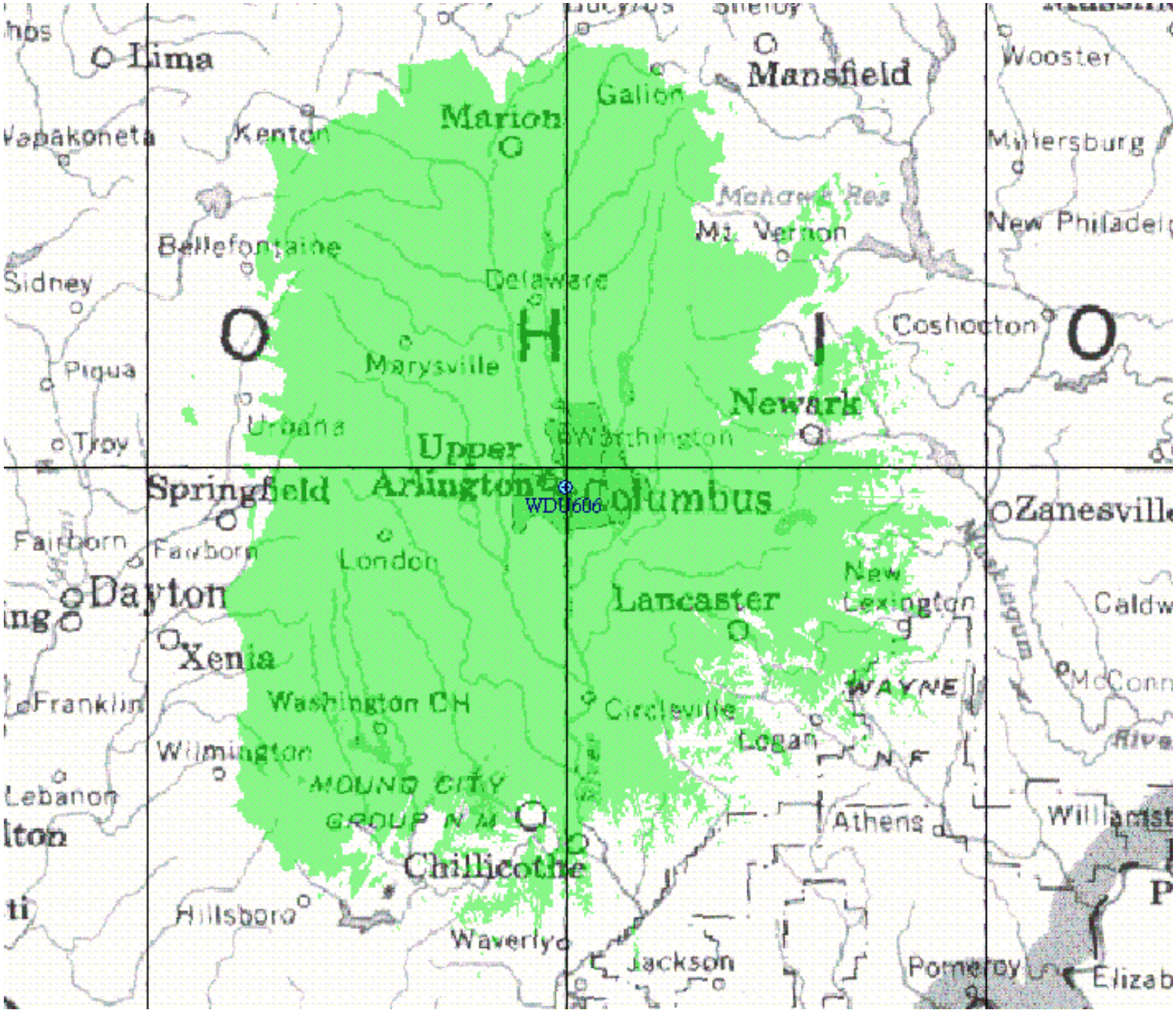
St. Louis M1 Downstream LOS Projections using 30m Remote



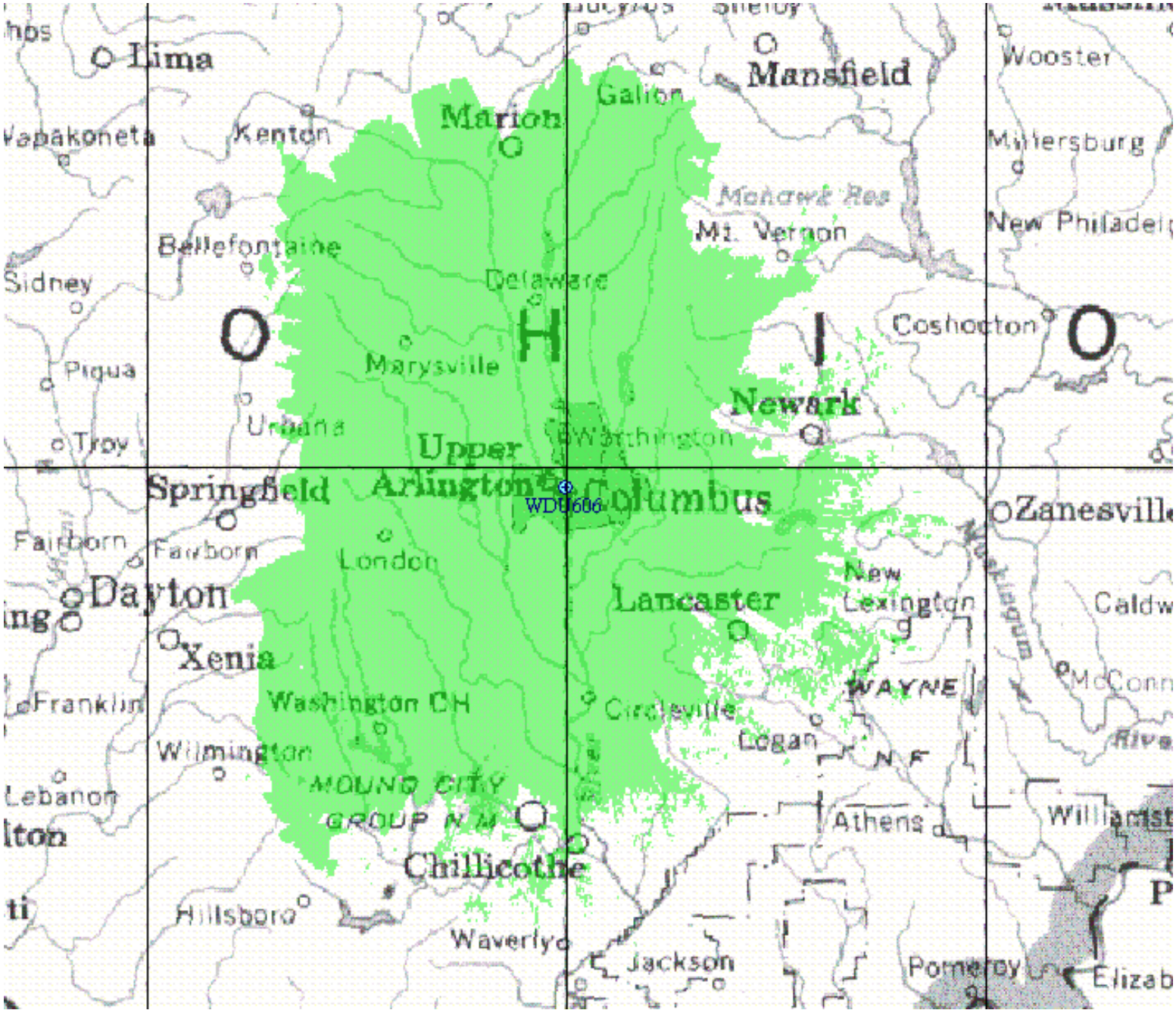
St. Louis M1 Downstream LOS Projections using 9m Remote



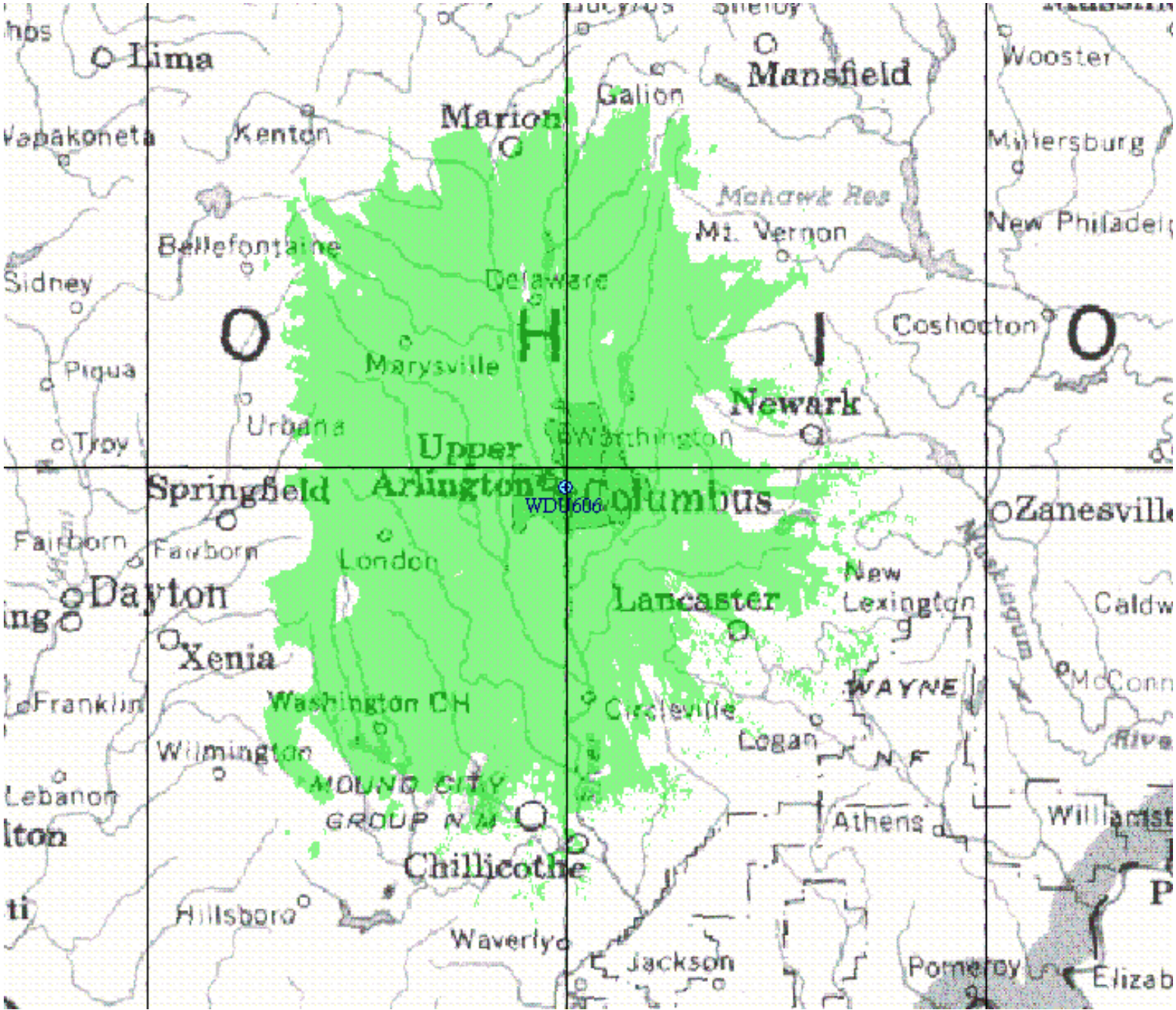
Columbus M2 Downstream LOS Projections using 50m Remote



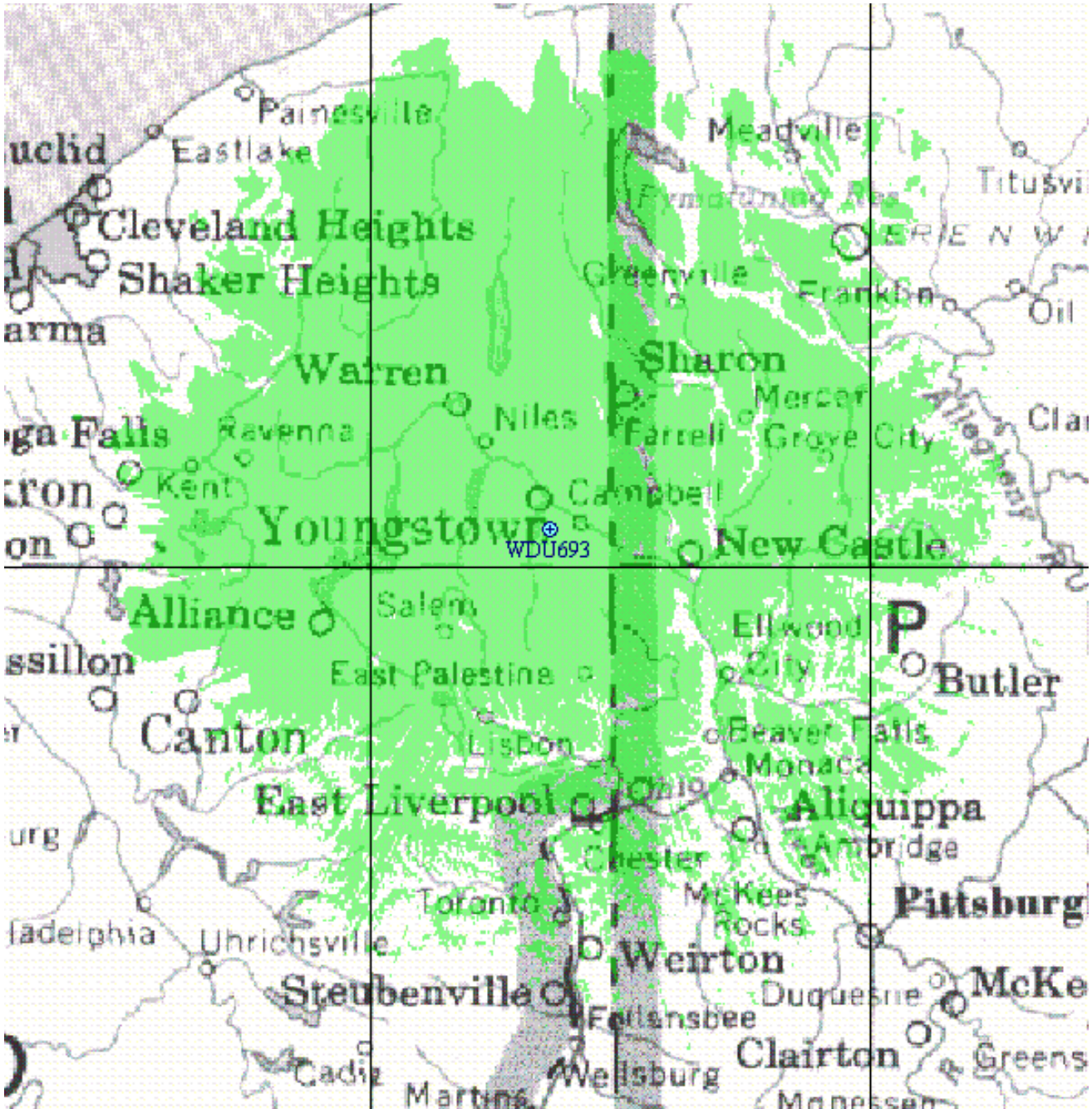
Columbus M2 Downstream LOS Projections using 30m Remote



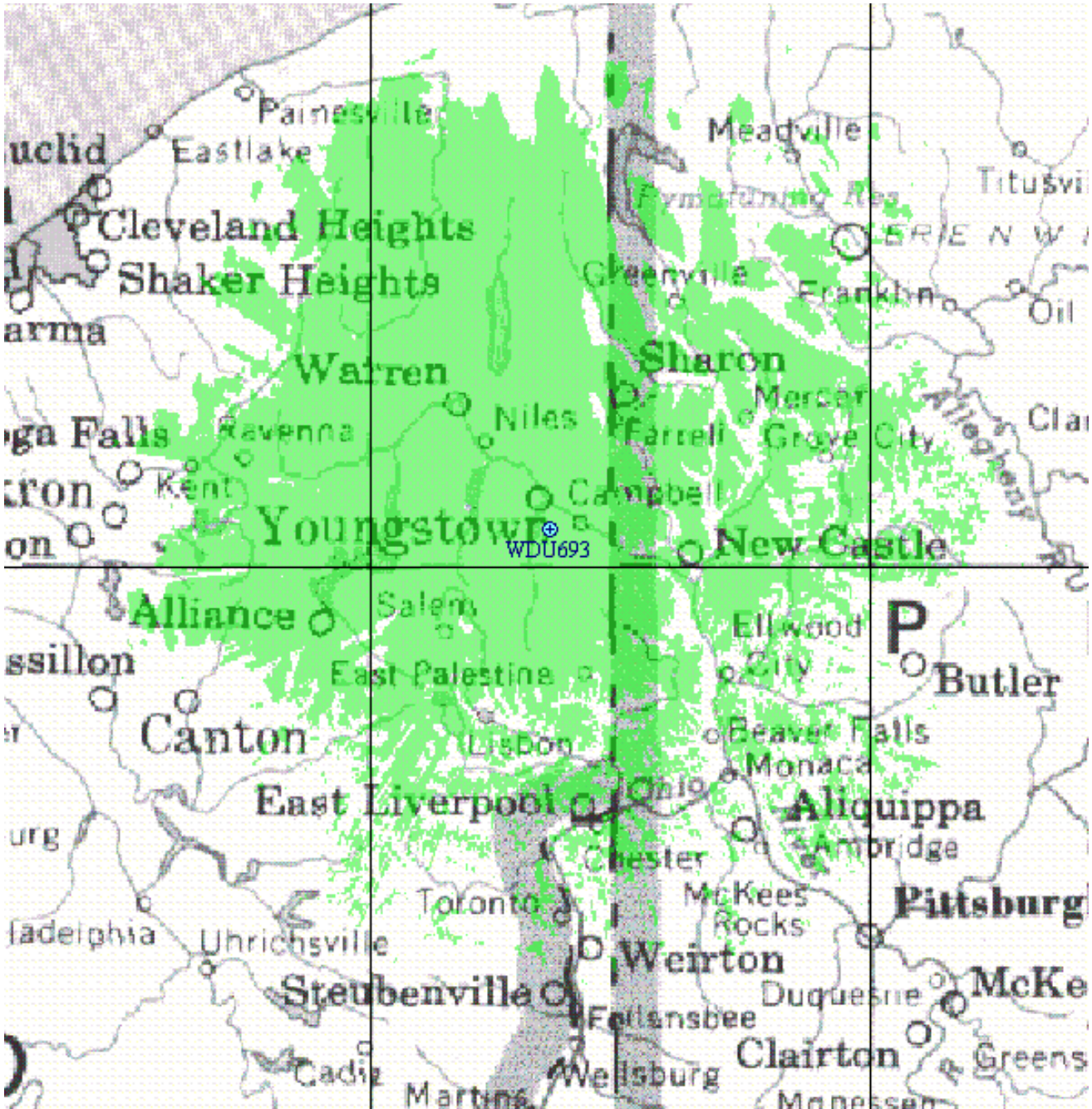
Columbus M2 Downstream LOS Projections using 9m Remote



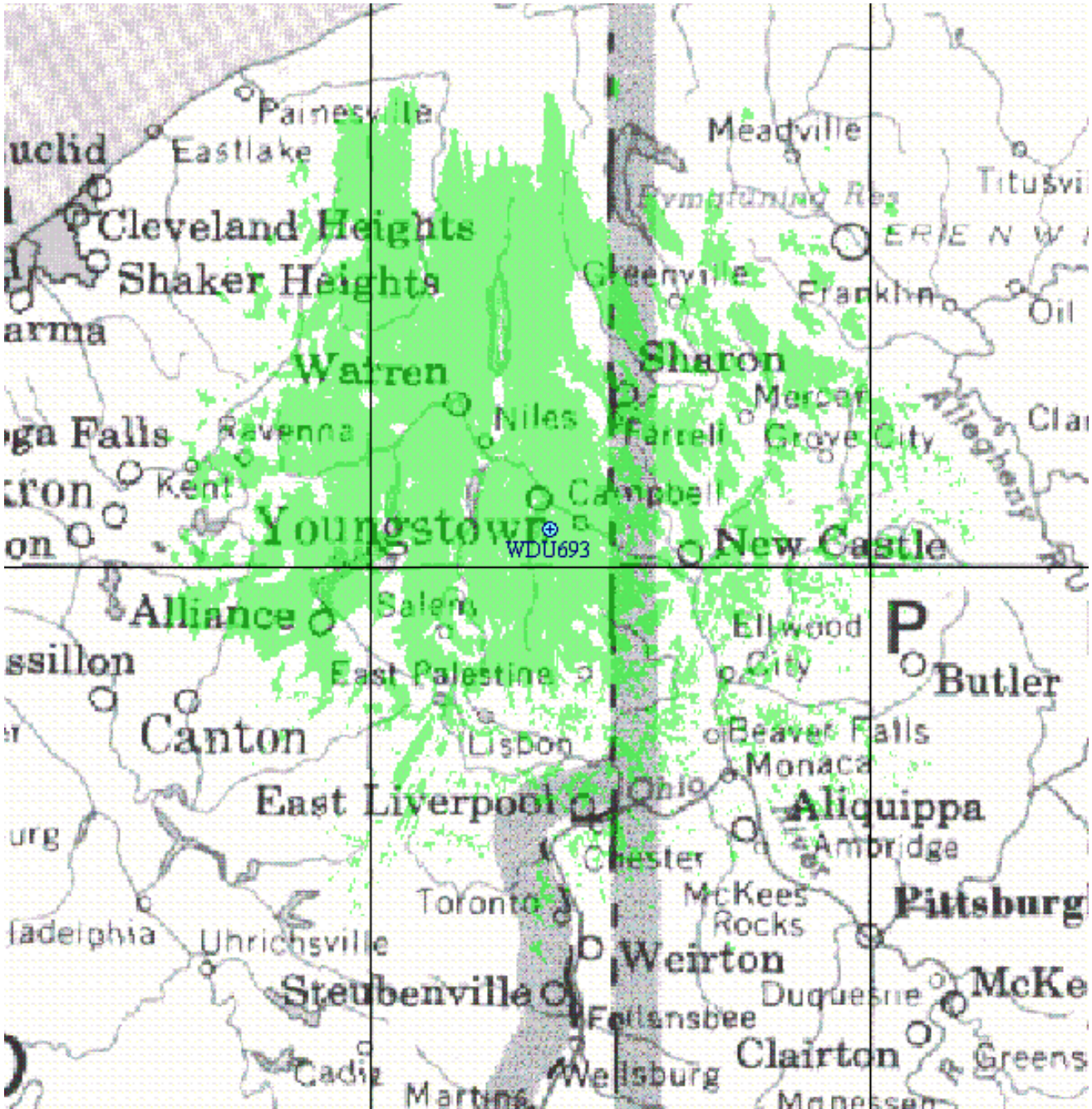
Youngstown M1 Downstream LOS Projections using 50m Remote



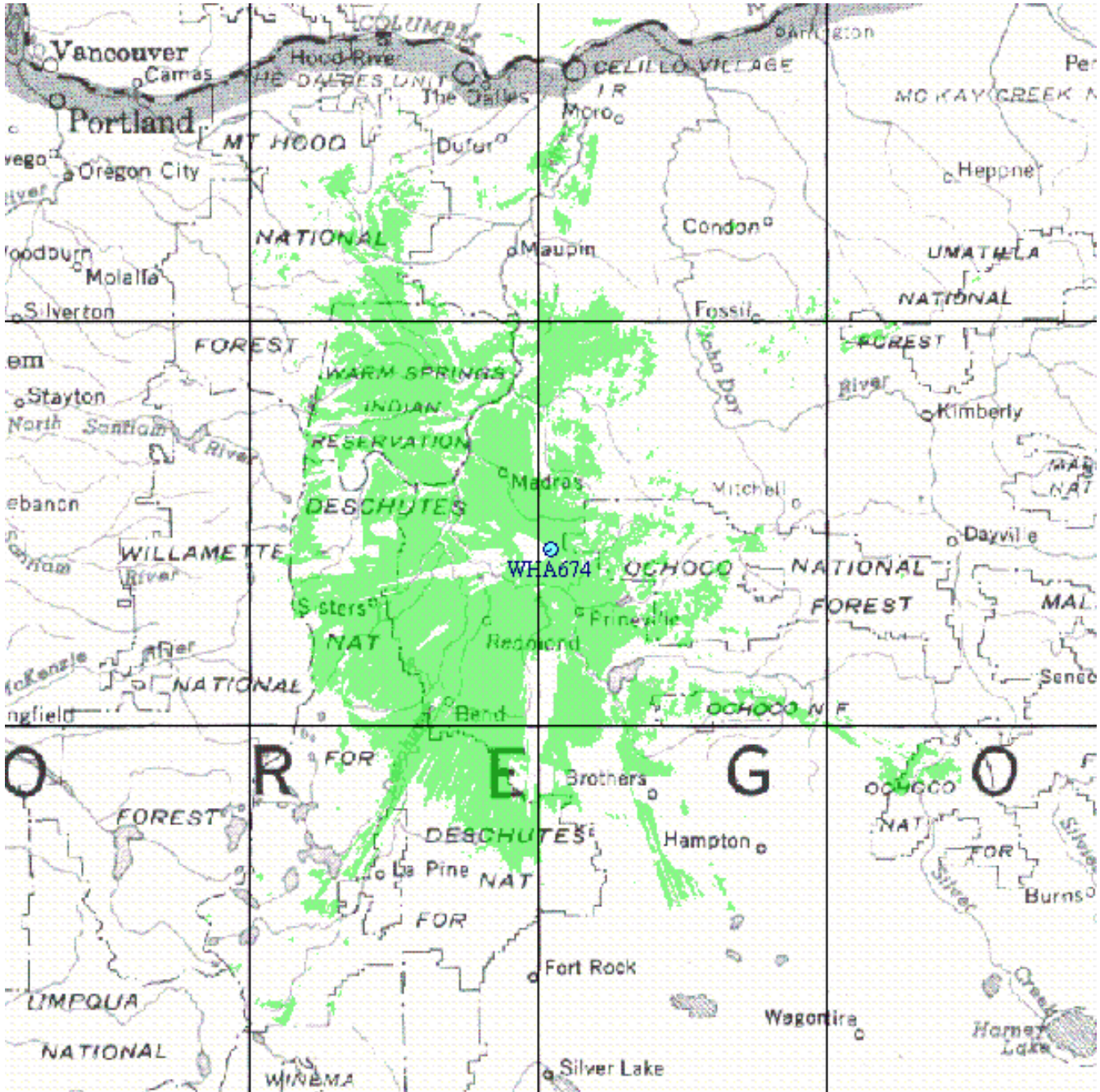
Youngstown M1 Downstream LOS Projections using 30m Remote



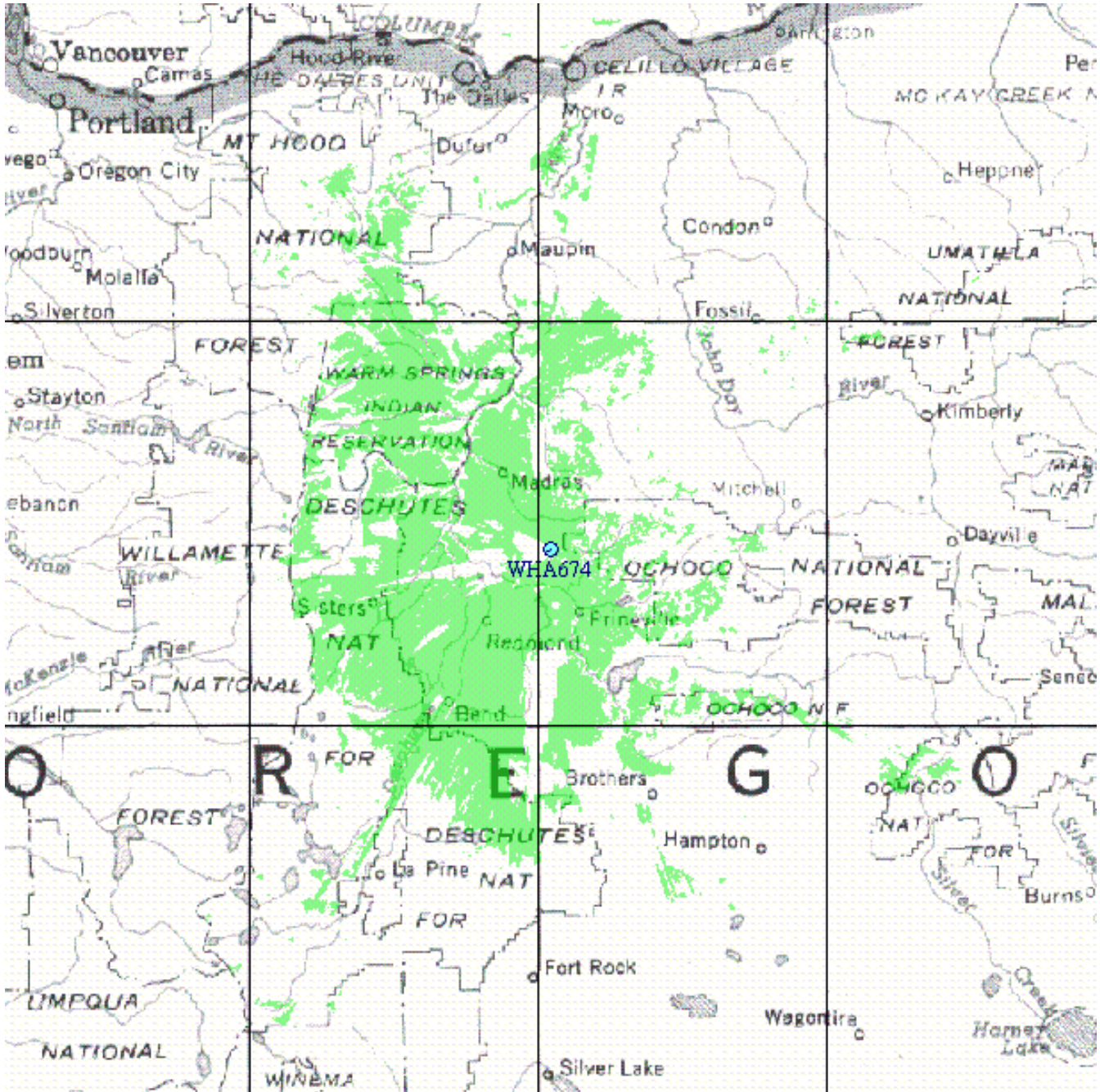
Youngstown M1 Downstream LOS Projections using 9m Remote



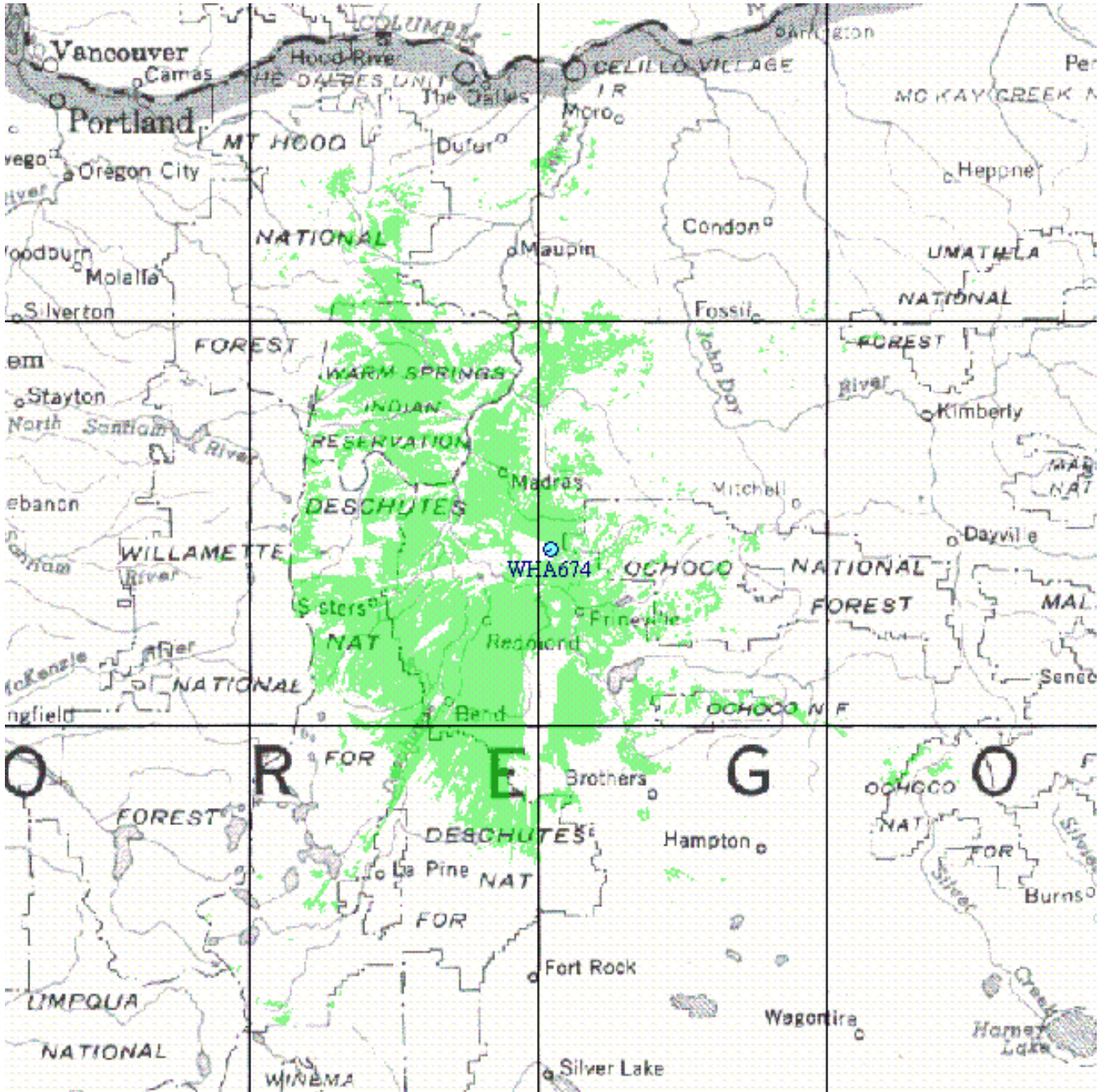
Bend M1 Downstream LOS Projections using 50m Remote



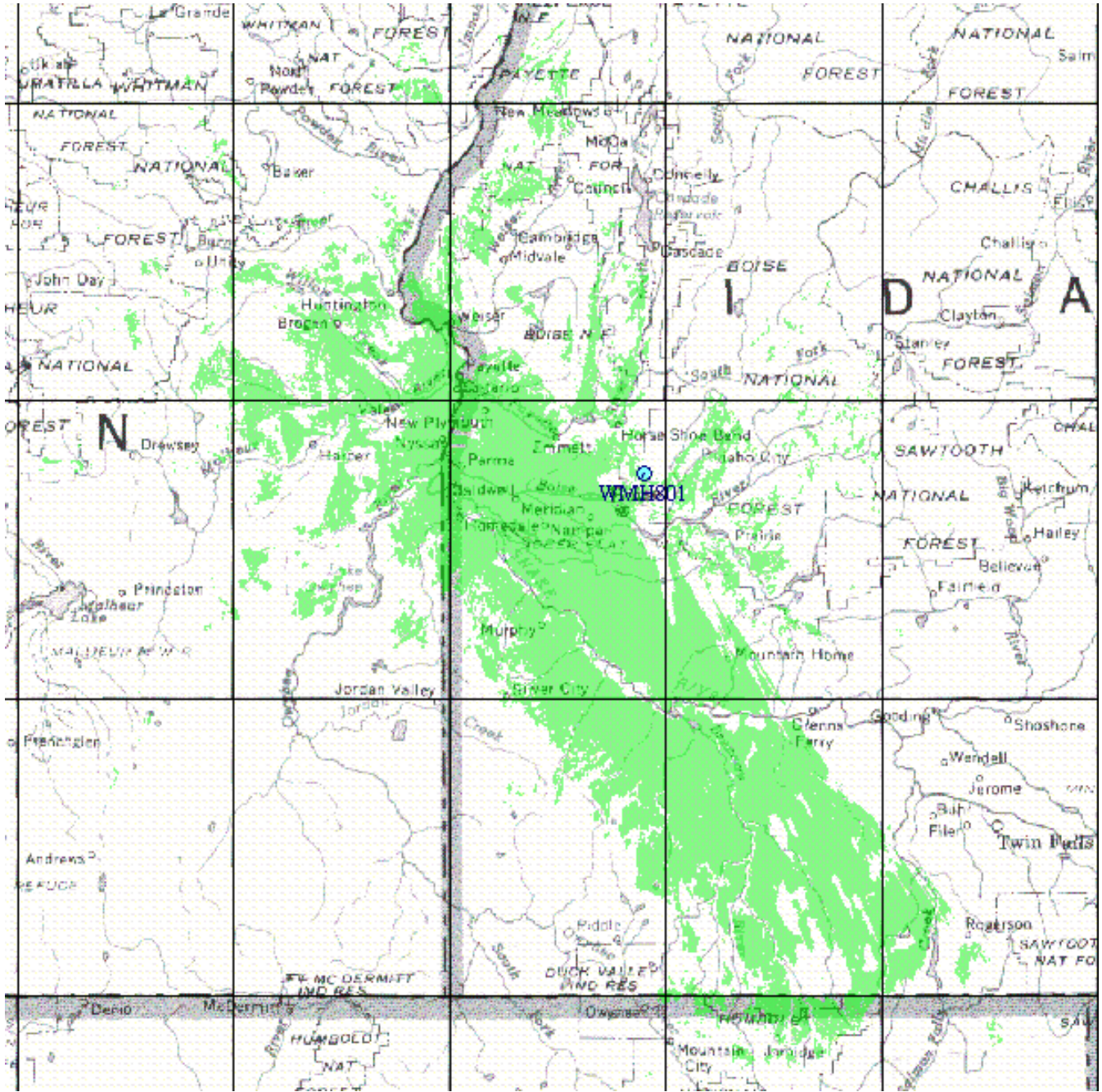
Bend M1 Downstream LOS Projections using 30m Remote



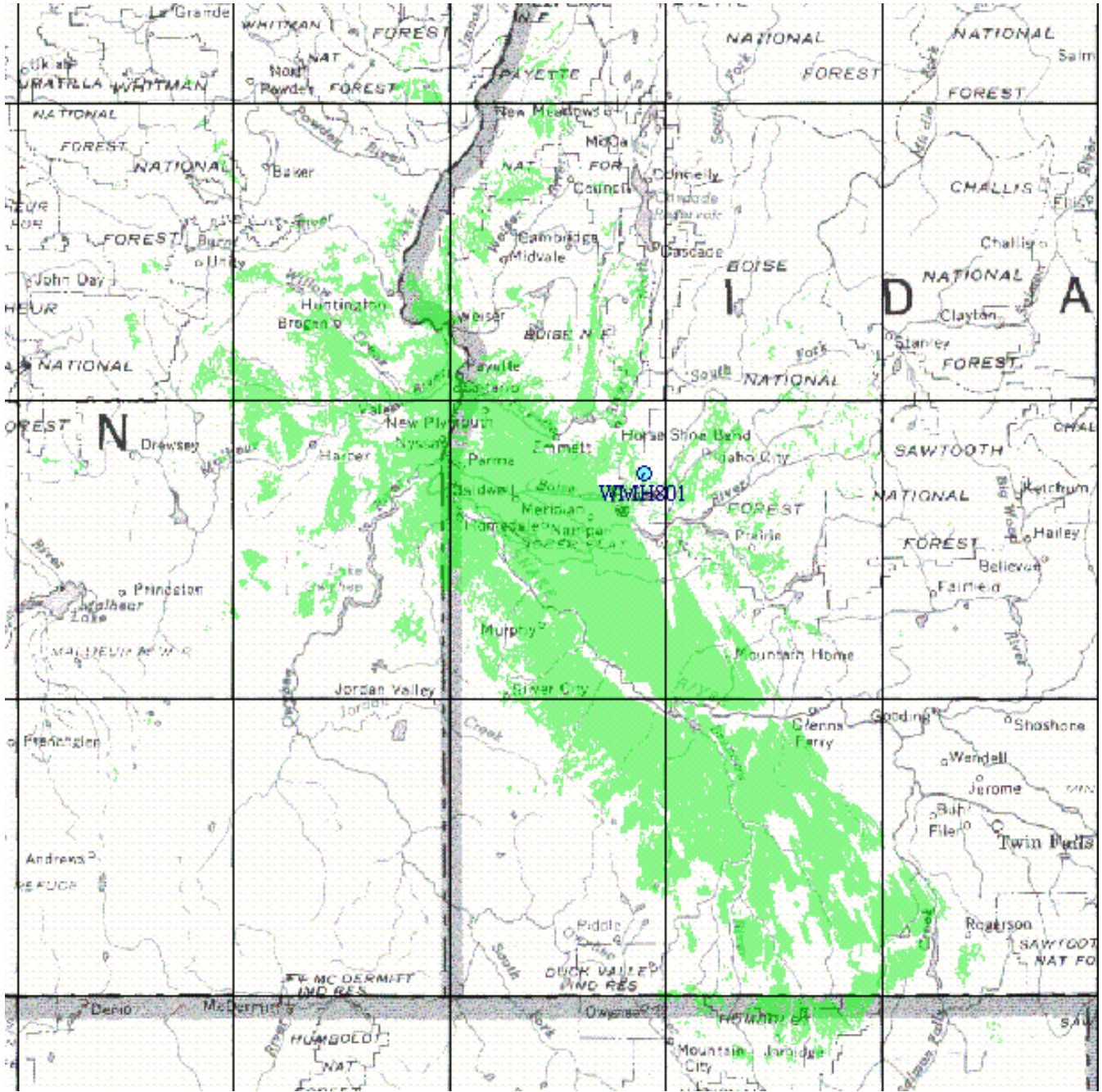
Bend M1 Downstream LOS Projections using 9m Remote



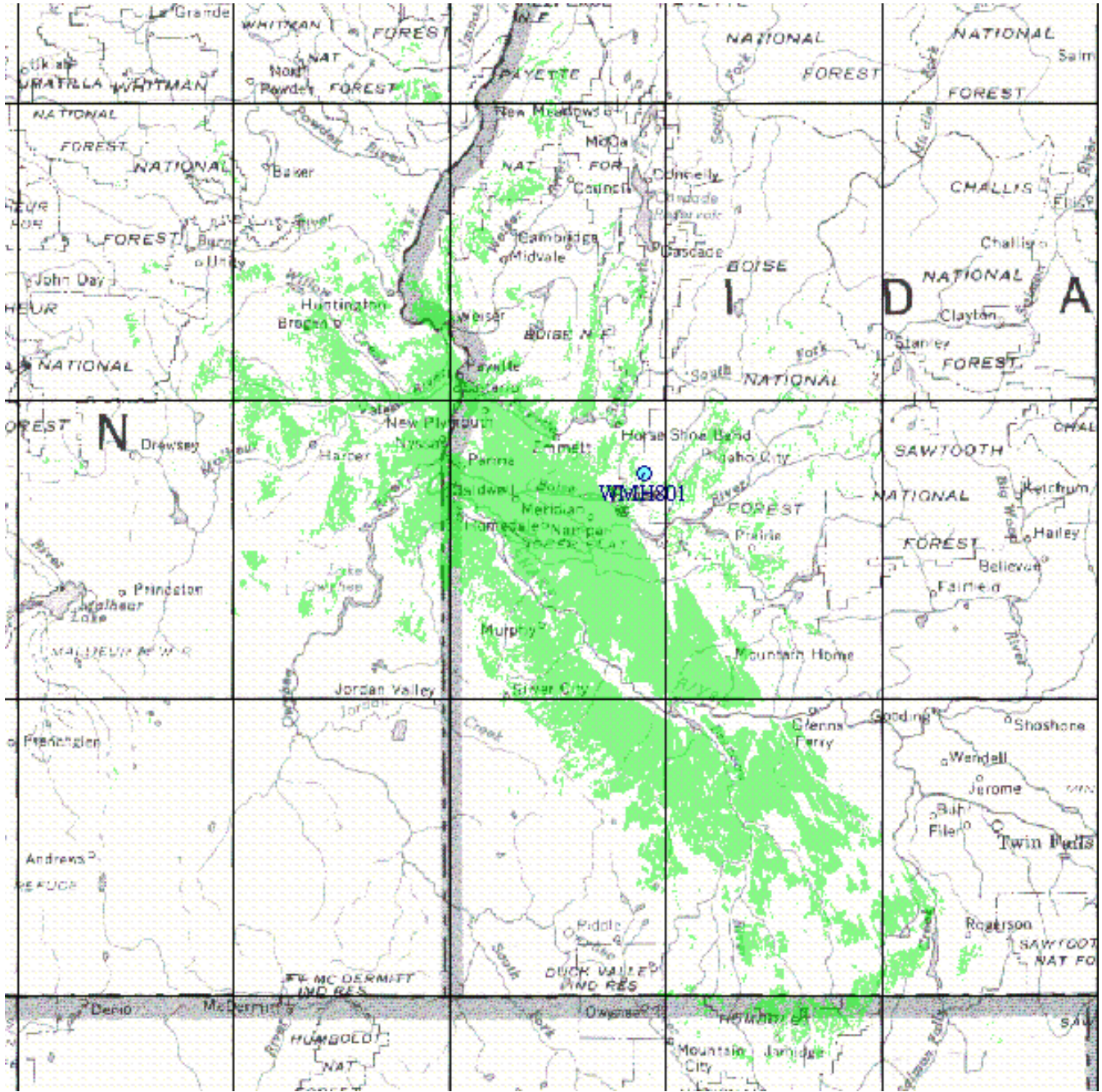
Boise M1 Downstream LOS Projections using 50m Remote



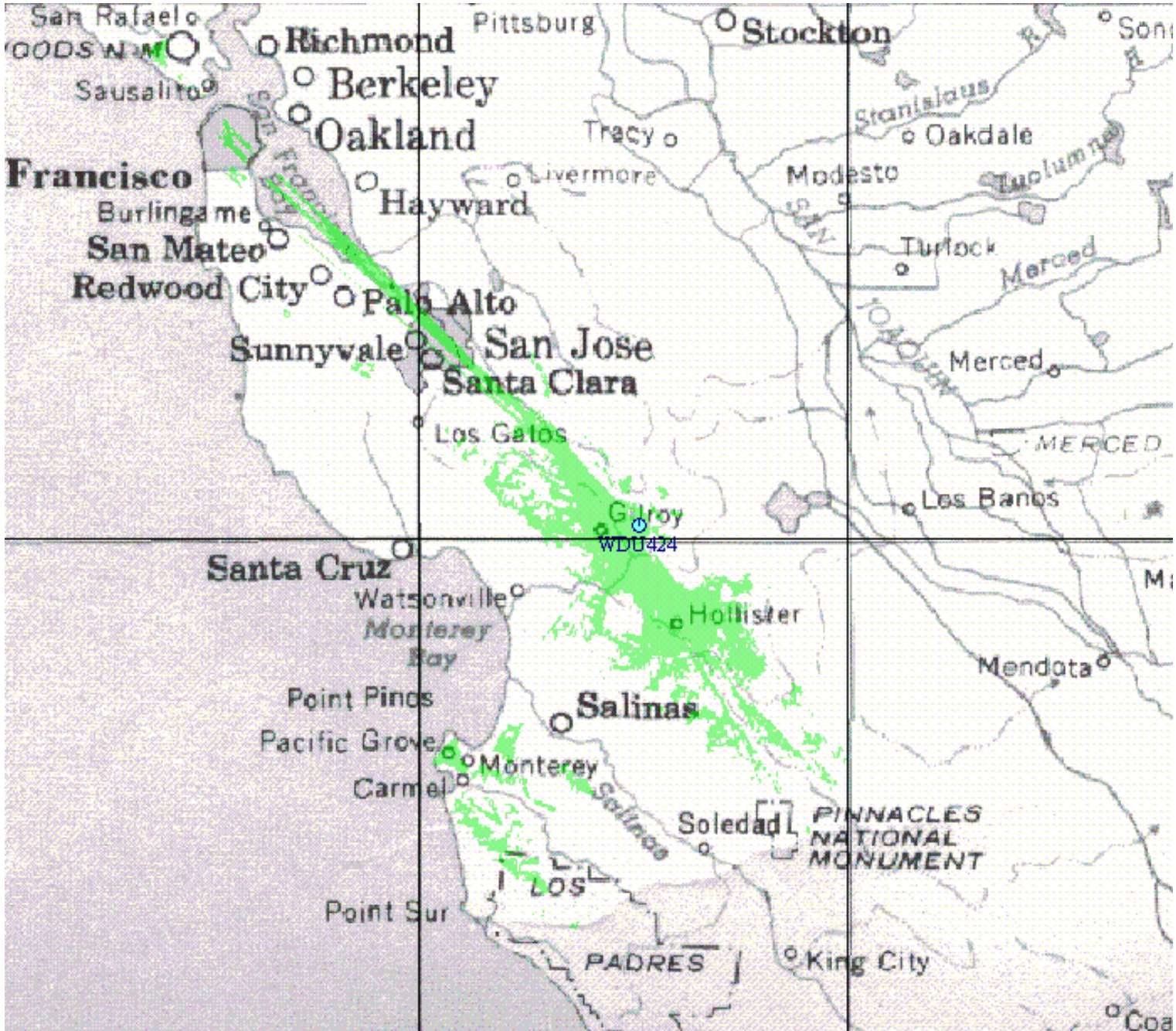
Boise M1 Downstream LOS Projections using 30m Remote



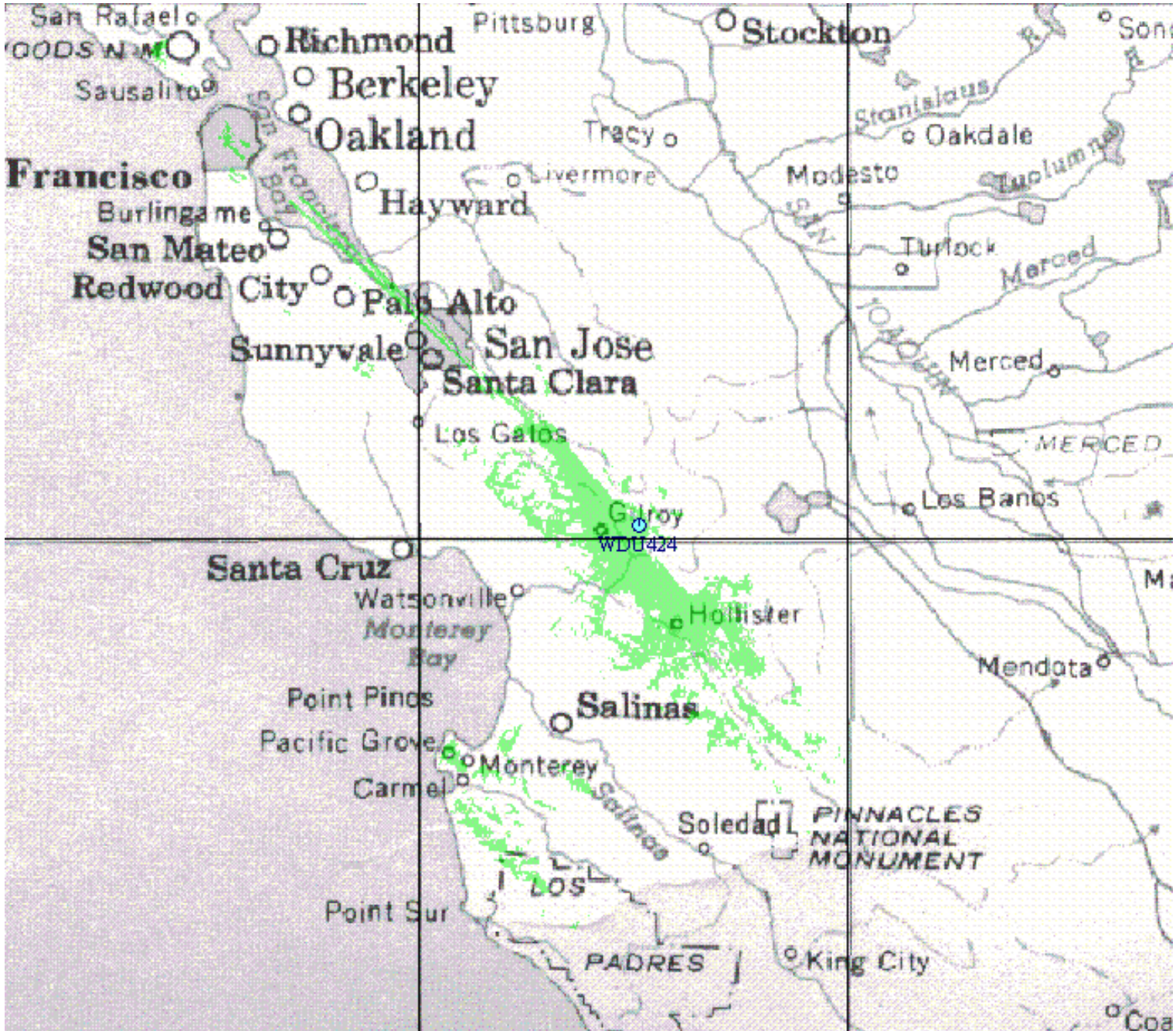
Boise M1 Downstream LOS Projections using 9m Remote



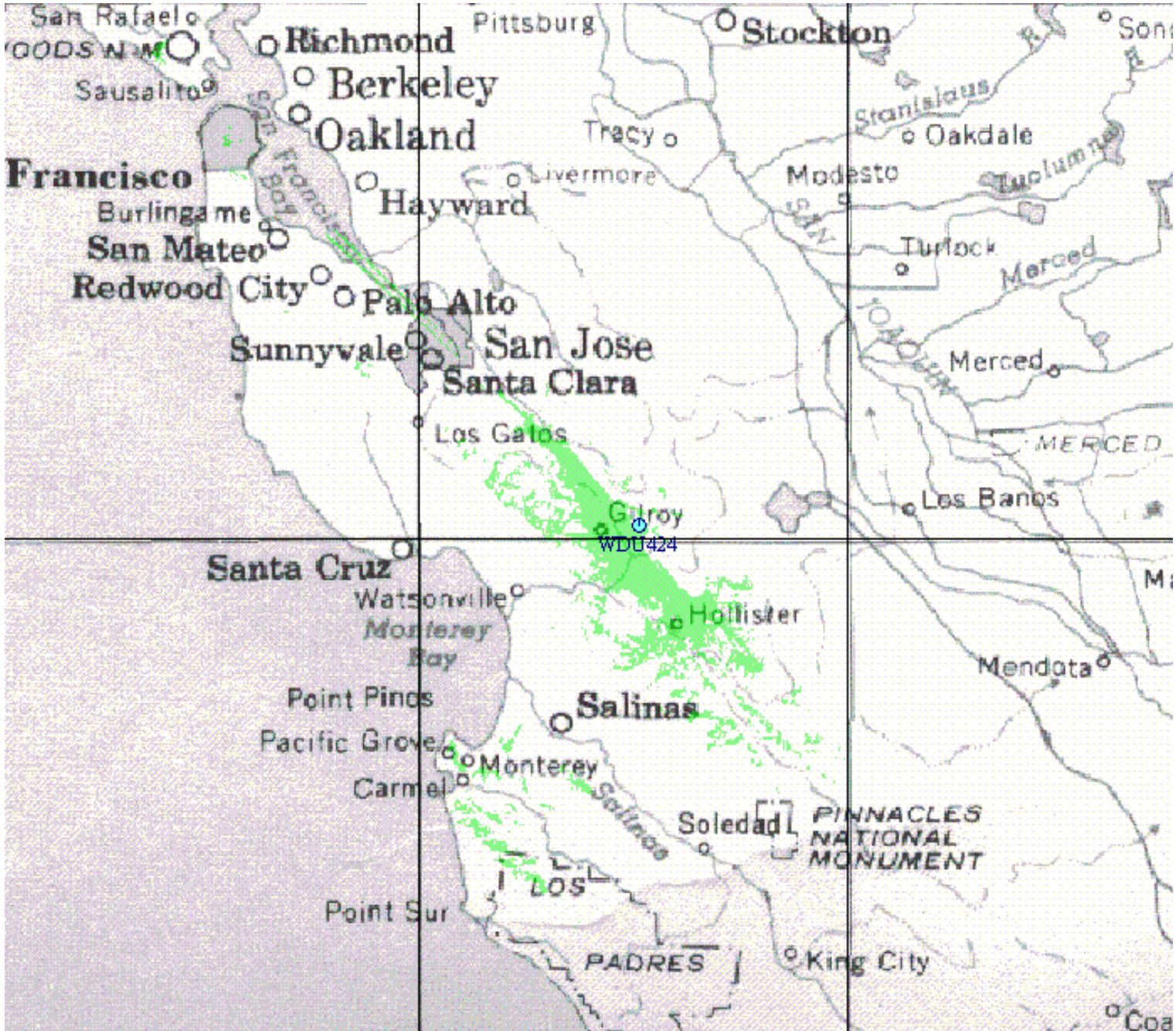
Gilroy M1 Downstream LOS Projections using 50m Remote



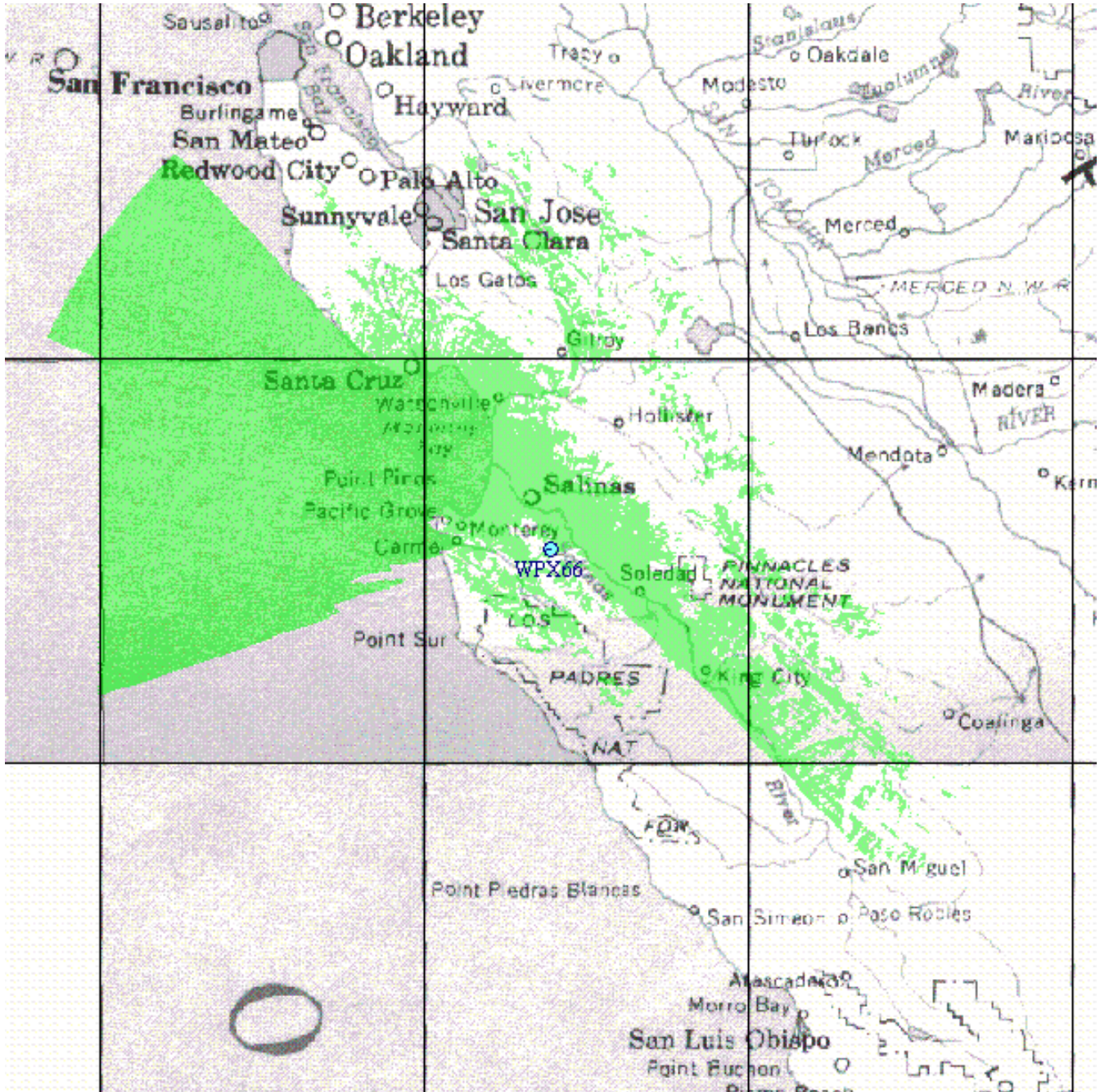
Gilroy M1 Downstream LOS Projections using 30m Remote



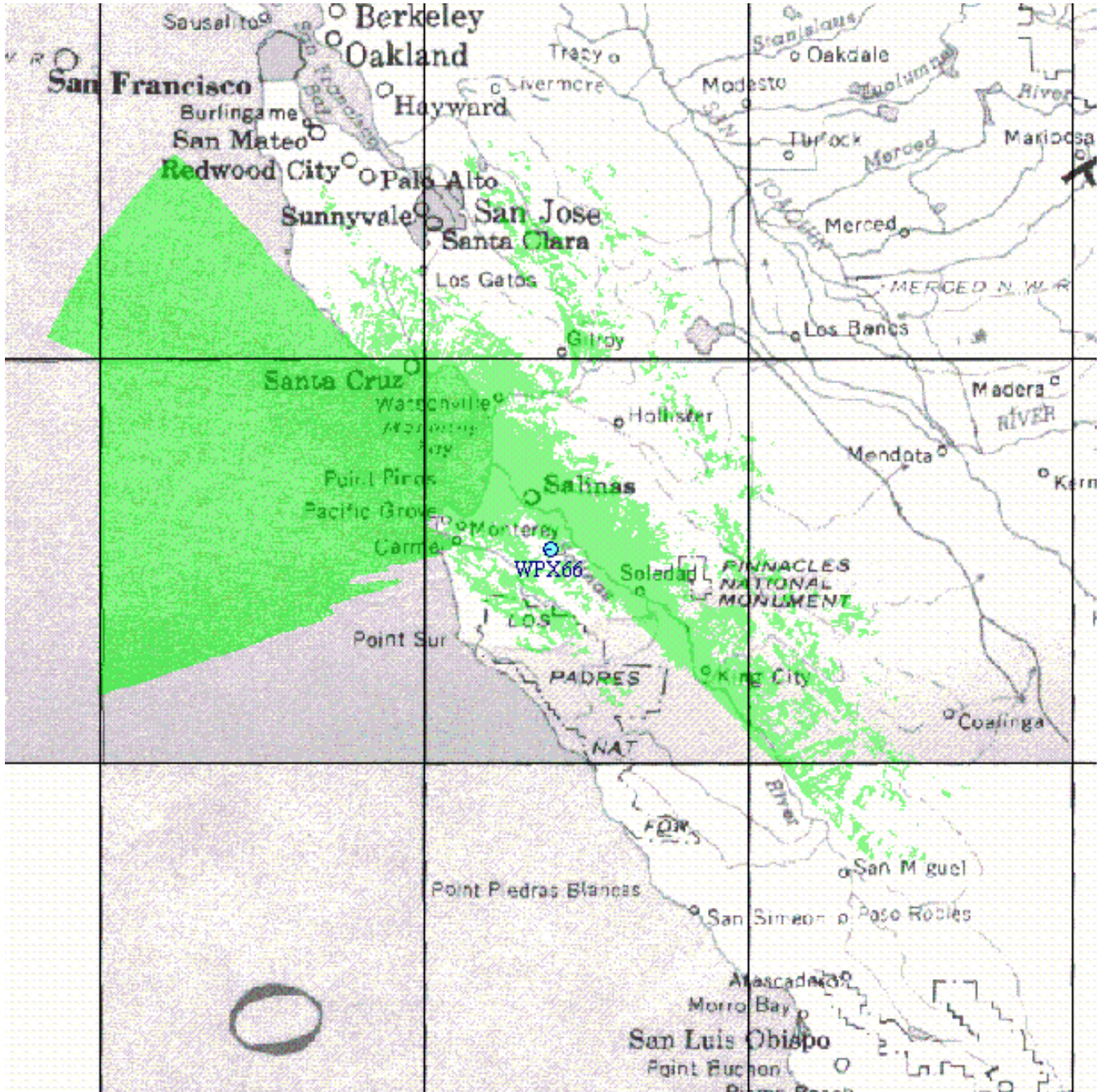
Gilroy M1 Downstream LOS Projections using 9m Remote



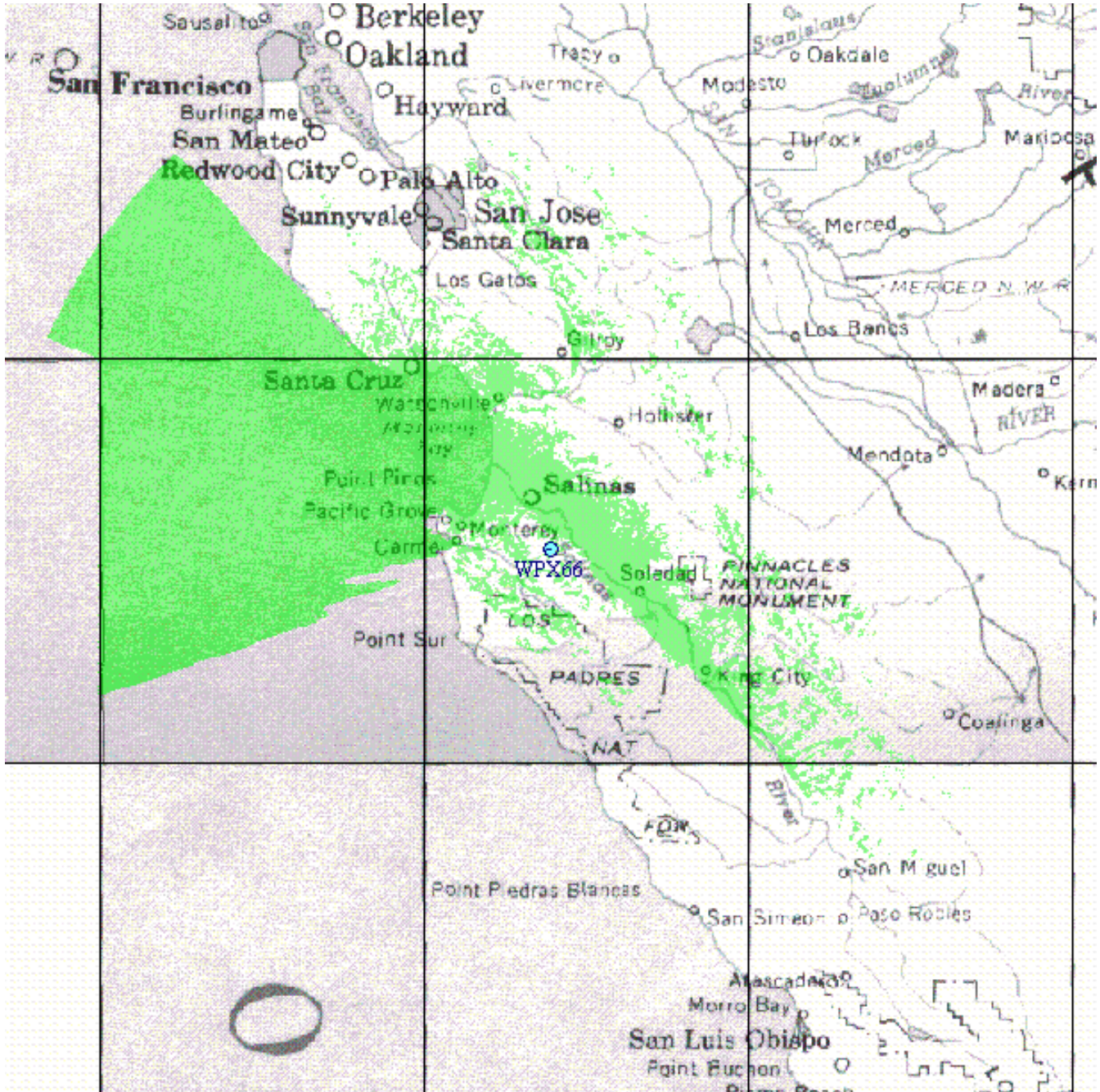
Monterey M1 Downstream LOS Projections using 50m Remote



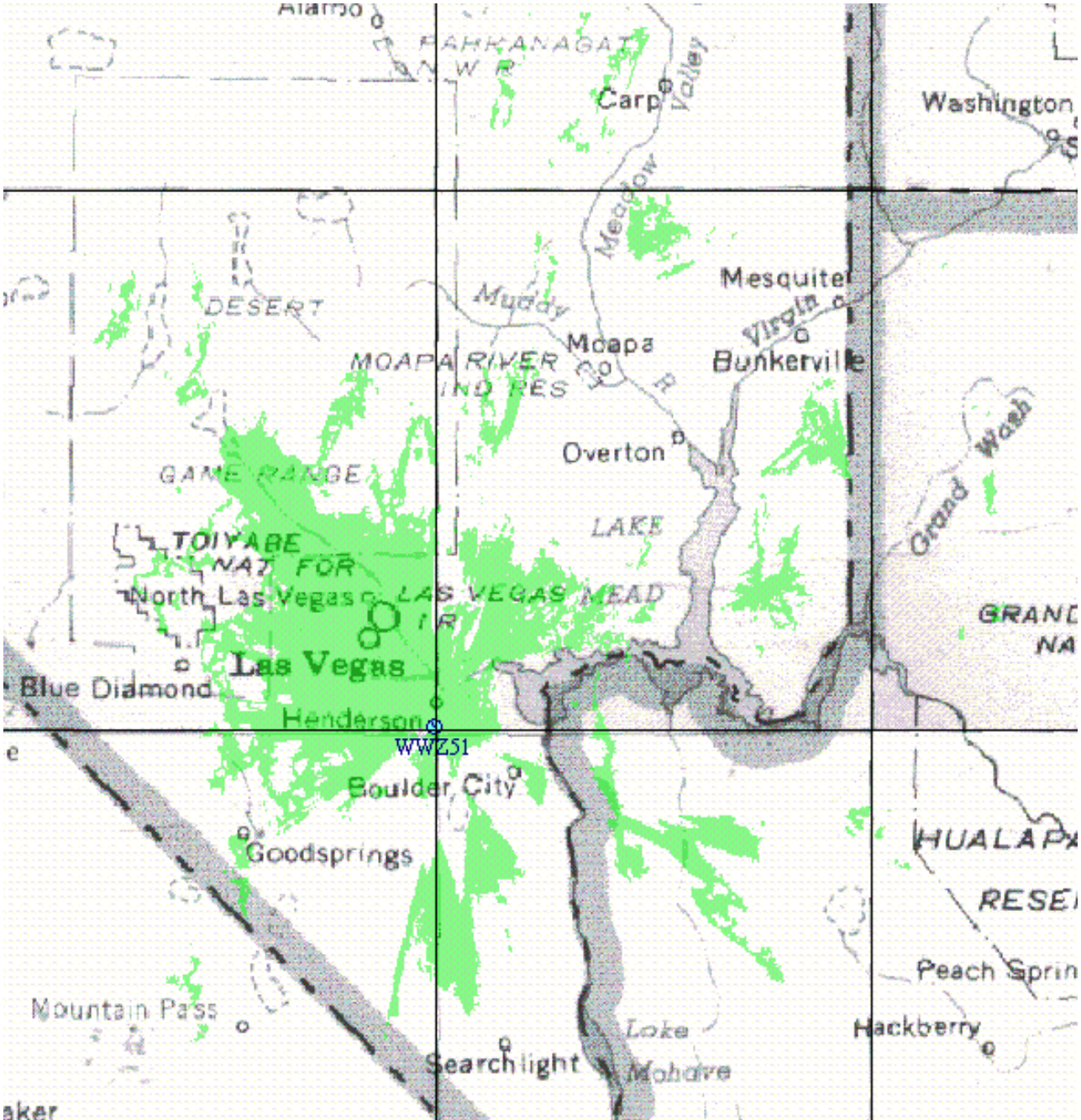
Monterey M1 Downstream LOS Projections using 30m Remote



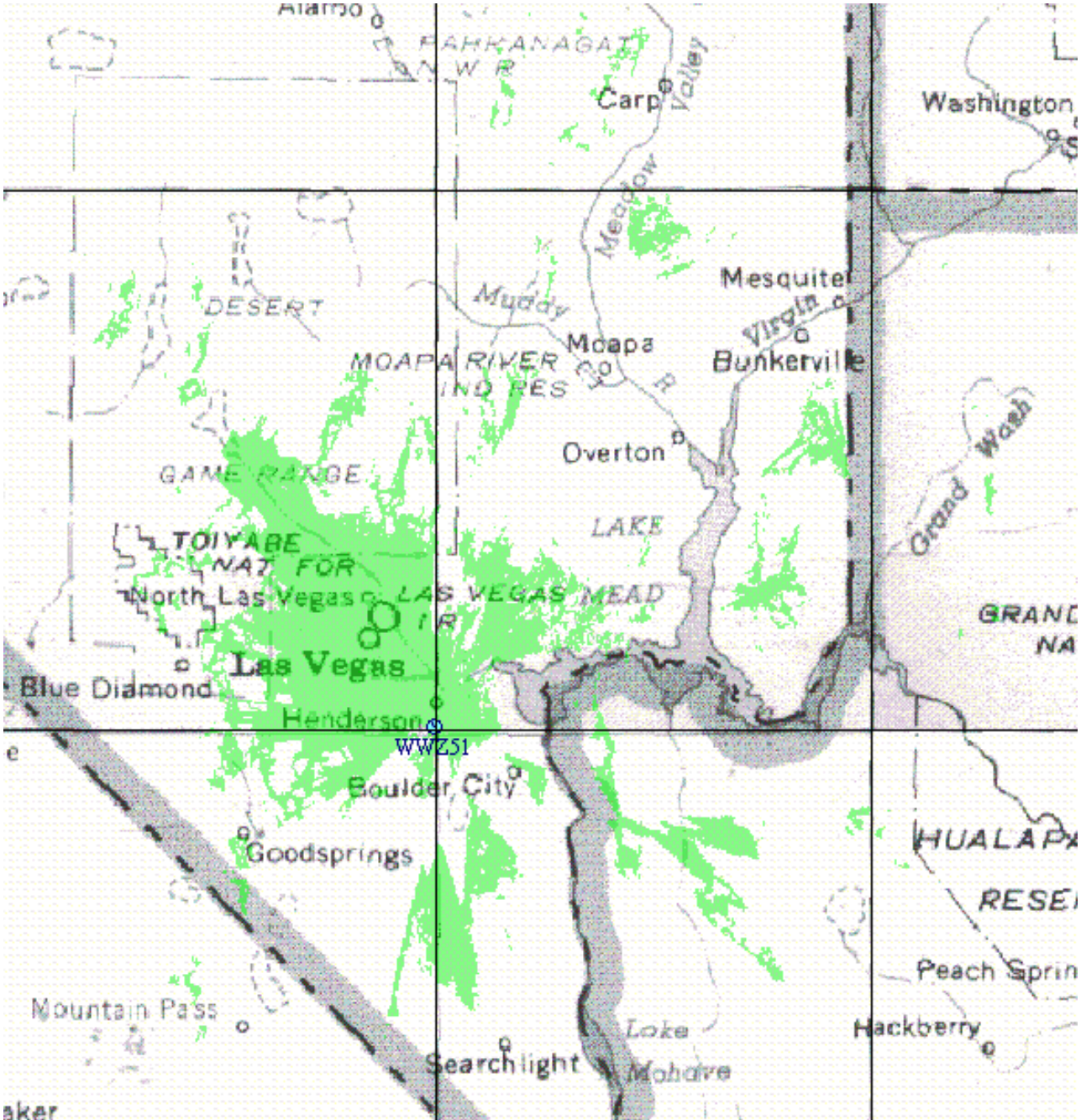
Monterey M1 Downstream LOS Projections using 9m Remote



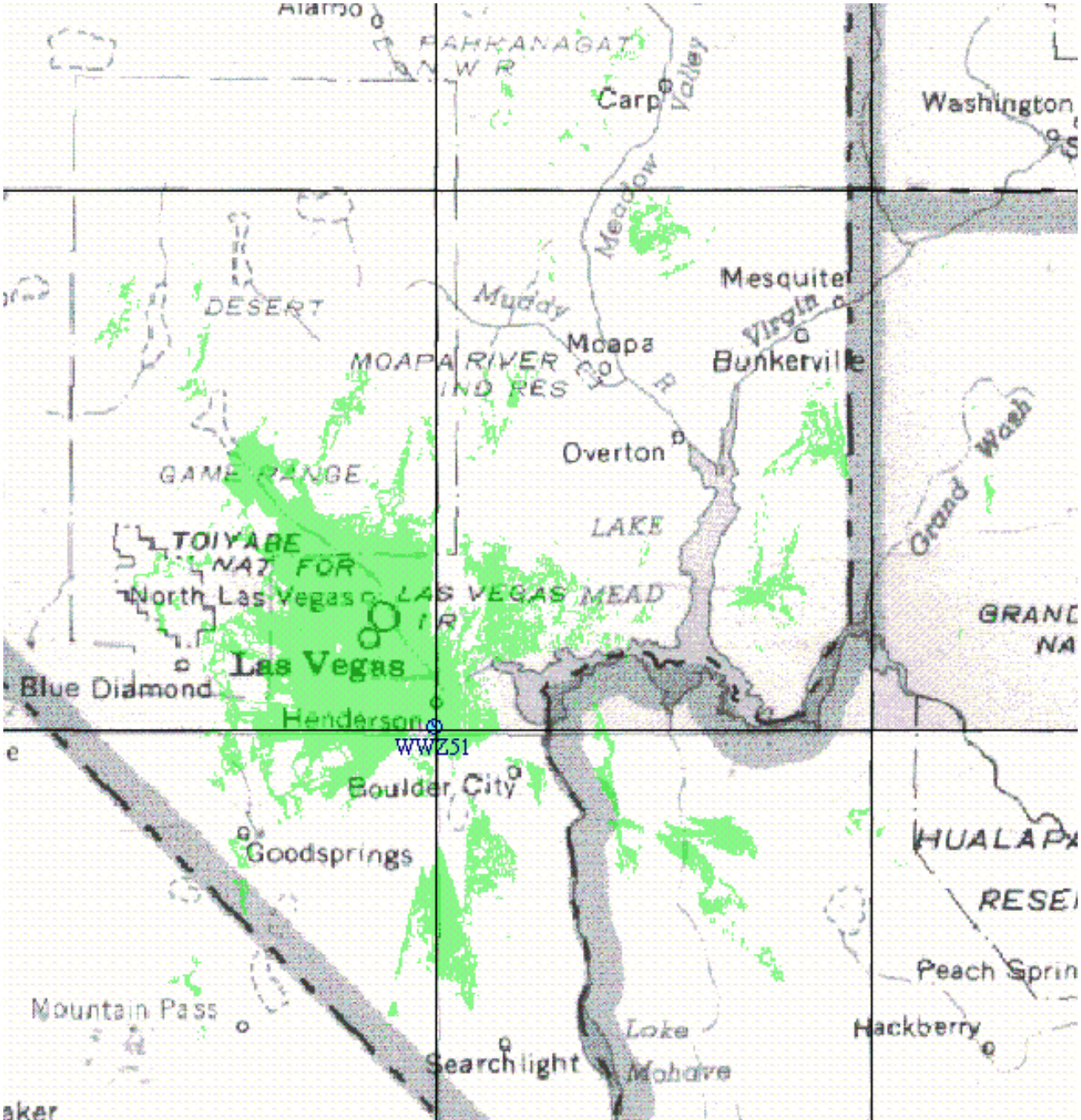
Las Vegas M1 Downstream LOS Projections using 50m Remote



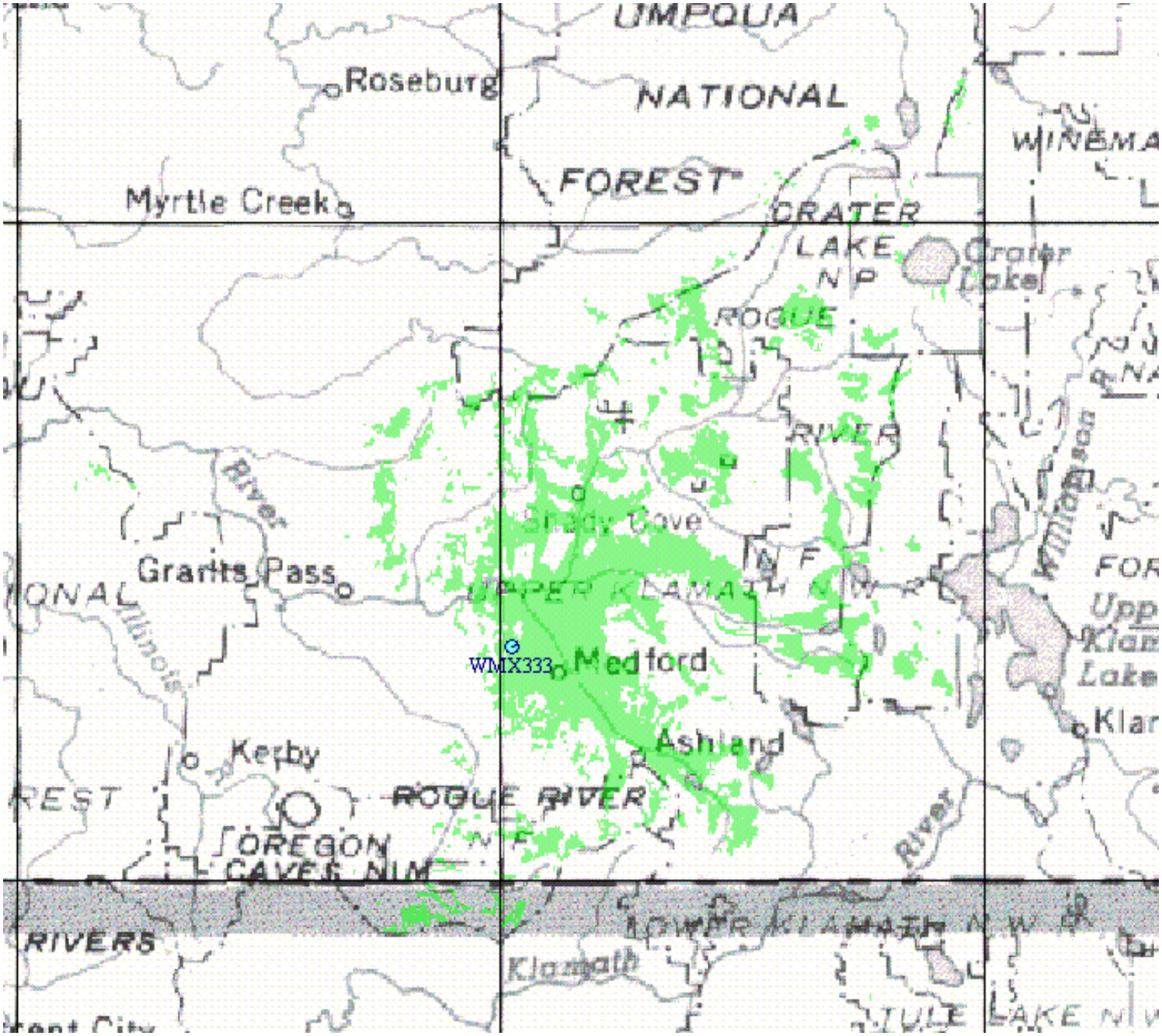
Las Vegas M1 Downstream LOS Projections using 30m Remote



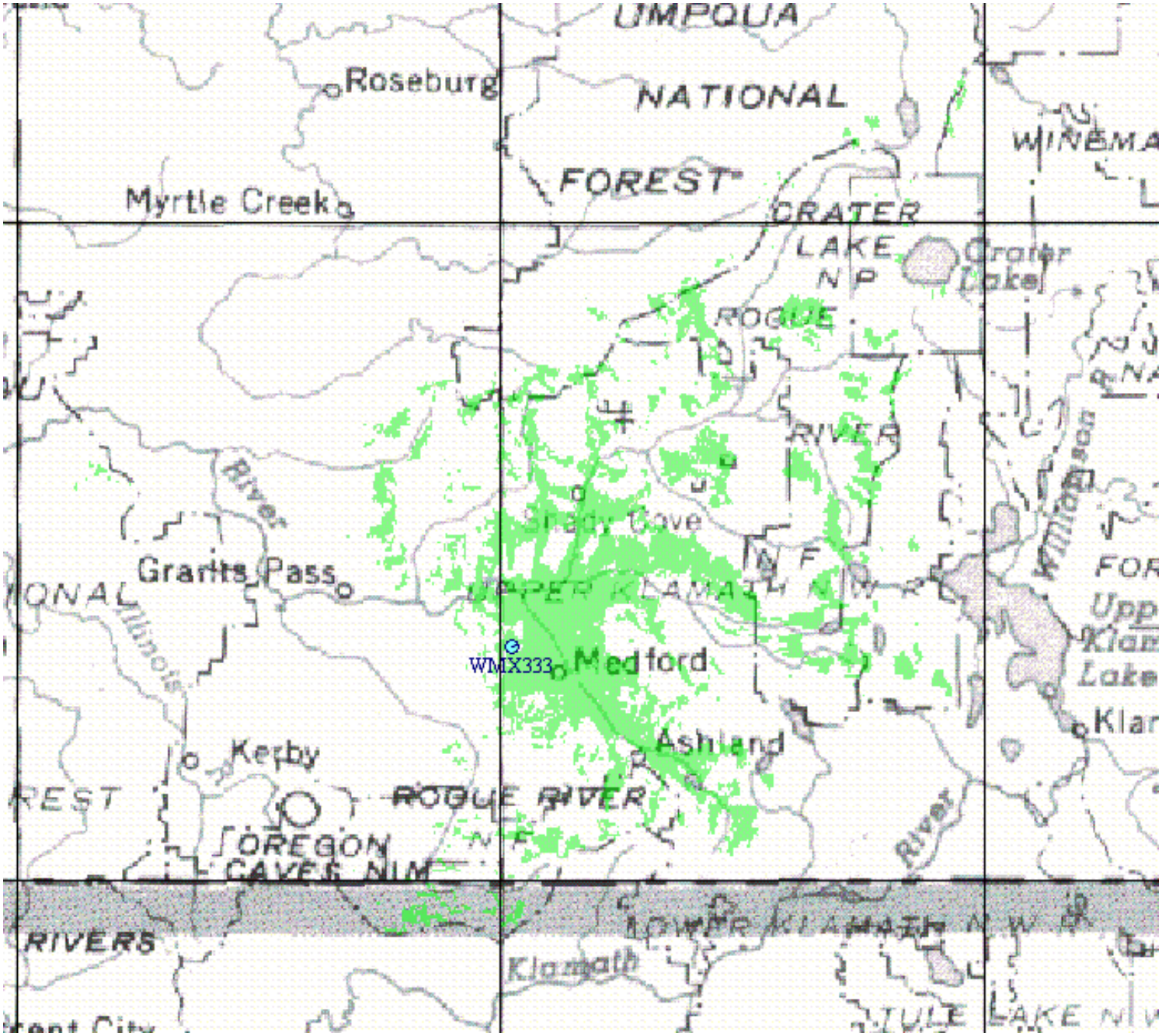
Las Vegas M1 Downstream LOS Projections using 9m Remote



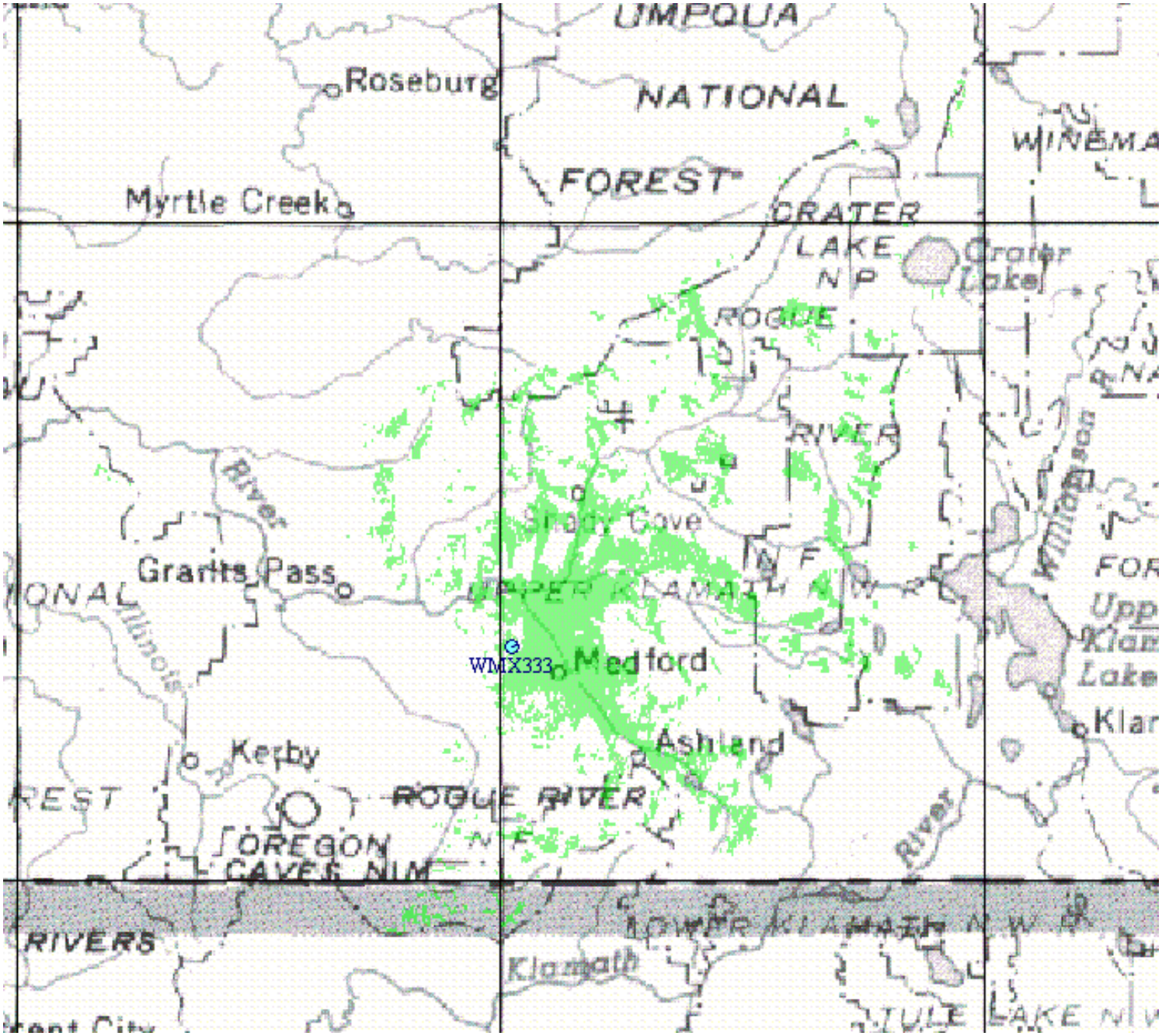
Medford M1 Downstream LOS Projections using 50m Remote



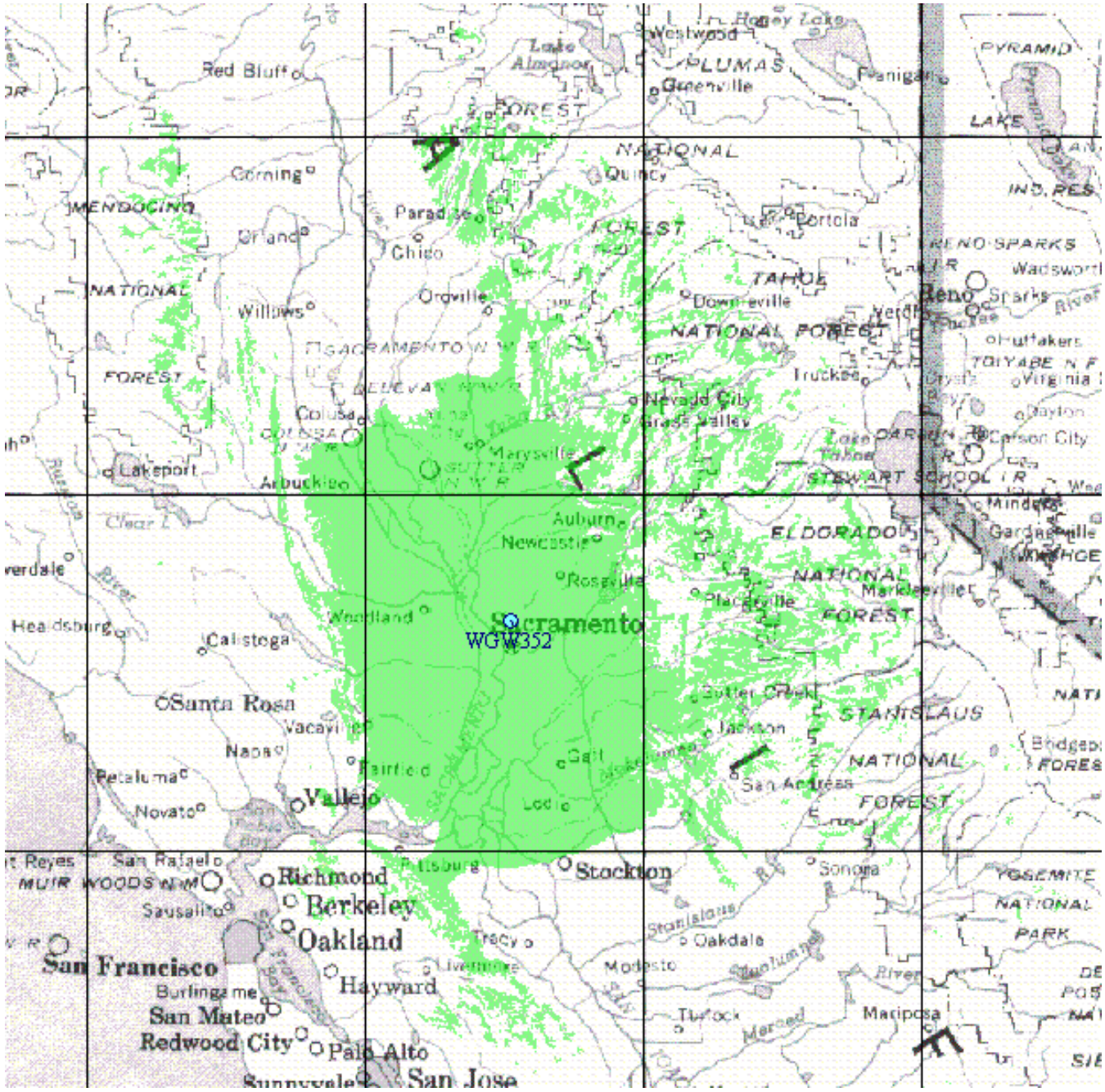
Medford M1 Downstream LOS Projections using 30m Remote



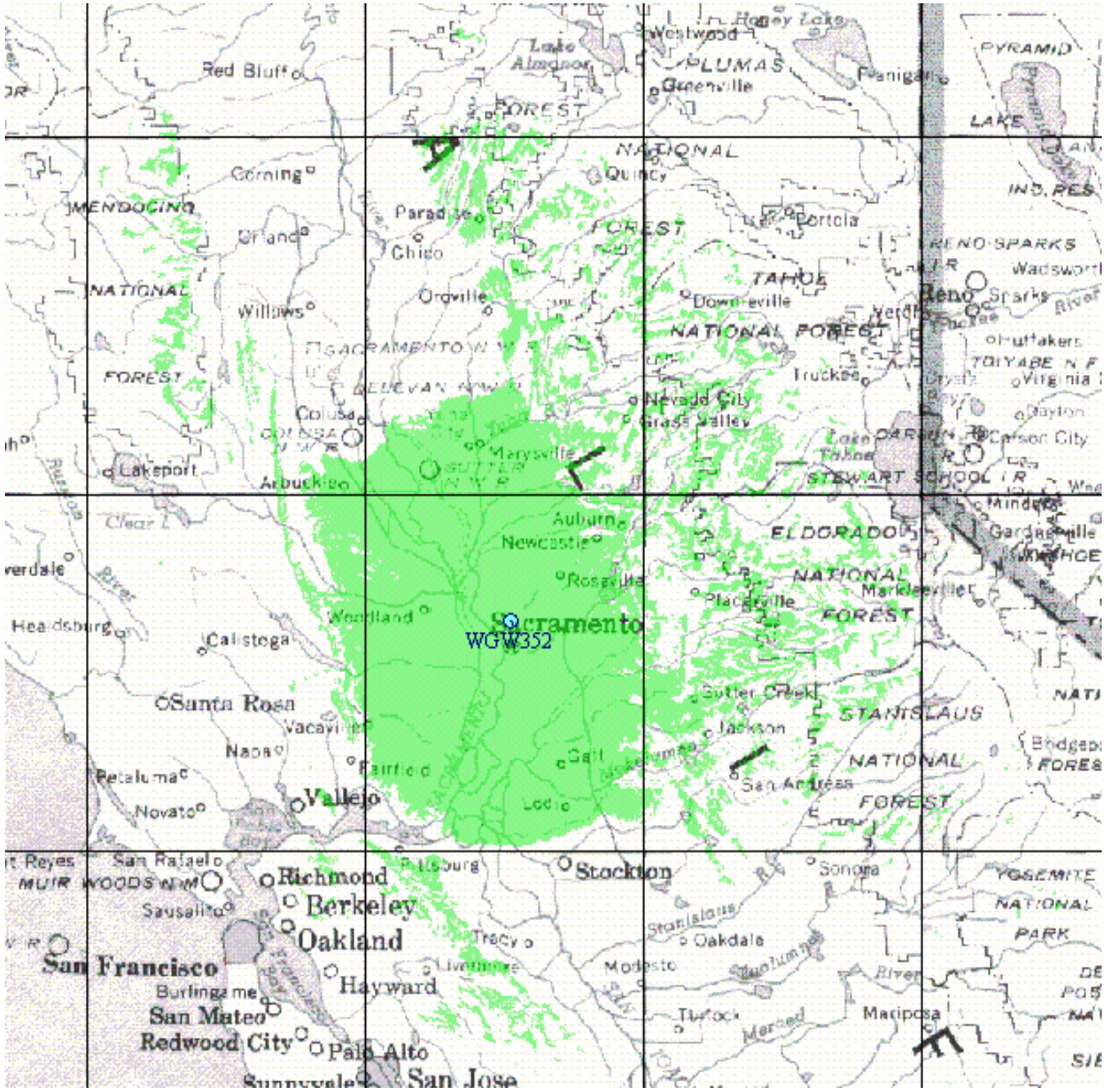
Medford M1 Downstream LOS Projections using 9m Remote



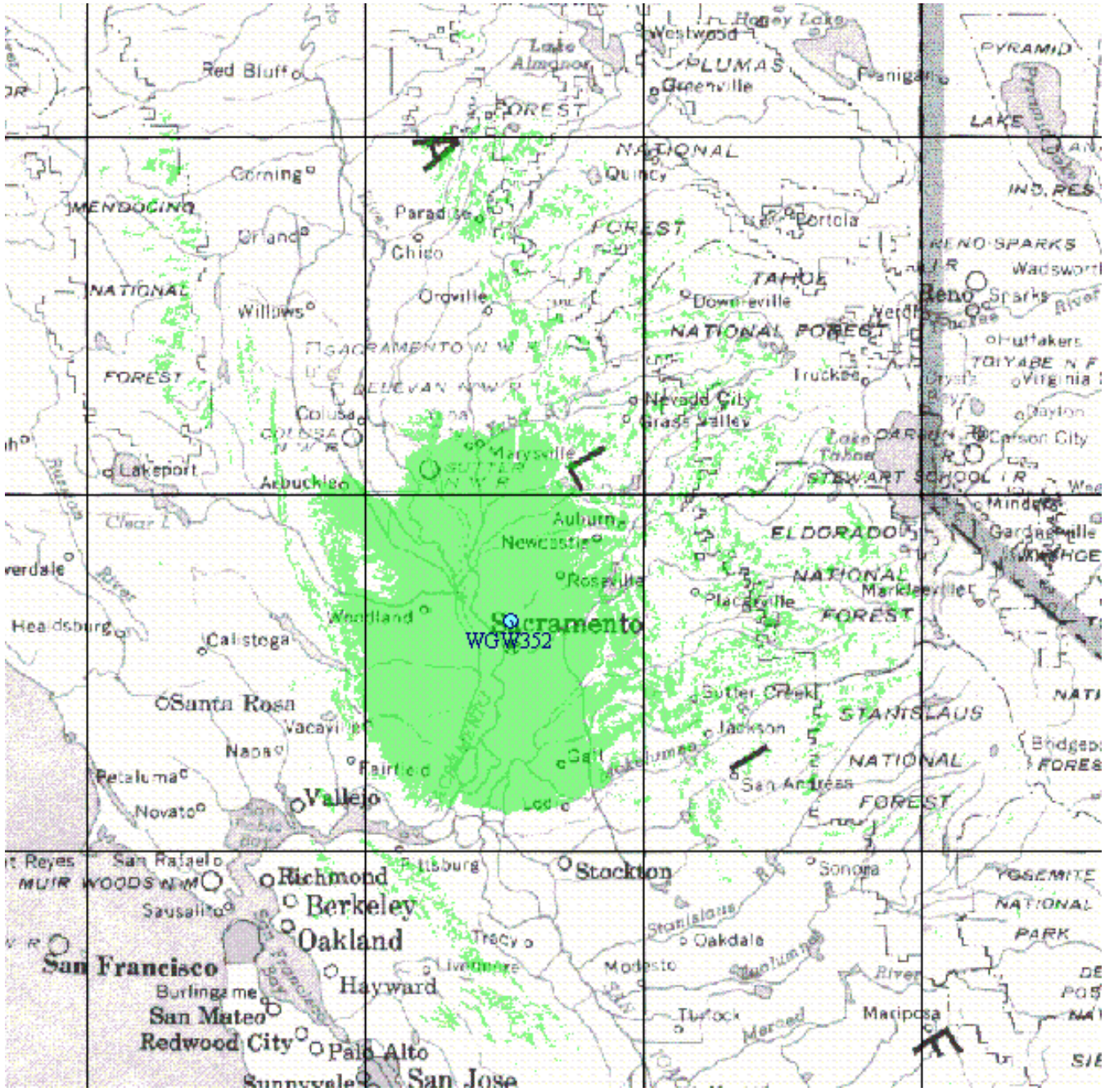
Sacramento M2 Downstream LOS Projections using 50m Remote



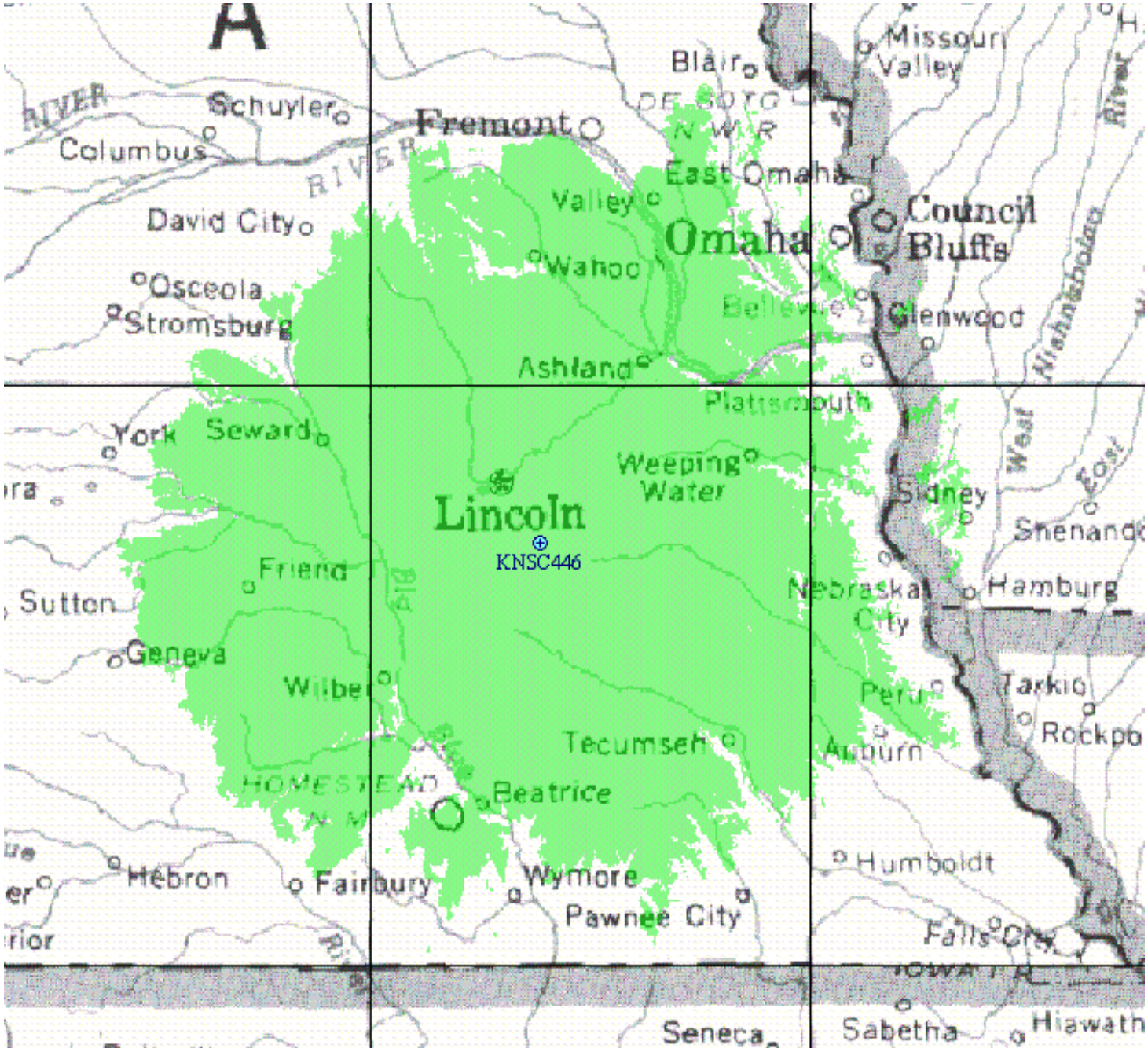
Sacramento M2 Downstream LOS Projections using 30m Remote



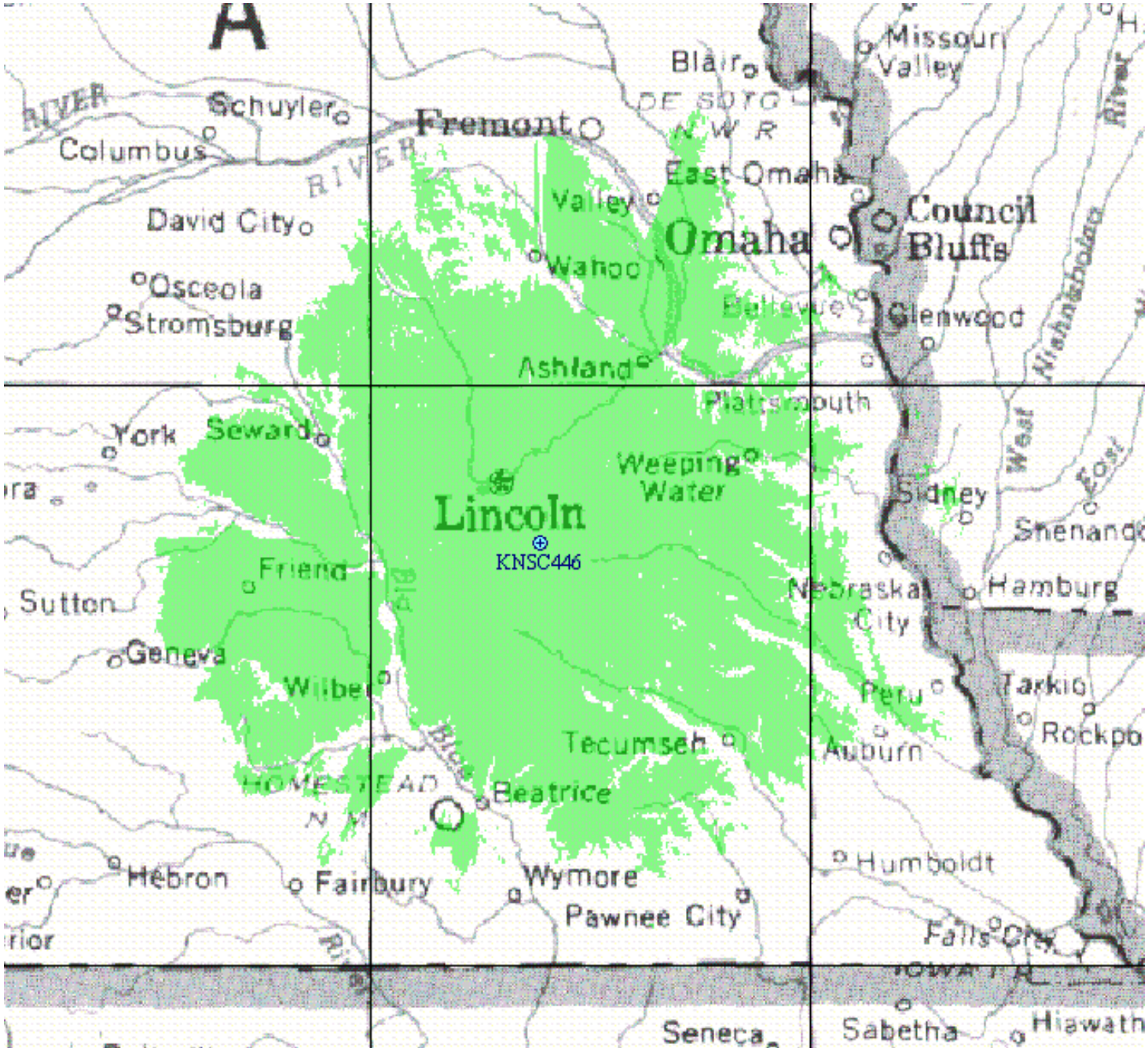
Sacramento M2 Downstream LOS Projections using 9m Remote



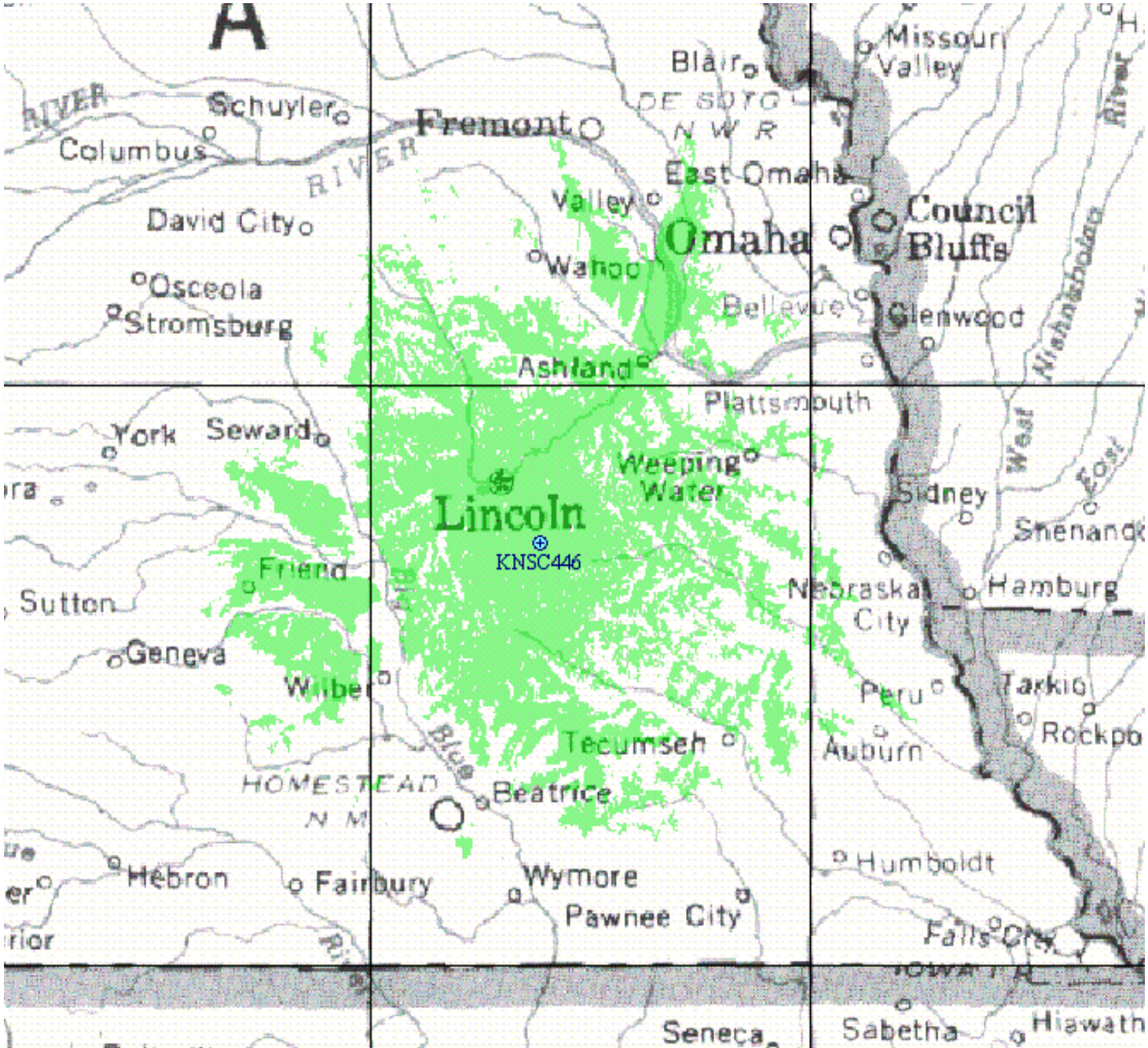
Lincoln M2 Downstream LOS Projections using 50m Remote



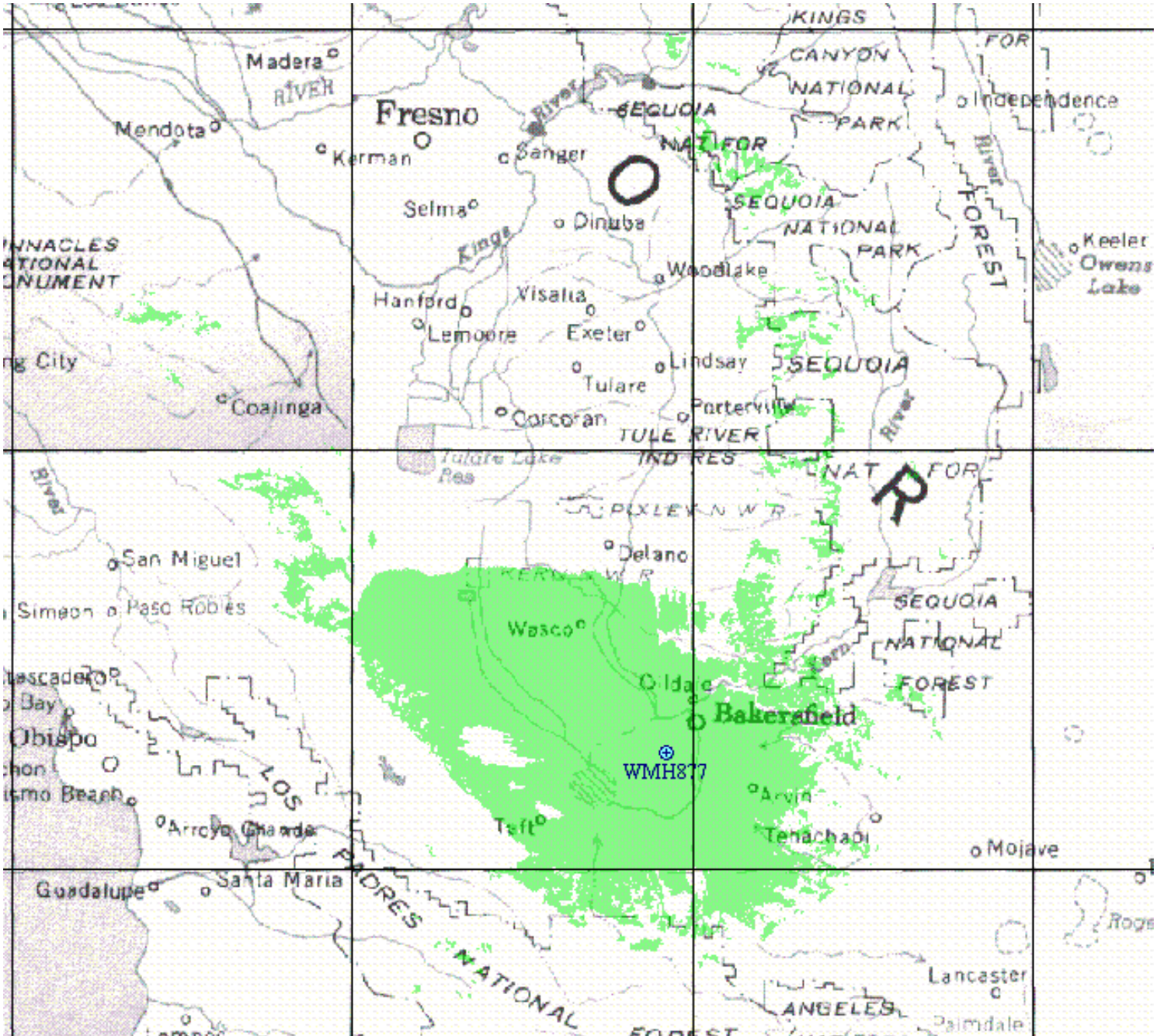
Lincoln M2 Downstream LOS Projections using 30m Remote



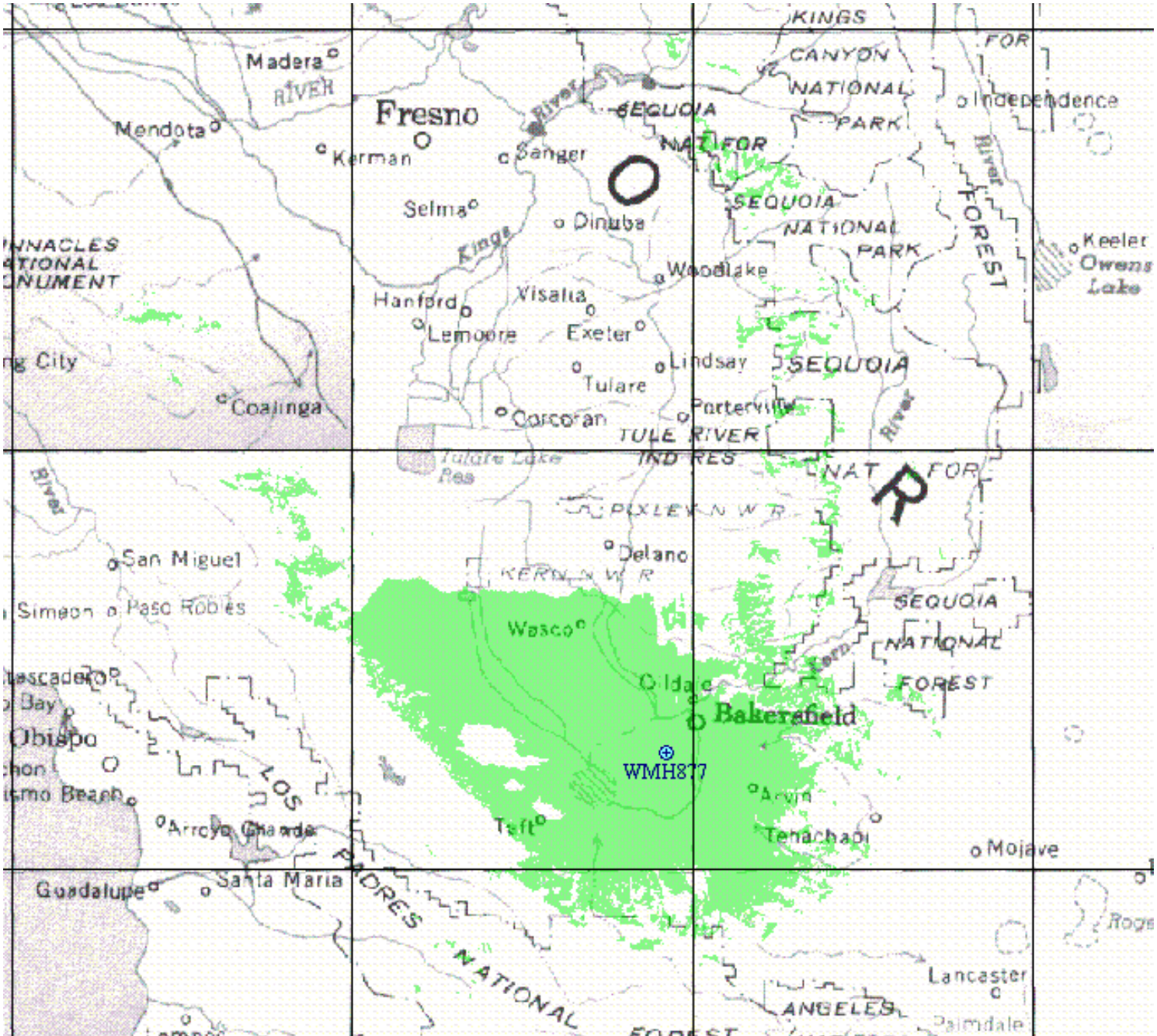
Lincoln M2 Downstream LOS Projections using 9m Remote



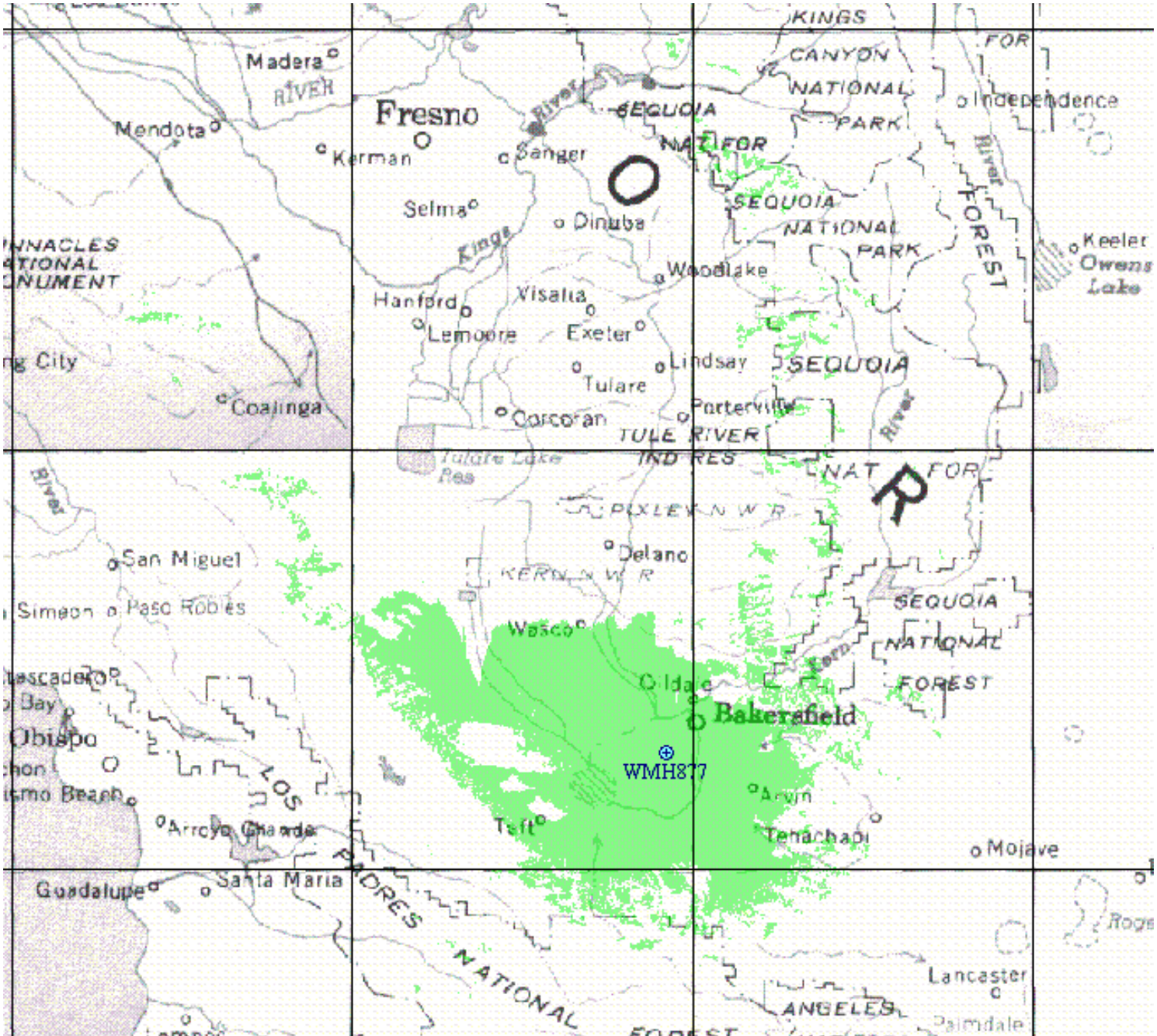
Bakersfield M1 Downstream LOS Projections using 50m Remote



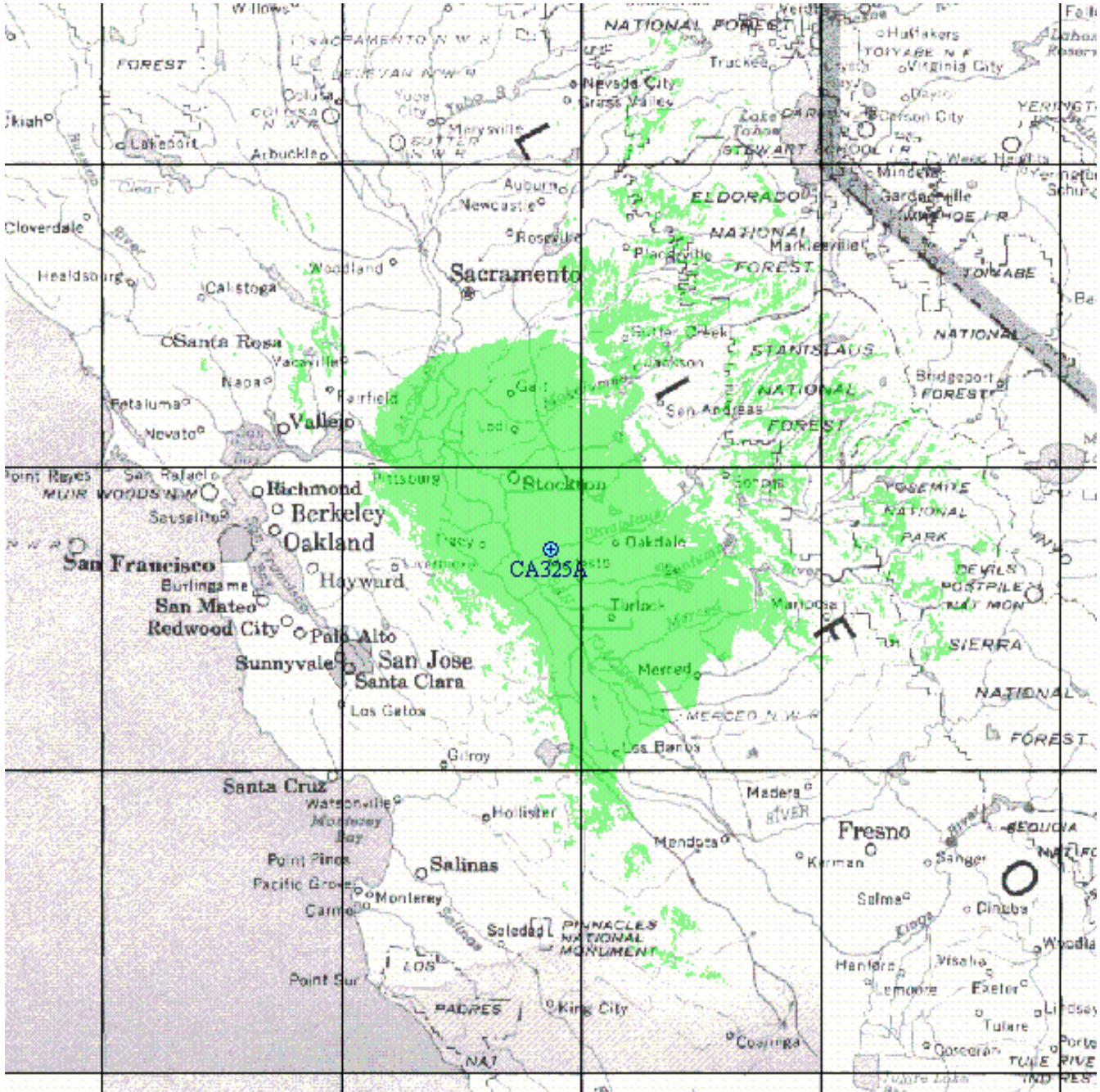
Bakersfield M1 Downstream LOS Projections using 30m Remote



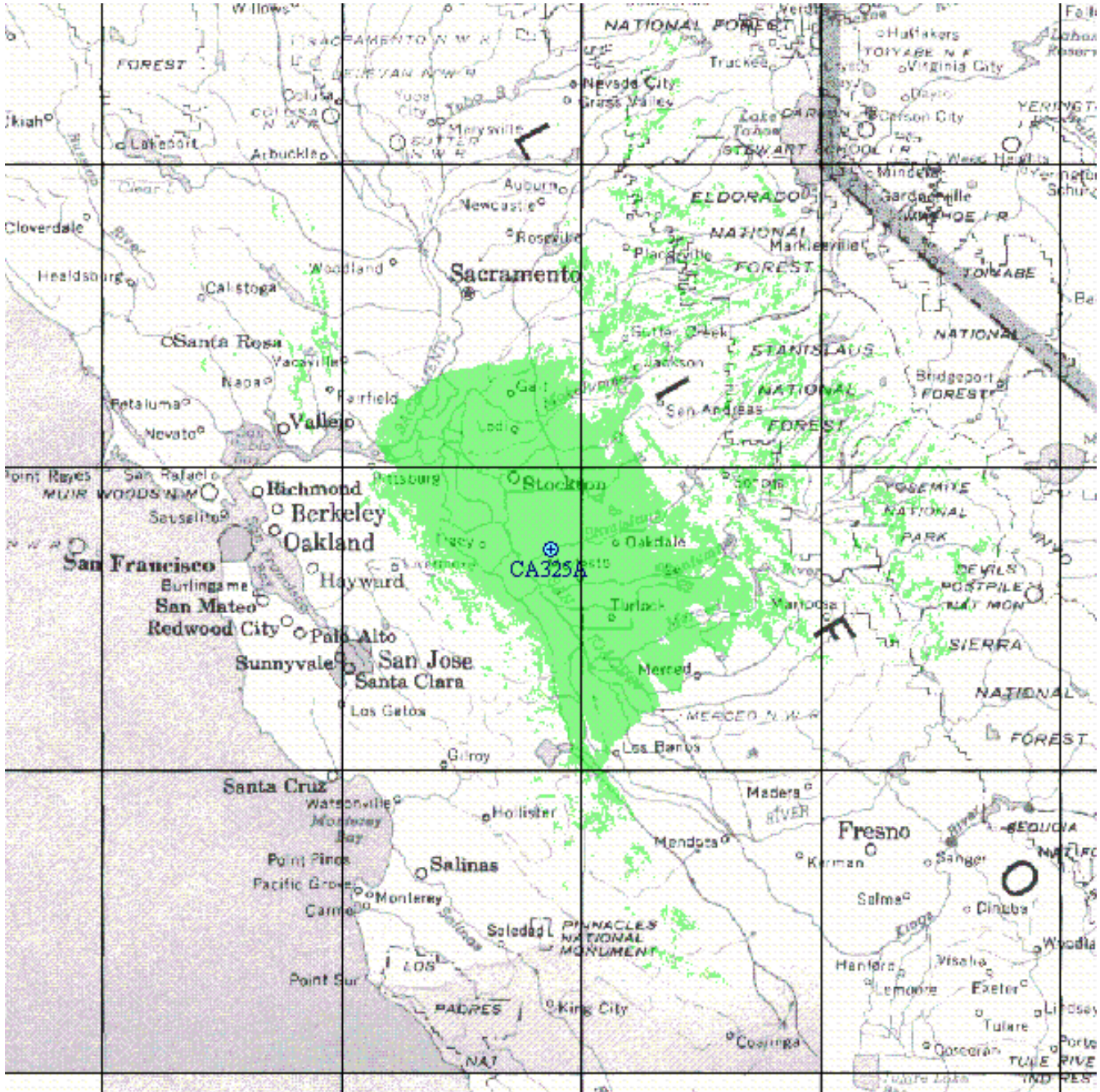
Bakersfield M1 Downstream LOS Projections using 9m Remote



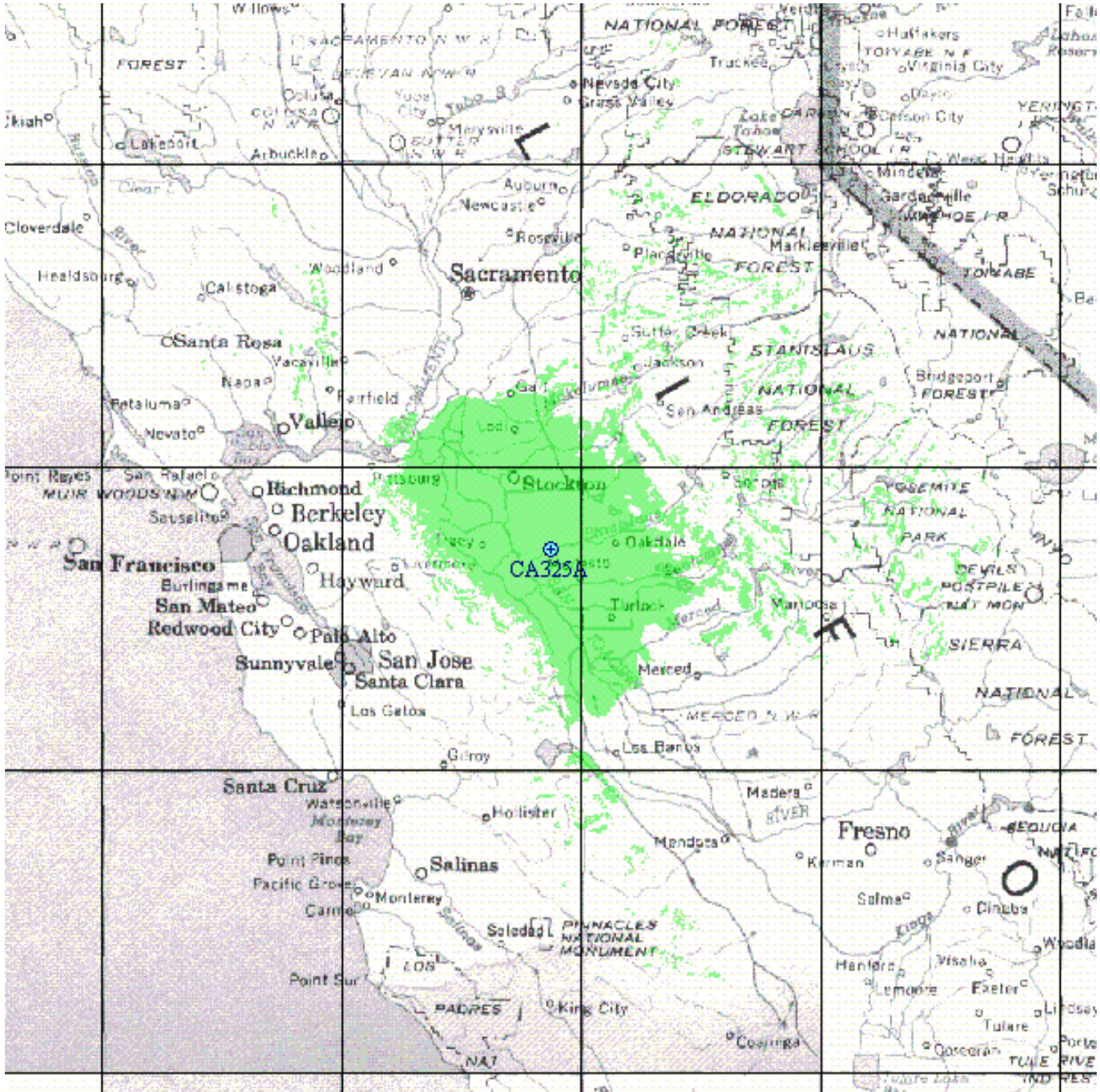
Stockton M1 Downstream LOS Projections using 50m Remote


Sacramento
Stockton
CA325A
Fresno
San Francisco
Oakland
Berkeley
Richmond
San Jose
Santa Clara
Santa Cruz
Salinas
Vallejo
Santa Rosa
Napa
Petaluma
Healdsburg
Calistoga
Woodland
Cloverdale
Ukiah
Lakeport
Arbuckle
Colusa
Yuba City
Marysville
Nevada City
Grass Valley
Truckee
Lake Tahoe
Carson City
Virginia City
Placerville
Auburn
Roseville
Lodi
Stockton
Oakdale
Turlock
Merced
Los Banos
Gilroy
Los Gatos
Sunnyvale
Palo Alto
Redwood City
San Mateo
Hayward
Berkeley
Richmond
Point Reyes
Sausalito
Watsonville
Hollister
Monterey
Pacific Grove
Carmel
Point Pinos
Point Sur
Soledad
King City
Coalinga
Madera
Mendota
Kerman
Selma
Sanger
Clovis
Hanford
Visalia
Lemoore
Exeter
Tulare
Corcoran
Mariposa
Bridgeport
Jackson
San Andreas
Markleeville
Gardnerville
Minden
Hallelujah
Virginia City
Carson City
Nevada City
Grass Valley
Truckee
Auburn
Newcastle
Roseville
Placerville
Woodland
Calistoga
Healdsburg
Cloverdale
Ukiah
Lakeport
Arbuckle
Colusa
Yuba City
Marysville
Napa
Vacaville
Fairfield
Petaluma
Novato
Vallejo
Lodi
Stockton
Oakdale
Turlock
Merced
Los Banos
Gilroy
Los Gatos
Sunnyvale
Palo Alto
Redwood City
San Mateo
Hayward
Berkeley
Richmond
Point Reyes
Sausalito
San Francisco
Oakland
Santa Cruz
Watsonville
Hollister
Monterey
Pacific Grove
Carmel
Point Pinos
Point Sur
Salinas
Soledad
King City
Coalinga
Madera
Mendota
Kerman
Fresno

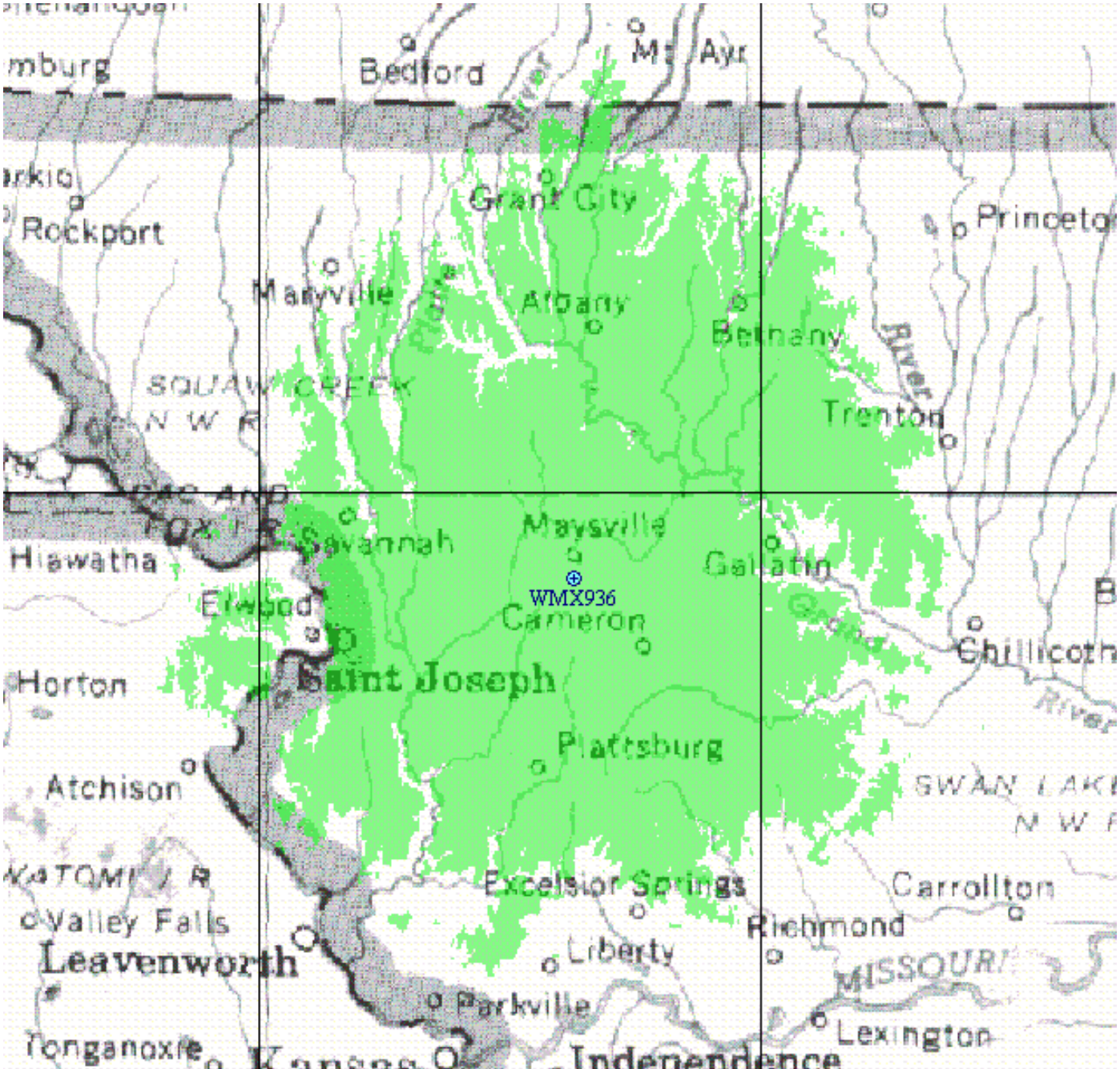
Stockton M1 Downstream LOS Projections using 30m Remote



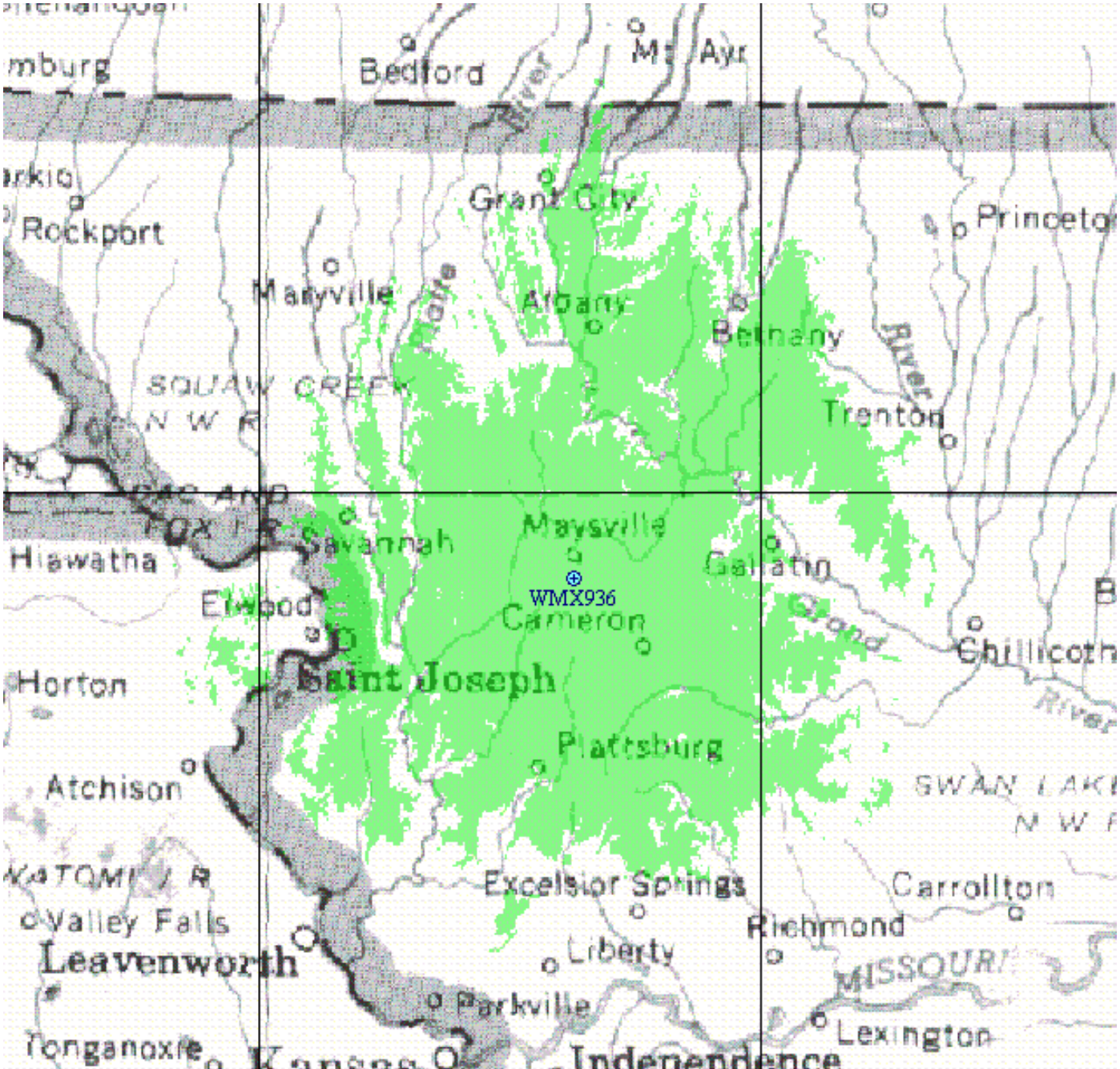
Stockton M1 Downstream LOS Projections using 9m Remote



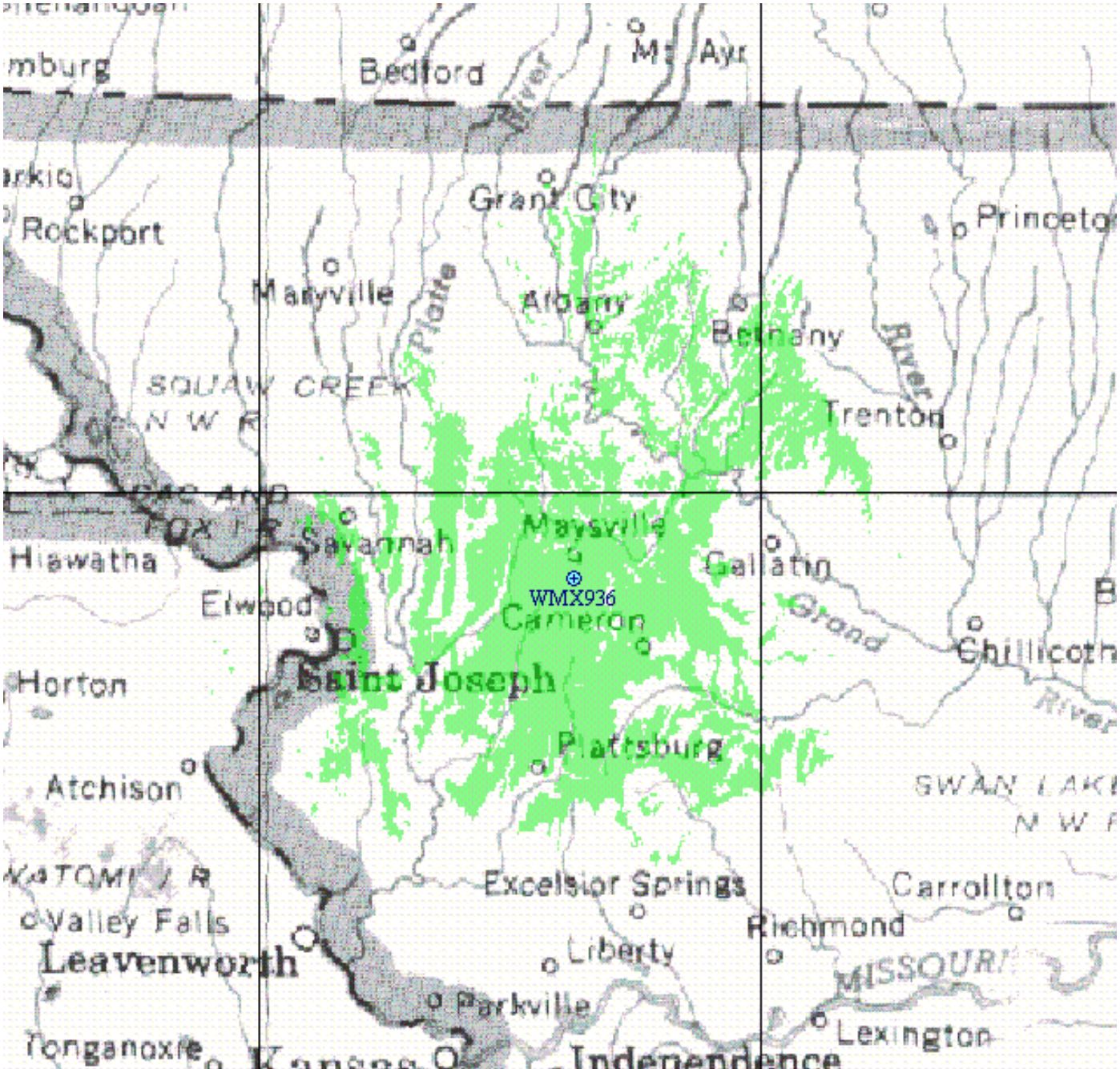
Maysville M1 Downstream LOS Projections using 50m Remote



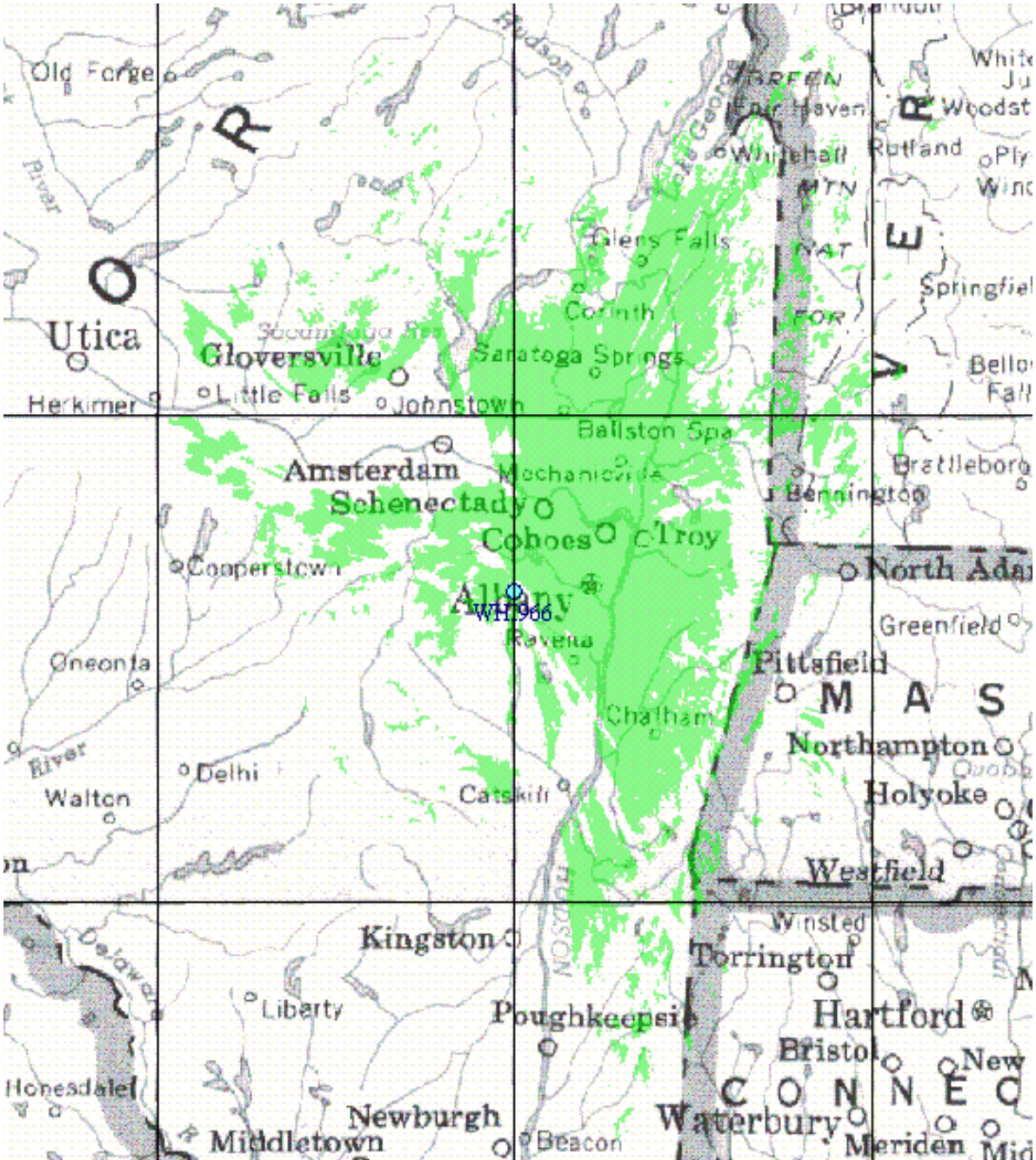
Maysville M1 Downstream LOS Projections using 30m Remote



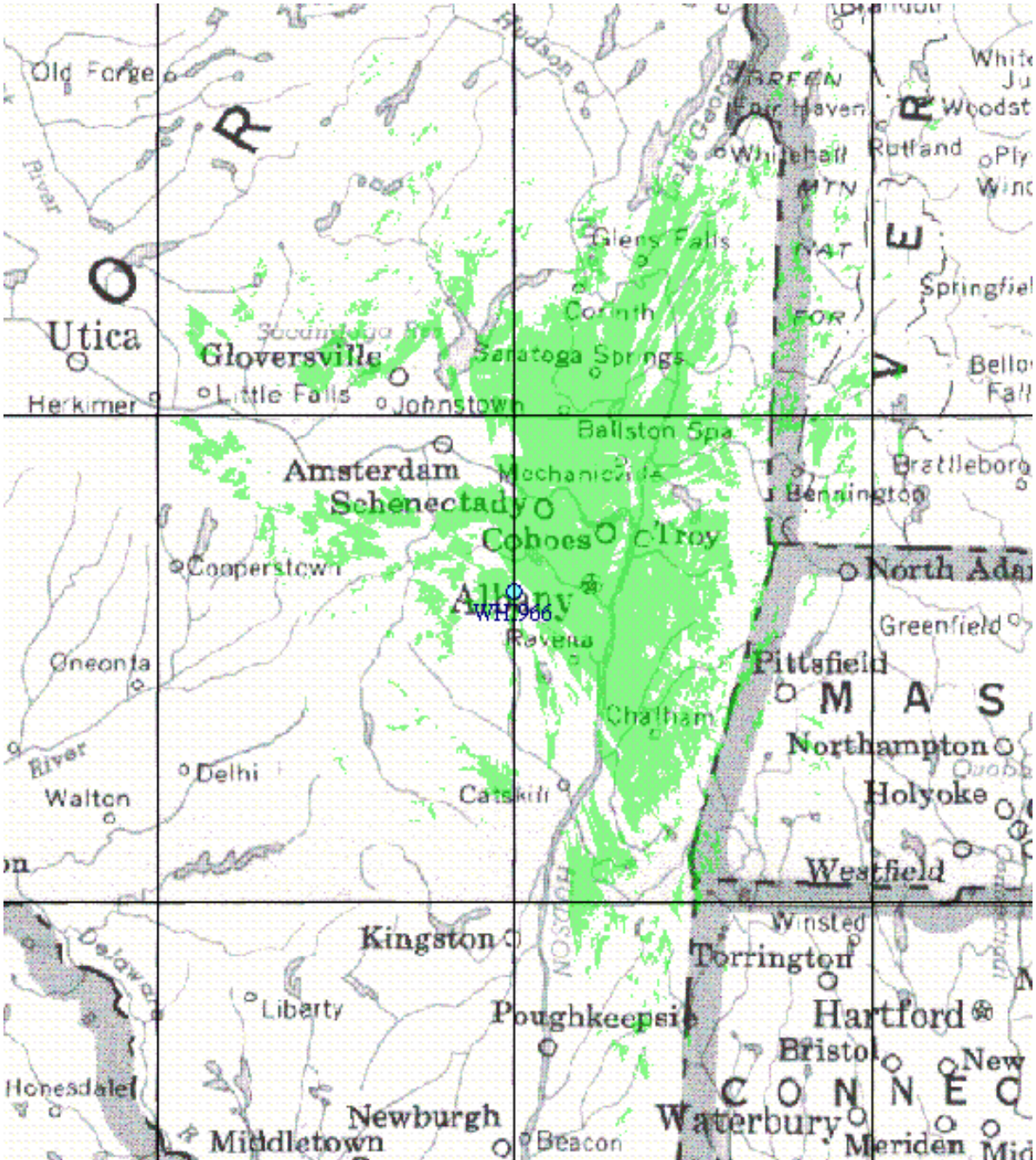
Maysville M1 Downstream LOS Projections using 9m Remote



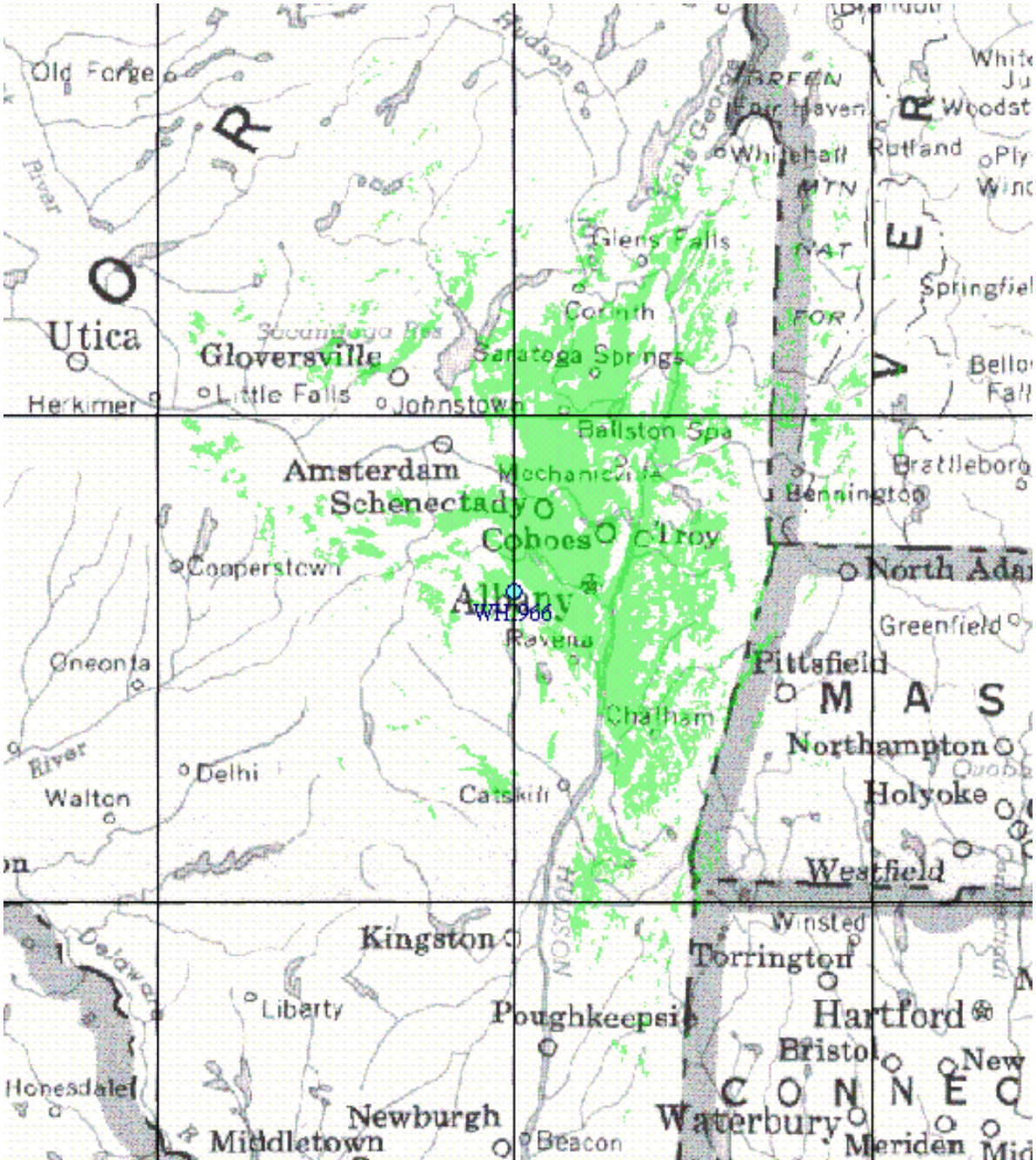
Albany M2 Downstream LOS Projections using 50m Remote



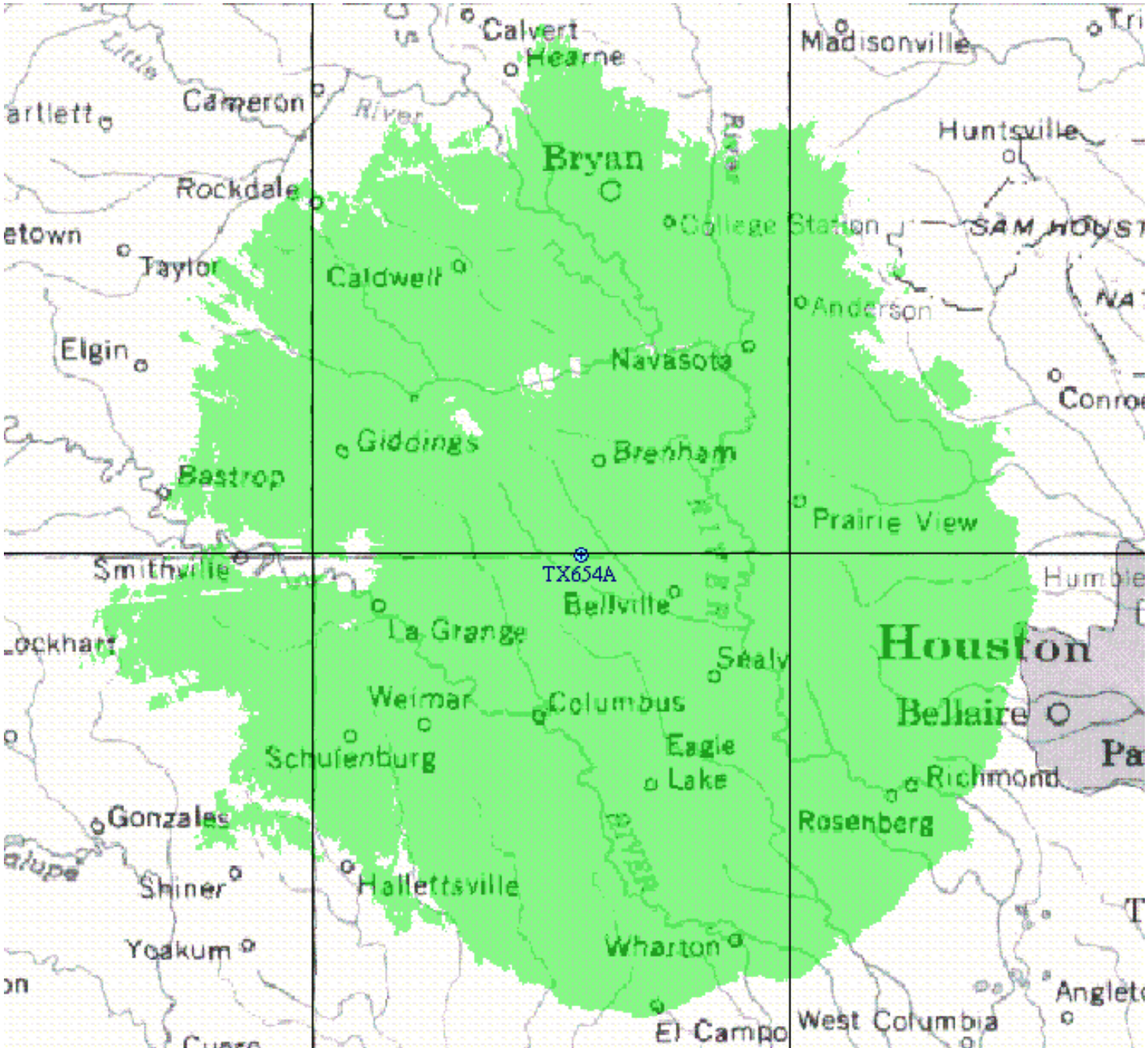
Albany M2 Downstream LOS Projections using 30m Remote



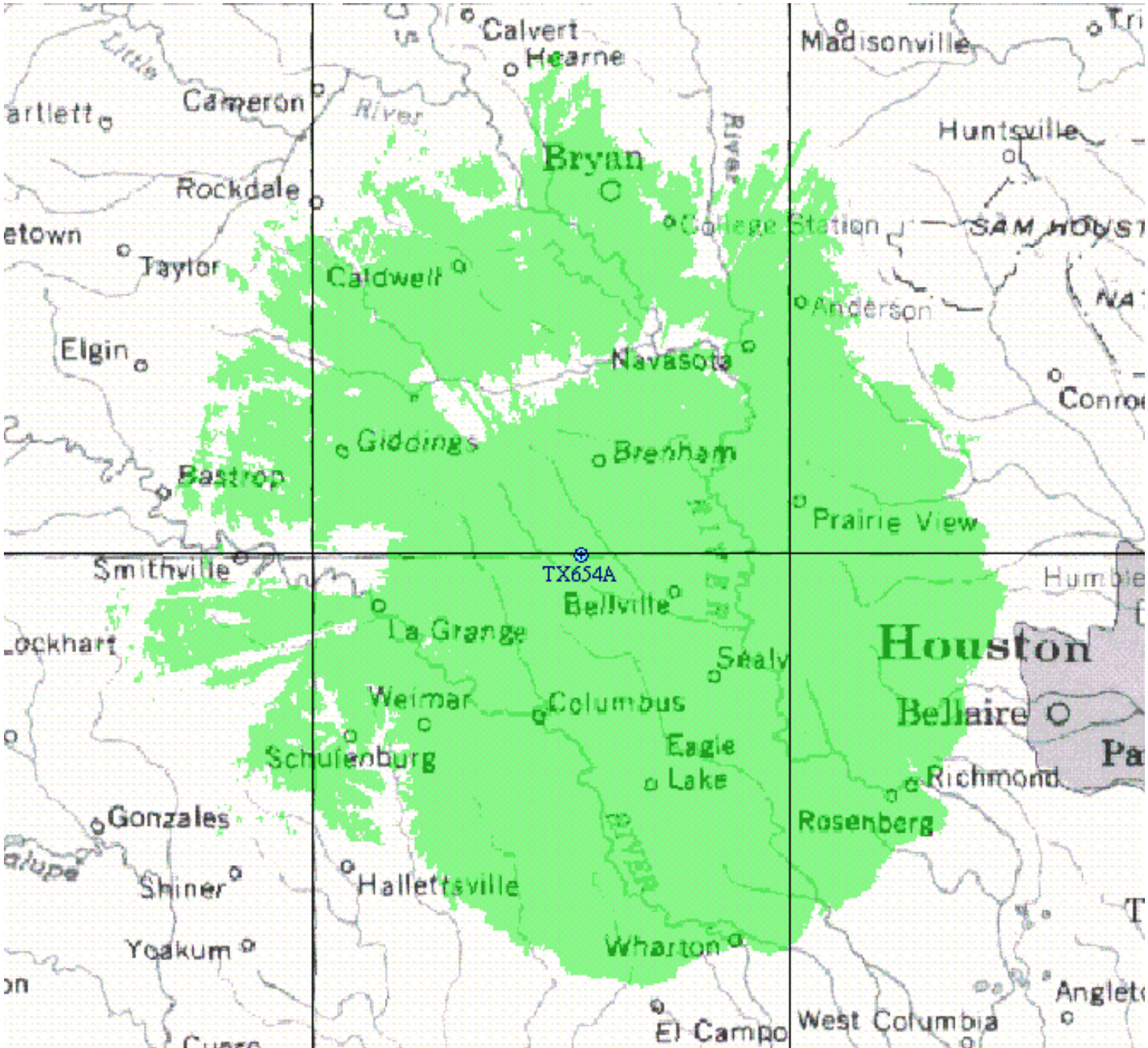
Albany M2 Downstream LOS Projections using 9m Remote



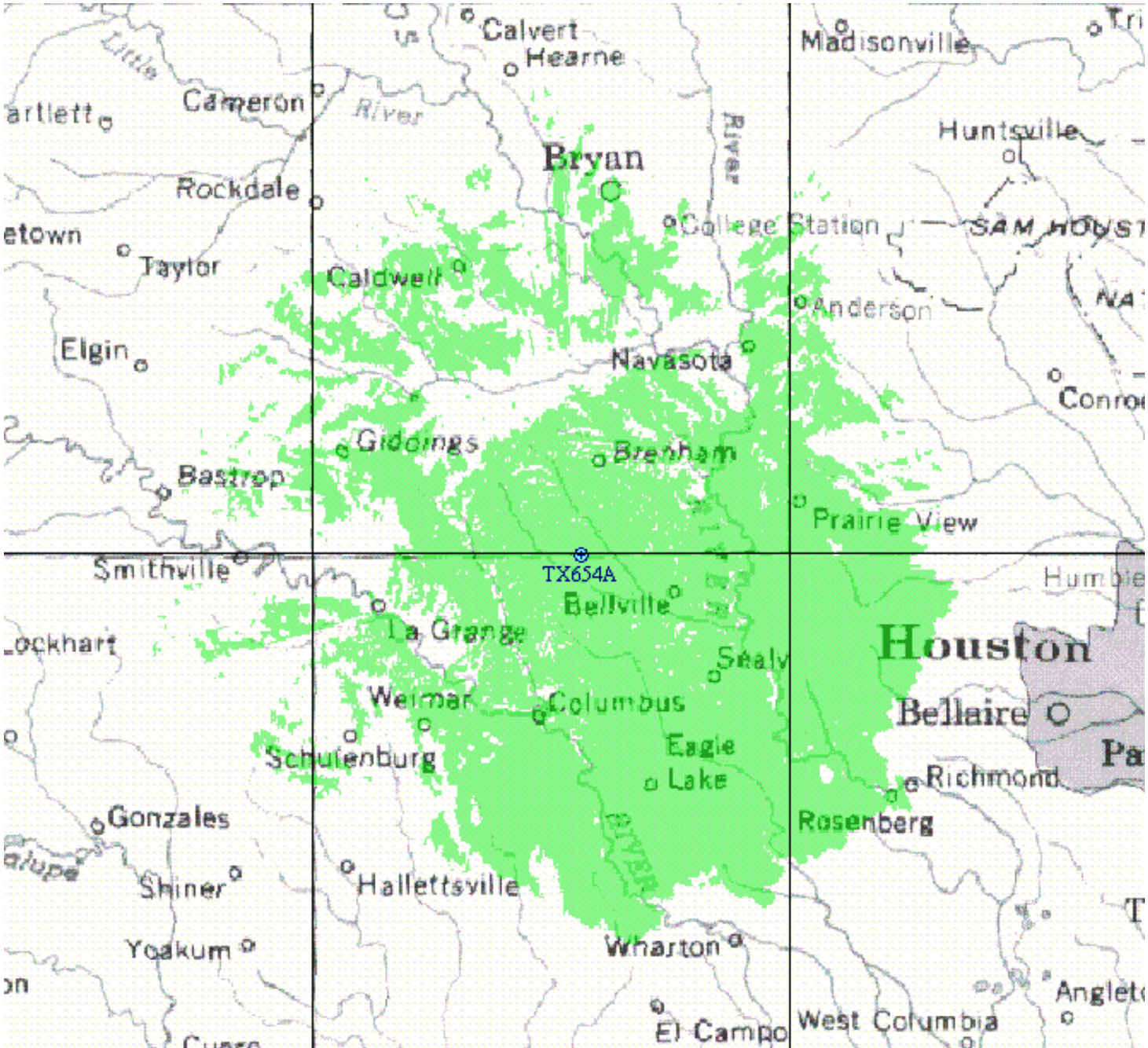
Brenham M1 Downstream LOS Projections using 50m Remote



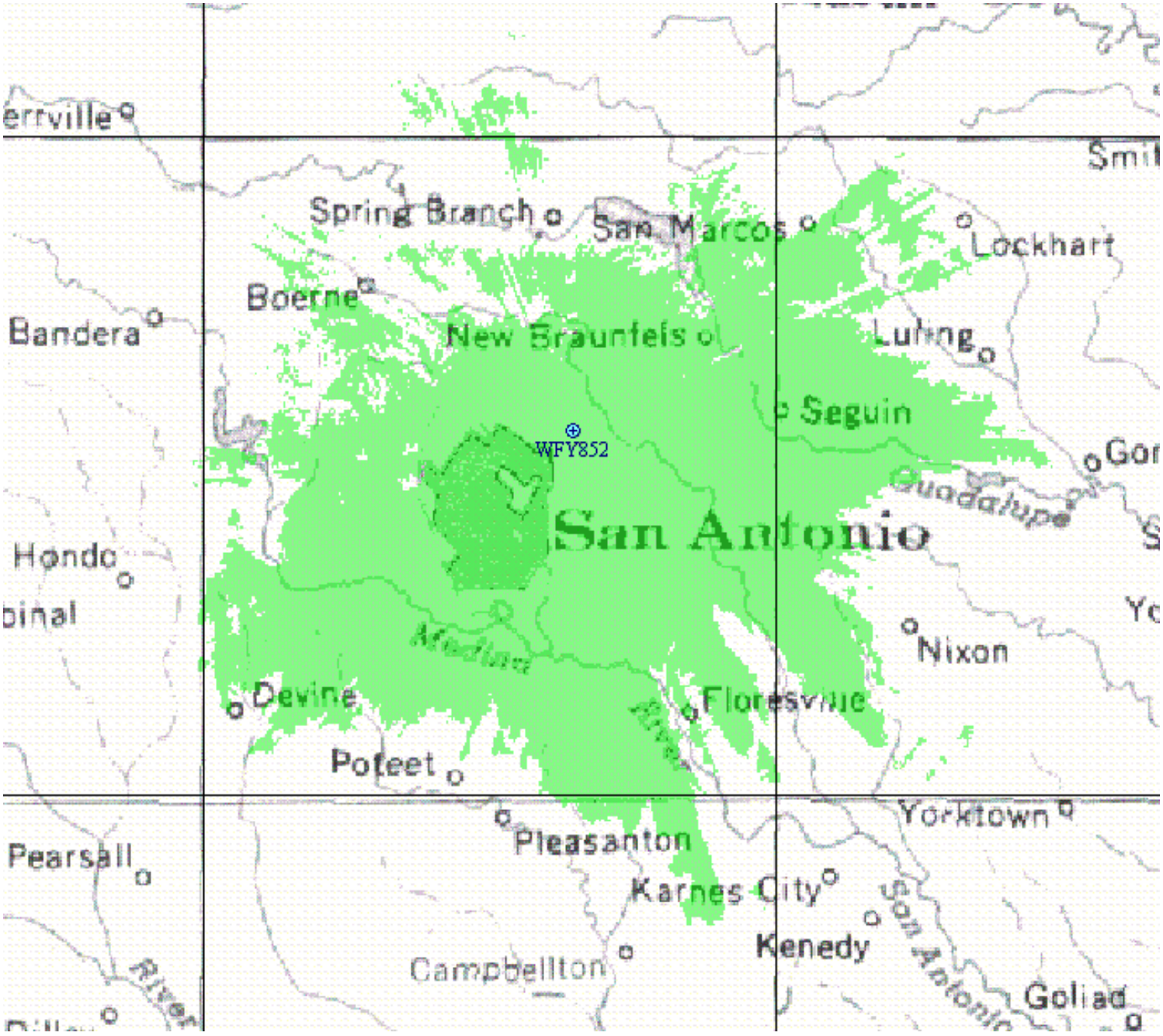
Brenham M1 Downstream LOS Projections using 30m Remote



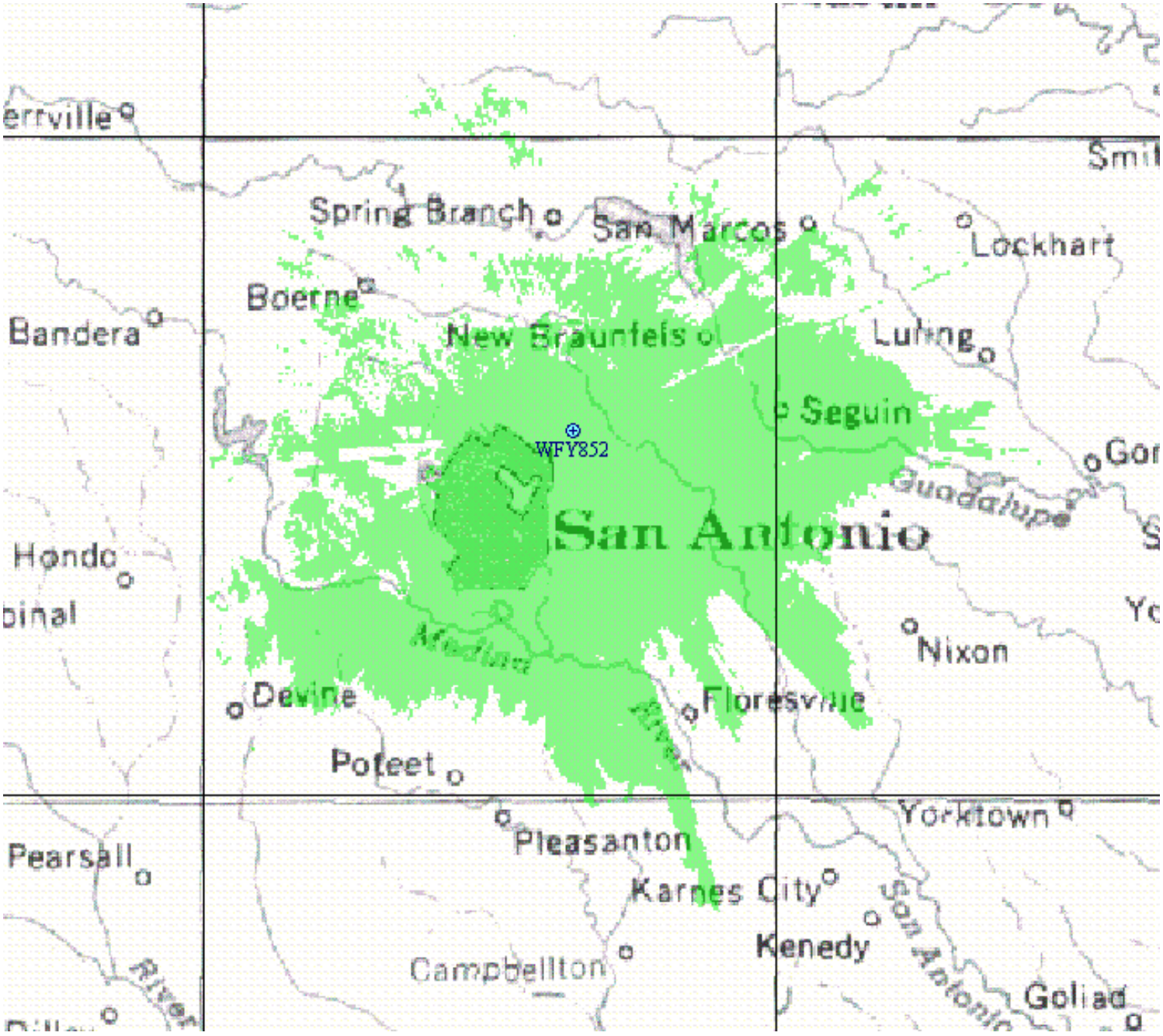
Brenham M1 Downstream LOS Projections using 9m Remote



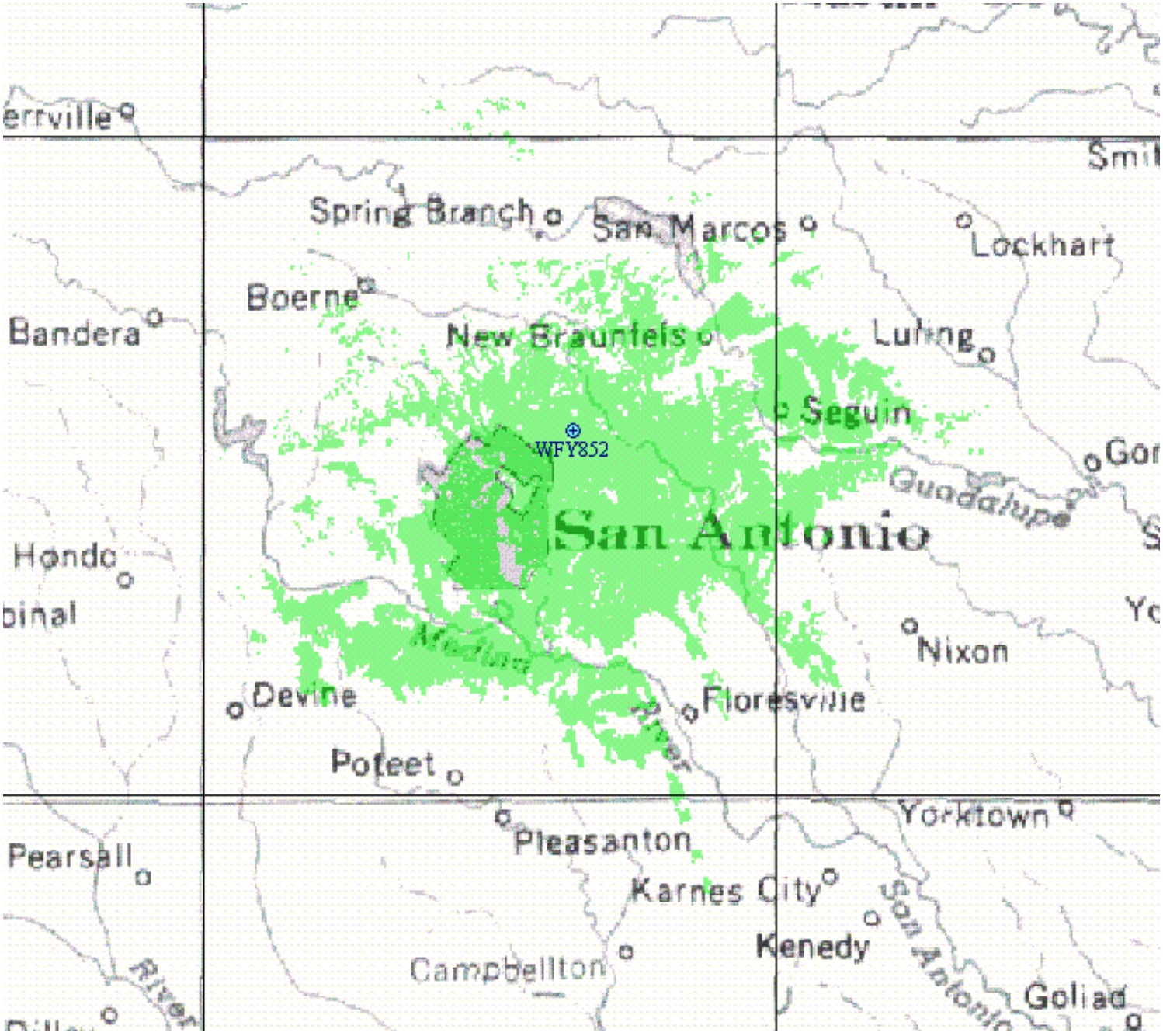
San Antonio M2 Downstream LOS Projections using 50m Remote



San Antonio M2 Downstream LOS Projections using 30m Remote

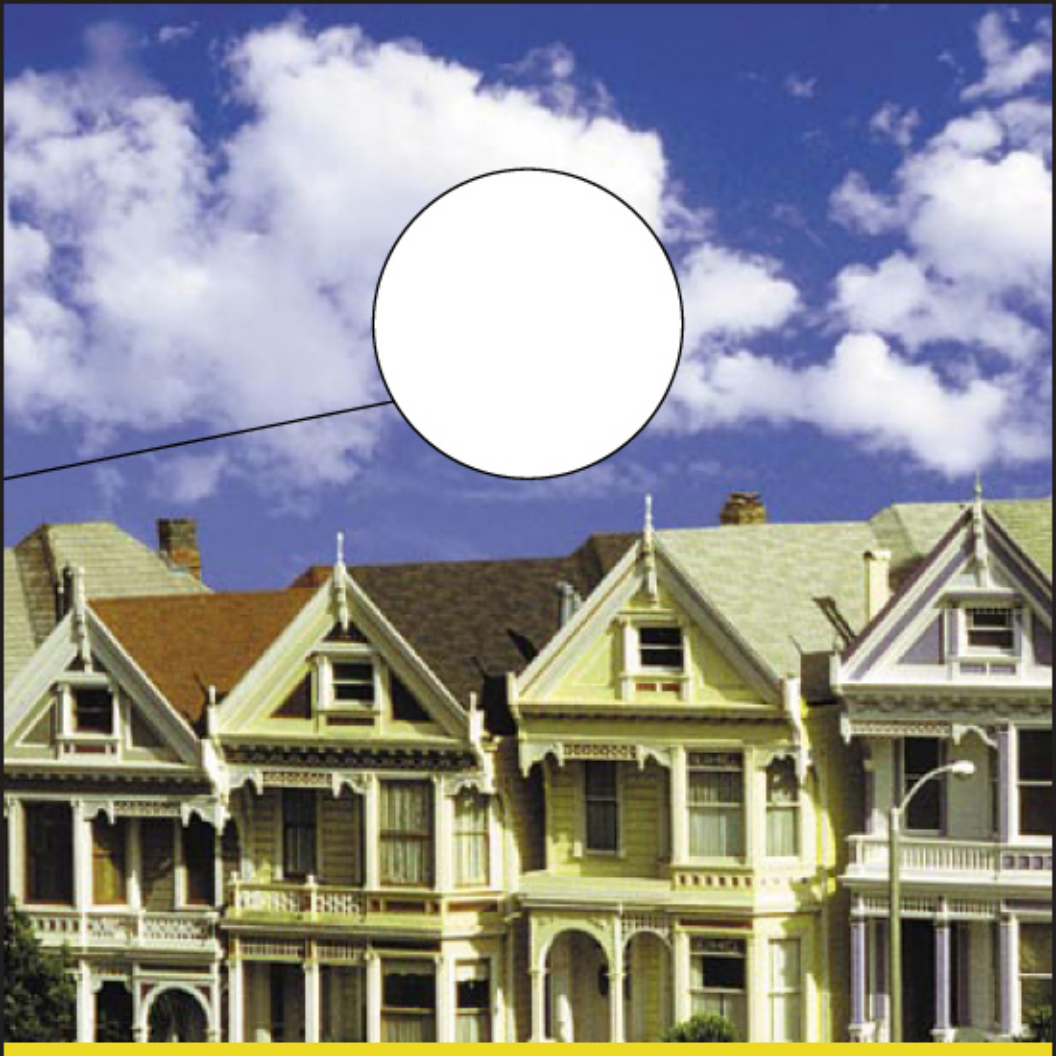


San Antonio M2 Downstream LOS Projections using 9m Remote



Appendix C

Sprint Broadband Direct Advertising Samples



Sorry we missed you.

But you won't want to miss this:

Presenting
Sprint Broadband Direct℠

The alternative to DSL is here.

Free Installation
$299 Value!
Limited time offer

$49.95
per month

Equipment Package $99*

***Save $100**

Limited time offer!
Call today: 1-888-996-0001

See back for details.

Sprint®

Sprint Broadband Direct℠

Now you can get high-speed Internet service just about anywhere. No phone line or cable connection is needed. It's affordable high-speed Internet that lets you download up to 50 times faster than a traditional dial-up modem.

As a Sprint Broadband Direct customer, you'll receive:

- Six e-mail addresses
- Six fully customizable start pages
- Up to 6MB of personal web space
- Up to 20 hours remote dial-up access

How it works ...

Radio broadband waves travel to and from ...

A dish-like transceiver on your roof that goes ...

To a broadband modem and then into your computer

Limited time offer!

Call now: 1-888-996-0001 or visit online at www.sprintbroadband.com

Sprint®

Service: Speed comparisons are based on a 56K modem. Plans are subject to credit approval. Services are subject to change. Service is not available in all areas. Actual coverage, quality and availability of coverage may vary based on network problems, signal strength, your equipment, terrain, structures, weather and other limitations or conditions. Other restrictions apply. For additional details visit www.sprintbroadband.com.
Installation Offer: Standard installation for residential customers only. Additional labor and materials charges may apply for non-standard installations. Promotion subject to change.
Equipment Offer: Equipment package only includes an external antenna, modem, transceiver and all wiring required to connect the antenna to the modem. Equipment package is $99 with a two year contract. $199 with a one year contract. $299 with a month-to-month contract. Promotion subject to change. Equipment package is non-refundable once installed.

© 2005 Sprint Nextel. All rights reserved. SPRINT, the "Going Forward" logo, the NEXTEL name and logo, and other trademarks are trademarks of Sprint Nextel.

OFFER CODE: 2001

"Finally, I can get high-speed Internet."

Can't get DSL? Go Wireless.

Presenting

Sprint Broadband Direct℠

Free Installation

$299 Value! Limited time offer

$49.95 per month

Equipment Package $99 Save $100

Sprint®

Limited time offer!
Call today: 1-888-996-0001

See back for details.

Sprint Broadband Direct℠

Now you can get high-speed Internet service just about anywhere. No phone line or cable connection is needed. It's affordable high-speed Internet that lets you download up to 50 times faster than a traditional dial-up modem.

As a Sprint Broadband Direct customer, you'll receive:

- Six e-mail addresses
- Six fully customizable start pages
- Up to 6MB of personal web space
- Up to 20 hours remote dial-up access

How it works ...

Radio broadband waves travel to and from ...

A dish-like transceiver on your roof that goes ...

To a broadband modem and then into your computer

Sprint®

Limited time offer!

Call now: 1-888-996-0001 or visit us online at www.sprintbroadband.com

Service: Speed comparisons are based on a 56K modem. Plans are subject to credit approval. Services are subject to change. Service is not available in all areas. Actual coverage, quality and availability of coverage may vary based on network problems, signal strength, your equipment, terrain, structures, weather and other limitations or conditions. Other restrictions apply. For additional details visit www.sprintbroadband.com.
Installation Offer: Standard installation for residential customers only. Additional labor and materials charges may apply for non-standard installations. Promotion subject to change.
Equipment Offer: Equipment package only includes an external antenna, modem, transceiver and all wiring required to connect the antenna to the modem. Equipment package is $99 with a two year contract. $199 with a one year contract. $299 with a month-to-month contract. Promotion subject to change. Equipment package is non-refundable once installed.

© 2005 Sprint Nextel. All rights reserved. SPRINT, the "Going Forward" logo, the NEXTEL name and logo, and other trademarks are trademarks of Sprint Nextel.

Sprint Broadband Direct℠

Now you can get high-speed Internet service just about anywhere. No phone line or cable connection is needed. It's affordable high-speed Internet that lets you download up to 50 times faster than a traditional dial-up modem.

As a Sprint Broadband Direct customer, you'll receive:

- Six e-mail addresses
- Six fully customizable start pages
- Up to 6MB of personal web space
- Up to 20 hours remote dial-up access

How it works ...

Radio broadband waves travel to and from ...

A dish-like transceiver on your roof that goes ...

To a broadband modem and then into your computer

Sprint®

Limited time offer!

Call now: 1-888-996-0001 or visit us online at www.sprintbroadband.com

Service: Speed comparisons are based on a 56K modem. Plans are subject to credit approval. Services are subject to change. Service is not available in all areas. Actual coverage, quality and availability of coverage may vary based on network problems, signal strength, your equipment, terrain, structures, weather and other limitations or conditions. Other restrictions apply. For additional details visit www.sprintbroadband.com.
Installation Offer: Standard installation for residential customers only. Additional labor and materials charges may apply for non-standard installations. Promotion subject to change.
Equipment Offer: Equipment package only includes an external antenna, modem, transceiver and all wiring required to connect the antenna to the modem. Equipment package is $99 with a two year contract. $199 with a one year contract. $299 with a month-to-month contract. Promotion subject to change. Equipment package is non-refundable once installed.

© 2005 Sprint Nextel. All rights reserved. SPRINT, the "Going Forward" logo, the NEXTEL name and logo, and other trademarks are trademarks of Sprint Nextel.

"Finally, I can get high-speed Internet."

Tired of slow dial-up service? Go Wireless.

Presenting

Sprint Broadband Direct℠

Free Installation
$299 Value! Limited time offer

$49.95 per month

Equipment Package $99 Save $100

Sprint

Limited time offer! Call today: 1-888-996-0001

See other side for details.

Sprint
P.O. Box 1949
Ridgeland, MS 39158

Appendix D

Engineering Statement of Robert Gehman, Jr., P.E.

KESSLER AND GEHMAN ASSOCIATES, INC.
TELECOMMUNICATIONS CONSULTING ENGINEERS

507 N.W. 60th Street, Suite C
Gainesville, Florida 32607
Phone 352-332-3157
FAX 352-332-6392

William J. Kessler, P.E.
Robert Gehman, Jr., P.E.
Jeffrey C. Gehman
Ryan C. Wilhour
William T. Godfrey

ENGINEERING STATEMEMT
OF ROBERT GEHMAN, JR., P. E.

Kessler and Gehman Associates, Inc. ("KGA") is a professional engineering firm, specializing in the design and evaluation of telecommunications systems for more than 40 years. The firm has been involved in virtually every phase of TV and FM broadcast, microwave communications, fiber optic, cable TV and wireless cable (MDS/ITFS), satellite earth stations, and two-way radio communications systems. The services rendered by KGA have ranged from consulting services on a daily basis to studies of technical and economic feasibility and the design and construction follow-up of major telecommunications systems in widely diverse geographical areas. In particular the firm has had extensive experience in the design of systems in geographical areas where special attention has had to be devoted to effects of meteorological variations on system propagation reliability. Baseband information carried on communications systems designed by the firm includes video, data, telemetry, supervisory, wide bandwidth audio, and telephone either in combination or individually.

The qualifications of the firm's key technical personnel are a matter of record with the Federal Communications Commission. KGA has represented many clients before the FCC in a variety of matters, including rule making and waiver requests of the Commission's rules to accommodate specialized telecommunications systems. While the firm maintains a continuous dialogue with equipment suppliers, contractors and manufacturers of television, radio and telecommunications equipment, its relationship to such companies is limited solely to the contacts necessary for the planning and implementation of systems for the firm's clients. The firm engages only in providing consulting services to its clients, and is thus not involved in the promotion, manufacture, sale or installation of any equipment.

AWS – BRS Interference Considerations

The Advanced Wireless Services ("AWS") occupies paired spectrum in the 1710-1755 and 2110-2155 MHz frequency bands and the Broadband Radio Service ("BRS") occupies spectrum in the 2150-2162

MHz band. The BRS channels have traditionally been used for upstream transmissions from the end user to a single base station hub receiving facility ("Response Station Hub").

Co-Channel AWS Base Station Interference to BRS Base Station Hubs

An AWS base station, even with an exceptionally low transmit power of 100 milliwatts ("mW"), would need to be located 1,259 miles away from a centralized BRS receive station hub to prevent harmful co-channel interference if line of sight could exist at those extreme distances.

Frequency		2150.00	MHz
AWS Base Station TPO	(100 mW)	20.00	dBm
AWS Base Station Transmit Antenna Gain		17.00	dBi
AWS Base Station EIRP		37.00	dBm
BRS Receive Station Hub Bandwidth		5.00	MHz
BRS Receive Antenna Gain		19.00	dBi
BRS Receiver Noise Figure		4.00	dB
BRS Noise Floor		-103.25	dBm
Allowable AWS Signal for a 1 dB Noise Floor Increase		-109.25	dB
Path Loss required to comply with Allowable AWS Signal		-165.25	dB
Minimum Separation for required L.O.S. Path Loss		**1,259**	**Miles**

L.O.S. = Line of Sight

Table A

Adjacent and Non-Contiguous AWS Base Station Interference to BRS Base Station Hubs

Cellularization of AWS could result in a large number of AWS Base Stations serving a geographic area. BRS Base Stations typically consist of ten sectors, each 36 degrees wide. The number of AWS base stations that might be in a given sector is a variable, and depends on the market population density and capacity requirements. Assuming 3-mile radius AWS cells (area 28.3 sq mi), the potential number of AWS base stations in a 36-degree sector with a 35-mile radius (area 384.8 sq mi) would be 13.6 for a single frequency block, or a total of (13.6 transmitters x 5 blocks) about 68 AWS base station transmitters on five AWS frequency blocks (Blocks A – E, assuming AWS would not operate on Block F, which is co-channel to BRS-1). Using the same methodology in dense population deployments capacity would require that AWS base stations be deployed with 2-mile radius cells, which would represent about 153 AWS base station transmitters in just one BRS 36-degree sector. If AWS were to operate just one base station with five transmitters simultaneously, such a facility would need to be located 138.8 miles away from a centralized BRS receive station hub to prevent harmful interference if the AWS and BRS base station antennas are within line of sight.

Frequency		2150.00 MHz
AWS Base Station TPO[1]	100 mW	20.00 dBm
AWS Base Station OOBE Attenuation		33.00 dB
AWS Base Station Transmit Antenna Gain		17.00 dBi
AWS Base Station OOBE EIRP per MHz		4.00 dBm/MHz
AWS Base Station Bandwidth		5.00 MHz
AWS Base Station OOBE EIRP for 5 MHz	12.559 mW	10.99 dBm
Simultaneous Base Stations (Blocks A, B, C, D, E)		5
Aggregate AWS Base Station OOBE EIRP for 5 Stations	62.797 mW	17.98 dBm
BRS Base Station Bandwidth		5.00 MHz
BRS Base Station Receive Antenna Gain		19.00 dBi
BRS Base Station Receiver Noise Figure		4.00 dB
BRS Base Station Noise Floor		-103.25 dBm
Allowable AWS Signal for a 1 dB Noise Floor Increase		-109.12 dB
Path Loss required to comply with Allowable AWS Signal		-146.10 dB
Minimum Separation for required L.O.S. Path Loss		**138.8 Miles**

L.O.S. = Line of Sight

Table B

Indeed, an OOBE attenuation of at least 55 + 10 $\log_{10}$(P) would be required for an AWS Base Station to permit five simultaneous transmitters to operate (on AWS Blocks A-E) within 35-miles of a BRS Base Station without causing interference. Even an OOBE attenuation of 80 + 10 $\log_{10}$(P), if it were achievable, would require such an AWS Base Station to locate more than 2 miles from a BRS Base Station to avoid interference. An AWS Base Station would require a TPO of more than 30 watts to generate the maximum allowable EIRP of 1,640 watts using a transmit antenna with a 17 dBi gain. As shown below, a TPO of 30 watts (30,000 mW) would require a filter with an attenuation of nearly 95 dB to comply with an OOBE attenuation of 80 + 10 $\log_{10}$(P).

Frequency		2150.00 MHz
AWS Base Station TPO	30000 mW	44.77 dBm
AWS Base Station OOBE Attenuation		**94.77 dB**
AWS Base Station Transmit Antenna Gain		17.00 dBi
AWS Base Station OOBE EIRP per MHz		-33.00 dBm/MHz
AWS Base Station Bandwidth		5.00 MHz
AWS Base Station OOBE EIRP for 5 MHz	0.003 mW	-26.01 dBm
Simultaneous Base Stations (Blocks A, B, C, D, E)		5

[1] The on-channel TPO is actually not relevant because the FCC's OOBE attenuation formula, 43 + 10 $\log_{10}$(P), always results in a permissible OOBE emission of –13 dBm. However, this does demonstrate as an example that an AWS TPO of 100 mW would require a filter with an attenuation of 33 dB.

Aggregate AWS Base Station OOBE EIRP for 5 Stations	0.013	mW	-19.02 dBm
BRS Base Station Bandwidth			5.00 MHz
BRS Base Station Receive Antenna Gain			19.00 dBi
BRS Base Station Receiver Noise Figure			4.00 dB
BRS Base Station Noise Floor			-103.25 dBm
Allowable AWS Signal for a 1 dB Noise Floor Increase			-109.12 dB
Path Loss required to comply with Allowable AWS Signal			-109.10 dB
Minimum Separation for required L.O.S. Path Loss			**2.0 Miles**

L.O.S. = Line of Sight

Table C

BRS End User CPE Interference to AWS Mobile Handsets

To prevent exceeding a one-decibel increase in the noise floor would require a separation distance of approximately 7.1 miles between a fixed BRS end user (CPE) transmitter and an AWS mobile handset receiver on different frequencies.

Frequency		2150.00	MHz
BRS End User CPE TPO[2]	(100 mW)	20.00	dBm
BRS CPE OOBE Attenuation		33.00	dB
BRS CPE External Transmit Antenna Gain		17.00	dBi
BRS CPE OOBE EIRP per MHz		4.00	dBm/MHz
AWS CPE Bandwidth		5.00	MHz
BRS CPE OOBE EIRP for 5 MHz		10.99	dBm
AWS Handset Bandwidth		5.00	MHz
AWS Handset Receive Antenna Gain		0.00	dBi
AWS Handset Receiver Noise Figure		4.00	dB
AWS Handset Noise Floor		-103.25	dBm
Allowable AWS Signal for a 1 dB Noise Floor Increase[3]		-109.12	dB
Path Loss required to comply with Allowable AWS Signal		-120.11	dB
Minimum Separation for required L.O.S. Path Loss		**7.0**	**Miles**

L.O.S. = Line of Sight

Table D

[2] The on-channel TPO is actually not relevant because the FCC's OOBE attenuation formula, $43 + 10 \log_{10}(P)$, always results in a permissible OOBE emission of –13 dBm. However, this does demonstrate as an example that a TPO of 100 mW would require a filter with an attenuation of 33 dB.

[3] The AWS interfering signal level would have to be 5.867 dB below the receiver noise floor to avoid increasing the noise floor by more than 1 dB.

AWS Mobile Handset in Close-Proximity to a BRS End User CPE

At a separation distance of one mile under line-of-sight conditions, an AWS handset would experience a noise-floor increase of 11.32 dB from a BRS station operating on an adjacent or non-contiguous frequency.

Frequency		2150.00	MHz
BRS End User CPE TPO	(100 mW)	20.00	dBm
BRS CPE OOBE Attenuation		33.00	dB
BRS CPE External Transmit Antenna Gain		17.00	dBi
BRS CPE OOBE EIRP per MHz		4.00	dBm
AWS CPE Bandwidth		5.00	MHz
BRS CPE OOBE EIRP for 5 MHz		10.99	dBm
Path Loss	(1 Mile)	103.25	dB
AWS Handset Bandwidth		5.00	MHz
AWS Handset Antenna Gain		0.00	dBi
AWS Handset Noise Figure		4.00	dB
AWS Handset Noise Floor	(4.73E-11 MW)	-103.25	dBm
Received Signal from BRS CPE	(5.94E-10 MW)	-92.26	dBm
Increased Noise Floor	(6.42E-10 MW)	-91.93	dBm
Noise Floor Increase (Interference)		**11.32**	**dB**

Table E

Conclusions

The above calculations demonstrate that BRS and AWS cannot co-exist in the same geographic area. All BRS operations in a given geographic area should be relocated before the Commission authorizes new AWS base stations to begin operating in that area to protect BRS against interference from co-channel, adjacent-channel, and non-contiguous AWS base station emissions.

This engineering statement has been prepared by or under the direct supervision of Robert Gehman, Jr., who states under penalty of perjury that he is president of Kessler and Gehman Associates, Inc., telecommunications consulting engineers with offices in Gainesville, FL; a professional engineer licensed in several states with an established record at the National Council of Examiners for Engineering and Surveying ("NCEES"); a member of the Association of Federal Communications

Consulting Engineers ("AFCCE"); a member of the Institute of Electrical and Electronic Engineers ("IEEE"); a member of the Society of Broadcast Engineers ("SBE"); and the information contained in this statement is true and correct to the best of his knowledge and belief.

KESSLER AND GEHMAN ASSOCIATES, INC.

Robert Gehman, Jr., P. E.
President
(bob@kga.bz)

November 21, 2005