

NILU TR : 7/84  
Referanse: 0-8415  
Dato : April 1984

*SPREDNING AV TUNG GASS*

*UTDRAG AV MÅLEDATA FRA THORNEY ISLAND  
FORSØKENE, FASE 1*

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ISBN 82-7247-475-1

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## 1. GENERELT OM FORSØKENE

NILU har tidligere gjort rede for bakgrunnen for og gjennomføringen av forsøkene på Thorney Island. Dette notatet gir en enkel oversikt og et sammendrag av forsøkene som ble utført i fase 1.

Registreringer av gasskonsentrasjoner og meteorologiske variable ble gjort hvert 1/20 sekund for alle parametre, selv om tidsoppløsningen for de fleste konsentrasjonsmålinger bare var på 1 sekund. Fra den store mengde av kontrollerte data har Health and Safety Executive utarbeidet rapporter for hvert enkelt forsøk. Måledataene er presentert i form av figurer med midlingstid 0,6 sekund. Hver rapport er på 100-150 sider, slik at en ytterligere forenkling er nødvendig for å få oversikt slik at de forskjellige forsøkene kan sammenlignes.

Vedlagt følger en kort oversikt over de enkelte forsøk for senere vurdering ved valg av forsøk til numerisk simulering og vind- og vanntunnelforsøk.

Registreringene omfatter:

- Gasskonsentrasjoner (% av utslipp)
- Vindstyrke og -retning
- Røykmåling (lysspredning)
- Temperatur - luft og bakke
- Solinnstråling
- Turbulens

Dessuten angis for hvert forsøk:

- Relativ tetthet ved utslipp
- Skydekke
- Atmosfærisk stabilitet (estimert ved flere metoder).

- Inndeling i stabilitet fra A til G er henholdsvis fra meget ustabil til meget stabil, og C og D beskriver nær nøytrale forhold.

Fra de mottatte diagrammer er det i tillegg estimert maksimalkonsentrasjon, middelkonsentrasjon og passasjetidspunkter for gasskyen. Konsentrasjonsfordeling i gitte tidspunkter er også vedlagt hvert forsøk. Selv om de gitte verdier beror på et visst skjønn, bør de gi et godt bilde av konsentrasjonsfordelingen. For å få mer nøyaktige resultater må rådataene behandles.

#### Forklaring til dataene:

X,Y : Koordinater (m). NB! Utslippspunkt: X=400, Y=200  
 H : Høyde over bakken (m)  
 CM : Maksimumkonsentrasjon (%)  
 C : Midlere konsentrasjon (%)  
 T1,T2 : Tidspunkter for skypassasje (s).  
 HGAS : Sensor med 1/10 sekunds oppløsning. Hvor det er er to sett konsentrasjoner i samme posisjon, kommer den siste fra HGAS sensor.

Tabell 1: Oversikt over spredningsforsøk, fase I

Forsøk nr.	Dato	Vindstyrke (10 m) m/s	Luftstabilitet (Pasquill klasse)	Relativ tetthet	Ant. sensorer som reagerte på gass
4 <sup>1</sup>	15.07.82	3,8	B	0,97	22
5 <sup>1</sup>	03.08.82	4,6	B	1,69	26
6 <sup>1</sup>	04.08.82	2,6	D/E	1,60	46
7	08.09.82	3,2	E	1,75	57
8	09.09.82	2,4	D	1,63	73
9	15.09.82	1,7	F	1,60	62
10	30.09.82	2,4	C	1,80	11
11	10.10.82	5,1	D	1,96	26
12	15.10.82	2,6	E	2,37	65
13	19.10.82	7,5	D	2,00	47
14	24.10.82	6,8	C/D	1,76	50
15	28.04.83	5,4	C/D	1,41	38
16	28.04.83	4,8	D	1,68	45
17	09.06.83	5,0	D/E	4,20	62
18	10.06.83	7,4	D	1,87	60
19	10.06.83	6,4	D/E	2,12	67

<sup>1</sup> Detaljert rapport ikke mottatt.

2. UTDRAG AV MÅLEDATA FRA FORSØKENE, FASE 1 OG  
CORRECTIONS FOR AIR ENTRAINED IN GAS RELEASED

Since data obtained from the gas sensors are based on the measurement of oxygen deficiency, any contamination of the source gas through air entrainment changes the effective reading of each sensor.

For Trial 14 calculations showed that the gas released contained 15% of Air. To allow for this in subsequent use of the data from this trial, a factor of 1.176 must be applied to each reading from standard and high speed gas sensors.

Note that for Trial 15 with 10% air entrainment and Trial 18 with 6% air entrainment the appropriate scale factor adjustments have already been incorporated in all gas sensor channels before the issue of data tapes.

CORRECTIONS TO HSE TRIALS DATA MANUALS

Hard copy data on atmospheric stability conditions

Due to an oversight the individual stability conditions produced by the seven methods listed on page 1 of the hard copy data were not updated for Trials 08 to 14. The values given were those for Trial 07 in all cases. The "overall" stability conditions inferred from the individual observations were, however, correct. The correct stability conditions for Trials 07 to 14 are reproduced below:-

<u>Trial No.</u>	<u>07</u>	<u>08</u>	<u>09</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>
Stability Condition:								
from observation	E	B/C	D/E	D	D	E	C/D	D
from DT/DZ	E	D/E	E	D/C	D	E	C	C
from solarimeter	G	D	F	C	D	F	D	C/D
from heat flux	G	D	G	C	E	F	D	C/D
from Richardson No.	E	G	G	B	D	F	D	C
from Bulk Richardson No.	D	E	F	C	D	E	D	D
from standard )								
deviation of mean )	D/E	D/E	E	D/E	D	D	D	D
wind heading )								
Stability Condition:								
inferred	E	D	F	C	D	E	D	C/D

Clarification

Section 5 of Trials Data Manuals.

In the Data For Trials Manuals issued by HSE there may be ambiguity in the values given for the turbulence intensities, for example in Data for Trial 14/1, U' RMS = 0.275. These are not RMS values in metre/sec but non-dimensional turbulence intensities - though the text immediately before does explain this. To clarify this, all future reports will be in the form "Turbulence Intensity (U) = 27.5% (component in the wind direction)".

A table of all turbulence intensities for Trials 04 to 19 inclusive is given below:-

Turbulence Intensity

<u>Trial No.</u>	(U) <u>Along Wind</u>	(V) <u>Cross Wind</u>	(W) <u>Vertical</u>	<u>Mean Wind Speed</u> <u>UAN at 10m</u>
04	15.1	12.5	10.9	3.435
05	10.2	11.6	11.3	4.198
06	16.9	16.3	9.2	2.681
07	18.2	12.6	8.4	3.199
08	16.1	16.3	11.0	2.248
09	9.6	9.1	4.9	1.674
10	19.6	19.4	10.9	2.349
11	16.5	11.4	8.9	4.963
12	11.3	14.2	5.6	2.555
13	13.4	12.0	6.4	7.367
14	27.5	20.9	7.9	5.419
15	10.5	10.3	9.3	5.013
16	16.9	12.2	8.3	4.163
17	14.7	11.8	8.4	5.146
18	13.4	15.3	8.5	6.782
19	13.5	9.0	7.0	6.281



THORNEY ISLAND TRIALS SPILL 007 8 SEPTEMBER 1982

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	19:33:20 hrs
Freon 12/Nitrogen mixture: relative density	1.78
Number of smoke canisters discharged:	4
Mean Wind Speed at 10 m height:	
During main data collection period:	3.2 m/s
From 5 minute cyclic data just before the release:	3.8 m/s
Mean Wind Heading ('A' station) (relative to the centre line of the array)	<u>45.3°</u>
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	80.66%
Insolation	2W/m <sup>2</sup>
Ambient Air Temperature (at 9 m height)	17.12°C
Treated Runway Surface Temperature	19.0°C
Grass Surface Temperature	17.7°C
Observed Cloud Cover	2/8

STABILITY CONDITION

E (From Observations)  
 E (From DT/DZ)  
 G (From Solarimeter)  
 G (From Heat Flux)  
 E (From Richardson No)  
 D (From Bulk Richardson No)  
 D/E (From Standard Deviation of Wind Heading)

Stability condition inferred from data during the release and just before the release: E.

THORNEY ISLAND TRIALS SPILL 007 8 SEPTEMBER 1982

#### HISTORY

About 4 hours before the release, the sun was out and insolation was slight to moderate ( $350 \text{ W/m}^2$ ); the wind speed was about 5 m/s and the heading was  $27^\circ$  to the right of the array centre line (clockwise). As time went by, the amount of insolation dropped but the wind speed remained more or less the same. The heading however, changed and moved further to the right (about  $30$  to  $40^\circ$ ). Approximately one hour before the release the wind speed was still about 5 m/s at a heading of about  $31^\circ$  to the right. Insolation was slight giving a neutral stability condition. From this time on, cloud cover increased, the wind speed dropped and the heading moved a further  $10^\circ$  to the right, thus giving the conditions listed above at the time of the spill.

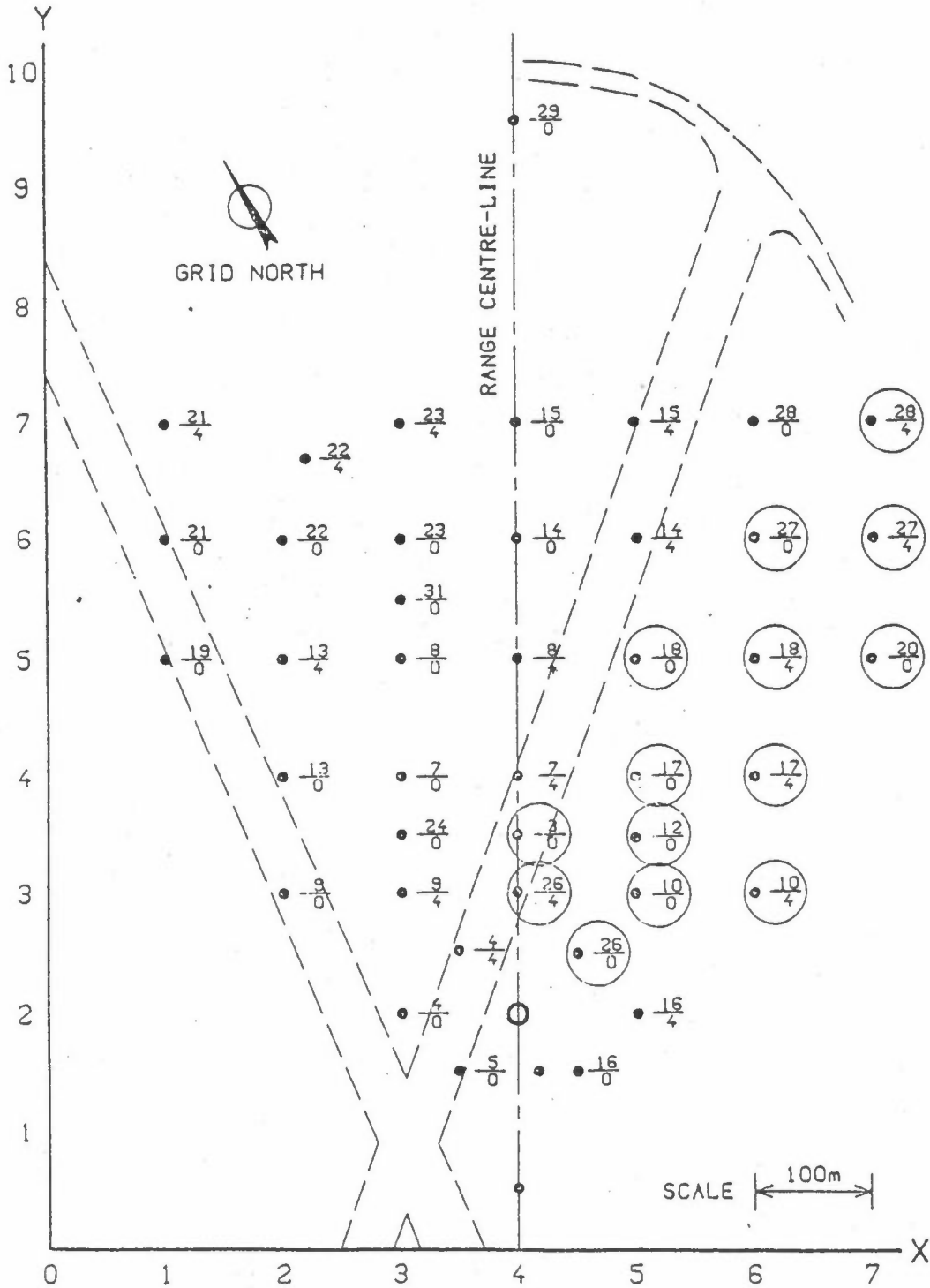
TRIAL No. - 007

DATE - 8/9/82

57 SENSORS SAW GAS

WIND SPEED ( $U_{10}$ ) 3-4 m/sec

PASQUILL CATEGORY - E/F



$\frac{21}{4}$  = DATA TERMINAL CHANNEL NUMBER OF GAS SENSORS AT 0.4m HEIGHT  
 ○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS



Trial	7	X	Y	H	CM	C	T1	T2	T2-T1	REMARKS
1	Gas	450	250	0.4	13.2	5.6	20	120	100	Well defined
2	Gas	450	250	2.4	7.0	0.8	25	115	90	Well defined
3	Gas	450	250	4.4	1.7	0.2	25	115	90	
4	Gas	450	250	6.4	1.1	0.1	25	85	60	Heavy noise
5	Gas	400	300	0.4	6.0	2.4	35	100	65	Well defined
6	Gas	400	300	2.4	3.9	0.5	35	90	55	Well defined
7	Gas	400	300	4.4	1.0	0.2	40	95	55	
8	Gas	400	300	6.4	0.2	0.1	50	55	5	
9	Gas	500	300	0.4	3.0	1.0	55	180	125	Well defined
10	Gas	500	300	2.4	1.6	0.6	50	180	130	Great oscillations
11	Gas	500	300	4.4	0.6	0.2	50	175	125	Great oscillations
12	Gas	500	300	6.4	0.6	0.1	60	150	90	Great oscillations
13	Gas	600	300	0.4	0.1	0.0	95	120	25	Not good
14	Gas	600	300	2.4	0.1	0.0	85	100	15	Not good
15	Gas	400	350	0.4	3.5	0.8	65	110	45	Well defined
16	Smoke	400	350	0.4	0.2	0.0	60	100	40	Well defined
17	Smoke	400	350	2.0	0.1	0.0	70	100	30	Not good
18	Gas	400	350	2.4	1.8	0.3	65	110	45	Great oscillations
19	Gas	400	350	4.4	1.3	0.2	70	100	30	Great oscillations
20	Gas	400	350	6.4	0.9	0.1	70	100	30	Great oscillations, bad
21	Gas	500	350	0.4	2.6	0.8	70	240	170	Well defined
22	HGas	500	350	2.0	2.0	0.3	60	320	260	Great oscillations
23	Smoke	500	350	2.0						Useless
24	Gas	500	350	2.4	1.7	0.3	60	240	180	Great oscillations
25	HGas	500	350	2.4	1.9	0.3	60	290	230	Great oscillations
26	Gas	500	350	4.4	1.9	0.1	60	230	170	Great oscillations
27	Gas	500	350	6.4	0.4	0.0	70	200	130	Not good
28	Gas	500	400	0.4	2.0	0.6	70	250	170	Well defined
29	Gas	500	400	2.4	1.6	0.3	70	240	170	Great oscillations
30	Gas	500	400	4.4	0.9	0.1	60	210	150	Great oscillations
31	Gas	500	400	6.4	0.3	0.0	60	200	140	Not good
32	Gas	600	400	0.4	0.8	0.2	105	420	315	Well defined
33	Gas	600	400	2.4	0.8	0.1	100	300	200	Good
34	Gas	600	400	4.4	0.7	0.1	100	270	170	Not good
35	Gas	600	400	6.4	0.5	0.1	150	240	90	Not good
36	Gas	500	500	0.4	0.9	0.2	115	240	125	Well defined
37	Gas	500	500	2.4	0.8	0.1	115	190	75	Good
38	Gas	500	500	4.4	0.3	0.0	110	180	70	
39	Gas	500	500	6.4	0.2	0.0	110	180	70	Good
40	Gas	600	500	0.4	1.2	0.3	125	>400	>275	Well defined
41	Gas	600	500	2.4	1.1	0.3	105	300	195	Well defined
42	Gas	600	500	4.4	0.7	0.1	100	300	200	Great oscillations
43	Gas	600	500	6.4	0.5	0.1	100	270	170	Great oscillations
44	Gas	700	500	0.4	0.4	0.1	145	380	235	Well defined
45	Gas	700	500	2.4	0.4	0.1	130	340	210	Great oscillations
46	Gas	700	500	4.4	0.3	0.1	125	340	215	Great oscillations
47	Gas	700	500	6.4	0.3	0.1	140	300	160	Not good
48	Gas	600	600	0.4	0.4	0.1	170	300	130	Good
49	Gas	600	600	2.4	0.4	0.1	150	300	150	Good
50	Gas	600	600	4.4	0.3	0.1	160	250	90	Great oscillations
51	Gas	600	600	6.4	0.3	0.1	150	260	110	Great oscillations
52	Gas	700	600	0.4	0.6	0.2	160	420	260	Well defined
53	Gas	700	600	2.4	0.7	0.1	160	400	240	Great oscillations
54	Gas	700	600	4.4	0.5	0.1	150	360	160	Great oscillations
55	Gas	700	700	0.4	0.2	0.1	210	390	180	
56	Gas	700	700	2.4	0.3	0.1	210	350	140	
57	Gas	700	700	4.4	0.3	0.1	200	350	150	



THORNEY ISLAND TRIALS SPILL 008 9 SEPTEMBER 1982

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	17:49:58 hrs
Freon 12/Nitrogen mixture: relative density	1.72
Number of smoke canisters discharged:	4
Mean Wind Speed at 10 m height:	
During main data collection period:	2.4 m/s
From 5 minute cyclic data just before the release:	2.9 m/s
Mean Wind Heading ('A' station) (relative to the centre line of the array)	-15.8°
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	87.6%
Insolation	158W/m <sup>2</sup>
Ambient Air Temperature (at 9 m height)	17.12°C
Treated Runway Surface Temperature	18.4°C
Grass Surface Temperature	18.4°C
Observed Cloud Cover	2/8

STABILITY CONDITION

E (From Observations)  
 E (From DT/DZ)  
 G (From Solarimeter)  
 G (From Heat Flux)  
 E (From Richardson No)  
 D (From Bulk Richardson No)  
 D/E (From Standard Deviation of Wind Heading)

Stability condition inferred from data during the release and just before the release: D.

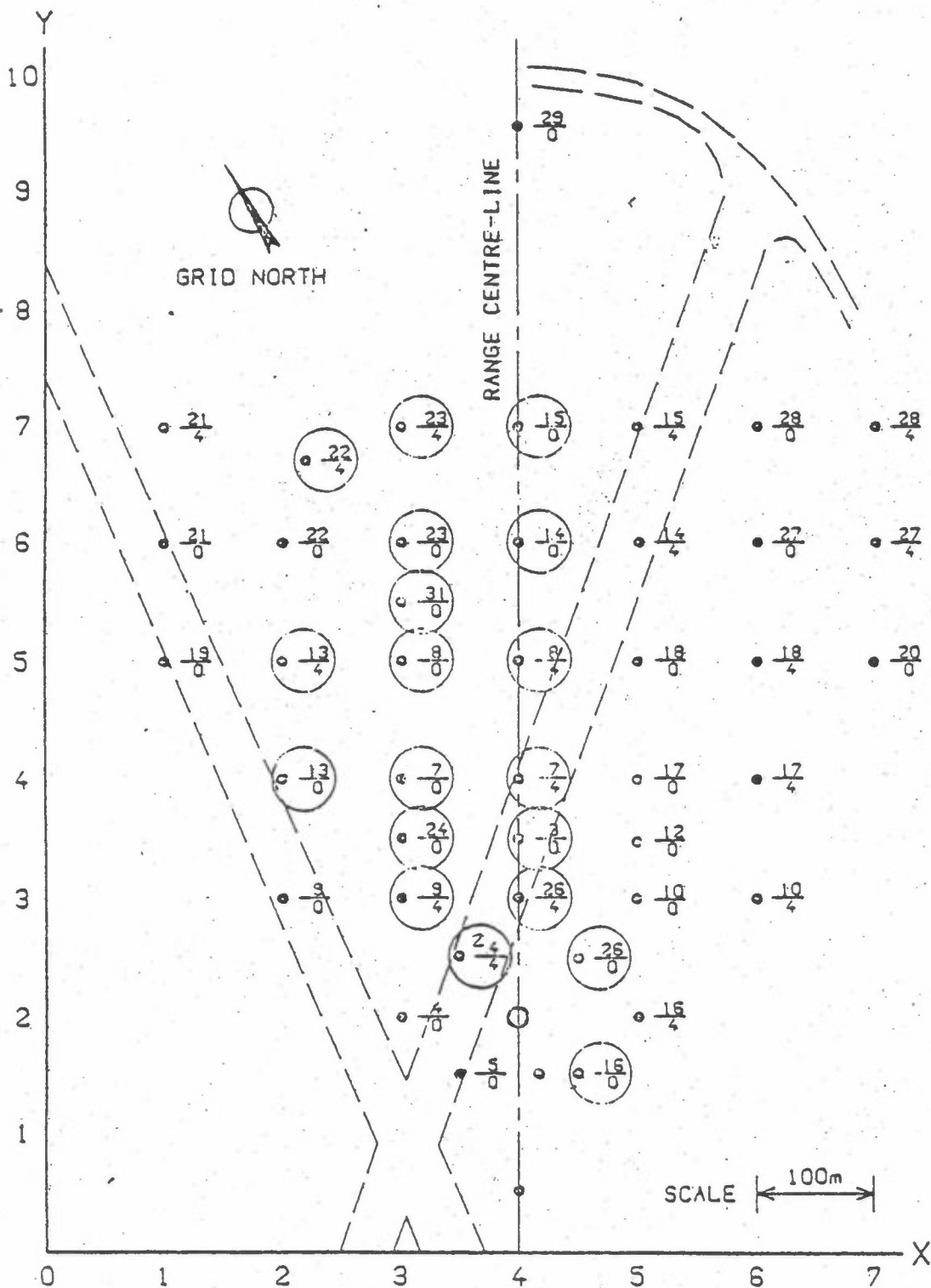
THORNEY ISLAND TRIALS SPILL 008 9 SEPTEMBER 1982

#### HISTORY

This was not a very sunny day so insolation was generally slight. At about three hours before the spill, insolation was  $135 \text{ W/m}^2$ , the wind speed was about  $4.9 \text{ m/s}$  and the wind heading about  $18^\circ$  to the left of the centre line of the array. These conditions gave a stability at that time of 'D'. During the following two hours insolation increased and the wind speed dropped gradually but the wind direction remained roughly the same. Thus, at about one hour before the spill, insolation was moderate (approximately  $450 \text{ W/m}^2$ ), the wind speed was about  $4 \text{ m/s}$  at a heading of about  $29^\circ$  to the left of the array, but the stability condition was still judged to be about 'D'. During the hour leading up to the spill insolation decreased, the speed dropped further and the wind heading swung around back to about  $16^\circ$  to the left, giving the conditions listed above by the time the gas was released.



TRIAL No. - 008      DATE - 9/9/82      73 SENSORS SAW GAS  
 WIND SPEED (U<sub>10</sub>) 2-3 m/sec      PASQUILL CATEGORY - D



$\frac{21}{4}$  = DATA TERMINAL CHANNEL NUMBER OF GAS SENSORS AT 0.4m HEIGHT.  
 ○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS



Trial	8	X	Y	H	CM	C	T1	T2	T2-T1	REMARKS
1	Gas	450	150	2.4	1.8	0.0	65	75	10	Heavy noise
2	Gas	350	250	0.4	9.5	1.4	30	160	130	Well defined
3	Gas	350	250	2.4	8.1	0.5	35	35	5	Narrow top
4	Gas	450	250	0.4	9.0	1.9	30	140	110	Well defined
5	Gas	450	250	2.4	4.4	0.7	35	80	45	Some noise
6	Gas	450	250	4.4	3.4	0.4	40	100	60	Well defined
7	Gas	450	250	6.4	1.8	0.1	40	90	50	Some noise,narrow oscillation
8	Gas	300	300	0.4	2.0	0.7	60	180	120	Some noise,well defined
9	Gas	300	300	2.4	1.8	0.2	80	130	50	Noise
10	Gas	300	300	4.4	1.9	0.1	60	75	15	Some noise
12	Gas	400	300	0.4	6.2	1.5	35	200	165	Well defined
13	Gas	400	300	2.4	3.8	0.3	35	135	100	Some noise
14	Gas	400	300	4.4	0.6	0.1	60	130	70	Heavy noise
15	Gas	400	300	6.4	0.7	0.1	40	130	90	Heavy noise
16	Gas	300	350	0.4	1.1	0.3	80	260	180	Some noise
17	HGas	300	350	2.0	1.0	0.2	80	225	145	
18	Gas	300	350	2.4	1.2	0.1	80	220	140	Some noise
19	Gas	300	350	4.4	0.8	0.1	140	210	70	Some noise
20	Gas	300	350	6.4	0.6	0.1	160	175	15	Some noise
21	Gas	400	350	0.4	4.2	1.2	55	240	185	Well defined
22	Smoke	400	350	2.0	0.2	0.1	60	120	60	
23	Gas	400	350	2.4	2.5	0.4	55	230	175	
24	Gas	400	350	4.4	1.8	0.2	55	200	145	Some noise
25	Gas	400	350	6.4	1.3	0.1	55	200	145	Some noise
26	Gas	200	400	0.4						Useless
27	Gas	200	400	2.4	0.1	0.0	180	200	20	Bad
28	Gas	200	400	4.4	0.1	0.0	160	210	50	Bad
29	Gas	200	400	6.4	0.1	0.0	170	195	25	Bad
30	Gas	300	400	0.4	0.7	0.2	105	>300	>195	Heavy noise
31	Gas	300	400	2.4	0.8	0.1	100	260	160	Heavy noise
32	Gas	300	400	4.4	0.4	0.0	100	210	110	Heavy noise,bad
33	Gas	300	400	6.4	0.3	0.0	160	220	60	Heavy noise,bad
34	Gas	400	400	0.4	2.9	0.8	70	270	200	Well defined
35	Gas	400	400	2.4	1.8	0.2	70	300	230	Noise
36	Gas	400	400	4.4	1.0	0.1	80	140	60	Heavy noise
37	Gas	400	400	6.4	0.7	0.1	80	130	50	Heavy noise
38	Gas	200	500	0.4	0.1	0.0	190	250	60	Noise
39	Gas	200	500	2.4	0.2	0.0	180	200	20	Heavy noise
40	Gas	200	500	4.4	0.1	0.0	180	200	20	Heavy noise
41	Gas	200	500	6.4	0.1	0.0	170	205	35	Noise
42	Gas	300	500	0.4	0.9	0.3	145	420	275	Noise
43	Gas	300	500	2.4	0.9	0.2	160	340	180	Noise
44	Gas	300	500	4.4	0.7	0.1	160	280	120	Noise
45	Gas	300	500	6.4	0.4	0.1	130	260	130	Noise
46	Gas	400	500	0.4	0.9	0.2	160	370	210	Noise
47	Gas	400	500	2.4	0.6	0.1	150	360	210	Noise
48	Gas	400	500	4.4	0.4	0.1	110	130	20	Heavy noise
49	Gas	400	500	6.4	0.3	0.1	150	170	20	Heavy noise
50	Gas	300	550	0.4	1.2	0.3	140	450	310	Noise
51	Gas	300	550	2.4	1.0	0.2	150	>500	>350	Noise
52	Gas	300	550	4.4	0.8	0.2	140	340	200	Noise
53	Gas	300	550	6.4	0.5	0.1	140	300	160	Noise
54	Gas	300	600	0.4	0.7	0.2	200	460	300	Heavy noise
55	Gas	300	600	2.4	0.7	0.2	200	420	310	Noise
56	Gas	300	600	4.4	0.6	0.1	210	420	210	Noise
57	Gas	300	600	6.4	0.7	0.1	210	410	200	Heavy noise
58	Gas	400	600	0.4	0.2	0.1	210	420	210	Noise
59	Gas	400	600	2.4	0.3	0.0	210	380	160	Noise,bad
60	Gas	400	600	4.4	0.2	0.0	210	360	150	Noise
61	Gas	400	600	6.4	0.2	0.0	210	360	150	Noise
62	Gas	220	670	0.4	0.2	0.0	320	420	100	Noise,bad
63	Gas	220	670	2.4	2.0	0.0	240	390	150	Noise
64	Gas	220	670	4.4	2.5	0.1	240	370	130	Heavy noise,bad
65	Gas	220	670	6.4	2.5	0.1	250	380	130	Heavy noise,bad
66	Gas	300	700	0.4	4.5	0.1	220	430	210	Heavy noise
67	Gas	300	700	2.4	0.4	0.1	120	370	250	Heavy noise,bad
68	Gas	300	700	4.4	0.4	0.1	200	380	180	Heavy noise
69	Gas	300	700	6.4	0.4	0.1	250	360	110	Heavy noise,bad
70	Gas	400	700	0.4	0.1	0.0	230	780	150	Noise
71	Gas	400	700	2.4	0.2	0.0	250	450	200	Noise
72	Gas	400	700	4.4	0.2	0.0	250	410	160	Noise
73	Gas	400	700	6.4	0.1	0.0	250			Noise,bad



THORNEY ISLAND TRIALS SPILL 009 15 SEPTEMBER 1982

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	18:45:20 hrs
Freon 12/Nitrogen mixture: relative density	1.73
Number of smoke canisters discharged:	4
Mean Wind Speed at 10 m height:	
During main data collection period:	1.7 m/s
From 5 minute cyclic data just before the release:	1.8 m/s
Mean Wind Heading ('A' station) (relative to the centre line of the array)	-26.9°
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	87.3%
Insolation	12W/m <sup>2</sup>
Ambient Air Temperature (at 9 m height)	18.55°C
Treated Runway Surface Temperature	—
Grass Surface Temperature	—
Observed Cloud Cover	0/8

STABILITY CONDITION

E (From Observations)  
 E (From DT/DZ)  
 G (From Solarimeter)  
 G (From Heat Flux)  
 E (From Richardson No)  
 D (From Bulk Richardson No)  
 D/E (From Standard Deviation of Wind Heading)

Stability condition inferred from data during the release and just before the release: F.

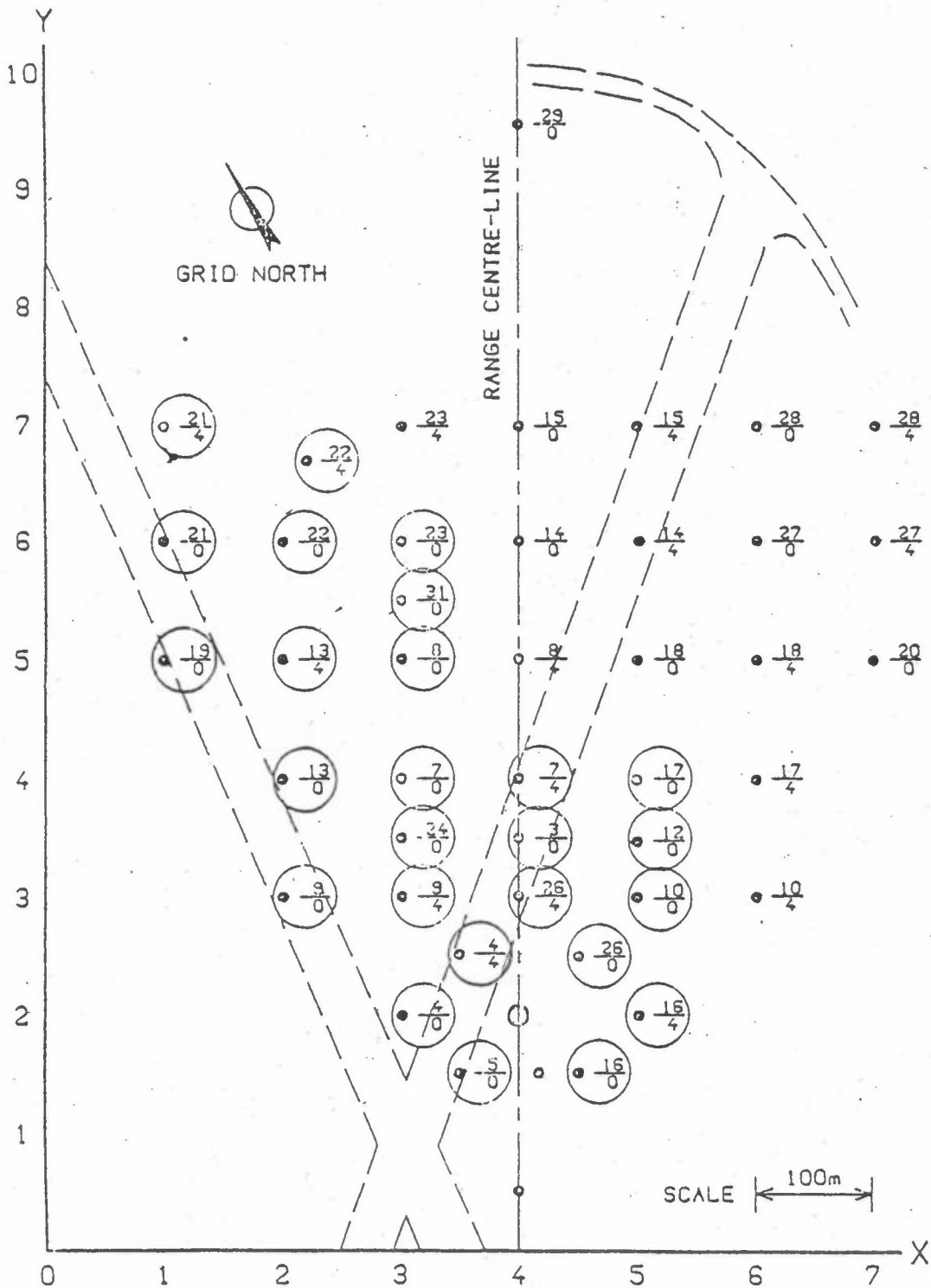
TRIAL No. - 009

DATE - 15/9/82

62 SENSORS SAW GAS

WIND SPEED ( $U_{10}$ ) 1-2 m/sec

PASQUILL CATEGORY - F



$\frac{21}{4}$  = DATA TERMINAL CHANNEL NUMBER OF GAS SENSORS AT 0.4m HEIGHT  
 ○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS

THORNEY ISLAND TRIALS SPILL 009 9 SEPTEMBER 1982

### HISTORY

About five hours before the gas was released the wind speed was 4.4 m/s and the heading about 11° to the left of the centre line of the array. Insolation was moderate, about 600W/m<sup>2</sup> (which incidentally was the highest for that day), giving a stability condition of about 'B'. From this time on, the wind gradually reduced in speed though its heading remained roughly the same; insolation also gradually decreased. Thus, by the time gas was released there was no sunshine and the wind speed was low; a stable condition was therefore achieved.

An interesting observation to note was that, a short time after being released, the orange coloured gas cloud appeared to be transformed to a white low-lying mist which persisted for several hours after the spill.

Trial	g	X	Y	H	CM	C	T1	T2	T2-T1	REMARKS
1	Gas	350	150	0.4	7.8	1.2	50	>600	>550	
2	Gas	350	150	1.4	2.9	0.5	50	180	130	
3	Gas	450	150	0.4	6.7	1.2	70	420	350	Heavy noise
4	Gas	450	150	1.4	0.7	0.0	80	130	50	Some noise
5	Gas	300	200	0.4	7.0	1.8	55	>600		Undefined
6	Gas	300	200	1.4	5.3	0.4	55	160	105	
7	Gas	300	200	2.4	3.7	0.5	55	115	60	
8	Gas	500	200	0.4	1.9	0.3	125	380	255	
9	Gas	350	250	0.4	12.2	0.5	130	280	150	
10	Gas	350	250	2.4	7.0	1.8	30	60	30	
11	Gas	450	250	0.4	9.8	1.4	35	320	285	
12	Gas	450	250	2.4	6.3	1.5	35	50	15	
13	Gas	200	300	0.4	0.8	0.3	230	>400	170	Heavy noise
14	Gas	200	300	2.4	0.7	0.3	200	320	120	Heavy noise
15	Gas	200	300	4.4	0.5	0.1	210	310	100	Heavy noise
16	Gas	200	300	6.4	0.6	0.2	200	300	100	Heavy noise
17	Gas	300	300	0.4	3.7	1.3	75	>600	>525	Undefined
18	Gas	300	300	2.4	1.5	0.3	70	115	45	Noise
19	Gas	300	300	4.4	1.4	0.2	70	80	10	
20	Gas	400	300	0.4	7.1	1.6	40	320	280	
21	Gas	400	300	2.4	4.7	0.8	30	95	65	
22	Gas	500	300	0.4	1.1	0.3	115	330		Undefined
23	Gas	500	300	2.4	0.1	0.1	115	120	5	Noise
24	Gas	300	350	0.4	2.7	1.0	100	740	640	Undefined
25	HGas	300	350	2.0	0.3	0.2	80	90	10	Noise
26	Gas	300	350	2.4	0.6	0.1	85	95	10	Noise
27	Smoke	300	350	5.0						Undefined
28	Gas	400	350	0.4	1.9	0.4	60	280	220	Undefined
29	Smoke	400	350	2.0						Undefined
30	Gas	400	350	2.4	0.9	1.2	75	110	35	Noise
31	Gas	500	350	0.4	0.8	0.0	160			Undefined
32	HGas	500	350	2.0	0.2	0.0	150	200	50	Noise
33	Gas	500	350	2.4	0.2	0.1	150	190	40	Noise
34	HGas	500	400	2.4	0.3	0.1	150	170	20	Noise
35	Gas	200	400	0.4	0.7					Drift
36	Gas	200	400	2.4	0.2	0.2	200	420	220	Undefined
37	Gas	200	400	4.4	0.3	0.2	260	530		Undefined
38	Gas	200	400	6.4	0.2					Undefined
39	Gas	300	400	0.4	2.2		80	>1000	>920	Undefined
40	Gas	300	400	2.4	0.3	0.1	115	>400	>285	Noise
41	Gas	400	400	0.4	0.5	0.2	120	290	120	Noise
42	Gas	500	400	0.4	0.3	0.2	190	450		Undefined
43	Gas	500	400	2.4	0.2	0.2	0	700		Undefined
44	Gas	100	500	0.4	0.4					Undefined, drift
45	Gas	200	500	0.4	0.7		260	>1000		Undefined
46	Gas	200	500	2.4	0.3	0.1	340	355	15	Noise
47	Gas	200	500	4.4						Undefined
48	Gas	200	500	6.4	0.2					Undefined
49	Gas	300	500	0.4	1.1	0.4	130	>1000		Undefined
50	Gas	300	500	2.4	0.5	0.1	180	300	120	Noise
51	HGas	300	550	2.0	0.4					Undefined
52	Gas	300	550	2.4	0.1	0.0	160	250	90	Noise
53	Gas	100	600	0.4			440	970		Noise
54	Gas	200	600	0.4			360	>1000		Noise
55	Gas	300	600	0.4			130	940		Drift
56	Gas	300	600	2.4			780	1150		Undefined
57	Gas	100	700	0.4						Undefined
58	Gas	100	700	2.4						Undefined
59	Gas	100	700	4.4						Undefined
60	Gas	100	700	6.4						Undefined
61	Gas	220	670	0.4			350	1115		Undefined
62	Gas	220	670	2.4						Undefined



## Trial 9

	X	Y	Peak		Seconds														
			Time	Cons	20	40	80	140	200	300	400	500	600	700	800	900			
H: 0.4 m	350	150	50	7.6			2.0	3.2	2.0	3.0	1.3	1.0	0.4	0.3					
	450	150	80	6.9			6.9	4.0	2.6	2.1	0.5								
	300	200	50	6.9			4.8	4.9	2.8	2.4	2.0	1.0	1.8	0.1					
	500	200	130	1.8				1.5	0.8										
	350	250	40	12.3		12.3	3.0	0.8	0.3										
	450	250	40	9.7		9.7	5.0	1.4	0.6	0.1									
	200	300	270	0.9						0.5	0.1	<0.1							
	300	300	350	3.7			1.4	2.5	2.8	3.0	2.9	2.3	1.3	0.7	0.3				
	400	300	50	7.0			4.0	4.8	2.5	0.2									
	500	300	240	1.0						0.5	0.3								
	300	350	370	2.8				1.0	1.5	2.4	2.6	2.3	1.3	0.4	0.3				
	500	350	250	0.8						0.5	0.4	0.2	0.1						
	200	400	440	0.7	0.0	0.0	<0.1	0.1	0.3	0.5	0.6	0.8	0.2						
	300	400	280	2.2				0.3	0.8	2.2	1.9	1.5	1.3	0.8					
	400	400	220	0.5				0.3	0.4	0.1									
	500	400	320	0.2					0.0	0.2	0.2								
	100	500	680	0.3								0.1	0.3	0.3	0.2				
	200	500	690	0.7						<0.1	0.3	0.4	0.6	0.6	0.5				
	200	500	330	0.2						0.0	0.0								
	100	600	790	0.4							0.0	0.0	0.2	0.4	0.3				
200	600	750	0.5							0.0	0.2	0.4	0.5	0.4					
300	600	570	0.5					<0.1	0.2	0.4	0.4	0.4	0.3	0.2					
100	700	760	0.2									<0.1	0.1	0.0					
220	670	740	0.6							<0.1	0.3	0.5	0.5	0.5					
H: 2.4 m	300	200	60	3.6			0.3												
	350	250	30	6.9															
	450	250	40	6.2		6.2													
	200	300	260	0.7					0.0	0.3									
	300	300	80	1.5			1.5												
	400	300	40	4.3	0.2	4.3	0.3												
	500	300	110	0.1															
	300	350	80	0.6			0.6												
	400	350	80	0.9	<0.1	<0.1	0.9												
	500	350	150	0.2															
	500	350	153	0.3															
	200	400	340	0.2					<0.1	0.2	<0.1	<0.1							
	300	400	180	0.3				<0.1	0.1	0.1	0.1	<0.1	<0.1						
	500	400	190	0.2															
	200	500	360	0.3					<0.1	0.1	0.1	0.1							
	300	500	280	0.5					0.2	0.2	0.2								
	300	550	210	0.1					0.1										
	300	600																	
100	700																		
220	670																		
H: 4.4 m	200	300	230	0.5						<0.1									
	300	300	80	1.3			1.3												
	200	400	340	0.3						0.1	0.1	0.1							
	300	500																	
100	700	650	0.1					<0.1	<0.1		<0.1								
H: 6.4 m	200	300	220	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	0.2									
	200	400	340	0.2						<0.1	0.1	<0.1							
	200	500	330	0.2						0.1	<0.1	0.0							



THORNEY ISLAND TRIALS SPILL 010 30 SEPTEMBER 1982

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	09:27:40 hrs
Freon 12/Nitrogen mixture: relative density	1.97
Number of smoke canisters discharged:	
Mean Wind Speed at 10 m height:	
During main data collection period:	2.4 m/s
From 5 minute cyclic data just before the release:	2.3 m/s
Mean Wind Heading ('A' station) (relative to the centre line of the array)	140'
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	19.2%
Insolation	276W/m <sup>2</sup>
Ambient Air Temperature (at 9 m height)	11.06°C
Treated Runway Surface Temperature	-
Grass Surface Temperature	-
Observed Cloud Cover	2/8

STABILITY CONDITION

E (From Observations)  
 E (From DT/DZ)  
 G (From Solarimeter)  
 G (From Heat Flux)  
 E (From Richardson No)  
 D (From Bulk Richardson No)  
 D/E (From Standard Deviation of Wind Heading)

Stability condition inferred from data during the release and just before the release: C.

THORNEY ISLAND TRIALS SPILL 010 30 SEPTEMBER 1982

### HISTORY

A few hours before gas was released, the wind speed was low and the wind heading was variable with a mean of about  $100^{\circ}$ . This was quite early in the morning (about 06:30 hrs) so the sun was not out and these conditions gave a stable atmosphere. Prior to filling the bag the wind speed dropped to about 0.3 to 0.7 m/s so that, even though the wind heading was outside the acceptable measuring sector, a useful trial was envisaged (as wind heading was less important at low wind speeds). While filling the bag the sun came out (about 08:00 hrs) and insolation gradually increased; the wind speed also increased but the heading still remained unacceptable (about  $100^{\circ}$  to  $130^{\circ}$ ). Thus, by the time gas was released the wind heading was about  $140^{\circ}$  and the wind speed was too high (2.4 m/s) to make this a very useful spill. The insolation at the time of the spill was moderate such that the stability was then judged to be about 'C'.

A point to note was that while filling the bag some leakage of gas (from the base of the bag) was discovered but this was soon corrected.

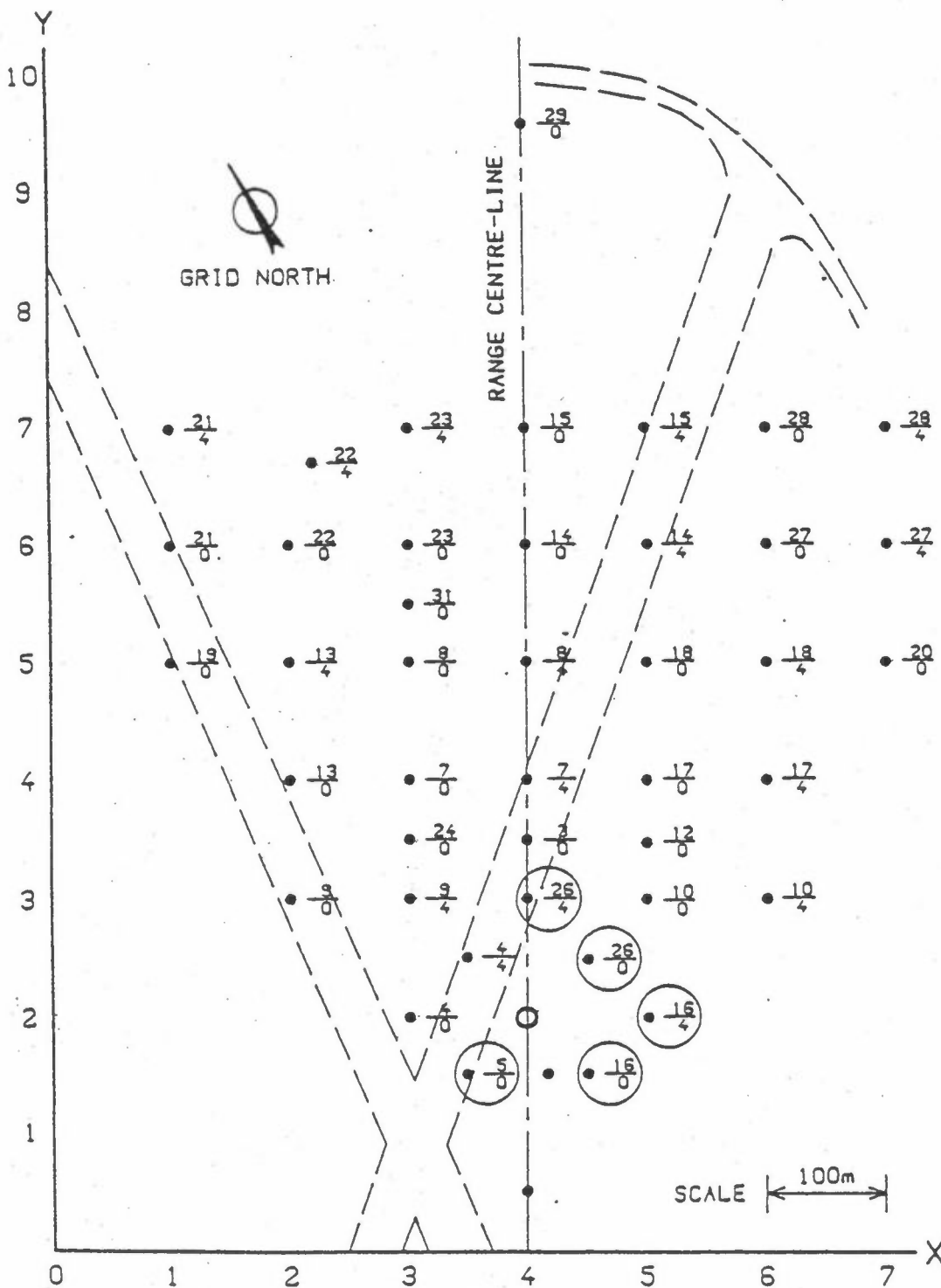
TRIAL No. - 010

DATE - 30/9/82

11 SENSORS SAW GAS

WIND SPEED ( $U_{10}$ ) 1-2 m/sec

PASQUILL CATEGORY - D



$\frac{21}{4}$  = DATA TERMINAL CHANNEL NUMBER OF GAS SENSORS AT 0.4m HEIGHT

○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS

Trial	10	X	Y	H	CM	C	T1	T2	T2-T1	REMARKS
1	Gas	350	150	0.4	6.7	2.0	30	160	130	Well defined
2	Gas	350	150	1.4	4.7	0.5	35	160	125	Well defined
3	Gas	350	150	2.4	4.6	0.1	35	150	115	Well defined
4	Gas	450	150	0.4	7.6	2.6	20	235	215	Well defined
5	Gas	450	150	1.4	4.5	0.6	20	200	180	Some noise
6	Gas	450	150	2.4	1.2	0.2	20	200	180	Some noise
7	Gas	500	200	0.4	4.0	0.8	50	>500	>450	Well defined
8	Gas	500	200	1.4	3.5	0.6	50	220	170	Well defined
9	Gas	500	200	2.4	2.0	0.3	50	150	100	Some noise
10	Gas	450	250	0.4	3.6	0.4	50	90	40	Well defined
11	Gas	400	300	0.4	0.1	0.0	340	420	80	Noise







THORNEY ISLAND TRIALS SPILL 011 10 OCTOBER 1982

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	17:21:46 hrs
Freon 12/Nitrogen mixture: relative density	2.03
Number of smoke canisters discharged:	4
Mean Wind Speed at 10 m height:	
During main data collection period:	5.1 m/s
From 5 minute cyclic data just before the release:	3.7 m/s
Mean Wind Heading ('A' station) (relative to the centre line of the array)	69.6°
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	77.1%
Insolation	46W/m <sup>2</sup>
Ambient Air Temperature (at 9 m height)	12.34°C
Treated Runway Surface Temperature	14.8°C
Grass Surface Temperature	-
Observed Cloud Cover	7/8

STABILITY CONDITION

E (From Observations)  
 E (From DT/DZ)  
 G (From Solarimeter)  
 G (From Heat Flux)  
 E (From Richardson No)  
 D (From Bulk Richardson No)  
 D/E (From Standard Deviation of Wind Heading)

Stability condition inferred from data during the release and just before the release: D.

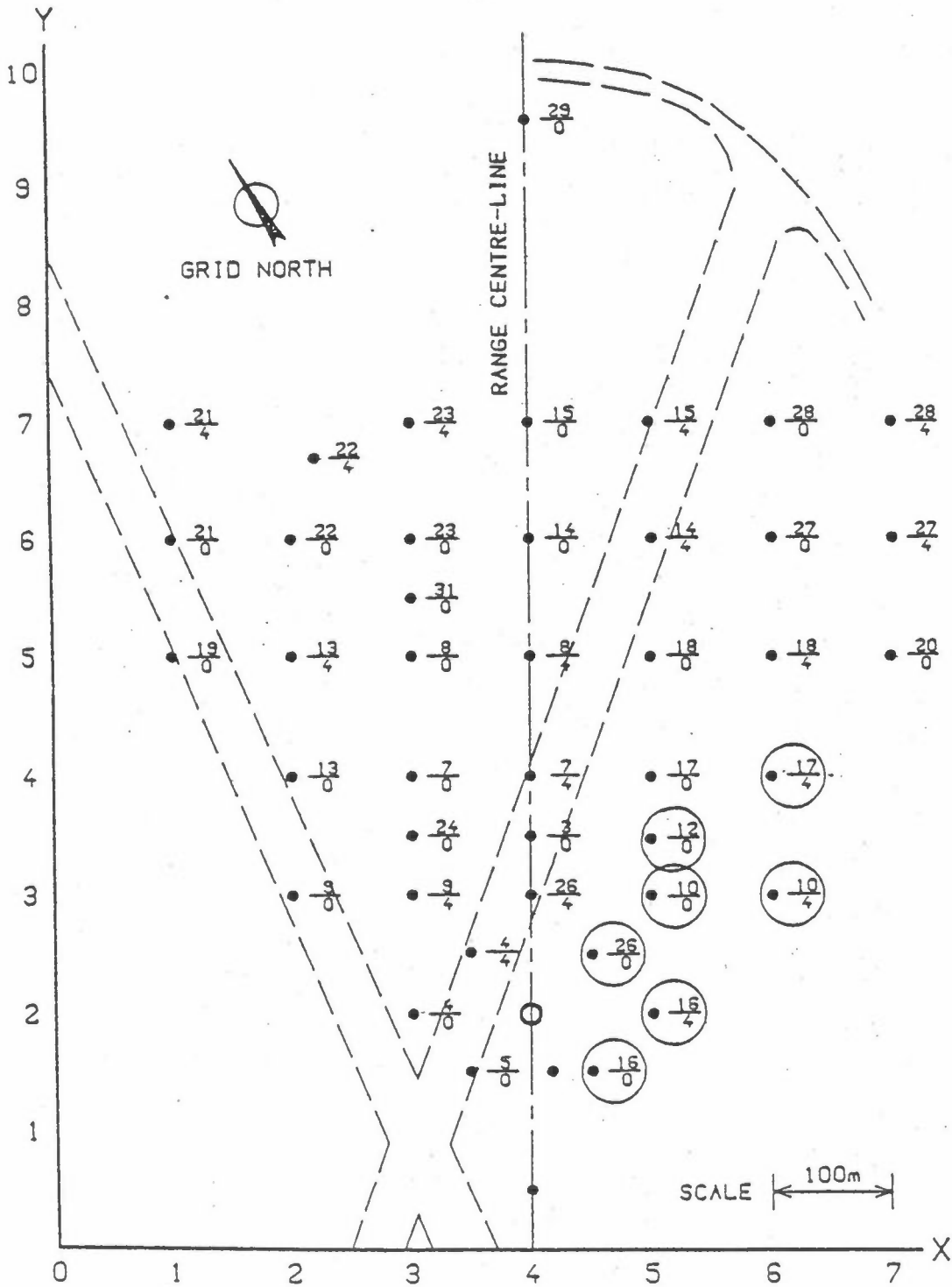
THORNEY ISLAND TRIALS SPILL 011 10 OCTOBER 1982

### HISTORY

About two hours before the spill the wind speed was about 4.8 m/s and the heading was approximately 15°. Insolation was slight and the stability was judged to be about 'C'; from here on insolation gradually decreased as cloud cover increased. During the two hours leading up to the spill the wind speed generally increased and the heading moved slowly to the right of the centre line of the array. Thus, by the time the gas was released, the wind was blowing down the edge of the array (a heading of about 70°); the wind speed was then about 5 m/s and insolation was low so that stability was then judged to be about 'D'.

It is worth noting that whilst the wind speed was generally increasing during the period leading up to the spill, just before the release, the 5 minute mean wind speed was 3.7 m/s compared with about 5 m/s during the first 10 minutes of the main data collection period.

TRIAL No. - 011      DATE - 10/10/82      23 SENSORS SAW GAS  
 WIND SPEED ( $U_{10}$ ) 5-6 m/sec      PASQUILL CATEGORY - D



$\frac{21}{4}$  = DATA TERMINAL CHANNEL NUMBER OF GAS SENSORS AT 0.4m HEIGHT  
 ○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS

Trial	11	X	Y	H	CM	C	T1	T2	T2-T1	REMARKS
1	Gas	450	150	0.4	0.4	0.1	35	40	5	Noise
2	Gas	500	200	0.4	3.5	1.0	20	>300	>200	
3	Gas	500	200	1.4	2.9	0.7	20	>200	>180	
4	Gas	500	200	2.4	2.4	0.5	20	200	180	
5	Gas	450	250	0.4	8.0	2.2	20	>200	180	
6	Gas	450	250	2.4	3.8	0.8	20	135	115	
7	Gas	450	250	4.4	1.9	0.6	20	60	40	
8	Gas	450	250	6.4	1.2	0.3	10	60	50	
9	Gas	500	300	0.4	3.5	1.0	35	190	155	
10	Gas	500	300	2.4	2.5	0.7	30	>100	>70	
11	Gas	500	300	4.4	1.3	0.3	30	125	95	
12	Gas	500	300	6.4	0.9	0.1	30	150	120	
13	Gas	600	300	0.4	1.6	0.4	55	270	215	
14	Gas	600	300	2.4	1.5	0.3	50	260	210	
15	Gas	600	300	4.4	1.2	0.2	40	260	220	
16	Gas	600	300	6.4	0.8	0.1	30	200	170	
17	Gas	500	350	0.4	0.2	0.1	75	95	20	
18	Gas	500	350	2.4	0.2	0.0	80	100	20	
19	Gas	500	350	4.4						Undefineable
20	Gas	600	400	0.4	0.2	0.0	90	140	50	
21	Gas	600	400	2.4	0.2	0.0	90	130	40	
22	Gas	600	400	4.4	0.2	0.0	90	120	30	
23	Gas	600	400	6.4	0.1					Undefineable





THORNEY ISLAND TRIALS SPILL 012 15 OCTOBER 1982

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	18:03:28 hrs
Freon 12/Nitrogen mixture: relative density	2.31
Number of smoke canisters discharged:	6
Mean Wind Speed at 10 m height:	
During main data collection period:	2.6 m/s
From 5 minute cyclic data just before the release:	3.1 m/s
Mean Wind Heading ('A' station) (relative to the centre line of the array)	53.8°
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	66.2%
Insolation	4W/m <sup>2</sup>
Ambient Air Temperature (at 9 m height)	10.80°C
Treated Runway Surface Temperature	13.5°C
Grass Surface Temperature	12.0°C
Observed Cloud Cover	7/8

STABILITY CONDITION

E (From Observations)  
 E (From DT/DZ)  
 G (From Solarimeter)  
 G (From Heat Flux)  
 E (From Richardson No)  
 D (From Bulk Richardson No)  
 D/E (From Standard Deviation of Wind Heading)

Stability condition inferred from data during the release and just before the release: E.

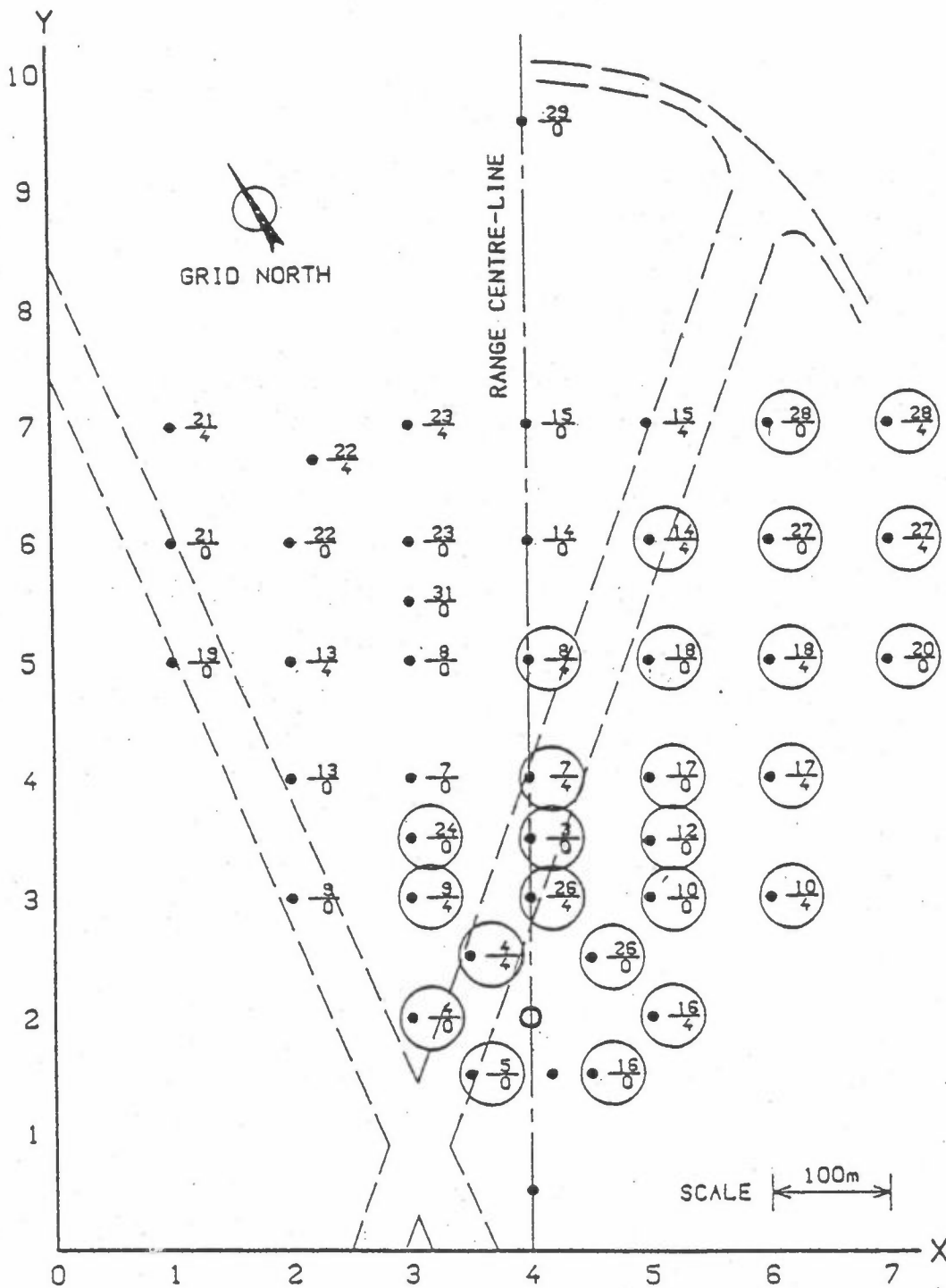
THORNEY ISLAND TRIALS SPILL 012 15 OCTOBER 1982

HISTORY

About 2 hours before gas was released insolation was slight (about  $170\text{W/m}^2$ ); the wind speed was about 3 m/s and its heading was  $65^\circ$ . These conditions gave an atmospheric stability of 'C/D' at that time. As time progressed, insolation gradually reduced but the wind speed remained more or less the same. The wind gradually swung round to the left so that the heading was about  $45^\circ$  while the bag was being filled; however about 15 minutes before the release the wind changed direction such that by the time gas was released the heading was about  $54^\circ$ . Under these conditions with almost total cloud cover the stability was judged to be 'E'.



TRIAL No. - 012      DATE - 15/10/82      65 SENSORS SAW GAS  
 WIND SPEED ( $U_{10}$ ) 1 m/sec      PASQUILL CATEGORY - E/D



$\frac{21}{4}$  =  $\frac{\text{DATA TERMINAL}}{\text{CHANNEL NUMBER}}$  OF GAS SENSORS AT 0.4m HEIGHT  
 ○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS

Trial	12	X	Y	H	CM	C	T1	T2	T2-T1	REMARKS
1	Gas	350	150	0.4	7.8	0.8	70	>470	>400	Well defined
2	Gas	350	150	1.4	0.6					Heavy noise, undefineable end
3	Gas	450	150	0.4	11.8	1.0	30	>630	>600	Well defined start, undefineable end
4	Gas	450	150	1.4	7.1	0.4	30	>830	>800	Well defined start, undefineable end
5	Gas	450	150	2.4	4.5	0.0	30	200	170	Well defined start, undefineable end
6	Gas	300	200	0.4	1.6	0.3	20	370	350	
7	Gas	500	200	0.4	2.0	0.6	40	>800	>760	Well defined start, undefineable end
8	Gas	500	200	1.4	1.7	0.2	30	480	450	Well defined start, undefineable end
9	Gas	500	200	2.4	1.8	0.2	30	520	490	Some noise
10	Gas	350	250	0.4	8.6	1.0	30	>430	>400	
11	Gas	450	250	0.4	9.0	1.9	20	990	970	Well defined start, undefineable end
12	Gas	450	250	2.4	9.0	0.7	20	110	90	
13	Gas	450	250	4.4	0.2	0.1	40	>60	>60	Insecure, heavy noise
14	Gas	450	250	6.4	0.2	0.0	40	60	20	Insecure, heavy noise
15	Gas	300	300	0.4	1.3	0.4	115	560	445	
16	Gas	400	300	0.4	4.0	0.6	35	>535	550	Insecure end
17	Gas	400	300	2.4	1.7	0.3	35	>40	>5	
18	Gas	400	300	4.4	0.2					Heavy noise, undefineable
19	Gas	500	300	0.4	2.9		50	>950	>900	Undefineable end
20	Gas	500	300	2.4	0.8					Heavy noise, undefineable
21	Gas	500	300	4.4	0.2					Heavy noise, undefineable
22	Gas	600	300	0.4	0.3	0.1	190	670	480	Insecure
23	Gas	600	300	2.4	0.1					Heavy noise, undefineable
24	Gas	600	300	6.4	0.1					Heavy noise, undefineable
25	Gas	300	350	0.4	0.2					Heavy noise, undefineable
26	HGas	300	350	2.0	0.2					Heavy noise, undefineable
27	Gas	400	350	0.4	3.2	0.5	60	>560	>500	
28	Smoke	400	350	0.4	0.2	0.0	60	140	80	
29	Smoke	400	350	2.0	0.1	0.0	65	65	0	Undefineable end
30	Gas	400	350	2.4	1.2	0.2	60	80	20	
31	Gas	500	350	0.4	1.8	0.6	80	980	900	
32	HGas	500	350	2.0	0.5					Undefineable
33	Gas	500	350	2.4	0.2	0.1	80	140	60	Heavy noise
34	HGas	500	350	2.4	0.4	0.1	70	160	90	Heavy noise
35	Gas	500	350	4.4	0.2	0.2	30	580	550	Noise, undefineable
36	Gas	400	400	0.4	1.9	0.5	10	>810	>800	
37	Gas	400	400	2.4	0.4					Noise, undefineable
38	Gas	500	400	0.4	1.1	0.4	140	700	560	
39	Gas	500	400	2.4	0.3					Heavy noise, undefineable
40	Gas	500	400	4.4	0.1					Heavy noise, undefineable
41	Gas	600	400	0.4	1.1	0.4	80	1000	920	
42	Gas	600	400	2.4	0.3	0.1	135	235	100	Heavy noise
43	Gas	600	400	4.4	0.1	0.0	120	180	60	Insecure, heavy noise
44	Gas	400	500	0.4	0.3	0.1	210	440	230	Noise
45	Gas	500	500	0.4	0.6	0.2	190	>800	>610	Noise
46	Gas	500	500	2.4	0.3					Noise, undefineable
47	Gas	500	500	4.4	0.1					Noise, undefineable
48	Gas	600	500	0.4	1.0	0.3	160	>1000	>840	Noise
49	Gas	600	500	2.4	0.4					Noise, undefineable
50	Gas	600	500	4.4	0.2					Noise, undefineable
51	Gas	600	500	6.4	0.1					Noise, undefineable
52	Gas	700	500	0.4	0.4	0.2	350	>1000	>650	Undefineable end
53	Gas	700	500	2.4	0.2					Noise, undefineable
54	Gas	700	500	4.4	0.1					Noise, undefineable
55	Gas	500	600	0.4	0.4	0.1	265	450	185	Noise
56	Gas	600	600	0.4	0.3	0.2	305	795	490	Noise
57	Gas	600	600	2.4	0.4	0.1	220	900	680	Noise
58	Gas	700	600	0.4	0.4	0.2	370	960	590	Noise
59	Gas	700	600	2.4	0.3	0.1	280	960	680	Noise, unreliable
60	Gas	600	700	0.4	0.3	0.1	330	670	340	Noise, unreliable
61	Gas	600	700	2.4	0.2					Noise, undefinable
62	Gas	600	700	4.4	0.1					Noise, undefinable
63	Gas	700	700	0.4						Noise, undefinable
64	Gas	700	700	2.4	0.2	0.1	430	770	340	Noise, undefinable
65	Gas	700	700	4.4	0.1					Noise, undefinable





THORNEY ISLAND TRIALS SPILL 013 19 OCTOBER 1982

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	11:41:11 hrs
Freon 12/Nitrogen mixture: relative density	1.96
Number of smoke canisters discharged:	4
Mean Wind Speed at 10 m height:	
During main data collection period:	7.5 m/s
From 5 minute cyclic data just before the release:	4.5 m/s
Mean Wind Heading ('A' station) (relative to the centre line of the array)	30.8°
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	74.1%
Insolation	407W/m <sup>2</sup>
Ambient Air Temperature (at 9 m height)	13.18°C
Treated Runway Surface Temperature	14.3°C
Grass Surface Temperature	14.7°C
Observed Cloud Cover	3/8

STABILITY CONDITION

E (From Observations)  
 E (From DT/DZ)  
 G (From Solarimeter)  
 G (From Heat Flux)  
 E (From Richardson No)  
 D (From Bulk Richardson No)  
 D/E (From Standard Deviation of Wind Heading)

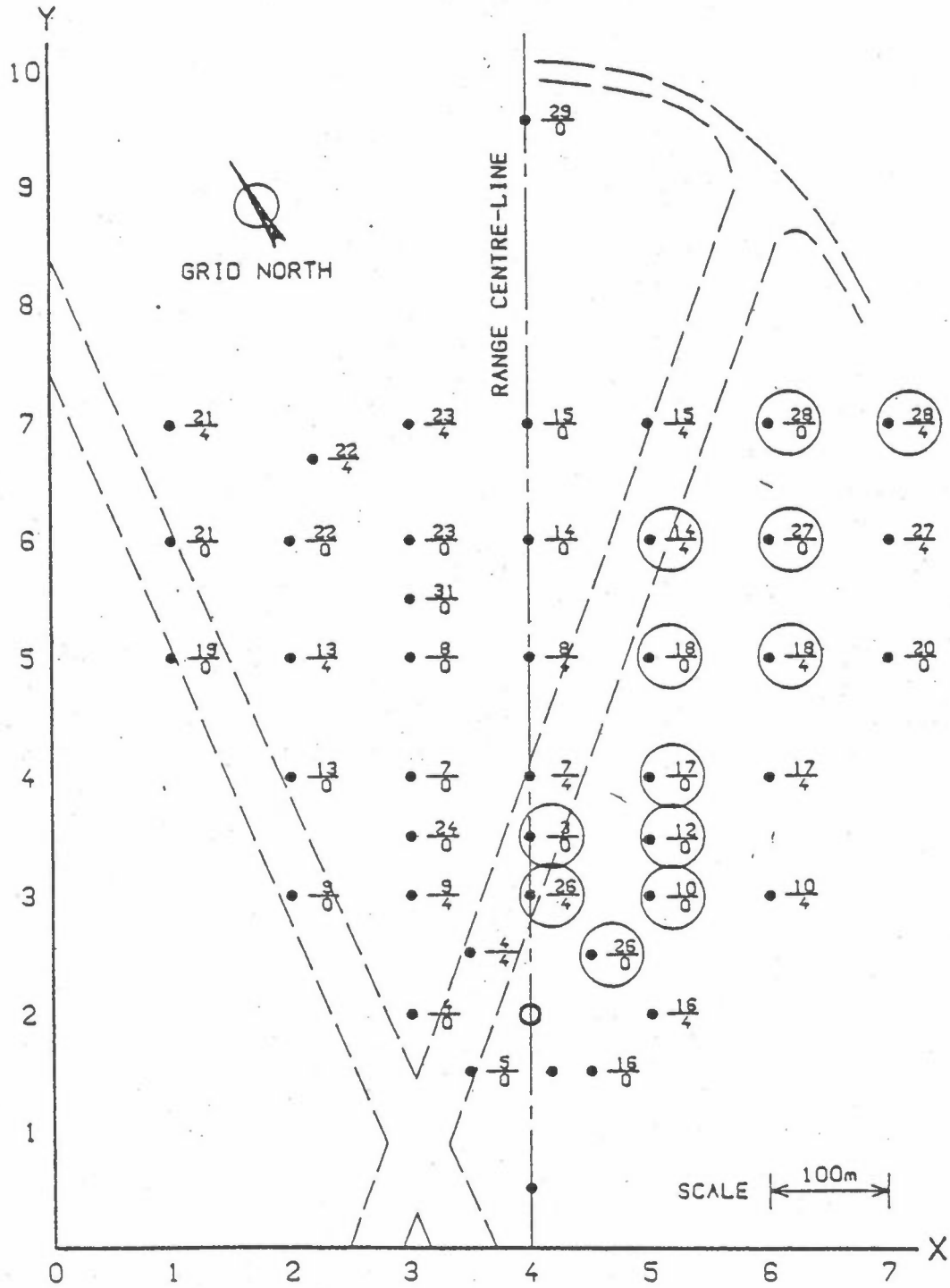
Stability condition inferred from data during the release and just before the release: D.

THORNEY ISLAND TRIALS SPILL 013 19 OCTOBER 1982

#### HISTORY

About 2 hours before gas was released (around 0900 hours), the wind speed was very low (about 0.4 m/s) and the wind heading was  $-113^{\circ}$ . Insolation was also very low at this time of the morning and these conditions gave a stable atmosphere. Throughout the morning insolation gradually increased such that, by the time gas was released, insolation was moderate. Approximately 1.5 hours before the release the wind changed its direction so that its heading was  $40^{\circ}$  and the wind speed began to increase. During the remainder of the period leading up to the spill the wind generally increased but there were periods when the wind dropped noticeably, and it is worth noting that just before the release the mean wind speed was 4.5 m/s compared with 7.5 m/s during the release and data collection period. The wind heading remained more or less the same in the period leading up to the spill. Based on wind speed, insolation and the parameters listed earlier the stability during the spill was judged to be 'D'.

TRIAL No. - 013      DATE - 19/10/82      47 SENSORS SAW GAS  
 WIND SPEED (U<sub>10</sub>) 7-8 m/sec      PASQUILL CATEGORY - E/D



$\frac{21}{4}$  = DATA TERMINAL CHANNEL NUMBER OF GAS SENSORS AT 0.4m HEIGHT  
 ○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS

Trial	13	X	Y	H	CM	C	T1	T2	T2-T1	REMARKS
1	Gas	450	250	0.4	7.4	2.0	15	>115	>100	
2	Gas	450	250	2.4	7.7	1.0	15	120	105	
3	Gas	450	250	4.4	3.2	0.3	15	45	30	
4	Gas	450	250	6.4	0.7	0.0	15	35	20	Noise
5	Gas	400	300	0.4	6.5	1.4	20	140	120	
6	Gas	400	300	2.4	2.2	0.4	20	45	25	
7	Gas	400	300	4.4	1.5	0.1	20	80	60	Noise
8	Gas	400	300	6.4	0.9	0.0	20	25	5	Noise
9	Gas	500	300	0.4	3.6	0.8	30	>130	>100	
10	Gas	500	300	2.4	1.9	0.3	30	80	50	
11	Gas	500	300	4.4	1.3	0.2	30	70	40	
12	Gas	500	300	6.4	0.7	0.1	50	65	15	Noise
13	Gas	400	350	0.4	0.9	0.1	35	40	5	Noise
14	Gas	400	350	2.4	0.1					Noise, undefineable
15	Gas	500	350	0.4	3.0	1.0	35	>135	>100	
16	HGas	500	350	2.0	3.1	0.6	35	130	85	Noise
17	Gas	500	350	2.4	2.8	0.5	35	>135	>100	
18	HGas	500	350	2.4	3.0	0.5	40	115	75	Noise
19	Gas	500	350	4.4	2.3	0.3	35	135	100	
20	Gas	500	350	6.4						Undefineable
21	Gas	500	400	0.4	2.6	0.8	40	240	200	
22	Gas	500	400	2.4	2.1	0.4	40	120	80	
23	Gas	500	400	4.4	1.4	0.3	40	130	90	
24	Gas	500	400	6.4	1.0	0.1	40	115	75	Noise
25	Gas	500	500	0.4	1.3	0.4	50	175	125	
26	Gas	500	500	2.4	1.4	0.4	45	160	115	
27	Gas	500	500	4.4	1.1	0.2	65	140	75	
28	Gas	500	500	6.4	0.8	0.2	65	135	135	Noise
29	Gas	600	500	0.4	0.9	0.2	65	140	75	Noise
30	Gas	600	500	2.4	0.8	0.2	65	140	75	Noise
31	Gas	600	500	4.4	0.7	0.1	65	175	110	Noise
32	Gas	600	500	6.4	0.8					Noise, undefineable
33	Gas	500	600	0.4	0.7	0.2	80	135	55	Noise
34	Gas	500	600	2.4	0.7	0.2	90	125	35	Noise
35	Gas	500	600	4.4	0.5	0.1	90	120	30	Noise
36	Gas	500	600	6.4	0.4	0.0	90	130	40	Noise
37	Gas	600	600	0.4	0.7	0.2	85	190	145	Noise
38	Gas	600	600	2.4	0.9	0.2	80	220	140	Noise
39	Gas	600	600	4.4	0.9	0.2	70	190	120	Noise
40	Gas	600	600	6.4	0.9	0.2	70	210	140	Noise
41	Gas	600	700	2.4	0.5	0.1	90	230	140	Noise
42	Gas	600	700	4.4	0.5	0.1	90	170	80	Noise
43	Gas	600	700	6.4	0.3	0.1	80	135	45	Noise
44	Gas	700	700	0.4	0.3	0.1	110	150	40	Noise
45	Gas	700	700	2.4	0.3	0.1	110	160	50	Noise
46	Gas	700	700	4.4	0.2	0.1	105	155	50	Noise
47	Gas	700	700	6.4	0.3	0.1	110	175	65	Noise







THORNEY ISLAND TRIALS SPILL 014 24 OCTOBER 1982

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	11:57:49 hrs
Freon 12/Nitrogen mixture: relative density	1.98
Number of smoke canisters discharged:	4
Mean Wind Speed at 10 m height:	
During main data collection period:	6.8 m/s
From 5 minute cyclic data just before the release:	4.6 m/s
Mean Wind Heading ('A' station) (relative to the centre line of the array)	-10.8°
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	84.2%
Insolation	448W/m <sup>2</sup>
Ambient Air Temperature (at 9 m height)	12.62°C
Treated Runway Surface Temperature	9.6°C
Grass Surface Temperature	13.1°C
Observed Cloud Cover	5/8

STABILITY CONDITION

E (From Observations)  
 E (From DT/DZ)  
 G (From Solarimeter)  
 G (From Heat Flux)  
 E (From Richardson No)  
 D (From Bulk Richardson No)  
 D/E (From Standard Deviation of Wind Heading)

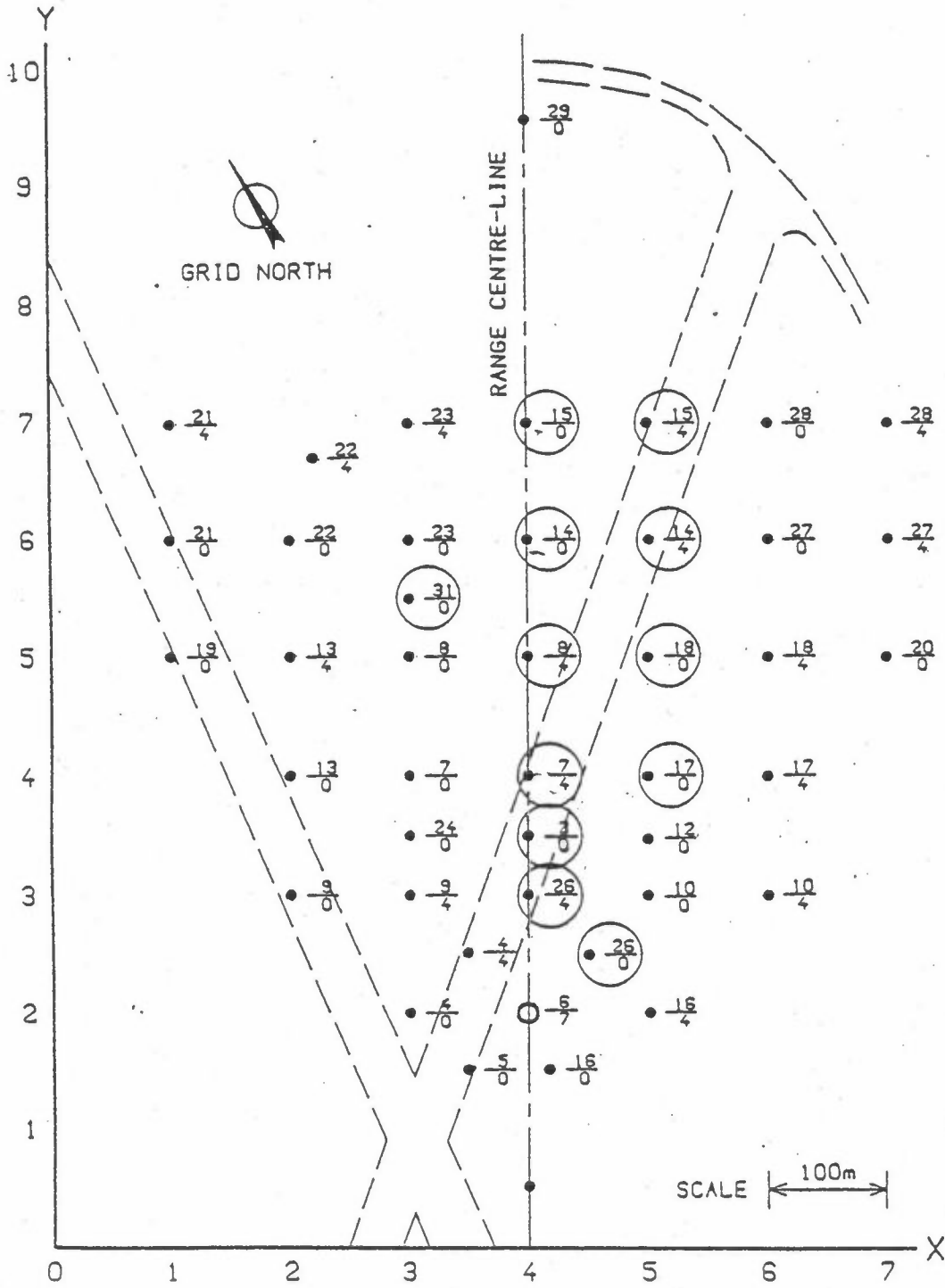
Stability condition inferred from data during the release and just before the release: C/D.

THORNEY ISLAND TRIALS SPILL 014 24 OCTOBER 1982

### HISTORY

Two hours before gas was released insolation was slight, the wind speed was fairly low (between 0.6 and 1 m/s) and the heading was about 40°C. The stability was then judged to be about 'C'. As time progressed the wind speed steadily increased such that, just before the release, the speed was 4.6 m/s whereas during the release and data collection period it was 6.8 m/s. The wind heading during the hour or so before the release did not change substantially and during this period it varied by about 10° on either side of the array centre line. During the period leading up to the spill insolation also steadily increased such that during the spill insolation was moderate. This and the other parameters listed earlier then gave a stability condition of 'C/D'.

TRIAL No. - 014    DATE - 24/10/82    50 SENSORS SAW GAS  
 WIND SPEED (U<sub>10</sub>) 5-6 m/sec    PASQUILL CATEGORY - E



$\frac{21}{4}$  = DATA TERMINAL CHANNEL NUMBER OF GAS SENSORS AT 0.4m HEIGHT  
 ○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS

Trial	14	X	Y	H	CM	C	T1	T2	T2-T1	REMARKS
1	Gas	450	250	0.4	7.0	1.8	30	80	50	Well defined
2	Gas	450	250	4.4	0.4	0.1	20	80	80	Heavy noise
3	Gas	450	250	6.4	0.2	0.2				Undefined, Heavy noise
4	Gas	400	300	0.4	6.4	1.6	25	95	70	Well defined
5	Gas	400	300	2.4	3.2	0.7	25	60	35	Some noise
6	Gas	400	300	4.4	2.3	0.5	25	65	40	Some noise
7	Gas	400	300	6.4	1.2	0.3	20	50	30	Noise
8	Gas	400	350	0.4	3.7	1.0	30	150	150	Well defined
9	HGas	400	350	2.0	2.7	0.5	30	190	190	Noise
10	Smoke	400	350	2.0	2.5	0.4		315	25	Noise
11	Gas	400	350	2.4	2.2	0.3	30	90	60	Well defined
12	Gas	400	350	4.4	1.2	0.2	30	80	50	Noise
13	HGas	400	350	5.0	1.4	1.5				Undefined, heavy noise
14	Gas	400	350	6.4	0.9	0.1	35	90	55	Heavy noise
15	Gas	400	400	0.4	2.7	0.9	45	105	60	Well defined
16	Gas	400	400	2.4	2.0	0.6	40	100	60	Some noise
17	Gas	400	400	4.4	1.4	0.4	40	90	50	Some noise
18	Gas	400	400	6.4	1.0	0.1	40	80	40	Noise
19	Gas	500	400	0.4	0.3	0.1	70	110	40	Noise
20	Gas	500	400	2.4	0.4	0.1	70	105	35	Noise
21	Gas	500	400	4.4	0.4	0.1	60	120	60	Noise
22	Gas	500	400	6.4	0.3	0.1	60	80	20	Noise
23	Gas	400	500	0.4	1.7	0.5	70	155	85	Heavy noise
24	Gas	400	500	4.4	1.1	0.3	60	110	50	Noise
25	Gas	400	500	6.4	0.7	0.1	60	95	35	Heavy noise
26	Gas	500	500	0.4	0.6	0.2	65	145	80	Heavy noise
27	Gas	500	500	2.4	0.6	0.1	70	140	70	Noise
28	Gas	500	500	4.4	0.4	0.1	80	120	40	Noise
29	Gas	500	500	6.4	0.2					Undefined, heavy noise
30	Gas	300	550	0.4	0.2	0.4	80	105	25	Heavy noise
31	Gas	300	550	2.4	0.2	0.4	80	155	75	Heavy noise
32	Gas	300	550	4.4	0.2	0.4	80	110	30	Heavy noise
33	Gas	300	550	6.4	0.3	0.1	80	130	50	Heavy noise
34	Gas	400	600	0.4	1.0	0.3	70	200	130	Well defined, some noise
35	Gas	400	600	2.4	0.9	0.2	80	190	110	Noise
36	Gas	400	600	4.4	0.8	0.1	70	180	80	Noise
37	Gas	400	600	6.4	0.6	0.1	70	140	70	Heavy noise
38	Gas	500	600	0.4	0.4	0.1	70	170	100	Noise
39	Gas	500	600	2.4	0.4	0.1	80	170	90	Noise
40	Gas	500	600	4.4	0.3	0.1	80	110	30	Heavy noise
41	Gas	500	600	6.4	0.4	0.1	90	130	40	Heavy noise
42	Gas	400	700	0.4	0.4	0.1	90	160	70	Heavy noise
43	Gas	400	700	2.4	0.5	0.1	80	200	120	Heavy noise
44	Gas	400	700	4.4	0.5	0.1	90	190	100	Heavy noise
45	Gas	400	700	6.4	0.5	0.1	95	150	55	Heavy noise
46	Gas	500	700	0.4	0.6	0.1	100	180	80	Heavy noise
47	Gas	500	700	2.4	0.6	0.1	100	180	80	Heavy noise
48	Gas	500	700	4.4	0.6	0.1	90	190	100	Heavy noise
49	Gas	500	700	6.4	0.4	0.1	10	160	150	Heavy noise







THORNEY ISLAND TRIALS SPILL 015 28 APRIL 1983

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	15:27:00 hrs
Freon 12/Nitrogen mixture: relative density	1.41
Number of smoke canisters discharged:	4
Mean Wind Speed at 10 m height:	
During main data collection period:	5.4 m/s
From 5 minute cyclic data just before the release:	5.9 m/s
Mean Wind Heading ('A' station) (relative to the centre line of the array)	0.8°
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	88.4%
Insolation	645W/m <sup>2</sup>
Ambient Air Temperature (at 9 m height)	10.3°C
Treated Runway Surface Temperature	16.9°C
Grass Surface Temperature	20.4°C
Observed Cloud Cover	2/8

STABILITY CONDITION

B/C (From Observations)  
 D (From DT/DZ)  
 C (From Solarimeter)  
 C (From Heat Flux)  
 A (From Richardson No)  
 D (From Bulk Richardson No)  
 E (From Standard Deviation of Wind Heading)

Stability condition inferred from data during the release and just before the release: C/D.

THORNEY ISLAND TRIALS SPILL 015 28 APRIL 1983

HISTORY

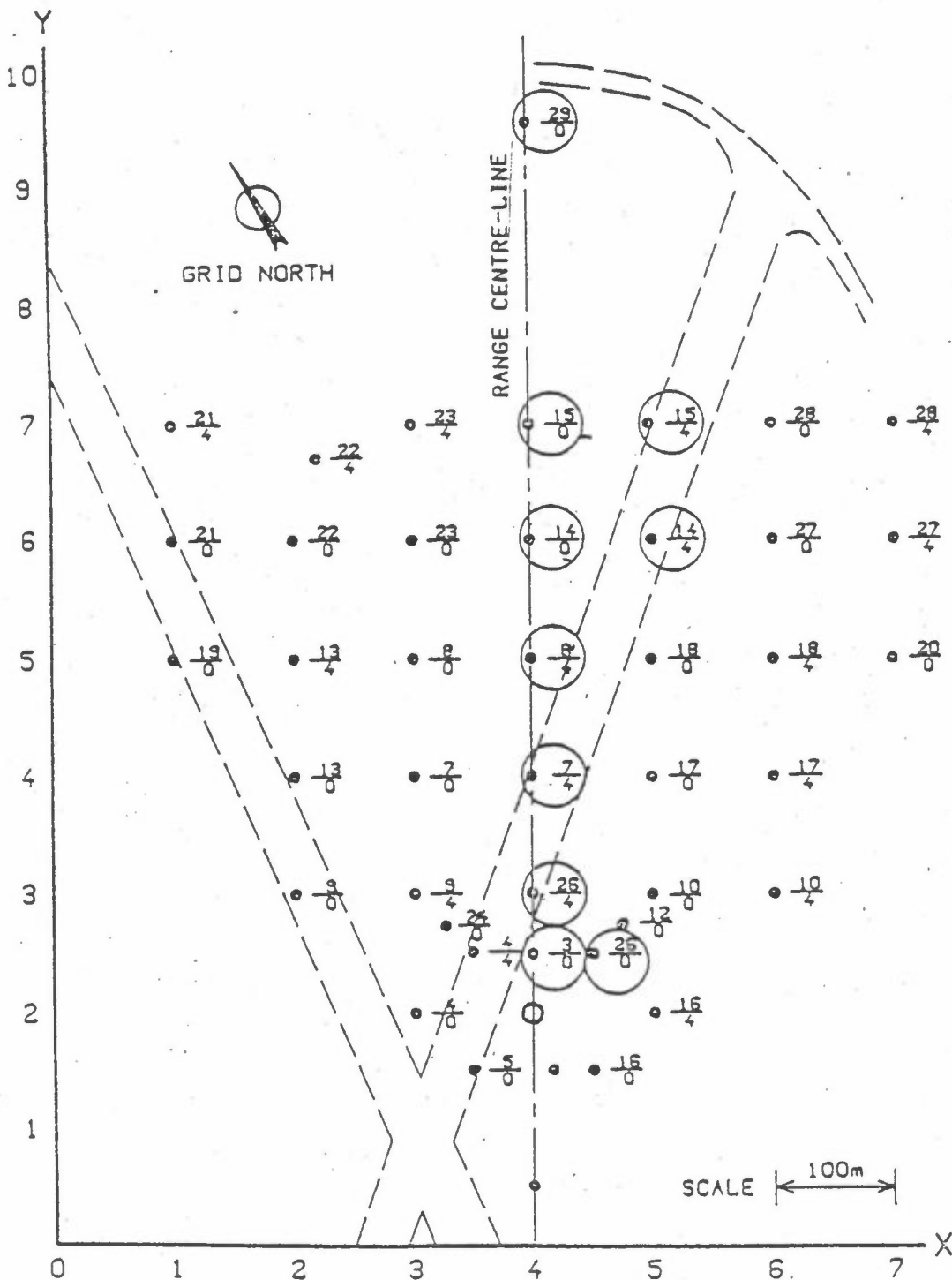
The day began with light winds (typically between 1 to 2 m/s) blowing slightly to the left of the centre line of the array of sensors (between 0 and -20 degrees). Insolation was slight. However, between 1100 and 1200 hours the wind speed increased significantly to values of between 4 and 5 m/s, but the wind direction remained more or less the same. During this period insolation also increased substantially and continued to increase until about 1400 hours when it attained its maximum value for the day of about 800 W/m<sup>2</sup>. From this time onwards insolation decreased gradually so that by the time gas was released insolation was moderate (approximately 650 W/m<sup>2</sup>). In the last few hours before the spill the wind speed fluctuated between 5 and 6 m/s and the heading varied between 0 and -20°. The ambient temperature also increased slowly during the day reaching a maximum (at 2 m) of about 11.5°C after having started the day at about 8°C (1000 hours). This was generally a slightly unstable day with the higher winds causing the stability to remain in the 'B' to 'C' category for most of the day; by the time of the release however the decrease in insolation caused the stability to be closer to a neutral condition, and may be represented by a C/D category.

TRIAL No. - 015 . DATE 28/4/83

38 SENSORS SAW GAS

WIND SPEED ( $U_{10}$ ) 5-6 m/sec

PASQUILL CATEGORY D/E



$\frac{21}{4}$  = DATA TERMINAL CHANNEL NUMBER OF GAS SENSORS AT 0.4m HEIGHT  
 ○ = SENSORS AT 0.1m HEIGHT VERIFIED TO HAVE SEEN GAS

Trial	15	X	Y	H	CM	C	T1	T2	T2-T1	REMARKS
1	Gas	400	250	0.4	26.0	4.0	15	100	85	
2	HGas	400	250	2.0	15.0	1.0	15	75	60	Some noise
3	Gas	400	250	2.4	11.0	1.0	15	100	85	
4	Gas	400	250	4.4	4.5	0.4	15	55	40	
5	Gas	400	250	6.4	4.2	0.4	15	35	20	
6	Gas	450	250	0.4	3.8	0.4	30	40	10	
7	Gas	450	250	2.4	0.8	0.1	30	40	10	Heavy noise
8	Gas	450	250	4.4	0.4	0.05	30	40	10	Heavy noise
9	Gas	400	300	0.4	14.0	3.0	25	90	65	
10	Gas	400	300	2.4	4.8	1.0	25	70	45	
11	Gas	400	300	4.4	3.0	0.6	25	55	30	
12	Gas	400	300	6.4	3.0	0.6	25	55	30	
13	Gas	400	400	0.4	4.4	1.3	45	115	70	
14	Gas	400	400	2.4	3.2	0.9	45	100	55	
15	Gas	400	400	4.4	2.0	0.6	45	90	45	
16	Gas	400	400	6.4	1.4	0.3	45	80	35	
17	Gas	400	500	0.4	2.4	0.6	55	165	110	
18	Gas	400	500	2.4	2.2	0.5	60	>200	>140	
19	Gas	400	500	4.4	1.8	0.2	65	235	170	Heavy noise
20	Gas	400	500	6.4	1.4	0.2	65	95	30	Heavy noise
21	Gas	400	600	0.4	1.5	0.3	70	155	85	Heavy noise
22	Gas	400	600	2.4	1.3	0.2	85	155	70	Heavy noise
23	Gas	400	600	4.4	1.2	0.3	90	220	130	Noise
24	Gas	400	600	6.4	1.3	0.3	80	120	40	Noise
25	Gas	500	600	4.4	0.1					Heavy noise, undefineable
26	Gas	500	600	6.4	0.1					Heavy noise, undefineable
27	Gas	400	700	0.4	0.6	0.1	100	230	130	Noise
28	Gas	400	700	2.4	0.7	0.1	90	175	85	Heavy noise
29	Gas	400	700	4.4	0.8	0.2	100	235	135	Heavy noise
30	Gas	400	700	6.4	0.8	0.2	90	170	80	Heavy noise
31	Gas	500	700	0.4	0.1					Heavy noise, undefineable
32	Gas	500	700	2.4	0.1					Heavy noise, undefineable
33	Gas	500	700	4.4	0.1					Heavy noise, undefineable
34	Gas	500	700	6.4	0.1					Heavy noise, undefineable
35	Gas	400	950	0.4	0.3	0.1	150	240	90	Heavy noise
36	Gas	400	950	2.4	0.4	0.1	140	220	80	Heavy noise
37	Gas	400	950	4.4	0.4	0.1	130	215	85	Heavy noise
38	Gas	400	950	6.4	0.4	0.1	140	215	75	Heavy noise

## Trial 15

	X	Y	Peak		Seconds												
			Time	Cons	20	40	80	140	200	300	400	500	600	700	800	900	
H: 0.4 m	400	250	20	26.0	26.0	10.0											
	450	250	30	3.8		2.0											
	400	300	30	13.1		8.1	0.3										
	400	400	65	4.4			2.3										
	400	500	90	2.4			1.2										
	400	600	110	1.5					0.6								
	400	700	140	0.6					0.6	<0.1							
	500	700	140	<0.1					<0.1								
	400	950	180	0.3							0.2						
H: 2.4 m	400	250	20	10.5	10.5	4.2											
	450	250	30	0.8		0.1											
	400	300	40	4.8		4.8											
	400	400	60	3.2				0.5									
	400	500	90	2.2				1.6									
	400	600	110	1.3					0.4								
	400	700	130	0.7				0.1	0.5								
	500	700	130	0.1													
	400	850	180	0.3							0.1						
H: 4.4 m	400	250	20	4.4	4.4	0.2											
	450	250	30	0.3													
	400	300	40	3.0		3.0											
	400	400	60	2.0				0.2									
	400	500	80	1.8				1.8	0.1	0.1							
	400	600	105	1.2					0.3								
	500	600	90	0.1													
	400	700	130	0.8					0.6	0.1							
	500	700	130	0.1													
400	850	175	0.4							0.2							
H: 6.4 m	400	250	20	4.2	4.2	0.3											
	400	300	30	3.0		1.1											
	400	400	60	1.3				0.4									
	400	500	80	1.4				1.4									
	400	600	105	1.3					1.2								
	500	600	100	0.1													
	400	700	130	0.7					0.4	0.1							
	500	700	120	0.1													
	400	850	170	0.3							0.1						



THORNEY ISLAND TRIALS SPILL 016 28 APRIL 1983

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	18:39:00 hrs
Freon 12/Nitrogen mixture: relative density	1.68
Number of smoke canisters discharged:	4
Mean Wind Speed at 10 m height:	
During main data collection period:	4.8 m/s
From 5 minute cyclic data just before the release:	3.9 m/s
Mean Wind Heading ('A' station) - (relative to the centre line of the array)	-14.3°
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	85.1%
Insolation	174W/m <sup>2</sup>
Ambient Air Temperature (at 9 m height)	9.7°C
Treated Runway Surface Temperature	14.9°C
Grass Surface Temperature	14.1°C
Observed Cloud Cover	3/8

STABILITY CONDITION

C (From Observations)  
D (From DT/DZ)  
C/D (From Solarimeter)  
D (From Heat Flux)  
F (From Richardson No)  
D (From Bulk Richardson No)  
D (From Standard Deviation of Wind Heading)

Stability condition inferred from data during the release and just before the release: D.

THORNEY ISLAND TRIALS SPILL 016 28 APRIL 1983

#### HISTORY

This spill was carried out about 3 hours after spill 015 (at 18:39 hours) on a day during which the winds were blowing in a direction of about 0° to 20° to the left of the centre line of the array for most of the time. Except during the morning the wind speed was generally in the range 4 to 6 m/s. Insolation was strong during the mid-day hours but gradually decreased during the afternoon so that, at the time of the spill, insolation was slight (about 174 W/m<sup>2</sup>). Air temperature also generally increased during the day until about 17:30 hours, after which it was evident that the ground began to cool at a rate slightly greater than at elevated positions.

During most of the day the atmospheric stability was judged to be in the range 'B' to 'C' but as evening approached more neutral conditions were evident, such that at the time of the spill the stability was judged to be neutral, with a slight bias to the unstable side.



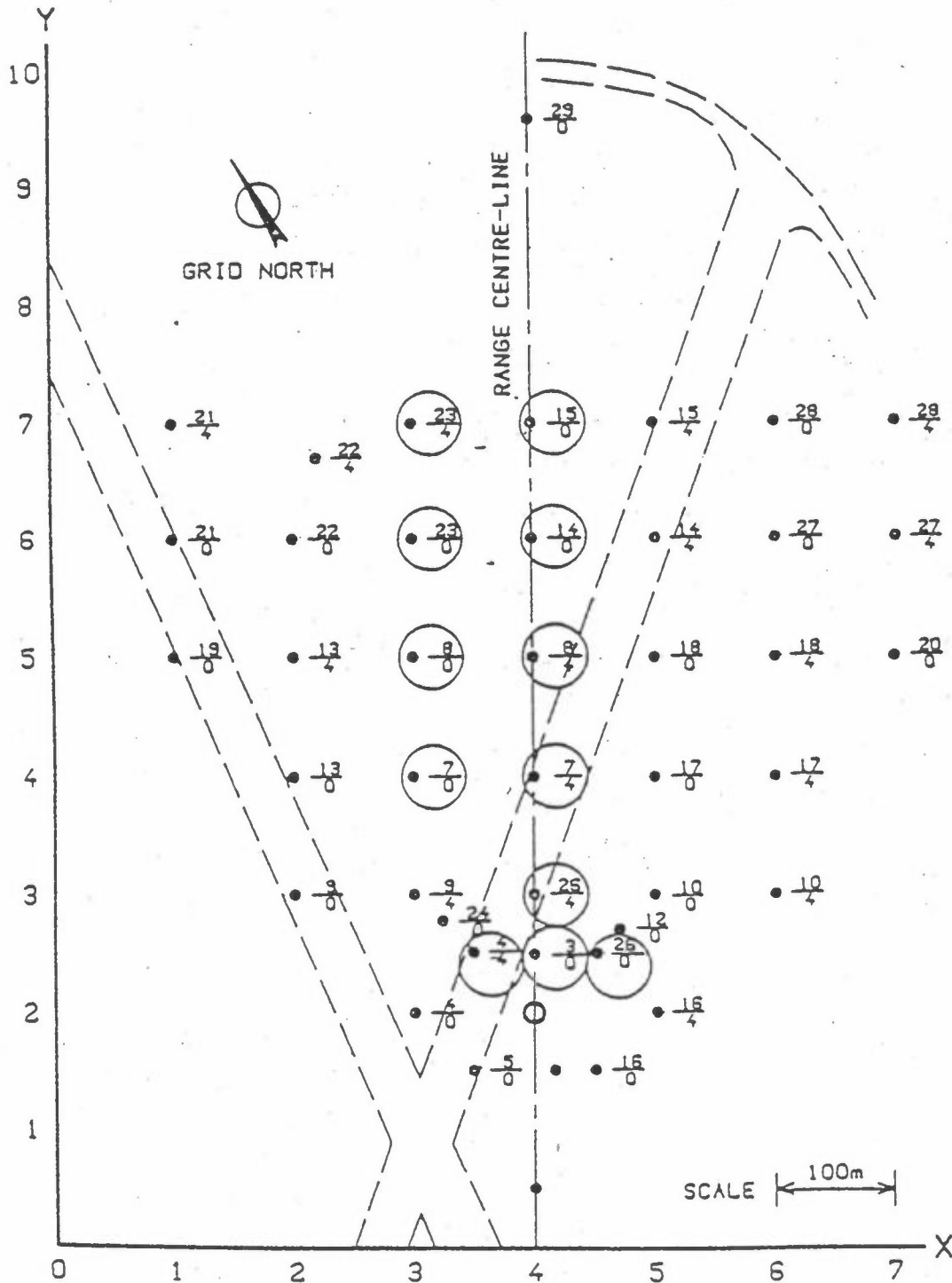
TRIAL No. - 016

DATE 28/4/83

45 SENSORS SAW GAS

WIND SPEED ( $U_{10}$ ) 4-5 m/sec

PASQUILL CATEGORY C/D



$\frac{21}{4}$  = DATA TERMINAL CHANNEL NUMBER OF GAS SENSORS AT 0.4m HEIGHT  
 ○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS

Trial	16	X	Y	H	CM	C	T1	T2	T2-T1	REMARKS
1	Gas	350	250	0.4	10.0	3.0	20	>100	>80	
2	Gas	350	250	2.4	2.6	0.4	20	50	30	Noise
3	Gas	350	250	4.4	0.3	0.1	25	65	40	Noise
4	Gas	400	250	0.4	18.0	5.0	15	>115	>100	
5	HGas	400	250	2.0	8.0	1.0	15	>115	>100	Noise
6	Gas	400	250	2.4	6.0	0.6	15	>115	>100	
7	Gas	400	250	4.4	1.6	0.3	15	80	65	
8	Gas	400	250	6.4	0.9	0.2	15	115	100	Noise
9	Gas	450	250	0.4	8.0	2.3	25	60	35	
10	Gas	450	250	2.4	3.2	0.7	25	50	25	
11	Gas	400	300	0.4	6.0	2.0	25	>125	>100	
12	Gas	400	300	2.4	4.9	0.8	25	>100	>75	
13	Gas	400	300	4.4	1.8	0.4	25	80	55	
14	Gas	400	300	6.4	1.1	0.3	25	75	50	Noise
15	Gas	300	400	0.4	0.5	0.1	75	120	45	Noise
16	Gas	300	400	2.4	0.5	0.1	70	120	50	Noise
17	Gas	300	400	4.4	0.3	0.1	60	180	120	Heavy noise
18	Gas	300	400	6.4	0.2	0.1	90	110	20	Noise
19	Gas	400	400	0.4	2.7	0.9	50	>200	>150	
20	Gas	400	400	2.4	1.8	0.5	50	>150	>100	
21	Gas	400	400	4.4	1.2	0.3	50	>200	>150	
22	Gas	400	400	6.4	1.1	0.2	50	>150	>100	Noise
23	Gas	300	500	0.4	0.5	0.1	90	160	70	Heavy noise
24	Gas	300	500	2.4	0.5	0.1	90	150	60	Noise
25	Gas	300	500	4.4	0.5	0.2	70	130	60	Heavy noise
26	Gas	300	500	6.4	0.2					Heavy noise, undefineable
27	Gas	400	500	0.4	1.4	0.3	90	200	110	
28	Gas	400	500	2.4	1.1	0.3	80	200	110	Noise
29	Gas	400	500	4.4	0.8	0.2	85	260	175	Noise
30	Gas	400	500	6.4	0.7	0.1	80	130	50	Heavy noise
31	Gas	300	600	0.4	0.4	0.1	110	215	105	
32	Gas	300	600	4.4	0.3	0.1	115	195	80	Noise
33	Gas	300	600	6.4	0.2	0.1				Heavy noise, undefineable
34	Gas	400	600	0.4	0.6	0.2	105	205	100	Heavy noise
35	Gas	400	600	2.4	0.6	0.2	105	185	80	Heavy noise
36	Gas	400	600	4.4	0.5	0.2	100	>200	>100	Noise
37	Gas	400	600	6.4	0.5	0.1	100	>200	>100	Noise
38	Gas	300	700	0.4	0.6	0.2	150	260	110	Heavy noise
39	Gas	300	700	2.4	0.5	0.2	160	250	90	Heavy noise
40	Gas	300	700	4.4	0.4	0.1	115	245	130	Heavy noise
41	Gas	300	700	6.4	0.5	0.1	180	>300	>120	Heavy noise
42	Gas	400	700	0.4	0.3	0.1	160	230	70	Noise
43	Gas	400	700	2.4	0.3	0.1	160	200	40	Heavy noise
44	Gas	400	700	4.4	0.3	0.1				Heavy noise, undefineable
45	Gas	400	700	6.4	0.3	0.1				Heavy noise, undefineable

## Trial 16

	X	Y	Peak		Seconds														
			Time	Cons	20	40	80	140	200	300	400	500	600	700	800	900			
H: 0.4 m	350	250	25	10.2	6.0	6.1													
	400	250	30	18.0	14.0	10.2	1.0												
	450	250	30	8.0		3.8													
	400	300	40	6.0		6.0	3.6												
	300	400	100	0.5			0.1												
	400	400	65	2.7			2.4	0.7	0.2										
	300	500	120	0.5				0.4											
	400	500	130	1.4				0.9											
	300	600	160	0.4				0.3											
	400	600	170	0.6				0.4											
	300	700	220	0.6				0.1	0.2										
	400	700	185	0.3					0.2										
	H: 2.4 m	350	250	30	2.6		0.6												
		400	250	10	6.1	2.1	2.4	0.4											
450		250	30	3.2															
400		300	40	4.9		4.9	0.7												
300		400	100	0.5			<0.1												
400		400	100	1.7			1.1	0.3											
300		500	120	0.5				0.1											
400		500	130	1.1				0.6	0.1										
400		600	160	0.5				0.4											
300		700	220	0.5				0.1	0.2										
400		700	180	0.3					0.1										
H: 4.4 m	350	250	30	0.3		<0.1													
	400	250	20	1.6	1.6	0.6													
	400	300	40	1.8		1.7	0.1												
	300	400	100	0.3															
	400	400	130	1.2			0.8	0.1											
	300	500	120	0.5	0.1		0.1	0.1											
	400	500	105	0.8				0.2	0.1	<0.1									
	300	600	170	0.3				0.2											
	400	600	170	0.5				0.5											
	300	700	220	0.4				0.1	0.3										
	400	700	180	0.3															
H: 6.4 m	400	250	25	0.9	0.6	0.2	0.1												
	400	300	60	1.1		0.9													
	300	400	100	0.2															
	400	400	130	1.1			0.6	0.1											
	300	500	110	0.2															
	400	500	100	0.7				0.3											
	300	600	170	0.2							0.1								
	400	600	170	0.5				0.4											
	300	700	210	0.5							0.4								
	400	700	170	0.3							0.1								



THORNEY ISLAND TRIALS SPILL 017 9 JUNE 1983

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	19:53:00 hrs
Freon 12/Nitrogen mixture: relative density	4.20
Number of smoke canisters discharged:	3
Mean Wind Speed at 10 m height:	
During main data collection period:	5.0 m/s
From 5 minute cyclic data just before the release:	5.8 m/s
Mean Wind Heading ('A' station) - (relative to the centre line of the array)	41.9°
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	94.0%
Insolation	89W/m <sup>2</sup>
Ambient Air Temperature (at 9 m height)	15.7°C
Treated Runway Surface Temperature	18.4°C
Grass Surface Temperature	17.9°C
Observed Cloud Cover	6/8

STABILITY CONDITION

C/D (From Observations)  
 E (From DT/DZ)  
 D (From Solarimeter)  
 D (From Heat Flux)  
 F (From Richardson No)  
 D (From Bulk Richardson No)  
 C (From Standard Deviation of Wind Heading)

Stability condition inferred from data during the release and just before the release: D/E.

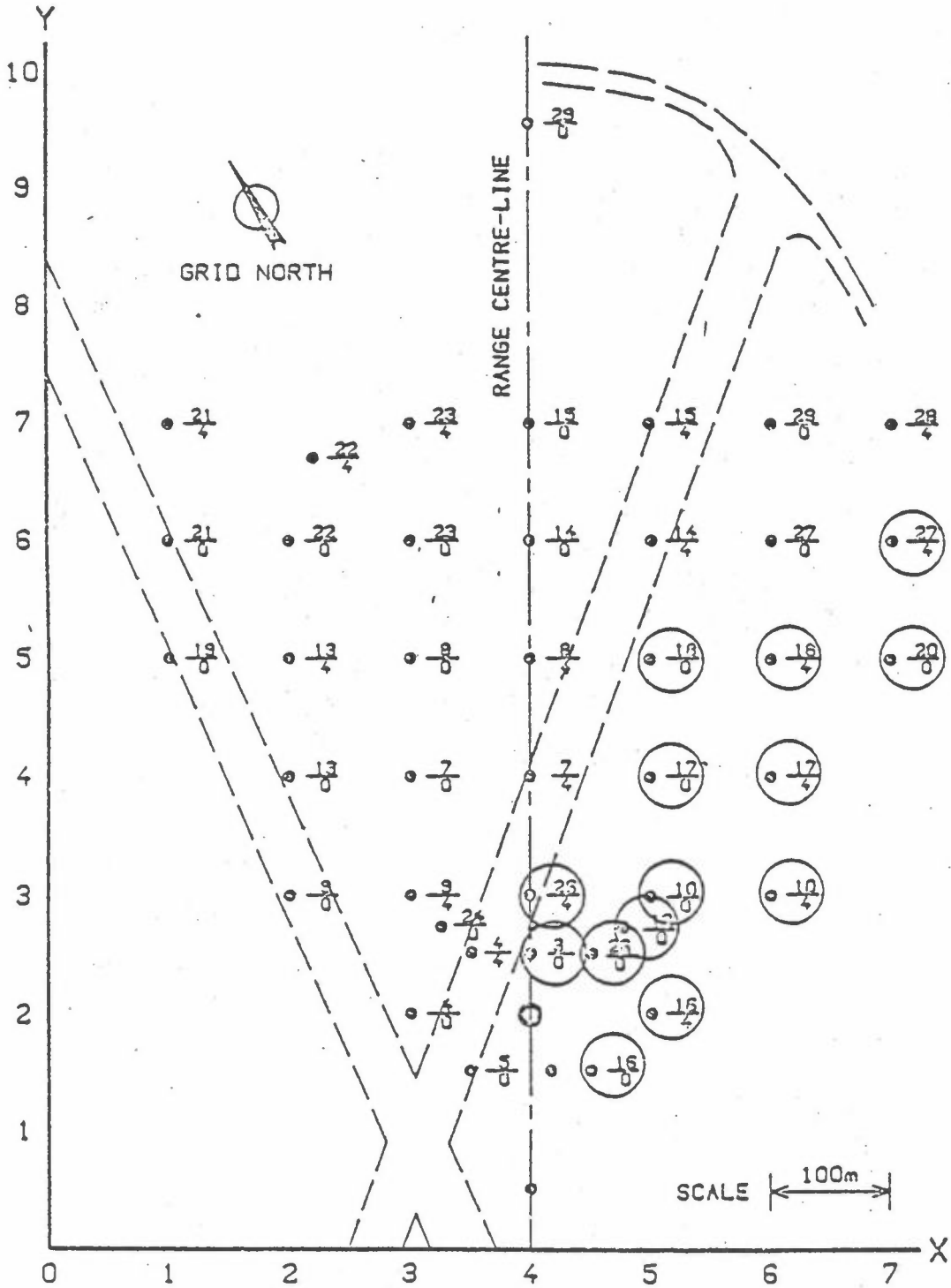
THORNEY ISLAND TRIALS SPILL 017 9 JUNE 1983

### HISTORY

The wind was generally blowing in the direction 30° to 40° to the right of the array centre-line for most of the day, with the speed ranging from 5 to 7 m/s. Throughout most of the day insolation was slight; about two hours before the spill (around 17:30 hrs) it was about 100 to 150 W/m<sup>2</sup>. As the evening progressed the insolation steadily decreased and the wind speed still fluctuated with values between 5 and 6 m/s being recorded. Although the wind still generally fluctuated at this time, there seemed to be an underlying gradual change in wind direction towards the right of the array. Thus by the time gas was released, the wind was blowing in a direction approximately 40° to the right of the centre line.

Based on the wind speed and other environmental considerations at that time, the overall atmospheric stability was judged to be just on the stable side of neutral, say a Pasquill stability category of 'D/E'.

TRIAL No. - 017      DATE - 9/6/83      62 SENSORS SAW GAS  
 WIND SPEED (U<sub>10</sub>) 5 m/sec      PASQUILL CATEGORY C/D



$\frac{21}{4}$  = DATA TERMINAL CHANNEL NUMBER OF GAS SENSORS AT 0.4m HEIGHT  
 ○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS

Trial 17	X	Y	H	CM	C	T1	T2	T2-T1	REMARKS
1	500	200	0.4	3.4	0.07	50	60	10	
2	500	200	1.0	2.9	0.05	50	65	15	
3	500	200	1.6	0.2	0.03	45	60	15	
4	500	200	2.4	0.15	0.03	50	60	10	
5	400	250	0.4	8.5	2.4	15	>415	>400	
6	400	250	2.0	6.7	0.6	15	160		
7	400	250	2.0	0.8	0.14	20	40		Heavy noise
8	400	250	2.0	0.4	0.1	20			Heavy noise
9	400	250	2.4	1.0	0.17	10	200	190	
10	400	250	4.4	0.14	0.04	10	30	20	Heavy noise
11	400	250	6.4	0.22	0.03	10	25	15	Heavy noise
12	450	250	0.4	4.8	1.3	20	>660	>640	
13	450	250	2.4	1.7	0.2	10	270	260	Noise
14	450	250	4.4	0.5	0.08	20			Heavy noise, undefineable
15	450	250	6.4	0.36	0.07	30	340	310	Heavy noise
16	475	275	0.4	2.3	0.7	30	>430	>400	
17	475	275	2.0	1.85	0.4	30	425	395	Noise
18	475	275	2.4	0.72	0.17	25	635	610	Noise
19	475	275	4.4	0.29	0.08	25	295	270	Heavy noise
20	475	275	5.0	0.35	0.06	10			Heavy noise
21	475	275	6.4	0.19	0.03	10			Heavy noise
22	400	300	0.4	3.2	0.8	30	120	90	
23	400	300	2.4	0.82	0.09	30	65	35	
24	500	300	0.4	1.45	0.4	40	725	685	
25	500	300	2.4	1.60	0.2	35	705	670	
26	500	300	4.4	0.40	0.06	35	330	295	Noise
27	500	300	6.4	0.18	0.03	35	335	300	Noise
28	600	300	0.4	0.23	0.03	70	255	185	Noise
29	600	300	2.4	0.15	0.02	70	115	45	Noise
30	600	300	4.4	0.16	0.03	90			Noise
31	600	300	6.4	0.22	0.02	70			Noise
32	500	400	0.4	0.66	0.2	60	290	230	Some noise
33	500	400	2.4	0.58	0.18	55	415	360	Some noise
34	500	400	4.4	0.46	0.07	50	390	340	Noise
35	500	400	6.4	0.26	0.03	60	195	135	Noise
36	600	400	0.4	0.44	0.12	80	340	260	Noise
37	600	400	2.4	0.54	0.13	70	>600	>530	Noise
38	600	400	4.4	0.34	0.11	70	430	360	Noise
39	600	400	6.4	0.26	0.06	70	440	370	Noise
40	500	500	0.4	0.15	0.04	120	150	30	Heavy noise
41	500	500	2.4	0.10	0.03	115	140	25	Heavy noise
42	500	500	4.4	0.17	0.03	110			Heavy noise
43	600	500	0.4	0.41	0.14	105	355	250	Noise
44	600	500	2.4	0.20	0.10	110	300	190	Heavy noise
45	600	500	4.4	0.26	0.08	110	200	90	Heavy noise
46	600	500	6.4	0.24	0.06	100	200	100	Heavy noise
47	700	500	0.4	0.24	0.07	100	460	360	Noise
48	700	500	2.4	0.22	0.06	115	335	220	Noise
49	700	500	4.4	0.23	0.04	105	405	300	Noise
50	700	500	6.4	0.21	0.04	110	280	170	Noise
51	700	600	0.4	0.33	0.10	160	630	470	Heavy noise
52	700	600	2.4	0.26	0.08	160	395	235	Noise
53	700	600	4.4	0.23	0.05	150	490	340	Noise
54	700	600	6.4	0.21	0.04	150	480	330	Noise



## Trial 17

	X	Y	Peak Time Cons	Seconds														
				20	40	80	140	200	300	400	500	600	700	800	900			
H: 0.4 m	500	200	60	3.4														
	400	250	20	8.5	8.5	8.1	3.2	0.7	0.4	0.3	0.2	0.2	0.1	0.1				
	450	250	60	4.8	3.6	4.0	3.3	2.0	1.3	0.5	0.4	0.3	0.3	0.2	0.1			
	475	275	70	2.3		1.0	2.0	1.3	0.9	0.3	0.2	0.1						
	400	300	30	3.2		2.3												
	500	300	70	1.5			1.4	1.4	0.8	0.4	0.2	0.2	0.1	<0.1				
	600	300	100	0.2			0.1	0.1	<0.1	<0.1								
	500	400	150	0.7				0.3	0.6	0.1	<0.1							
	600	400	160	0.4				0.3	0.3	0.1								
	500	500	130	0.2	<0.1	<0.1	<0.1	<0.1										
	600	500	180	0.4				0.2	0.4									
	700	500	180	0.2				0.2	0.2	0.2	<0.1							
	700	600	260	0.3					0.2	0.3	0.2	0.2	<0.1					
	H: 2.4 m	500	200	60	0.2													
400		250	10	1.0	0.6	0.4	0.3	0.1										
450		250	10	1.7	0.8	0.2	0.4	0.2	0.2	<0.1								
475		275	80	0.7		0.6	0.7	0.3	0.4	0.2	0.1	0.1	<0.1					
400		300	30	0.8		0.2												
500		300	80	1.6		0.4	1.6	0.5	0.4	0.3	0.2	0.2	0.1	<0.1				
600		300	100	0.2			0.1	<0.1										
500		400	140	0.6				0.3	0.6	<0.1	<0.1							
600		400	160	0.5			0.1	0.5	0.4	0.2	0.1	0.1	<0.1	<0.1	<0.1			
500		500	125	0.1														
600		500	140	0.2				0.2	0.3									
700		500	190	0.2				0.1	0.2	<0.1	<0.1							
700		600	250	0.3					0.2	0.1								
H: 4.4 m		400	250	5	0.1													
	450	250	20	0.5	0.5	0.1	<0.1											
	475	275	30	0.3		0.3	0.2											
	500	300	80	0.4		0.2	<0.1	0.2										
	600	300	80	0.2														
	500	400	120	0.5			0.2	0.3	<0.1	0.1	<0.1							
	600	400	110	0.3			0.1	0.3	0.2	0.1								
	500	500	120	0.2														
	600	500	160	0.3				0.2			<0.1							
	700	500	160	0.2				0.1	0.1	<0.1								
	700	600	190	0.2					0.2	<0.1	<0.1							
	H: 6.4 m	400	250	5	0.2													
		450	250	20	0.4	0.4		0.1	0.1	0.1	<0.1							
		475	275	30	0.2		<0.1											
500		300	40	0.2		0.2	0.1	<0.1	0.0									
600		300	90	0.1				<0.1	<0.1									
500		400	12	0.3			0.2	0.2	<0.1	0.1	<0.1							
600		400	130	0.3				<0.1	0.1	0.1								
600		500	160	0.3				0.2		0.0								
700		500	170	0.2				0.1	0.2		0.0							
700		600	190	0.2					0.1	<0.1								



THORNEY ISLAND TRIALS SPILL 018 10 June 1983

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	15:56:00 hrs
Freon 12/Nitrogen mixture: relative density	1.87
Number of smoke canisters discharged:	3
Mean Wind Speed at 10 m height:	
During main data collection period:	7.4 m/s
From 5 minute cyclic data just before the release:	7.6 m/s
Mean Wind Heading ('A' station) - (relative to the centre line of the array)	18.2°
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	81.3%
Insolation	139 W/m <sup>2</sup>
Ambient Air Temperature (at 9 m height)	15.5°C
Treated Runway Surface Temperature	24.3°C
Grass Surface Temperature	24.3°C
Observed Cloud Cover	5/8

STABILITY CONDITION

C/D (From Observations)  
D (From DT/DZ)  
D (From Solarimeter)  
D (From Heat Flux)  
D (From Richardson No)  
D (From Bulk Richardson No)  
D (From Standard Deviation of Wind Heading)

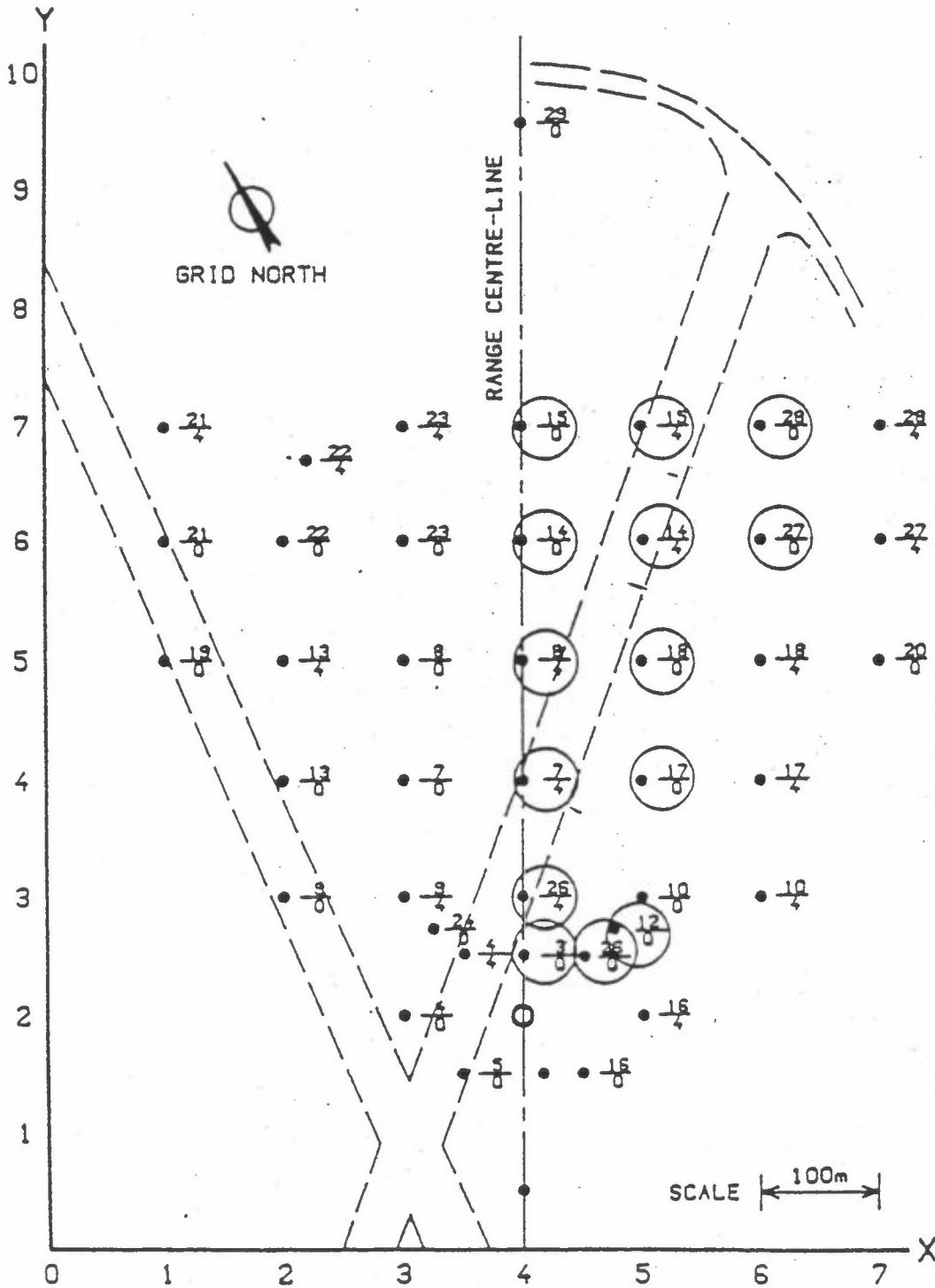
Stability condition inferred from data during the release and just before the release: D.

THORNEY ISLAND TRIALS SPILL 018 10 JUNE 1983

### HISTORY

The day began with winds of between 3 and 4 m/s which blew along the right edge of the array of sensors (approximately 50° to 60° off the centre-line) and which hardly changed until about midday. Insolation, on the other hand, rose gradually throughout the morning and by midday quite strong values (approximately 790 W/m<sup>2</sup>) were recorded. At this time the atmospheric stability was judged to be on the unstable side of neutral, about Pasquill type 'C'. As the wind increased in speed (from about midday) its direction also changed and by 14.00 hrs it was blowing slightly to the left of the array centre-line at a speed of about 6 m/s. The wind speed increased even further, reaching a maximum value close to 9 m/s at about 15.30 hrs by which time insolation had decreased to about 500 W/m<sup>2</sup>. From hereon until gas was released at 15.56 hrs, the wind speed decreased and its heading oscillated approximately 10° about a direction 10° to the right of the array centre-line; insolation decreased even further such that, by the time of the spill, values of about 150 W/m<sup>2</sup> were recorded. These conditions lead to an atmospheric stability which was judged to be Pasquill category 'D'.

TRIAL No. - 018      DATE - 10/6/83      60 SENSORS SAW GAS  
 WIND SPEED ( $U_{10}$ ) 6 m/sec      PASQUILL CATEGORY C/D



$\frac{21}{4}$  = DATA TERMINAL CHANNEL NUMBER OF GAS SENSORS AT 0.4m HEIGHT  
 ○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS

Trial	ID	X	Y	H	CM	C	T1	T2	T2-T1	REMARKS
1	Gas	400	250	0.4	9.6	3.0	8	140	140	
2	HGas	400	250	2.0	11.0	2.0	15	115	100	
3	Gas	400	250	2.4	7.4	1.6	10	100	90	
4	Gas	400	250	4.4	5.2	1.0	10	70	60	
5	Gas	400	250	6.4	5.5	1.0	5	20	15	
6	Gas	400	250	0.4	5.6	1.3	15	50	35	
7	Gas	450	250	2.4	3.1	0.7	15	70	55	
8	Gas	450	250	4.4	2.3	0.5	15	70	55	
9	Gas	450	250	6.4	1.6	0.3	15	120	105	
10	Gas	475	275	0.4	0.3	<0.1	10	35	25	
11	Gas	475	275	2.0	0.4	0.1	20	50	30	Heavy noise, undefineable
12	Gas	475	275	2.4	0.4	0.1	20	50	30	Heavy noise, undefineable
13	Gas	475	275	4.4	0.3	<0.1	30	45	15	Heavy noise, undefineable
14	Gas	400	300	0.4	4.1	1.3	20	160	140	
15	Gas	400	300	2.4	2.3	0.5	20	70	50	
16	Gas	400	300	4.4	1.0	0.3	20	60	40	Noise
17	Gas	400	300	6.4	0.6	0.1	15	45	30	Heavy noise, undefineable
18	Gas	400	400	0.4	1.6	0.5	30	>100	>70	
19	Gas	400	400	2.4	1.2	0.3	30	70	40	
20	Gas	400	400	4.4	0.9	0.2	30	70	40	Noise
21	Gas	400	400	6.4	0.7	0.1	30	70	40	Noise
22	Gas	500	400	0.4	1.1	0.3	40	90	50	Noise
23	Gas	500	400	2.4	1.1	0.3	40	90	50	Noise
24	Gas	500	400	4.4	0.9	0.2	40	80	40	Heavy noise
25	Gas	500	400	6.4	0.9	0.2	30	>100	>70	Heavy noise
26	Gas	400	500	0.4	0.8	0.2	50	100	50	Heavy noise
27	Gas	400	500	2.4	1.0	0.2	40	>170	>130	Heavy noise
28	Gas	400	500	4.4	0.8	0.2	50	85	35	Heavy noise
29	Gas	400	500	6.4	0.5	0.1	50	80	30	Heavy noise, undefineable
30	Gas	500	500	0.4	0.3	<0.1	50	200	150	Heavy noise
31	Gas	500	500	2.4	0.5	0.1	40	170	130	Heavy noise
32	Gas	500	500	4.4	0.5	0.1	40	170	130	Heavy noise
33	Gas	500	500	6.4	0.5	0.1	40	160	120	Heavy noise
34	Gas	400	600	0.4	0.5	0.1	60	130	70	Heavy noise
35	Gas	400	600	2.4	0.4	0.1	55	115	60	Noise
36	Gas	400	600	4.4	0.4	0.1	60	95	35	Heavy noise
37	Gas	400	600	6.4	0.6	0.1	20	220	200	Heavy noise
38	Gas	500	600	0.4	0.3	0.1	20	110	90	Heavy noise
39	Gas	500	600	2.4	0.3	<0.1	60	115	55	Heavy noise
40	Gas	500	600	4.4	0.3	<0.1	60	140	80	Heavy noise, undefineable
41	Gas	500	600	6.4	0.3	<0.1	60	120	60	Heavy noise, undefineable
42	Gas	600	600	0.4	0.2	<0.1	40	120	80	Heavy noise
43	Gas	600	600	2.4	0.2	<0.1				Heavy noise, undefineable
44	Gas	600	600	6.4	0.3	<0.1				Heavy noise, undefineable
45	Gas	400	700	0.4	0.2	<0.1	80	210	130	Heavy noise
46	Gas	400	700	2.4	0.2	<0.1	80	120	40	Heavy noise, undefineable
47	Gas	500	700	0.4	0.3	0.1	40	140	100	Heavy noise
48	Gas	500	700	2.4	0.3	<0.1				Heavy noise, undefineable
49	Gas	500	700	4.4	0.4	0.1	50	110	60	Heavy noise, undefineable
50	Gas	500	700	6.4	0.5	0.1				Heavy noise, undefineable
51	Gas	600	700	0.4	0.2	<0.1	80	140	60	Heavy noise
52	Gas	600	700	2.4	0.1	<0.1	80	130	50	Heavy noise
53	Gas	600	700	4.4	0.2	<0.1	50	100	110	Heavy noise







THORNEY ISLAND TRIALS SPILL 019 10 June 1983

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	20:41:00 hrs
Freon 12/Nitrogen mixture: relative density	2.12
Number of smoke canisters discharged:	2
Mean Wind Speed at 10 m height:	
During main data collection period:	6.4 m/s
From 5 minute cyclic data just before the release:	7.0 m/s
Mean Wind Heading ('A' station) - (relative to the centre line of the array)	30.2°
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	94.8%
Insolation	18 W/m <sup>2</sup>
Ambient Air Temperature (at 9 m height)	13.3°C
Treated Runway Surface Temperature	13.6°C
Grass Surface Temperature	13.0°C
Observed Cloud Cover	3/8

STABILITY CONDITION

D/E (From Observations)  
 E (From DT/DZ)  
 D (From Solarimeter)  
 D (From Heat Flux)  
 F (From Richardson No)  
 D (From Bulk Richardson No)  
 D (From Standard Deviation of Wind Heading)

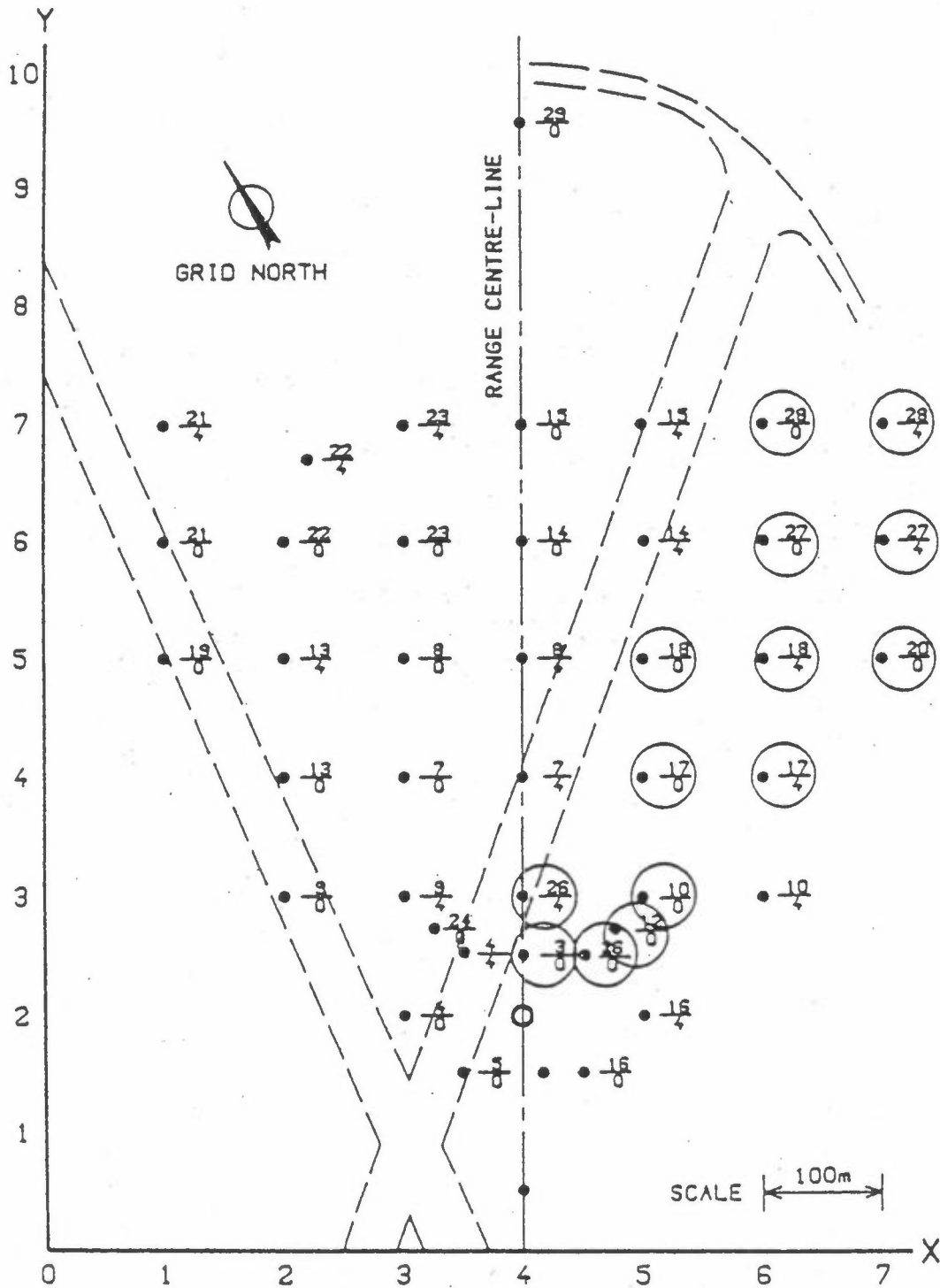
Stability condition inferred from data during the release and just before the release: D/E

THORNEY ISLAND TRIALS SPILL 019 10 JUNE 1983

#### HISTORY

This spill was carried out about four and a half hours after spill 018. During the time between the two spills, the mean wind speed at first varied between 7 and 8 m/s and the heading slowly swung further round to the right of the array centre-line. Insolation steadily decreased as the sun set, so that by the time gas was released (quite late in the evening at 20:40 hrs) insolation was very low. During the hour or so before gas was released, the wind speed dropped a little such that, at the time of the spill, it was 6.4 m/s; the wind heading was then about 30° to the right of the array centre-line. These conditions then led to an atmospheric stability which was judged to be about Pasquill category 'D/E'.

TRIAL No. - 019      DATE - 10/6/83      67 SENSORS SAW GAS  
 WIND SPEED ( $U_{10}$ ) 6 m/sec      PASQUILL CATEGORY D/E



$\frac{21}{4}$  = DATA TERMINAL CHANNEL NUMBER OF GAS SENSORS AT 0.4m HEIGHT  
 $\bigcirc$  = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS

Trial	19	X	Y	H	CM	C	T1	T2	T2-T1	REMARKS
1	Gas	400	250	0.4	12.4	3.2	15	215	200	
2	HGas	400	250	2.0	15.0	2.0	15	180	165	
3	Smok	400	250	0.0	2.5	0.2	15	60	45	
4	Smok	400	250	0.0	0.9	0.1	20	40	20	
5	Gas	400	250	2.4	5.4	<0.1	15	180	165	
6	Gas	400	250	4.4	1.9	0.3	15	130	115	
7	Gas	400	250	6.4	0.9	0.1	15	40	25	
8	Gas	450	250	0.4	7.2	0.1	15	>315	>300	
9	Gas	450	250	2.4	4.5	0.7	20	100	80	
10	Gas	450	250	4.4	1.6	0.3	15	90	75	
11	Gas	450	250	6.4	0.9	0.2	20	50	30	Noise, undefineable
12	Gas	475	275	0.4	3.4	0.8	30	180	150	
13	HGas	475	275	2.0	3.0	0.7	30	160	30	
14	Gas	475	275	2.4	2.5	0.5	30	160	30	
15	Gas	475	275	4.4	1.6	0.4	30	130	100	
16	HGas	475	275	5.0	1.9	0.4	30	70	40	Noise
17	Gas	475	275	6.4	0.9	0.2	20	60	40	Noise
18	Gas	400	300	0.4	5.7	1.2	30	120	90	
19	Gas	400	300	2.4	2.5	0.5	30	60	30	
20	Gas	400	300	4.4	1.4	0.3	25	40	15	
21	Gas	400	300	6.4	0.4	<0.1	40	60	20	Noise
22	Gas	500	300	0.4	1.9	0.5	30	210	180	
23	Gas	500	300	2.4	1.7	0.4	30	135	105	
24	Gas	500	300	4.4	1.3	0.3	30	80	50	Noise
25	Gas	500	300	6.4	0.7	0.1	30	80	50	Noise
26	Gas	500	400	0.4	1.4	0.3	50	290	240	
27	Gas	500	400	2.4	1.4	0.3	50	210	260	
28	Gas	500	400	4.4	1.0	0.2	50	145	95	Noise
29	Gas	500	400	6.4	0.5	0.1	50	140	90	Heavy noise, undefineable
30	Gas	600	400	0.4	0.5	0.1	65	190	125	Noise
31	Gas	600	400	2.4	0.4	0.1	65	130	65	Noise
32	Gas	600	400	4.4	0.5	0.2	80	140	60	Heavy noise
33	Gas	600	400	6.4	0.2	<0.1	60	140	80	Heavy noise
34	Gas	500	500	0.4	0.5	0.1	75	150	75	Heavy noise
35	Gas	500	500	2.4	0.5	0.1	75	155	80	Heavy noise
36	Gas	500	500	4.4	0.6	0.1	75	130	55	Heavy noise
37	Gas	500	500	6.4	0.5	0.1	80	120	40	Heavy noise
38	Gas	600	500	0.4	0.7	0.1	80	120	40	Noise
39	Gas	600	500	2.4	0.7	0.2	70	240	170	Noise
40	Gas	600	500	4.4	0.5	0.2	60	340	280	Noise
41	Gas	600	500	6.4	0.5	0.1	60	190	130	Noise
42	Gas	700	500	0.4	0.2	0.1	70	190	120	Noise
43	Gas	700	500	2.4	0.2	0.1	90	190	100	Noise
44	Gas	700	500	4.4	0.2	<0.1	90	180	90	Noise
45	Gas	700	500	6.4	0.2	<0.1	90	230	140	Noise
46	Gas	600	600	0.4	0.3	0.1	100	260	160	Noise
47	Gas	600	600	2.4	0.4	0.1	90	280	190	Noise
48	Gas	600	600	6.4	0.3	<0.1	90	200	110	Noise
49	Gas	700	600	0.4	0.3	0.1	110	230	120	Noise
50	Gas	700	600	2.4	0.3	0.1	110	210	100	Noise
51	Gas	700	600	4.4	0.3	0.1	100	230	130	Noise
52	Gas	700	600	6.4	0.3	0.1	100	190	90	Noise
53	Gas	600	700	0.4	0.2	<0.1	130	220	90	Noise
54	Gas	600	700	2.4	0.2	<0.1	130	210	80	Noise
55	Gas	600	700	4.4	0.2	<0.1	130	200	70	Noise
56	Gas	700	700	0.4	0.3	0.1	140	260	120	Noise
57	Gas	700	700	2.4	0.3	0.1	120	270	150	Noise
58	Gas	700	700	4.4	0.4	0.1	120	300	180	Noise
59	Gas	700	700	6.4	0.3	<0.1	120	265	145	Noise

## Trial 19

	X	Y	Peak		Seconds													
			Time	Cons	20	40	80	140	200	300	400	500	600	700	800	900		
H: 0.4 m	400	250	25	12.4	6.0	8.4	0.6	0.2										
	450	250	40	7.2	6.2	7.2	0.9	0.3	0.3									
	475	275	60	3.4		2.5	1.2											
	400	300	40	5.7		5.7												
	500	300	65	1.9		0.8	1.4											
	500	400	100	1.4			1.2	0.4	0.1									
	600	400	100	0.5			0.2	0.1										
	500	500	100	0.5			0.2	0.1										
	600	500	150	0.7			<0.1	0.6	0.1									
	700	500	140	0.2				0.2										
	600	600	140	0.3				0.3	0.1									
	700	600	180	0.3				0.2	0.2									
	600	700	160	0.2														
	700	700	210	0.3						0.3								
	400	210	5	90.0	44.0	17.0	1.5											
	400	220	5	45.0	26.0	11.0	3.0	1.5										
	400	230	5	45.0	28.0	14.5	2.0	1.5										
	400	240	15	19.5	17.0	9.0	0.9	0.5										
	400	260	30	8.4	6.8	6.4	0.6	0.3										
	400	270	40	5.6	3.5	5.6	0.4											
	400	280	40	4.5	0.9	4.5	0.2	0.1										
	400	290	40	4.7	0.3	4.7	0.2	0.1										
	H: 2.4 m	400	250	15	5.4	2.2	1.4	0.2										
		450	250	35	4.5	3.0	3.5	0.3										
		475	275	50	2.5		2.0	0.2										
		400	300	30	2.5		1.3											
		500	400	90	1.4			1.3	0.2									
600		400	100	0.4			0.3											
500		500	100	0.5			0.2											
600		500	140	0.7			0.2	0.7	0.1									
700		500	130	0.2				0.2										
600		600	130	0.4				0.3	0.2									
700		600	165	0.3				0.2	0.1									
600		700	160	0.2				0.1										
700	700	200	0.3				0.1	0.3										
H: 4.4 m	400	250	15	1.9	1.3	0.2												
	450	250	40	1.6	1.5	1.6	0.1											
	475	275	50	1.6		1.1												
	400	300	30	1.4														
	500	300	50	1.3		0.6	0.2											
	500	400	85	1.0			0.6	0.1										
	600	400	100	0.5			0.4	0.2	0.1									
	500	500	90	0.6			0.1	0.1										
	600	500	120	0.5			0.2	0.5										
	700	500	130	0.2				0.2										
	700	600	160	0.3					0.3	0.1								
	600	700	150	0.2					0.1									
700	700	200	0.3					0.2	0.3									
H: 6.4 m	400	250	25	1.3	0.9	0.3												
	450	250	15	0.9	0.2	0.5	0.1											
	475	275	50	0.9	0.1	0.7												
	400	300	30	0.4														
	500	300	60	0.7		0.4												
	500	400	85	0.5			0.1											
	600	400	70	0.2			0.1											
	500	500	100	0.5			0.2											
	600	500	100	0.5			0.1	0.2										
	700	500	140	0.2				0.2										
	600	600	120	0.3					0.1									
	700	600	160	0.3						0.2								
700	700	170	0.3						0.2	0.3								