ATTACHMENT I

MCL 143
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PROGRESS REPORT

TECHNICAL SERVICES DEPARTMENT
SQ 13569

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TITLE: AROCLOR PLANT - ATMOSPHERIC MEASUREMENTS

PERSONNEL: D. PARKER (D.W.H. CASEY)

OBJECTIVES:
(1) To develop a suitable method of atmospheric Aroclor measurement by electron capture gas chromatography.

(2) To recommend a suitable monitoring frequency.

SUMMARY: A known volume of air was drawn through three absorbers, in series, containing hexane. In the laboratory the hexane was analysed for lower Aroclor content by electron capture gas chromatography.

CONCLUSIONS: All the results obtained were well below the TLV

RECOMMENDATIONS:
1. Monitoring of Aroclor plant atmosphere to be carried out at yearly intervals or on request.

2. A more portable and time saving system of sample collection is required, e.g. a G.C. tube.

FUTURE WORK:
1. Monitor at yearly intervals in summer months or on request.

2. Develop improved method.

D. PARKER

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1. DETAILS

1.1. Sample Collection

The absorption train consisted of three 250 ml. absorbers (Drechsel bottles) connected in series and each containing 100 ml. of distilled hexane. It was found that sintered diffusers were better than the column type to prevent hexane carry over. It was necessary also to immerse each absorber above the hexane level in methanol/solid carbon dioxide mixture at 2°C to help prevent hexane evaporation. To go below this temperature to 0°C meant on occasion that any moisture in the air turned to ice and blocked the diffusers.

Air was drawn through the train by means of a Millipore pump at about 1 litre/minute and the flow monitored on a dry gas meter calibrated in litres. The absorption train stood about 3 feet above the ground and when sufficient air, initially about 100 litres then latterly about 50 litres, had been sampled the absorbers were sealed and removed from the plant to transfer the hexane plus washings to clean glass flasks. For the first three sample collections on each site the individual absorbers were analysed but for consequent collections they were bulked.

Samples were collected over two periods, October to December 1974 and July to August 1975. Thus the differing effects of temperature, wind and weather could be taken into consideration.

1.2. Analysis

The collected samples were analysed by Newport Analytical Department. Mrs. A. Tansley also took part in collecting the 1975 samples and was responsible for completing the analysis of these samples in the laboratory.

Using Kuderna Danish evaporators the samples were first concentrated to a known volume of about 5 ml. By varying the sample injection size the peaks of the chromatogram were kept in the range of known linearity, i.e. between 1 and 10 ppm.

Operating Conditions

Instrument	Hewlett Packard 402 Gas Chromatograph.
Column	6 mm x 6 ft. glass with 4% OV 225 on 80/100 mesh Chromosorb W, HP.
Detector	High temperature Ni^{63} electron capture cell.

Column Temperature:	170°C
Detector Temperature:	230°C
Injection Port Temperature	200°C
Pulse	150
Flow Rates:	Argon/Methane 61 ml/min. Helium 120 ml/min.
Range	10
Attenuation	4
Chart Speed	0.25 inches/min.

RESULTS

The following results are from samples collected under differing atmospheric conditions, e.g. the temperature range is from 11°C to 29°C, varying wind force and direction, and wet and dry days. Over the periods of sample collection plant conditions varied also but still the highest result obtained was 0.25 mg/cubic metre which is well below the TLV of 1 mg/cubic metre for Aroclor 1242 and 0.5 mg/cubic metre for higher Aroclors.

PCB CONTENT OF ATMOSPHERE (mg/cubic metre)

DATE	CONTROL ROOM	AIR BLOWING ROOM	TOTE BIN AREA
4.10.74	0.124	0.028	0.023
11.10.74	0.043	0.025	0.018
24.10.74	0.043	0.029	0.014
8.11.74	0.023	0.089	0.033
15.11.74	0.072	0.053	0.017
22.11.74	0.089	0.196	0.049
29.11.74	0.026	0.300	0.028
3.7.75	0.222	0.249	0.113
10.7.75	0.254	0.070	0.076
17.7.75	0.143	0.255	0.119
24.7.75	0.104	0.097	0.052
14.8.75	0.088	0.196	0.097
21.8.75	0.046	0.043	0.030

DISCUSSION

The locations at which sampling was carried out were chosen after consultation with plant supervision as to the sites most likely to cause concern.

The method used is effective and reliable but rather time consuming. Improvements in mind involve collection of the sample by drawing 100 ml. of air through a short packed column and then introducing the column into the chromatograph. Modifications to the carrier gas system will be needed so that any air in the column can be flushed out by the carrier gas to avoid introducing air into the electron capture detector.