HOLMES & NARVER, INC.
ENGINEERS . CONSTRUCTORS
LOS ANGELES, CALIFORNIA

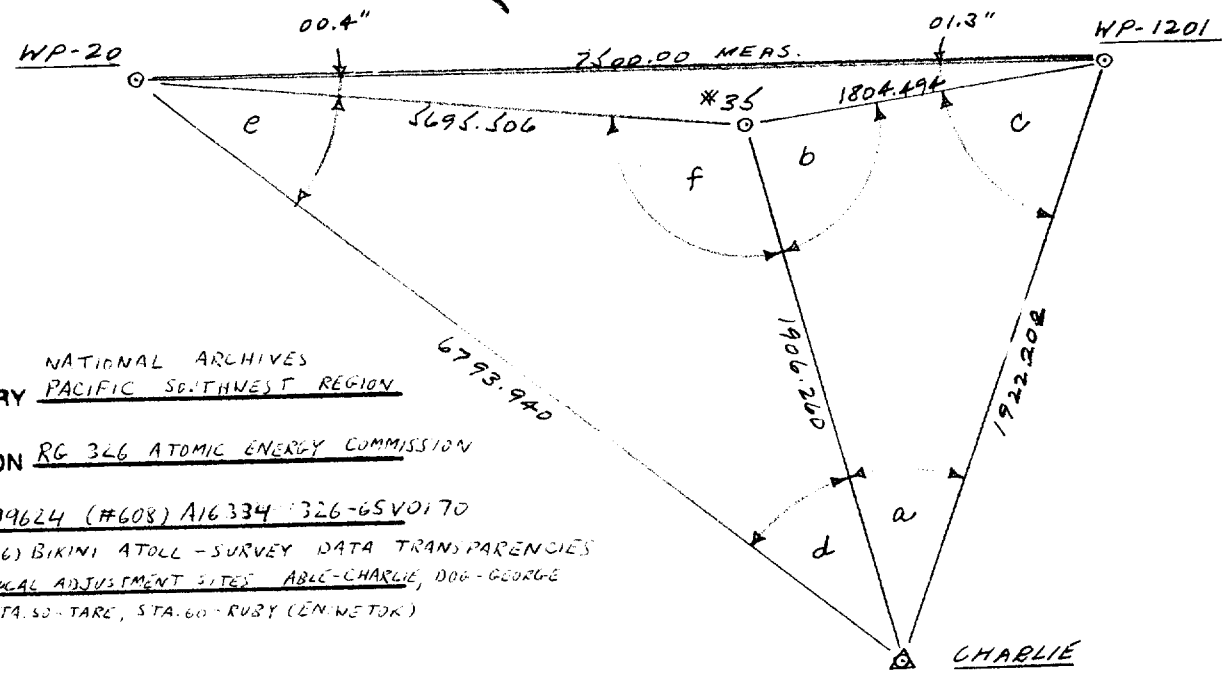
JOB NO. 607

SHEET 1 OF 4

TITLE LOCAL TRIANGULATION ADJUSTMENT ABLE-CHARLIE AREA BY LSH DATE 10-53

406283

~~OFFICIAL USE ONLY~~



REPOSITORY NATIONAL ARCHIVES PACIFIC SOUTHWEST REGION

COLLECTION RG 326 ATOMIC ENERGY COMMISSION

BOX No. 199624 (#608) A16334 326-65V0170
(6) BIKINI ATOLL - SURVEY DATA TRANSPARENCIES

FOLDER LOCAL ADJUSTMENT SITES ABLE-CHARLIE, DOG-GEORGE
STA. 50 - TARE, STA. 60 - RUBY (ENIWETOK)

	MEAS. ∡	GEO. COND.		TRIG. COND.	
			b+f = 01.7		
a	56-14-26.1	25.7	25.4	25.3	
b	62-19-34.7	34.2	34.9	34.9	
c	61-26-00.6	00.1	59.7	59.8	
	01.4				
d	47-56-18.1	17.3	16.9	17.0	
e	14-23-17.4	16.6	16.3	16.2	
f.	117-40-27.0	26.1	26.8	26.8	
	02.5				

TRIG EQ. $\frac{1804.494 \sin c \sin d}{5695.506 \sin e \sin a} = 1$

1804.494	3.2563555		5695.506	3.7555324	
Sin 61-25-59.7	9.9946234	11.5	Sin 14-23-16.3	9.3952996	82.1
Sin 47-56-16.9	9.8706500	19.0	Sin 56-14-25.4	9.9197977	14.1
	3.0706289	30.5		3.0706297	96.2
				289	30.5
				8	126.7

8/126.7 = 0.06"

5695.506 / Sin 47-56-17.0 — Sin 14-23-16.2 (1906.254) — Sin 117-40-26.8 (6793.936)

1804.494 / Sin 56-14-25.3 — Sin 61-25-59.8 (1906.257) — Sin 62-19-34.9 (1922.202)

~~OFFICIAL USE ONLY~~

Reproduced from the holdings of the National Archives
Pacific Southwest Region

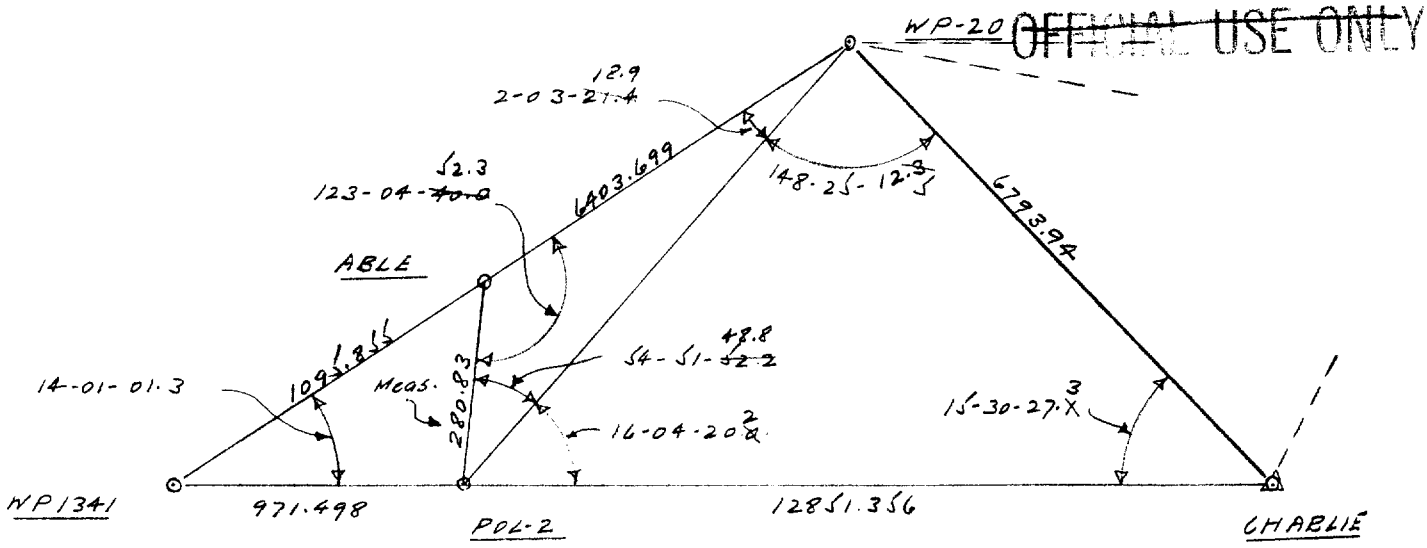
HOLMES & NARVER, INC.
ENGINEERS · CONSTRUCTORS
LOS ANGELES, CALIFORNIA

JOB NO. 884

SHEET 2 OF 4

TITLE LOCAL TRIANGULATION ADJUSTMENT ABLE-CHARLIE AREA BY LSH DATE 10-53

OFFICIAL USE ONLY



6793.94 / Sin 16-04-20.2 — Sin 15-30-27.3 (6561.205) — Sin 148-25-12.5 (12851.356)

6561.205 Sin 2-03-18.9 = 235.306
Log " = 6556.984

971.498 Sin 14-01-01.3 = 235.307
Log " = 942.570

280.83 / Sin 14-01-01.3 — Sin 56-55-07.7 (971.498) — Sin 109-03-51.0 (1095.855)

Reproduced from the holdings of the National Archives
Pacific Southwest Region

OFFICIAL USE ONLY

Reproduced from the holdings of the National Archives
Pacific Southwest Region

LETTER DATED JULY, 15, 1994
FROM ANTON [illegible] TO
DIANE S. [illegible]

STATION	BEARING	DISTANCE	COSINE	SINE	LATITUDE	DEPARTURE	CO-ORDINATES NORTH	CO-ORDINATES EAST
△ CHARLIE							171,297.20	82,923.80
	S 84-15-19.3W	6793.94	10009496	99497788	S 680.039	W 6759.821		
WP-20							170,617.16	76,163.98
	N 69-52-02.7E	7500.00	34419370	93889867	N 2581.453	E 7041.740		
WP-1201							173,198.61	83,205.72
	S 8-26-01.4W	1922.20	98918619	14666525	S 1901.414	W 281.920		
△ CHARLIE							171,297.20	82,923.80
WP-20							170,617.16	76,163.98
	N 69-52-03.1E	5695.506	34419187	93889934	N 1960.347	E 5347.507		
*35							172,577.51	81,511.49
	N 69-52-01.4E	1804.494	34419961	93889650	N 621.106	E 1694.233		
WP-1201							173,198.61	82,205.72
*35							172,577.51	81,511.49
△ CHARLIE	S 47-48-24.0E	1906.257	67163439	74088275	S 1280.308	E 1412.31	171,297.20	82,923.80
△ CHARLIE							171,297.20	82,923.80
	S 68-44-52.0W	12851.356	36247419	93199381	S 4658.285	W 11977.384		
POL-2							166,638.92	70,946.42
	"	971.498	"	"	S 352.143	W 905.430		
WP-1341							166,286.77	70,040.99
	N 54-43-50.7E	1095.855	57741953	81644760	N 632.768	E 894.708		
ABLE							166,919.54	70,935.69
	"	6403.699	"	"	N 3697.621	E 5228.285		
WP-20							170,617.16	76,163.98
POL-2							166,638.92	70,946.42
	N 2-11-17.0W	280.83	99927090	03817949	N 280.625	W 10.722		
ABLE							166,919.54	70,935.69
POL-2							166,638.92	70,946.42
	N 52-40-31.8E	6561.205	60632849	79521427	N 3978.246	E 5217.564		
WP-20							170,617.16	76,163.98

CALC. BY MRT DATE 10-53
CHKD. BY LSH DATE 10-53

HOLMES & NARVER INC. - ENGINEERS - [illegible]

TRAVERSE LOCATION OF STATIONS 20,1201,1341

JOB NO. 884

SHEET NO. 3 OF 4

OFFICIAL USE ONLY

OFFICIAL USE ONLY

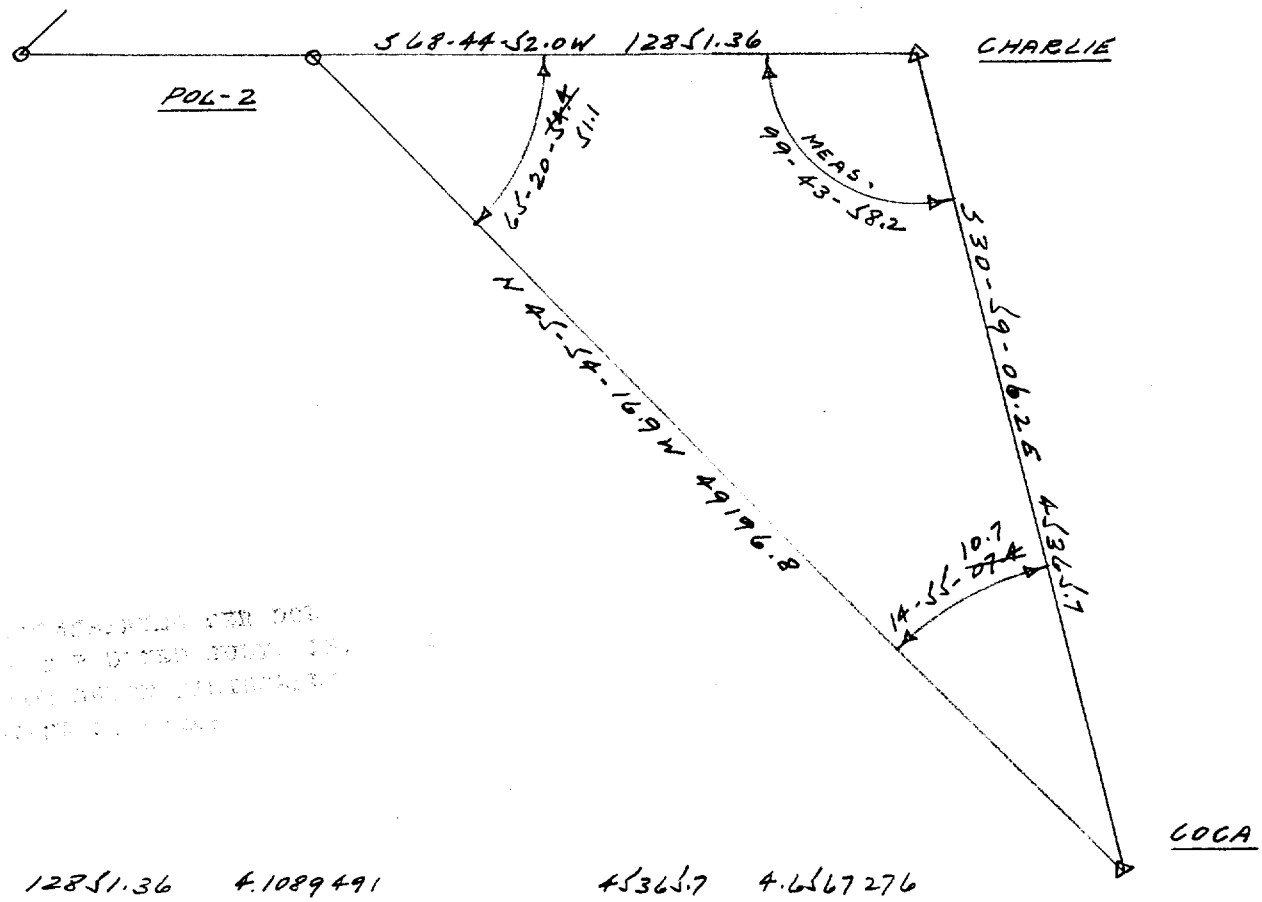
HOLMES & NARVER, INC.
ENGINEERS · CONSTRUCTORS
LOS ANGELES, CALIFORNIA

JOB NO. 984
SHEET 4 OF 4

TITLE LOCAL TRIANGULATION ADJUSTMENT ABLE-CHARLIE AREA
BY LSH DATE 10-53

~~OFFICIAL USE ONLY~~

ORIENTATION OF ABLE-CHARLIE AREA



Log. 12851.36	4.1089491	
Log. Sin 65-20-54.4	9.9584985	9.7
	4.0674476	9.7
	4181	79.0
	296	88.7

45365.7	4.6567276	
14-55-07.4	9.4106905	79.0
	4.0674181	79.0

296 / 88.7 = 3.3"

45365.7
Sin 65-20-51.1

Sin 14-55-10.7
12851.38

Sin 99-43-58.2
49196.81

S 30-59-06.2 E
14-55-10.7
N 45-54-16.9 W

S 30-59-06.2 E
99-43-58.2
S 68-44-52.0 W

OFFICIAL USE ONLY

Reproduced from the holdings of the National Archives
Pacific Southwest Region

Reproduced from the holdings of the National Archives
Pacific Southwest Region

DECLASSIFIED PER DOE
LETTER DATED JULY. 15, 1994
FROM ANTON SINISTALLI TO
DIANE S. NIXON

HOLMES & NARVER INC.-ENGINEERS CONSTRUCTORS

COMPUTATION OF SITE CHARLIE ~~BASE LINE~~ FIRST ORDER TRAVERSE

~~OFFICIAL USE ONLY~~

CALC. BY: McF CHKD BY: L.S.H. DATE: 9-53 JOB NO. 884 LOCATION BIKINI ATOLL M.I.

SECTION	DATE	DIR. OF MEAS.	TAPE NO	SUP-PORT	UNCORR. LENGTH NO.	UNCORR. LENGTH METERS	TEMP "C"	CORRECTIONS TEMP METERS	CORRECTIONS ~~SET-UP~~ SET-BACK METERS	CORRECTIONS INCLINATION METERS	CORRECTIONS SEA LEVEL METERS	REDUCED LENGTH METERS	ADOPTED LENGTH ~~METERS~~ FEET
STA. 0+00													
	8-15-53	F	8193		23	49.99923		+.00654	+.06000	-.00390		1150.04493	
STAKE-23													
	8-15-53	B	8187		23	49.99874		+.00790	+.07490	-.00390		1150.04992	
STA. 0+00												1150.04742	3373.11391
STAKE-23													
	8-15-53	F	8172		23	49.99913		+.00837	+.01710	-.00100		1150.00446	
STAKE-46													
	8-15-53	B	8193		23	49.99923		+.00838	+.01480	-.00100		1150.00447	
STAKE-23												1150.00447	3772.97300
											TOTAL	2300.05189	7546.08691
			46.087					7500.000					
0+00						WP-20						WP-1201 STK-46	

~~OFFICIAL USE ONLY~~

HOLMES & NARVER, INC.
ENGINEERS - CONSTRUCTORS

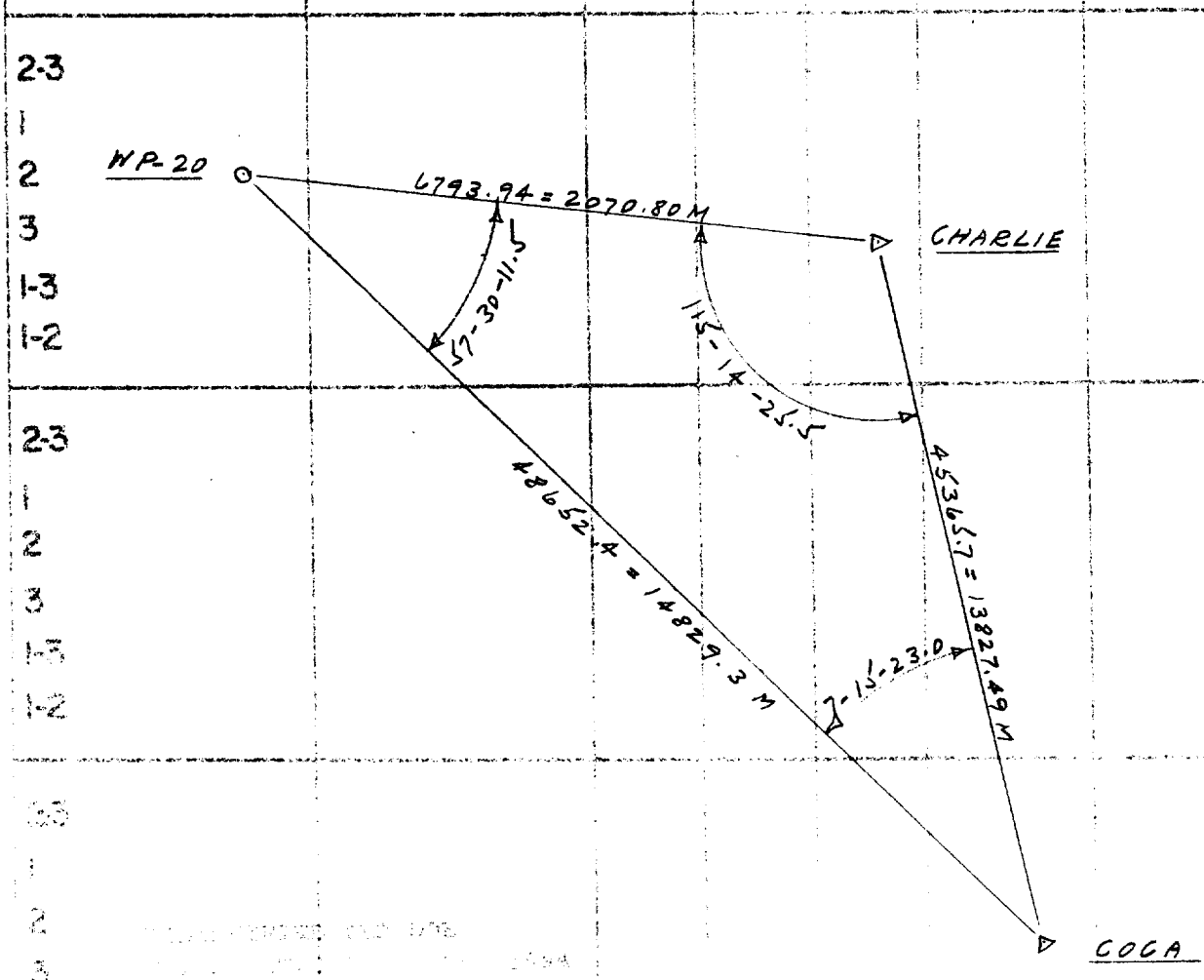
JOB NO. 884

~~OFFICIAL USE ONLY~~

COMPUTATION OF TRIANGLES

COMPUTED BY LSH CHECKED BY DATE 10-53

STATION	OBSERVED ANGLE	CORR-N	SPHERICAL ANGLE	SPHERICAL EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
2-3						4.1407434
1 WP-20	57-30-11.5	—	11.5	0.0	11.5	0.0739554
2 CHARLIE	115-14-25.5	—	25.5	0.0	25.5	9.9564213
3 COCA	7-15-23.0	—	23.0	0.0	23.0	9.1014363
1-3					14829.3	4.1711201
1-2					2070.80	3.3161351



~~OFFICIAL USE ONLY~~

Reproduced from the holdings of the National Archives
Pacific Southwest Region

Reproduced from the holdings of the National Archives
Pacific Southwest Region

DECLASSIFIED PER DOE
[illegible] APRIL 15, 1994
[illegible] TO
DIANE E. NELSON

JOB Nº 884

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

COMPUTED BY LSH DATE 10-53

			°	'	"					°	'	"
CHARLIE		COCA	328	59	24.5	α	3	COCA	to 2 CHARLIE	149	00	11.9
			+115	14	25.5	3rd ∠			B	− 7	15	23.0
CHARLIE	to	WP-20	84	13	50.0	α	3	COCA	to 1 WP-20	141	44	48.9
			−	0	13.8	Δα				−	1	01.2
			180	00	00.0					180	00	00.0
WP-20	to	CHARLIE	264	13	36.2	α'	1	WP-20	to 3 COCA	321	43	47.7

FIRST ANGLE OF TRIANGLE 57-30-11.5

				°	'	"		°	'	"			°	'	"
11 41 33.672	CHARLIE	λ	165	17	32.784	φ	11	35	07.935	3	COCA	λ	165	21	27.917
− 0 06.777		Δλ	−	1	08.030	Δφ	+	6	18.960			Δλ	−	5	03.164
11 41 26.895	WP-20	λ'	165	16	24.754	φ'	11	41	26.895	1	WP-20	λ'	165	16	24.75[illegible]

Logarithms	Values in seconds
3.3161382	
9.0022772	
8.5124950	
0.8309104	1st term +6.7750
6.63228	
9.99559	
0.72248	
7.35035	2d term .0022
1.6618	
1.9899	
3.6517	3d term .0000
	+6.7772

	° ' "	Logarithms	Values in seconds
½(φ+φ')	11-41-30.284		
s		3.3161382	
Sin α		9.9977945	
A'		8.5096662	
Sec φ'		0.0091039	
Δλ		1.8327028	−68.0304
Sin ½(φ+φ')		9.3067385	
−Δα		1.1394413	−13.786

	Logarithms	Values in seconds
s	4.1711207	
Cos α	9.8950265	
B	8.5124983	
h	2.5786455	1st term −379.0055
h²	8.34224	
Sin 1"	9.58357	
C	0.71848	
	8.64429	2d term +.0441
h⁴	5.1573	
P	1.9861	
	7.1434	3d term +.0014
		−Δφ −378.9600

	° ' "	Logarithms	Values seconds
½(φ+φ')	11-38-17.415		
s		4.1711207	
Sin α		9.7917862	
A'		8.5096662	
Sec φ'		0.0091039	
Δλ		2.4816770	−303.1636
Sin ½(φ+φ')		9.3047715	
−Δα		0.7864485	−61.157

OFFICIAL USE ONLY

OFFICIAL USE ONLY

Reproduced from the holdings of the National Archives
Pacific Southwest Region

JOB Nº 884

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

LSH 11-S3

WP-20	CHARLIE	264	13	36.2	α	3 CHARLIE	to 2 WP-20	84	13	50.0
		150	28	31.4	3rd ∠			− 14	18	57.2
WP-20	ABLE	54	42	07.6	α	3 CHARLIE	to 1 ABLE	69	54	52.8
		−	0	10.6	Δα			−	0	24.4
		180	00	00.0				180	00	00.0
ABLE	WP-20	234	41	57.0	α'	1 ABLE	to 3 CHARLIE			

FIRST ANGLE OF TRIANGLE 15-12-31.4

11 41 26.895	WP-20	λ	165	16	24.754	φ	11	41	33.672	3 CHARLIE	λ	165	17	32.784
− 0 36.708		Δλ	−	0	52.599	Δφ	−	0	43.486		Δλ	−	02	00.629
11 40 50.187	ABLE	λ'	165	15	32.155	φ'	11	40	50.186	1 ABLE	λ'	165	15	32.155

Logarithms	Values in seconds
3.2904465	
9.7617982	
8.5124951	
1.5647398	
6.58089	
9.82355	
0.72251	
7.12695	
3.1295	
1.9899	
1st term	+36.7062
2nd term	.0013
	.0000
Δφ	+36.7075

$\frac{1}{2}(\phi+\phi')$ 11-41-08.541

	Logarithms	Values in seconds
s	3.2904465	
Sin α	9.9117747	
A'	8.5096663	
Sec φ'	0.0090881	
Δλ	1.7209756	−52.5988
$\sin^2\frac{1}{2}(\phi+\phi')$	9.3065172	
Δα	1.0274928	+10.654

	Logarithms	Values in seconds
s	3.5899485	
Cos α	9.5358247	
B	8.5124950	
h	1.6382682	
s^2	7.17990	
$\sin^2\alpha$	9.9455	
C	0.72248	
	7.84788	
h^2	3.2765	
	1.9899	
	5.2664	
1st term		+43.4789
2nd term		+.0070
3rd term		.0000
−Δφ		+43.4859

$\frac{1}{2}(\phi+\phi')$ 11-41-11.929

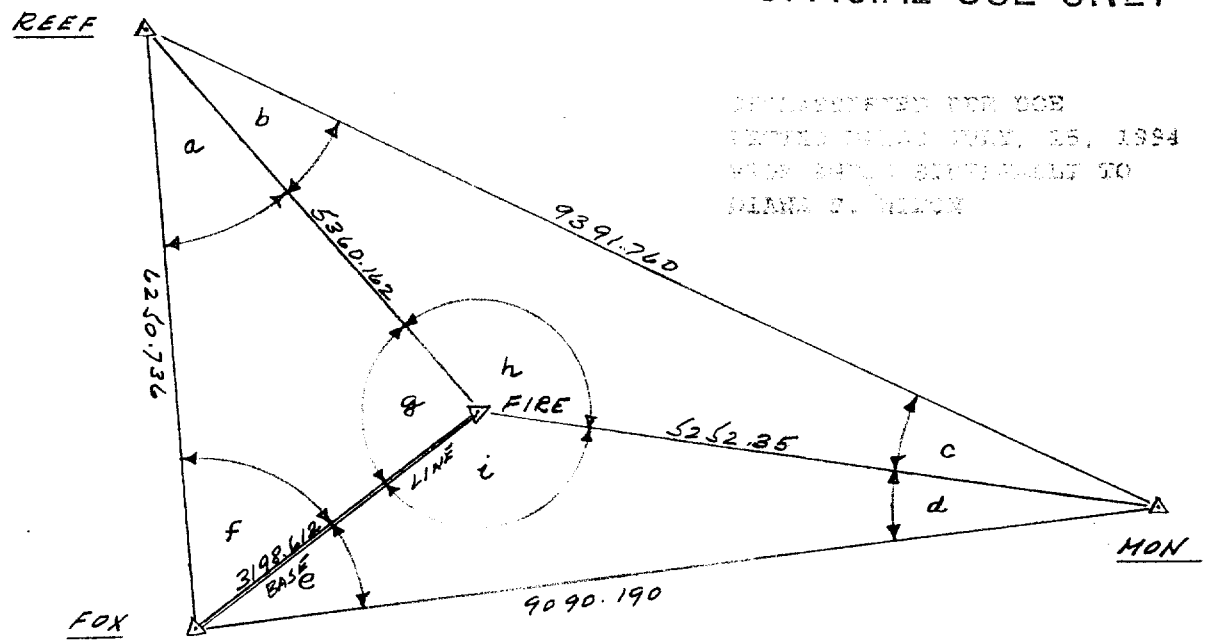
	Logarithms	Values in seconds
s	3.5899485	
Sin α	9.9727499	
A'	8.5096663	
Sec φ'	0.0090881	
Δλ	2.0814528	−120.629
$\sin^2\frac{1}{2}(\phi+\phi')$	9.3065151	
−Δα	1.3880043	+24.434

HOLMES & NARVER, INC.
ENGINEERS · CONSTRUCTORS
LOS ANGELES, CALIFORNIA

JOB NO. 884
SHEET 1 OF 6

TITLE LOCAL TRIANGULATION ADJUSTMENT DOG-GEORGE AREA
BY LSH DATE 9-53

~~OFFICIAL USE ONLY~~



	MEAS ∡	GEO. COND.		TRIG. COND.	
a	30-46-43.7	43.9		41.3	
b	27-26-47.9	48.1		50.7	
c	28-03-38.3	38.5		35.9	
d	12-59-53.7	53.9		56.5	
e	21-40-36.4	36.6		34.0	
f	59-02-18.7	19.0		21.6	
	58.7				
g	90-10-55.0	57.1		57.1	
h	124-29-33.7	33.4		33.4	
i	145-19-31.3	29.5		29.5	
	00.0				

Side Eq $\frac{\text{FOX-Fire} \quad \sin f \quad \sin b \quad \sin d}{\text{FOX-Fire} \quad \sin e \quad \sin c \quad \sin a} = 1$

Log	3198.612 =	3.5049615		Log	3198.612	3.5049615	
Log sin	59-02-19.0 =	9.9332413	12.6	Log sin	21-40-36.6	9.5674629	53.0
"	27-26-48.1 =	9.6636285	40.6	"	28-03-38.5	9.6724735	39.5
"	12-59-53.9 =	9.3520324	91.3	"	30-46-43.9	9.7090374	35.4
		2.4538637	144.5			2.4539353	127.9
						8637	144.5
						716	272.4

716 / 272.4 = 2.63"

~~OFFICIAL USE ONLY~~

Reproduced from the holdings of the National Archives
Pacific Southwest Region

~~OFFICIAL USE ONLY~~

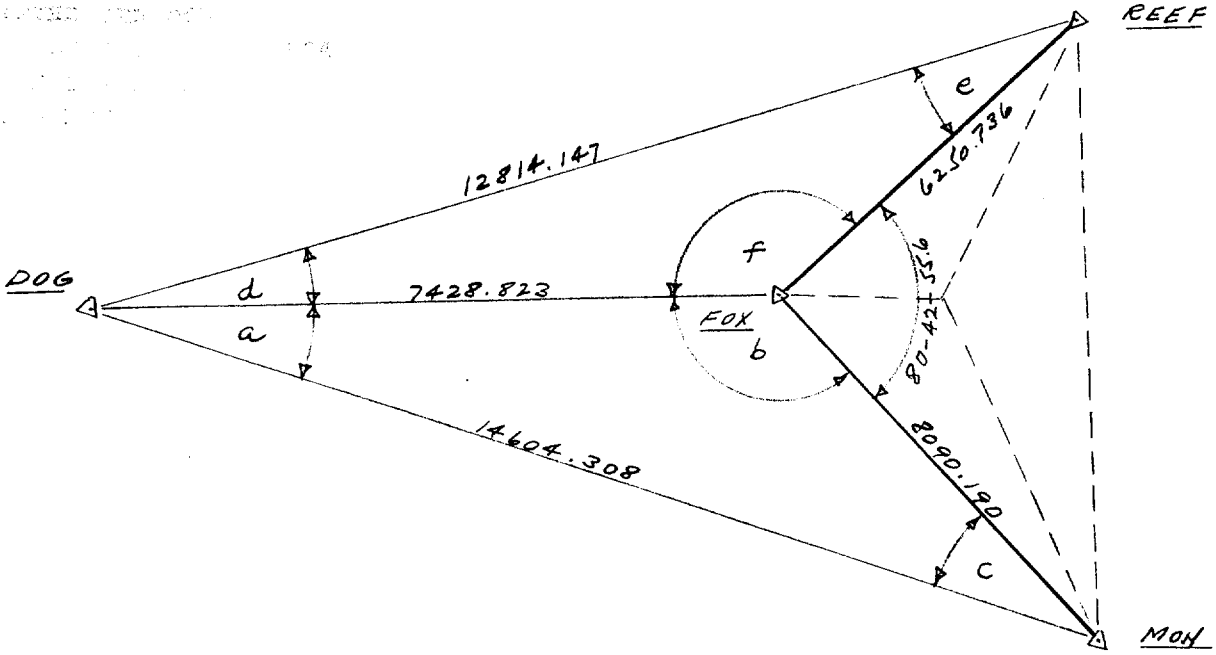
3198.612	Sin 59-02-21.6	Sin 90-10-57.1
Sin 30-46-41.3	(5360.162)	(6250.736)
5360.162	Sin 27-26-50.7	Sin 124-29-33.4
Sin 28-03-35.9	(5252.352)	(9391.760)
3198.612	Sin 21-40-34.0	Sin 145-19-29.5
Sin 12-59-56.5	(5252.360)	(8090.190)

Reproduced from the holdings of the National Archives
Pacific Southwest Region

~~OFFICIAL USE ONLY~~

TITLE LOCAL TRIANGULATION ADJUSTMENT DOG-GEORGE AREA BY LSH DATE 9-53

~~OFFICIAL USE ONLY~~



	MEAS. ∡	GEO. COND.		TRIG. COND	
			b+f. = 04.4		
a	20-40-00.7	59.2	59.0	00.9	
b	140-25-24.2	22.7	23.2	23.2	
c	18-54-39.5	38.1	37.8	35.9	
	04.4				
d	18-43-07.8	07.8	07.6	05.7	
e	22-25-11.5	11.5	11.2	13.1	
f.	138-51-40.7	40.7	41.2	41.2	
	0.00				

Side Eq. $\frac{\text{Fire-Reef} \sin e \sin a}{\text{Fire-Mon} \sin c \sin d} = 1$

Log 6250.736 =	3.7959312	
Log sin 22-25-11.2 =	9.5813681	51.0
" 20-39-59.0 =	9.5476837	55.8
	2.9249830	106.8

Log 8090.190 =	3.9079588	
Log. sin 18-54-37.8 =	9.5106667	61.5
" 18-43-07.6 =	9.5064014	62.1
	2.9250269	123.6
	49830	106.8
	439	230.4

439 / 230.4 = 1.9"

6250.736	sin 22-25-13.1	sin 138-51-41.2	8090.190	sin 18-54-35.9	sin 140-25-23.2
sin 18-43-05.7	(7428.823)	(12814.147)	sin 20-40-00.9	(7428.813)	(14604.308)

~~OFFICIAL USE ONLY~~

Reproduced from the holdings of the National Archives
Pacific Southwest Region

Reproduced from the holdings of the National Archives
Pacific Southwest Region

DECLASSIFIED PER DOE
LETTER DATED JULY, 15, 1994
FROM [illegible] MINISGALLI TO
DIANE S. MIXON

OFFICIAL USE ONLY

HOLMES & NARVER INC. - ENGINEERS - CONSULTANTS

CALC. BY ____ CHKD. BY ____ DATE ____ DATE ____

TRAVERSE *1210, 1342, 30, 10* LOCATION OF STATIONS ____ JOB NO. *884* SHEET NO. *4 of 55*

STATION	BEARING	DISTANCE	COSINE	SINE	LATITUDE	DEPARTURE	CO-ORDINATES NORTH	CO-ORDINATES EAST	
△ FOX							170,640.40	124,002.70	1
△ REEF	N 32-07-51.3 E	6250.736	84683506	53185561	N 5293.342	E 3324.489	175,933.74	127,327.19	2
△ MON	S 26-05-40.7 E	9391.760	89806874	43985514	S 8434.446	E 4131.014	167,499.29	131,458.20	3
△ FOX	N 67-09-13.1 W	8090.190	38826139	92154929	N 3141.108	W 7455.509	170,640.40	124,002.69	4
									5
△ FOX							170,640.40	124,002.70	6
△ FIRE	S 88-49-47.1 E	3198.612	02042330	99979142	S 65.326	E 3197.945	170,575.07	127,200.64	7
△ REEF	N 1-21-10.0 E	5360.162	99972129	02360823	N 5358.668	E 126.544	175,933.74	127,327.19	8
									9
△ FIRE							170,575.07	127,200.64	10
△ MON	S 54-09-16.6 E	5252.350	58560000	81060017	S 3075.776	E 4257.556	167,499.29	131,458.20	11
									12
△ MON							167,499.29	131,458.20	13
△ DOG	N 86-03-49.0 W	14604.308	06864891	99764088	N 1002.570	W 14569.855	168,501.86	116,888.35	14
△ REEF	N 54-33-04.4 E	12814.147	57997491	81463434	N 7431.884	E 10438.844	175,933.74	127,327.19	15
									16
△ FOX							170,640.40	124,002.70	17
△ DOG	S 73-16-10.1 W	7428.823	28787028	95766925	S 2138.537	W 7114.355	168,501.86	116,888.35	18
									19
△ DOG							168,501.86	116,888.35	20
WP-1210	N 62-12-35.9 W	206.59	46623267	88466213	N 96.319	W 182.762	168,598.18	116,705.59	21
WP-30, 10, 90, 40	S 0-47-10.4 E	6900.00	99995855	01372174	S 6899.350	E 94.680	161,698.83	116,800.27	22
~~WP-10~~	N 69-19-16.9 E	2640.06	35312606	93557575	N 932.274	E 2469.976	162,631.10	119,270.24	23
WP-1342	N 69-15-34.9 E	13282.07	35413280	93519514	N 4703.617	E 12421.327	167,334.72	131,691.57	24
△ MON	N 54-48-33.1 W	285.56	57630118	81723739	N 164.569	W 233.370	167,499.29	131,458.20	25
									26
WP-30							161,698.83	116,800.27	27
WP-1342	N 69-16-11.7 E	15922.13	35396595	93525831	N 5635.89	E 14891.30	167,334.72	131,691.57	28

OFFICIAL USE ONLY

HOLMES & NARVER, INC.
ENGINEERS . CONSTRUCTORS
LOS ANGELES, CALIFORNIA

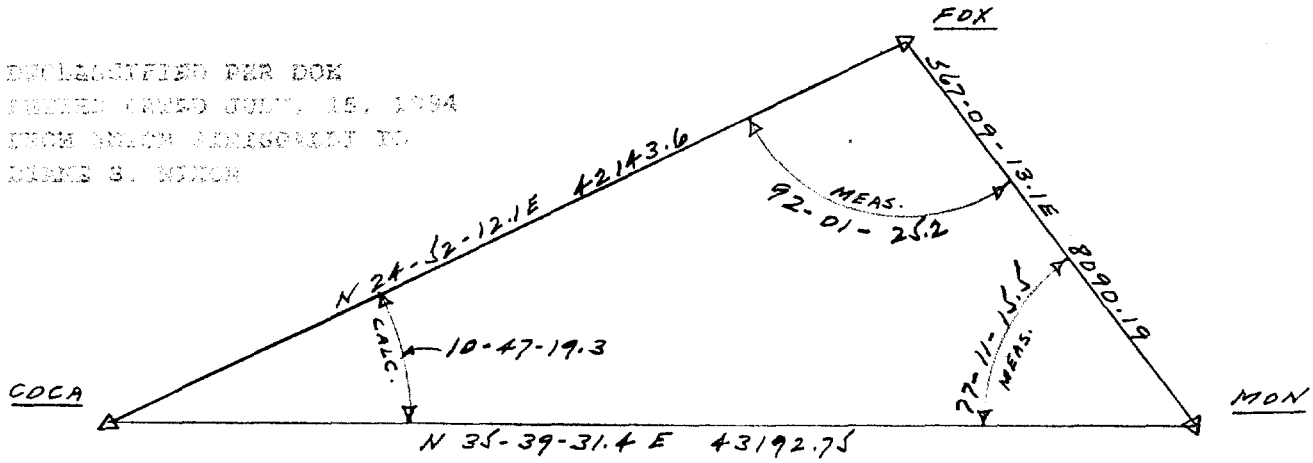
JOB NO. 884
SHEET 5 OF 5

TITLE LOCAL TRIANGULATION ADJUSTMENT DOG-GEORGE AREA
BY LSH DATE 10-53

~~OFFICIAL USE ONLY~~

ORIENTATION OF DOG-GEORGE AREA

DECLASSIFIED PER DOE
[illegible] DATED JULY, 15, 1994
FROM [illegible] TO
[illegible]



92-01-~~26.4~~ 25.2
77-11-15.5
169-12-40.7
10-47-19.3

Log. 42143.60	4.6247316		8090.19	3.9079588	
Log Sin. 10-47-19.3	9.2722768	110.5	77-11-15.5	9.9890498	4.8
	3.8970084	110.5		3.8970086	4.8
				0084	110.5
				02	115.5

42143.6 / Sin 77-11-15.5   Sin 10-47-19.3 (8090.19)   Sin 92-01-25.2 (43192.75)

N 24-52-12.1 E
92-01-25.2
S 67-09-13.1 E

N 24-52-12.1 E
10-47-19.3
N 35-39-31.4 E

Reproduced from the holdings of the National Archives
Pacific Southwest Region

~~OFFICIAL USE ONLY~~

Reproduced from the holdings of the National Archives
Pacific Southwest Region

DECLASSIFIED PER DOE
[illegible] 15, 1994
[illegible] TO
[illegible]

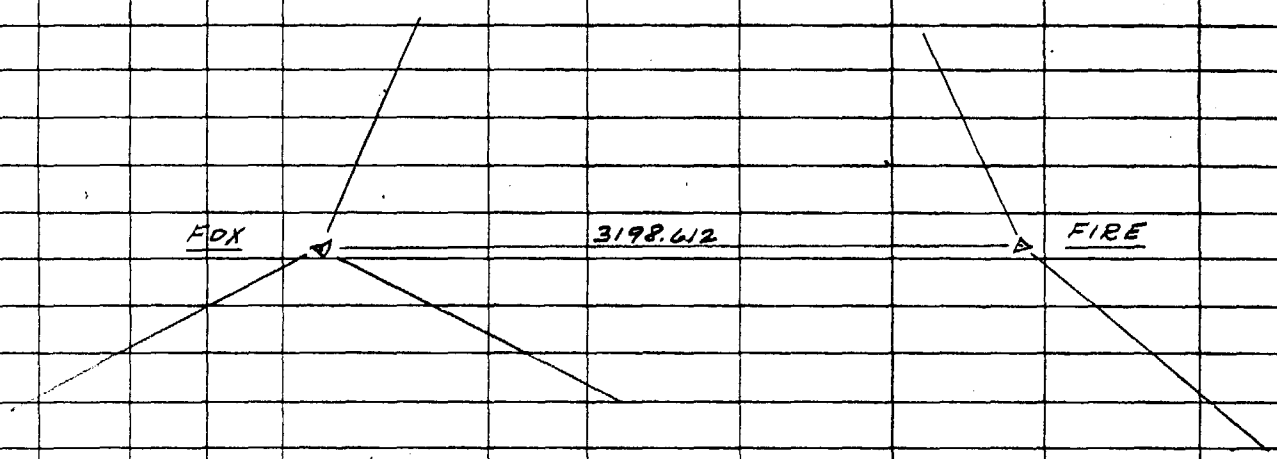
HOLMES & NARVER INC.-ENGINEERS CONSTRUCTORS

COMPUTATION OF SITE FOX ~~BASE LINE~~ FIRST ORDER TRAVERSE

~~OFFICIAL USE ONLY~~

CALC. BY: MR CHKD BY: LSH DATE: 9-53 JOB NO. 884 LOCATION BIKINI ATOLL MI

SECTION	DATE	DIR. OF MEAS.	TAPE NO	SUP-PORT	UNCORR. LENGTH NO.	UNCORR. LENGTH METERS	TEMP "C"	CORRECTIONS TEMP METERS	CORRECTIONS SET-UP SET-BACK METERS	CORRECTIONS INCLINATION METERS	CORRECTIONS SEA LEVEL METERS	REDUCED LENGTH METERS	ADOPTED LENGTH ~~METERS~~ FEET
STA. FOX													
	8-26-53	F	8187		19½	49.99874		+.00742	+.01320	-.05770		974.93835	
STA. FIRE													
	8-26-53	B	8193		19½	49.99923		+.00789	+.00440	-.05770		974.93958	
STA. FOX													
										ADOPTED	LENGTH	974.93897	3198.612



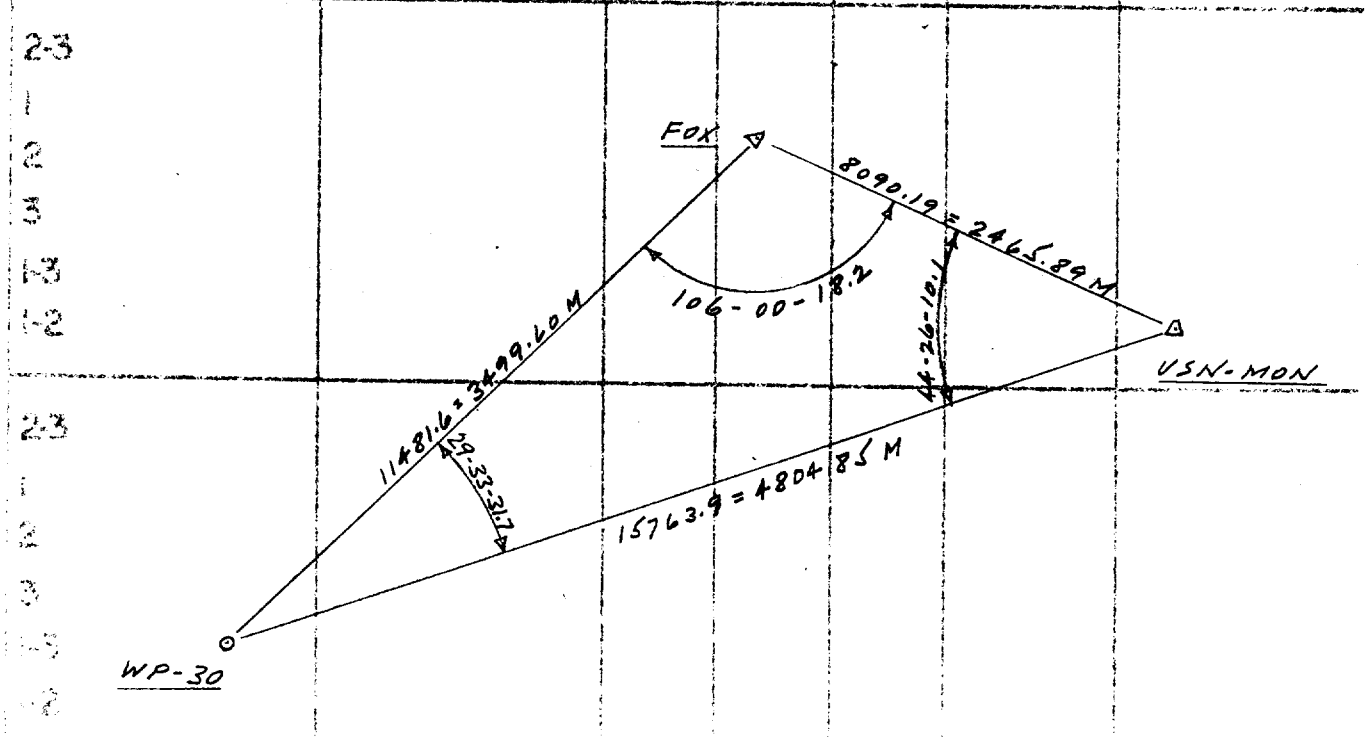
~~OFFICIAL USE ONLY~~

COMPUTATION OF TRIANGLES

~~OFFICIAL USE ONLY~~

COMPUTED BY LSM CHECKED BY DATE 10-53

STATION	OBSERVED ANGLE	CORR-N	SPHERICL ANGLE	SPHERICL EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
2-3						3.3919737
1 WP-30	29-33-31.7	—	31.7	0.0	31.7	0.3068743
2 FOX	106-00-18.2	—	18.2	0.0	18.2	9.9828307
3 USN-MON	44-26-10.1	—	10.1	0.0	10.1	9.8451687
1-3					4804.85	3.6816787
1-2					3499.60	3.5440167



~~OFFICIAL USE ONLY~~

Reproduced from the holdings of the National Archives
Pacific Southwest Region

Reproduced from the holdings of the National Archives
Pacific Southwest Region

DECLASSIFIED PER DOE
LETTER DATED JULY, 15, 1994
FROM ANTON FINTOGALLI TO
DIANE S. NIXON

JOB Nº 884

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

COMPUTED BY LSH DATE 10-53

		°	'	"					°	'	"
FOX	USN-MON	292	50	40.9	α	3 USN-MON	to 2	FOX	112	50	56.1
		106	00	18.2	3d ∠		&		- 44	26	10.1
FOX	WP-30	38	50	59.1	α	3 USN-MON	to 1	WP-30	68	24	46.0
		-	0	14.7	Δα				-	0	29.9
		180	00	00.0					180	00	00.0
WP-30	FOX	218	50	44.4	α'	1 WP-30	to 3	USN-MON	248	24	16.1

FIRST ANGLE OF TRIANGLE 29-33-31.7

					°	'	"		°	'	"			°	'	"
11	41	27.251	FOX	λ	165	24	26.220	φ	11	40	56.091	3 USN-MON	λ	165	25	41.253
-	1	28.705		Δλ	-	1	12.479	Δφ	-	0	57.545		Δλ	-	2	27.513
11	39	58.546	WP-30	λ'	165	23	13.741	φ'	11	39	58.546	1 WP-30	λ'	165	23	13.74[illegible]

Logarithms	Values in seconds	
3.5440184		
9.8914223		
8.5124951		
1.9479358	1st term	+88.7025
7.08804		
9.59492		
0.72252		
7.40548	2d term	+.0025
3.8959		
1.9899		
5.8858	3d term	.0001
	-Δφ	+88.7051

	°	'	"
½(φ+φ')	11-40-42.919		
	Logarithms	Values in seconds	
s	3.5440184		
Sin α	9.7974617		
A'	8.5096665		
Sec φ'	0.0090656		
Δλ	1.8602122	- 72.4790	"
Sin ½(φ+φ')	9.3062563		
-Δα	1.1664685	+ 14.671	

	Logarithms	Values in seconds	
s	3.6816798		
Cos α	9.5657501		
B	8.5124953		
h	1.7599252	1st term	+57.5341 "
s^2	7.36336		
$Sin^2 α$	9.93683		
C	0.72219		
	8.02238	2d term	+.0105
h^2	3.5199		
D	1.9896		
	5.5095	3d term	+.0000
		-Δφ	+57.5446

	°	'	"
½(φ+φ')	11-40-27.319		
	Logarithms	Values in seconds	
s	3.6816798		
Sin α	9.9684169		
A'	8.5096665		
Sec φ'	0.0090656		
Δλ	2.1688288	- 147.5125	"
Sin ½(φ+φ')	9.3060974		
-Δα	1.4749262	29.849	

OFFICIAL USE ONLY
OFFICIAL USE ONLY

Reproduced from the holdings of the National Archives
Pacific Southwest Region

JOB Nº 884

HOLMES & HARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

COMPUTED BY L.S.H. DATE 11-53

		°	'	"					°	'	"
FOX	USN-MON	292	50	40.9	α	3 USN-MON	to 2	FOX	112	50	56.1
		+140	25	23.2	3rd ∠		8		−18	54	35.9
FOX	DOG	73	16	04.1	α	3 USN-MON	to 1	DOG	86 93	03 56	39.8 20.2
		−	0	14.5	Δα				−	0	29.7
		180	00	00.0					180	00	00.0
DOG	FOX	253	15	49.6	α'	1 DOG	to 3	USN-MON	273	55	50.5

SUM OF ANGLES OF TRIANGLE 20-40-00.9

			°	'	"		°	'	"			°	'	"
11 41 27.251	FOX	λ	165	24	26.220	φ	11	40	56.091	3 USN-MON	λ	165	25	41.253
− 0 21.219		Δλ	−	1	11.599	Δφ	+	0	09.941		Δλ	−	2	26.633
11 41 06.032	DOG	λ'	165	23	14.620	φ'	11	41	06.032	1 DOG	λ'	165	23	14.620

Logarithms	Values in seconds																
3.354935 9																	
9.452397																	
8.512495 1																	
1.326670 7	1st term	+21.2164															
6.70987																	
9.96242																	
0.722552																	
7.39481	2d term	.0025															
2.6533																	
1.9899																	
4.6432	3d term	.0000															
	−Δφ	+21.2189															

	°	'	"
½(φ+φ')	11	41	16.642

	Logarithms	Values in seconds
s	3.354935 9	
Sin α	9.981211 7	
Δ'	8.509666 3	
Sec φ'	0.009095 0	
Δλ	1.854908 9	−71.5993
Sin ½(φ+φ')	9.306599 7	
−Δα	1.161508 6	+14.505

	Logarithms	Values in seconds	
s	3.648496 6		
Cos α	8.836915 1		
B	8.512495 3		
h	0.997907 0	1st term	−9.9519
s²	7.29699		
Sin² α	9.99795		
C	0.72219		
	8.01713	2d term	+.0104
h²	1.9958		
D	1.9896		
	3.9854	3d term	+.0000
		−Δφ	−9.9415

	°	'	"
½(φ+φ')	11	41	01.061

	Logarithms	Values in seconds
s	3.648496 6	
Sin α	9.998972 9	
Δ'	8.509666 3	
Sec φ'	0.009095 0	
Δλ	2.166230 8	−146.632
Sin ½(φ+φ')	9.306441 1	
−Δα	1.472671 9	+29.694

HOLMES & NARVER, INC.
ENGINEERS . CONSTRUCTORS
LOS ANGELES, CALIFORNIA

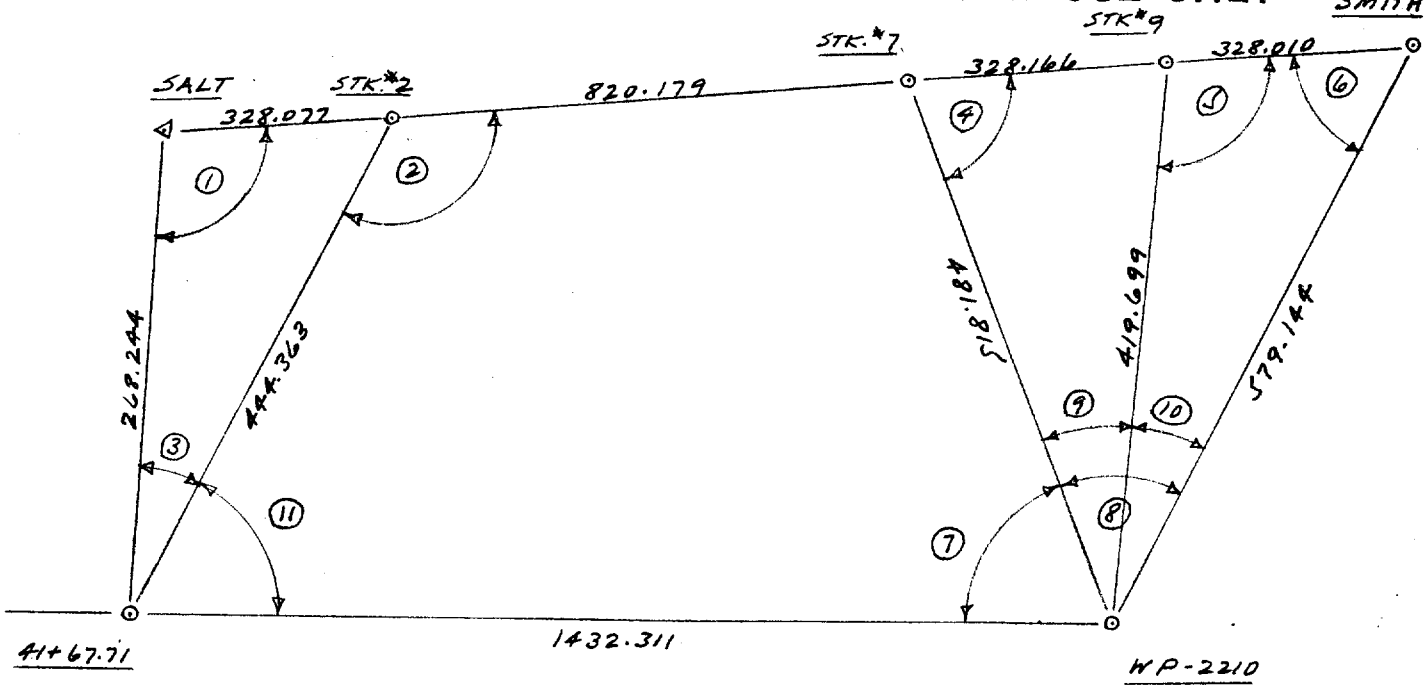
JOB NO. 884

SHEET 1 OF 3

TITLE SITE SUGAR-TARE LOCATION OF STA. 50 AND 2211

BY LSH DATE 10-53

OFFICIAL USE ONLY



(1)	95-49-35.0	37.0	(4)	58-49-35.0	35.0	(7)	53-00-00.0	02.0	(10)	33-48 —	02.5
(2)	36-54-30.0	31.0	(5)	100-49-00.0	00.0	(8)	75-47-27.5	27.5	(11)	42-44 —	04.0
(3)	47-15-50.0	52.0	(6)	45-22-57.5	57.5	(9)	41-59 —	25.0			

328.166
328.010
656.176

656.176 / sin 75-47-27.5

sin 58-49-35.0 (579.144)

sin 45-22-57.5 (481.815)

579.144 / sin 100-49-00.0

sin 45-22-57.5 (419.699)

sin 33-48-02.5 (328.009)

481.815 / sin 79-11-00.0

sin 58-49-35.0 (419.699)

sin 41-59-25.0 (328.167)

328.077 / sin 47-15-52.0

sin 36-54-31.0 (268.244)

sin 95-49-37.0 (444.363)

Reproduced from the holdings of the National Archives
Pacific Southwest Region

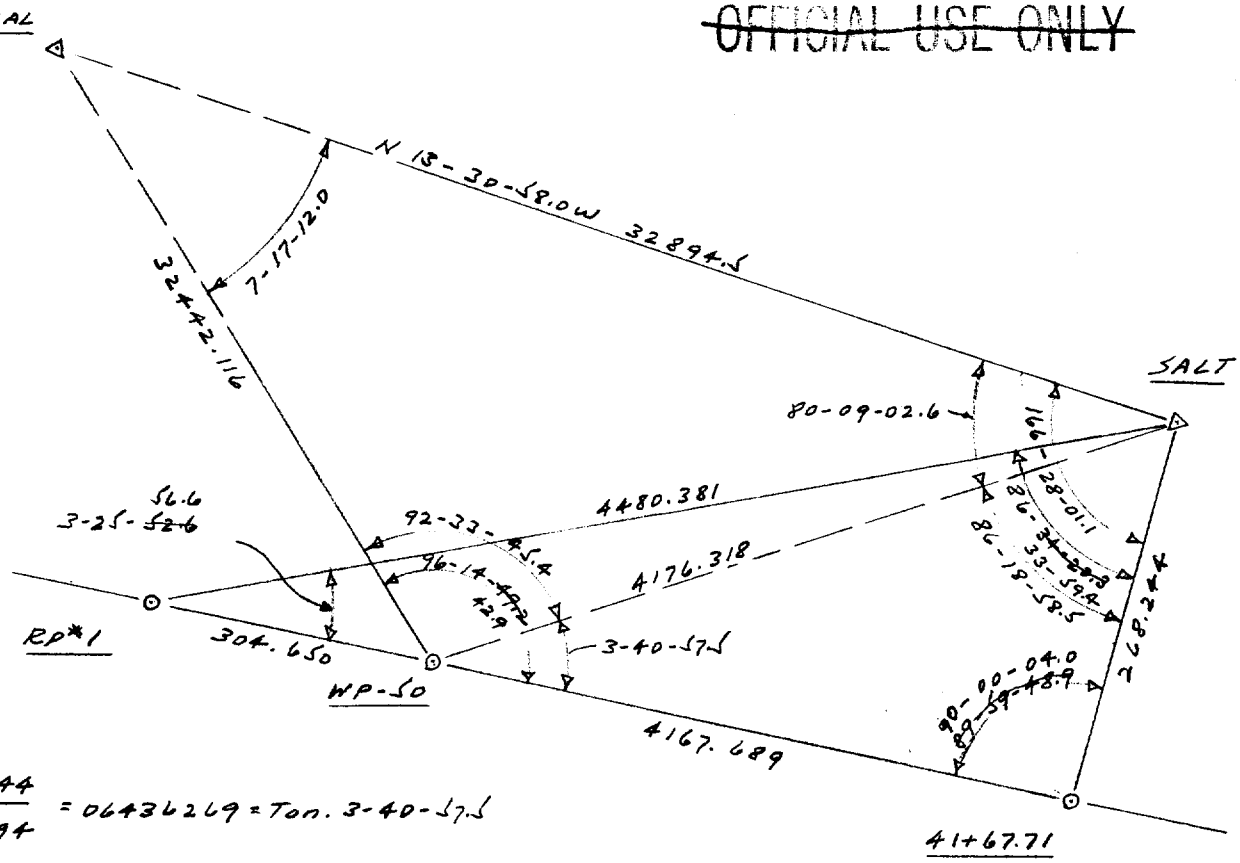
OFFICIAL USE ONLY

HOLMES & NARVER, INC.
ENGINEERS · CONSTRUCTORS
LOS ANGELES, CALIFORNIA

JOB NO. 884
SHEET 2 OF 3

TITLE SITE SUGAR-TARE LOCATION OF STA. 50 AND 2211
BY LSH DATE 10-53

~~OFFICIAL USE ONLY~~



$\frac{268.244}{4167.694}$ = 0.0643269 = Tan. 3-40-57.5

$\frac{4167.694}{\text{Cos. } 3\text{-}40\text{-}57.5}$ = 4176.318

$\frac{4472.339}{\text{Sin } 86\text{-}33\text{-}59.4}$ Sin 3-25-56.6 (268.243) Sin 90-00-04.0 (4480.381)

$\frac{4176.318}{\text{Sin } 90\text{-}00\text{-}04.0}$ Sin 3-40-57.5 (268.245) Sin 86-18-58.5 (4167.689)

4176.318 3.6207936
Sin 92-33-51.7 9.9995648 1.0
3.6203584 1.0
2545 164.6
1039 165.6

32894.5 4.5171233
Sin 7-17-05.7 9.1031312 164.6
3.6202545 164.6
1039 / 165.6 = 6.3"

$\frac{32894.5}{\text{Sin } 92\text{-}33\text{-}45.4}$ Sin 7-17-12.0 (4176.310) Sin 80-09-02.6 (32442.116)

~~OFFICIAL USE ONLY~~

Reproduced from the holdings of the National Archives Pacific Southwest Region

Reproduced from the holdings of the National Archives
Pacific Southwest Region

OFFICIAL USE ONLY

		DISTANCE	COSINE	SINE	LATITUDE	DEPARTURE	CO-ORDINATES NORTH	CO-ORDINATES EAST
SALT								
STK. #2	N84-11-23.9E	328.077	10123042	99486301	N33.211	E326.392	100,421.60	113,966.80
#7	"	820.179	"	"	N83.027	E815.966	100,454.81	114,293.19
#9	"	328.166	"	"	N33.220	E326.480	100,537.84	115,109.16
SMITH	"	328.010	"	"	N33.205	E326.325	100,571.06	115,435.64
W.P.-2210	S38-48-26.4W	579.144	77925776	62670355	S451.302	W362.952	100,604.26	115,761.96
41+67.71	N89-59-03.1W	1432.311	00027586	99999996	N0.395	W1432.311	100,152.96	115,399.01
WP-50	"	4167.689	"	"	N1.150	W4167.689	100,153.36	113,966.70
SALT	N86-19-59.4E	4176.318	06395463	99795280	N267.095	E4167.768	100,154.51	109,799.01
							100,421.60	113,966.80
WP-50								
COCA	N6-13-46.0	32442.1W	99409533	10851024	N32250.540	W3520.300	100,154.51	109,799.01
							132,405.1	106,278.7

CALC. BY LSH DATE 10-53 TRAVERSE SITE SUGAR-TARE LOCATION OF STA. 50,2210 JOB NO. 884

SHEET NO. 3 OF 3

OFFICIAL USE ONLY

Reproduced from the holdings of the National Archives
Pacific Southwest Region

DECLASSIFIED PER DOE
LETTER DATED JULY, 15, 1994
FROM ANTON SINISGALLI TO
DIANE S. NIXON

HOLMES & NARVER INC.-ENGINEERS CONSTRUCTORS

COMPUTATION OF SITE SUGAR-TARE FIRST ORDER TRAVERSE ~~BASE LINE~~ ~~OFFICIAL USE ONLY~~

CALC. BY: JD CHKD BY: LSH DATE: 9-63 JOB NO. 884 LOCATION BIKINI ATOLL M.I.

SECTION	DATE	DIR. OF MEAS.	TAPE NO.	SUP-PORT	UNCORR. LENGTH NO.	UNCORR. LENGTH METERS	TEMP. "C"	CORRECTIONS TEMP. METERS	CORRECTIONS SET-BACK METERS	CORRECTIONS INCLINATION METERS	CORRECTIONS SEA LEVEL METERS	REDUCED LENGTH METERS	ADOPTED LENGTH METERS-FEET
TARGET TO	7-25-63	F	8172		12	49.99913		+.0041	-.0401	+.0120		599.9472	599.9407
STK. 12	7-25	B	8187		12	49.99874		+.0036	-.03575	+.0120		599.9402	
STK 12 TO	7-25	F	8187		12	49.99874		+.0040	-.1200	+.0090		599.8594	599.8577
STK. 24	7-25	B	8193		12	49.99923		+.0038	-.1293	+.0090		599.8559	
STK.24 TO	7-25	F	8193		13	49.99923		+.0052	-.05925	+.0006		649.9349	649.9363
STK.37	7-25	B	8172		13	49.99913		+.0052	-.05525	+.0006		649.9376	
											TOTAL	METERS	1849.7347
												FEET	6068.671
STK 24 TO	7-25	F	8193		4	49.99923		+.0016		-.0002		199.9982	213.3669
STA 41+67.71	7-25	F	8340		13.4 / 50	13.4000		+.0023	-.0320	-.0016		13.3687	
	7-25	B	8172		4	49.99913		+.0016	-.05525	-.0002		199.9425	213.3670
	7-25	B	8340		13.4 / 50	13.4300		+.0023	-.0061	-.0016		13.4246	
											TOTAL	METERS	218.3670
												FEET	700.0216
									TARGET TO WP-50			468.671 ft	
									WP-50 TO STA 41+67.71			1167.689	
									STA 41+67.71 TO WP-2210			1432.311	
												3068.671 ft	

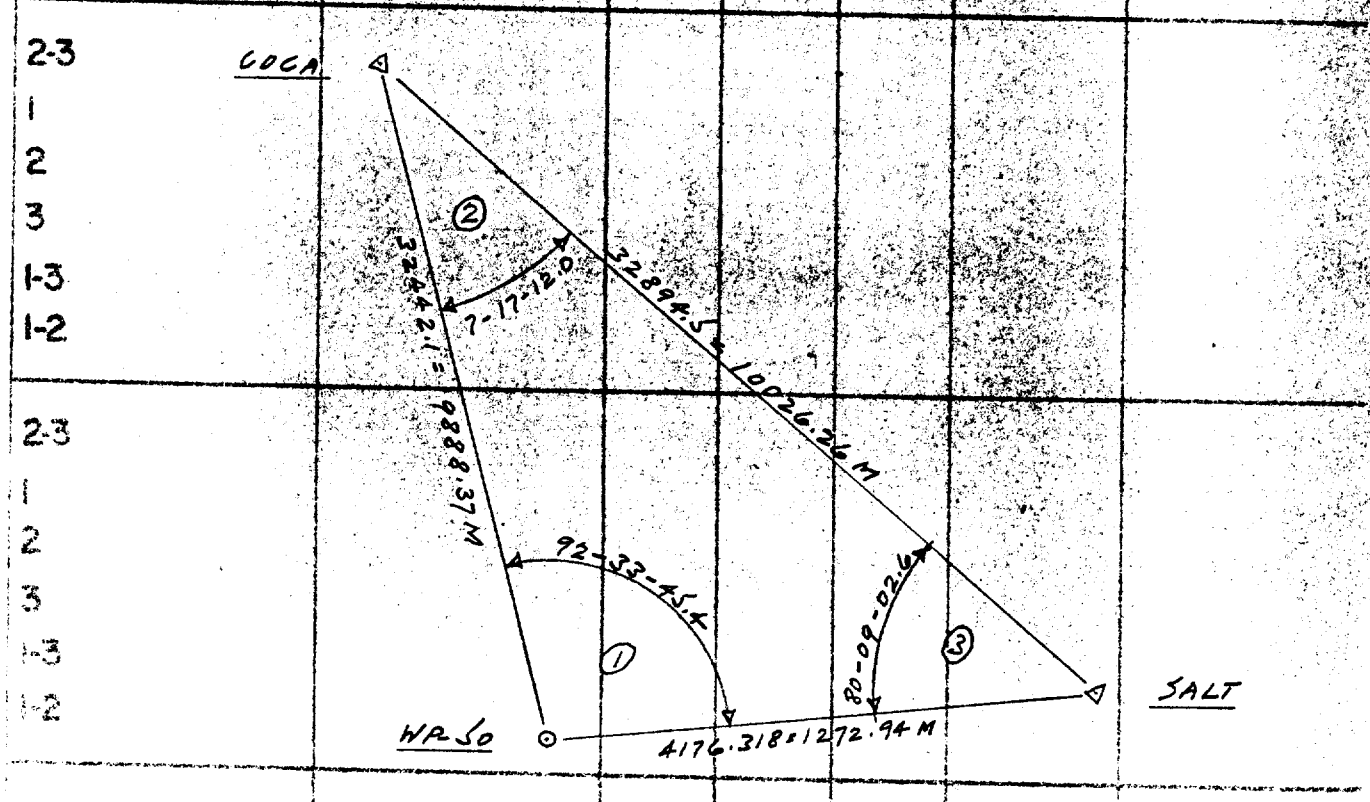
~~OFFICIAL USE ONLY~~

~~OFFICIAL USE ONLY~~

COMPUTATION OF TRIANGLES

COMPUTED BY L.S.H. CHECKED BY _____ DATE 10-53

STATION	OBSERVED ANGLE	CORR-N	SPHERICL ANGLE	SPHERICL EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
2-3						4.0011390
1 WP-50	92-33-45.4	—	45.4	0.0	45.4	0.0004354
2 COCA	7-17-12.0	—	12.0	0.0	12.0	9.1032349
3 SALT	80-09-02.6	—	02.6	0.0	02.6	9.9935513
1-3					1272.94	3.1048093
1-2					9888.37	3.9951257



DECLASSIFIED PER DOE
LETTER DATED JULY, 15, 1994
FROM ANTON SINISGALLI TO
DIANE S. NIXON

~~OFFICIAL USE ONLY~~

Reproduced from the holdings of the National Archives
Pacific Southwest Region

Reproduced from the holdings of the National Archives
Pacific Southwest Region

DECLASSIFIED PER DOE
LETTER DATED JULY, 15, 1994
FROM ANTON SINISGALLI TO
DIANE S. NIXON

JOB Nº 884

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION — SECOND ORDER TRIANGULATION

COMPUTED BY LSH DATE 10-53

COCA	to 3 SALT	346	28	20.1	α	3 SALT	to 2 COCA	166	28	35.6
	&	+ 7	17	12.0	3d ∠		&	− 80	09	02.6
COCA	to 1 WP-50	353	45	32.1	α	3 SALT	to 1 WP-50	86	19	33.0
		+	0	07.1	Δα			−	0	08.4
		180	00	00.0				180	00	00.0
WP-50	to 2 COCA	173	45	39.2	α'	1 WP-50	to 3 SALT	266	19	24.6

FIRST ANGLE OF TRIANGLE 92-33-45.4

φ	11	35	07.935	2 COCA	λ	165	21	27.917	φ	11	29	50.670	3 SALT	λ	165	22	45.305
Δφ	−	5	19.922		Δλ	+	0	35.471	Δφ	−	0	02.656		Δλ	−	0	41.917
φ'	11	29	48.014	1 WP-50	λ'	165	22	03.388	φ'	11	29	48.014	1 WP-50	λ'	165	22	03.388

Logarithms	Values in seconds	
3.9951247		
9.9974184		
8.5124983		
2.5050414	1st term	+319.9200
7.99025		
8.07256		
0.71848		
6.78129	2d term	+.0006
5.0101		
1.9861		
6.9962	3d term	+.0010
	−Δφ	+319.9216

½(φ+φ')	11-32-27.974	
	Logarithms	Values in seconds
s	3.9951247	
Sin α	9.0362781	
A'	8.5096681	
Sec φ'	0.0088022	
Δλ	1.5498731	+35.4710
Sin ½(φ+φ')	9.3011838	
−Δα	0.8510569	−7.0967

	Logarithms	Values in seconds	
s	3.1048079		
Cos α	8.8067385		
B	8.5124910		
h	0.4240374	1st term	+2.6548
s²	6.20962		
Sin² α	9.99821		
C	0.71508		
	6.92291	2d term	+.0008
n²	0.8481		
D	1.9830		
	2.8311	3d term	+.0000
		−Δφ	+2.6556

½(φ+φ')	11-29-49.342	
	Logarithms	Values seconds
s	3.1048079	
Sin α	9.9991064	
A'	8.5096681	
Sec φ'	0.0088022	
Δλ	1.6223846	−41.9166
Sin ½(φ+φ')	9.2995450	
−Δα	0.9219296	+8.3547

OFFICIAL USE ONLY

OFFICIAL USE ONLY