

April 2000

SCHLUMBERGER RESERVOIR EVALUATION SEISMIC

for

SANTOS LTD CAMERONS 2000 SEISMIC SURVEY

*Final Operations Report
on the*

Surveys

Satellite

Dynamic



Table of Contents

1	INTRODUCTION	
2	INSTRUMENTATION AND PERSONNEL	
2	2.1 Personnel	
2	2.2 Equipment	
3	2.3 Logistics	
4	SURVEY REFERENCE SYSTEMS	
4	3.1 Survey Datum	
4	3.1.1 Geodetic Datum	
4	3.1.2 Map Projection	
5	3.1.3 Height Datum	
7	SURVEY CONTROL	
7	4.1 Survey Datum	
8	MONUMENTATION	
9	METHOD OF SURVEY	
9	6.1 Line Pointing	
10	6.2 RT20 Survey-chaining	
11	6.3 GPS Processing and Quality Control	
12	DATA PRESENTATION	
13	SAFETY	
14	CHRONOLOGICAL SUMMARY OF SURVEY	
18	OPERATIONAL ASPECTS	
20	CONCLUSION AND RECOMMENDATIONS	
21	APPENDICES	
A-1	Control Survey, Miscloses and Ties	
B-1	Control Network and Base Station Diagrams	
C-1	New Permanent Markers Listing	
D-1	New Line Intersections Listing	
E-1	Line Intersection Diagrams	
F-1	Upholes Listing	
G-1	Chaining Maps	
H-1	Photographs	

Total Distance = 70.520 Kilometres

Line	From	To	Distance
OCM00-01	200	550	7.000
OCM00-02	200	675	9.500
OCM00-03	200	700	10.000
OCM00-04	200	675	9.500
OCM00-05	200	625	8.500
OCM00-06	200	676	9.520
OCM00-07	200	650	9.000
OCM00-08	200	575	7.500

The survey consisted of 70.52 kilometres of seismic lines on the PEP 119 prospect situated approximately ten (10) kilometres west of Casterton, Victoria. The survey commenced on March 14th and was completed on April 2nd. There were eight (8) seismic lines with the station interval set at 20 m. These lines are listed below:

The following report covers the Camerons 2000 2D Seismic Survey operations, performed by Dynamic Satellite Surveys Pty Ltd (DSS) whilst contracted to Schlumberger Reservoir Evaluation Seismic for Santos Ltd.

INTRODUCTION



2



INSTRUMENTATION AND PERSONNEL

2.1 Personnel

DSS personnel involved in the survey were:

Senior Surveyors:

- Lynne Baker Bachelor of Geomatic Engineering - UNSW
- Denis Williams Bachelor of Applied Science (Surveying) QUT
- Bachelor of Information Technology (QUT)

Field Chainperson

- Rob Heyer DSS Operations Manager

2.2 Equipment

Equipment provided by DSS and used on this project:

Quantity	Description	
1	Toyota Landcruiser Trayback - Hired	Vehicles
2	NovAtel 2151R/RT20 c/w VHF telemetry	GPS receivers
1	Acer 486 Portable PC	Computers
2	GRID 386 Field PC	

Personnel and equipment logistics were supported by the DSS Yeppoon office. The survey vehicle was hired from Adelaide and the crew mobilised to Casterton on March 13th after picking up relevant equipment and supplies. Survey operations and messing were based from the Albion Hotel in Casterton.

2.3 Logistics

Quantity	Description	
1	Waypoint GPS post-processing	
1	DSS MIB for Windows QC	
1	Lexmark 1000 Colorjet	<i>Printer</i>
1	Suunto Clinometer	<i>Survey Instruments</i>
2	Suunto Compass	
	Sundry office and support equipment	<i>Miscellaneous</i>
	Field and Office Consumables	

Datum:	AGD 66 (Australian Geodetic Datum 1966)
Spheroid:	ANS (Australian National Spheroid)
Semi-Major Axis Length:	6 378 160.0
Inverse Flattening:	298.25
The Unit of Measure:	International Metre

Coordinate sets are transformed directly to the Australian Map Grid (AMG) based on the Australian Geodetic Datum 1966 (AGD 66):

Datum:	WGS 84 (World Geodetic System 1984)
Spheroid:	WGS 84
Semi-Major Axis Length:	6 378 137.0
Inverse Flattening:	298.257223563
The Unit of Measure:	International Metre

Raw GPS data is acquired on the WGS 84 datum, described by the following parameters:

3.1.1 Geodetic Datum

3.1 Survey Datum

SURVEY REFERENCE SYSTEMS

3



Observations were made on the WGS84 datum. The height associated with this datum is an ellipsoidal height (h). The Australian Height Datum (AHD) uses a height datum associated with the Australian Map Grid (AMG), as an orthometric height, which is measured as the height above mean sea level or the geoid (H).

3.1.3 Height Datum

Final data was presented as AMG66 and AHD coordinates as requested by the client.

Projection:	AMG Zone 54
Latitude of Origin:	0°
Central Meridian (CM):	141° E
Scale Factor at CM:	0.9996
False Easting:	500 000
False Northing:	10 000 000
The Unit of Measure:	International Metre

Parameters for this projection are:

Rectangular coordinates provided were based on the Australian Map Grid (AMG).

3.1.2 Map Projection

Translations:	ΔX: 116.00 m	ΔY: 50.47 m	ΔZ: -141.69 m
Rotations:	R1: 0.230"	R2: 0.390"	R3: 0.344"
Scale:	bs: -0.0983 ppm		

seven transformation parameters:

Coordinate conversions from WGS 84 to AGD 66 are performed using the following

The function that defines the relationship between the ellipsoid and orthometric heights is:

$$H = h - N$$

Or

AHD = WGS84 - Geoid-Ellipsoid Separation

A digital model (AUSGEOID98) was used for automatic determination of N at each point, so that orthometric heights within the survey area could be readily derived. For all lines, one model was calculated and the models' residuals indicated a good fit, reflecting the gradual change in geoid slope within the extents of the models.



SURVEY CONTROL

4.1 Survey Datum

The datum for the survey was based upon a local government survey mark (PM125). This mark is located directly underneath the Corndale fire tower ten kilometres west of Casterton. The listed coordinates for this mark are:

<u>Station Name</u>	<u>Eastng</u>	<u>Northng</u>	<u>Elevation</u>	<u>Order</u>
PM125	525117.005	5840147.709	127.500	hor 3rd, v 5th

The GPS base station used for the survey was BASETOW which is located between the fire tower and the Casterton - Penola road. The computed coordinates for this base are:

<u>Station</u>	<u>Eastng</u>	<u>Northng</u>	<u>AHD</u>
BASETOW	525106.54	5840124.28	127.55

A location diagram for BASETOW and the control network diagram can be found in **Appendix B - Control Network and Base Station Diagrams**.

Ties were made another survey mark as well as numerous old permanent markers. These ties can be found in **Appendix A - Control Survey, Miscloses and Ties**. The results are included in the digital data supplied to the client in the file named **TIES.CRD**.

A coordinate listing of the new permanent markers placed is contained in **Appendix C - Permanent Markers Listing**. This list of permanent markers was included in the digital data supplied to the client.

New permanent markers were placed at all new line intersections and the ends of lines where appropriate. The markers consist of a steel star picket with an aluminium tag attached. These attached tags were stamped with relevant information such as line name and station number. A total of 30 new permanent markers were installed and surveyed.

White wooden pegs were placed at all stations with the pegs at even stations numbered on both sides. The line name was written on at least every 25th peg and on any pegs placed near a track or road.

White paper plates marked with the line name were also placed on major tracks and roads.

MONUMENTATION



The first stage of the survey operations was line pointing. This was carried out by both DSS and Schlumberger personnel.

The pre-designed line coordinates were loaded into the GPS unit as waypoints. The GPS unit, in RT20 mode (described in the following section - 6.2 RT20 survey-chaining), was carried along the line on a backpack or vehicle and was used to guide the surveyors along the line. Generally, due to the heavily wooded nature of the area, a compass was used for flagging the line and the line was checked with the GPS approximately every 400 metres. This sped up the operation considerably.

The lines were flagged using fluorescent pink flagging tape and white paper plates marking each line were placed on major tracks and roads.

Line pointing through the blue gum and thick pine plantations was slow due to the lack of intervisibility and intermittent GPS signal.

DSS completed 24.25 kms of the line pointing.

6.1 Line Pointing

The survey work was completed in two stages; line pointing and RT20 survey-chaining.

METHOD OF SURVEY

6



6.2 RT20 Survey-chaining

Chaining and surveying were carried out in a single pass operation using DSS' RT20 Real-Time Kinematic survey-chaining technique. RT20 enables both position and elevation coordinates to be acquired in real time and on the appropriate datum.

The survey method utilised phase data received from US Navy NAVSTAR Satellites to provide three dimensional positioning. One receiver was set up as a base station at a known location while another receiver was used as a remote rover. The base station was set up to transmit "corrections" via VHF telemetry to the roving GPS unit in order to eliminate any errors present in the GPS positional data.

The pre-designed line coordinates were used as waypoints and DSS in house software was used to guide the surveyor to each station along the line. In the heavily wooded areas of the prospect a 60 m survey chain was dragged behind the vehicle meaning that the vehicle could stop at every third station. The chain was marked at 20 m intervals so that pegs could be placed at the intermediate stations. This sped up the operation in such areas.

Novatel Real-Time Kinematic can achieve accuracies of better than +/- 0.3 m in position and elevation depending on base line length. The expected precision for locating pegged positions is better than 0.3 metres in both elevation and height relative to the base station used and is generally better than 0.2 metres.

Initialisation of the RT20 rover GPS usually takes as little as 2-3 minutes, although this is greatly dependant on satellite geometry, availability, and baseline length.

Checks and ties were examined in both real time operation and at the post-processing stage to assess coordinate integrity.

The field data was edited into line files and examined for quality control.

Line trace diagrams (mud maps) were drawn as the line was pegged and were later finalised in the office. These maps aid the main crew in line navigation and were provided to David Branton on a regular basis.

6.3 GPS Processing and Quality Control

When using RT20, all data is recorded internally in GRID palmtop data loggers and then downloaded to the office computer each evening. Quality of the satellite data was monitored by careful examination of the various on-screen quality control statistics produced by DSS's software. These checks on data integrity are in the form of standard deviation (or sigma) values for latitude, longitude, and height and are generally better than 0.3 metres.

The coordinates were then checked using a chaining check routine developed by DSS that calculates line bearing and compares calculated peg distance with actual peg distance. Points outside specified distance and azimuth tolerances are flagged for further investigation and rechainned if necessary. The chaining checks for each line were provided to the client in digital format (.CHK). In some places the hydro-axed line was deviated to avoid the clearing of trees and this shows up in the chaining checks.

Profile plots were examined to identify any height anomalies.

Coordinates were then finalised by interpolating intermediate stations using software developed by DSS.

Surveyed elevations at all new line intersections were checked and the results are listed in **Appendix D - New Line Intersections Listing**. The list was also included in the digital data supplied to Schlumberger as **INTERSEC.CRD**.



7

DATA PRESENTATION

On completion of the survey two full sets of digital data were presented to Schlumberger. Files supplied were:

<u>File</u>	<u>Description</u>
OCM00-?? .UKA	Coordinates and elevations of all stations in UKOOA format.
OCM00-?? .CHK	A chaining check file for each surveyed station.
OCM00-?? .PMS	Coordinates and elevations of all permanent markers on the line.
OCM00-?? .AMG	Coordinates and elevations of all surveyed stations.
UPHOLES.CRD	A listing of all upholes.
INTERSEC.CRD	A listing of all new line intersections.
TIES.CRD	A listing of all ties to old permanent markers and survey marks.

These files are all backed up on digital disks in the Yeppoon office for future reference.

No hard copy data was given to the client as it was not required.

SAFETY

8



DSS personnel are aware of safety conditions governing mining and exploration leases. DSS safety guidelines were followed at all times.

The DSS vehicle was fitted with a fire extinguisher, shovel, first-aid kit, UHF radio and weekly vehicle maintenance check lists. A digital mobile phone was also carried by the DSS personnel.

After arriving at the job, DSS personnel were advised that long sleeved shirts, long pants and safety jackets were part of Santos and Schlumberger's personal protective equipment (PPE). This policy was adhered to by DSS.

No field work was carried out on the prospect during the two total fire ban days.

No LTIs (Lost Time Injuries), no near misses and no accidents were reported for the survey.

9



CHRONOLOGICAL SUMMARY OF SURVEY

DATE SURVEY OPERATIONS

Mar 12 Denis and Lynne mobilise from Sydney to Adelaide.

Mar 13 Pick up vehicle and mobilise from Adelaide to Casterton. Arrive 18:30 and met with Ben Zillman.

Mar 14 Meeting and gear setup. Control ties. Line pointing: OCM00-07 7.6 km. Went to Mt Gambier to buy a fire extinguisher and PPE clothing.

Mar 15 Line pointing: OCM00-08 7.5 km. Control ties, new base, BASETOW, established at the fire tower. Set up survey chain. Processing.

Mar 16 Line pointing: OCM00-04 4.0 km, OCM00-03 1.5km, OCM00-06 1.5 km. Total = 7.0 km. Lots of blue gumsl

Mar 17 Static control tie. Total fire ban = standby 8 hours. Went to Mt Gambier to pick up pegs and gear.

Mar 18 Line pointing: OCM00-06 0.75 km, OCM00-07 1.5km. Total = 2.25 km. Lots of pine trees. Line pointing complete. Control tie and processing.

Mar 19 **Chaining:** OCM00-01 (200 - 550).
Surveying: OCM00-01 218 - 550 (6.64 kms). Three PMS placed.

DATE	SURVEY OPERATIONS
Mar 20	<p>Chain and Survey: OCM00-07 200 - 388 (3.76 kms). OCM00-02 345 - 560 (4.30 kms). Total = 8.06 kms.</p>
Mar 21	<p>Chain and Survey: OCM00-02 249 - 345 (1.92 kms). OCM00-02 597 - 695 (1.56 kms). OCM00-01 200 - 218 (0.36 kms). Total = 3.84 kms.</p> <p>Line pointing access to southern end of OCM00-03. Upholes #1 and #6 placed. Caught up with hydro-axe: 2 hours standby.</p>
Mar 22	<p>Total fire ban - standby = 10 hours.</p>
Mar 23	<p>Chain and Survey: OCM00-02 200 - 249 (0.98 kms). OCM00-03 200 - 376 (3.52 kms). Total = 4.50 kms.</p> <p>Caught up with hydro-axe: 3.5 hours standby.</p>
Mar 24	<p>Chain and Survey: OCM00-03 376 - 632 (5.12 kms). OCM00-04 536 - 606 (1.40 kms). Total = 6.52 kms.</p> <p>Upholes #3, #8, #9, #10, #13, #14 and #16 flagged as requested by the client.</p>
Mar 25	<p>Chain and Survey: OCM00-04 430 - 536 (2.12 kms). OCM00-07 388 - 499 (2.22 kms). Total = 4.34 kms.</p> <p>Caught up with hydro-axe: 3.5 hours standby. Upholes #11, #15 flagged.</p>

DATE SURVEY OPERATIONS

Mar 26 Chain and Survey: OCM00-04 200 - 430 (4.60 kms).
 OCM00-08 395 - 462 (1.34 kms).
 Total = 5.94 kms.
 Control tie to PM 32, McEachern #1 not found.
 Upholes #12, #14 flagged.

Mar 27 Chain and Survey: OCM00-07 499 - 582 (1.66 kms).
 OCM00-05 333 - 534 (4.02 kms).
 Total = 5.68 kms.
 Rob Heyer arrived 18:00.

Mar 28 Chain and Survey: OCM00-07 582 - 650 (1.36 kms).
 OCM00-02 560 - 597 (0.74 kms).
 Total = 2.10 kms.
 Caught up with hydro-axe: standby = 4.5 hours.
 Denis demobilised in morning.

Mar 29 Chain and Survey: OCM00-03 632 - 700 (1.36 kms).
 OCM00-06 392 - 498 (2.12 kms).
 Total = 3.48 kms.
 Processing, mudmaps during bad satellite period in middle of the day.
 Standby = 1 hour.

Mar 30 Chain and Survey: OCM00-04 606 - 675 (1.38 kms).
 OCM00-06 498 - 566 (1.36 kms).
 Total = 2.74 kms.
 Waiting for line to be cut in morning: Standby = 2.75 hours

DATE SURVEY OPERATIONS

Mar 31 Chain and Survey: OCM00-05 200 - 333 (2.66 kms).
534 - 625 (1.82 kms).
Total = 4.48 kms.

Met with Bruce Beer (1 hour) for revision of shooting order due to hydro-axe down. Advised by Dave Branton (Geco) of line name change from OS00B-?? to OCM-00-?? . All PM tags need to be changed.

Apr 1 Chain and Survey: OCM00-08 200 - 395 (3.90 kms).
462 - 575 (2.26 kms).
Total = 6.16 kms.

Slow and frustrating during bad satellite period 1100 - 1430!

Apr 2 Chain and Survey: OCM00-06 200 - 392 (3.84 kms).
566 - 676 (2.20 kms).
Total = 6.04 kms.

All chaining and surveying complete. 3 hours changing PM tags.

Apr 3 Processing final data. Equipment list and finals given to Dave Branton.

Line names changed again from OCM-00-?? to OCM00-??.

Demobilise to Port Fairy in afternoon.

Throughout the survey there was a bad satellite period lasting from 1 to 3 hours during the middle of the day. This slowed down production and made the survey work very frustrating. On April 1, one satellite was down which made survey through the middle of the day impossible. This time was used to do office work and draw mudmaps.

The method of combining RT20 survey - chaining with a 60 m conventional chain was deemed to be the most efficient method through the heavily wooded areas. RT20 survey - chaining worked well in the open areas and in the blue gum and pine plantations however these areas only accounted for approximately one quarter of the prospect.

Chaining and survey averaged 5.4 kms per day (not including standby time) or 4.4 kms per day if you include standby time.

The hydro-axe cleared 64 kms of line over a 17 day period (including 2 fire ban days) which gave an average of 3.8 kms per day or 4.3 kms per day not including fire ban days.

The chaining and surveying proceeded smoothly but was slowed down by numerous standby hours due to lack of cut line and a bad satellite period during the middle of the day. The line pointing was very efficient through the natural forest areas. It proved to be much slower through the blue gum and pine plantations due to the lack of intervisibility.

OPERATIONAL ASPECTS

10



Upholes were marked by the survey crew as per the uphole program map. A full listing is contained in **Appendix F - Uphole Listing**.

Lynne Baker

Submitted by,

DSS recorded 18.25 hours of standby time due to no cleared line. The hydro-axe commenced only two days before survey therefore it never had enough lead. It is recommended that in future the hydro-axe be given as much lead time as possible.

The survey control network tied in reasonably well with the surrounding survey marks and all new points of survey met the required survey tolerances. 30 new permanent markers were placed throughout the prospect and one 1996 permanent marker was connected to and tagged on line OCM00-07 (triple intersection). These will provide survey control for future work in the area.

There was little down time (2 hours) due to equipment problems but the poor satellite geometry and availability during the middle of the day slowed production.

CONCLUSION AND RECOMMENDATIONS

11



APPENDICES

12



Control Survey, Miscloses and Ties

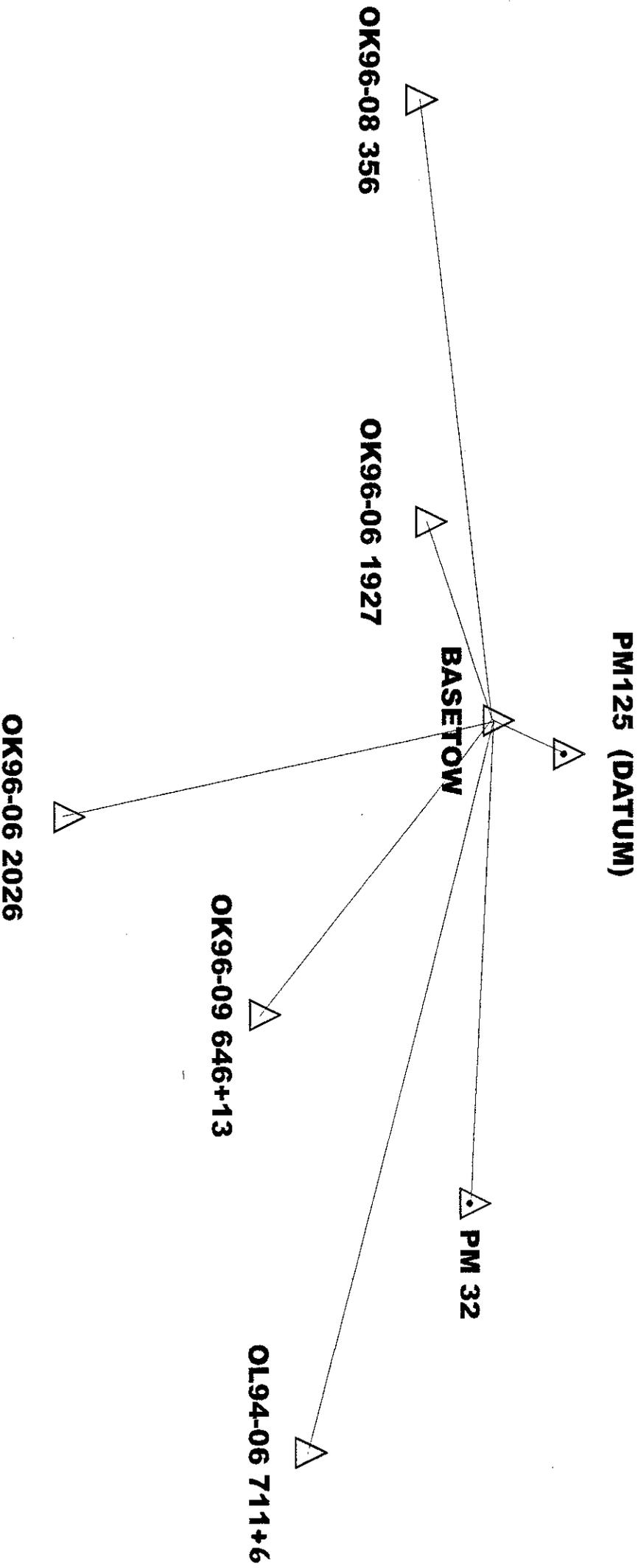
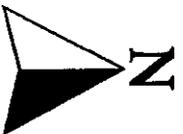
Control survey, Miscloses and Ties

Coordinates are AMG66 Zone 54 Central Meridian 141°
 Heights are AHD, using AUSGEOID98 N value model

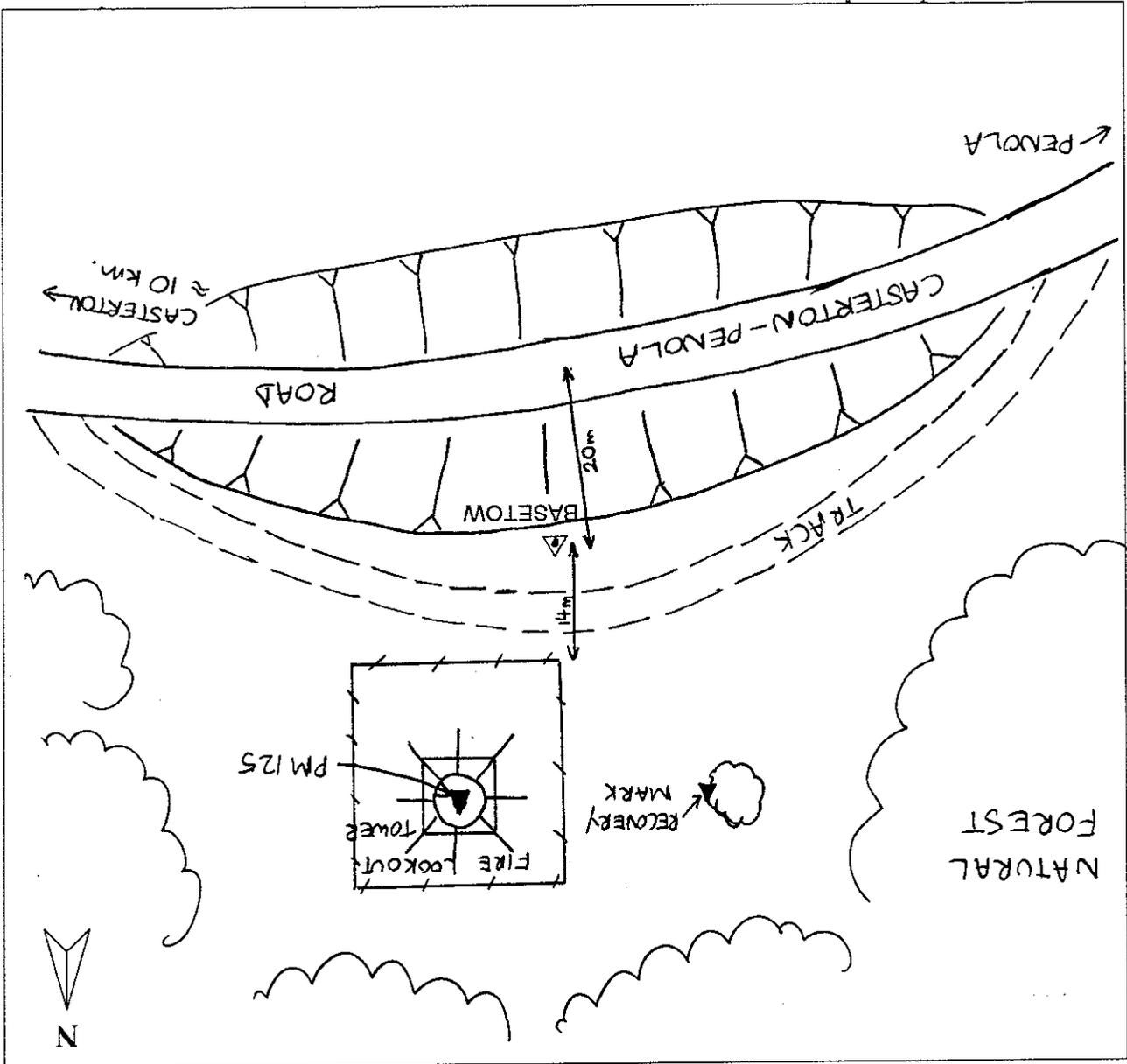
Station	Eastings	Northings	AHD	Comments
PM 125	525117.005	5840147.709	127.5	DATUM
PM 32	527960.804	5839648.205	137.67	
	<u>527960.33</u>	<u>5839647.77</u>	<u>137.77</u>	RT20
	-0.47	-0.44	+0.10	
OK96-06 1927	524272.1	5839942.1	99.6	DSS Job #96-21
	<u>524272.5</u>	<u>5839943.3</u>	<u>97.3</u>	Float soln (trees)
	+0.4	+1.2	-2.3	
OK96-06 2026	525083.1	5838144.4	97.3	DSS Job #96-21
	<u>525082.7</u>	<u>5838143.8</u>	<u>98.2</u>	RT20
	-0.4	-0.6	+0.9	
OK96-08 356	520000.6	5839295.4	79.7	DSS Job #96-21
	<u>520000.9</u>	<u>5839293.1</u>	<u>80.2</u>	Static
	+0.3	-2.3	+0.5	
OK96-09 646+13	527635.5	5839959.2	136.2	DSS Job #96-21
	<u>527636.2</u>	<u>5839958.9</u>	<u>136.0</u>	Static
	+0.7	-0.3	-0.2	
OL94-06 711+6	529185.9	5839510.2	138.7	OL94-06 711+6
	<u>529186.2</u>	<u>5839509.9</u>	<u>138.1</u>	RT20
	+0.3	-0.3	-0.6	

Control Network and Base Station Diagrams

**00-19 - 2000 CAMERONS SEISMIC SURVEY
CONTROL NETWORK DIAGRAM**



NOT TO SCALE



Vertical Control Data		Horizontal Control Data	
RL	127.553	Eastings	525106.543
Datum	AHD	Northings	5840124.276
Origin	PM125	Datum	AMG Zone 54 AGD 66
Origin	PM125	Origin	PM125
Mark Type	Star Picket	Mark Type	Star Picket

AREA: CAMERONS EP119 MAP REFERENCE:

STATION NAME: BASETOW

Dynamic Satellite Surveys
 PROJECT / JOB # 00-19 CLIENT SANTOS DATE 03/00
 STATION LOCATION DIAGRAM
 REV 4.0
 Nov 1995
 DSS-F-15

New Permanent Markers Listing

Permanent Markers

Coordinates are AMG66 Zone 54 Central Meridian 141°
 Heights are AHD, using AUSGEOID98 N value model

Line name	Stn	Easting	Northing	Elev.	Comments
OCM00-01	200	518559.1	5840160.9	75.7	EOL
OCM00-01	366+13	521058.6	5842375.1	86.1	OCM00-07 273+11
OCM00-01	456+6	522398.6	5843565.7	100.3	OCM00-06 320+9
OCM00-01	547+10	523759.6	5844779.5	122.1	EOL 50m NE
OCM00-02	200	517651.6	5838110.1	72.1	EOL
OCM00-02	288+18	519061.4	5839193.2	77.5	OCM00-08 283+12
OCM00-02	467+3	521906.4	5841343.2	85.4	OCM00-07 340+5
OCM00-02	557+17	523352.5	5842437.8	106.2	OCM00-06 394+6
OCM00-02	674+11	525214.2	5843847.1	129.7	EOL 9M NE
OCM00-03	200	517894.5	5837138.4	71.4	EOL
OCM00-03	334+13	520092.0	5838695.2	79.9	OCM00-08 340+16
OCM00-03	488+5	522603.2	5840465.2	86.3	OCM00-07 396+7
OCM00-03	580+19	524113.1	5841540.4	103.8	OCM00-06 453+3
OCM00-03	697+17	526022.5	5842890.6	131.3	EOL 43M NE
OCM00-04	200	518661.3	5836491.9	71.7	EOL
OCM00-04	348+14	521068.6	5838239.2	75.9	OCM00-08 394+13
OCM00-04	479+3	523189.9	5839758.2	86.8	OCM00-07 442+5
OCM00-04	571+15	524682.9	5840854.2	116.7	OCM00-06 497+15
OCM00-04	667	526227.7	5841968.3	132.8	EOL 160M NE
OCM00-05	200	520143.2	5836024.8	74.1	EOL
OCM00-05	334+12	522285.8	5837654.2	76.7	OCM00-08 462+4
OCM00-05	434+17	523884.1	5838863.8	89.9	OCM00-07 498+17
OCM00-05	529+17	525396.7	5840013.3	126.6	OCM00-06 552+17
OCM00-05	625	526907.6	5841169.7	135.7	EOL

Permanent Markers

Coordinates are AMG66 Zone 54 Central Meridian 141°

Heights are AHD, using AUSGEOID98 N value model cont.

Line name	Stn	Easting	Northing	Elev.	Comments
OCM00-06	200	520837.3	5845400.8	98.2	EOL
OCM00-06	676	526983.2	5838129.1	128.0	EOL

Permanent Markers

Coordinates are AMG66 Zone 54 Central Meridian 141°

Heights are AHD, using AUSGEOID98 N value model

Line name	Stn	Easting	Northing	Elev.	Comments
OCM00-07	200	520178.1	5843553.3	86.0	EOL
OCM00-07	569+7	525082.7	5838143.8	98.2	X OK96-06&09
OCM00-07	627+4	526098.2	5837589.5	105.8	EOL 456M SE
OCM00-08	200	517545.8	5839897.9	74.7	EOL
OCM00-08	575	524320.4	5836678.7	80.9	EOL

New Line Intersections Listing

New Line Intersections

Coordinates are AMG66 Zone 54 Central Meridian 141°
 Heights are AHD, using AUSGEOID98 N value model

Line 1 and VP	Line 2 and VP	Eastings	Northings	Elev.
OCM00-01/456+04	OCM00-06/320+09	522396.85	5843564.41	100.36
OCM00-02/557+15	OCM00-06/394+09	523352.01	5842434.93	105.83
OCM00-03/580+16	OCM00-06/543+04	524111.96	5841538.14	103.69
OCM00-04/571+15	OCM00-06/497+17	524683.40	5840851.76	116.50
OCM00-05/529+15	OCM00-06/552+14	525393.43	5840015.32	126.73
OCM00-01/366+15	OCM00-07/273+08	521057.42	5842377.08	86.39
OCM00-02/467+04	OCM00-07/340+08	521908.29	5841341.55	84.97
OCM00-03/488+09	OCM00-07/396+01	522602.97	5840472.53	86.31
OCM00-04/479+05	OCM00-07/442+07	523192.03	5839758.26	86.68
OCM00-05/435+00	OCM00-07/498+17	523886.16	5838866.11	89.50
OCM00-02/288+17	OCM00-08/283+15	519063.84	5839189.92	77.19
OCM00-03/334+10	OCM00-08/340+13	520089.01	5838695.24	79.68
OCM00-04/348+14	OCM00-08/394+16	521069.53	5838236.64	75.82
OCM00-05/334+08	OCM00-08/462+01	522281.62	5837653.18	76.51

Line Intersection Diagrams



Dynamic
Satellite
Surveys

INTERSECTION DIAGRAM

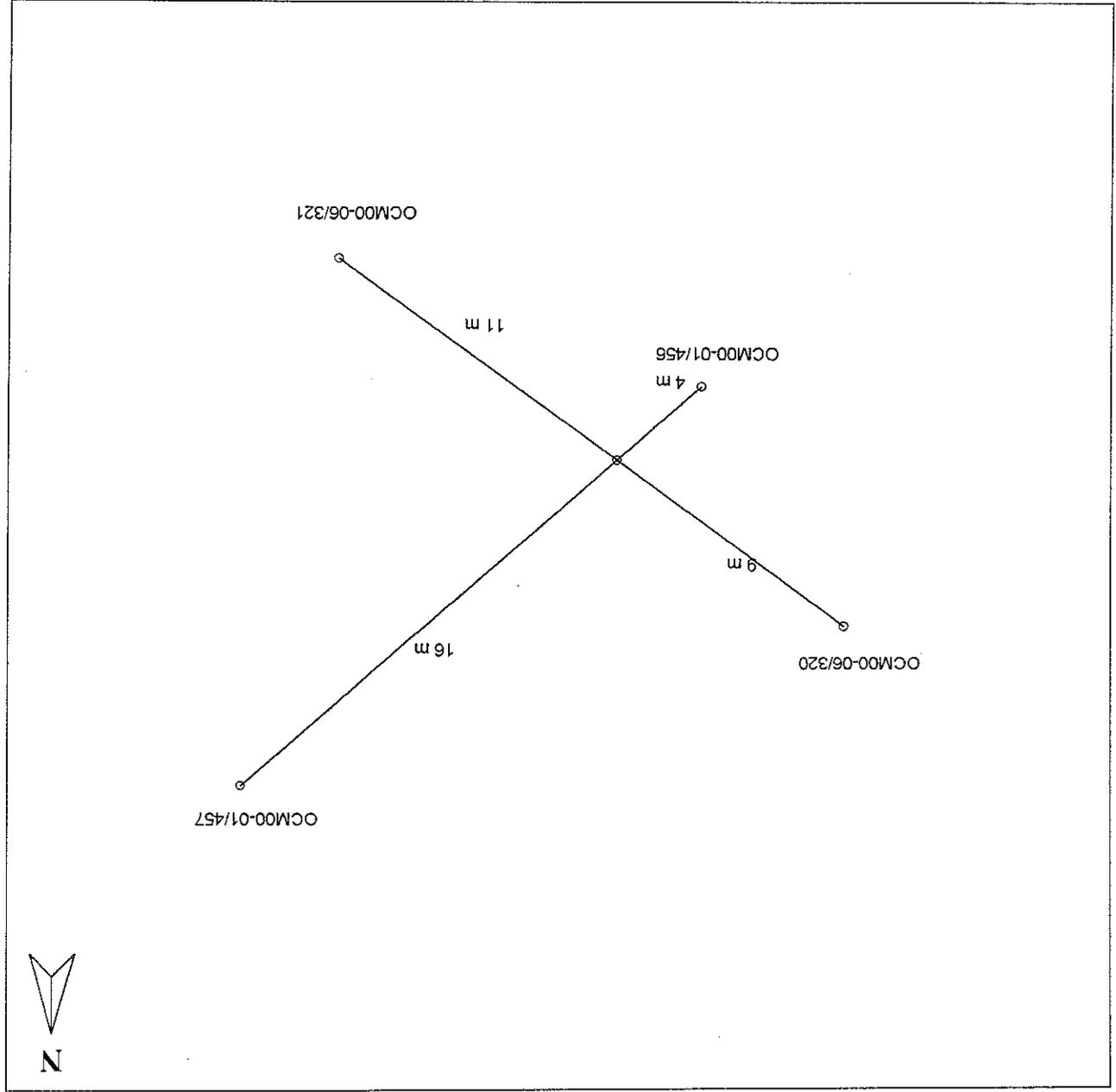
DSS-FI-14
REV 4.0
May 1998
DATE 04/00
PROJECT / JOB # 00-19 CLIENT SANTOS

INTERSECTION LINES: OCM00-01 / OCM00-06

AREA: CAMERONS PEP119
PROJECTION: AMG Zone 54 CM: 141

STATION INTERVAL: 20

DATUM: AGD 66
AHD



LINE INTERSECTION: OCM00-01/456+04 = OCM00-06/320+09

Eastng	522396.85	RT1 =	100.57
Northng	5843564.41	RT2 =	100.16
RT	100.36	MEAN:	100.36

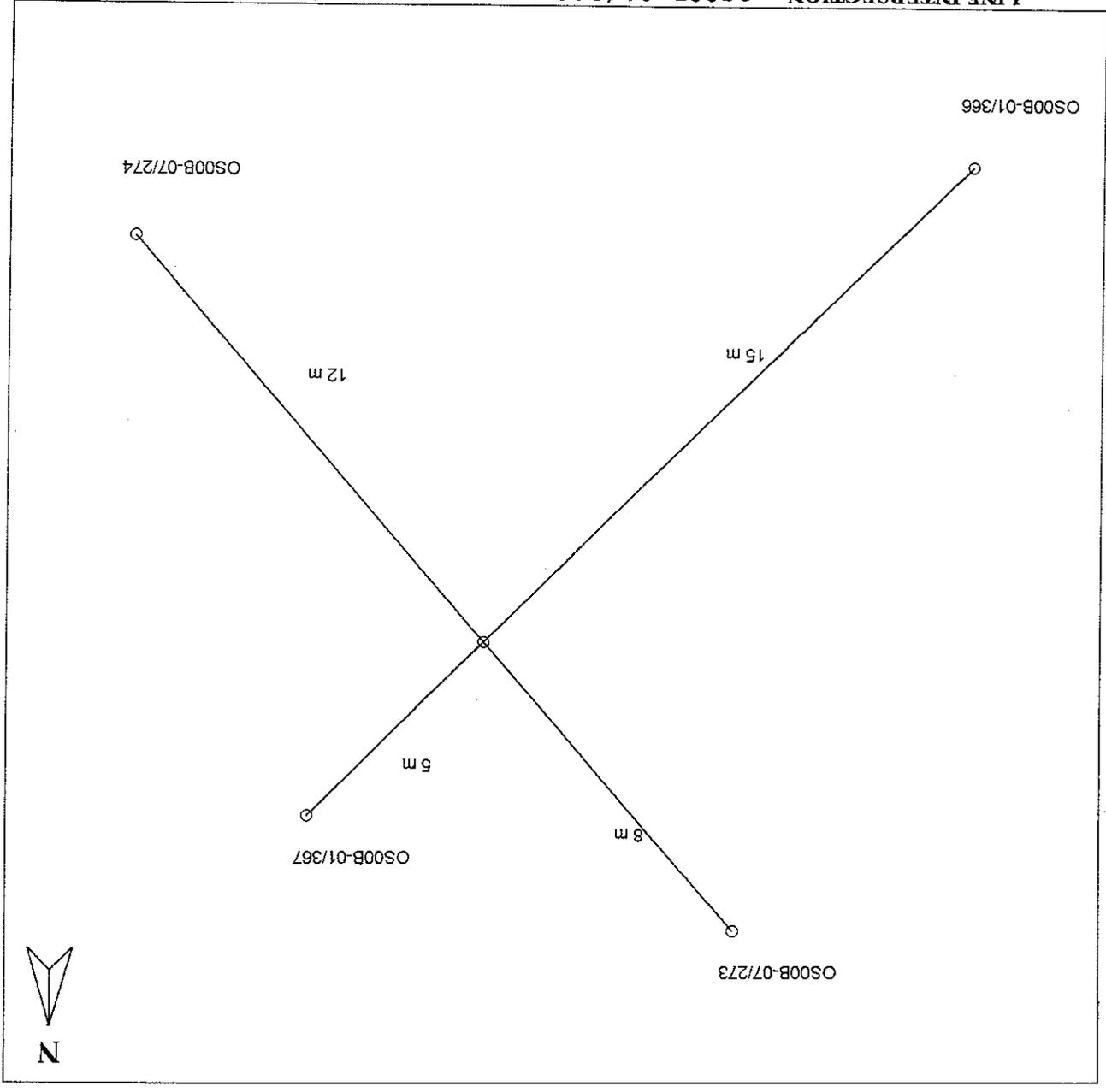


Dynamic
Satellite
Surveys

INTERSECTION DIAGRAM

DSS-FI-14
REV 4.0
May 1998
DATE 03/00
PROJECT / JOB # 00-19 CLIENT SANTOS
INTERSECTION LINES: OS00B-01 / OS00B-07

AREA: CAMERONS PEP119
STATION INTERVAL: 20
PROJECTION: AMG Zone 54 CM: 141
DATUM: AGD 66 AHD



LINE INTERSECTION: OS00B-01/366+15 = OS00B-07/273+08

Easting	521057.42	RL1 =	86.54
Northing	5842377.08	RL2 =	86.23
RL	86.39	MEAN:	86.39



Dynamic
Satellite
Surveys

INTERSECTION DIAGRAM

DSS-FI-14
REV 4.0
May 1998
DATE 03/00
PROJECT / JOB # 00-19 CLIENT SANTOS

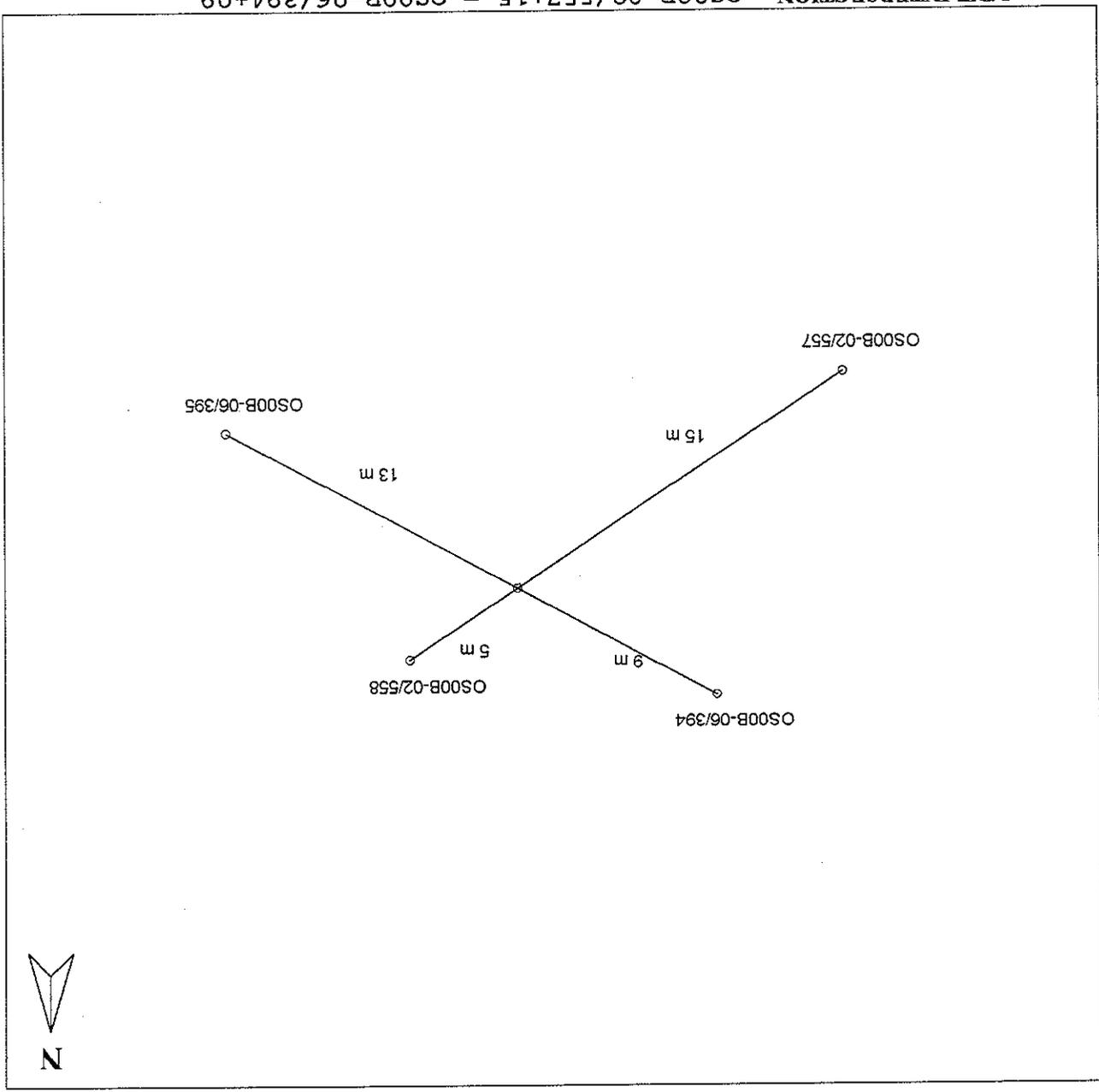
INTERSECTION LINES: OS00B-02 / OS00B-06

AREA: CAMERONS PEP19
PROJECTION: AMG Zone 54 CM: 141

STATION INTERVAL: 20
DATUM: AGD 66 AHD

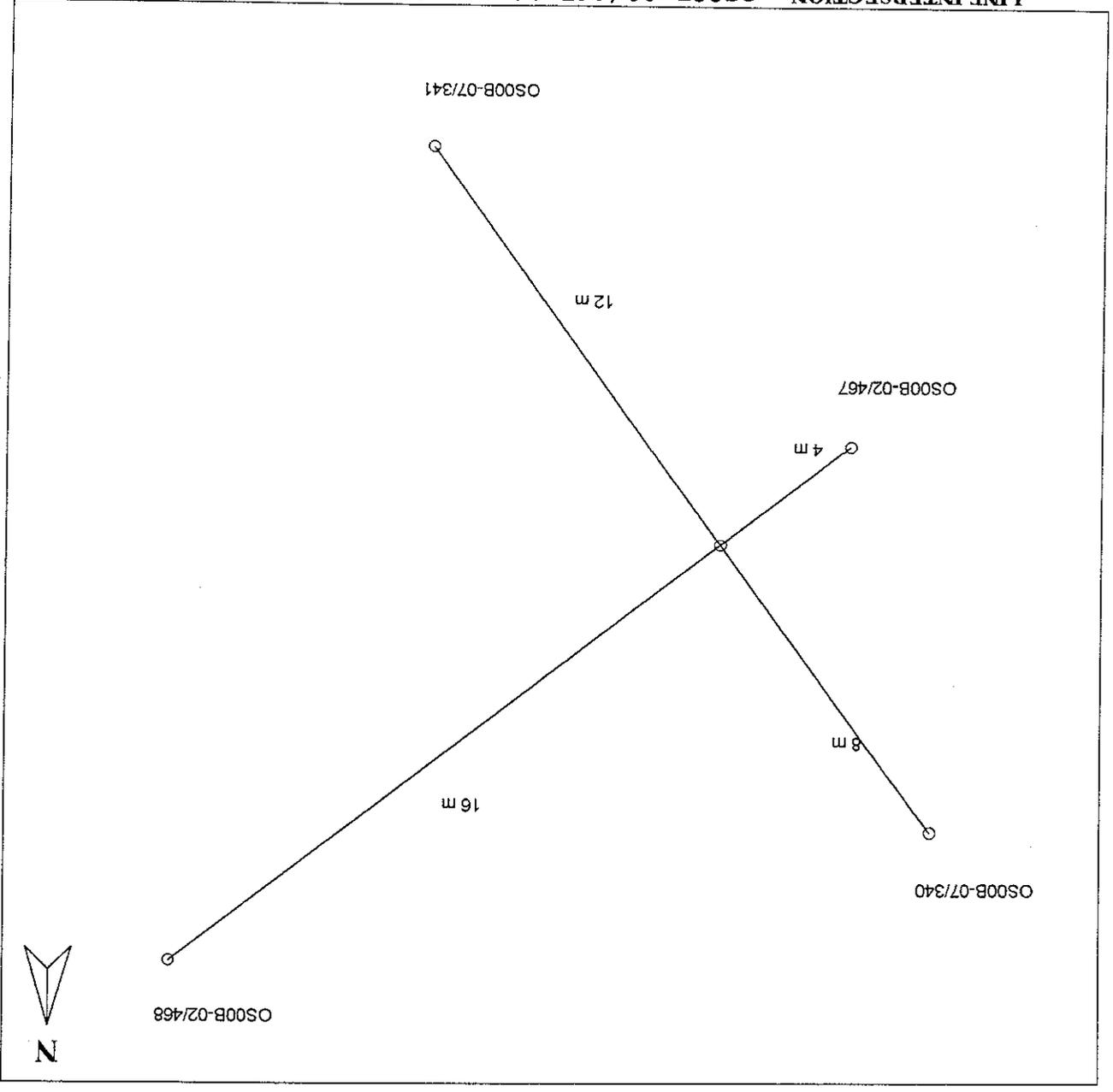
LINE INTERSECTION: OS00B-02/557+15 = OS00B-06/394+09

Easting 523352.01
Northing 5842434.93
RL 105.83
MEAN: 105.83
RL1 = 106.01
RL2 = 105.65



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 REV 4.0
 May 1998
 DATE 03/00
 INTERSECTION DIAGRAM
 PROJECT / JOB # 00-19 CLIENT SANTOS
 Surveys
 Satellite
 Dynamic

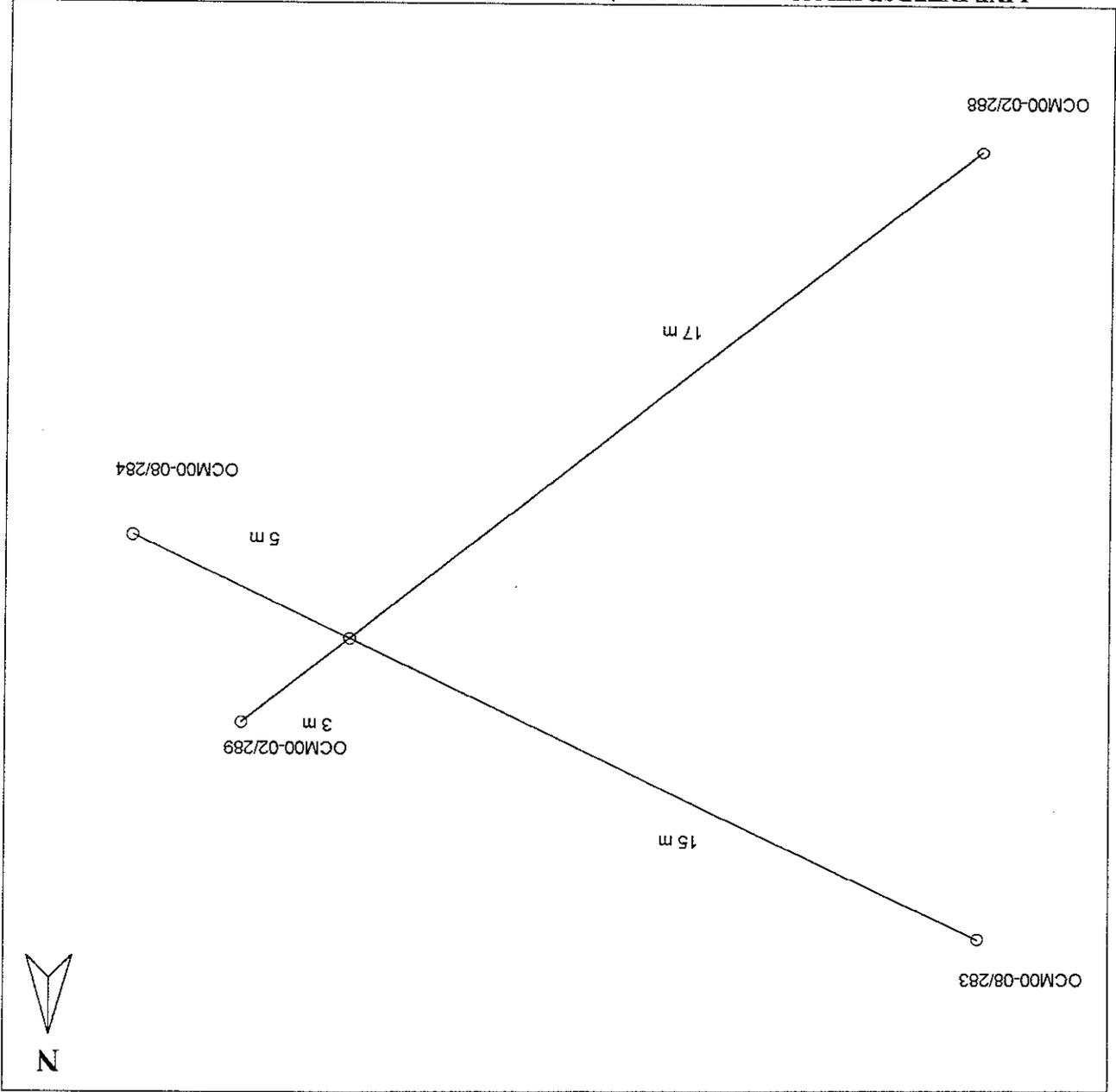
INTERSECTION LINES: OS00B-02 / OS00B-07
 AREA: CAMERONS PEP119
 STATION INTERVAL: 20
 PROJECTION: AMG Zone 54 CM: 141
 DATUM: AGD 66 AHD



LINE INTERSECTION: OS00B-02/467+04 = OS00B-07/340+08

Eastng	521908.29	RT1 =	85.02
Northng	5841341.55	RT2 =	84.92
RT	84.97	MEAN:	84.97

DSS-FE-14
 REV 4.0
 May 1998
 DATE 04/00
 INTERSECTION DIAGRAM
 PROJECT / JOB # 00-19 CLIENT SANTOS
 AREA: CAMERONS PEP19
 STATION INTERVAL: 20
 INTERSECTION LINES: OCM00-02 / OCM00-08
 PROJECTION: AMG Zone 54 CM: 141
 DATUM: AGD 66 AHD



LINE INTERSECTION: OCM00-02/288+17 = OCM00-08/283+15

Eastng	519063.84	RL1 =	77.22
Northng	5839189.92	RL2 =	77.16
RL	77.19	MEAN:	77.19

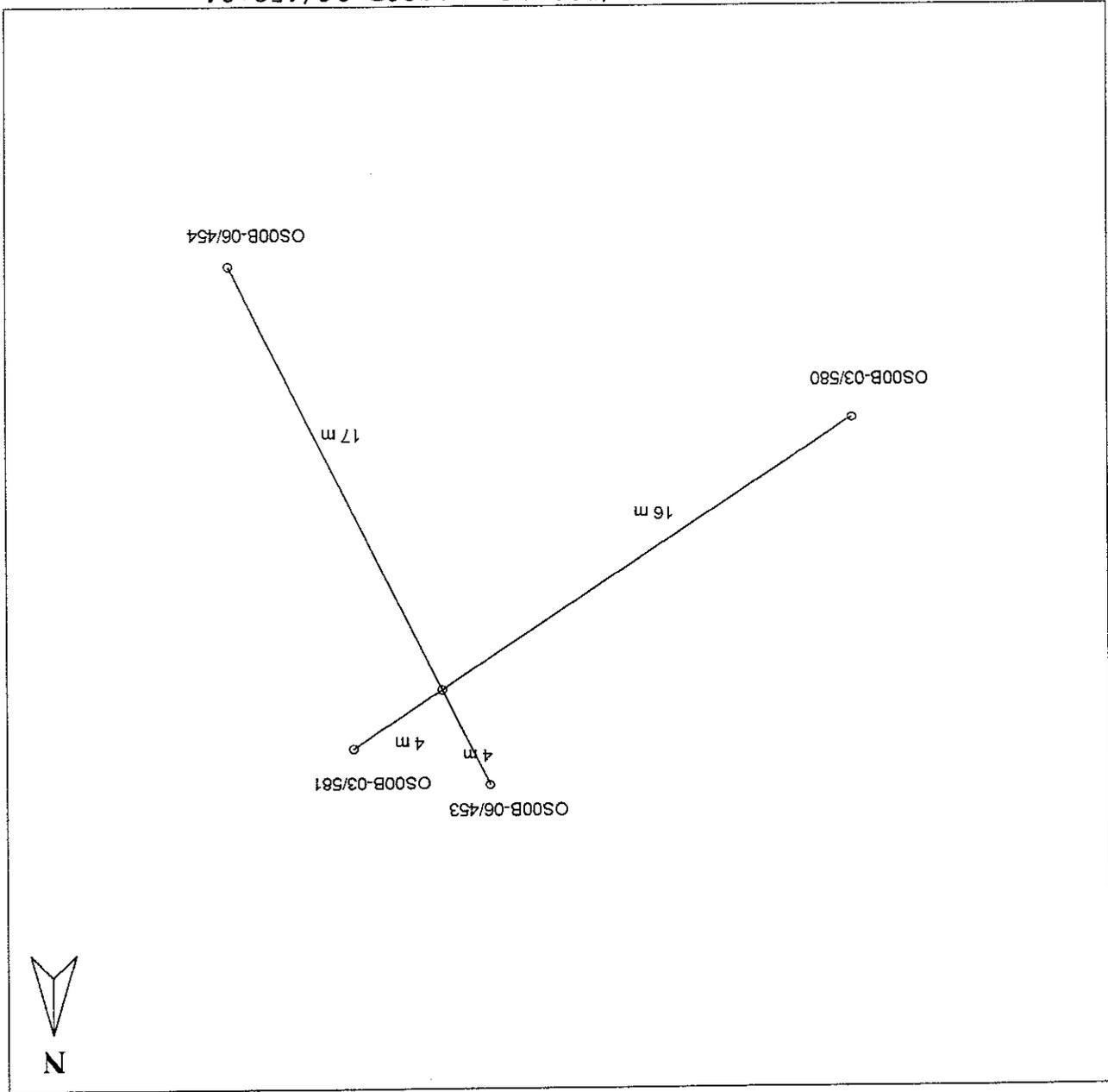


Dynamic
Satellite
Surveys

INTERSECTION DIAGRAM

DSS-FI-14
REV 4.0
May 1998
DATE 03/00
PROJECT / JOB # 00-19 CLIENT SANTOS
INTERSECTION LINES: OS00B-03 / OS00B-06

AREA: CAMERONS PEP19
STATION INTERVAL: 20
PROJECTION: AMG Zone 54 CM: 141
DATUM: AGD 66 AHD



LINE INTERSECTION: OS00B-03/580+16 = OS00B-06/453+04

Easting	524111.96	RL1 =	103.62
Northing	5841538.14	RL2 =	103.77
RT	103.69	MEAN:	103.69

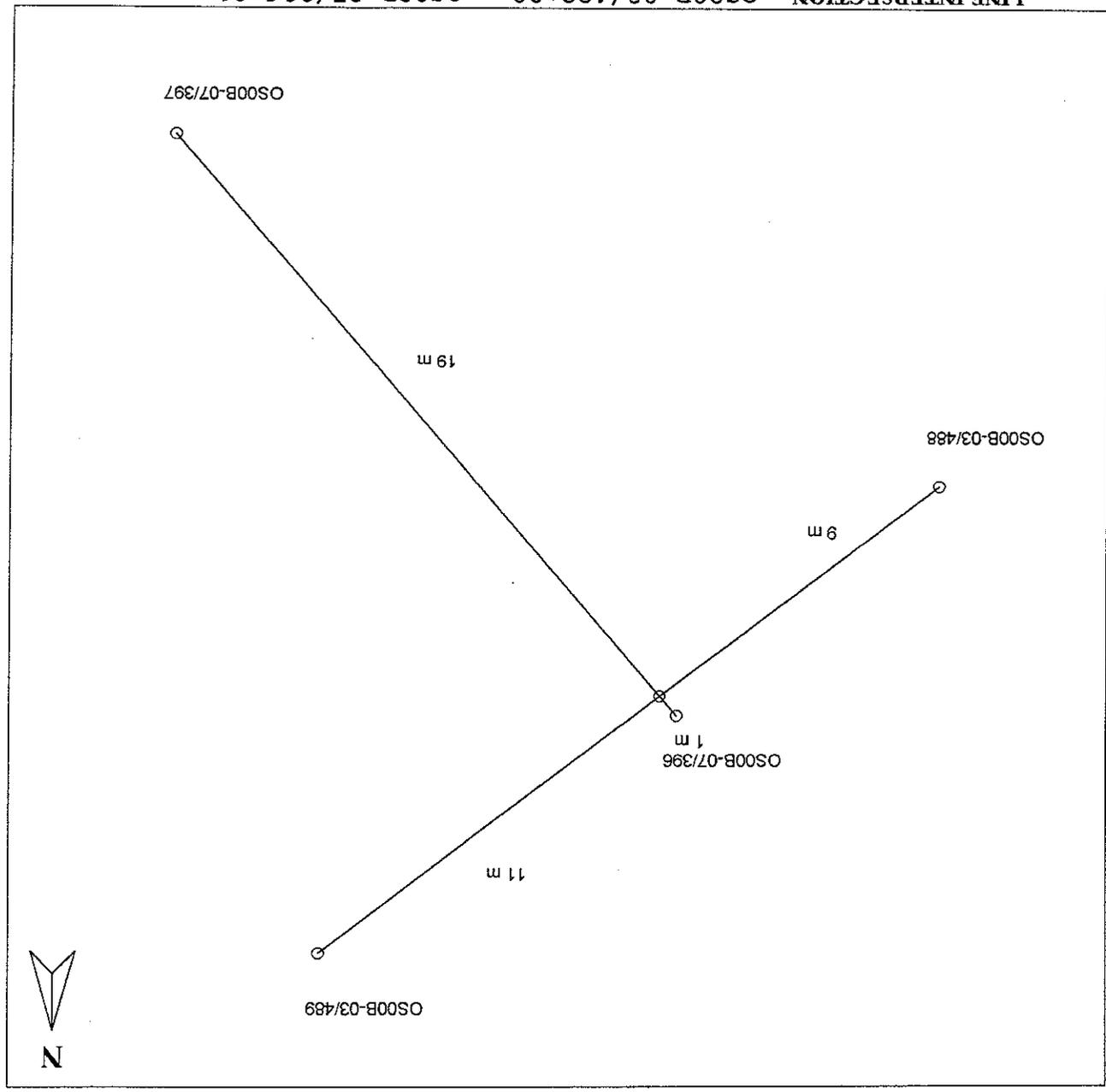


Dynamic
Satellite
Surveys

INTERSECTION DIAGRAM

DSS-FI-14
REV 4.0
May 1998
DATE 03/00
PROJECT / JOB # 00-19 CLIENT SANTOS
INTERSECTION LINES: OS00B-03 / OS00B-07

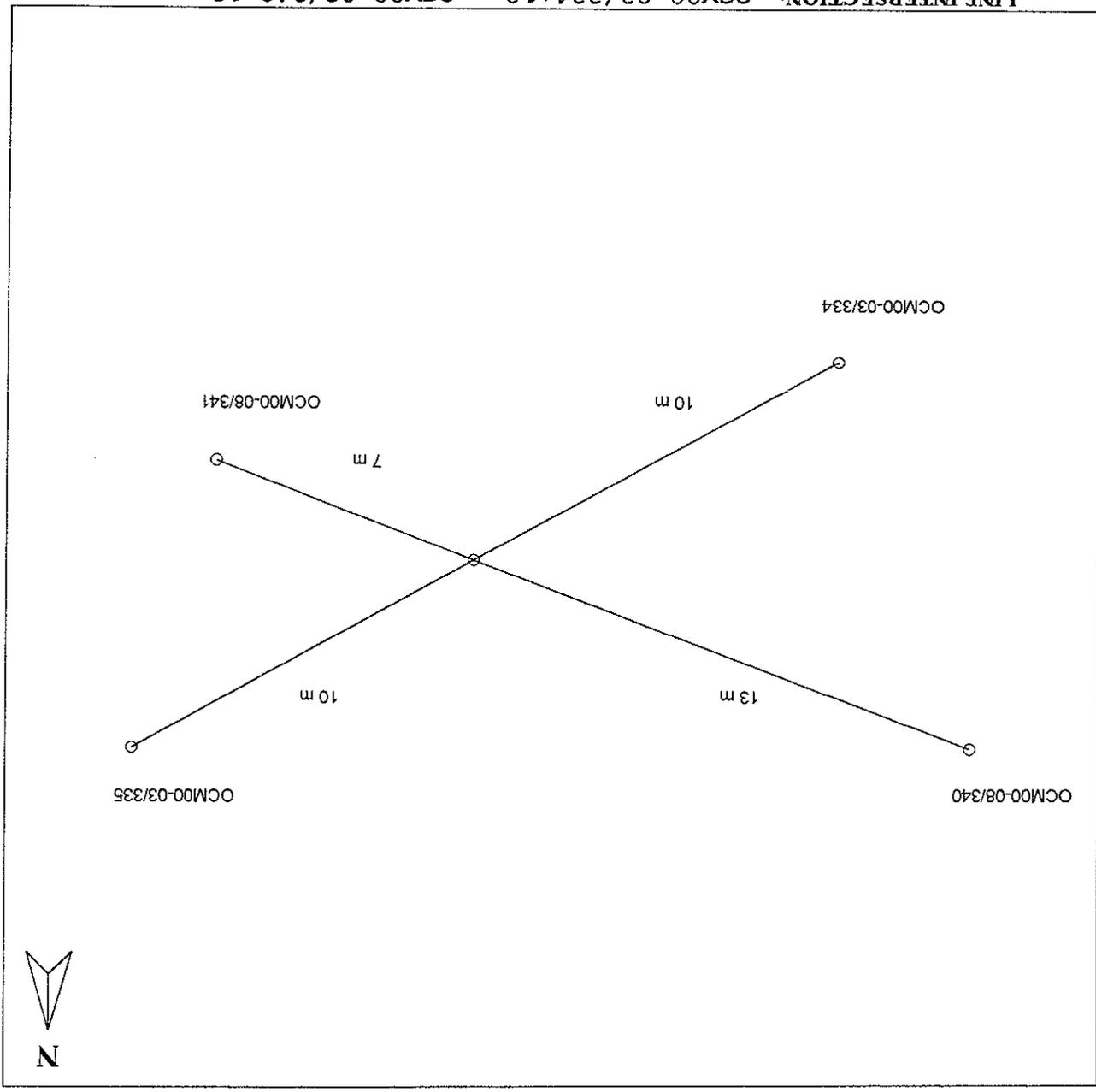
AREA: CAMERONS PEP19
STATION INTERVAL: 20
PROJECTION: AMG Zone 54 CM: 141
DATUM: AGD 66 AHD



LINE INTERSECTION: OS00B-03/488+09 = OS00B-07/396+01

Eastng	522602.97	RLI =	86.21
Northng	5840472.53	RL2 =	86.40
RL	86.31	MEAN:	86.31

DSS-FI-14
 REV 4.0
 May 1998
 DATE 04/00
 INTERSECTION DIAGRAM
 PROJECT / JOB # 00-19 CLIENT SANTOS
 AREA: CAMERONS PEP19
 STATION INTERVAL: 20
 INTERSECTION LINES: OCM00-03 / OCM00-08
 PROJECTION: AMG Zone 54 CM: 141
 DATUM: AGD 66 AHD



LINE INTERSECTION: OCM00-03/334+10 = OCM00-08/340+13

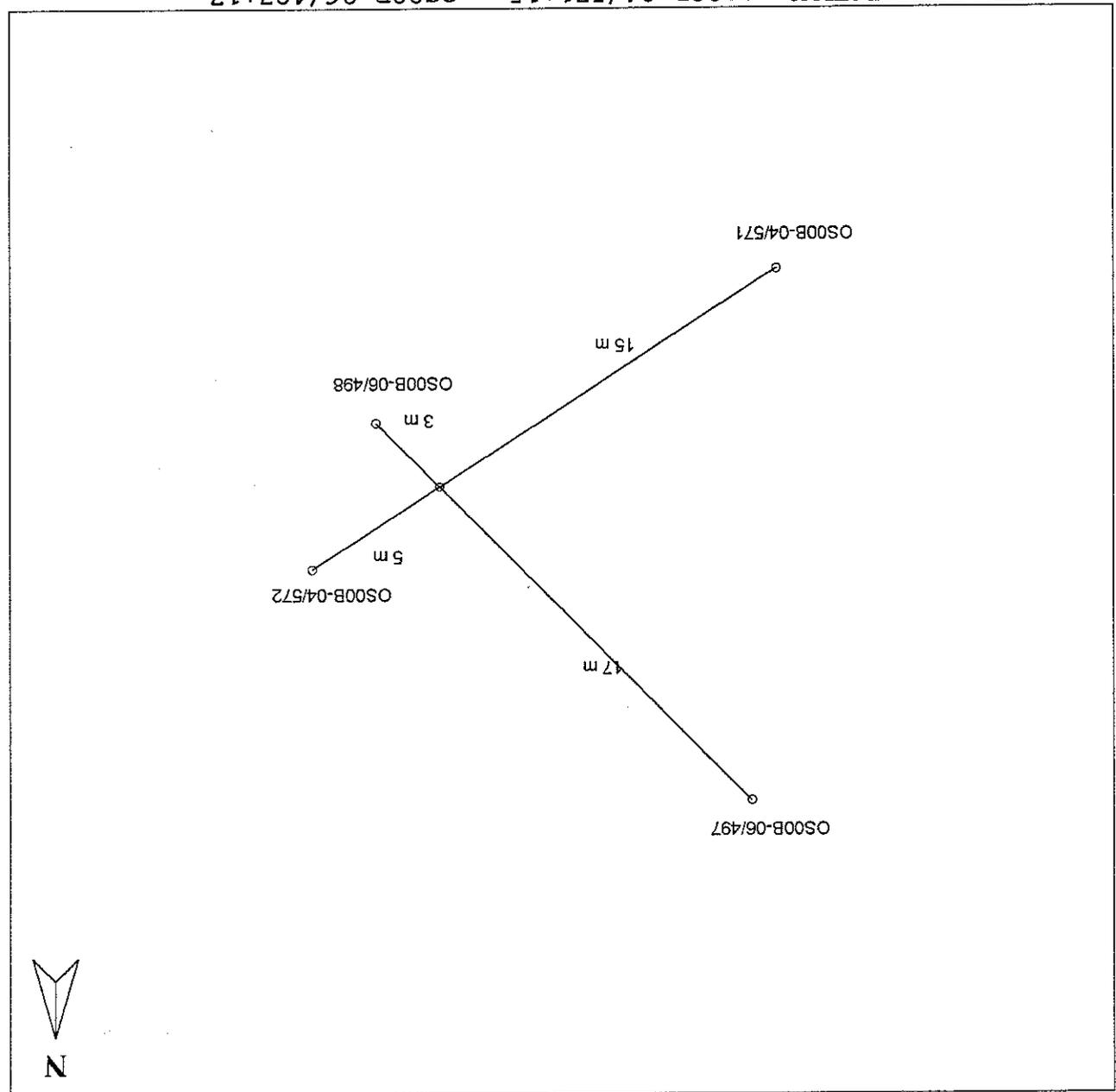
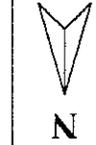
Eastng	520089.01	RL1 =	79.54
Northng	5838695.24	RL2 =	79.82
RL	79.68	MEAN:	79.68



Dynamic
Satellite
Surveys

INTERSECTION DIAGRAM

DSS-FF-14
REV 4.0
May 1998
DATE 03/00
PROJECT / JOB # 00-19 CLIENT SANTOS
INTERSECTION LINES: OS00B-04 / OS00B-06
AREA: CAMERONS PEP19
STATION INTERVAL: 20
DATUM: AGD 66 AHD



LINE INTERSECTION: OS00B-04/571+15 = OS00B-06/497+17

Easting	524683.40	RL1 =	116.75
Northing	5840851.76	RL2 =	116.26
RL	116.50	MEAN:	116.50

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Surveys

DSS-FI-14
REV 4.0
May 1998

DATE 03/00

PROJECT / JOB # 00-19 CLIENT SANTOS

INTERSECTION DIAGRAM

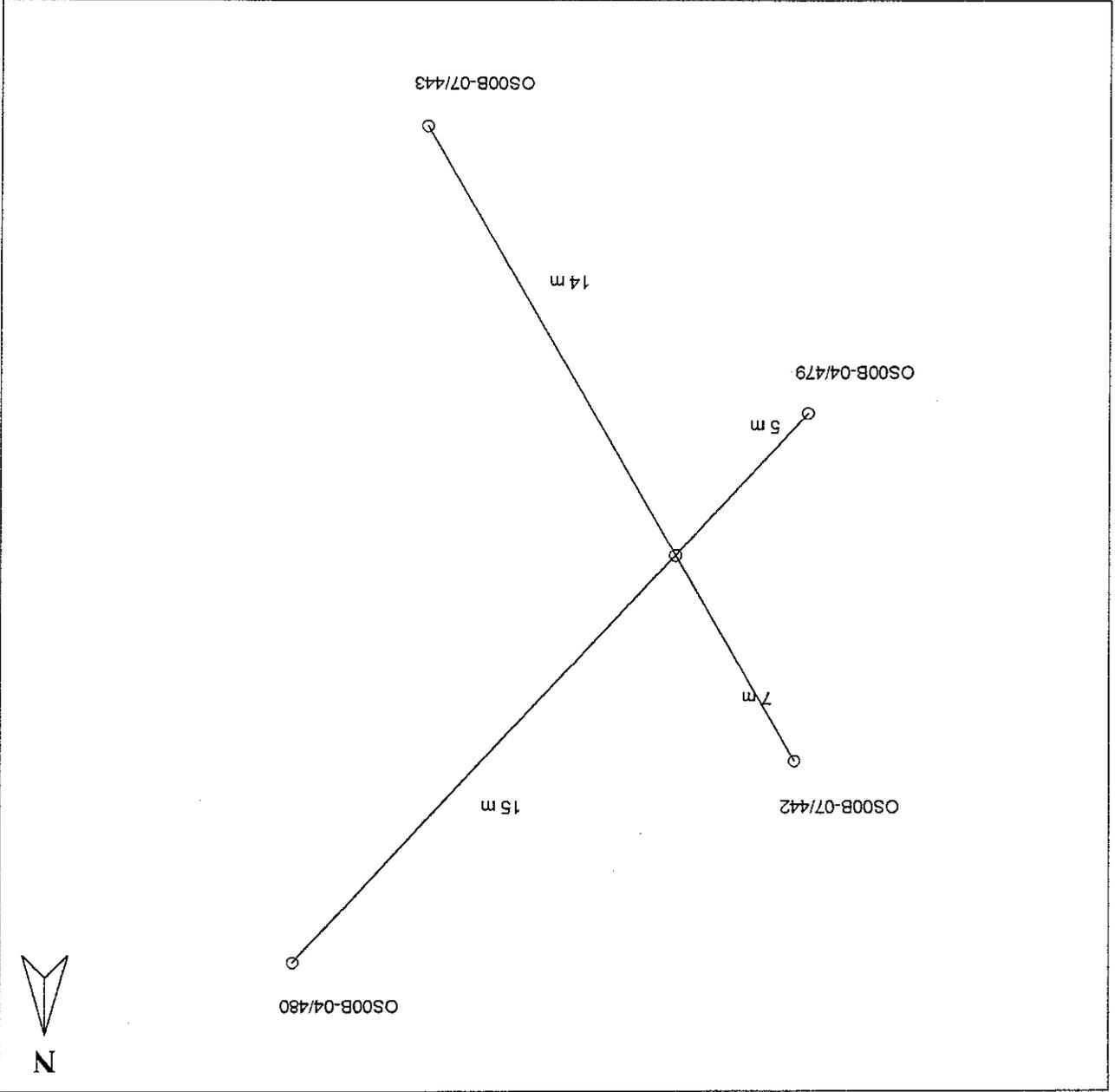
INTERSECTION LINES: OS00B-04 / OS00B-07

AREA: CAMERONS PEP19

STATION INTERVAL: 20

PROJECTION: AMG Zone 54 CM: 141

DATUM: AGD 66 AHD



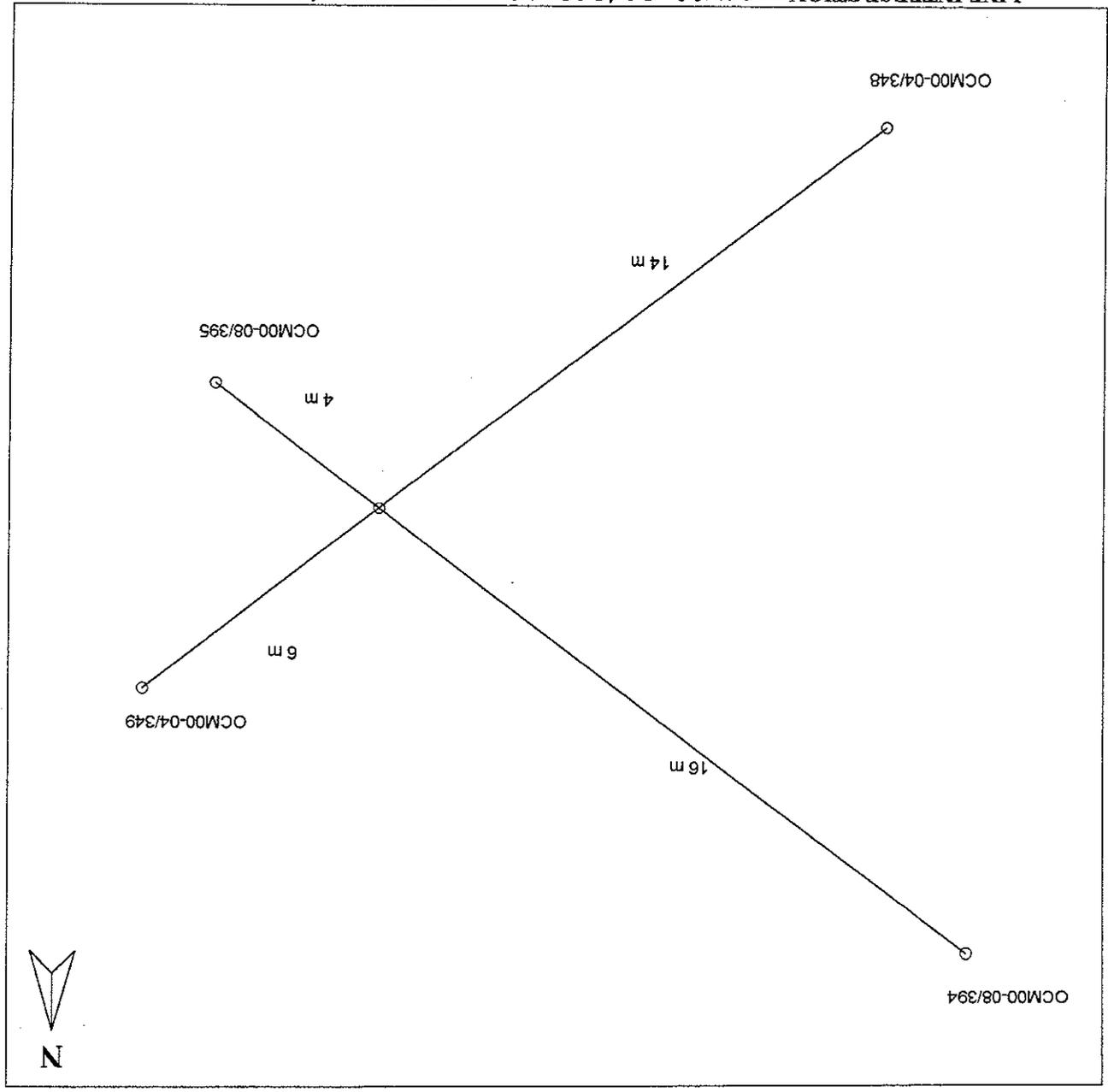
LINE INTERSECTION: OS00B-04/479+05 = OS00B-07/442+07

Easting 523192.03
Northing 5839758.26
RL 86.68

MEAN: 86.68

RL1 = 86.63
RL2 = 86.72

DSS-FF-14
 REV 4.0
 May 1998
 DATE 04/00
 INTERSECTION DIAGRAM
 PROJECT / JOB # 00-19 CLIENT SANTOS
 AREA: CAMERONS PEP119
 INTERSECTION LINES: OCM00-04 / OCM00-08
 STATION INTERVAL: 20
 DATUM: AGD 66 AHD
 PROJECTION: AMG Zone 54 CM: 141



Easting	521069.53	RL1 =	75.80
Northing	5838236.64	RL2 =	75.84
RL	75.82	MEAN:	75.82

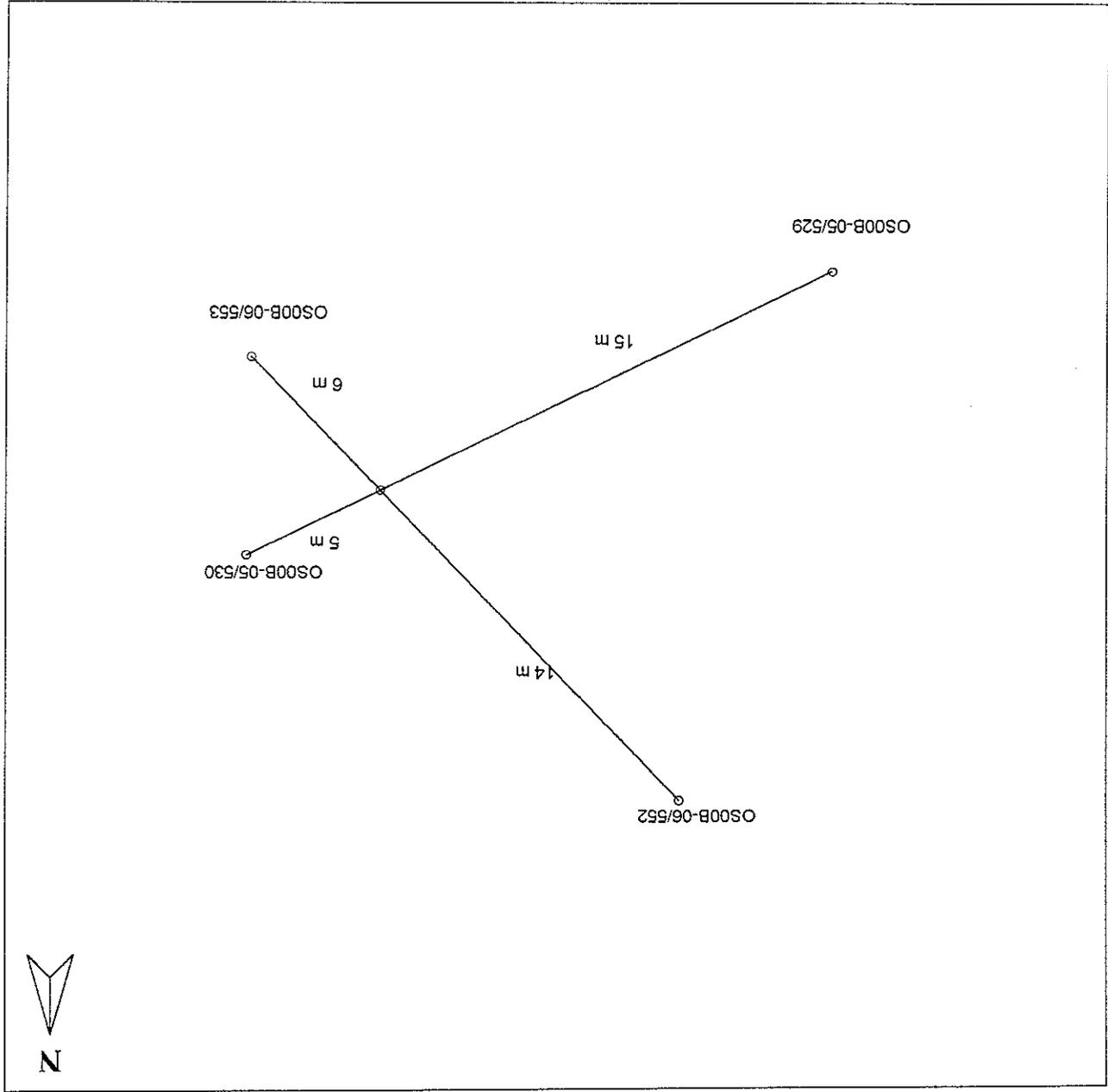


Dynamic
Satellite
Surveys

INTERSECTION DIAGRAM

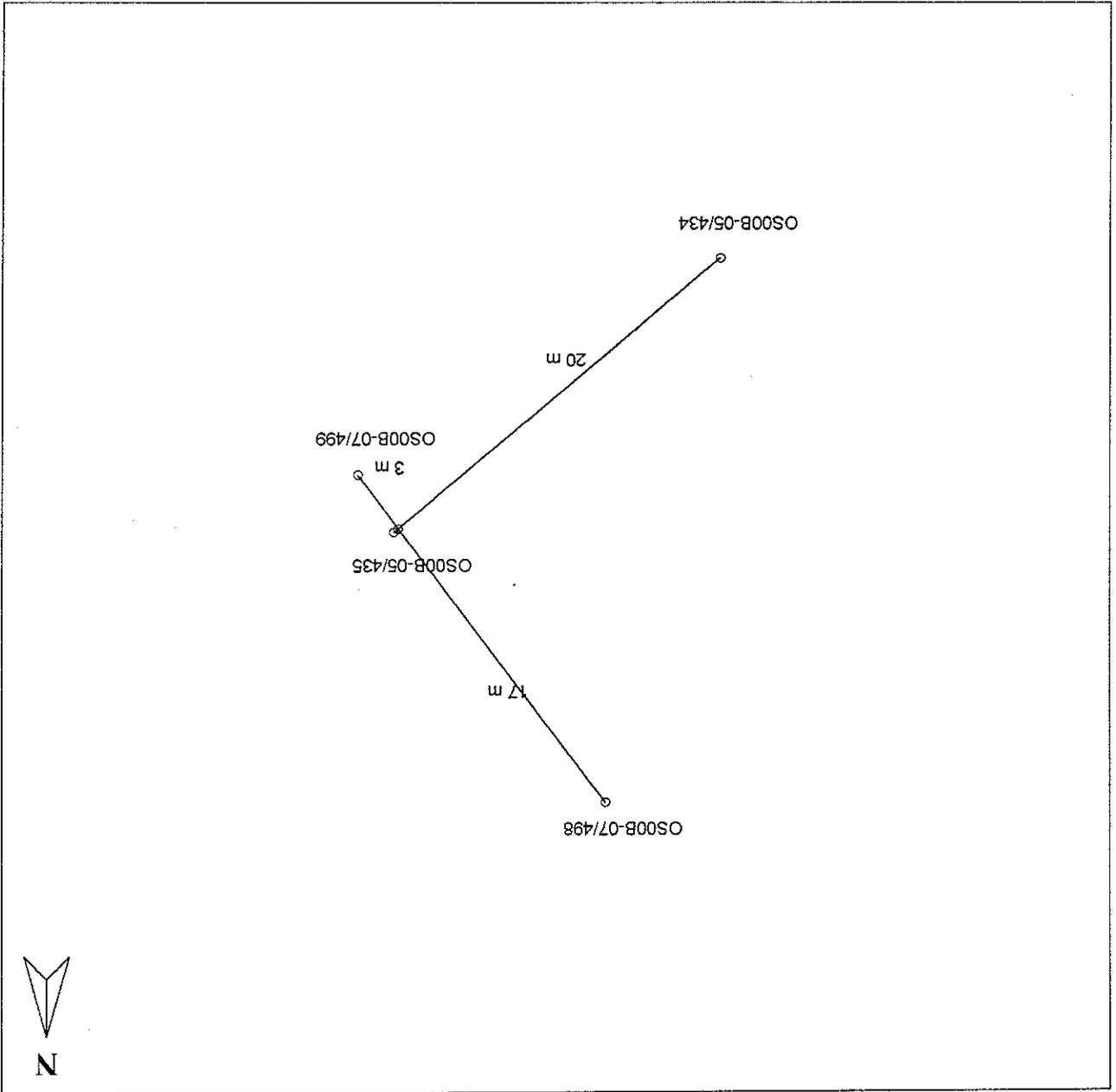
DSS-FI-14 REV 4.0 May 1998
DATE 03/00
PROJECT / JOB # 00-19 CLIENT SANTOS
INTERSECTION LINES: OS00B-05 / OS00B-06

AREA: CAMERONS PEP19
STATION INTERVAL: 20
PROJECTION: AMG Zone 54 CM: 141
DATUM: AGD 66 AHD



LINE INTERSECTION: OS00B-05/529+15 = OS00B-06/552+14

Eastng	525393.43	RL1 =	126.83
Northng	5840015.32	RL2 =	126.64
RL	126.73	MEAN:	126.73



LINE INTERSECTION: OS00B-07/498+17 = OS00B-05/434+20

Easting	523886.16	RL1 =	89.53
Northing	5838866.11	RL2 =	89.48
RL	89.50	MEAN:	89.50

DSS-FI-14
 REV 4.0
 May 1998

INTERSECTION DIAGRAM

Dynamic
 Satellite
 Surveys

PROJECT / JOB # 00-19 CLIENT SANTOS DATE 04/00

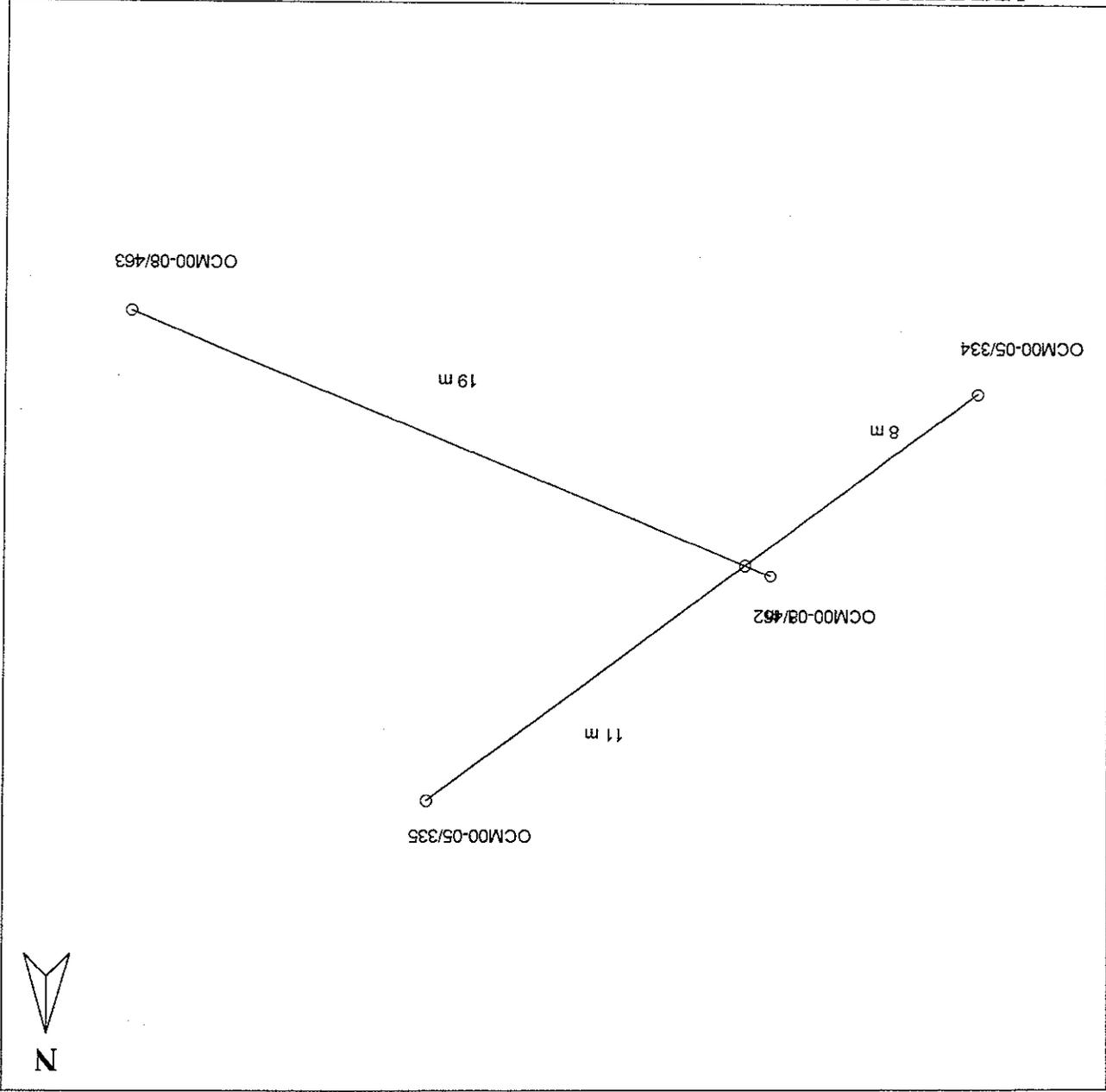
INTERSECTION LINES: OCM00-05 / OCM00-08

AREA: CAMERONS PEP19

STATION INTERVAL: 20

PROJECTION: AMG Zone 54 CM: 141

DATUM: AGD 66 AHD



LINE INTERSECTION: OCM00-05/334+08 = OCM00-08/462+01

Eastng	522281.62	RL1 =	76.46
Northng	5837653.18	RL2 =	76.56
RL	76.51	MEAN:	76.51

Upholes Listing

UPHOLES

Coordinates are AMG66 Zone 54 Central Meridian 141°
 Heights are AHD, using AUSGEOID98 N value model

Uphole No.	Line	VP	Easting	Northing	Elev.	Comments
UH#1	OCM00-01	221	518871	5840445	78.6	
UH#2	OCM00-07	273+11	521059	5842375	86.4	X OCM00-01
UH#3	OCM00-06	320+9	522399	5843566	100.3	X OCM00-01
UH#4	OCM00-02	557+17	523353	5842438	106.0	X OCM00-06
UH#5	OCM00-07	340+5	521906	5841343	85.2	X OCM00-02
UH#6	OCM00-02	288+16	519061	5839193	77.0	X OCM00-08
UH#7	OCM00-03	334+13	520092	5838695	80.0	X OCM00-08
UH#8	OCM00-03	488+5	522604	5840465	86.5	X OCM00-07
UH#9	OCM00-03	580+19	524113	5841541	103.9	X OCM00-06
UH#10	OCM00-04	571+15	524683	5840854	116.6	X OCM00-06
UH#11	OCM00-04	479+3	523190	5839758	86.9	X OCM00-07
UH#12	OCM00-04	348+14	521069	5838239	75.9	X OCM00-08
UH#13	OCM00-04	233+4	519202	5836879	73.2	X HF88-03
UH#14	OCM00-08	462+4	522286	5837654	76.7	X OCM00-05
UH#15	OCM00-07	498+17	523884	5838864	89.9	X OCM00-05
UH#16	OCM00-05	529+17	525397	5840013	126.5	X OCM00-06

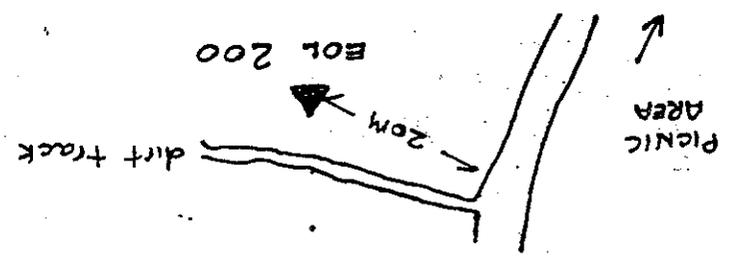
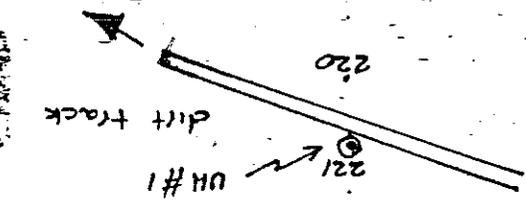
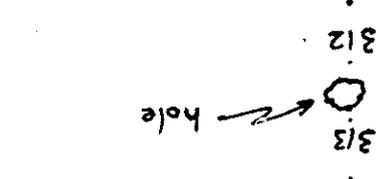
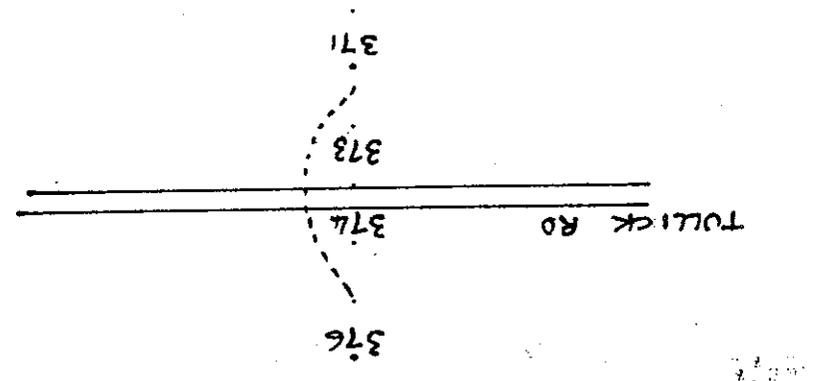
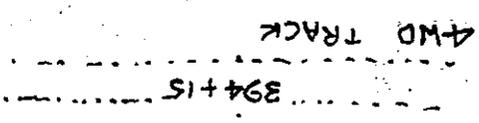
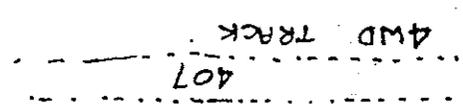
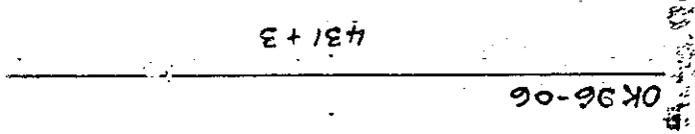
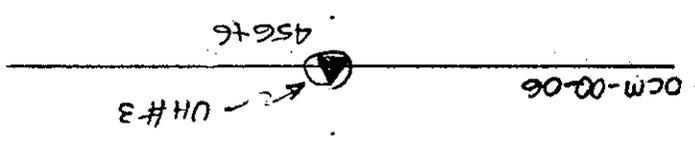
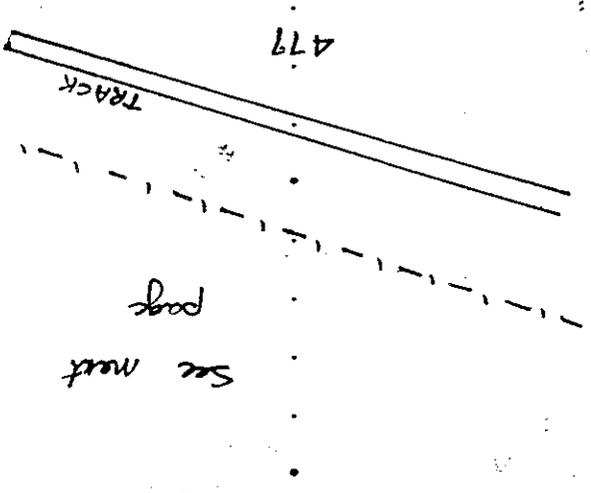
Chaining Maps

TRACE DIAGRAM

PROJECT/JOB # 00-19 CLIENT *ECCO / SANTOS*

PAGE 1 OF 2 LINE: *DCM-00-01* AREA: *CAMERONS* STN INTERVAL: 20 m

FROM: STN 200 TO STN 477 SHOOTING DIRECTION: *S → N* BEARING: °



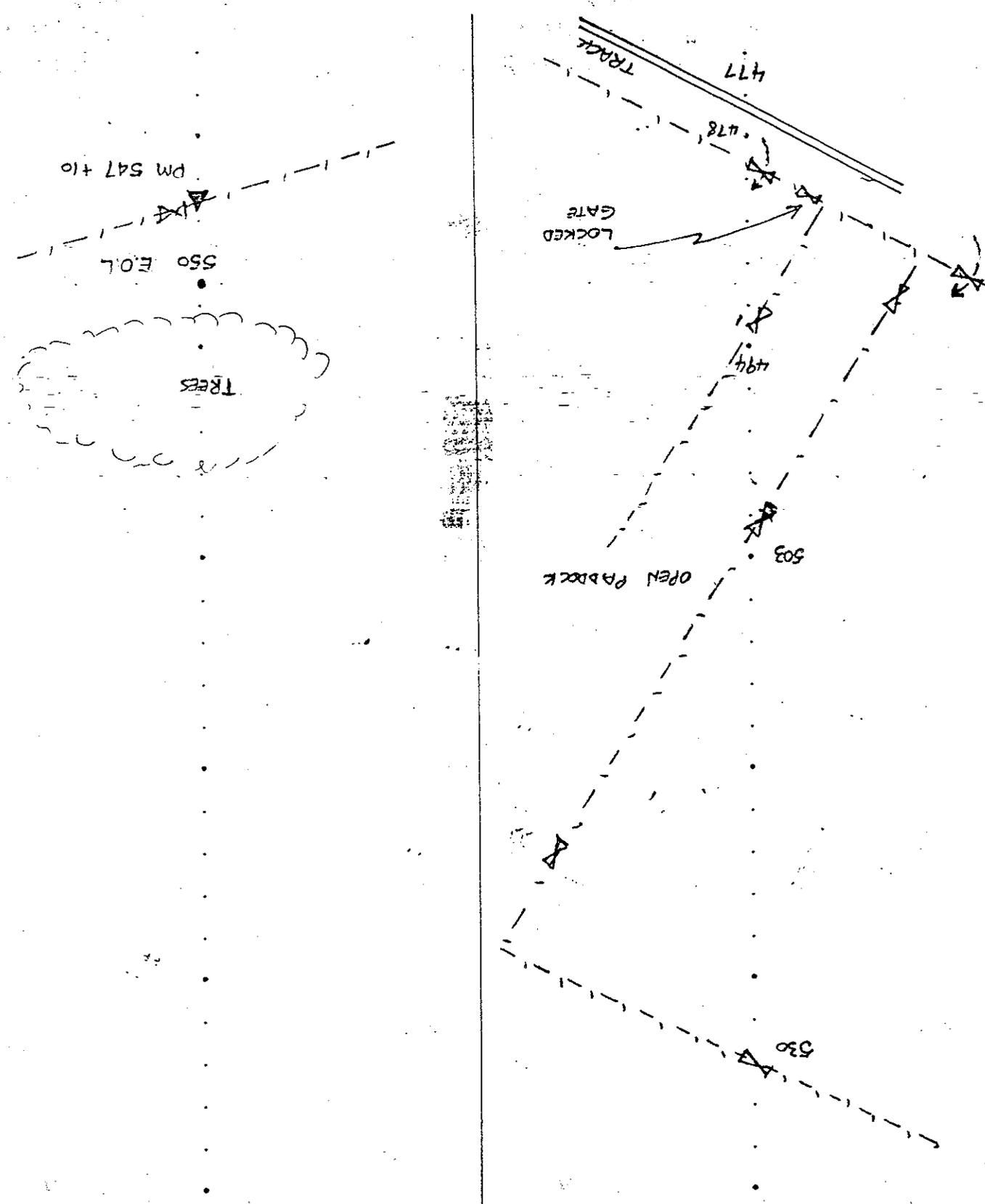
FROM STN 477 TO STN 550 SHOOTING DIRECTION: S ← N BEARING: °

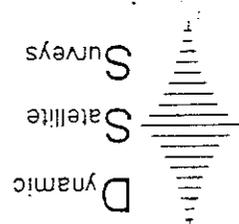
PAGE 2 OF 2 LINE: OCM-00-01 AREA: CAMERONS STN INTERVAL: 20 m

PROJECT/JOB # 00-19 CLIENT GECO / SANTOS

DSS-FF-07 REV 6.0 March 1998

TRACE DIAGRAM





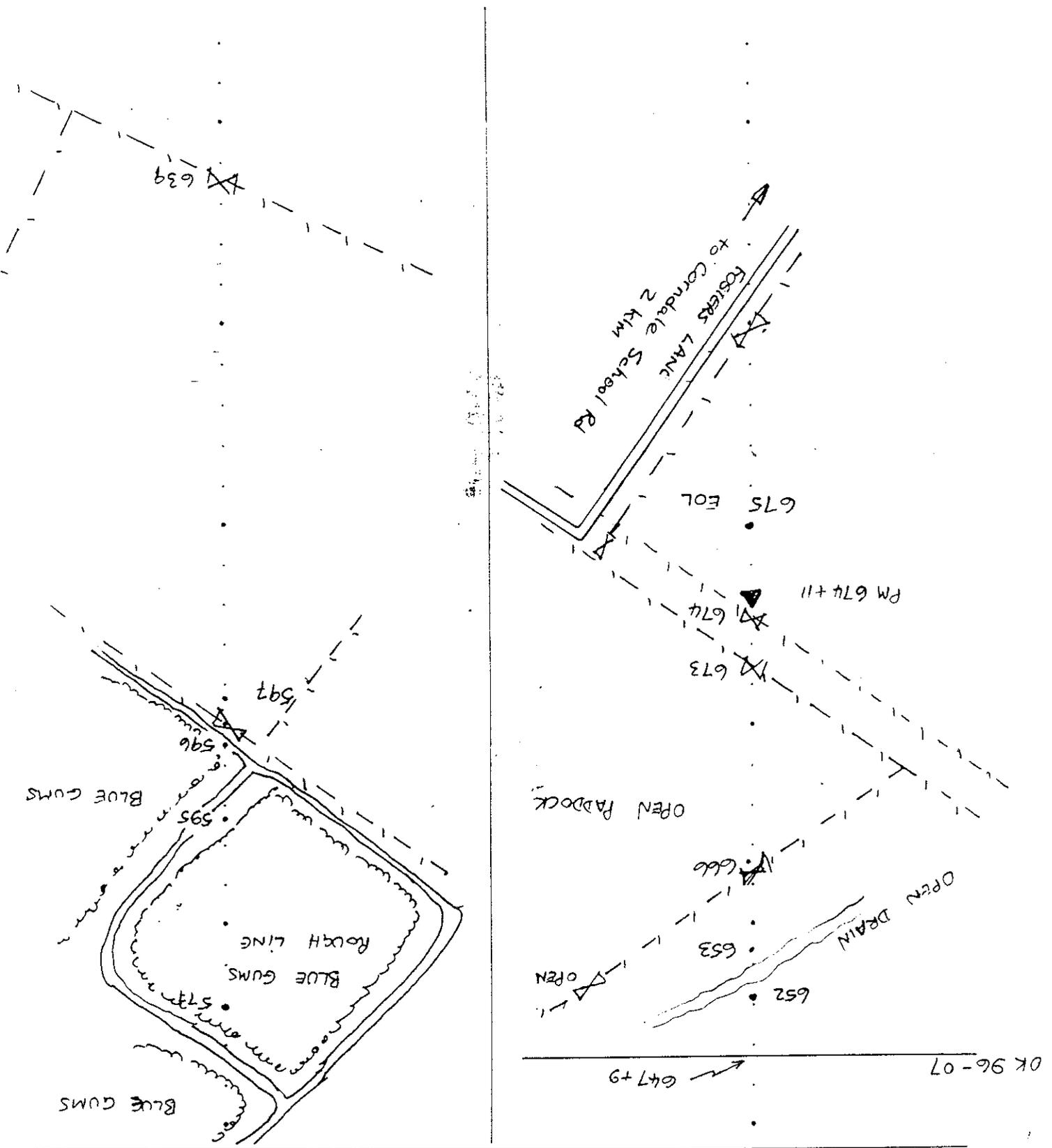
TRACE DIAGRAM

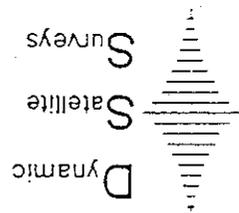
DSS-FF-07
REV 6.0
March 1998

CLIENT: GECO / SANTOS

PAGE 1 OF 3 LINE: DCM-00-02 AREA: CAMERONS STN INTERVAL: 20 m

PROJECT/JOB # 00-19 FROM STN 675 EOL TO STN 577 SHOOTING DIRECTION: N 95 BEARING: °





DSS-FF-07
 REV 6.0
 March 1998

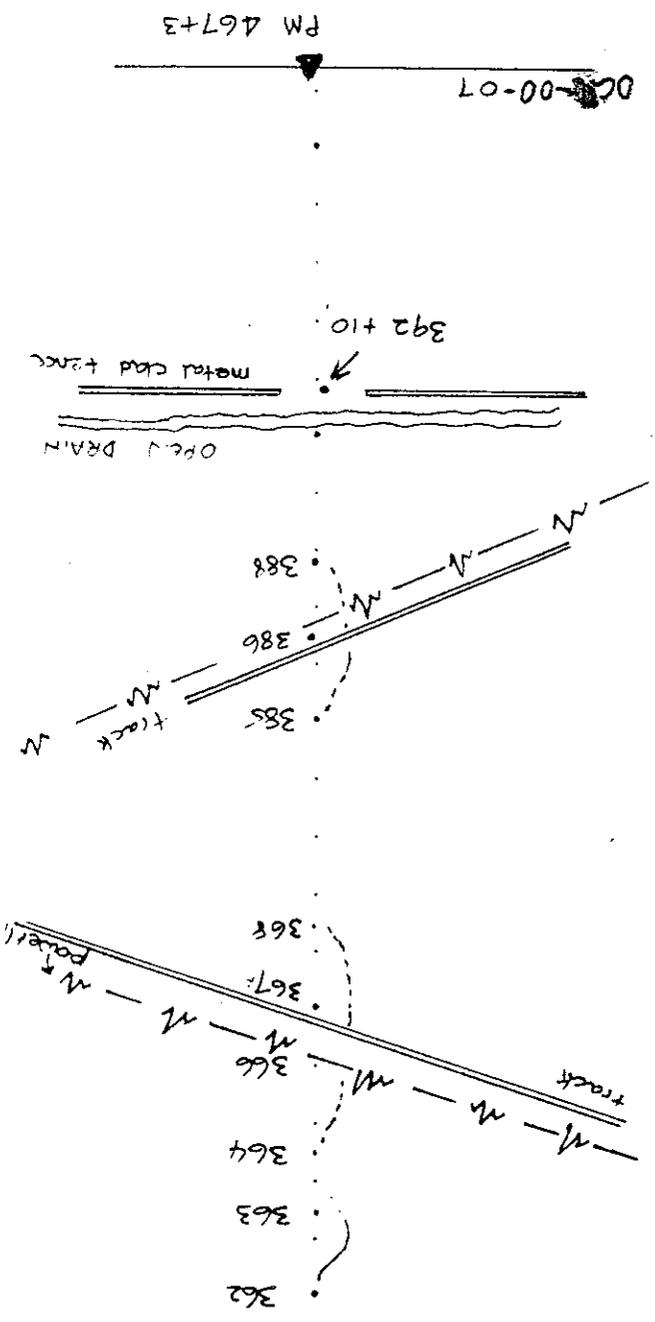
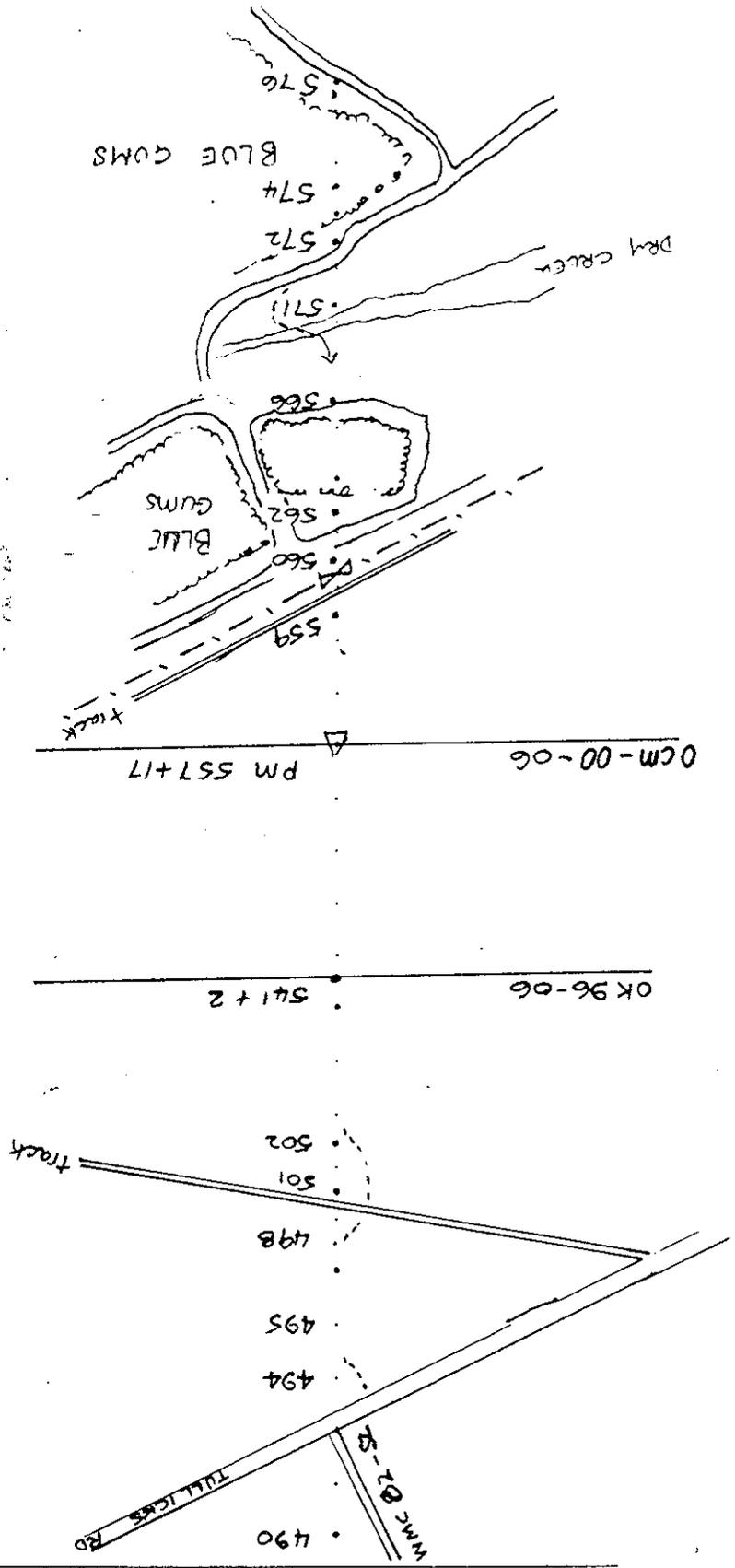
CLIENT: GECO / SANTOS

PROJECT/JOB #: 00-19

PAGE 2 OF 3
 LINE: OCM-00-02
 AREA: CAMERONS
 STN INTERVAL: 20 m

FROM STN 576 TO STN 362
 SHOOTING DIRECTION: N 9 S
 BEARING: 0

TRACE DIAGRAM





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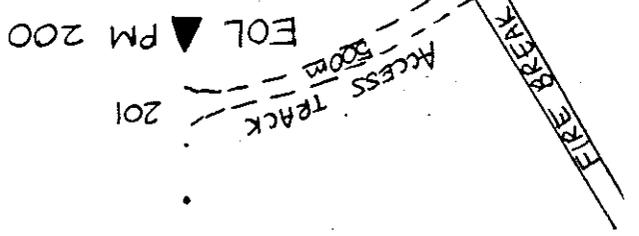
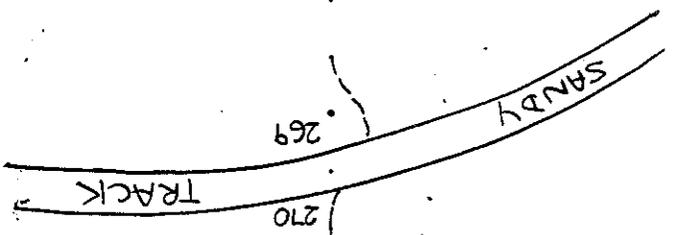
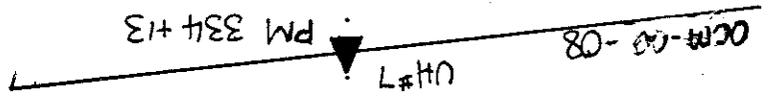
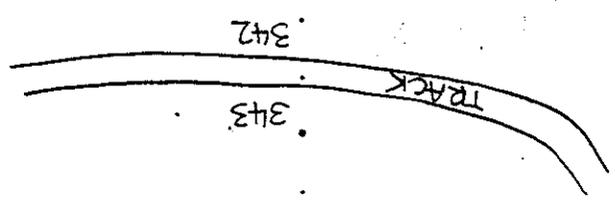
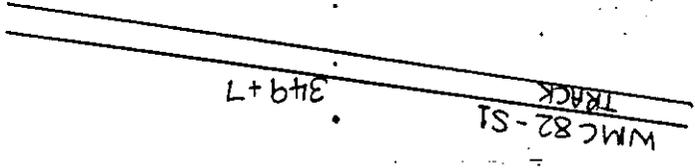
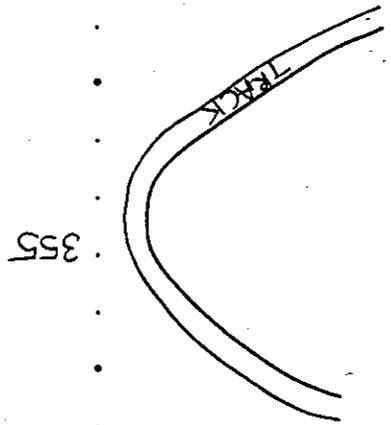
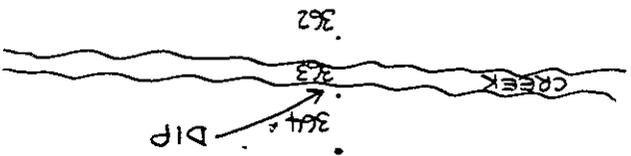
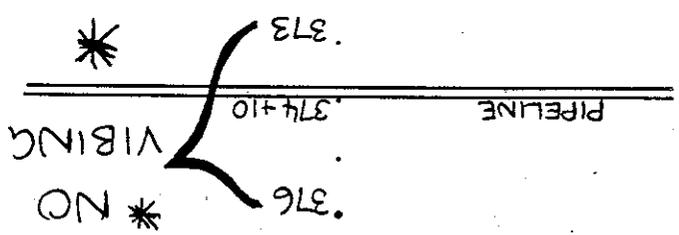
TRACE DIAGRAM

DSS-FF-07
REV 6.0
March 1998

CLIENT GECO/SANTOS PROJECT/JOB # 00-19

PAGE 1 OF 4 LINE: OCM-00-03 AREA: CAMEROUS STN INTERVAL: 20 m

FROM STN 200 (EOL) TO STN 376 SHOOTING DIRECTION: S - N BEARING: °



EOL ▼ PM 200

Dynamic
Satellite
Surveys



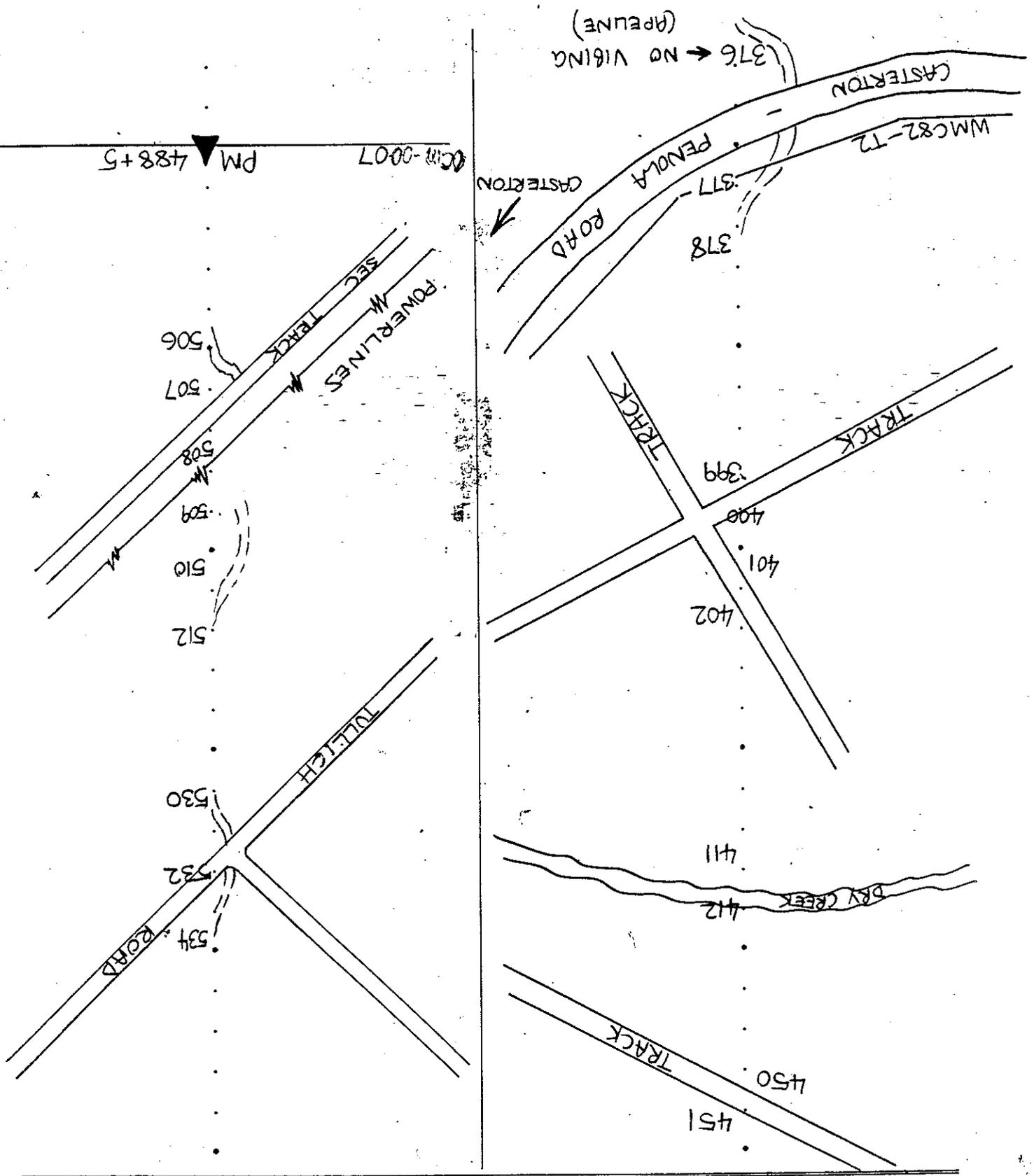
TRACE DIAGRAM

DSS-FF-07
REV 6.0
March 1998

CLIENT GECO / SANTOS PROJECT/JOB # 00-19

PAGE 2 OF 4 LINE: DCM-00-03 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 376 TO STN 534 SHOOTING DIRECTION: S-N BEARING: °



Dynamic
Satellite
Surveys



TRACE DIAGRAM

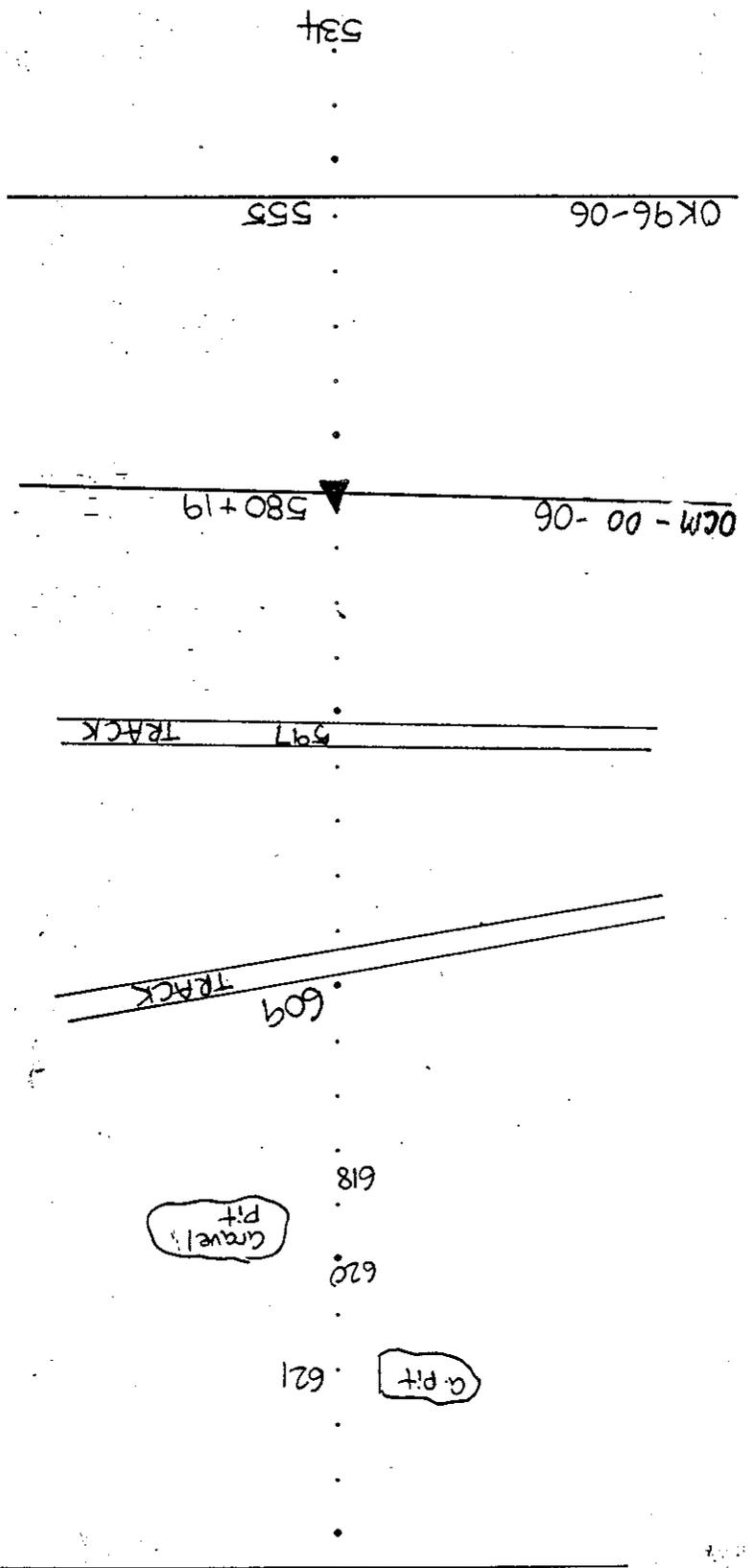
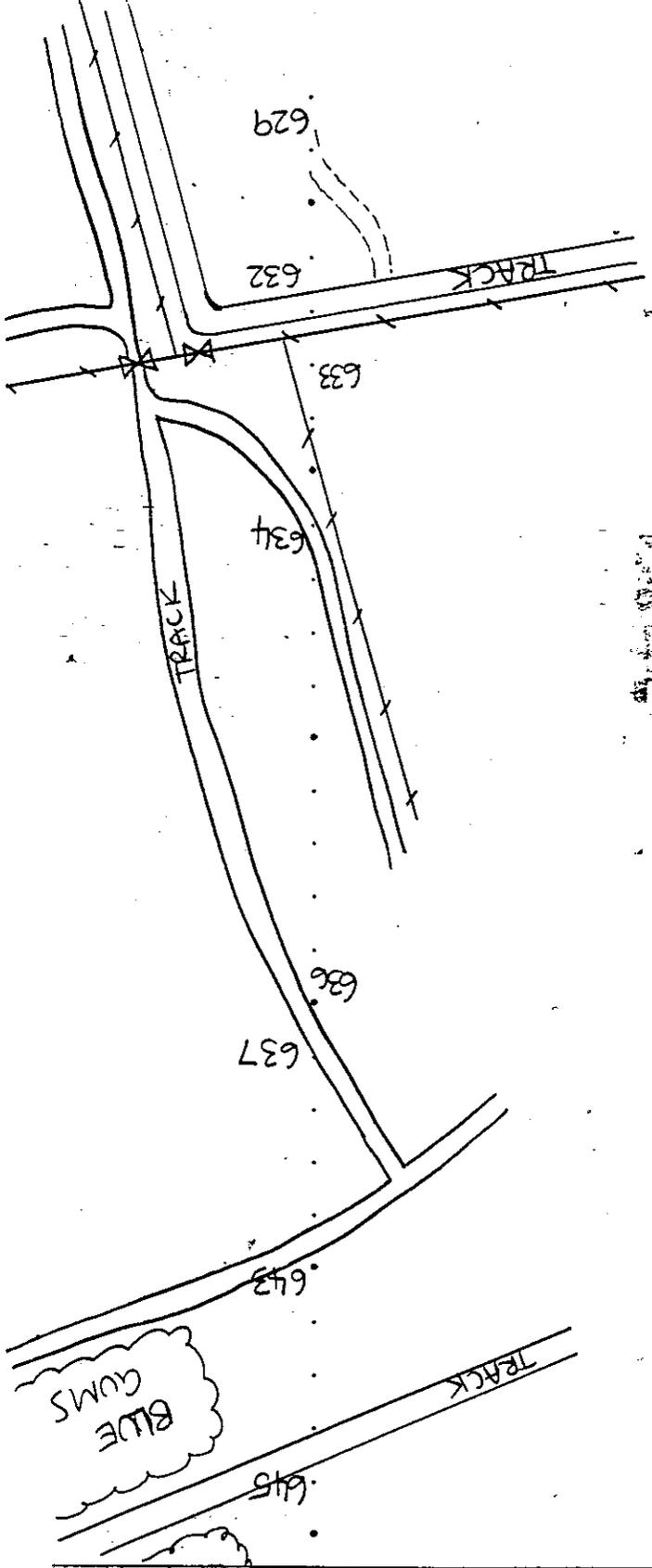
DSS-FF-07
REV 6.0
March 1998

CLIENT GECCO / SANTOS

PROJECT/JOB # 00-19

PAGE 3 OF 4 LINE: OCM-00-03 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 534 TO STN 645 SHOOTING DIRECTION: S-N BEARING: °



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Dynamic
Satellite
Surveys

TRACE DIAGRAM

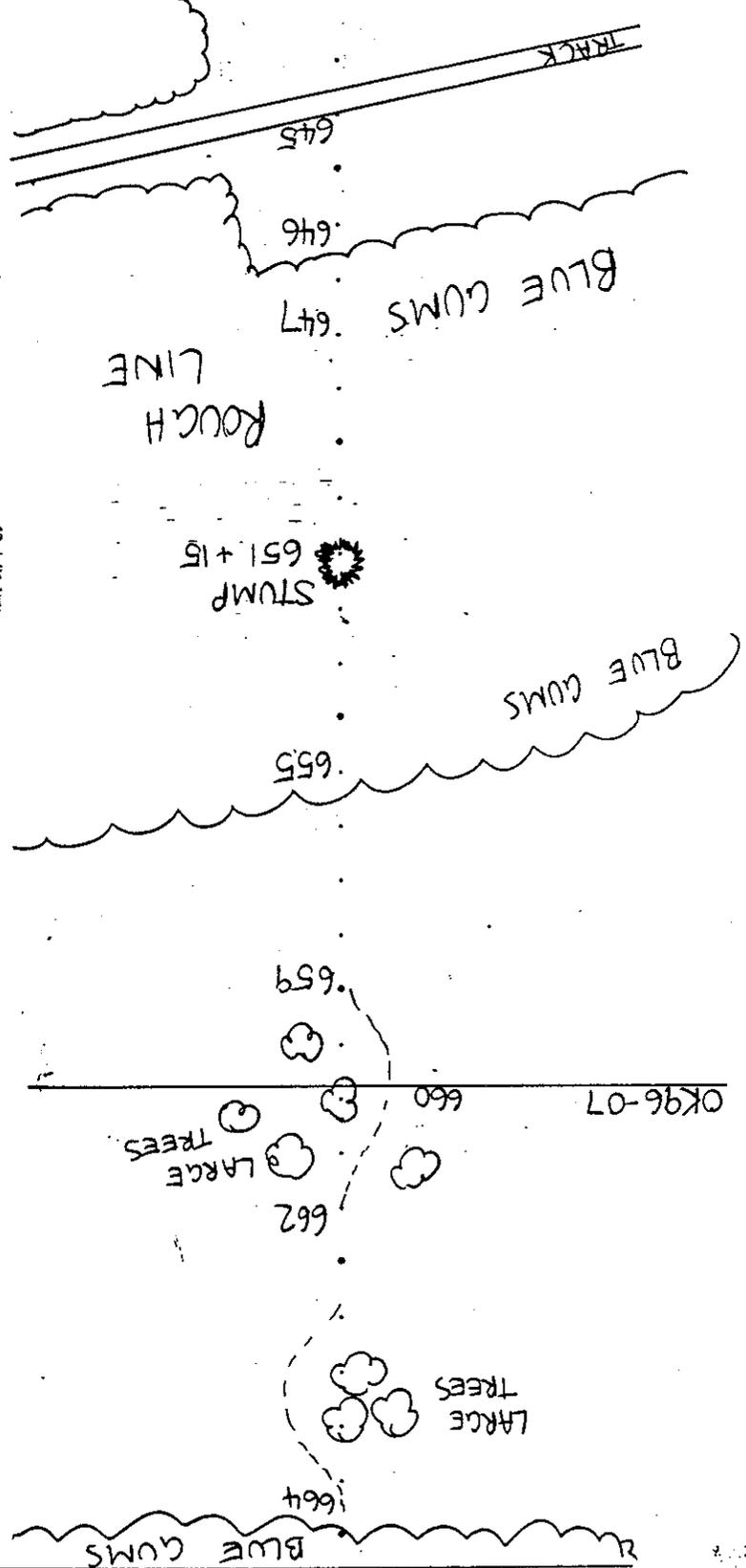
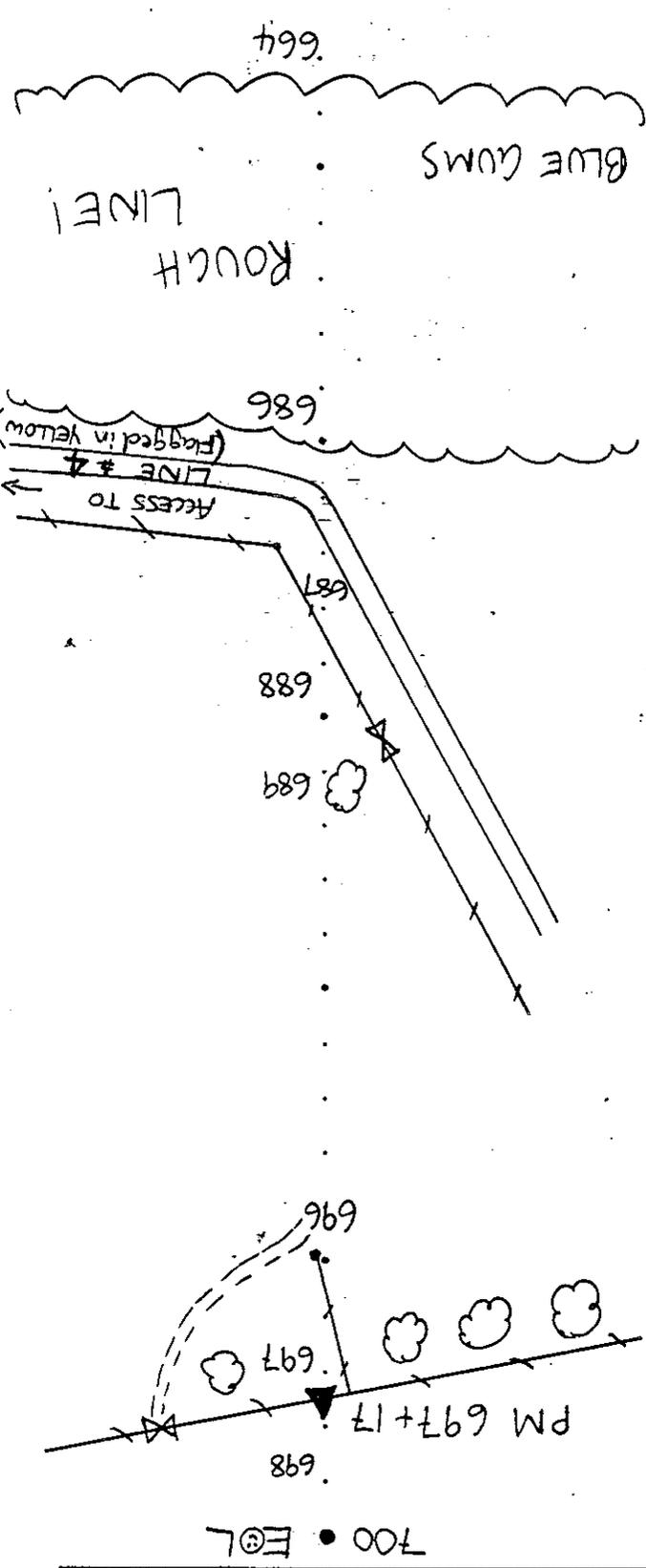
DSS-FF-07
REV 6.0
March 1998

CLIENT CECO / SHANTOS

PROJECT/JOB # 00-19

PAGE 4 OF 4 LINE: OCM-00-03 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 645 TO STN 700 (EOL) SHOOTING DIRECTION: S-N BEARING: _____



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TRACE DIAGRAM

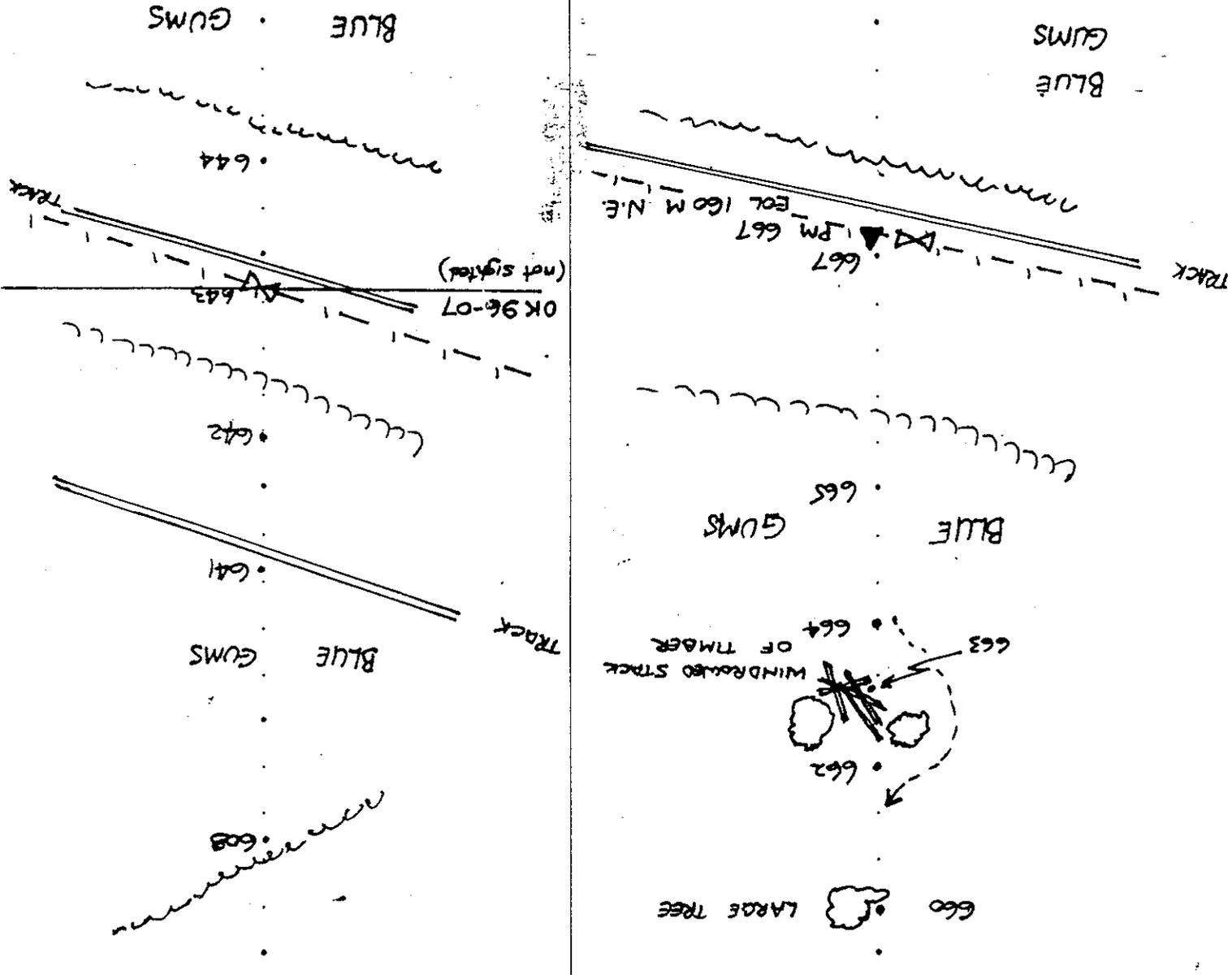
DSS-FF-07
REV 6.0
March 1998

CLIENT GECCO / SANTOS

PROJECT/JOB # 00-19

PAGE 1 OF 3 LINE: 00M-00-04 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 675 EOL TO STN 608 SHOOTING DIRECTION: N 85 BEARING: 0



N.B. SMALL TURNAROUND VIBS SHOULD INSPECT !! MAY REQUIRE REVERSE IN FROM 668

675 EOL

BLUE GUMS

BLUE GUMS

667
PM 667
EOL 160 M N.E.

OK 96-07
(not sighted)

BLUE GUMS 665

BLUE GUMS 641

WINDROWED STACK
662
663
664 OF TIMBER

LARGE TREE 660

608

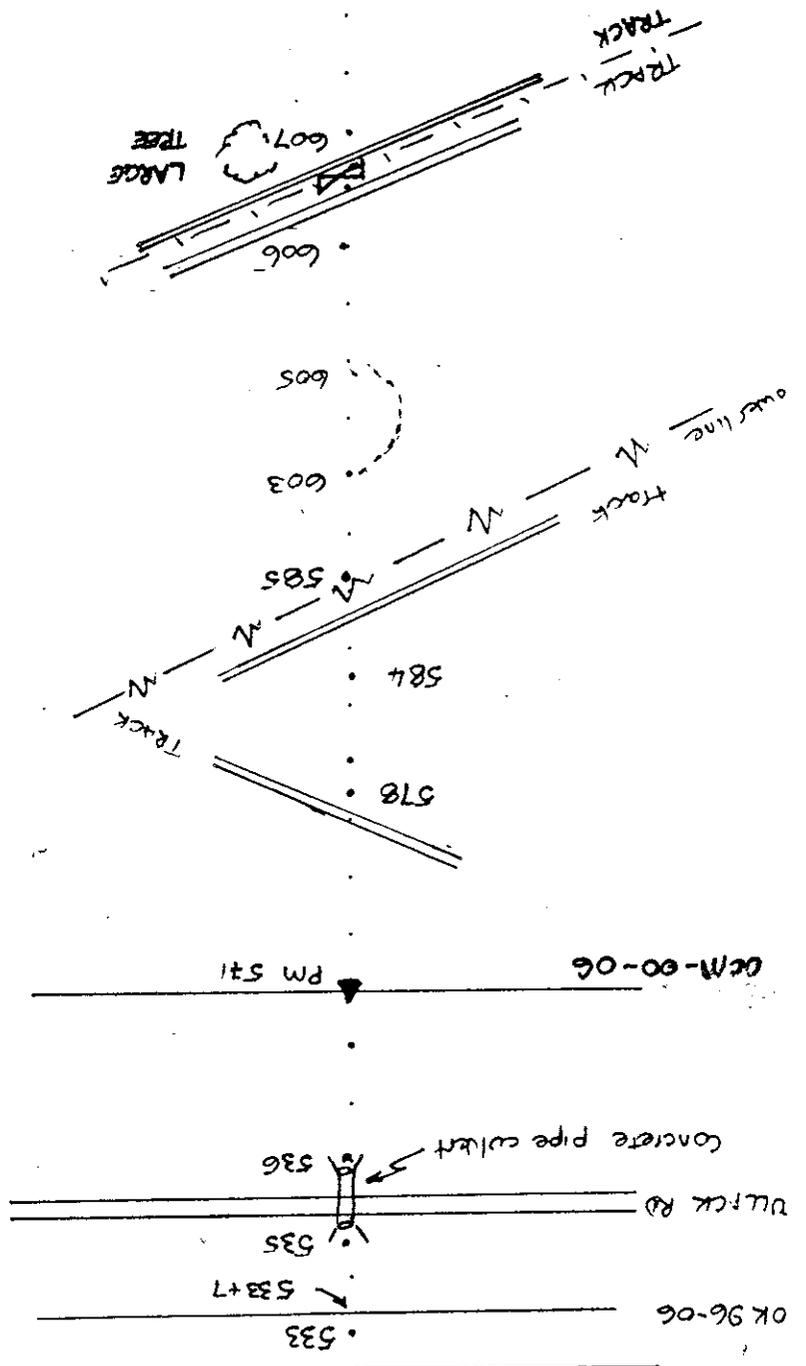
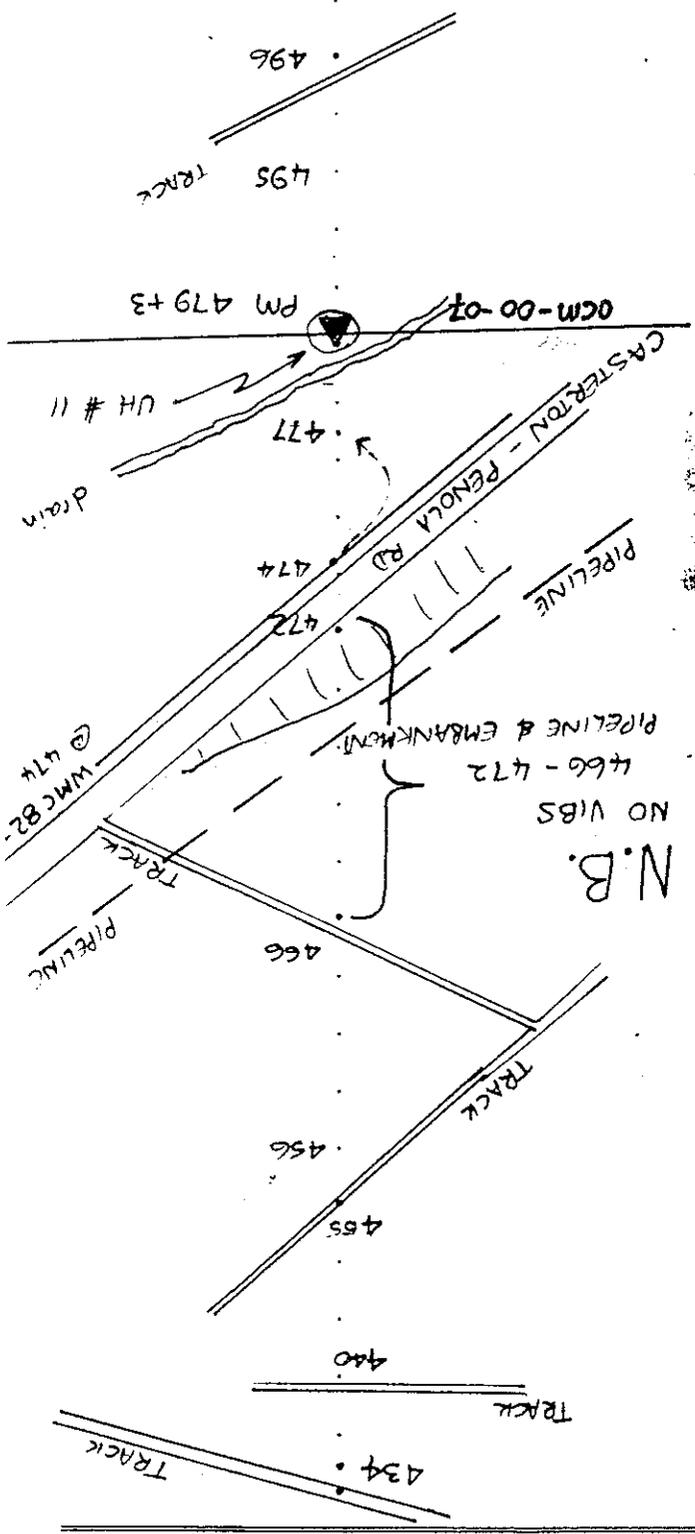
TRACK

TRACK

TRACK



TRACE DIAGRAM





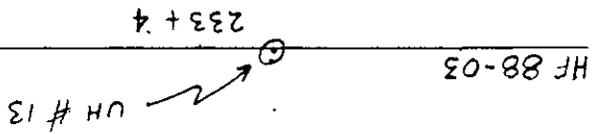
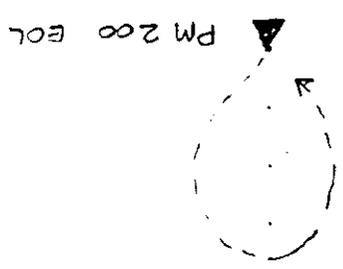
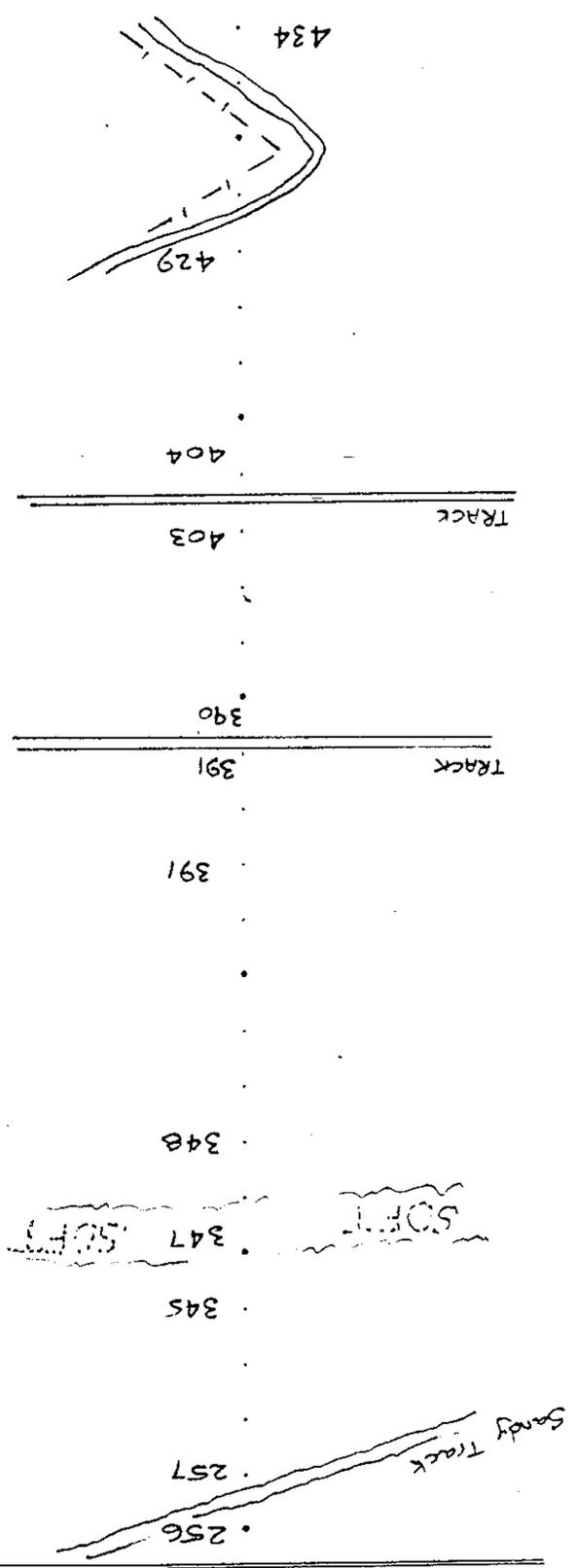
TRACE DIAGRAM

DSS-FF-07
REV 6.0
March 1998

PROJECT/JOB # 00-19 CLIENT GECCO / SANTOS

PAGE 3 OF 3 LINE: DCM-00-04 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 434 TO STN 200 SHOOTING DIRECTION: N → S BEARING: °



TRACE DIAGRAM

Dynamic
Satellite
Surveys

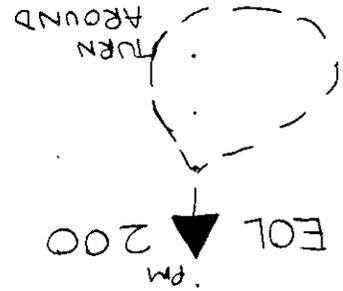
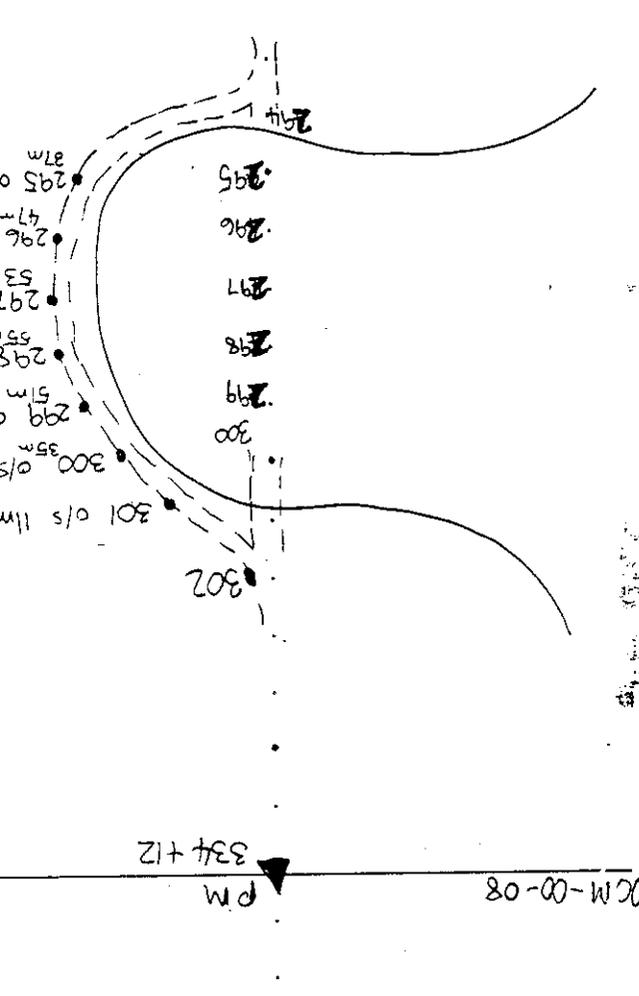
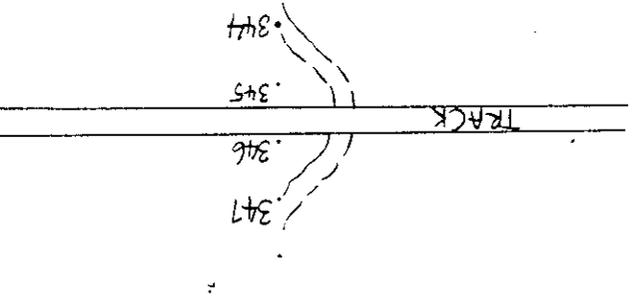
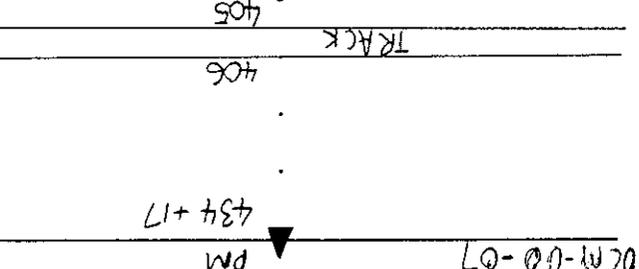


PROJECT/JOB # 00-19 CLIENT GECO/SANTOS

PAGE 1 OF 3 LINE: 0CM-00-05 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 200 (EOL) TO STN 435 SHOOTING DIRECTION: S-N BEARING: °

OCM-00-07 435 PM 434+17



CLIENT CECO / SANTOS

PROJECT/JOB # 00-19

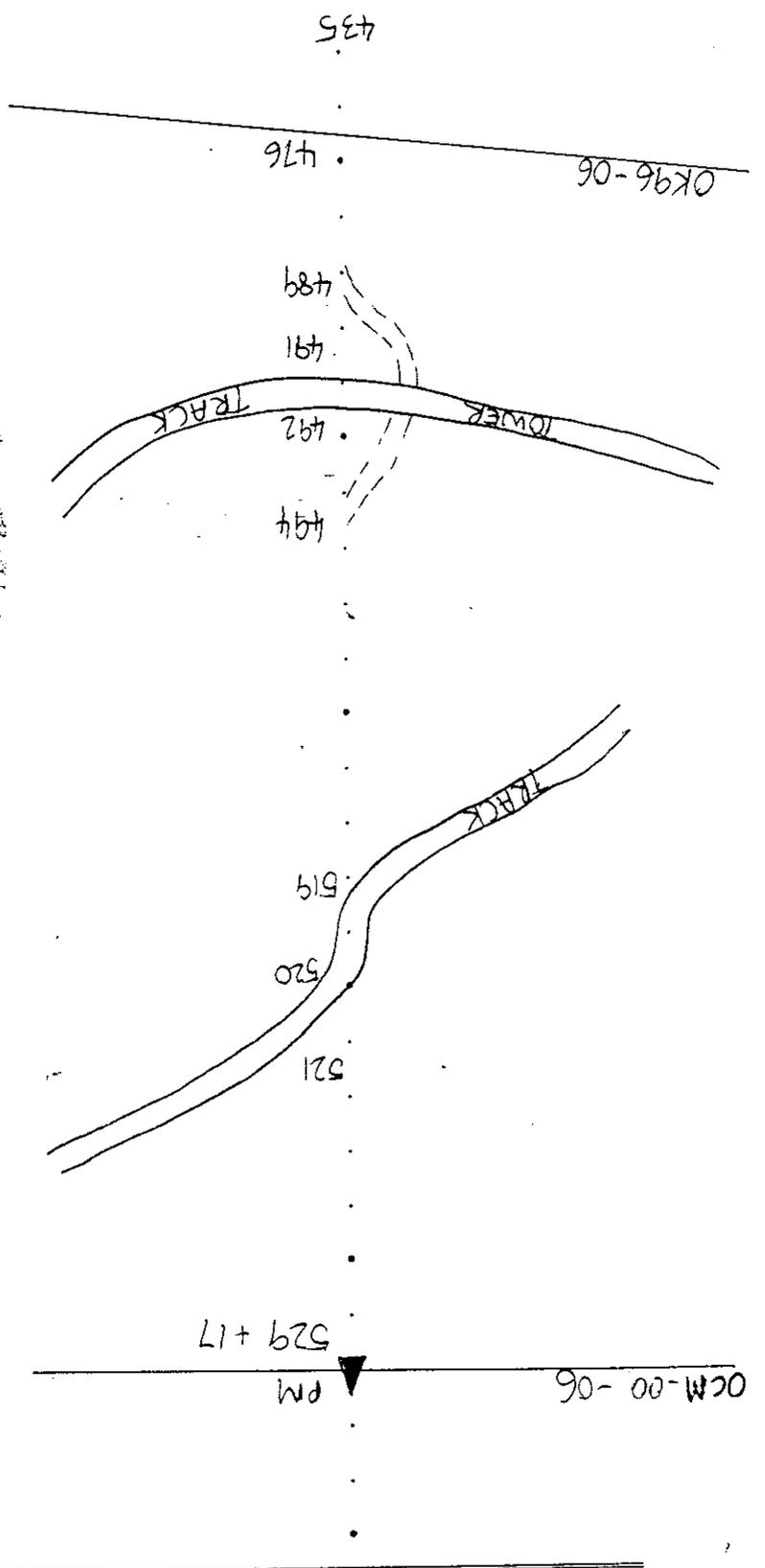
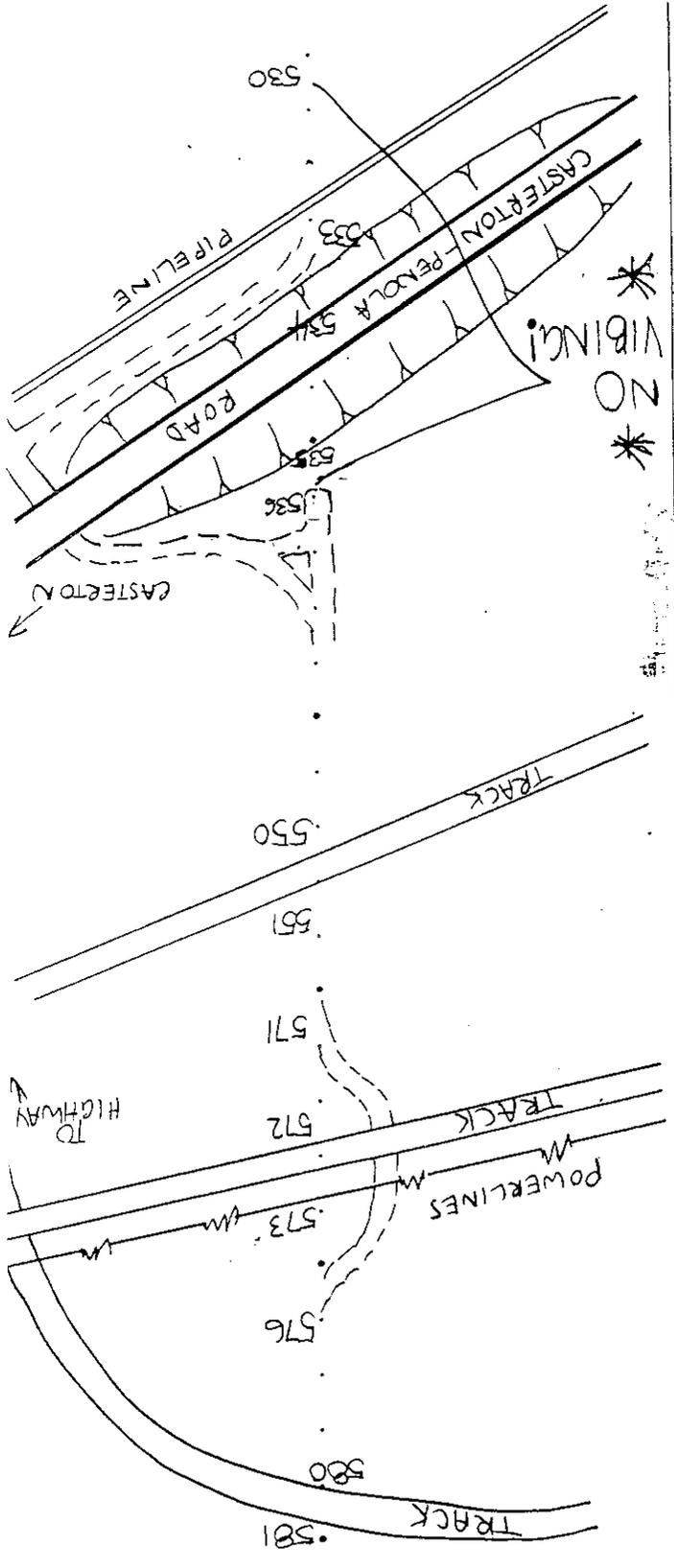
Dynamic
Satellite
Surveys



PAGE 2 OF 3 LINE: DCM-00-05 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 435 TO STN 581 SHOOTING DIRECTION: S-N BEARING: °

TRACE DIAGRAM



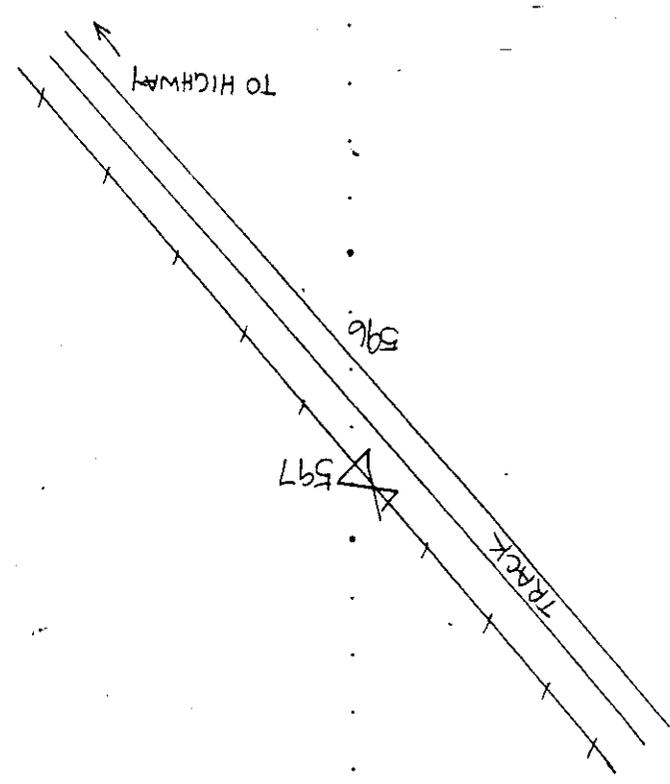
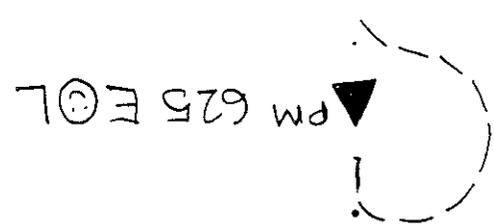
TRACE DIAGRAM

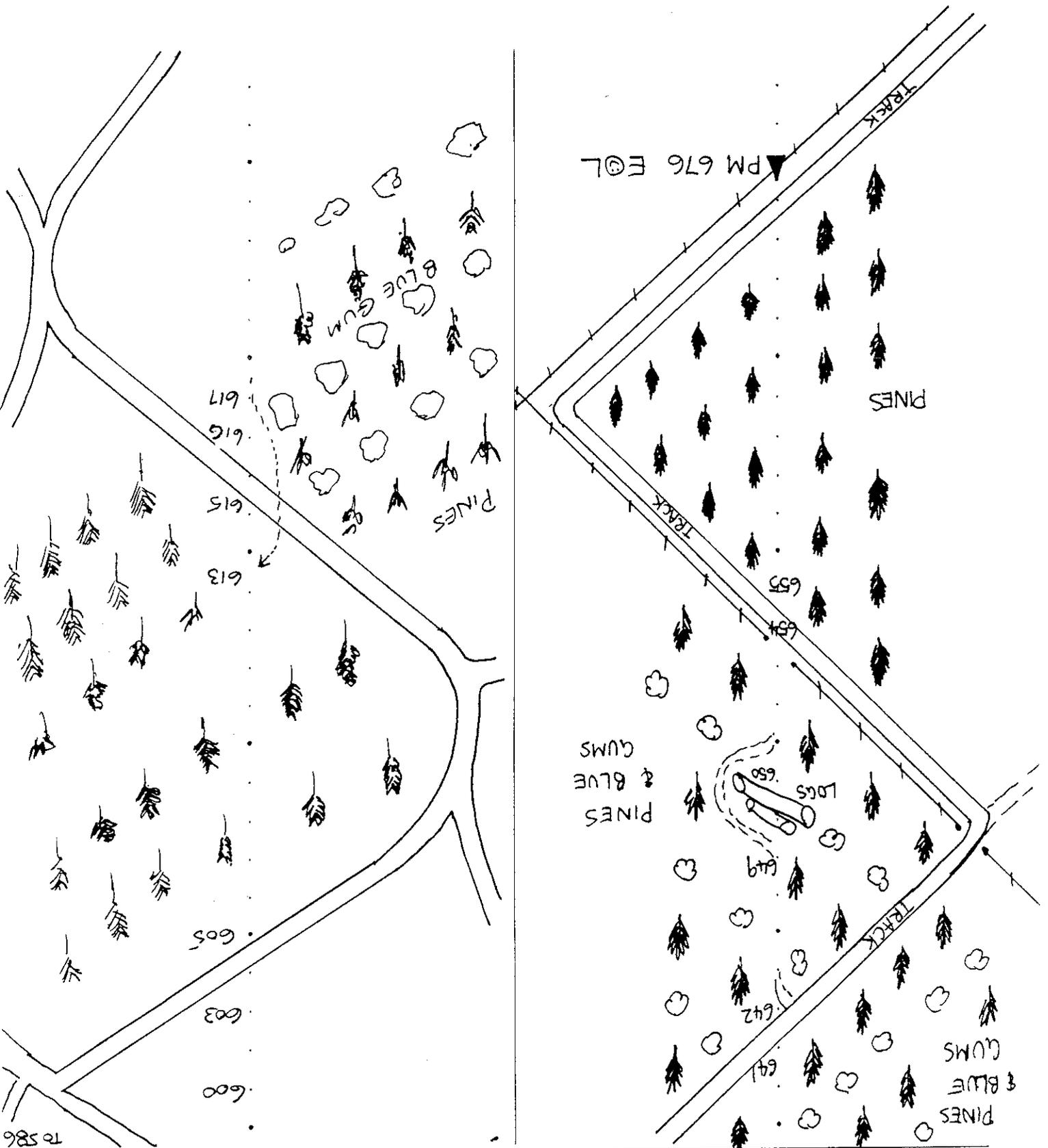


PROJECT/JOB # 00-19 CLIENT GECO/SANTOS

PAGE 3 OF 3 LINE: OCM-00-05 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 581 TO STN 625 (EOL) SHOOTING DIRECTION: S-N BEARING: °





FROM STN 676 (EOL) TO STN 600 SHOOTING DIRECTION: S-N BEARING

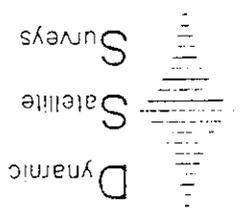
PAGE 1 OF 4 LINE: DCM-00-06 AREA: CAMERONS STN INTERVAL: 20m

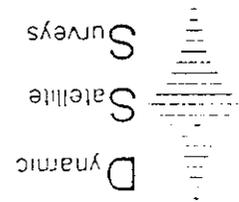
PROJECT/JOB # 00-19 CLIENT GECO/SANTOS

March 1998

DSS-FR-07 REV 6.0

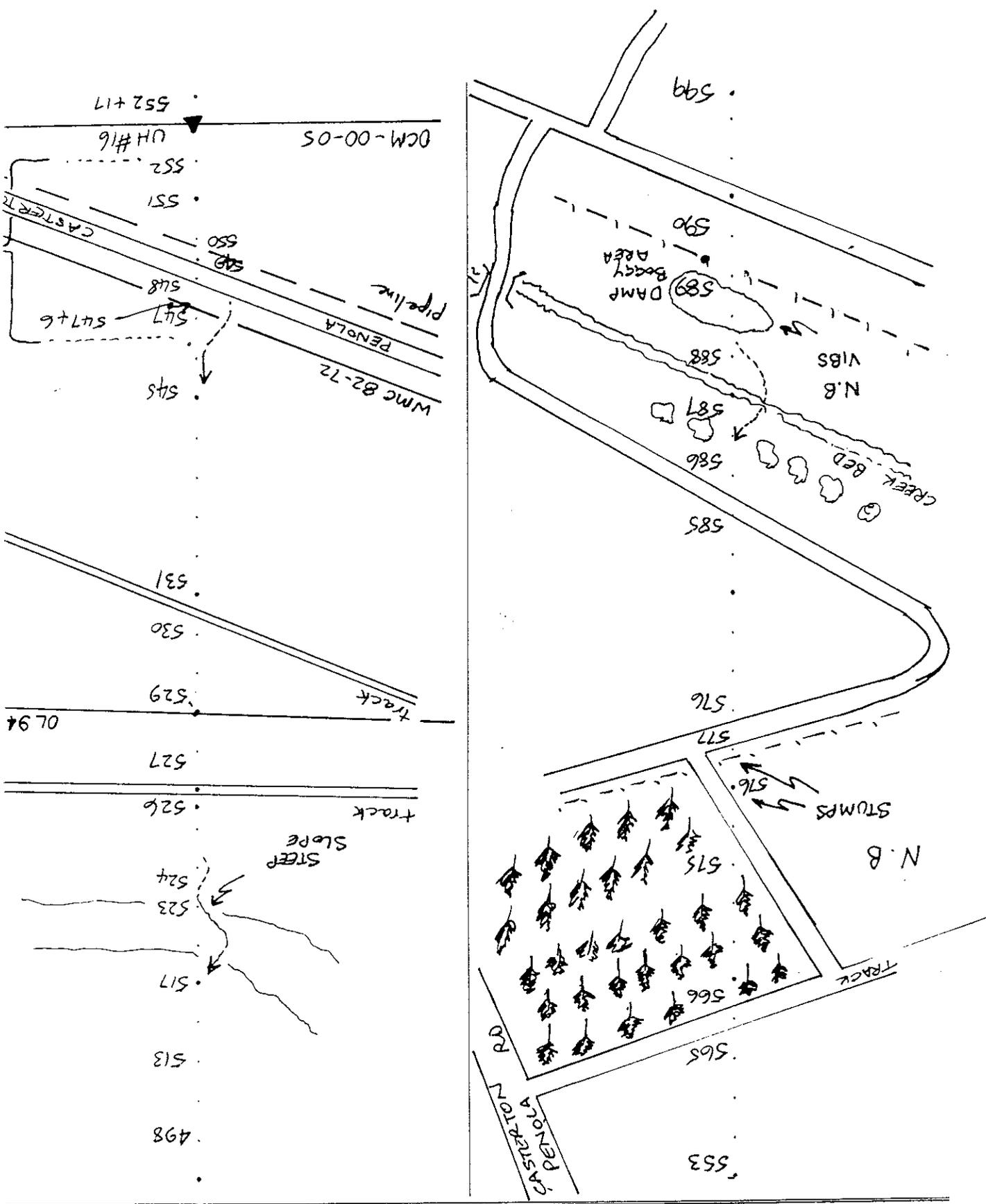
TRACE DIAGRAM

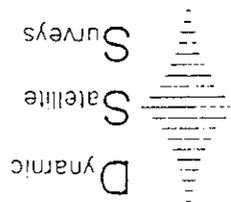




TRACE DIAGRAM

FROM STN **599** TO STN **498** SHOOTING DIRECTION: **S-N** BEARING: _____





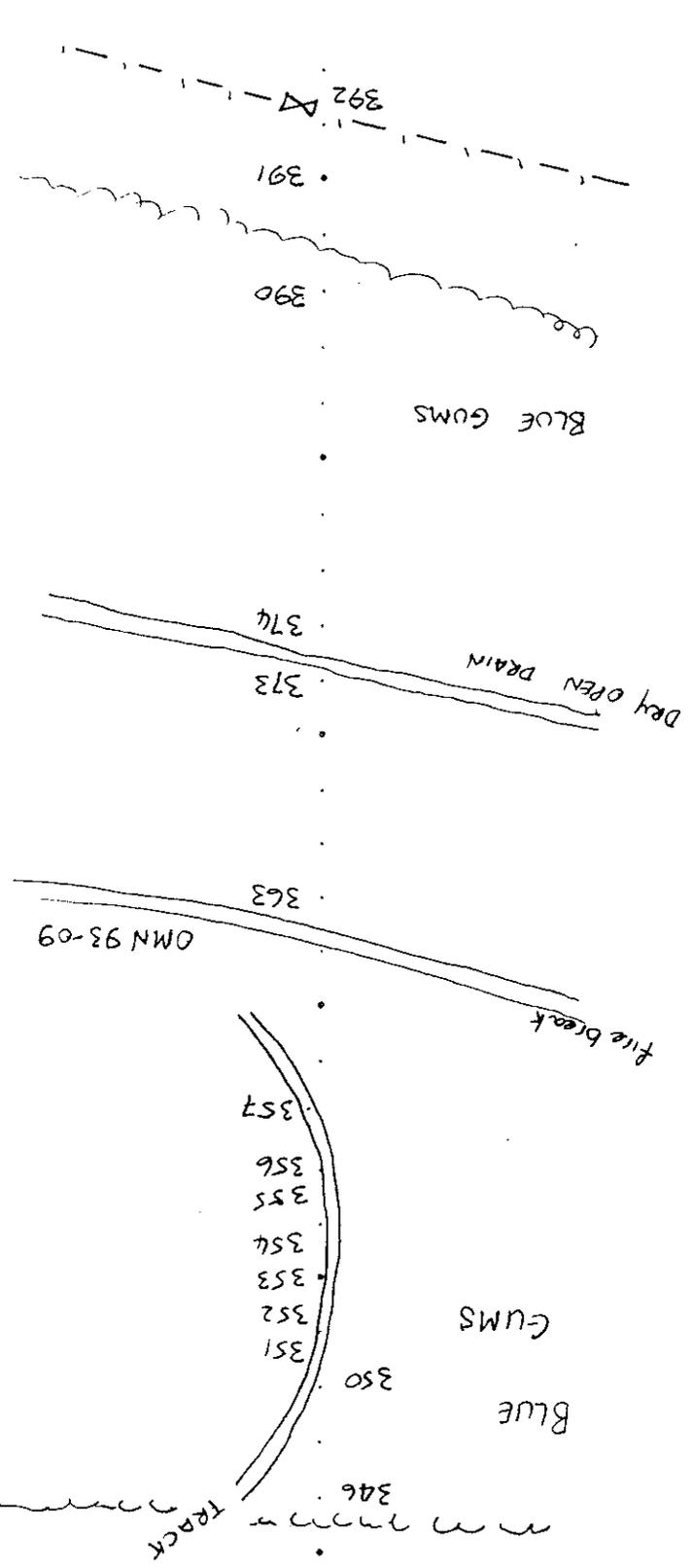
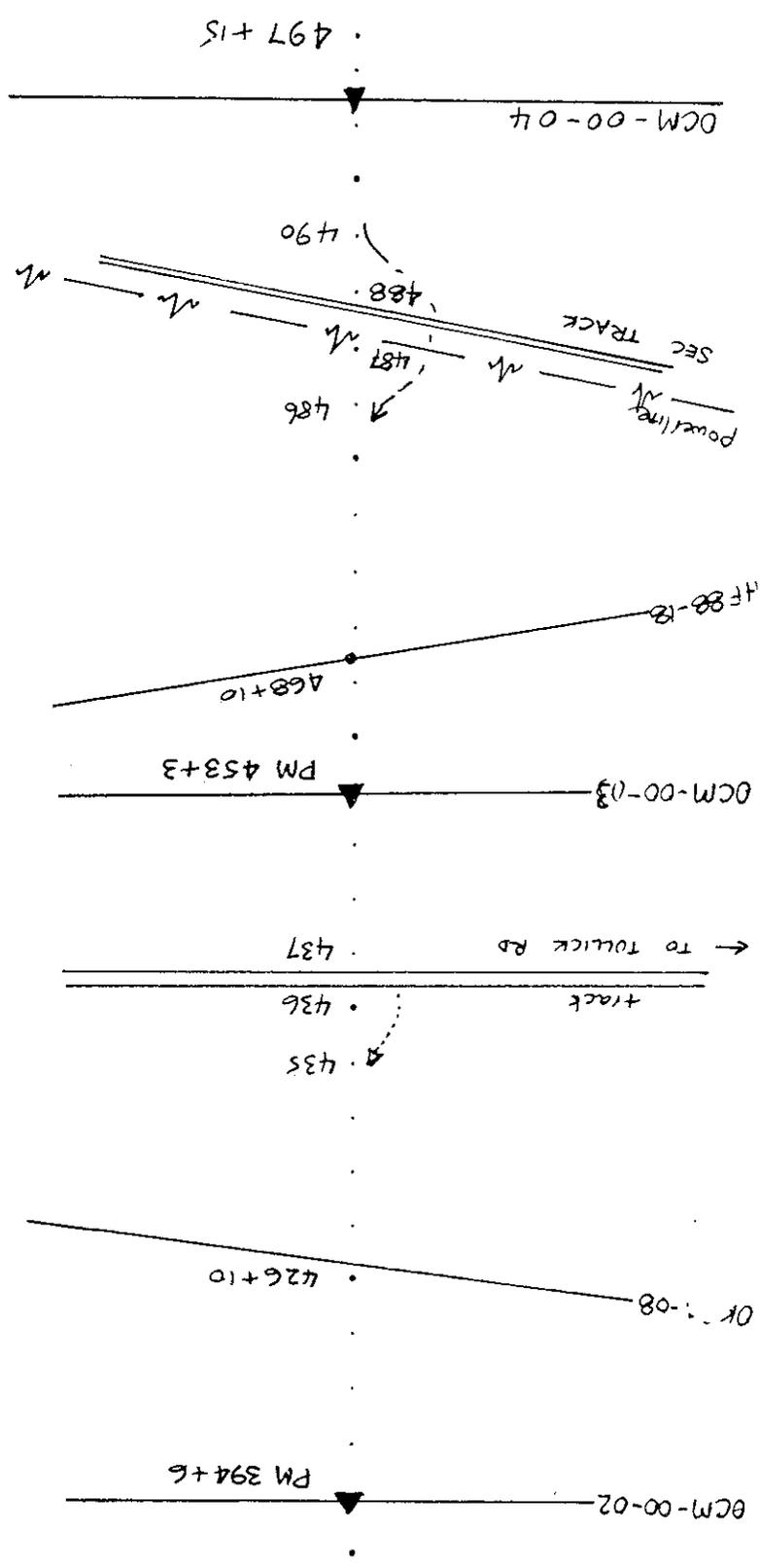
TRACE DIAGRAM

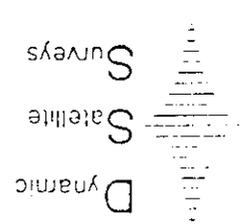
DSS-FE-07
 REV 6.0
 March 1998

PROJECT/JOB # 00-19 CLIENT GECO / SANTOS

PAGE 3 OF 4 LINE: DCM-00-06 AREA: CANERONS STN INTERVAL: 20 m

FROM STN 497+15 TO STN 346 SHOOTING DIRECTION: S - N BEARING:





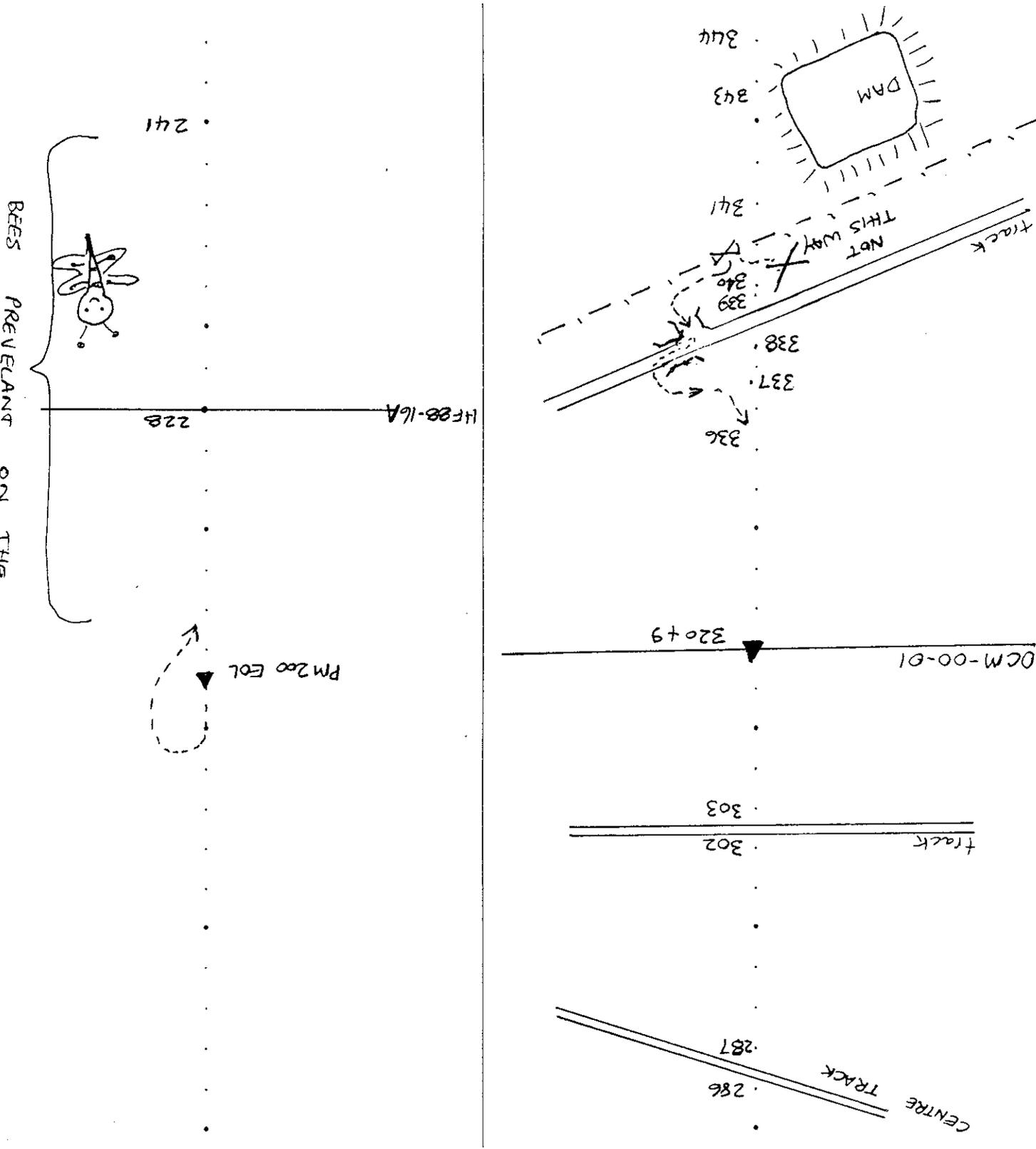
DSS-FF-07
REV 6.0
March 1993

PROJECT/JOB # 00-19 CLIENT GECO / SANTOS

PAGE 4 OF 4 LINE: OCM-00-06 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 344 TO STN 200 SHOOTING DIRECTION: S - N BEARING:

TRACE DIAGRAM





Dynamic
Satellite
Surveys

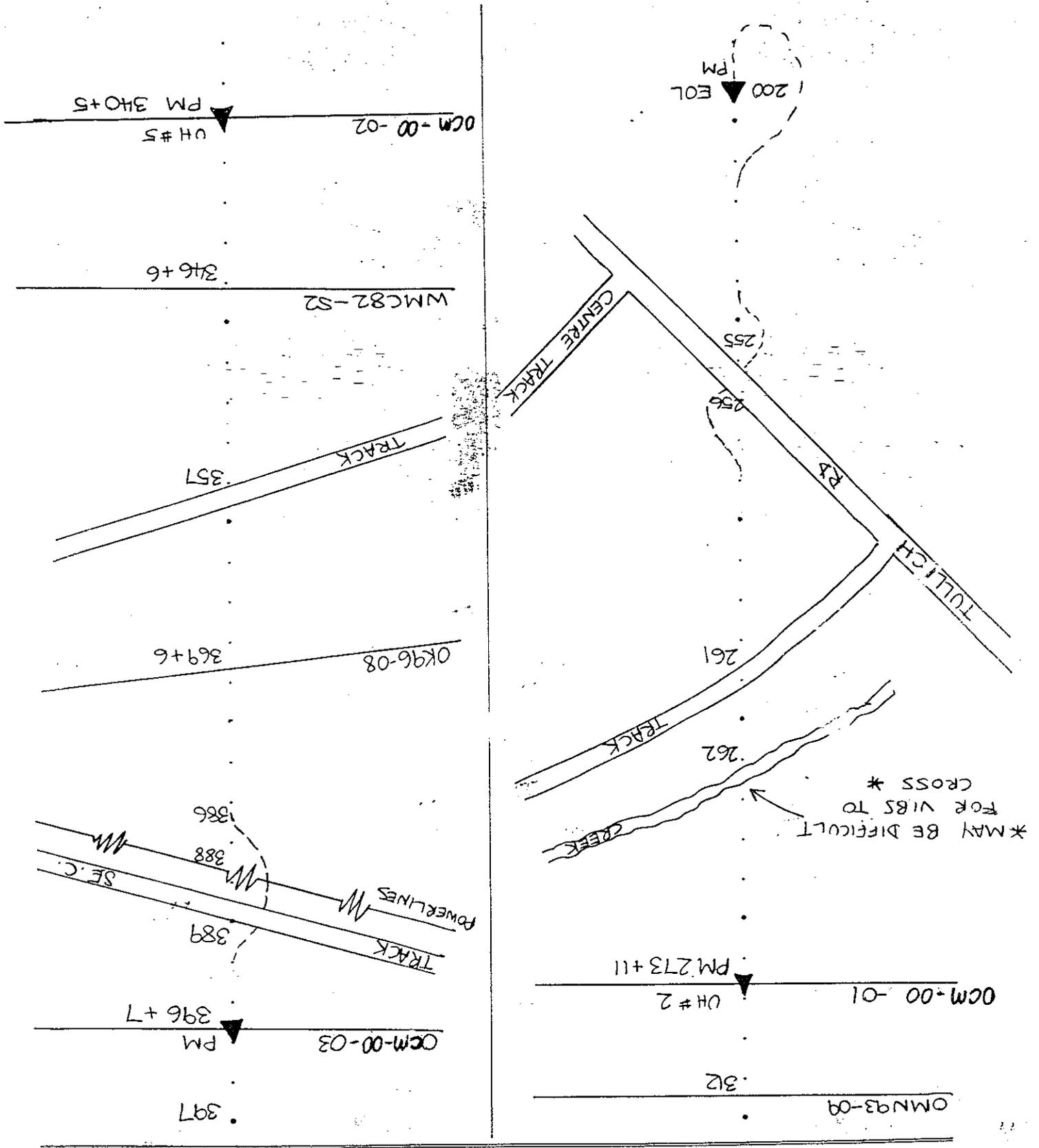
PROJECT/JOB # 00-19 CLIENT DECO/SANTOS

PAGE 1 OF 3 LINE 0CM-00-07 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 200 TO STN 397 SHOOTING DIRECTION: N-S BEARING: °

TRACE DIAGRAM

DSS-FF-07
REV 6.0
March 1998



Dynamic
Satellite
Surveys



TRACE DIAGRAM

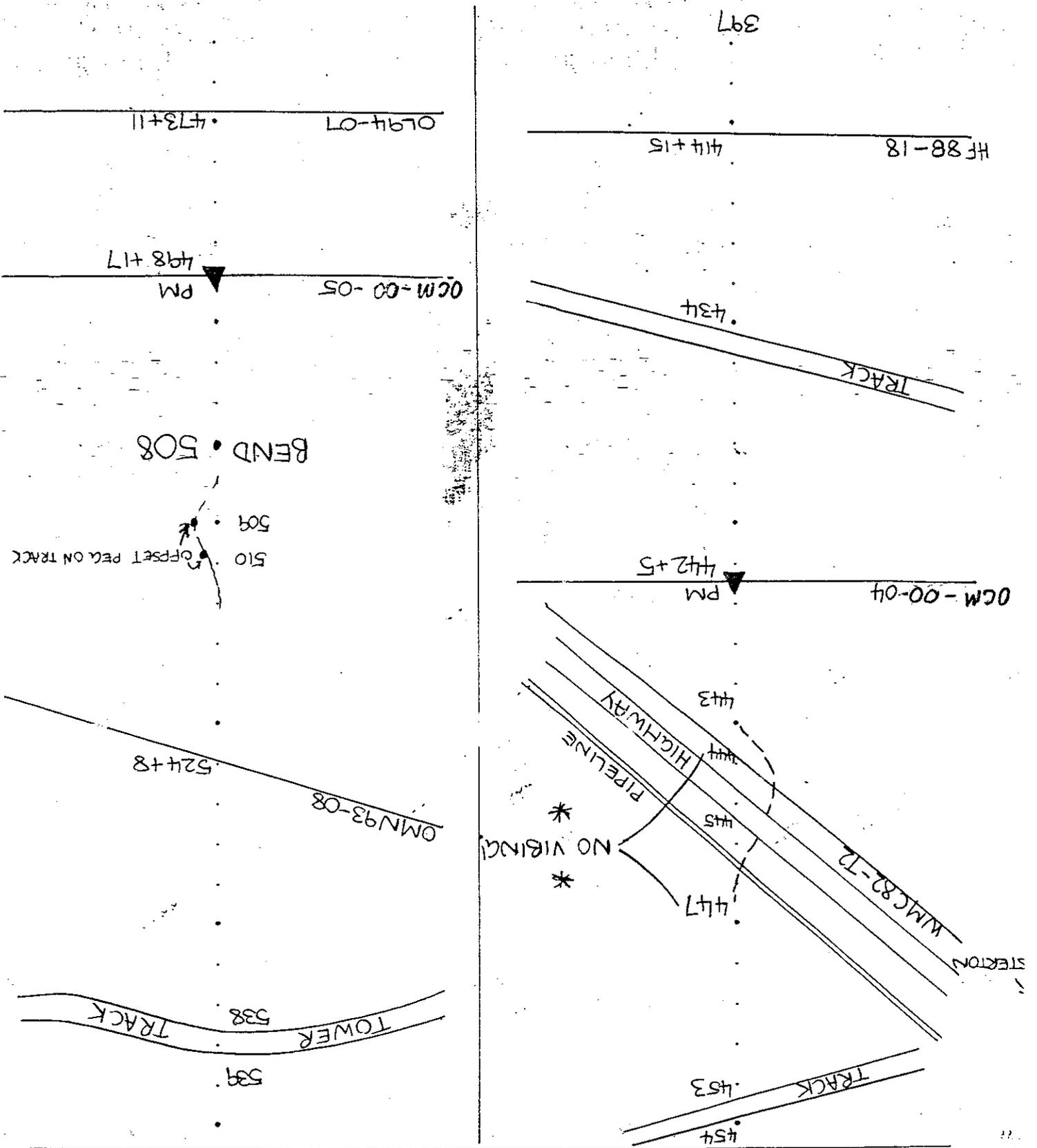
DSS-FF-07
REV 6.0
March 1998

CLIENT: GECO / SANTOS

PROJECT/JOB # 00-19

PAGE 2 OF 3 LINE: DCM-00-07 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 397 TO STN 539 SHOOTING DIRECTION: N-S BEARING: °



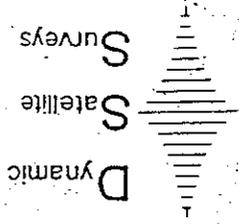
DSS-FF-07
REV 6.0
March 1998

CLIENT: GECO / SANTOS

PROJECT/JOB # 00-19

PAGE 2 OF 3 LINE: DCM-00-07 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 397 TO STN 539 SHOOTING DIRECTION: N-S BEARING: °



Dynamic

Satellite

Surveys

TRACE DIAGRAM

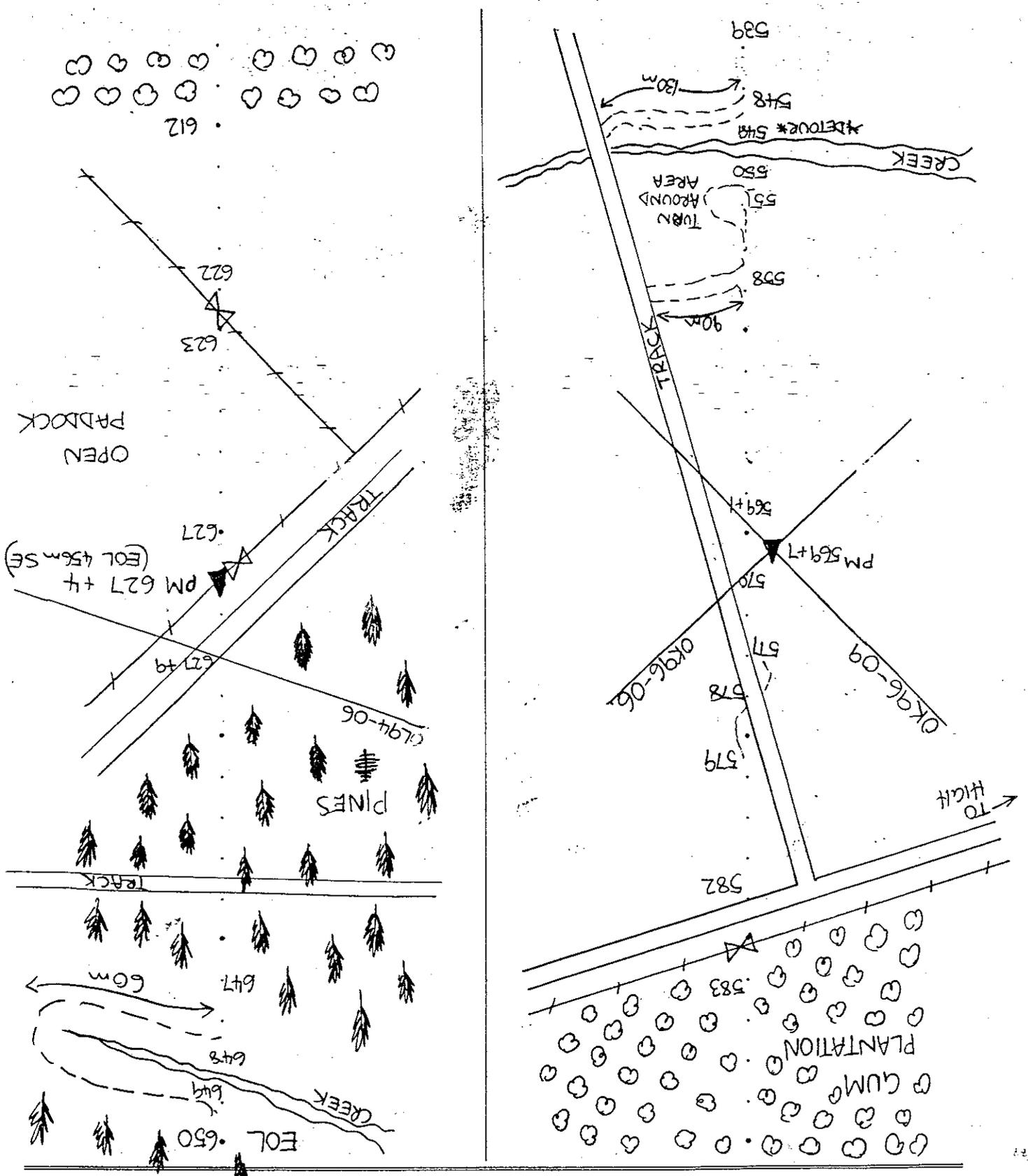
DSS-FF-07
REV 6.0
March 1998

CLIENT GECO/SANTOS

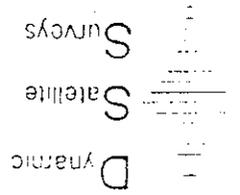
PROJECT/JOB # 00-19

PAGE 3 OF 3 LINE: 0CM-00-07 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 539 TO STN 650 SHOOTING DIRECTION: N-S BEARING: °



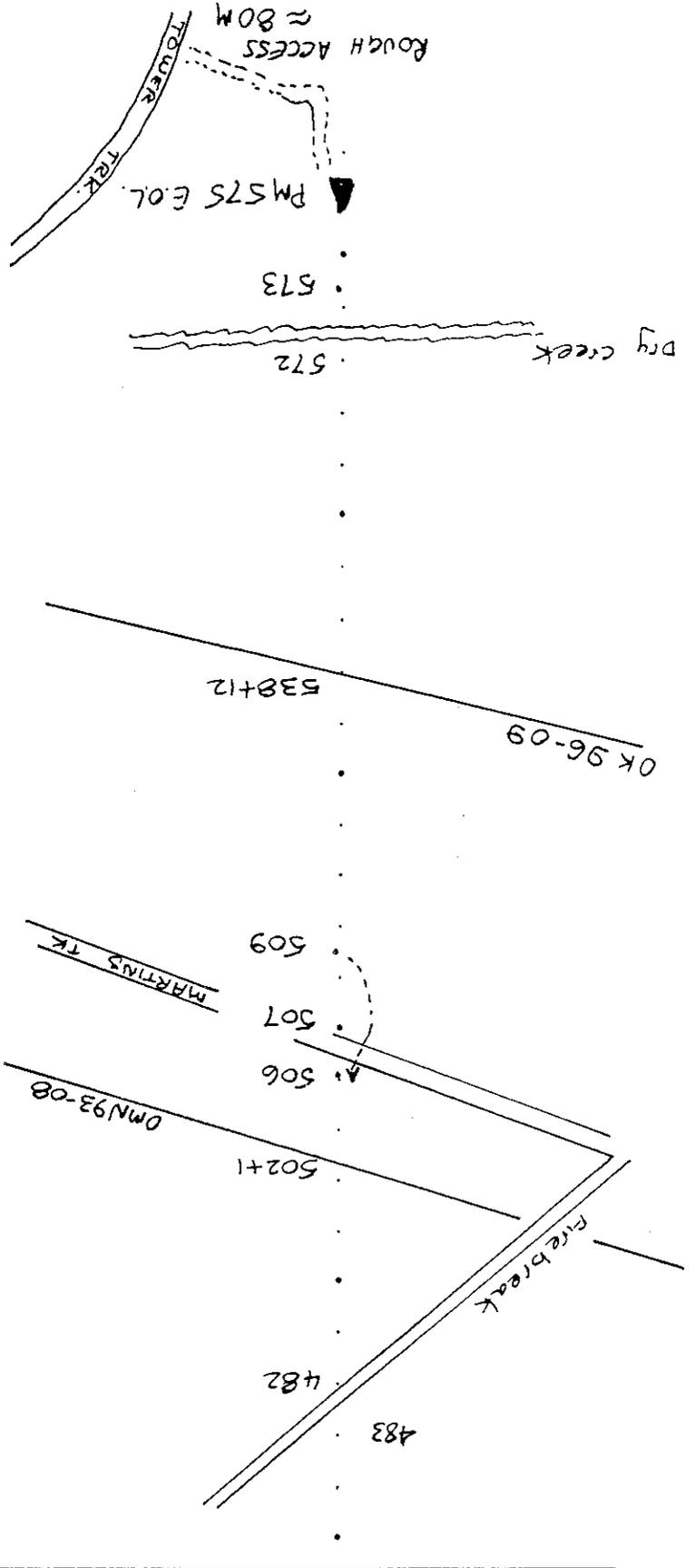
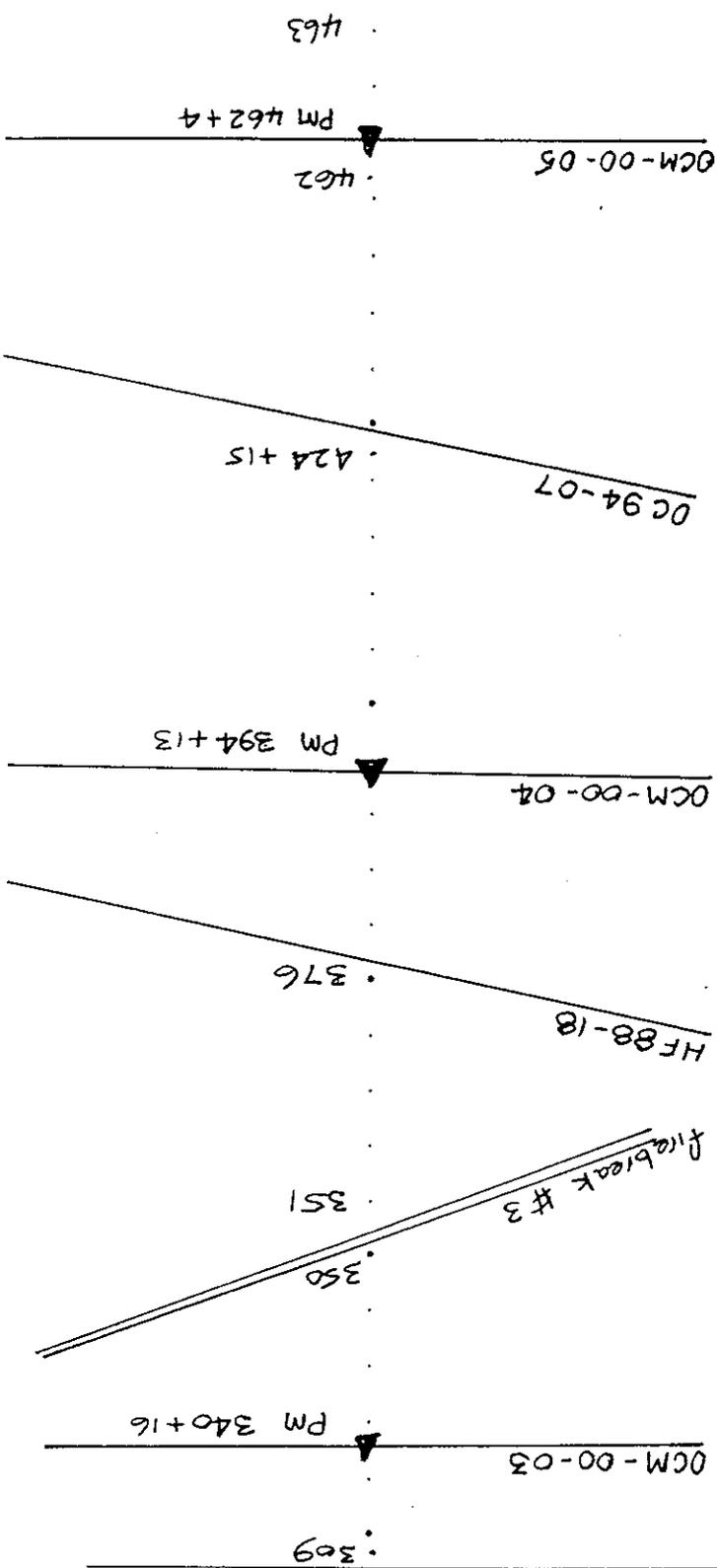
TRACE DIAGRAM



PROJECT/JOB # 00-19 CLIENT GECO / SANTOS

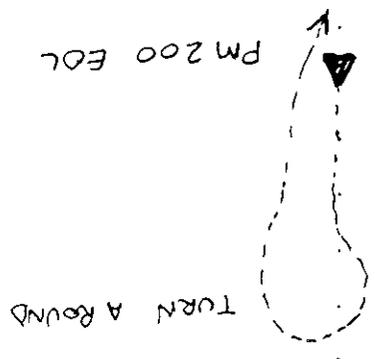
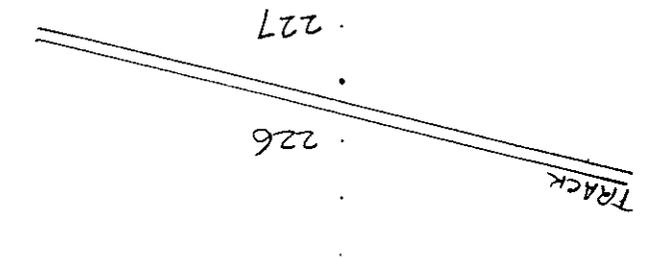
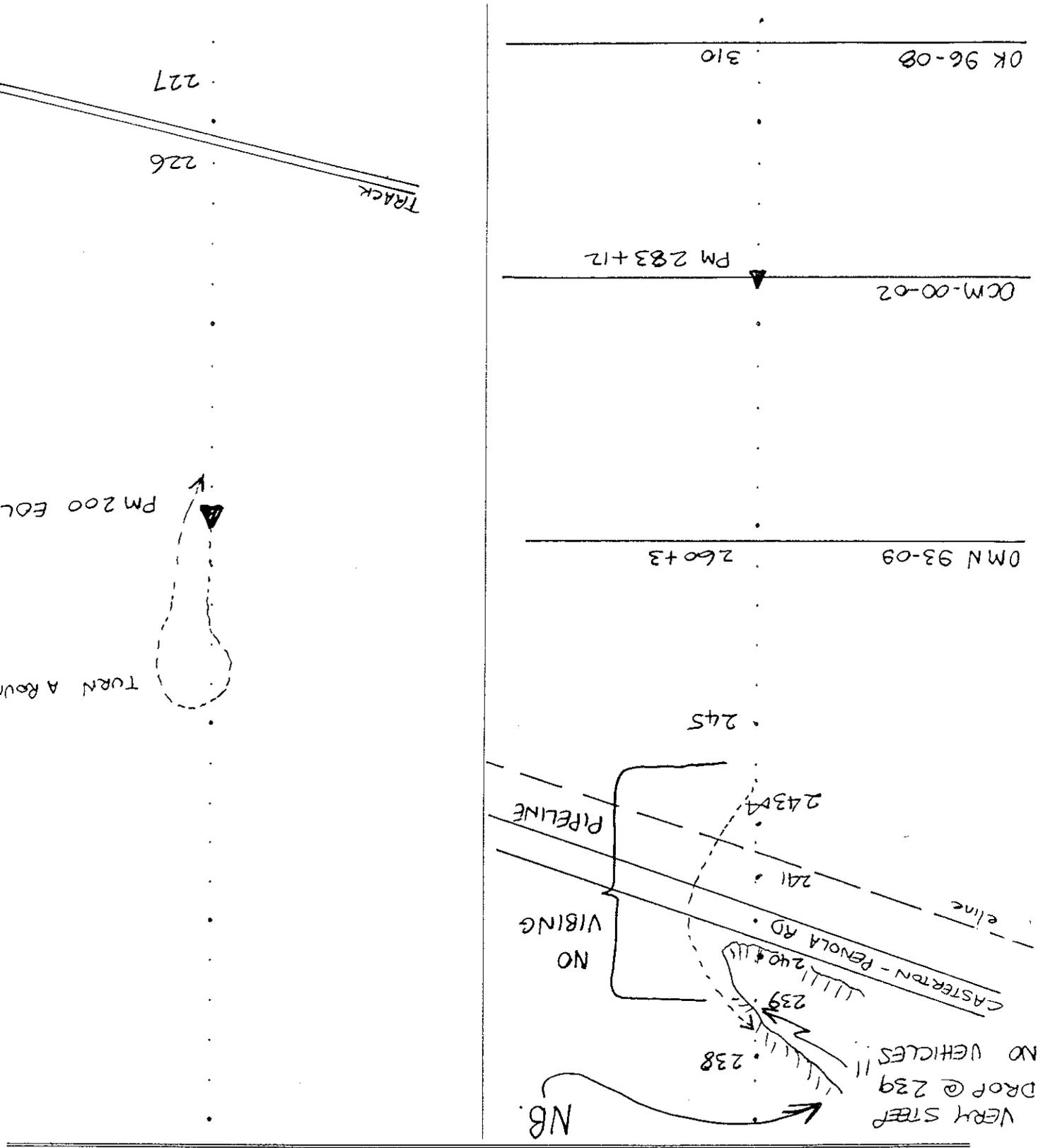
PAGE 1 OF 2 LINE: OCM-00-08 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 575 TO STN 309 SHOOTING DIRECTION: S → N BEARING: °

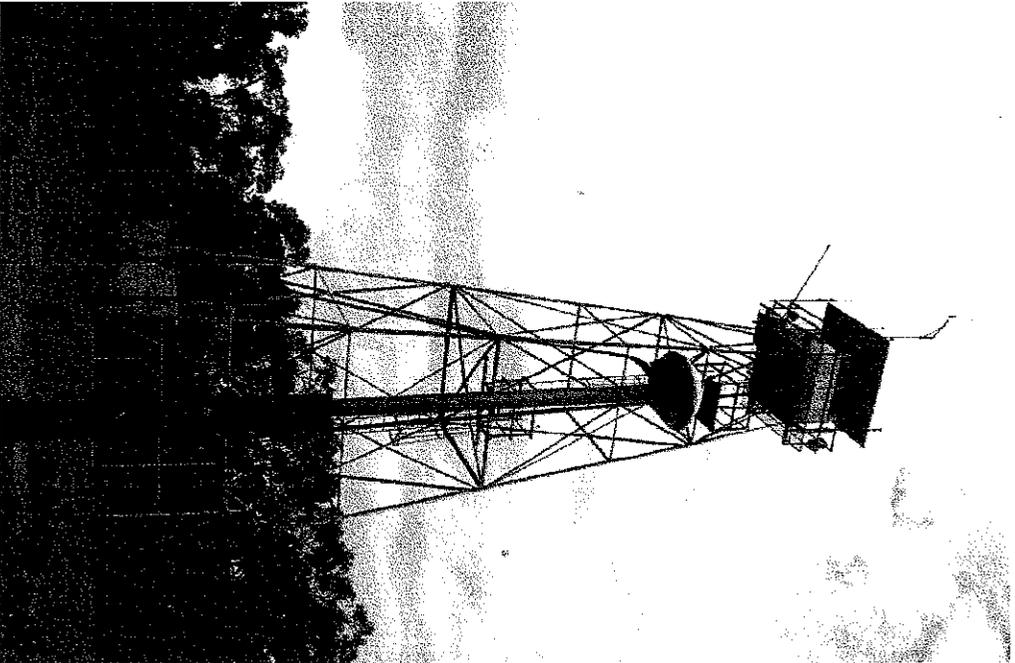




TRACE DIAGRAM



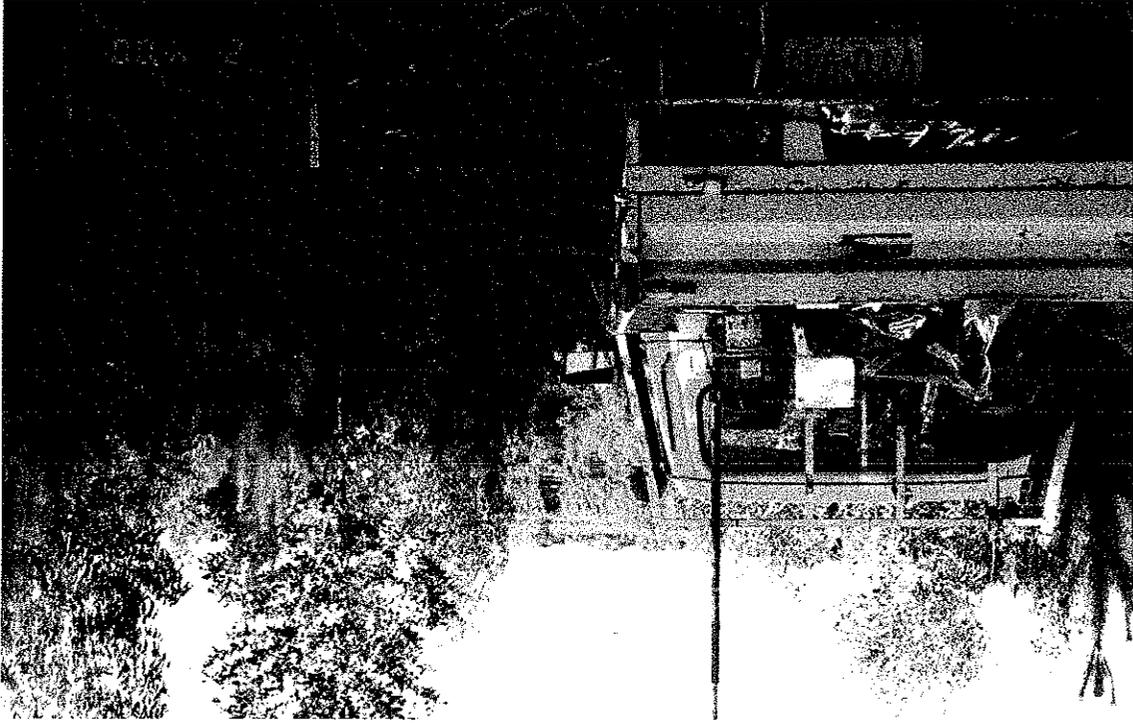
Photographs



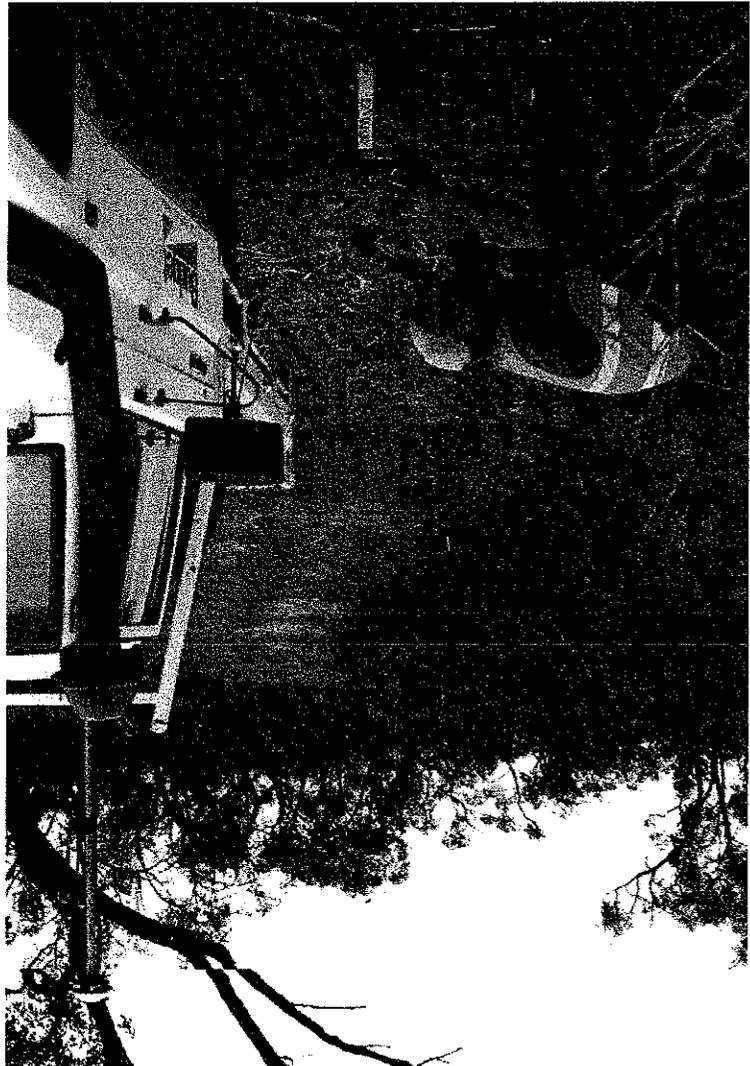
**GPS Base Station at "BASETOW"
next to Corndale Fire Tower.**



Line Pointing, GPS on backpack.

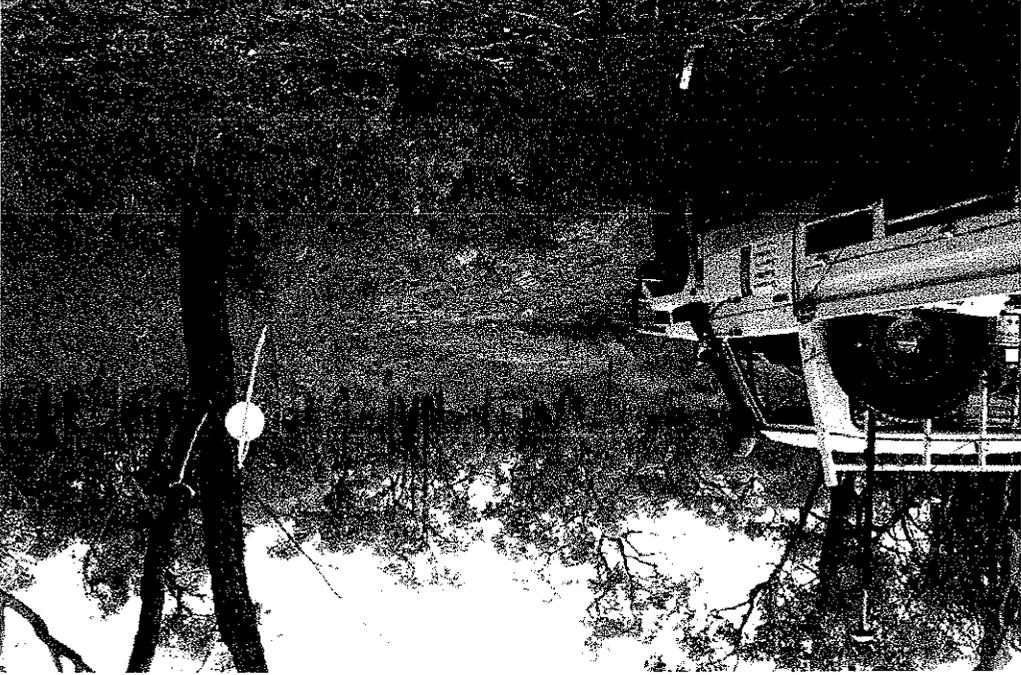


Chain and survey
through pines and
blue gums.
OCM00-06 596



Chain and Survey
through natural
forest area.

Intersection of OCM00-02 and OMC00-07 at uphole #5.



Tie to stn OL94-06 711+6.



00-19

Chain and survey
through blue gum
plantation on line
OCM00-04.



GPS tie to OK96-09
646+13.



00-19