Public Service of Colorado Ponnequin Wind Farm

New River Geothermal Research Program, Imperial County, CA

May 19, 2010

Principal Investigator
Stuart Johnson
Ram Power Corporation

Validation of Innovative Exploration Technologies

Project Overview

Timeline		
Phase 1	**Phase2**	**Phase 3**
Data Acquisition	Drilling	Flow Testing / Final Report
2nd to 3rd Quarter 2010	4th quarter 2010 to 1st Quarter 2011	1 Quarter 2011

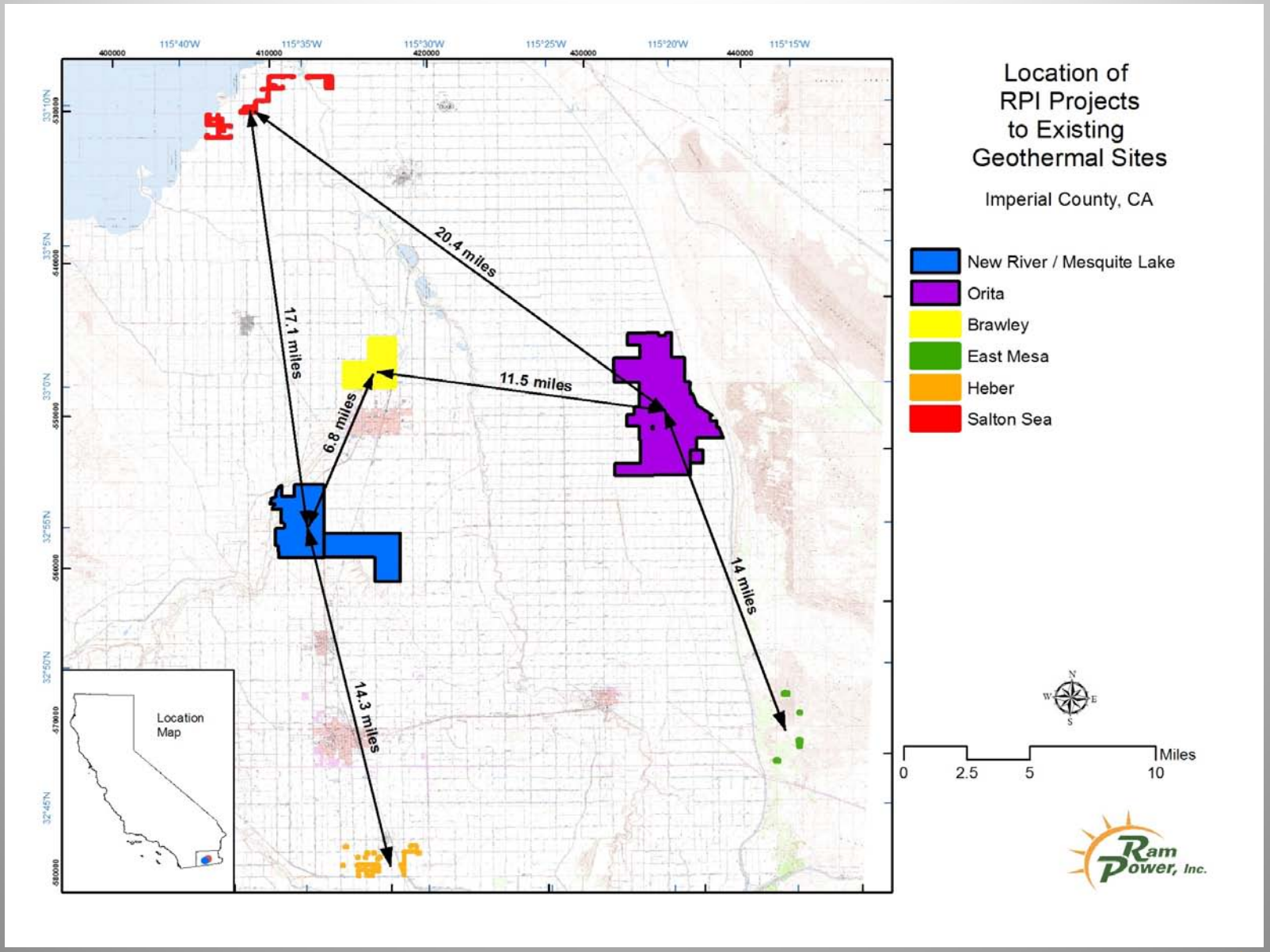
Budget		
DOE Share	**Ram Power Corp Share**	**Total Project**
$5,000,000	$9,339,420	$14,339,420
To date no funding has been received		

SALTON TROUGH GEOTHERMAL PROVINCE

New River Innovative Technologies Phase I

- Compilation of Existing Data
  - Proprietary and public domain heat flow and temperature gradient data
  - Published geologic data and tectonic models of Salton Trough
- Conduct Detailed Gravity Survey
- Conduct Magnetotelluric Survey
- Acquire Reflection Seismic Profiles
- Complete a Refined Geologic Model of New River

NEW RIVER PROJECT LOCATION



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Innovative Aspects

- Utilization of Previously Developed Industry Data Sets for Development and Testing of Integrated New Exploration Models
  - Tectonic Framework proposed by Fuis and Kohler, 1984
  - Utilization of Existing data sets, Combs, 2006
  - Detachment Models defined by Axen, 2000; Dorsey et al., 2005
  - Rotational Crustal Blocks proposed by Hudnut , 1989
  - NW migration of Salton Trough Rift System, Larsen and Relinger, 1984
  - Sedimentation Rates and Constraints on Age of Intrusives, Steely et al., 2009; Kirbey et al., 2007; Dorsey et al., 2005
- Conduct a modern suite of geophysical surveys as a tie to previously drilled geothermal wells
  - Micro gravity
  - Magnetotellurics
  - Reflection Seismic

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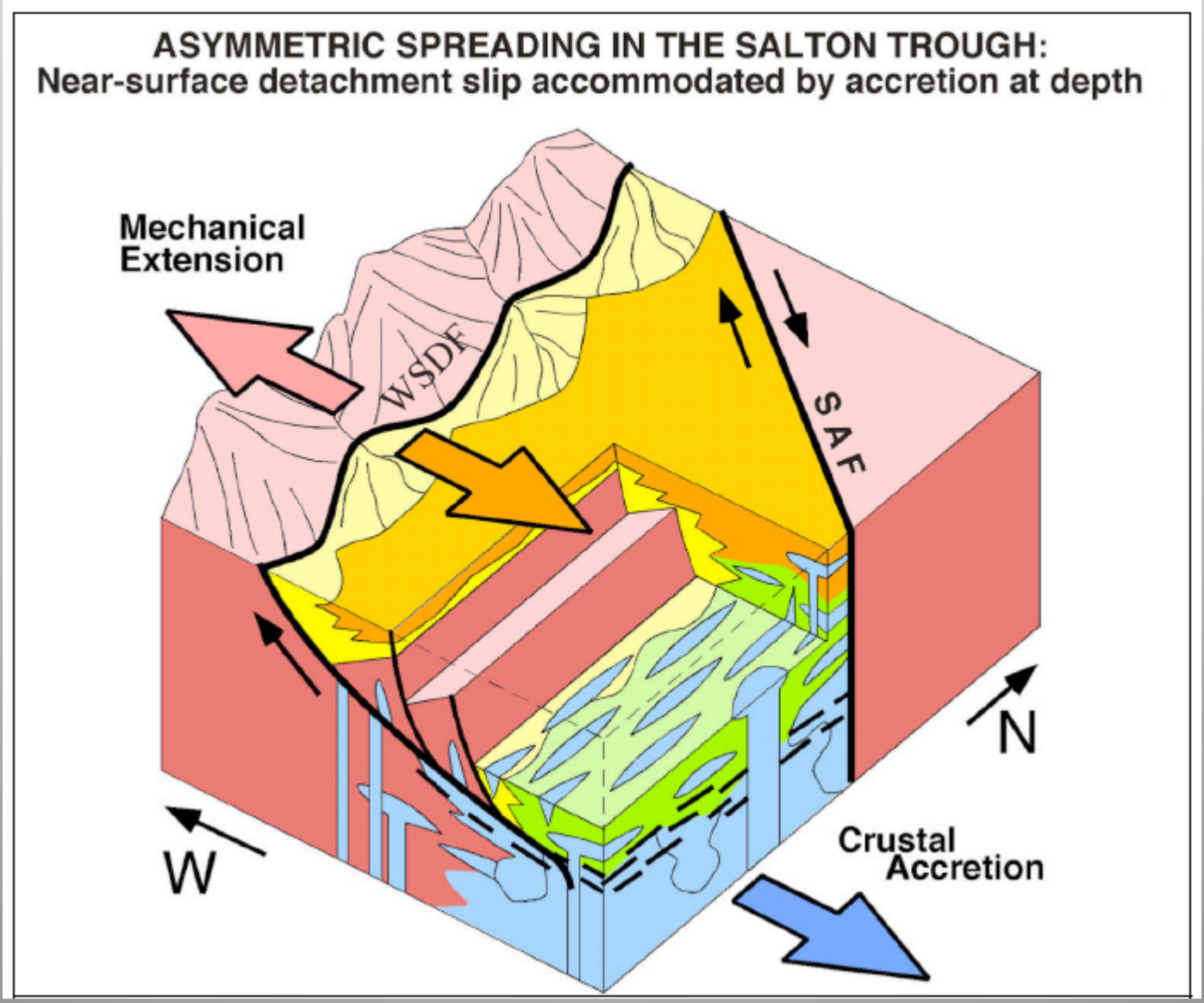
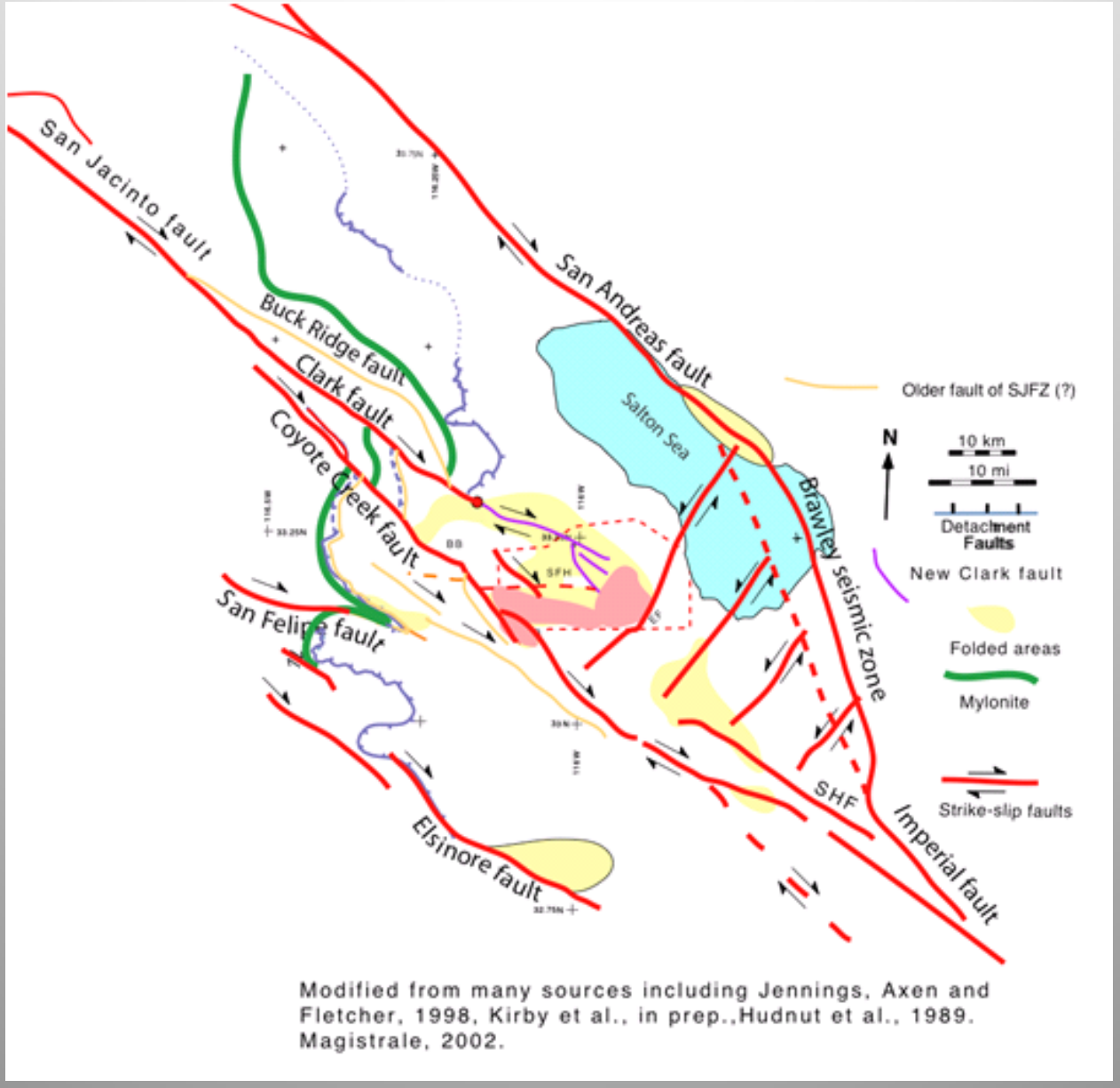
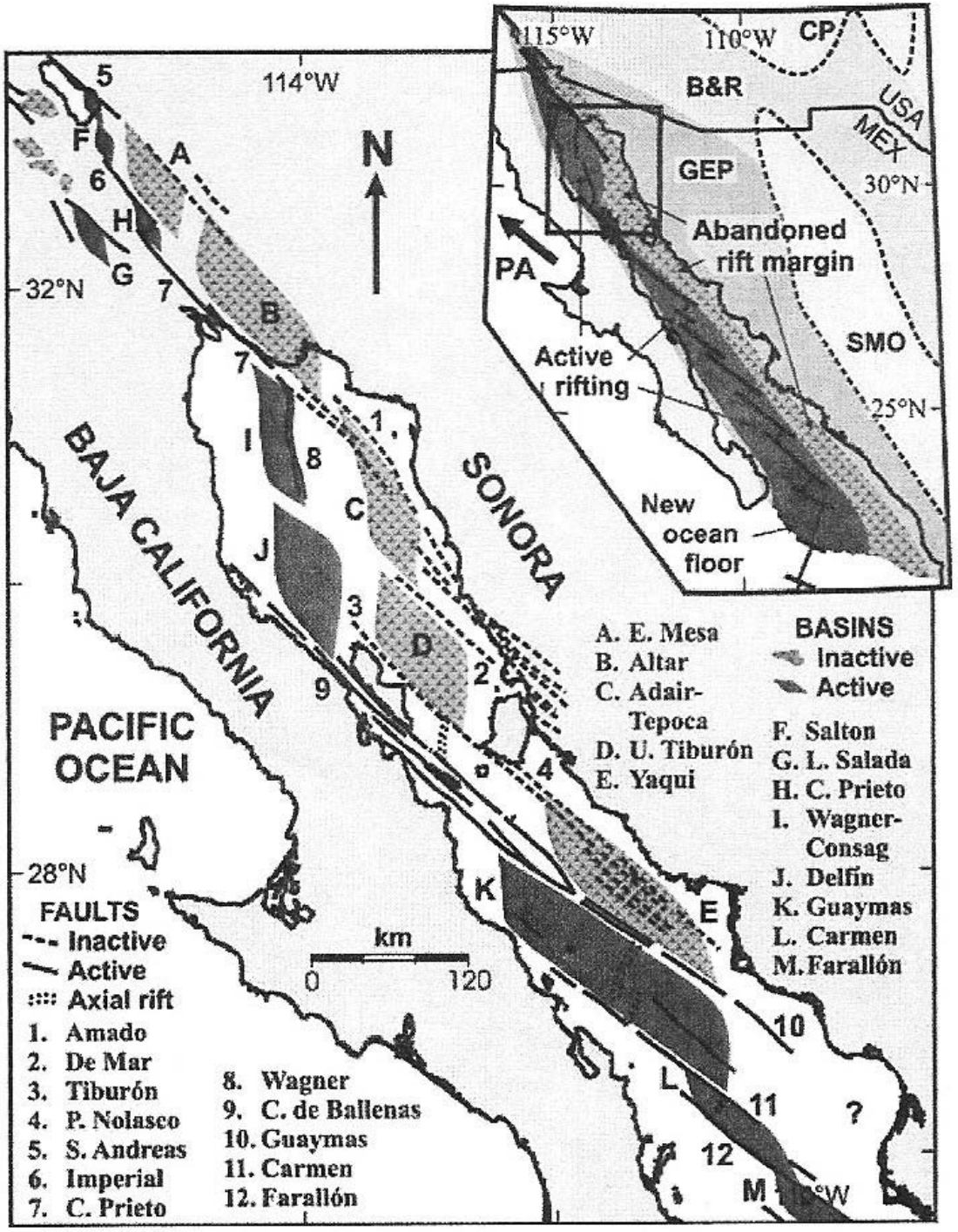
Displacement on the Detachment may be 20 km. (Axen, 2000)



Regional Faulting and Rotational Crustal Blocks

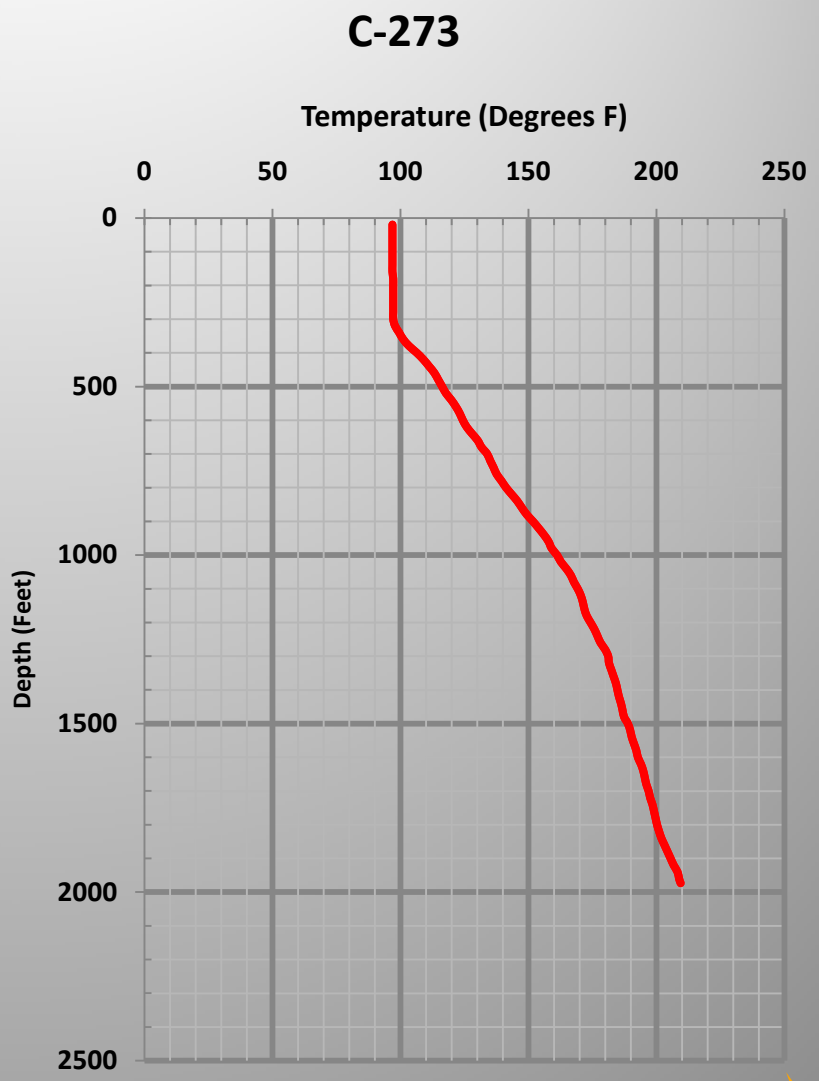


Modified from many sources including Jennings, Axen and Fletcher, 1998, Kirby et al., in prep.,Hudnut et al., 1989. Magistrale, 2002.

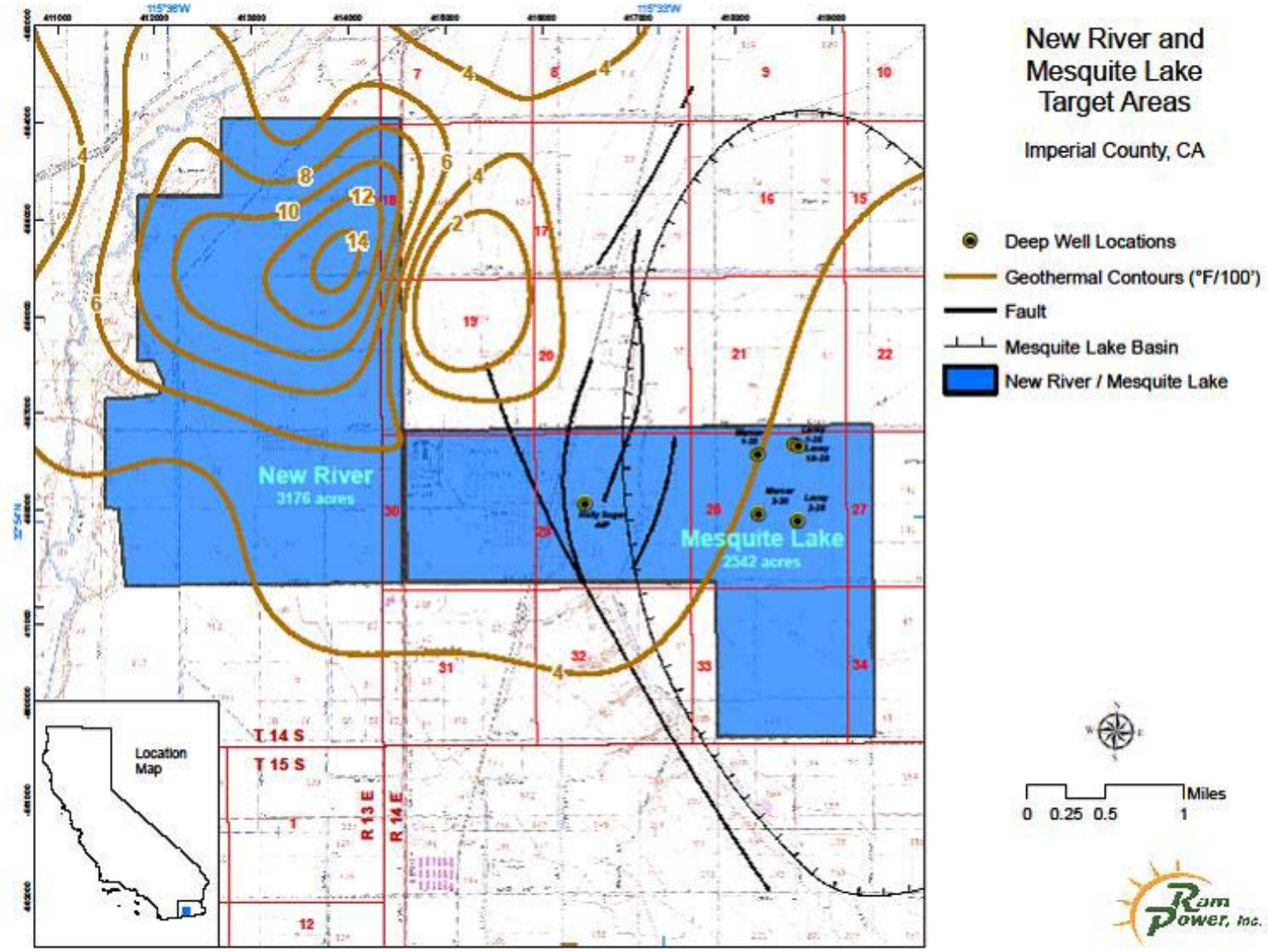

115°W
110°W
CP
B&R
USA
MEX
GEP
30°N
Abandoned rift margin
PA
SMO
Active rifting
25°N
New ocean floor
114°W
N
32°N
28°N
BAJA CALIFORNIA
SONORA
PACIFIC OCEAN
BASINS
Inactive
Active
A. E. Mesa
B. Altar
C. Adair-Tepoca
D. U. Tiburón
E. Yaqui
F. Salton
G. L. Salada
H. C. Prieto
I. Wagner-Consag
J. Delfín
K. Guaymas
L. Carmen
M. Farallón
FAULTS
Inactive
Active
Axial rift
1. Amado
2. De Mar
3. Tiburón
4. P. Nolasco
5. S. Andreas
6. Imperial
7. C. Prieto
8. Wagner
9. C. de Ballenas
10. Guaymas
11. Carmen
12. Farallón
km
0
120
?

Typical New River Deep Gradient Profile

- Gradient:
- 5.1 ºF/100’
- 4000’ 313 ºF
- 5000’ 364 ºF
- 6000’ 415 ºF
- 7000’ 466 ºF
- 8000’ 517 ºF



New River Lease Targets



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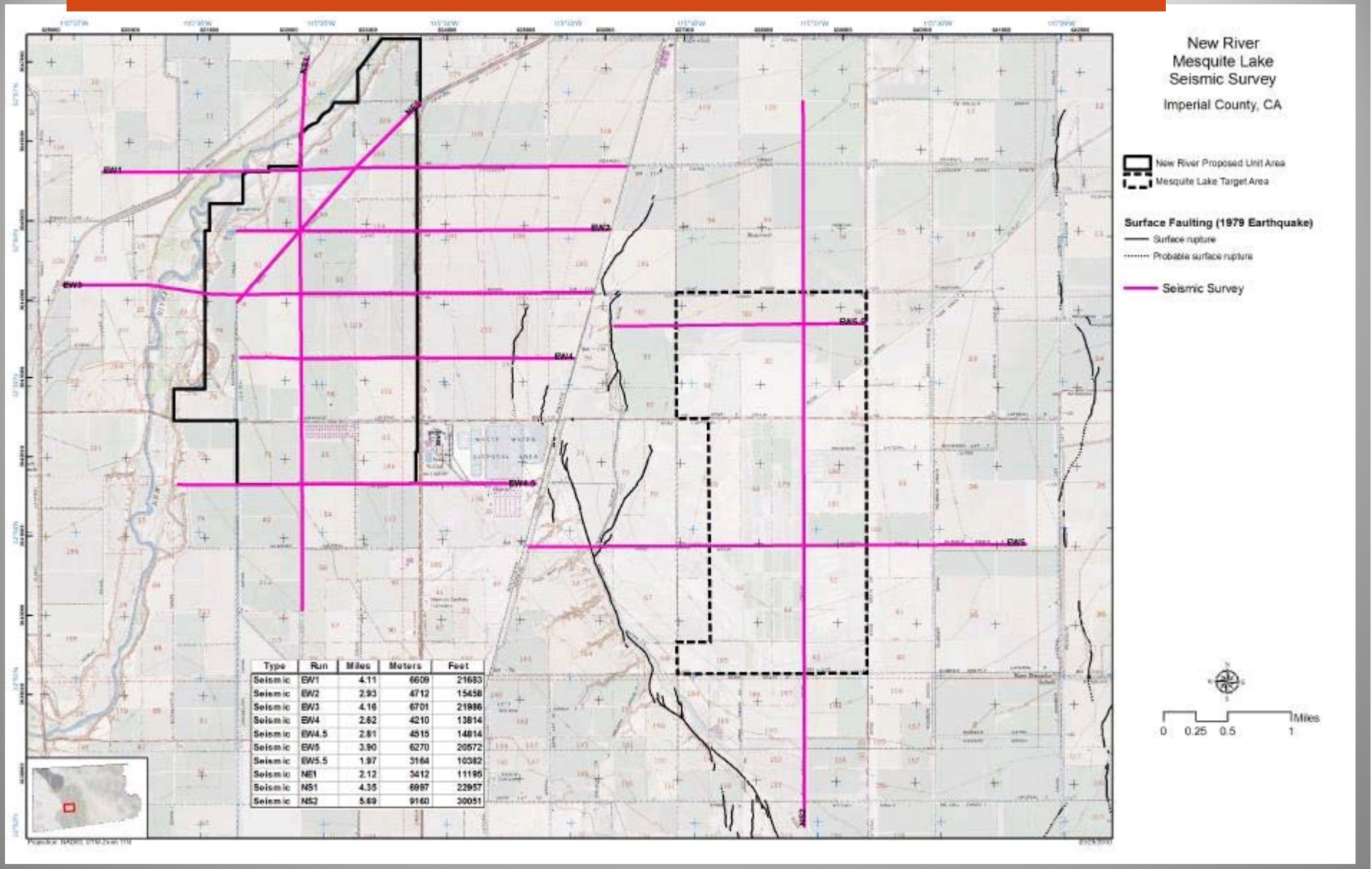
New River Seismic Line Locations



Type	Run	Miles	Meters	Feet
Seismic	EW1	4.11	6609	21683
Seismic	EW2	2.93	4712	15458
Seismic	EW3	4.16	6701	21986
Seismic	EW4	2.62	4210	13814
Seismic	EW4.5	2.81	4515	14814
Seismic	EW5	3.90	6270	20572
Seismic	EW5.5	1.97	3164	10382
Seismic	NE1	2.12	3412	11195
Seismic	NS1	4.35	6997	22957
Seismic	NS2	5.69	9160	30051

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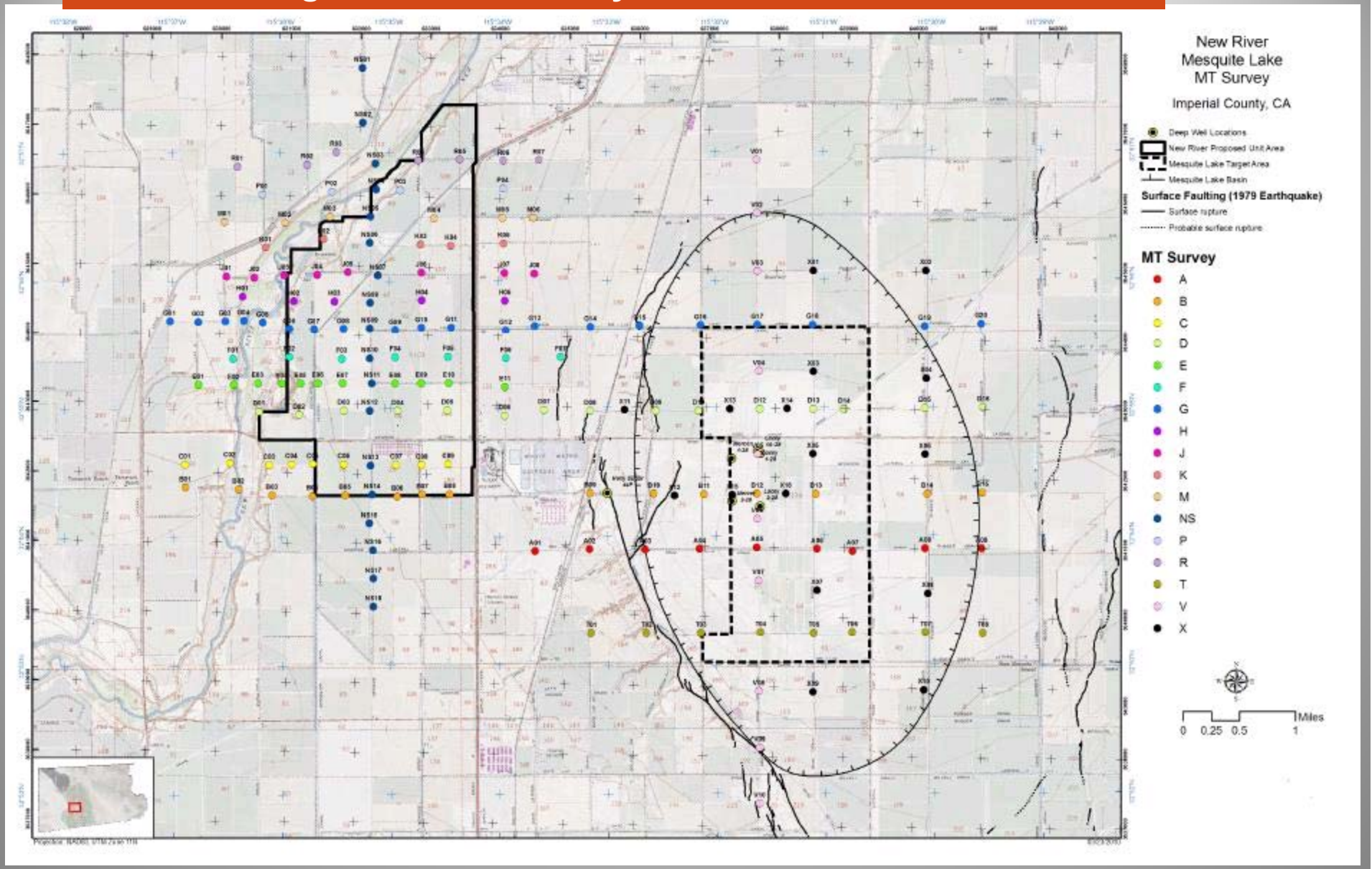
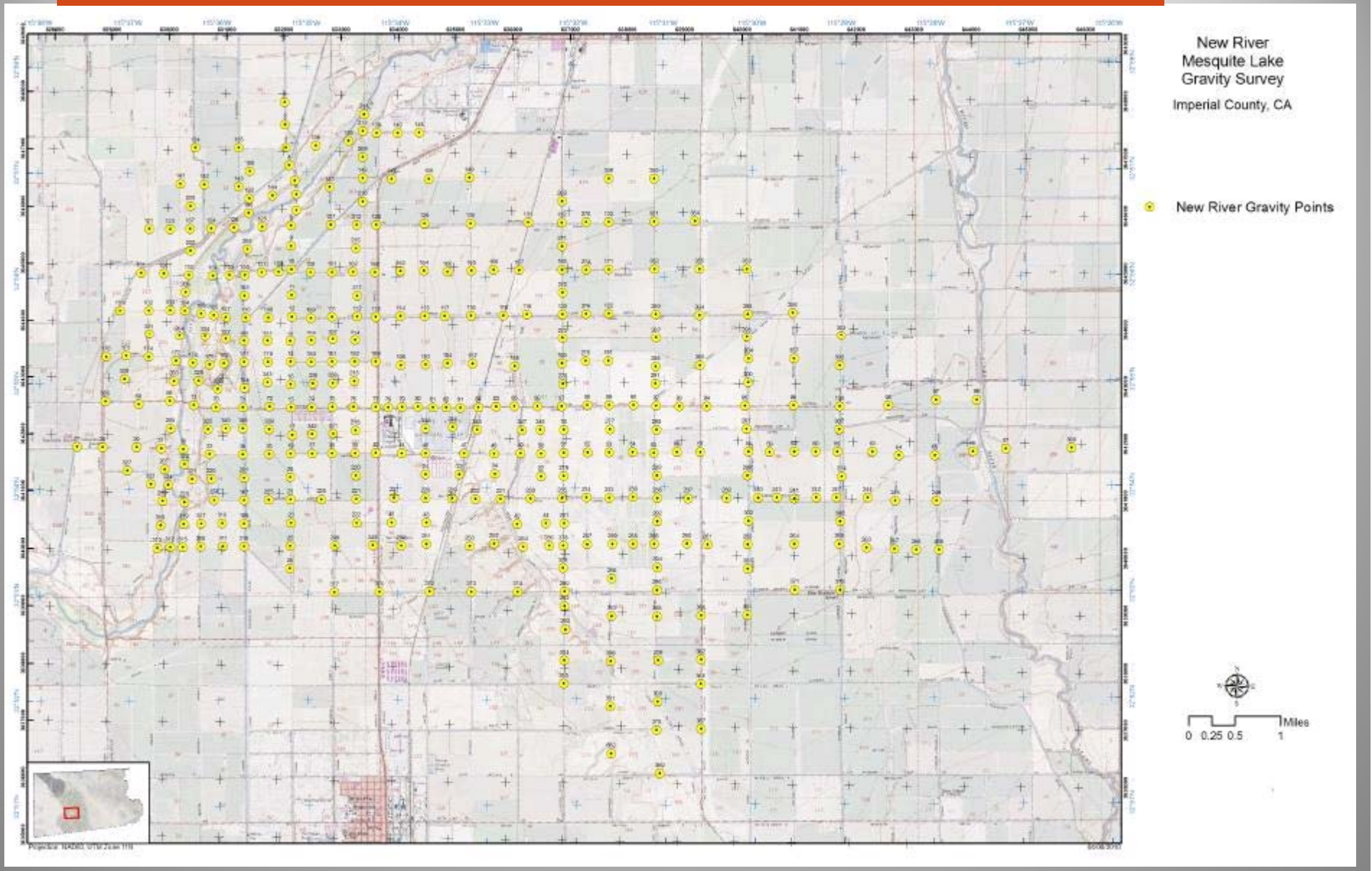
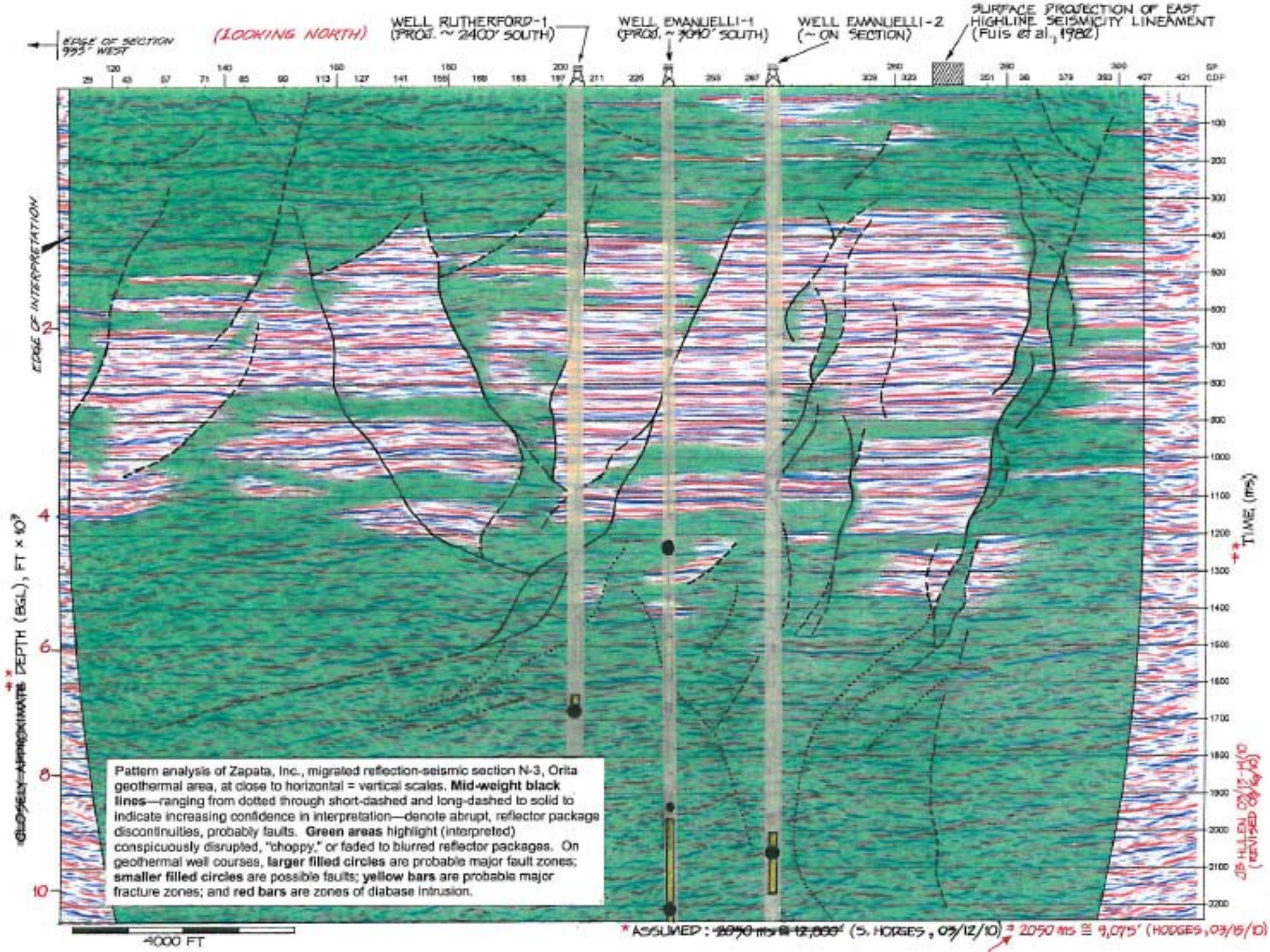
New River Magnetotelluric Survey Locations



New River Gravity Station Locations




EDGE OF SECTION 995' WEST
(LOOKING NORTH)
WELL RUTHERFORD-1 (PROJ. ~ 2400' SOUTH)
WELL EMANUELLI-1 (PROJ. ~ 3910' SOUTH)
WELL EMANUELLI-2 (~ ON SECTION)
SURFACE PROJECTION OF EAST HIGHLINE SEISMICITY LINEAMENT (Fuis et al., 1982)
SP
CDP
EDGE OF INTERPRETATION
DEPTH (BGL), FT x 10³
TIME (ms)
Pattern analysis of Zapata, Inc., migrated reflection-seismic section N-3, Orita geothermal area, at close to horizontal = vertical scales. **Mid-weight black lines**—ranging from dotted through short-dashed and long-dashed to solid to indicate increasing confidence in interpretation—denote abrupt, reflector package discontinuities, probably faults. **Green areas** highlight (interpreted) conspicuously disrupted, "choppy," or faded to blurred reflector packages. On geothermal well courses, **larger filled circles** are probable major fault zones; **smaller filled circles** are possible faults; **yellow bars** are probable major fracture zones; and **red bars** are zones of diabase intrusion.
4000 FT
* ASSUMED: ~~2070 ms @ 12,000'~~ (S. HODGES, 03/12/10) ≈ 2050 ms @ 9,075' (HODGES, 03/15/10)
JB HULEN 03/12-14/10 (REVISED 03/19/10)