

MEMORANDUM FOR: Marti Ikehra
California State Advisor
Hector Mine Earthquake Survey Project
Coordinator

FROM: Charles W. Challstrom
Director, National Geodetic Survey

SUBJECT: INSTRUCTIONS: California FBN/CBN
Re-observations as a Result of the
Hector Mine Earthquake of 1999 (GPS-1460)
Task Number: 8K6D2000

GENERAL:

On October 16, 1999, a 7.1 magnitude earthquake, designated the Hector Mine Earthquake, occurred in the Mojave Desert. The National Geodetic Survey (NGS), in cooperation with the California Department of Transportation (CALTRANS) Districts 8 and 11, Riverside County, San Bernadino County, U.S. Geological Survey, Las Vegas Valley Water District, and Mohave County, Arizona, will re-observe the portion of the California Federal Base Network (FBN) and Cooperative Base Network (CBN) that was affected by this earthquake: 12 FBN and 18 CBN stations in California and one CBN station in Nevada that were affected will be re-observed. One FBN station in Arizona and one FBN and one CBN station in Nevada will also be occupied as ties.

PURPOSE:

In order to meet America's accelerating positioning and navigation needs, the existing coordinate reference system must be continually enhanced to provide the accessibility and high accuracy required for use with GPS. The digital revolution in mapping, charting, and surveying requires a National Spatial Reference System (NSRS) consisting of, among other components, a network of monumented points having four-dimensional positions. NGS is tasked with the responsibility of maintaining the FBN component of the NSRS, as the user community involved is tasked with maintaining the CBN.

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This GPS project will provide new coordinates for the affected FBN/CBN relative to the portion of FBN/CBN that was unaffected by the earthquake.

SPECIFICATIONS:

Project requirements for the observations are to ensure 2-centimeter local accuracy in the horizontal component, as well as 2-centimeter local accuracy for the ellipsoid heights.

General specifications for the project are as follows. At each site, three sessions of 5½ hours duration shall be observed. The observing scheme shall be arranged so that for each station, the start time of one of the observing sessions shall be at least 4 hours different than the other two. The observing scheme shall be arranged to ensure that adjacent stations are directly connected in at least one observing session, and at least half of all base lines are repeated.

In general, station occupation and observing procedures must be carried out according to appropriate sections of the "NGS Operations Handbook" and the current applicable GPS receiver field manuals. Data formats and digital file definitions are given in "Input Formats and Specifications of the National Geodetic Survey Data Base," Volume I. Horizontal Control Data, Federal Geodetic Control Subcommittee, September 1994, revised and reprinted November 1998. Success in meeting the accuracy standards will be based on repeatability of measurements, analysis of loop misclosures, and adjustment residuals.

General specifications for the project are given in "Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques," Version 5.0: dated May 11, 1988, reprinted with corrections August 1, 1989. Specific project criteria are given in the following sections.

Data from all CORS within the project area are to be used in processing. The CORS information is included in the attached Table 2. Further, the CORS of the Southern California Integrated GPS Network (SCIGN) are also to be used in processing. The SCIGN information will be found in Table 3.

PROJECT NETWORK:

A list of stations has been provided in the attached Table 1. A sketch of stations has also been provided.

DATA ACQUISITION:

Data collection must be accomplished as specified in the appropriate dual-frequency receiver field manuals in the compressed mode at a 15-second epoch collection interval. The GPS receivers must be dual-frequency and full-wavelength. Track satellites down to a 10-degree elevation angle. Vectors between the project stations shall be measured by single sessions consisting of continuously and simultaneously tracking for 5½ hours.

Each station must be occupied at least three times - twice at one observing window and once at the other. Adjacent stations must be directly connected in at least one observing session, and at least one-half of all base lines must be repeated. All available CORS data will be used throughout the project.

Record weather data just before, immediately after, and at the mid-point of each session. Meteorological data shall also be collected immediately after an obvious weather front passes during a session and immediately before it passes, if possible. Pressure and relative humidity measurements must be made near and at about the height of the GPS antenna phase center. Indicate in the log the location of the barometer and psychrometer.

Survey operations shall be conducted with due regard to the safety of personnel and equipment.

VECTOR COMPUTATIONS:

Data management, quality review of collected data, and final vector processing for the survey will be accomplished by the Spatial Reference System Division (SRSD) using PAGES. Vectors shall be computed in the International Terrestrial Reference Frame (ITRF) system, using the most current epoch and precise IGS ephemerides. Use 30-second epoch intervals for data processing. For stations where weather data are not available, or are suspect, predicted values computed based on the station's latitude, height above mean sea level, and time and day of year will be used. Use 15 degrees as the cutoff elevation angle in data processing. A cutoff angle of 10 degrees may be used when necessary to improve results.

The data will be processed in 24-hour sessions (or slightly longer if the observation session crosses 0000 UTC) in order to utilize the 24-hour data sets collected at the CORS. The "fixed baseline" option in PAGES will be used to compute the baseline between the CORS. The final ITRF vectors will be assessed and transformed to the NAD 83 coordinate system using program ADJUST.

The type of final solution, L1 versus ion-free, will depend on the length of the vectors. For vectors less than 10 km in length, the final reduction will consist of a L1 fixed solution. Compute vectors greater than 10 km in length in a separate processing session from the short (less than 10 km) vectors. In all cases, integer ambiguities will be fixed for each vector whenever possible.

The quality of collected data shall be determined from the plots generated from PAGES and by analysis of repeated vectors and free adjustment residuals and/or loop misclosures.

The data and results will be submitted to the Global Positioning System Branch of SRSD. All B-files and G-files must be complete, including *25* and *27* records.

STATION DESCRIPTIONS:

Station recovery notes must be submitted in computer-readable form using DDPROC software. Include the name, address, and, if public ownership, telephone number of the responsible party. Do not include the telephone numbers of private property owners. The California Geodetic Advisor will be responsible for all quality checks for conformance with NGS format standards as pertains to descriptions and recoveries.

SPECIAL REQUIREMENTS:

Antenna set-up is critical to the success of this project. Fixed-height tripods are preferred for all receivers. the plumbing bubbles on the antenna pole of the fixed-height tripod must be shaded when plumbing is performed. They must be shaded for 3 minutes before checking and/or re-plumbing. Also, the perpendicularity of the poles must be checked at the beginning of the project and any other time there is a suspicion of a problem.

When a fixed-height tripod is not used, the height of the antenna must be carefully measured to prevent station set-up blunders from occurring. Tribrachs used for these set-ups must be checked and adjusted when necessary. Totally independent measurements of the antenna height above the mark in both metric units and English units must be made before and after each session. Someone other than the observer must check the measurement computations by carefully comparing measurements and then entering his/her initials on the log.

A rubbing of the stamping of the mark must be made at each visit to a station. If it is impossible to make a rubbing of the mark, a plan sketch of the mark must be substituted, accurately recording all markings.

For each station visited, a visibility obstruction diagram must be prepared and the TO-REACH description carefully checked for errors or omissions.

The following must be recorded at each occupation of a station:

- 1) receiver manufacturer,
- 2) antenna manufacturer,
- 3) receiver model number (part number),
- 4) antenna model number (part number),
- 5) the complete serial number of the receiver, and
- 6) the complete serial number of the antenna.

Success of this project requires that the highest quality GPS data be collected. Therefore, during each station occupation, the operators shall carefully monitor the operation of the receivers. Any irregularities in the data due to equipment malfunction, DOD adjustment of the satellite orbit, obstructions, etc., must be reported to the Project Development Branch, N/NGS21, as soon as possible and noted on the observing log. If the quality of observations for an observing session is questionable, notify the Project Development Branch immediately.

The survey team shall not depart the project area until they have quality reviewed all data and advised N/NGS21.

GPS DATA:

Project report and data listed in Annex L of "Input Formats and Specifications of the NGS Data Base" and in the attached addendum for the adjustment portion must be transmitted. Any data considered suspect as to quality in achieving accuracy standards should be sent via FedEx immediately for office review. Backup of transmitted data must be held until notified by the Project Development Branch, N/NGS21.

The data set collected during the project shall be named "caro040d.746". All records in connection with this project shall be titled "CALIFORNIA FBN/CBN RE-OBSERVATIONS, 2000". The project number (accession number) is GPS-1460.

LIAISON:

Liaison must be maintained with designated offices at the National Geodetic Survey headquarters located at:

1315 East-West Highway
Silver Spring, MD 20910-3282

The Arizona Geodetic Advisor is:

CDR Dave Minkel, NOAA
Office of the State Cartographer
1616 W. Adams St.
Phoenix, AZ 85007
Telephone: 602-542-1569
Cellular: 602-549-4744
FAX: 602-542-2600
e-Mail: Dave.Minkel@noaa.gov

The Nevada contact is:

Timothy J. Wolf
District Surveyor
1001 South Valley View Boulevard
Las Vegas, NV 89153
Telephone: 702-258-7163
Mobile: 702-375-9430
FAX: 702-258-3811
e-Mail: timothy.wolf@lvvwd.com

Questions and problems which could affect the technical adequacy of the project should be directed to:

Steven J. Frakes
Project Development Branch
Spatial Reference System Division
SSMC3 -- N/NGS21, Station 8853
Telephone: 301-713-3194, ext. 111
FAX: 301-713-4316
e-Mail: Steve.Frakes@noaa.gov

Questions and problems concerning adjustment processing should be directed to:

Maralyn L. Vorhauer
Observation and Analysis Division
N/NGS4, SSMC III, Station 8562
Telephone: 301-713-3176, ext. 104
FAX: 301-713-4327
e-Mail: Maralyn.Vorhauer@noaa.gov

Questions and problems concerning using CORS data in processing should be directed to:

Neil Weston
Geosciences Research Division
N/NGS6, SSMC III, Station 9830
Telephone: 301-713-2847, ext. 202
FAX: 301-713-4475
e-Mail: Neil.D.Weston@noaa.gov

PUBLICITY:

See "NGS Operations Handbook," Section 1.4.1.

EXPENSES:

Expenses for this project will be charged to Task Number 8K6D2000.

TRAVEL:

Travel and per diem are authorized in accordance with Federal Travel Regulations, Part 301-11, Per Diem allowances. Current per diem rates were effective January 1, 2000.

Attachments

cc: N/NGS - D.Zilkoski
N/NGS - S. Misenheimer*
N/NGS1 - G. Mitchell
N/NGS1x1 - Dave Minkel
N/NGS21 - S. Frakes
N/NGS22 - D. Pursell
N/NGS4 - E. Wade
N/NGS4 - M. Vorhauer
N/NGS4 - D. Hoar
N/NGS41 - W. McLemore
N/NGS41 - J. Blackwell
N/NGS413 - G. Sowell
N/NGS5 - R. Snay
N/NGS6 - N. Weston
FGCS Members*
T. Wolf, District Surveyor, Las Vegas, Nevada
W. Young, CSRC
G. Helmer, CSRC
M. Duffy, CSRC
D. D'Onofrio, CSRC

*First page only

HECTOR MINE EARTHQUAKE RE-OBSERVATIONS
STATION LISTING
Table 1

<u>DESIGNATION</u>	<u>PID</u>	<u>STATE</u>	<u>V DATUM</u>	<u>ELEV MT</u>	<u>ELEV SOURCE</u>	<u>LATITUDE</u>	<u>LONGITUDE</u>	<u>ID</u>
11 AAR	DX0471	CA	NAVD 88	188.052	READJUSTED	33 17 44.46821	116 17 54.77341	11AA
435	DX5442	CA	NAVD 88	461.811	ADJUSTED	33 49 49.64856	117 14 59.26107	0435
2680		CA				33 42 40	117 21 40	2680
603 51	DX0107	CA	NAVD 88	340.590	ADJUSTED	33 53 57.62568	116 21 12.64329	6351
603 58	DX0122	CA	NAVD 88	278.290	ADJUSTED	33 55 30.41766	116 28 28.48613	6358
603 86	DX1078	CA	NAVD 88	548.276	ADJUSTED	33 54 58.58327	116 47 00.79301	6386
AMBOY	EU0492	CA	NAVD 88	195.363	ADJUSTED	34 33 31.04969	115 44 32.90846	AMBO
BLCK BUTTE NCMN 7269	DW9002	CA	NAVD 88	522.8	GPS OBS	33 39 49.47507	115 43 11.28045	BLAC
C 391	EU0063	AZ	NAVD 88	426.809	ADJUSTED	34 46 28.	114 11 25.	C391
CAJON	EV3699	CA	NAVD 88	1342.1	GPS OBS	34 20 49.92686	117 27 03.88485	CAJO
CRISS	EU1138	CA	NAVD 88	456.9	GPS OBS	34 02 39.00777	115 13 05.65925	CRIS
D 368	GR1237	NV	NAVD 88	989.6	GPS OBS	36 09 16.91262	115 21 47.19854	D368
DASH	DX3756	CA	NAVD 88	462.113	ADJUSTED	33 38 08.41318	117 05 10.36999	DASH
DESERT CENTER	AH5231	CA	NAVD 88	269.1	GPS OBS	33 42 54.45482	115 24 01.26945	DESO
END	EU0986	CA	NAVD 88	134.1	GPS OBS	34 02 38.61871	114 28 53.10497	ENDD
FRINK	DW0033	CA	NAVD 88	-51.316	ADJUSTED	33 21 37.10323	115 38 49.15205	FRIN
GODWIN	EU0440	CA	NAVD 88	537.338	ADJUSTED	34 08 11.07471	115 55 53.54320	GODW
H 8 2 RESET	DX5396	CA	NAVD 88	468.738	ADJUSTED	33 46 23.052	116 58 20.784	H82R
HAVASU	EU1257	AZ	NAVD 88	212.5	GPS OBS	34 33 58.2732	114 21 41.5296	HAVA
HECTOR 2	EV3968	CA	NAVD 88	629.69	LEVELING	34 47 05.89055	116 25 14.48003	HECT
HOKUS	EU1007	CA	NAVD 88	398.0	GPS OBS	34 28 35.30540	114 39 02.36672	HOKU
HPGN CA 07 05	EV9240	CA	NAVD 88	1061.83	LEVELING	34 29 33.79376	117 45 54.28743	0705
HPGN CA 08 01	FS1409	CA	NAVD 88	806.7	GPS OBS	35 32 27.71714	115 25 22.12070	0801
HPGN CA 08 02	FS1410	CA	NAVD 88	917.3	GPS OBS	35 22 16.73512	115 53 21.84327	0802
HPGN CA 08 03	FT1609	CA	NAVD 88	543.5	GPS OBS	35 04 18.56660	116 24 52.48852	0803
HPGN CA 08 04	EV9241	CA	NAVD 88	693.4	GPS OBS	34 54 13.84000	116 58 50.72661	0804
HPGN CA 08 05	FT1610	CA	NAVD 88	754.98	LEVELING	35 00 25.74113	117 31 44.97690	0805
HPGN CA 08 06	FT1611	CA	NAVD 88	1102.6	GPS OBS	35 21 58.14991	117 36 51.08340	0806
HPGN CA 08 08	EU1246	CA	NAVD 88	760.9	GPS OBS	34 43 40.08863	115 55 59.32703	0808
HPGN CA 08 09	EU1247	CA	NAVD 88	626.6	GPS OBS	34 48 22.65158	115 19 37.20615	0809
HPGN CA 08 18	EV9242	CA	NAVD 88	637.2	GPS OBS	34 01 20.00882	117 06 14.77835	0818
HPGN CA 08 21	DX5290	CA	NAVD 88	1519.1	GPS OBS	33 33 40.54016	116 34 14.20654	0821
HPGN CA 11 08	DX5292	CA	NAVD 88	873.6	GPS OBS	33 14 01.57873	116 41 35.95582	1108
HPGN CA 11 09	DX5293	CA	NAVD 88	234.44	LEVELING	33 09 35.32860	116 14 49.23085	1109
HPGN CA 11 10	DW9074	CA	NAVD 88	4.4	GPS OBS	33 10 36.47656	115 53 16.26925	1110
HPGN CA 11 13	DW9077	CA	NAVD 88	506.8	GPS OBS	33 40 37.86616	115 57 49.94991	1113
HPGN CA 11 14	DW9078	CA	NAVD 88	215.7	GPS OBS	33 40 50.48185	115 14 35.09150	1114
INYOKERN	FT0930	CA	NAVD 88	742.452	ADJUSTED	35 38 50.54938	117 48 42.42842	INYO
JUNCTION	GS0410	CA	NAVD 88	623.440	ADJUSTED	36 18 15.93545	116 24 59.26184	JUNT
K 526	EV0899	CA	NAVD 88	371.817	ADJUSTED	34 06 27.90873	117 12 11.04692	K526
L 290	FT0373	CA	NAVD 88	628.484	ADJUSTED	35 58 40.51303	117 19 43.09267	L290

LAST	DX3832 CA	NAVD 88	498.449	ADJUSTED	33 50 14.49728	117 18 33.22685	LAST
LAZY	EV9188 CA	NAVD 88	1059.1	GPS OBS	34 20 38.02719	116 30 49.94512	LAZY
NEEDLES	EU0749 CA	NAVD 88	216.304	ADJUSTED	34 48 23.91676	114 36 14.28592	NEED

<u>DESIGNATION</u>	<u>PID</u>	<u>STATE</u>	<u>V DATUM</u>	<u>ELEV MT</u>	<u>ELEV SOURCE</u>	<u>LATITUDE</u>	<u>LONGITUDE</u>	<u>ID</u>
OAK DAM	AH5244 CA	NAVD 88		315.8	GPS OBS	33 50 50.27159	117 35 52.91663	OAKD
PARK 2	FT1190 CA	NAVD 88		439.169	ADJUSTED	35 52 01.26848	116 18 00.96375	PARK
PEARBLOSSOM NCMN	7254DZ1220 CA	NAVD 88		923.56	LEVELING	34 30 43.65349	117 55 20.56889	PEAR
PORT	FU3349 CA	NAVD 88		892.6	GPS OBS	35 05 13.67348	118 09 25.95340	PORT
R 119	FS0394 AZ	NAVD 88		544.612	POSTED	35 55 10.	114 29 38.	R119
S 364	FS0115 NV	NAVD 88		521.919	POSTED	35 52 18.81927	114 55 42.07939	S364
SAND HILL RESET	EV4004 CA	NAVD 88		865.3	GPS OBS	34 15 17.95975	116 16 43.90036	SAND
SAN DIEGO GPS 03	DX5297 CA	NAVD 88		93.958	ADJUSTED	33 19 54.31129	117 09 31.67229	SD03
SAN DIEGO GPS 34	DX5303 CA	NAVD 88		823.42	GPS OBS	33 17 36.85866	116 53 54.65934	SD34
SANDY	ET1100 AZ	NAVD 88		771.7	VERTCON	34 41 05.83316	113 37 11.30053	SANY
STIM	EV2861 CA	NAVD 88		888.6	GPS OBS	34 32 12.05035	117 14 30.43797	STIM
T 448 RESET	DX2369 CA	NAVD 88		752.747	ADJUSTED	33 56 32.37378	117 00 08.71774	T448
TABLE	FS1223 NV	NAVD 88		1571.3	GPS OBS	35 48 19.64289	115 29 10.36109	TBLE
TOMTIT 2	DX5133 CA	NAVD 88		416.8	GPS OBS	33 55 29.45627	116 38 30.96840	TOMT
YUNG	DX5304 CA	NAVD 88		352.094	ADJUSTED	33 25 48.76091	117 08 40.74744	YUNG
Z 38 RESET	EV1120 CA	NAVD 88		289.961	ADJUSTED	34 00 54.59973	117 20 02.09111	Z38R

HECTOR MINE EARTHQUAKE RE-OBSERVATIONS
 CORS LISTING
 Table 2

<u>DESIGNATION</u>	<u>PID</u>	<u>STATE</u>	<u>H DATUM</u>	<u>V DATUM</u>	<u>POS SOURCE</u>	<u>ELEV MT</u>	<u>ELEV SOURCE</u>	<u>LATITUDE</u>	<u>LONGITUDE</u>
BLYTHE PPGA STA CORS ARP	AF9486	CA	NAD 83	NAVD 88	ADJUSTED	119.56	GPS OBS	33 36 37.47848	114 42 53.41657
CHINA LAKE CORS ARP	AF9693	CA	NAD 83		ADJUSTED			35 58 56.41606	117 48 31.95282
DURMID HILL PPGA CORS ARP	AF9696	CA	NAD 83		ADJUSTED			33 23 23.28429	115 47 16.85128
GOLDSTONE DS STA CORS ARP	AF9648	CA	NAD 83		ADJUSTED			35 25 30.54416	116 53 21.25076
LAKE SKINNER CORS ARP	AF9684	CA	NAD 83		ADJUSTED			33 34 41.65190	117 03 52.50227
MONUMENT PEAK CORS ARP	AF9705	CA	NAD 83		ADJUSTED			32 53 30.96051	116 25 20.39881
PINON 1 PPGA CORS ARP	AF9708	CA	NAD 83		ADJUSTED			33 36 43.74137	116 27 29.32367
POINT LOMA 3 CORS ARP	AF9569	CA	NAD 83	NAVD 88	ADJUSTED	13.63	GPS OBS	32 39 55.49055	117 14 34.84564
TORRANCE AIRPORT CORS ARP	AF9714	CA	NAD 83		ADJUSTED			33 47 52.04873	118 19 50.11159

Southern California Integrated GPS Network
Table 3

<u>SITE</u>	<u>ID</u>	<u>LATITUDE</u>	<u>LONGITUDE</u>	<u>ELEVATION</u>
Anza Gravel Excavation Site	AZRY	33.54	116.63	1265.71
Apple Valley Road Yard	AVRY	34.47	117.15	888.91
Argos Mountain Firing Area	AGMT	34.59	116.43	1337.84
Barstow Rd. Yd.	BSRY	34.92	117.01	613.5
BEARMAT Hill	BMHL	34.25	116.05	722.64
Beaumont Road Yard	BMRY	33.96	116.98	787.26
Big Bear Rd. Yd.	BBRY	34.26	116.88	2051.06
Cajon Maintenance Statio	CJMS	34.31	117.48	933.36
Challenger Middle School	CHMS	34.64	117.83	760.33
College of the Desert	COTD	33.73	116.39	27.79
Desert Sun Science Center	DSSC	33.73	116.71	1660.87
Devil's Punchbowl Park	DVPB	34.41	117.86	1430.85
Diamond Valley Lake West Dam	ESRW	33.68	117.07	548.53
Diamond Valley Lake East Dam	ESRE	33.67	116.99	538.16
Glen Helen Regional Park	GHRP	34.2	117.4	628.62
Hector Mine	HCMN	34.75	116.43	568.76
High Vista Communications Facility	HIVI	34.76	117.8	930.88
Hinds Pumping Station	HNPS	33.71	115.64	393.96
Holcomb Ridge	HOLC	34.46	117.85	1238.17
Iron Mountain Pumping Station	IMPS	34.16	115.15	563.26
La Contenta Middle School	CTMS	34.12	116.37	966.47
Lake Mathews	MATH	33.86	117.44	396.89
Lake Los Angeles School	LLAS	34.59	117.84	812.5
Landers Elementary School	LDES	34.27	116.43	978.04
Ludlow Southwest	LDSW	34.7	116.21	640.93
Mills Filtration Plant	MLFP	33.92	117.32	472.99
Montezuma Valley Fire Dept.	MVFD	33.21	116.53	1190.1
Mountain Skies Observatory	MSOB	34.23	117.21	1733.15
Noble Pass Firing Area	NBPS	34.51	116.15	1098.79
Oasis Elementary School	OAES	34.14	116.07	604.78
Observation Point Creole	OPCL	34.43	116.31	1312.89
Observation Point Bullion	OPBL	34.37	115.92	1226.55
Observation Point Cross	OPCX	34.43	116.15	1133.82
Observation Point Crampto	OPCP	34.37	116.08	1096.67
Observation Point Round	OPRD	34.53	116.29	1400.22
Palm Springs Airport	PSAP	33.82	116.49	86.75
Palomar Observatory	PMOB	33.36	116.86	1662.53
Perris Pump Back Facility	PPBF	33.84	117.18	428.11

<u>SITE</u>	<u>ID</u>	<u>LATITUDE</u>	<u>LONGITUDE</u>	<u>ELEVATION</u>
Philips Lab	PHLB	34.93	117.69	886.17
Pinemeadon	ROCH	33.61	116.61	1393.73
Rialto High School	RTHS	34.09	117.35	328.7
Rodman Mountain	RDMT	34.64	116.62	1782.99
Salton City Maintenance Station	SLMS	33.29	115.98	-45.93
San Gorgonio Pass 1	SGPS	33.91	116.7	476.72
Siberia	SIBE	34.62	116.02	362.51
Southern California Intl. Apt.	SCIA	34.61	117.39	831.45
Sweeney Granite Mountains Research Ctr	GMRC	34.78	115.66	1298.21
Table Mountain	TABL	34.38	117.68	2228.02
Troy	TROY	34.84	116.53	613.57
West Ord Mtn. Communications Facility	WOMT	34.67	116.93	1353.04
Wide Canyon	WIDC	33.93	116.39	445.02
Yucaipa	CRFP	34.04	117.1	688.81