

AESOP Flight

Flight #9 I990712

<u>Sensor or system</u>	<u>Number or Name</u>
INE	1
Accelerometer	1
Temperature Probe	2
Dew Point Probe	2
Altitude (for vertical wind)	Pressure Altitude
Static Pressure	Rosemount Fuselage
Dynamic Pressure	Rosemount Fuselage
Time Source	Micro 99
Constants File	CO3992.CON

Notes:

The radar altimeter (RA159) had a spike at takeoff and was set to zero from 1755:01-1802:28. A spike also occurred on landing and RA159 was set to zero from 0027:52-0033:00.

Dewpoint (DW2) was replaced by DW1 due to "maxing" out of DW2 (1813:39-1833:00). DW2 had a few spikes removed and patched (1835:05-1835:30, 1930:00-1930:30 and 1933:40-1934:20). DW2 appears to be less responsive in such dry conditions 1815:00-1835:30 and 2106:30-2107:00.

	<u>Takeoff</u>	<u>Landing</u>
Aircraft static pressure	996.0	995.1
Corrected tower pressure	1018.3	1016.6

The aircraft INE positions were renavigated with respect to GPS.

SPECIAL NOTE!!! Locations 80, 81 and 82 of record five on the standard tape contain vertical ground, vertical air and vertical speeds, respectively, computed using Dave Jorgensen's vertical wind algorithm.
It is recommended that these values be used for vertical wind analysis.

Flight Meteorologist: Stan Czyzyk, (813) 828-3310 ext. 3086

U.S. DEPT. COMM./NOAA/OAO - DATA SECTION WORK FORM NO.1 OAOWF1 FILE

FLT ID: 990712I	FM: KBNA	TO: KBNA
FLT NO: 99-040	BLK IN: 0032Z	ATA: 0028Z
ETD: 1800Z	DLK OUT: 1754Z	RTD: 1802Z
ETE: 0130Z	BLK TIME: 6:38 6.6	FLT TIME: 6:26 6.4
SPONSOR ORG: NOAA-AL	PROGRAM: AES-OP	PURPOSE: W. NASHVILLE

OAO PERSONNEL

AC TAGGART, B	SYS ENG LYNCH, T ✓
CP KENNEDY, P ✓	DATA SYS HORNBRONK, C ✓
NAV RATHBUN, D ✓	RADAR
FE MOORE, H	BT/ODW
RADIO ROGERS, M ✓	CLD PHYS
FD CZYZYK, J ✓	DOPPLER

PARTICIPATING SCIENTIST/VISITORS/OAO

LAST, FIRST NAME	ACTIVITY ON A/C	AFFILIATION
HUBLER, G ✓	PI	NOAA-AL
RYANSON, T / HUEY, G ✓	SCIENTIST	"
GOLDAN, P / JOHNSON, J ✓	"	"
HOLLOWAY, J ✓	"	"
KLOCKE, F ✓	"	"
LEE, Y ✓	"	NCAR
BASIS, J / HANDER, H ✓	"	BROOKHAVEN
STUTE, J ✓	"	PSY
		UCLA

PROPOSED/ACTUAL MISSION/REMARKS (RECCO, FIXES, STORM, PENET, NHOP #)

U.S. DEPT. COMM./NOAA/OAO - DATA SECTION WORK FORM NO.2 OAOWF2 F

FLT ID: 9907127 TIME OFF: 1802Z TIME ON: 0028Z

	A/C T/O	WX STN	A/C LAND	WX STN
PRESSURE	996.0	30.07	995.1	30.02

NO DATA DISPOSITION/DATE/QUALITY

1/SEC FLT LVL TAPES	2	
FAST FLT LVL TAPES		
RADAR TAPES	1	
DOPPLER TAPES		
ODW CASSETTES		
HARD COPIES	1	
AXDT		
AXCP		
ODW		

PHOTOGRAPHY

	FWD	LS	RS	VERT
ON				
OFF				
RATE				

REMARKS

TIME	LAT	CON	TK	HD	TD	TD	WD	WS	PA	GO	PS	SP	REMARKS
180600	36 15	86 47											CLOUD BASE 4200 PBL 7500 AGL
181150	36 24	87 12	300	299	6.3	-18.0	289	14.0	3168	3123	686.1	994.0	LEVEL 10.5
183245	36 30	88 09											DESCEND
183544	36 30	87 55	92	93	12.5	8.4	116	5.7	1607	1529	834.5	1002.3	LEVEL 5.5
1842													DESCEND
184510	36 26	87 18	311	310	20.9	12.1	342	7.3	702	612	931.5	999.0	LEVEL 2500
1847	36 29	87 22											PT 0
185644	36 29	88 07	270	273	20.0	8.2	25	8.2	704	604	931.7	1000.9	PT 1
190035	36 19	88 00											PT 2
190720	36 18	87 29											PT 3 TURN + DESCEND
191720	36 18	87 58											PT 4 TURN + CLIMB
192005	36 18	88 00	89	88	14.7	7.5	27	3.0	1327	1258	863.7	1002.4	LEVEL 4500
192620	36 18	87 32											TURN + CLIMB
193027	36 18	87 36	270	272	11.5	4.4	305	8.7	2274	2193	966.2	990.8	LEVEL 7500
193613	36 18	87 50	93	92	16.6	10.9	329	4.9	1092	944	888.6	990.3	TURN + DESCEND LEVEL 3700
194055	36 18	87 29											PT 3 + DESCEND
194230												4500 FT	PT 4 + LEVEL
195135	36 12	87 53											PT 5
195505	36 03	88 05											PT 6
200412	36 05	87 28	89	86	21.3	12.7	334	9.6	708	514	930.2	983.2	PT 7 +
200721	35 58	87 23											PT 8
201715	35 56	88 05											PT 9 + DESCEND
202045	35 56	88 03	101	101	23.8	13.0	334	8.6	450	288	960.8		LEVEL 1000
202305	35 56	87 53											DESCEND
202415	35 56	87 48											LEVEL 500 AGL
202735	35 56	87 25											PT 9 TURN + CLIMB
203225	35 56	87 23	270	273	18.3	13.3	355	7.1	1029	842	835.5	989.4	LEVEL 3500
204205	35 56	88 06											TURN + CLIMB
204715	35 56	87 57	89	90	12.7	7.5	10	—	1658	1613	829.2	999.0	LEVEL 5500 CLOUD
205350	35 56	87 27											CLIMB, TURN PT 8
205730	35 56	87 29	271	272	11.2	0.4	52	3.8	2068	1954	788.2	989.7	LEVEL 6800
210553	35 56	88 08											PT 9 TURN + DESCEND
211100	35 48	88 16	90	89	20.7	12.2	321	7.1	729	611	928.7	996.0	PT 10 LEVEL 2500
212440	35 48	88 16											PT 11
212640	35 42	87 16											PT 12
213645	35 40	87 59											PT 13
213855	35 34	88 05											PT 14
215050	35 32	87 14											PT 15
215250	35 25	87 12	271	275	21.5	14.1	340	11.1	730	459	928.5	999.8	PT 16
220324	35 24	87 57											PT 17
2205	35 18	87 59											PT 18
221625	35 16	87 11											PT 19
222610	35 08	88 24											PT 20
224115	35 00	88 05	109	107	21.2	13.1	331	12.7	733	633	928.5	998.2	PT 22
225315	35 00	87 12											PT 23 + CLIMB
225545	35 00	87 09	274	278	18.9	14.5	349	14.4	1020	870	896.5	989.3	LEVEL 3500
230730	35 00	88 00											DESCEND PT 22
232150	35	87 09											PT 23 + CLIMB
2337	34 50	88 00											PT 25 + TURN
002048													C.FORT

Czyzyk

Flight plan : 12 July 1999

Johnsonville and Cumberland Plume Study

Johnsonville (36 02N, 88 00W) 20 ktons NOx / y,
Cumberland (36 23N, 87 39W) 175 ktons NOx / y

6.5 HRS Flight Time

default climb rate 1500 ft/min

Preflight : :00 am CDT

Pt 0: Nashville (36 08N, 86 41W)

Doors closed:

Takeoff: 12 CDT

Head to Pt. 1 (36 29N, 87 23W) (73 km, 11 min)

On way to Pt. 1 climb to 10 kft, Include holding pattern for Calibration at 10 kft (20 min)

Descend to 6 kft for second Calibration (5 min)

After calibration descend in route to arrive at Pt. 1 at 1500 ft AGL

12:40-16:40 Cumberland and Johnsonville

(plume pattern 3 hrs 05min, vertical stack: 45 min, traffic cones: 15 min ==> time ~ 4 hrs)

Winds are forecast to be from the N at ~ 5 m/s (10 knts)

Intercept the power plant plume at 12 upwind and downwind distances (~15 km).

Collect WAS hydrocarbon samples in the Cumberland and Johnsonville plume plus occasional outside sample

==> **Vertical Stack** (45 min)

2 WAS hydrocarbon samples at each altitude

At 2nd Johnsonville downwind transect (~25 km downwind): Measure vertical distribution of plume by repeating the transect at **2 additional heights within the PBL** and one **200m above the top of the PBL**

==> **At about 1 hour intervals probe the PBL height** by climbs out of the PBL, descend in route

If the legs are shorter than in the default plume pattern, use the spare time for the repeat pattern.

Head to Pt. 1 (36 29N, 87 23W) (165 km, 25 min + 5min for calibration)

On way to Pt. 1 climb to 10 kft, Include holding pattern for Calibration at 10 kft if necessary

Descend to 6 kft for second Calibration (5 min)

After calibration descend to arrive at Pt. 1 at 1500 ft AGL

17:10-18:30 Cumberland and Johnsonville Repeat

Depending on time : Fly every other leg of previous Cumberland and Johnsonville Pattern.

If time allows fly one **short vertical Stack** at 2nd Johnsonville downwind transect.

Repeat only part of the transect at **2 additional heights** within the PBL, and one **200 m above the top of the PBL**.

At the end of the Cumberland and Johnsonville Pattern head ENE to intercept the Nashville urban plume at 1500 ft AGL.

Head to **Nashville Pt. 6** (36 08N, 86 41W)

Climb to ~18 kft altitude in route 17.5

On return to BNA include low level pass over Cornelia Fort

Arrive in Nashville at ~ 19:15

Flight Time is estimated as ~> 7hrs 15 min

3.5
4.5
6.0

0212
0212
0212

Point	lat_John	lng_John	lat_deg_john	lat_min_john	lng_deg_john	lng_min_john
0	36.48	-87.38	36	29	-87	23
1	36.48	-87.88	36	29	-87	53
2	36.3	-87.99	36	18	-87	59
3	36.3	-87.49	36	18	-87	29
4	36.19	-87.43	36	12	-87	26
5	36.19	-88.1	36	12	-88	6.1
6	36.08	-88.21	36	4.5	-88	13
7	36.08	-87.43	36	4.5	-87	26
8	35.94	-87.38	35	56	-87	23
9	35.94	-88.21	35	56	-88	13
10	35.8	-88.27	35	48	-88	16
11	35.8	-87.32	35	48	-87	19
12	35.67	-87.27	35	40	-87	16
13	35.67	-88.32	35	40	-88	19
14	35.53	-88.38	35	32	-88	23
15	35.53	-87.21	35	32	-87	13
16	35.4	-87.21	35	24	-87	13
17	35.4	-88.44	35	24	-88	26
18	35.26	-88.44	35	16	-88	26
19	35.26	-87.15	35	16	-87	9.3
20	35.13	-87.15	35	7.7	-87	9.3
21	35.13	-88.44	35	7.7	-88	26
22	34.99	-88.44	34	60	-88	26
23	34.99	-87.1	34	60	-87	5.9

804

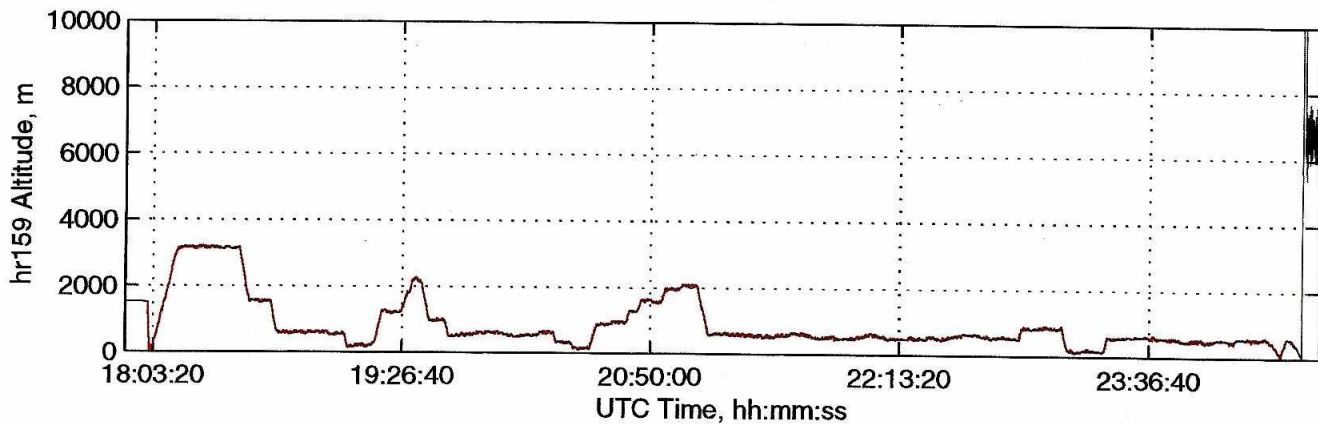
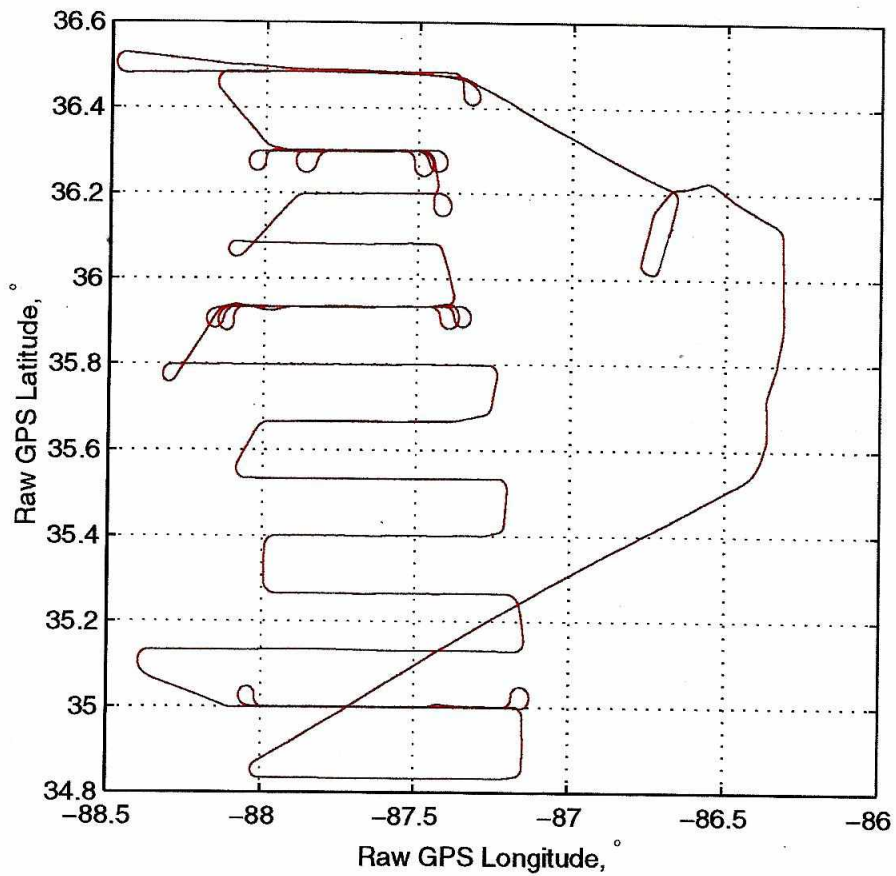
515

7.8
6.5
7.5
7.0
788
11
9
43

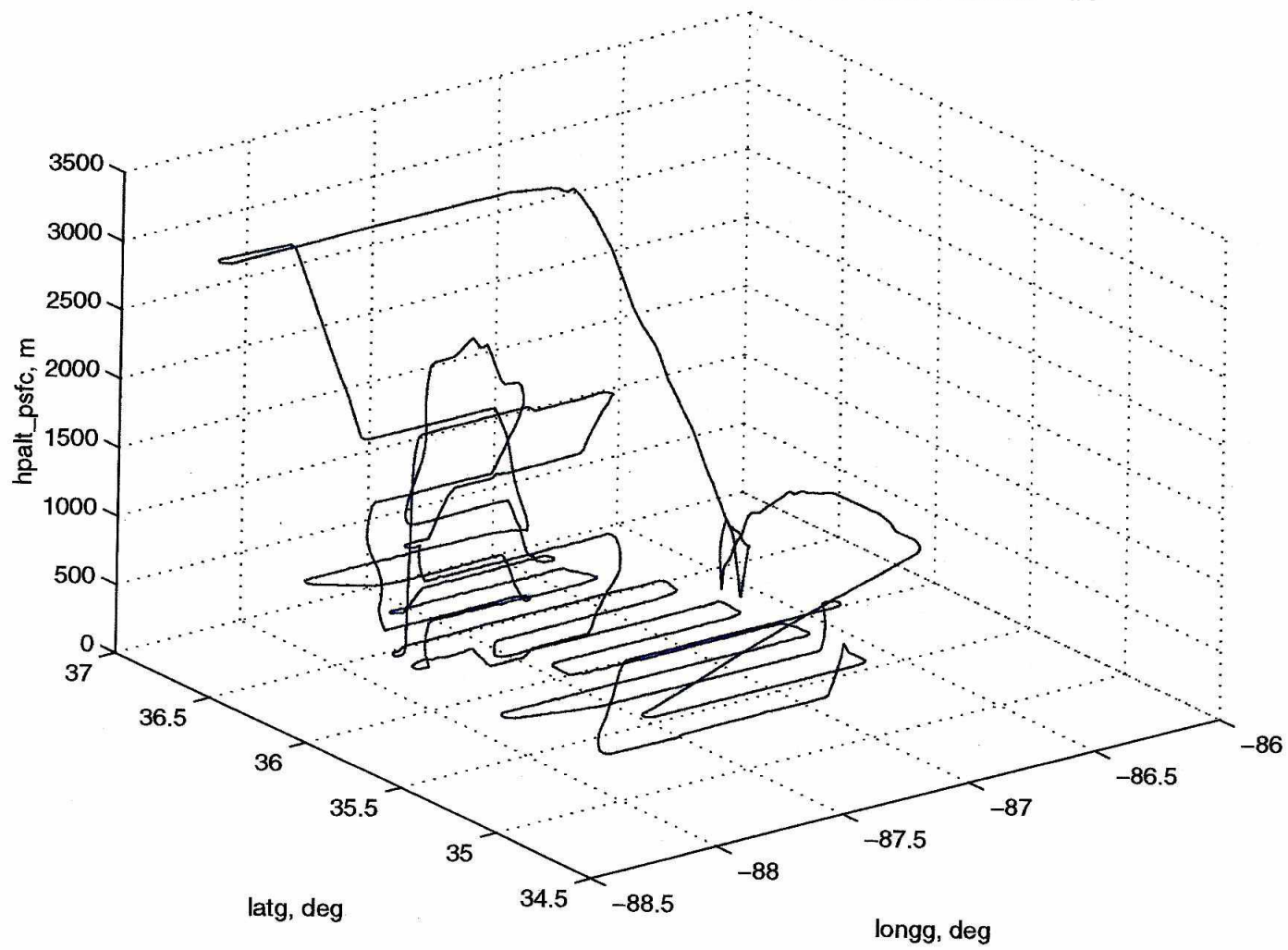
8:15-2045
10:15-

Point	x_john	y_john	cross_wind_km	km_from_John	km_from_Cumb
0	-55	-50			
1	-10	-50	65	-50	-10
2	0	-30			
3	-45	-30	45	-30	10
4	-50	-18			
5	10	-18	60	-18	22
6	20	-5			
7	-50	-5	70	-5	35
8	-55	10			
9	20	10	75	10	50
10	25	25			
11	-60	25	85	25	65
12	-65	40			
13	30	40	95	40	40
14	35	55			
15	-70	55	105	55	95
16	-70	70			
17	40	70	110	70	110
18	40	85			
19	-75	85	115	85	125
20	-75	100			
21	40	100	115	100	140
22	40	115			
23	-80	115	120	115	155

N43RF -- OZONE99 -- 12 July 1999 UTC



OZONE99 990712ls_P 17:53:51-00:34:00 UTC: 3-D FLIGHT TRACK 1/8



Flight plan : 12 July 1999
Cumberland and Johnsonville Power Plant Study

