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memorandum

TO: D. Benson

DATE: October 11, 1984

FROM: G. Cocks, F. Walter

MAIL STOP/TELEPHONE: J981-7-1926

SYMBOL: ESS-4-84-394

SUBJECT: Wellbore Trajectories into the Phase II Reservoir.

Introduction:

In order to establish a new deep HDR-system in the crystalline rockmass below Fenton Hill, new holes into the reservoirs created in the hydraulic tests 2032 and 2042 have been proposed.
A decision to drill a new wellbore into one of these two reservoirs was made in summer of 1984. At this time it was decided by the HDR program management to restrict the planning of the new wellbores to trajectories out of the existing wells EE-1, GT-2 or EE-3 in order to avoid exessive costs. According to planning guide-lines, which resulted from a meeting held in October 1984, the new hole should also pass near the injection areas, penetrate the seismic clouds as much as possible and have as simple a trajectory as possible. Most important was to maximize the chance of achieving an hydraulic connection, the main goal of this redrilling task.
Attempts to free the casing in well GT-2 have so far failed. Because it is still unknown how well EE-2 can be repaired, the planning for the new wellbore has to include alternatives for the use of well EE-2.
The method used to calculate wellbore trajectories is based on two 2D-spline functions. This method minimizes the sum of all curvature increments between the first and the last given trajectory-point.

Selecting the Point for Sidetracking:

The existing downhole completion hardware and the general relative trajectories of the old and new hole very much define the region for sidetracking.
In all the trajectories given below a 2°/30.48m whipstock is assumed. To prevent the whipstock from moving into the hole, it is also assumed, that the hole is always sidetracked on the higher side of the existing hole.

Sidetracking from Wellbore EE-1.

In EE-1 the following points are of special importance:

The 10 3/4-in. casing shoe has a depth of 1957 m (6420 feet).
Stretch measurements in well EE-1 gave an indication that the 8 5/8-in. casing may be free to a depth of 2130 m (7000 feet).
The general path of a wellbore sidetracked from wellbore EE-1 will be down and in the north-east direction. To keep the curvature of the hole at the sidetrack-point as small as possible, wellbore EE-1 should decrease its inclination and change its azimuth to the south-west direction.
In the region between 1957m and 2130m cable depth (CD) the existing wellbore EE-1 maintains a relatively constant inclination of 5.8°/30.48m. At a drilling depth of 2073m (6800 feet) the azimuth is changing from

185.74° to 270.21° (west). The wellbore curvature resulting from this is 2.1°/30.48m.

As a result of the above facts a point at 2072.63m CD was chosen as the sidetracking point for wellbore EE-1.

Sidetracking from Wellbore EE-3.

In EE-3 the following points are important:

An old whipstock is set at 2870.3m (9417 feet) CD.
A lost circulation zone was encounterd at 3044m (9987 feet) CD.
The stage collar is located between 2211 and 2212m (7254 to 7257 feet) CD.
A float collar is located at 3122m (10243 feet) CD.
The float shoe is located at 3153m (10344 feet) CD.
The general direction of the new trajectory relative to the existing hole EE-3 will be down and left. To minimize the curvature at the new whipstock, EE-3 should drop and turn to the right.
Wellbore EE-3 is dropping at 3138m CD. This point is just above the shoe and below a 5.43°/30.48m dogleg.
From the old whipstock to the float shoe, the wellbore inclination steadily rises from 23° to 30°.
From 2765m (9071 feet) to 2863.8m (9396 feet) CD the wellbore inclination is constant at 22.5° and the wellbore turns to the right below this point.

In considering the above given facts, a point at 2830.98 (9288 feet) CD was chosen as the new sidetracking point for wellbore EE-3.

The Targets:

According to the above given guide-lines, a number of target-points were chosen within the reservoirs. These points are specified below:

Trajectory from EE-3 into the 2032 cloud.

1. The injection point for test 2032 in wellbore EE-2 :
   -183.96m North -312.59m East 3540.41m Depth
2. A point near the lower outside surface of the seismic cloud :
   -183.96m North -312.59m East 3800.00m Depth

Trajectory from EE-1 into the 2032 cloud.

1. The top of the reservoir (This point allows crow's footing into a cluster of seismic events commonly named A):
   -359.10m North -456.88m East 3092.23m Depth
2. The injection point for test 2032 in wellbore EE-2 :
   -183.96m North -312.59m East 3540.41m Depth

Trajectory from EE-1 into the 2042 cloud.

1. The EE-3 wellbore at a cable depth of 3907.54m (12820 feet) :
   -33.14m North 5.50m East 3696.24m Depth

(This point forces the trajectory to enter the seismic cloud high on the east side and exit low on the west side).

Trajectories:

Three trajectories are given in this memo. The authors believe that these trajectories are realistic and may lead to an hydraulic connection.

The trajectories are presented with the aid of 2 tables and 4 figures each.
Table .1 gives the points actually used to calculate the trajectory, and table .2 provides the data of the new wellbore, as calculated with spline functions.
Figure .1 gives a synopsis of trajectory figures for a quick overview.
Figure .2, .3 and .4 provide in more detail the down view and two orthogonal side views (0°=view from east; 90°=view from south).

Case 1: Well EE-2 can be repaired. EE-3 will be sidetracked and drilled into the seismic cloud of 2032. -Trajectory EE-3 8 to 2032-

In table 1.1 points 1 to 8 represent the old hole EE-3. Point 9 and 10 are given to simulate the whipstock at the lower side of the hole. Point 11 represents the target and point 12 a region vertical below the target.
The first new point is given in table 1.2 at 2849.85m CD.
The new hole has a max. length of 1019m (3344 feet) and a low, but constant, dogleg of 0.5°/30.48m.
Directional drilling will be necessary for sidetracking.

Case 2: Well EE-2 cannot be repaired, but only one hole can be drilled because of, e.g., low budget.
EE-1 should be sidetracked and drilled into the seismic cloud of test 2042. -Trajectory EE-1 to 2042 (C)-

In table 2.1 points 1 to 10 represent the old hole EE-1. Point 11 simulates the whipstock and point 12 the target in wellbore EE-3.
The first new point in table 2.2 is given at 2072.64m CD. The new hole has a max. length of 1829 m (6000 feet). The max. dogleg in this new hole can be as low as .85°/30.48m. Directional drilling will be necessary for the first 300m to turn the wellbore around, and also later to help increase the inclination. The curvature of this hole is significant for more than 500m (1640 feet).

At a depth of 3000m (1000m (3280 feet) of new hole drilled) a connection into the thief zone may be obtained. A low pressure circulation system between the new hole and the EE-3 annulus may be possible. The possibility of a high pressure connection between the lower zone in EE-3 and the new hole cannot be excluded.

Case 3: Well EE-2 still cannot be repaired but now two wells can be drilled because of higher budget.
-Trajectory EE-3 8 to 2032 and Trajectory EE-1 m EE-2-

The trajectory EE-3 8 to 2032 is already explained in case 1.
In table 3.1 of trajectory EE-1 m to EE-2, points 1 to 10 represent the old hole EE-1. Point 11 simulates the whipstock. Point 12 (m) is an intermediate point along the wellbore. This point moves the trajectory in its upper part to the south. A trajectory from EE-1 to point A (cluster of events deep and in the southern part of the 2032 cloud) would follow a path from EE-1 to point 12 (m) identical with the trajectory discussed here.- Point 13 on table 3.1 represents again the target in EE-2.

A P P E N D I X

Table 1.1: Trajectory EE-3 8 to 2032

Nr. 1	x= -314.33	y= -564.82	z= 2574.05	Kd= 2604.68	Alpha= 87.09	Beta=17.33
Nr. 2	x= -313.77	y= -555.33	z= 2604.40	Kd= 2636.49	Alpha= 85.84	Beta=17.39
Nr. 3	x= -313.07	y= -545.94	z= 2634.75	Kd= 2668.27	Alpha= 85.24	Beta=17.28
Nr. 4	x= -311.95	y= -536.15	z= 2665.10	Kd= 2700.18	Alpha= 81.32	Beta=19.00
Nr. 5	x= -309.74	y= -525.08	z= 2695.45	Kd= 2732.56	Alpha= 76.93	Beta=21.66
Nr. 6	x= -307.04	y= -513.10	z= 2725.80	Kd= 2765.31	Alpha= 77.01	Beta=22.36
Nr. 7	x= -303.90	y= -500.96	z= 2756.15	Kd= 2798.15	Alpha= 75.48	Beta=22.52
Nr. 8	x= -301.10	y= -488.74	z= 2786.50	Kd= 2830.98	Alpha= 76.73	Beta=22.28
Nr. 9	x= -299.74	y= -482.90	z= 2800.51	Kd= 2846.22	Alpha= 76.73	Beta=23.28
Nr. 10	x= -298.31	y= -476.85	z= 2814.43	Kd= 2861.46	Alpha= 76.73	Beta=24.28
Nr. 11	x= -183.96	y= -312.59	z= 3540.41	Kd= 0.00	Alpha= 0.00	Beta= 0.00
Nr. 12	x= -183.96	y= -312.59	z= 3800.00	Kd= 0.00	Alpha= 0.00	Beta= 0.00

Table 1.2: Trajectory EE-3 8 to 2032

NORTH	EAST	DEPTH	DRILL DEPTH	AZIMUTH	INCLINATION	CURVATURE
-313,77	-555,33	2604,40	2636,49	86,27	17,29	,21
-313,10	-546,32	2633,51	2666,97	85,24	17,28	,21
-312,09	-537,03	2662,52	2697,45	81,46	18,83	1,67
-310,10	-526,73	2691,14	2727,93	77,79	21,23	,86
-307,66	-515,66	2719,43	2758,41	76,67	22,38	,55
-304,77	-504,38	2747,60	2788,89	75,39	22,49	,31
-302,09	-493,09	2775,78	2819,37	77,31	22,47	,29
-299,41	-481,50	2803,79	2849,85	76,88	23,93	1,04
-296,41	-469,44	2831,62	2880,33	74,84	23,81	,59
-292,98	-457,78	2859,57	2910,81	72,41	23,17	,57
-289,17	-446,57	2887,66	2941,29	70,00	22,56	,55
-284,99	-435,81	2915,86	2971,77	67,62	21,96	,53
-280,50	-425,49	2944,19	3002,25	65,28	21,37	,51
-275,72	-415,63	2972,63	3032,73	62,98	20,79	,50
-270,68	-406,22	3001,18	3063,21	60,75	20,21	,48
-265,44	-397,26	3029,84	3093,69	58,57	19,62	,47
-260,02	-388,75	3058,60	3124,17	56,45	19,03	,45
-254,47	-380,70	3087,47	3154,65	54,40	18,42	,44
-248,82	-373,09	3116,44	3185,13	52,42	17,79	,44
-243,12	-365,93	3145,51	3215,61	50,51	17,14	,43
-237,41	-359,22	3174,69	3246,09	48,68	16,46	,43
-231,73	-352,96	3203,97	3276,57	46,91	15,75	,43
-226,12	-347,14	3233,36	3307,05	45,23	15,00	,44
-220,63	-341,76	3262,86	3337,53	43,62	14,20	,45
-215,31	-336,82	3292,46	3368,01	42,08	13,36	,47
-210,19	-332,32	3322,17	3398,49	40,62	12,46	,49
-205,34	-328,26	3351,98	3428,97	39,25	11,51	,51
-200,79	-324,63	3381,90	3459,45	37,95	10,50	,53
-196,60	-321,43	3411,92	3489,93	36,75	9,42	,56
-192,82	-318,66	3442,04	3520,41	35,65	8,27	,59
-189,49	-316,31	3472,24	3550,89	34,68	7,06	,63
-186,68	-314,40	3502,53	3581,37	33,91	5,77	,66
-184,42	-312,90	3532,89	3611,85	33,46	4,40	,70
-182,78	-311,81	3563,31	3642,33	33,43	3,03	,65
-181,71	-311,10	3593,76	3672,81	33,43	1,81	,57
-181,14	-310,73	3624,23	3703,29	33,43	,76	,48
-181,01	-310,64	3654,71	3733,77	213,43	,12	,40
-181,23	-310,79	3685,19	3764,25	213,43	,84	,32
-181,73	-311,12	3715,66	3794,73	213,43	1,39	,23
-182,44	-311,58	3746,13	3825,21	213,43	1,77	,15
-183,27	-312,14	3776,60	3855,69	213,43	1,98	,06
-184,17	-312,73	3807,06	3886,17	213,43	2,02	,02

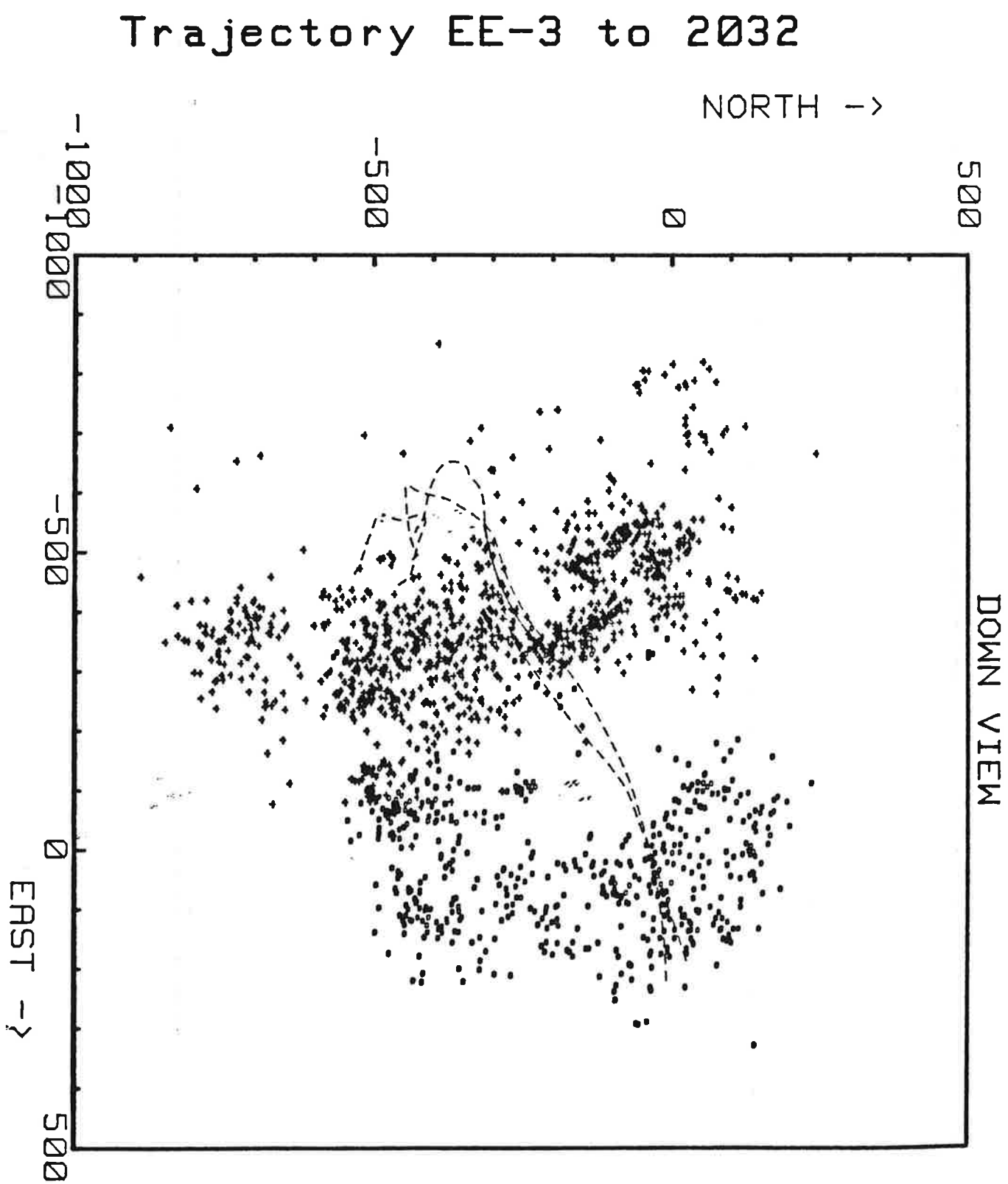
Trajectory EE-3 to 2032
NORTH ->
-1000
-500
0
500
-1000
-500
0
500
<- EAST ->
DOWN VIEW

Fig. 1.2

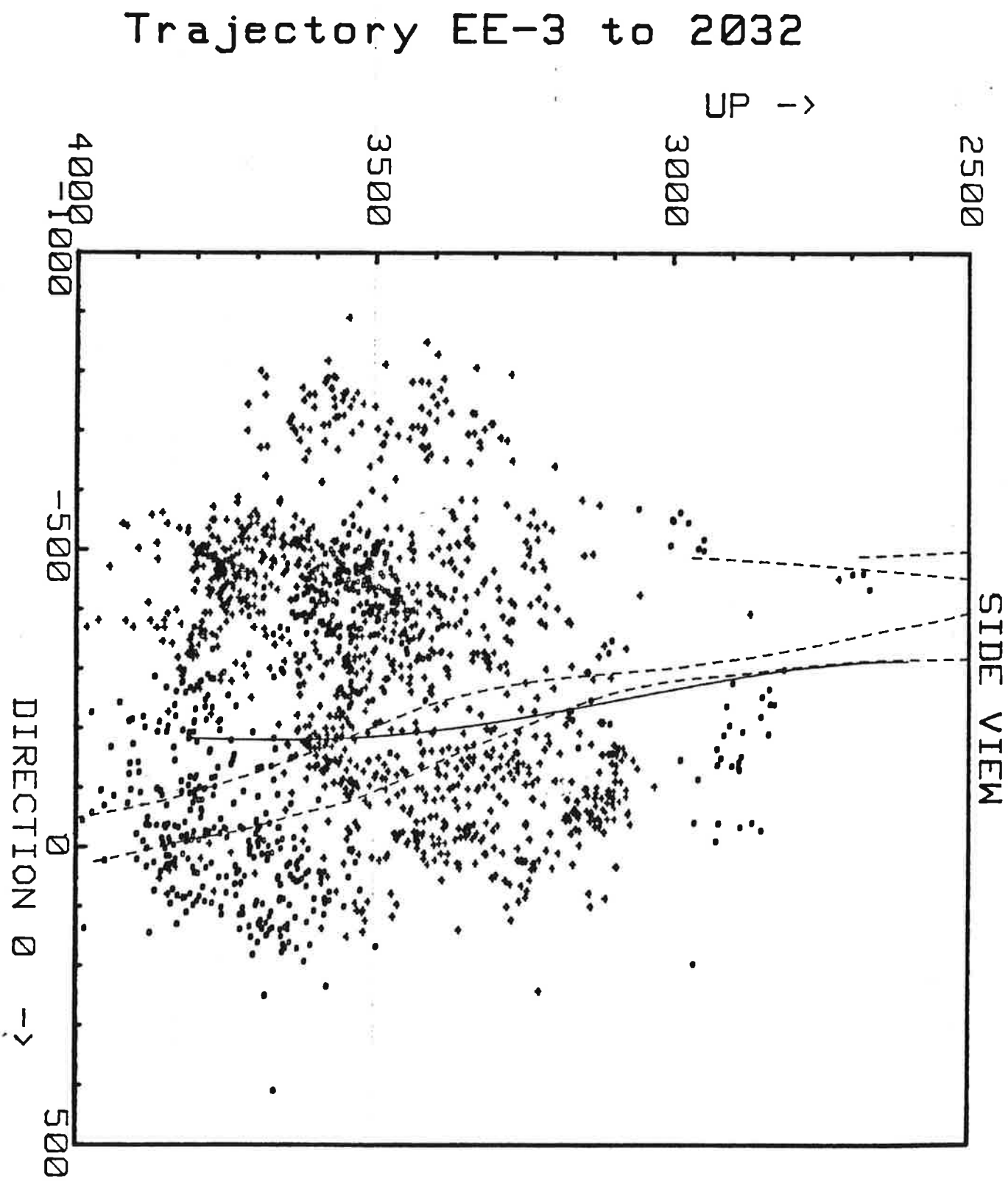
Trajectory EE-3 to 2032
UP ->
4000
3500
3000
2500
-1000
-500
0
500
DIRECTION 0 ->
SIDE VIEW

Fig. 1.3

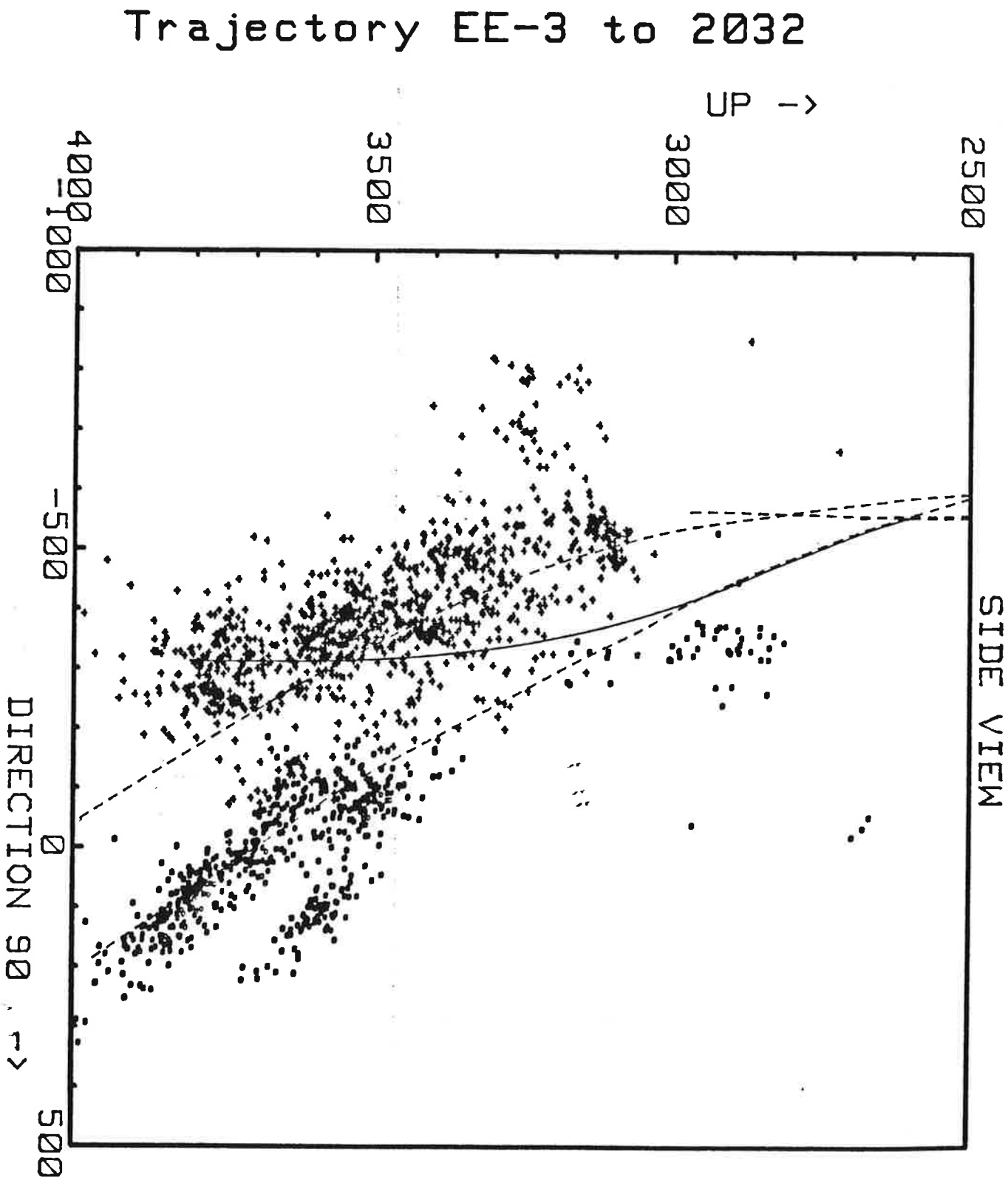
Trajectory EE-3 to 2032
UP ->
4000
3500
3000
2500
1000
500
0
500
DIRECTION 90 ->
SIDE VIEW

Fig. 1.4

Table 2.1: Trajectory EE-1 to 2042 (C)

Nr. 1	x= -423.79	y= -523.68	z= 1794.72	Kd= 1798.32	Alpha=291.73	Beta= 6.23
Nr. 2	x= -422.50	y= -526.68	z= 1825.03	Kd= 1828.80	Alpha=293.67	Beta= 6.13
Nr. 3	x= -421.28	y= -529.71	z= 1855.33	Kd= 1859.28	Alpha=291.55	Beta= 6.15
Nr. 4	x= -420.18	y= -532.75	z= 1885.64	Kd= 1889.76	Alpha=289.50	Beta= 6.07
Nr. 5	x= -419.05	y= -535.68	z= 1915.96	Kd= 1920.24	Alpha=291.47	Beta= 5.88
Nr. 6	x= -417.97	y= -538.56	z= 1946.28	Kd= 1950.72	Alpha=290.30	Beta= 5.77
Nr. 7	x= -416.95	y= -541.46	z= 1976.61	Kd= 1981.20	Alpha=289.20	Beta= 5.80
Nr. 8	x= -416.13	y= -544.47	z= 2006.93	Kd= 2011.68	Alpha=284.13	Beta= 5.90
Nr. 9	x= -415.38	y= -547.51	z= 2037.24	Kd= 2042.16	Alpha=283.80	Beta= 5.88
Nr. 10	x= -414.70	y= -550.50	z= 2067.57	Kd= 2072.64	Alpha=282.65	Beta= 5.75
Nr. 11	x= -413.84	y= -554.30	z= 2097.80	Kd= 2103.12	Alpha=282.65	Beta= 7.75
Nr. 12	x= -33.14	y= 5.50	z= 3696.24	Kd= 0.00	Alpha= 0.00	Beta= 0.00

Table 2.2: Trajectory EE-1 to 2042 (C)

NORTH	EAST	DEPTH	DRILL DEPTH	AZIMUTH	INCLINATION	CURVATURE
-422,50	-526,68	1825,03	1828,80	292,90	6,15	,06
-421,28	-529,71	1855,33	1859,28	290,67	6,13	,18
-420,18	-532,75	1885,64	1889,76	290,29	6,01	,18
-419,05	-535,68	1915,96	1920,24	291,07	5,84	,09
-417,97	-538,56	1946,28	1950,72	290,48	5,77	,02
-416,95	-541,46	1976,60	1981,20	287,31	5,83	,33
-416,13	-544,47	2006,92	2011,68	284,13	5,91	,01
-415,38	-547,51	2037,24	2042,16	283,27	5,64	,43
-414,70	-550,50	2067,57	2072,64	281,99	6,60	1,45
-413,84	-554,30	2097,80	2103,12	284,89	7,36	,83
-412,66	-557,67	2128,07	2133,60	294,47	6,16	,82
-411,14	-560,25	2158,40	2164,08	307,91	5,21	,81
-409,26	-562,05	2188,77	2194,56	325,50	4,66	,79
-407,05	-563,07	2219,15	2225,04	345,02	4,62	,78
-404,52	-563,32	2249,52	2255,52	2,50	5,08	,76
-401,67	-562,84	2279,86	2286,00	15,82	5,89	,74
-398,50	-561,62	2310,15	2316,48	25,32	6,91	,72
-395,04	-559,71	2340,37	2346,96	32,10	8,03	,70
-391,30	-557,11	2370,51	2377,44	37,04	9,19	,68
-387,28	-553,85	2400,55	2407,92	40,74	10,37	,66
-382,99	-549,95	2430,47	2438,40	43,60	11,54	,63
-378,45	-545,45	2460,27	2468,88	45,86	12,69	,61
-373,67	-540,35	2489,94	2499,36	47,68	13,82	,59
-368,65	-534,69	2519,46	2529,84	49,18	14,91	,57
-363,42	-528,49	2548,84	2560,32	50,43	15,96	,54
-357,97	-521,77	2578,07	2590,80	51,49	16,98	,52
-352,33	-514,57	2607,14	2621,28	52,39	17,97	,50
-346,50	-506,89	2636,06	2651,76	53,17	18,91	,48
-340,49	-498,76	2664,81	2682,24	53,84	19,82	,46
-334,31	-490,20	2693,41	2712,72	54,44	20,69	,44
-327,97	-481,24	2721,84	2743,20	54,97	21,52	,42
-321,47	-471,90	2750,11	2773,68	55,43	22,32	,40
-314,83	-462,18	2778,23	2804,16	55,85	23,08	,38
-308,06	-452,12	2806,19	2834,64	56,22	23,81	,36
-301,15	-441,73	2834,00	2865,12	56,56	24,51	,35
-294,13	-431,03	2861,66	2895,60	56,87	25,17	,33
-286,99	-420,03	2889,18	2926,08	57,14	25,80	,31
-279,74	-408,75	2916,55	2956,56	57,40	26,40	,30
-272,38	-397,20	2943,78	2987,04	57,63	26,97	,28
-264,93	-385,40	2970,88	3017,51	57,84	27,52	,27
-257,39	-373,36	2997,84	3047,99	58,03	28,04	,26
-249,76	-361,09	3024,68	3078,47	58,21	28,53	,24
-242,05	-348,62	3051,40	3108,95	58,37	28,99	,23
-234,27	-335,94	3078,01	3139,43	58,52	29,43	,22
-226,41	-323,07	3104,50	3169,91	58,66	29,85	,21
-218,49	-310,03	3130,88	3200,39	58,78	30,25	,19
-210,50	-296,82	3157,16	3230,87	58,90	30,62	,18
-202,45	-283,45	3183,34	3261,35	59,01	30,97	,17
-194,35	-269,93	3209,43	3291,83	59,11	31,30	,16
-186,19	-256,28	3235,43	3322,31	59,20	31,61	,15
-177,99	-242,49	3261,35	3352,79	59,28	31,90	,14
-169,74	-228,59	3287,19	3383,27	59,36	32,17	,13
-161,45	-214,57	3312,95	3413,75	59,43	32,42	,12
-153,12	-200,45	3338,65	3444,23	59,50	32,65	,11
-144,76	-186,23	3364,28	3474,71	59,56	32,87	,10
-136,36	-171,93	3389,85	3505,19	59,61	33,07	,10
-127,93	-157,54	3415,37	3535,67	59,66	33,25	,09
-119,48	-143,09	3440,83	3566,15	59,70	33,41	,08

Table 2.2: Trajectory EE-1 to 2042 (C)

NORTH	EAST	DEPTH	DRILL DEPTH	AZIMUTH	INCLINATION	CURVATURE
-111,00	-128,56	3466,25	3596,63	59,74	33,56	,07
-102,50	-113,98	3491,63	3627,11	59,78	33,69	,06
-93,98	-99,34	3516,97	3657,59	59,81	33,81	,05
-85,44	-84,66	3542,28	3688,07	59,83	33,91	,05
-76,89	-69,94	3567,57	3718,55	59,86	34,00	,04
-68,32	-55,19	3592,83	3749,03	59,87	34,07	,03
-59,75	-40,41	3618,07	3779,51	59,89	34,12	,02
-51,17	-25,61	3643,29	3809,99	59,90	34,16	,02
-42,58	-10,80	3668,51	3840,47	59,90	34,18	,01
-34,00	4,02	3693,72	3870,95	59,91	34,19	0,00
-25,41	18,84	3718,94	3901,43	59,91	34,19	,01

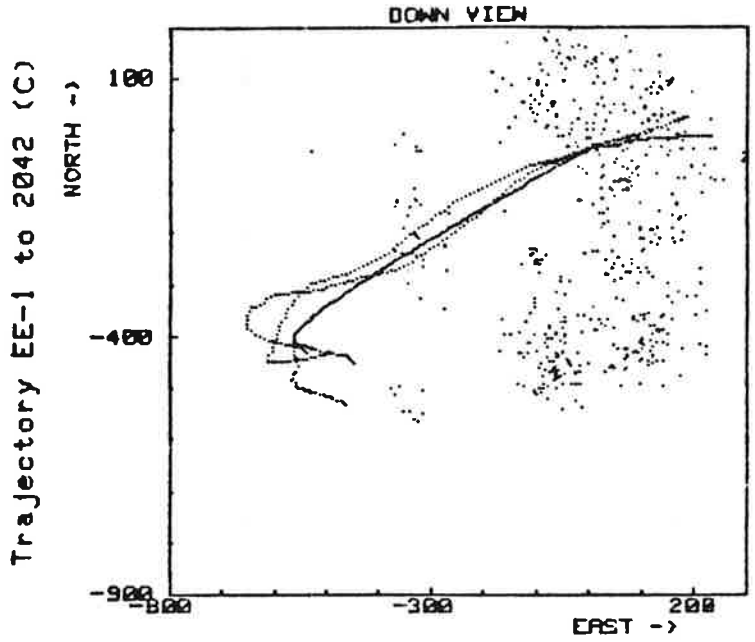
DOWN VIEW
Trajectory EE-1 to 2042 (C)
NORTH ->
100
-400
-900
-800
-300
200
EAST ->
SIDE VIEW
Trajectory EE-1 to 2042 (C)
UP ->
2900
3400
3900
-800
-300
200
DIRECTION 0 ->
SIDE VIEW
Trajectory EE-1 to 2042 (C)
UP ->
2900
3400
3900
-800
-300
200
DIRECTION 90 ->

Fig. 2.1

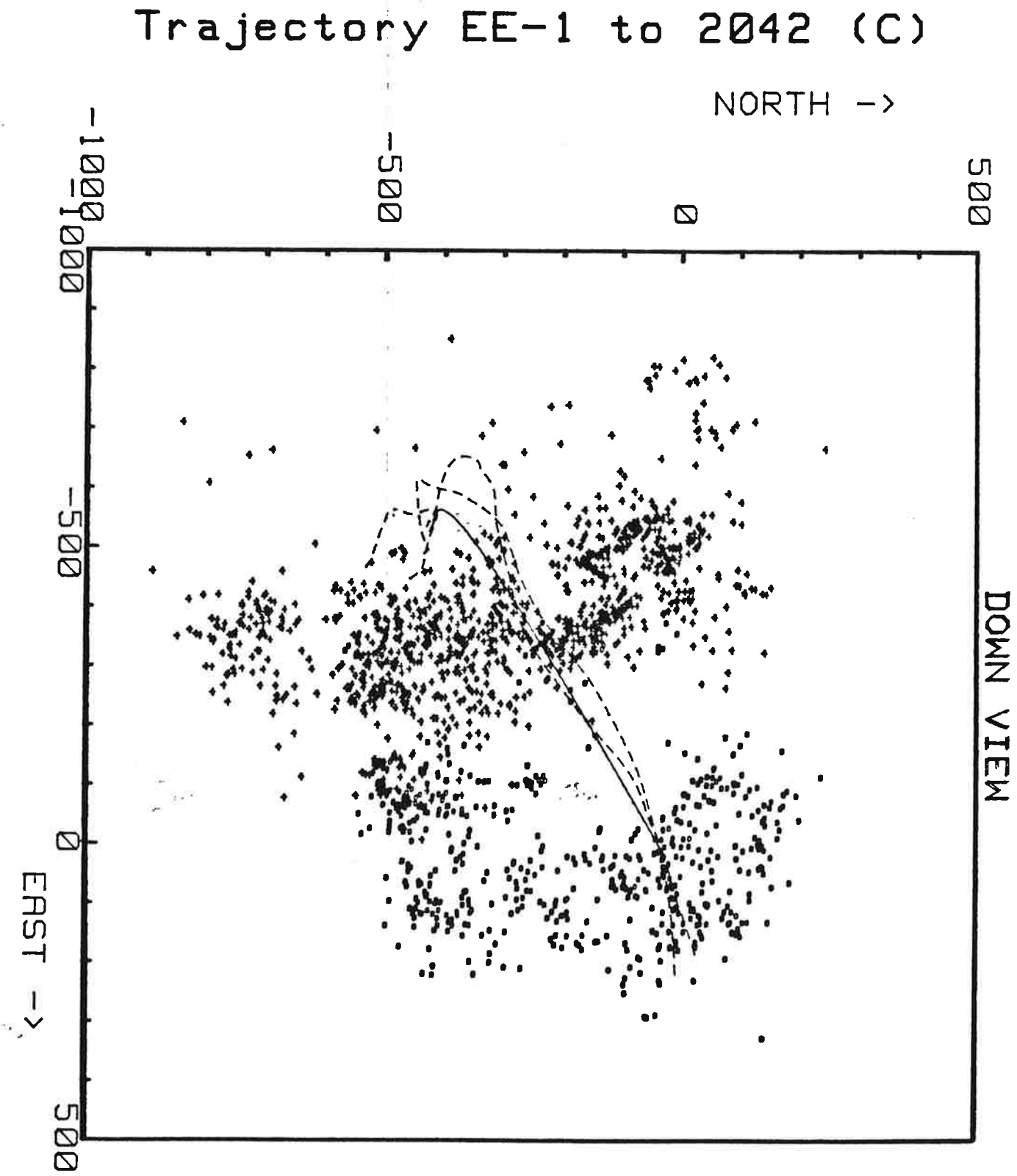
Trajectory EE-1 to 2042 (C)
NORTH ->
-1000
-500
0
500
-1000
-500
0
500
EAST ->
DOWN VIEW

Fig. 2.2

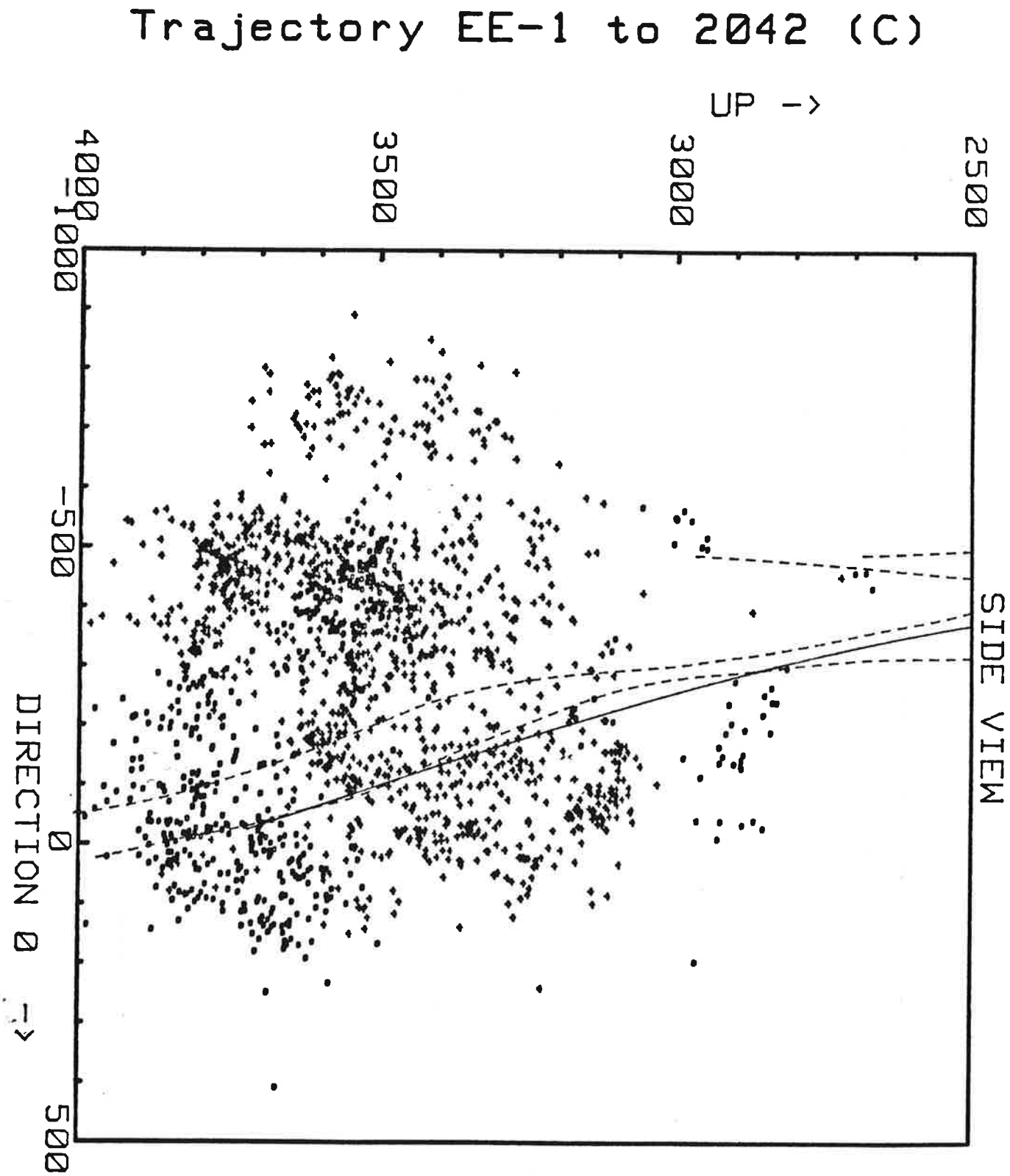
Trajectory EE-1 to 2042 (C)
UP ->
4000
3500
3000
2500
1000
-500
0
500
DIRECTION 0 ->
SIDE VIEW

Fig. 2.3

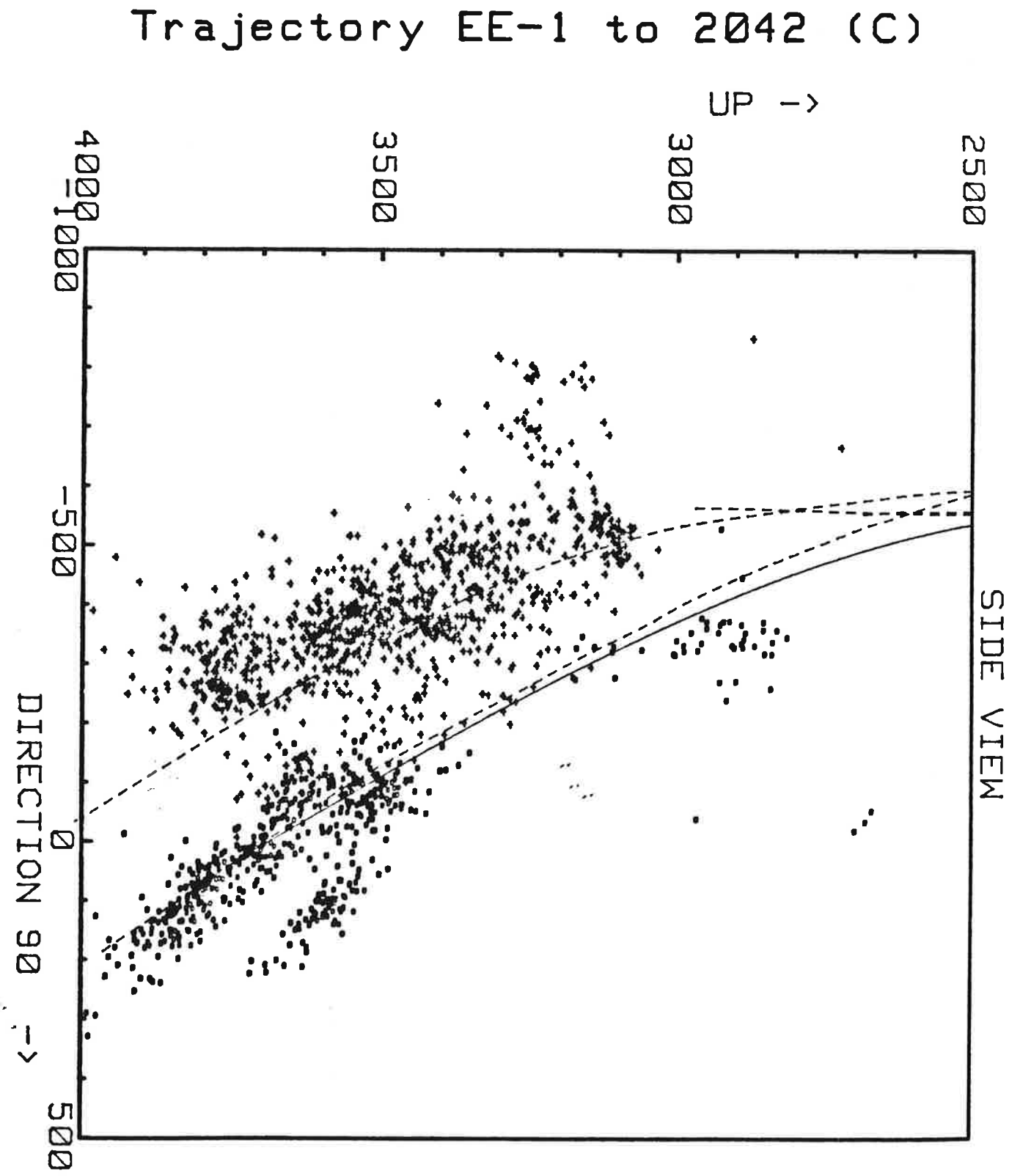
Trajectory EE-1 to 2042 (C)
UP ->
4000
3500
3000
2500
1000
-500
0
500
DIRECTION 90 ->
SIDE VIEW

Fig. 2.4

Table 3.1: Trajectory EE-1 m EE-2

Nr. 1	x= -423.79	y= -523.68	z= 1794.72	Kd= 1798.32	Alpha=291.73	Beta= 6.23
Nr. 2	x= -422.50	y= -526.68	z= 1825.03	Kd= 1828.80	Alpha=293.67	Beta= 6.13
Nr. 3	x= -421.28	y= -529.71	z= 1855.33	Kd= 1859.28	Alpha=291.55	Beta= 6.15
Nr. 4	x= -420.18	y= -532.75	z= 1885.64	Kd= 1889.76	Alpha=289.50	Beta= 6.07
Nr. 5	x= -419.05	y= -535.68	z= 1915.96	Kd= 1920.24	Alpha=291.47	Beta= 5.88
Nr. 6	x= -417.97	y= -538.56	z= 1946.28	Kd= 1950.72	Alpha=290.30	Beta= 5.77
Nr. 7	x= -416.95	y= -541.46	z= 1976.61	Kd= 1981.20	Alpha=289.20	Beta= 5.80
Nr. 8	x= -416.13	y= -544.47	z= 2006.93	Kd= 2011.68	Alpha=284.13	Beta= 5.90
Nr. 9	x= -415.38	y= -547.51	z= 2037.24	Kd= 2042.16	Alpha=283.80	Beta= 5.88
Nr. 10	x= -414.70	y= -550.50	z= 2067.57	Kd= 2072.64	Alpha=282.65	Beta= 5.75
Nr. 11	x= -413.84	y= -554.30	z= 2097.80	Kd= 2103.12	Alpha=282.65	Beta= 7.75
Nr. 12	x= -359.10	y= -456.88	z= 3092.23	Kd= 0.00	Alpha= 0.00	Beta= 0.00
Nr. 13	x= -183.96	y= -312.59	z= 3540.41	Kd= 0.00	Alpha= 0.00	Beta= 0.00

Table 3.2: Trajectory EE-1 m EE-2

NORTH	EAST	DEPTH	DRILL DEPTH	AZIMUTH	INCLINATION	CURVATURE
-422,50	-526,68	1825,03	1828,80	292,90	6,15	,06
-421,28	-529,71	1855,33	1859,28	290,67	6,13	,18
-420,18	-532,75	1885,64	1889,76	290,29	6,01	,18
-419,05	-535,68	1915,96	1920,24	291,07	5,84	,09
-417,97	-538,56	1946,28	1950,72	290,48	5,77	,02
-416,95	-541,46	1976,60	1981,20	287,31	5,83	,33
-416,13	-544,47	2006,92	2011,68	284,13	5,91	,01
-415,38	-547,51	2037,24	2042,16	283,27	5,64	,43
-414,70	-550,50	2067,57	2072,64	282,40	6,58	1,41
-413,84	-554,29	2097,80	2103,12	281,86	7,42	,53
-413,17	-557,91	2128,05	2133,60	279,02	6,43	,52
-412,76	-561,04	2158,37	2164,08	275,74	5,47	,50
-412,58	-563,69	2188,73	2194,56	271,80	4,54	,48
-412,60	-565,87	2219,14	2225,04	266,83	3,66	,47
-412,79	-567,57	2249,57	2255,52	260,02	2,82	,45
-413,11	-568,82	2280,02	2286,00	249,50	2,04	,44
-413,54	-569,61	2310,49	2316,48	230,27	1,38	,43
-414,04	-569,95	2340,96	2346,96	192,61	1,01	,42
-414,58	-569,85	2371,43	2377,44	149,63	1,20	,41
-415,13	-569,31	2401,90	2407,92	125,69	1,74	,40
-415,65	-568,34	2432,36	2438,40	113,06	2,40	,40
-416,12	-566,96	2462,81	2468,88	105,07	3,10	,40
-416,49	-565,17	2493,23	2499,36	99,22	3,81	,40
-416,75	-562,97	2523,63	2529,84	94,51	4,52	,40
-416,86	-560,38	2554,00	2560,32	90,45	5,24	,40
-416,79	-557,40	2584,34	2590,80	86,81	5,97	,41
-416,50	-554,05	2614,63	2621,28	83,46	6,70	,42
-415,97	-550,34	2644,88	2651,76	80,33	7,45	,42
-415,16	-546,26	2675,07	2682,24	77,35	8,21	,44
-414,05	-541,85	2705,21	2712,72	74,52	8,98	,45
-412,61	-537,09	2735,28	2743,20	71,80	9,78	,46
-410,81	-532,02	2765,28	2773,68	69,18	10,59	,47
-408,62	-526,63	2795,20	2804,16	66,67	11,43	,49
-406,02	-520,93	2825,03	2834,64	64,25	12,28	,50
-402,98	-514,95	2854,76	2865,12	61,92	13,17	,52
-399,47	-508,68	2884,39	2895,60	59,67	14,08	,53
-395,48	-502,16	2913,89	2926,08	57,52	15,01	,55
-390,99	-495,37	2943,26	2956,56	55,45	15,97	,56
-385,97	-488,35	2972,49	2987,04	53,46	16,95	,57
-380,40	-481,10	3001,57	3017,52	51,55	17,95	,58
-374,28	-473,64	3030,48	3048,00	49,73	18,98	,59
-367,58	-465,98	3059,21	3078,48	47,98	20,03	,60
-360,30	-458,13	3087,75	3108,96	46,31	21,09	,61
-352,43	-450,12	3116,08	3139,44	44,79	22,14	,57
-344,01	-441,95	3144,22	3169,92	43,50	23,12	,52
-335,09	-433,65	3172,15	3200,40	42,42	24,01	,47
-325,71	-425,22	3199,90	3230,88	41,50	24,83	,43
-315,93	-416,69	3227,48	3261,36	40,72	25,58	,39
-305,77	-408,05	3254,89	3291,84	40,05	26,26	,35
-295,29	-399,34	3282,15	3322,32	39,47	26,86	,31
-284,52	-390,55	3309,28	3352,80	38,99	27,40	,27
-273,50	-381,69	3336,28	3383,28	38,57	27,88	,24
-262,25	-372,77	3363,17	3413,76	38,23	28,29	,20
-250,81	-363,81	3389,96	3444,24	37,94	28,64	,17
-239,21	-354,81	3416,67	3474,72	37,70	28,93	,14
-227,49	-345,78	3443,32	3505,20	37,52	29,16	,11
-215,66	-336,72	3469,91	3535,68	37,38	29,34	,08
-203,76	-327,65	3496,46	3566,16	37,29	29,46	,05
-191,82	-318,56	3522,99	3596,64	37,24	29,52	,02

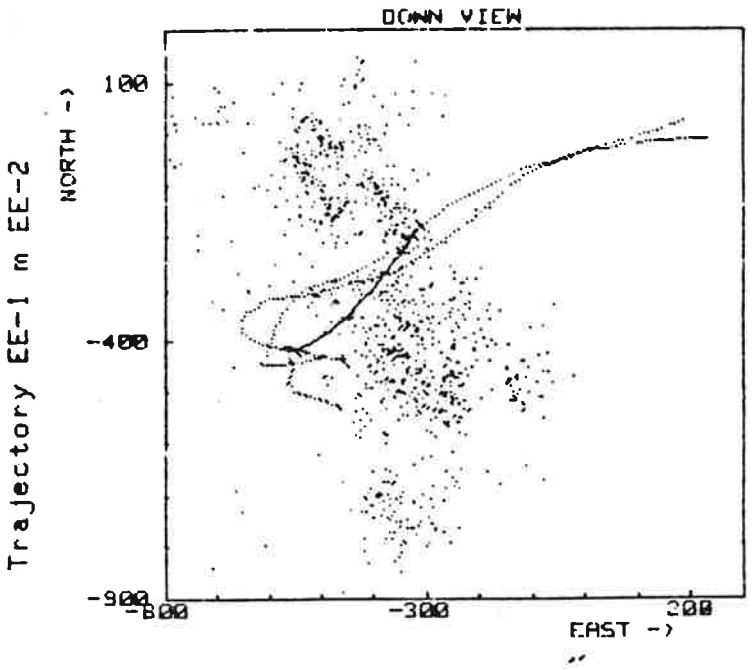
DOWN VIEW
Trajectory EE-1 m EE-2
NORTH ->
100
-400
-900
-800
-300
200
EAST ->
SIDE VIEW
Trajectory EE-1 m EE-2
UP ->
2900
3400
3900
-800
-300
200
DIRECTION Ø ->
SIDE VIEW
Trajectory EE-1 m EE-2
UP ->
2900
3400
3900
-800
-300
200

Fig. 3.1

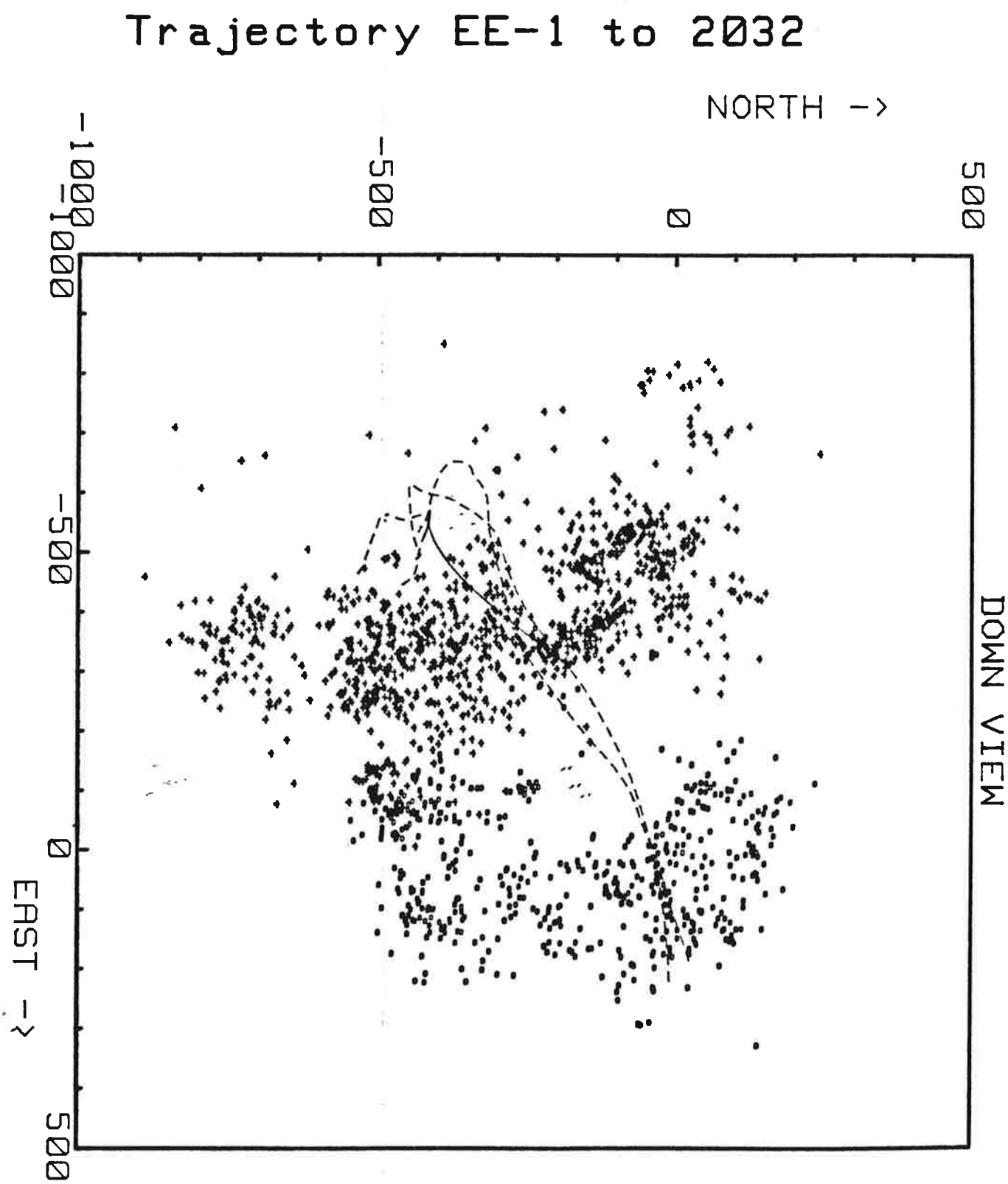
Trajectory EE-1 to 2032
NORTH ->
-1000
-500
0
500
500
0
-500
-1000
<- EAST
DOWN VIEW

Fig. 3.2

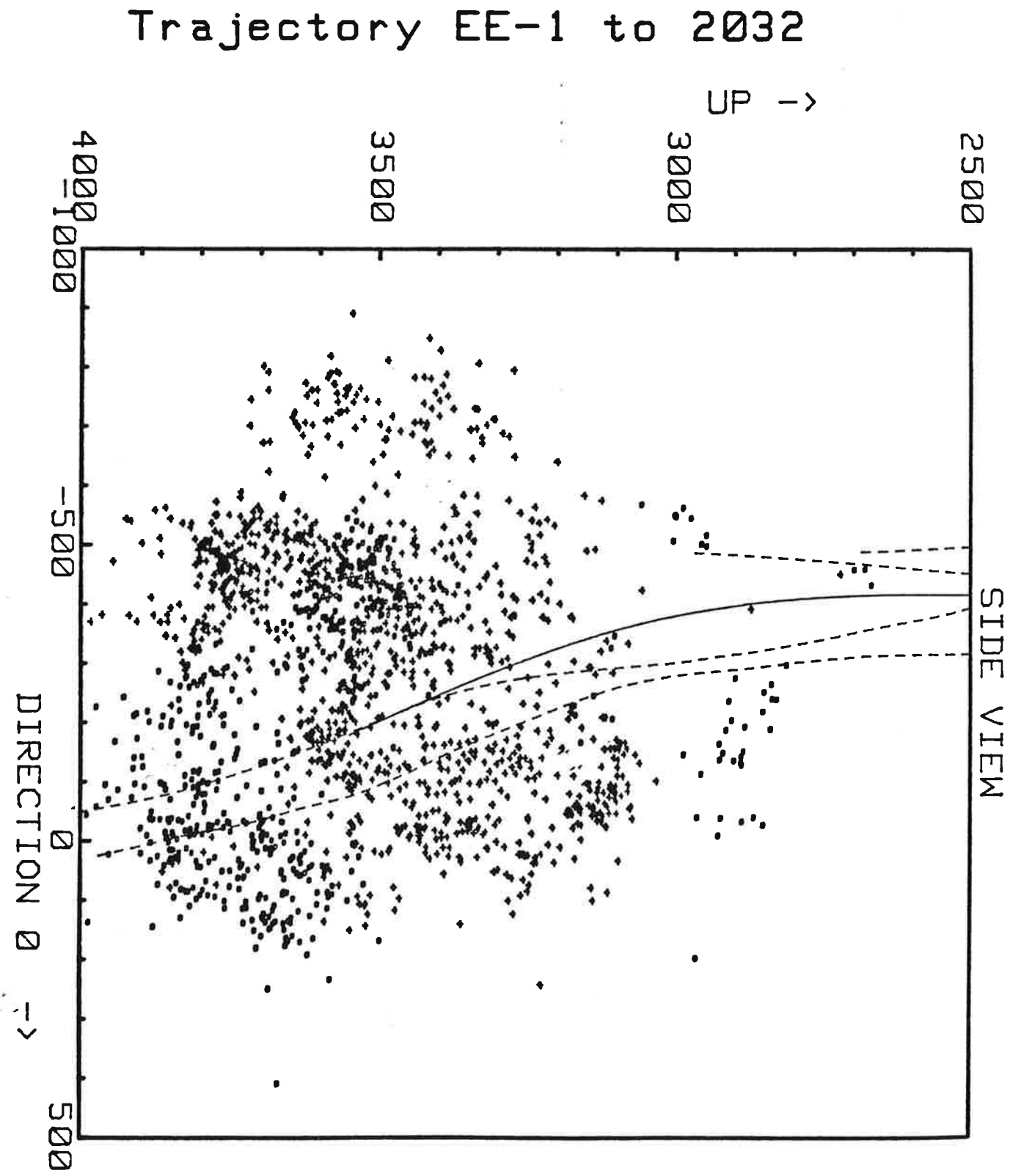
Trajectory EE-1 to 2032
UP ->
4000
3500
3000
2500
-1000
-500
0
500
DIRECTION 0 ->
SIDE VIEW

Fig. 3.3

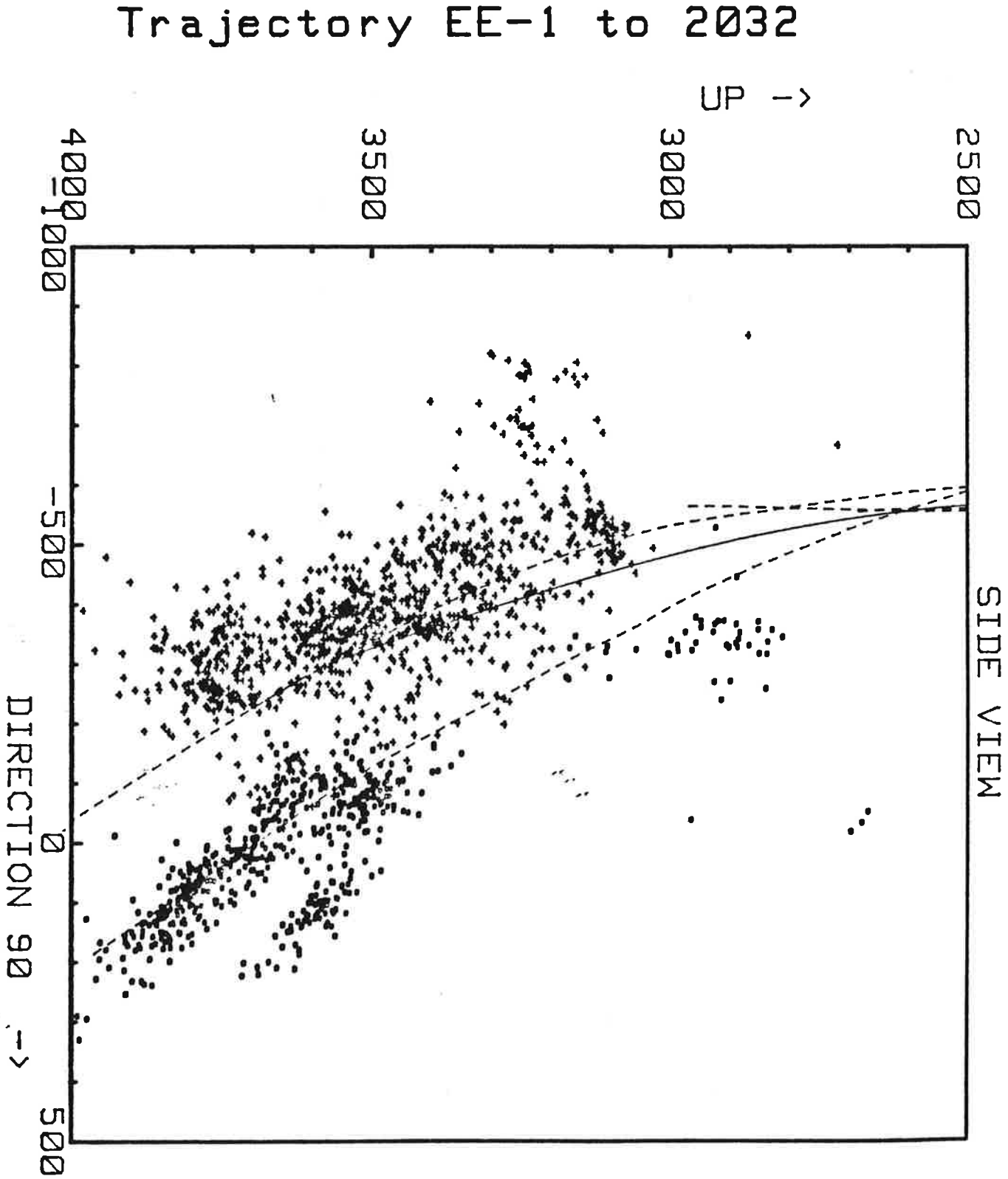
Trajectory EE-1 to 2032
UP ->
4000
3500
3000
2500
1000
-500
0
500
DIRECTION 90 ->
SIDE VIEW

Fig. 3.4